The Mayor's School Air Quality Audit Programme

Air Pollution at Schools



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Introduction

Developing the Toolkit

This toolkit of measures for addressing air quality issues has been created for use in developing the recommendations for a school. The toolkit will be used as a source of reference in completing school air quality audits.

The toolkit was compiled from a review of best practice approaches and new technologies. It includes well established measures as well as more innovative solutions and quick wins. The range of measures includes hard hitting solutions and contains both physical and behavioural measures.

The toolkit is multi-disciplinary and holistic in its nature, 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 schools.

The toolkit provides information which includes:

- Comprehensive set of measures
- Detailed description of measures
- Identification of their scale of impact and benefits
- Precedents of measures, including photos

The toolkit of measures and audit templates will serve as a replicable good practice approach, but are also intended to be live documents, to build on our knowledge of how effective different measures prove to be over time, allowing the toolkit to be continually refined for future audits.

Who is the Toolkit for?

The toolkit can be used by boroughs, schools and other organisations who will be involved in completing school air quality audits. However, a certain level of technical expertise is required to understand what the measures represent and when it is appropriate to use them. The detailed description of the measures has been written on the basis that suitably experienced professionals will be the main audience. The naming of the measures has been kept as simple and concise as possible so that the terms are, as far as possible, easily understood. However, the use of technical terms is unavoidable.

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Applying the Toolkit

When to use the Toolkit

The audit approach can be considered in terms of the following components:

- · Technical Content of Audit.
- Audit day scheduling, operations, running times.
- Toolkit of Solutions.
- · Engagement Activities.

The audit will consist of the three key stages shown opposite, within which there are the following tasks:

- 1. Air quality assessment and context plan preparation.
- 2. Fieldwork complete audit templates with input from the school and borough officers (air quality, school travel, transport planning).
- 3. Review findings and identify key issues, sources of emissions and causes of exposure.
- 4. Identify measures from the toolkit to address these issues, informed by the audit findings.
- 5. Reporting on audit process, issues and recommendations.

The toolkit can be used as a source of reference on the day of the audit as well as in the subsequent development of recommendations and in the reporting. The audit will involve engagement with school representatives and borough officers to discuss issues and opportunities for improving air quality. The toolkit will help in facilitating the discussions and in generating ideas.

Suitability of Measures

The characteristics of the local area, school site and school building must be carefully considered when 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 should also be developed with an appreciation of any relevant existing plans for the local and wider area around the school.

The auditors and stakeholders should be aware of the potential wider benefits of each measure and also how well the package of measures works together. The audit promotes a holistic approach to improving air quality and reducing exposure in the area, such that benefits may also be gained for walking, cycling, public realm and road safety. This is fully accordant with the principles of the healthy streets approach which aims to create more pleasant, safe, attractive, and ultimately more liveable environments.





Stage 2: Fieldwork and engagement



Stage 3: Recommendations and Reporting

Key assessment criteria

The measures and initiatives have been categorised as either highways, school grounds, school building, behaviour change or wider measures, and are assigned an indicative rating against a series of key criteria, including:

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 be strong support from key stakeholders.

In addition, the toolkit indicates whether the measures:

- Primarily target reducing the source of pollution and/ or reducing exposure.
- May be suitable for introducing as a trial at relatively low cost, within minimal/no consultation for a
 period of days, weeks or months in order to determine their suitability and impact.
- Are suitable for introduction on a main road and/or minor roads some measures restrict traffic flow which on main roads may not be suitable, particularly Transport for London roads and the Strategic Road Network.

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Summary of Measures

Air Pollution at Schools



Summary of Measures

| 1. HI | GHWAY MEASURES |
|------------|--|
| Α | Anti-idling |
| | Fines |
| | Campaigns, including driver engagement |
| A3 | Information signage |
| В | Reducing traffic flow |
| | 'School Streets' |
| B2 | Collapsible bollards |
| В3 | 'Play Streets' (temporary measure) |
| | Road closure |
| B5 | Filtered permeability |
| В6 | One-way streets/ No entry restrictions |
| В7 | ULEV-only streets |
| B8 | Width restriction (e.g. 7ft) |
| В9 | Environmental weight limit signs |
| B10 | Reallocate roadspace |
| | Weight restrictions |
| | 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 |
| | School Keep Clear markings |
| D3 | Double/single yellow lines |
| D4 | Improve enforcement of restrictions |
| Е | Improved pedestrian and cyclist |
| _ | environment |
| - 4 | Improved pedestrian environment - footway |
| E1 | 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 |
| | Remove or relocate parking/ loading bays |
| G2 | and/or amend restrictions |
| G3 | Introduce kerb blip loading restrictions |
| G4 | Enforce parking restrictions |
| G4 | Additional parking charges for more polluting |
| G5 | vehicles |
| G6 | Introduce or amend CPZ restrictions around |
| 00 | school to restrict non-residents parking |
| G7 | Parking rationalisations with ULEV car clubs |
| Н | Buses |
| H1 | Bus stop relocation |
| H2 | Low emission buses |
| ı | Freight and Deliveries |
| | Engage with local businesses to reduce |
| 11 | freight/ delivery emissions |
| | Promote low emission vehicles for freight and |
| 12 | deliveries |
| 13 | Delivery Servicing Plans (DSPs) for new |
| .0 | developments |
| 14 | Re-time Borough commercial waste collection |
| J | Construction |
| J1 | Planning conditions to reduce impacts of freight traffic |
| 10 | Managing the impact of dust and emissions |
| J2 | 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 |
| | Healthy Streets approach, sustainable |
| K1 | transport and roadspace reallocation from |
| | vehicular traffic |
| L | Green Infrastructure |
| <u>L</u> 1 | Green screens |
| L2 | Trees, shrubs, planters |
| | , , |
| L3 L4 | Green Gateways |
| L4 | Pocket parks |

| Z. 31 | CHOOL SITE MEASURES |
|--------|--|
| | School Grounds |
| | Additional scooter/ cycle parking |
| | Staff car parking |
| | Anti-idling for deliveries |
| M4 | Re-timing for deliveries |
| | Reduce number of deliveries, staff/visitor |
| M5 | vehicle trips and/or use more sustainable |
| IVIO | modes |
| M6 | |
| | Relocate pedestrian entrances |
| M7 | Green screens |
| M8 | Trees/ shrubs/ planters |
| | 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 |
| IVITO | schools |
| M14 | Reconsider playground layouts to reduce |
| IVI 14 | exposure |
| M15 | Sheltered waiting areas for parents/ guardians |
| | ool Building |
| N | School boilers/ heating |
| N1 | Upgrade aging boilers |
| | Install Optimising Compensator Control |
| N2 | System for School Boilers |
| N3 | Boiler flues and extraction equipment |
| N4 | Reducing over-heating and tackling heat gain |
| N5 | Replace aging radiators |
| | Improve product choice (e.g. cleaning |
| 0 | products) |
| 01 | Improve product choice (e.g. cleaning |
| Oi | products) |
| Р | Regular service & maintenance of |
| r | appliances and equipment |
| P1 | Regular service & maintenance of appliances |
| Ρ1 | and equipment |
| Q | Improve school building insulation |
| Q1 | Improve school building insulation |
| Q2 | Upgrade windows |
| | Replace temporary classrooms with |
| Q3 | permanent structures |
| Q4 | Green Roofs |
| R | Ventilation / Air Filtration |
| R1 | Installation of Air Conditioning Units |
| R2 | Introduce Air Filtration Systems |
| R3 | |
| | Install HEPA Filters in Air Handling Units |
| R4 | Other air filtration systems - air purifiers |
| S | Other |
| S1 | Air quality monitoring and information provision |
| | eco-monitors and walking route maps. |

| 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 | | | | | | | | |
|---|--|--|--|--|--|--|--|--|
| T1 | | | | | | | | |
| | , , | | | | | | | |
| | | | | | | | | |
| T3 | Promoting Park & Stride | | | | | | | |
| T4 | Promoting car sharing | | | | | | | |
| T5 | Walking Route Maps / Leaflets | | | | | | | |
| T6 | Parent and Public Workshops | | | | | | | |
| T7 | | | | | | | | |
| 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 | | | | | | | |
| T12 | Attain an improved Award in Healthy Schools | | | | | | | |
| 113 | London, ultimately a Gold Award | | | | | | | |
| T11 | Awareness raising events amongst the wider | | | | | | | |
| 114 | community | | | | | | | |
| T15 | Cycle training and promotional initiatives | | | | | | | |
| T16 | Gamification to promote active travel | | | | | | | |
| T17 | Restrict or reduce personal deliveries | | | | | | | |
| T10 | CPD supporting teachers subject knowledge | | | | | | | |
| 110 | on air quality | | | | | | | |
| T19 | Walking Buses | | | | | | | |

WIDER MEASURES Targeted scrappage scheme for polluting vehicles entering London Reform Vehicle Excise Duty Promote a transition to electric heating and heat pumps Reform Buildings Regulations to promote heat pumps Jero emission zones

| Air c | uality audit approach: | Purp | ose | Ass | essme | ent Cri | teria | | | | Wid | ler E | Ben | efits | ; | | | Sui | tabi | lity |
|-------|--|----------------|-----------------|-----------------------------------|-------|----------------|---------------------|-------------|------------------------------------|----------------|-------------------|-----------------|--------------|-------------------------------|-------------------------|-------------------|-----------------------|------------|-------------|-----------------|
| A.) A | ir quality assessments and context plan | | | ıt | | | | | | | | | | | | | () | | | |
| prepa | aration | | | neu | | | | | ort | | | | | ηt | | | ves | | | |
| B.) F | ieldwork – complete audit templates with input | | | Potential Air Quality Improvement | | | | | Promotion of sustainable transport | | | | | Improved learning environment | S | | objectives | | | |
| from | the school and borough officers (air quality, | S | ē. | δ | | | ort | | trar | | / | | | Iuo. | ost | g | obj | | | trial |
| scho | ol travel, transport planning). Use Toolkit as | Ş | ınsı | ш | | iť | ddn | ≥. | ole | ity | /ac | ion | Σ | nvir | g G | sin | | S | န | att |
| | ence. | no | χbc | _ _ | پ | ig | S | afei | nal | ner | pri∖ | luct | rsit | g e | atir | rai | ηр | oad | oac | |
| | Review findings and identify key issues, sources | Reduce Sources | Reduce Exposure | Jali | Cost | Deliverability | Stakeholder Support | Road safety | stai | Visual amenity | Security, privacy | Noise reduction | Biodiversity | nin | Reduced operating costs | Awareness raising | Support STARS and HSL | Main roads | Minor Roads | Suitability for |
| | nissions and causes of exposure |) In | nce | <u> </u> | | el⊵ | lod | toa | sns. | sua | curi | ise | 3ioc | ear | o p | ren | RS | /aii | i. | iii |
| | dentify measures from the Toolkit to address | Şec | edi | Ą | | Δ | ake | œ | u of | V. | Se | No | ш | l pe | nce | wa | TA | _ | Σ | rita |
| | e issues, informed by the audit findings | " | ~ | ija | | | St | | tioi | | | | | ove | edi | A | rt S | | | હ |
| | dentify funding sources and task owners | | | eni | | | | | mc | | | | | npr | R | | odo | | | |
| , | stablish an approach to monitoring the | | | Pol | | | | | Pro | | | | | _ | | | Sup | | | |
| effec | tiveness of measures | | | | | | | | | | | | | | | | | | | |
| 1. HI | GHWAY MEASURES (Key Stakeholder: Boro | ugh/ | TfL) | | | | | | | | | | | | | | | | | |
| | Anti-idling | | | | | | | | | | | | | | | | | | | |
| | Fines | Χ | | L | L | L | Н | | | | | | | | | | Χ | Υ | Υ | Υ |
| | Campaigns, including driver engagement | Χ | | L | L | L | Н | | | | | | | | | | Χ | Υ | Υ | Υ |
| | Information signage | Х | | L | L | L | Н | | | | | | | | | | Χ | Υ | Υ | Υ |
| В | Reducing traffic flow | | | | | | | | | | | | | | | | | | | |
| B1 | 'School Streets' | Х | | L | М | M | М | Χ | | | | | | | | | | | Υ | Υ |
| | Collapsible bollards | Х | | L | L | M | М | Χ | | | | | | | | | | | Υ | Υ |
| В3 | 'Play Streets' (temporary measure) | Х | | L | L | S | Н | Χ | Χ | | | | | | | Χ | | | Υ | Υ |
| | Road closure | Х | Χ | Н | L-M | S-M | L-M | | | | | | | | | | | | Υ | Υ |
| | Filtered permeability | Χ | | М | М | М | L | Χ | Χ | | | | | | | | | | Υ | Υ |
| | One-way streets/ No entry restrictions | Χ | | М | L-H | S-M | М | Χ | Χ | | | | | | | | | | Υ | Υ |
| | ULEV-only streets | Х | | M | М | M | L | | Χ | | | | | | | | | | Υ | Υ |
| | Width restriction (e.g. 7ft) | Х | | L | L | S | М | | | | | | | | | | | | Υ | Ш |
| | Environmental weight limit signs | Х | | L | L | S | М | | | | | | | | | | | | Υ | Ш |
| | Reallocate roadspace | Х | | М | Н | L | М | | Χ | | | | | | | | | Υ | Υ | Ш |
| | Weight restrictions | Х | | М | L | М | М | Χ | | | | | | | | | | | Υ | Ш |
| | Smoothing traffic flow/speed | | | | | | | | | | | | | | | | | | | |
| | Modify traffic calming | Х | | L | М | S | Н | | | | | | | | | | | Υ | Υ | Ш |
| | Optimise traffic signals | Х | | L | L-M | S-M | М | | | | | | | | | | | Υ | Υ | Υ |
| C3 | Junction improvements | Χ | | L | М-Н | M-L | L | | | | | | | | | | | Υ | Υ | Ш |
| | Reducing drop-off activity | | | | | | | | | | | | | | | | | | | |
| | Public Space Protection Orders | Х | | L | М | M | М | Х | | | | | | | | | | Υ | Υ | Щ |
| | School Keep Clear markings | Χ | | L | L | S | М-Н | Χ | | | | | | | | | | Υ | Υ | Щ |
| | Double/single yellow lines | X | | L | L | S | М | Х | | | | | | | | | | Υ | Υ | Ш |
| D4 | Improve enforcement of restrictions | Χ | | L | L | S-M | М | Χ | | | | | | | | | | Υ | Υ | Ш |

| 1. HI | GHWAY MEASURES (Key Stakeholder: Boro | ugh/ | TfL) | | | | | | | | | | | | | |
|-------|---|------|------|---|-----|-----|---|---|---|--|--|--|---|---|---|---|
| E | Improved pedestrian and cyclist environment | | | | | | | | | | | | | | | |
| E1 | Improved pedestrian environment - footway widening, kerb build-outs | Х | Х | L | L-M | S-M | Н | Х | Х | | | | | Υ | Υ | Υ |
| E2 | Improved crossing facilities on desire lines | | Χ | L | L-M | S-M | Н | Χ | Χ | | | | | Υ | Υ | Υ |
| | Traffic calming | Χ | | L | L-M | S-M | Н | Χ | Χ | | | | | Υ | Υ | Υ |
| | Improve Visibility of the School | Χ | | L | L | S | Н | Χ | | | | | | Υ | Υ | |
| E5 | Cycle hangers | Χ | | L | L-M | S | М | | Χ | | | | Χ | Υ | Υ | |
| F | Promote a switch to low emission vehicles | | | | | | | | | | | | | | | |
| F1 | Ultra-low Emission Zone (ULEZ) & Low Emission Zone (LEZ) | Х | Х | Н | Н | М | М | | Х | | | | | Υ | Υ | |
| F2 | Comprehensive charging provision for ULEVs | Х | | L | М | М | М | | Χ | | | | | Υ | Υ | Υ |
| G | Parking/loading | | | | | | | | | | | | | | | |
| G1 | Identify a Park & Stride site | Χ | | L | L | M | М | | | | | | | | | Υ |
| G2 | Remove or relocate parking/ loading bays and/or amend restrictions | Х | | М | L | S-M | М | | | | | | | Υ | Υ | |
| G3 | Introduce kerb blip loading restrictions | Χ | | L | L | S | М | | | | | | | Υ | Υ | |
| G4 | Enforce parking restrictions | Χ | | L | L | S | М | Χ | | | | | | Υ | Υ | |
| G5 | Additional parking charges for more polluting vehicles | Х | | М | М | М | ٦ | | | | | | | Υ | Υ | |
| G6 | Introduce or amend CPZ restrictions around school to restrict non-residents parking | Х | | М | М | М | L | Х | | | | | | Υ | Υ | |
| | Parking rationalisations with ULEV car clubs | Χ | | L | М | L | L | | Χ | | | | | Υ | Υ | |
| Н | Buses | | | | | | | | | | | | | | | |
| H1 | Bus stop relocation | Χ | | М | М | М | L | | | | | | | Υ | | |
| H2 | Low emission buses | Χ | | Н | Н | М | М | | | | | | | Υ | | |



| 1. H | GHWAY MEASURES (Key Stakeholder: Boro | ugh/ | TfL) | | | | | | | | | | | | | | | |
|------|---|------|------|---|---|-----|---|---|---|---|---|---|--|--|---|---|---|--|
| ı | Freight and Deliveries | | | | | | | | | | | | | | | | | |
| 11 | Engage with local businesses to reduce freight/ delivery emissions | X | | М | L | М | L | Χ | | | | | | | | Υ | | |
| 12 | Promote low emission vehicles for freight and deliveries | X | | М | L | М | L | | Χ | | | | | | | Υ | | |
| 13 | Delivery Servicing Plans (DSPs) for new developments | Х | | L | L | М | L | | | | | | | | | Υ | Υ | |
| 14 | Re-time Borough commercial waste collection | Χ | | L | М | М | М | | | | | | | | | Υ | Υ | |
| J | Construction | | | | | | | | | | | | | | | | | |
| J1 | Planning conditions to reduce impacts of freight traffic | Х | | М | L | М | L | | Х | | | | | | | Υ | | |
| J2 | Managing the impact of dust and emissions during construction and demolition | Х | Х | L | L | S | М | | | | | | | | Х | Υ | | |
| J3 | Retrospective discussions with already permitted developments to lessen the impacts | Х | | М | L | L | L | | Х | | | | | | | Υ | | |
| J4 | Non-Road Mobile Machinery Audit | Χ | | L | L | S | М | | | | | Χ | | | | | | |
| K | Planning Policy and Strategy | | | | | | | | | | | | | | | | | |
| K1 | Healthy Streets approach, sustainable transport and roadspace reallocation from vehicular traffic | X | Х | Н | Н | L | L | | Х | | | | | | | Υ | Υ | |
| L | Green Infrastructure | | | | | | | | | | | | | | | | | |
| L1 | Green screens | | Χ | L | L | S | Н | | | Χ | Χ | | | | | Υ | Υ | |
| L2 | Trees, shrubs, planters | | Χ | L | L | S-M | М | | | Χ | | | | | | Υ | Υ | |
| | Green Gateways | | Х | L | L | S | Н | | | Χ | | | | | | Υ | Υ | |
| L4 | Pocket parks | | Χ | L | M | S-M | Н | | | | | | | | | Υ | Υ | |



School Site Measures: school grounds

| 2. S | CHOOL SITE MEASURES (Key Stakeholder: \$ | Scho | ol/ B | orou | gh) | | | | | | | | | | | | | |
|----------|---|------|-------|------|-----|---|---|---|---|---|---|---|---|--|---|---|--|---|
| M | School Grounds | | | | | | | | | | | | | | | | | |
| M1 | Additional scooter/ cycle parking | Χ | | L | L | S | Н | | Χ | | | | | | | Χ | | |
| M2 | Staff car parking | Χ | | L | L | М | L | | Χ | | | | | | | | | |
| М3 | Anti-idling for deliveries | Χ | | L | L | S | Н | | | | | | | | | | | |
| M4 | Re-timing for deliveries | Χ | | L | L | S | М | Χ | | | | | | | | | | |
| | Reduce number of deliveries, staff/visitor | | | | | | | | | | | | | | | | | |
| M5 | vehicle trips and/or use more sustainable | Χ | | L | L | М | M | | Х | | | | | | | | | ı |
| | modes | | | | | | | | | | | | | | | | | |
| M6 | Relocate pedestrian entrances | | Χ | L | L | S | М | | | | | | | | | | | |
| M7 | Green screens | | Χ | L | М | М | М | | | Χ | Χ | | Χ | | | | | |
| M8 | Trees/ shrubs/ planters | | | L | L-M | М | Н | | | | | | Χ | | Χ | | | |
| M9 | Green spaces | | Χ | L | L | S | Н | | | | | | | | | | | |
| M10 | Pupil & staff cycle parking | Χ | | L | L | S | Н | | Χ | | | | | | | X | | |
| M11 | Reduced waiting times to enter school grounds | | Х | L | L | S | Н | | Х | | | | | | | | | Υ |
| M12 | Relocate playgrounds and free flow spaces | | Χ | М | М-Н | М | М | | | | Χ | Χ | | | | | | |
| M13 | Co-ordinate start/ finish times with nearby schools | X | Х | L | L | S | L | Х | | | | | | | | | | |
| IIVI I 4 | Reconsider playground layouts to reduce exposure | | Х | L | L | S | М | | | | | | | | | | | |
| M15 | Sheltered waiting areas for parents/ guardians | Х | Х | L | L | S | М | | Х | | | | | | | | | |



School Site Measures: school building

| 2. S | CHOOL SITE MEASURES (Key Stakeholder: \$ | Scho | ol/ B | oroug | gh) | | | | | | | | | | | |
|------|---|------|-------|-------|-----|-----|-----|--|---|---|---|---|---|---|--|--|
| Sch | ool Building | | | | | | | | | | | | | | | |
| N | School boilers/ heating | | | | | | | | | | | | | | | |
| | Upgrade aging boilers | Х | | L | L-H | S-M | М-Н | | | | | | Χ | | | |
| N2 | Install Optimising Compensator Control System for School Boilers | Х | | L | L | S | Н | | | | | | Х | | | |
| N3 | Boiler flues and extraction equipment | | Χ | L | L | S | М | | | | | | | | | |
| N4 | Reducing over-heating and tackling heat gain | Χ | | L | L-M | S | Н | | | | | Х | Χ | | | |
| N5 | Replace aging radiators | Χ | | L | М | S-M | М | | | | | Χ | Χ | | | |
| 0 | Improve product choice (e.g. cleaning products) | | | | | | | | | | | | | | | |
| 01 | Improve product choice (e.g. cleaning products) | Х | Х | L | L | S | Н | | | | | | | | | |
| Р | Regular service & maintenance of appliances and equipment | | | | | | | | | | | | | | | |
| P1 | Regular service & maintenance of appliances and equipment | Х | | L | L | S | Н | | | | | | | | | |
| Q | Improve school building insulation | | | | | | | | | | | | | | | |
| Q1 | Improve school building insulation | Х | | L | L-M | S-M | М-Н | | | Χ | | Χ | Χ | | | |
| Q2 | Upgrade windows | | Χ | L | L-H | S-M | М-Н | | | Χ | | Χ | Χ | | | |
| Q3 | Replace temporary classrooms with permanent structures | Х | | L | Н | M-L | М | | | | | Х | Χ | | | |
| Q4 | Green Roofs | | Χ | L | М | М | М | | Χ | | Χ | | | | | |
| R | Ventilation / Air Filtration | | | | | | | | | | | | | | | |
| R1 | Installation of Air Conditioning Units | | Χ | L | L-H | S-M | М-Н | | | | | Χ | | | | |
| | Introduce Air Filtration Systems | | Χ | L | М | М | M | | | | | Χ | | | | |
| R3 | Install HEPA Filters in Air Handling Units | | Χ | L | L | S-M | М | | | | | Χ | | | | |
| R4 | Other air filtration systems - air purifiers | | Χ | L | L-M | S-M | М | | | | | Χ | | | | |
| S | Other | | | | | | | | | | | | | | | |
| S1 | Air quality monitoring and information provision eco-monitors and walking route maps. | Х | Х | L | L | S | Н | | | | | | | Х | | |



Behavioural Measures

| 3. BI | EHAVIOURAL MEASURES (Key Stakeholder: | Scho | ool/ I | Borou | gh) | | | | | | | | | | | |
|-------|---|------|--------|-------|-----|-----|---|---|---|--|--|---|---|---|--|---|
| T1 | Attain improved STARS accreditation status, ultimately Gold status. | Х | | L | L | S-M | Η | | | | | | Х | | | |
| T2 | Promote cleaner walking routes to school | Χ | Χ | L | L | S | Η | | Χ | | | | Χ | Χ | | |
| T3 | Promoting Park & Stride | Χ | | L | L | S-M | Н | | Χ | | | | Χ | Χ | | |
| T4 | Promoting car sharing | Χ | | L | L | S | Н | | Χ | | | | | Χ | | |
| T5 | Walking Route Maps / Leaflets | | Χ | L | L | S | Н | | Χ | | | | X | X | | |
| T6 | Parent and Public Workshops | Χ | Χ | L | L | S | Н | | | | | | X | X | | Υ |
| T7 | Prepare 'Welcome Packs' for new pupils / parents | Х | Х | L | L | S | Н | Χ | Χ | | | | X | X | | Υ |
| Т8 | Deliver Air Quality focused lesson/s to children | Х | Х | L | L | S | Η | | | | | | X | X | | Υ |
| T9 | Awareness raising session amongst staff | Χ | Χ | L | L | S | Η | | | | | | X | | | |
| T10 | Daily monitoring of London Air website/ app | Χ | Χ | L | L | S | Н | | | | | Χ | X | | | |
| T11 | Add Air Quality to Junior Citizenship Scheme | Χ | Χ | L | L | S | Η | | | | | | X | | | l |
| T12 | Anti-idling campaign | Χ | | L | L | S | Η | | | | | | X | X | | |
| T13 | Attain an improved Award in Healthy Schools London, ultimately a Gold Award | Х | Х | L | L | S-M | Ι | | | | | | X | X | | |
| T14 | Awareness raising events amongst the wider community | Х | Х | L | L | S-M | М | | | | | | X | | | |
| T15 | Cycle training and promotional initiatives | Χ | | L | L | S | М | Χ | Χ | | | | | X | | |
| T16 | Gamification to promote active travel | Χ | | L | L-M | М | М | | Χ | | | | | X | | |
| T17 | Restrict or reduce personal deliveries | Χ | | L | L | S | М | | | | | | | | | |
| T18 | CPD supporting teachers subject knowledge on air quality | X | Х | L | L | S-M | М | | | | | | X | X | | |
| T19 | Walking Buses | Χ | | L | L | S | М | | Χ | | | | X | X | | |

Wider Measures

| 4. W | IDER MEASURES (Key Stakeholder: Borougl | n/ Tfl | _/ GL | .A/ Ce | ntral | Gover | nment |) | | | | | | |
|------|--|--------|-------|--------|-------|-------|-------|---|--|--|--|--|--|--|
| U1 | Targeted scrappage scheme for polluting vehicles entering London | Х | | Н | Н | L | ٦ | | | | | | | |
| U2 | Reform Vehicle Excise Duty | L | | | | | | | | | | | | |
| 1 03 | Promote a transition to electric heating and heat pumps | Χ | | Н | М | L | ٦ | | | | | | | |
| 1 04 | Reform Buildings Regulations to promote heat pumps | Χ | | М | М | L | L | | | | | | | |
| U5 | Zero emission zones | Χ | Х | Η | Η | L | L | | | | | | | |

Summary of Measures

Hard Hitting Measures

The combined package of measures that will be developed for schools can have a significant impact on mitigating air quality issues as well as generating some of the wider benefits that are described earlier.

However, some of the measures can be hard hitting in themselves, and some of these are described below:

- **School Streets**: traffic access restrictions at school opening and closing times to help create a safer, more pleasant environment for children travelling to school, by removing air quality and road safety problems associated with through traffic and drop-off activity on the street/s outside the school. The benefits to be gained will be dependent on how much traffic there is at present.
- **Road closures**: A full road closure where possible would remove the associated vehicle emissions and free up space for alternative uses.
- Bus stop relocation: In some cases bus stops near the school may serve as a major source of
 emissions from buses frequently braking and accelerating hard when pulling up to the stop. They
 may also result in queuing traffic and congestion, and it may be possible to relocate the stop to
 lessen these issues.
- **Filtered permeability**: The introduction of filtered permeability serves to close a road to motorised vehicles, whilst retaining routes through for pedestrians and cyclists.
- **Ultra-low Emission Zone**: The introduction of the ULEZ in 2019 and the proposed expansion of the ULEZ and tightened emissions standards for the Low Emission Zone will significantly improve air quality. The ULEZ expansion and LEZ proposals are subject to consultation.
- Low emission buses: TfL has plans to introduce around 3,000 Ultra Low Emission double-deck buses in central London by 2019 and over 250 Zero Emission single-deck buses into central London by 2020. From 2018, all new double-deck buses entering the TfL fleet will be diesel-hybrid meeting Euro VI emissions standards. TfL is planning to re-fit around 5,000 buses so that they meet the highest emissions standards (Euro VI) as quickly as possible.
- Wider schemes: there are a range of potential measures which if introduced can help London take
 a significant step forward in creating a cleaner city. These include: a targeted scrappage scheme,
 reform of Vehicle Excise Duty, promoting a transition to electric heating and heat pumps and
 introducing zero emission zones in central London and town centres and larger inner London and
 London-wide zones in the longer term.

Case Studies

Air Pollution at Schools



B1 'School Streets'

- Potential Air Quality Improvement = Low
- Cost = Medium
- Deliverability = Medium-term
- Stakeholder support = Medium
- Wider benefits: Road safety
- Suitable for: Minor roads



Description

Traffic access restrictions at school opening and closing times to help create a safer, more pleasant environment for children travelling to school, by removing air quality and road safety problems associated with through traffic and drop-off activity on the street/s outside the school.

Purpose

- Restrict through traffic and drop-off activity in school peak periods
- Reduces emissions and improves road safety

Approach

- Introduced as part of Pedestrian Zones or Pedestrian & Cycle Zones
- Use of access signs and ANPR cameras.
- Exemptions for residents, blue badge holder etc through permits
- Issue penalty charge notices for contraventions
- Can use experimental traffic order
- Need to be aware of knock-on impacts on surrounding streets

- Schemes in Scotland running for a few years now
- School streets being introduced in several boroughs, including LB Hackney and LB Croydon

B3 'School Streets'

- Potential Air Quality Improvement = Low
- Cost = Low
- Deliverability = Short-term
- Stakeholder support = High
- Wider benefits: road safety, sustainable travel
- Suitable for: Minor roads



Hackney schools were the first in the UK to run school hosted play streets. Thomas Fairchild School in Hoxton was the first school to run a play street in 2013.



Description

'A 'play street' is a timed closure on the street/s outside the school during a certain period of the day (e.g. on Friday after the school day ends). A play street can be run periodically, say once a term. Games and activities are organised for children and parents on the reclaimed street space. Signing and enforcing the closure is a joint exercise between the borough and the school.

Purpose

- · Restrict through traffic and drop-off activity.
- Reclaims the street temporarily so children can play and the school community can socialise.
- Raises awareness of air quality & sustainable travel.

Approach

- · Organisers may be parents or school staff.
- Need to gain support from head teacher and residents/businesses before applying to the council for permission.
- Session typically last between one and three hours.
 They can take place weekly, monthly, or once a quarter.
- Councils usually provide the 'Road Closed' signage.

- Schemes started in 2013, now commonplace.
- Play streets regularly run in several boroughs, including LB Hackney, LB Islington and LB Camden.

B5 'Filtered Permeability'

- Potential Air Quality Improvement = Medium
- Cost = Medium
- Deliverability = Medium-term
- Stakeholder support = Low
- Wider benefits: road safety, sustainable travel
- Suitable for: Minor roads



Hackney

Description

The introduction of filtered permeability serves to close a road to motorised vehicles, whilst retaining routes through for pedestrians and cyclists. The scope to introduce road closures and filtered permeability measures depends on the wider road network, routing options and the impact of displaced traffic, as well as any requirements for preserving emergency access. Where implemented they can be paired with footway extensions, planting and public realm improvements.

Purpose

- Reduce volume of through traffic travelling through a residential area.
- Often introduced as part of a range of measures to improve the liveability of a neighbourhood.

Approach

- Restrict access at a point or through a section of street.
- Maintains access for cyclists and pedestrians.
- Can use bollards, planters or build-out the footway across the road.
- Needs area-wide approach to consider permeability so traffic not just displaced to nearby roads.

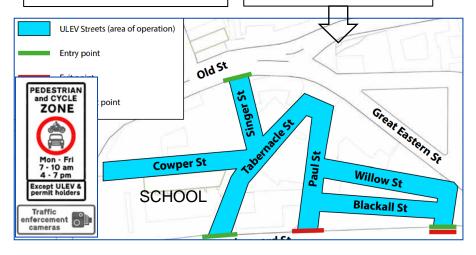
- Waltham Forest Mini-Holland 'villages', 2016
- Schemes introduced in LB Hackney, LB Haringey
- Some measures introduced as part of Quietways

B7 'ULEV-only street'

- Potential Air Quality Improvement = Medium
- Cost = Medium
- Deliverability = Medium-term
- Stakeholder support = Low
- · Wider benefits: promoting sustainable travel
- Suitable for: Minor roads

Camden – 23 schools will benefit from a 'School Low Emission Neighbourhood' in the Frognal and Fitzjohns area. The proposal will see 8,500 pupils at 23 schools benefit from streets in the vicinity being restricted to electric vehicles and local access only.

LB Hackney & LB Islington are introducing London's first ULEV-only streets in Shoreditch. One of the streets runs alongside a school. The ULEV-only zones will operate 7am-10am and 4pm-7pm Monday to Friday



Description

Ultra-low emission vehicle (ULEV) only restriction, utilising a recently approved exemption for ULEVs paired with access restrictions such as Pedestrian Zone, No Motor Vehicles or Bus Lane to promote ULEV uptake and significantly reduce traffic emissions. Like School Streets, ULEV-only streets can have exemptions for permits holders such as residents, businesses and blue badge holders.

Purpose

- Restrict through traffic and drop-off activity but also promotes use of ULEVs.
- · Reduces emissions and improves road safety.
- Can introduce in streets with high footfall/cycling where current exposure to emissions is high.

Approach

- Restrict access at entry cordon points to the ULEV only streets.
- Use Pedestrian Zone/ Pedestrian & Cycle Zone or No Motor Vehicle signs, with exemptions for ULEVs and permit holders.
- Restrictions during certain times/days or 24/7.
- · Use ANPR to enforce restrictions.

- Two areas in Shoreditch: ULEV-only zones in 2018
- Camden: planning ULEV-only streets at 23 schools

L2 Trees, shrubs, planters

- Potential Air Quality Improvement = Low
- Cost = Low
- Deliverability = Short-Medium term
- Stakeholder support = Medium
- · Wider benefits: improved visual amenity
- Suitable for: Major and Minor roads



Trees on carriageway outside school.
Provides visual road narrowing and encourages considerate driving behaviour



Trees and planting introduced on footway buildout outside school in Waltham Forest. Narrowed road also deters dropoff activity. Planting area provides sustainable drainage.

Description

Installation of trees and planting captures some emissions from traffic, thus reducing exposure to children when approaching the school and when within the school grounds/buildings.

Purpose

- Help to block pollutants but also provide shade, improve the look and feel of the area, and create visual cues to drivers that considerate driving behaviour is appropriate around the school environs.
- · Can act as means of sustainable drainage.

Approach

- Planting and trees on the footway or buildouts immediately outside the school, around the school boundary or on key walking routes to school.
- If to be introduced on footways then care should be taken that adequate width will remain.
- Careful planning is required for the introduction of trees to ensure that the right species are used to maximise exposure reduction benefits, retain sightlines, provide shade, minimise maintenance etc.
 If used in the wrong location then trees can block airflow and therefore trap pollution.

- Boroughs and TfL have programmes of tree planting.
- Mayor's Greener City fund provides grants for tree planting.

M7 Green screens

- Potential Air Quality Improvement = Low
- Cost = Medium
- Deliverability = Medium-term
- Stakeholder support = Medium
- Wider benefits: visual amenity, security/privacy, noise reduction, biodiversity



At Sir John Cass School 45m2 of green ivy screens were installed in the playground and roof garden and pupils planted 170 air quality plants. Six mobile green ivy screens with chalkboards were delivered to create unique play areas.

Screens alongside perimeter fence

Movable green screens

Description

Exposure to roadside pollutants can be reduced through using green screening. Certain types of plants can trap airborne particles and act as a pollution sink.

Purpose

- Traps airborne particles.
- Green screens provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction.

Approach

- Green screens can be installed or grown along fences and other barriers/structures. Can also be installed on movable planters.
- The screens can be planted directly into the ground or into planters and are maintained with the option of a drip line irrigation system.
- It should be noted that green screens need ongoing maintenance which has associated time/cost considerations which need to be borne in mind.
- The most effective types are generally those with a dense vegetation layer and a high leaf density, and/or waxy leaves (such as ivy).
- Benefits will be heavily dependant on proximity to the pollution source and school, and screen height and orientation to prevailing wind or wind circulation.

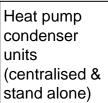
Precedents

Precedents: Bowes Primary (Enfield), Oxford
 Gardens (RBKC) and Sir John Cass (City of London)

N1 Boiler upgrades and heat pumps

- Potential Air Quality Improvement = Low
- Cost = Low-high
- Deliverability = Short-Medium term
- Stakeholder support = Medium-High
- Wider benefits: reduced operating costs







Aging gas fired

Description

Consider replacing older boilers which are less efficient and contribute to worsening air quality. Where possible replace with Heat Pumps.

Purpose

- Reduces or eliminates a source of local emissions.
 Older boiler emissions rise as combustion efficiency drops.
- Improved provision of heating (& potentially cooling).

Approach

- Where possible replace with Heat Pumps with zero local emissions, particularly where more significant building changes are planned.
- Whilst there are significantly higher costs to install and require remedial works, they will reduce ongoing costs and greatly reduce emissions, increasingly so as electricity generation becomes increasingly decarbonised.
- If direct replacement is required, consider replacing with an Ultra Low NOx gas boiler with dry NOx emissions not exceeding 40 mg/kWh (at 0% O2).

- Brandlehow Primary School, Putney
- King Edward VII High School, Kings Lynn

School Buildings - Air Filtration Systems (R2)

R2 Air Filtrations Systems

- Potential Air Quality Improvement = Low
- Cost = Medium
- Deliverability = Medium-term
- Stakeholder support = High
- Wider benefits: reduced operating costs

Example of classroom air filtration system – floor mounted, stand alone system.

Research has shown that the drop in attention from high CO2 is of similar magnitude to that observed when students skip breakfast.



Description

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 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 NOx and NO2, and some claims it will eliminate 99.5% of NO2. They can also assist with virus reduction and PM reduction.

An air filtration system will not reduce CO2 levels. High CO2 can result in reduced attention and therefore learning, so some fresh air is going to be needed through windows, vents or air handling unit.

Purpose

Reduces NOx and NO2 levels in classroom.

Approach

 For classrooms with poorest air quality or high exposure, consider installation of these units.

- Limited use in UK so far some recent testing carried out in three London schools (results TBC).
- Widely used in South Korea.

Appendix A – Detailed Description of Measures



Highway Measures

| | | | Pur | oose | Ħ | | | | Wid | er Bene | efits | | | | | | | | Suita | bility |
|------|---|---|----------------|-----------------|----------------------------------|-------------|------------------------------------|----------------|-------------------|---------------------------------|-------------------------------|-------------------------|---|----------------------------------|------|----------------|---------------------|--------------------|------------|-------------|
| | Toolkit Measures | Description | Reduce Sources | Reduce Exposure | Potential Air Quality Improvemen | Road safety | Promotion of sustainable transport | Visual amenity | Security, privacy | Noise reduction Biodiversity | Improved learning environment | Reduced operating costs | | Support STARS and HSL objectives | Cost | Deliverability | Stakeholder Support | Suitable for trial | Main roads | Minor Roads |
| 1. H | GHWAY MEASURES (Key Sta | keholder: Borough/ TfL) | | | | | | | | | | | | | | | | | | |
| Α | Anti-idling | | | | | | | | | | | | | 4 | | | | | <u> </u> | |
| A1 | Fines | Adopt legislation that will allow the borough to fine idling drivers near schools, and ensure the measures are enforced, delivered as part of wider campaign to raise awareness in the first instance, resorting to fines for persistent offenders. | Х | | L | | | | | | | | | Х | L | L | Н | Υ | Υ | Υ |
| A2 | Campaigns, including driver engagement | Initiate a campaign, such as Westminster's #DontBeldle campaign, and look to deploying some of the local volunteers to act as 'Vehicle Idling Action Champions' to raise awareness of the impacts idling can have and benefits of turning off your engine. | Х | | L | | | | | | | | | Х | L | ٦ | I | Υ | Υ | Υ |
| А3 | Information signage | Signage at the front of the school to raise awareness, accompanied by banner to further promote anti-idling (in a number of languages if | Х | | L | | | | | | | | | Х | L | L | Н | Υ | Υ | Υ |
| | Reducing traffic flow | required). | | | | | | | | | | | | _ | | | | | | |
| | 'School Streets' | Traffic access restrictions at school opening and closing times to help create a safer, more pleasant environment for children travelling to school, by removing air quality and road safety problems associated with through traffic and drop-off activity on the street/s outside the school. 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. Existing residents would be exempt from any penalties. The impacts of displaced traffic need to be carefully considered, and whether it would result in more 'park and stride' journeys to school, a switch to public transport, or just displace the activity to a different nearby street. | х | | L | х | | | | | | | | | М | М | М | Y | | Υ |
| B2 | Collapsible bollards | As an alternative to the 'School Street' measure, a collapsible bollard or bollards can be used to prevent vehicle access through the street/s outside the school over specified periods. This could be manually operated by a member of staff if granted the necessary permission by the borough, allowing continued access to the school and nearby homes for those who need it. This measure has been successful at a number of schools, including St Joseph's Catholic Primary School in Camden. | х | | L | х | | | | | | | | | L | М | M | Υ | | Υ |
| В3 | 'Play Streets' (temporary measure) | A 'play street' is effectively a timed closure on the street's outside the school during a certain period of the day (e.g. on Friday after the school day ends). The play street can be run periodically, say once a term. Games and activities are organised for children and parents on the reclaimed street space. Signing and enforcing the closure is a joint exercise between the Borough and the school. 'Play streets' involve quite a lot of organisation and it is best if a local resident or parent is closely involved in the process who can rally others to the cause. | х | | L | х | x | | | | | | x | | L | S | Н | Υ | | Υ |
| B4 | Road closure | A full road closure where possible would remove the associated vehicle emissions and free up space for alternative uses. Traffic surveys would need to be undertaken to understand typical traffic flows and potential impacts on surrounding streets. Operational and emergency access requirements would also need to be considered. | х | х | н | | | | | | | | | 1 | L-M | S-M | L-M | Υ | | Υ |
| B5 | Filtered permeability | The introduction of filtered permeability served to close a road to motorised vehicles, whilst retaining routes through for pedestrians and cyclists. The scope to introduce road closures and filtered permeability measures depends on the wider road network, routing options and the impact of displaced traffic, as well as any requirements for preserving emergency access. Where implemented they can be paired with footway extensions, planting and public realm improvements. | х | | М | х | х | | | | | | | | М | М | ٦ | Υ | | Υ |
| В6 | One-way streets/ No entry restrictions | Investigate options for restricting a road to one-way operation or retain two-way with a No Entry point access restriction. This willreduce traffic flows past the school, which could also enable the footway space to be widened, potentially incorporating trees and shrubs. All of which contribute towards TiL's Healthy Street agenda. Traffic surveys would need to be undertaken to understand typical traffic flows and potential impact on surrounding streets. | х | | М | х | х | | | | | | | | L-H | S-M | M | Υ | | Υ |
| В7 | ULEV-only streets | Introduce an ultra-low emission vehicle (ULEV) only restriction, utilising a recently approved exemption for ULEVs paired with access restrictions such as Pedestrian Zone, No Motor Vehicles or Bus Lane to promote ULEV uptake and significantly reduce traffic emissions. Like School Streets, ULEV-only streets can have exemptions for permits holders such as residents, businesses and blue badge holders. LB Hackney & LB Islington are introducing London's first ULEV-only streets in Shoreditch. One of the streets runs alongside a school. | х | | М | | х | | | | | | | | М | М | L | Υ | | Υ |
| В8 | Width restriction (e.g. 7ft) | The introduction of a width restriction will mean that certain larger (often more polluting) vehicles will have to use alternative routes. The location of the narrowing would need to be considered carefully as it is likely to create some bunching of vehicles which may increase emissions at this point. | х | | L | | | | | | | | | | L | S | M | | | Υ |
| В9 | Environmental weight limit signs | These weight limits prevent large vehicles from using inappropriate roads, routes and areas in order to: reduce emissions, prevent damage to buildings, preserve the character, amenity and environment of an area. | Х | | L | | | | | | | | | | L | S | М | ' | | Υ |
| B10 | Reallocate roadspace | Investigate the scope for reallocating some roadspace currently open to all vehicles to promote a wider shift towards more sustainable modes, for example through introducing a new segregated cycle route or bus lane to improve public transport provision and discourage travel by car to reduce local emissions. The likely resulting impact on traffic congestion would need to be conisidered. | х | | М | | х | | | | | | | | н | L | М | | Υ | Υ |
| B11 | Weight restrictions | Introduce a weight restriction to prevent large freight vehicles routing past a school to reduce local traffic emissions and road safety issues. Alternative more suitable routes would need to be available and the impacts of re-routing would need to be considered carefully. | Х | | М | Х | | | | | | | | | L | М | М | | | Υ |

Case studies

| С | Smoothing traffic | | | | | | | | | | | | | | | |
|----|--|--|---|---|---|---|---|--|--|---|-----|-----|-----|---|---|---|
| | flow/speed | Consider replacing existing traffic calming such as road humps and cushions with more graduated calming measures, such as road | | | | | | | | | | | | | | |
| C1 | Modify traffic calming | narrowings. The ramps of some humps can be overly steep which leads to excessive breaking and speeding up. A properly constructed sinusoidal road hump will slow traffic but not excessively so, which should minimise vehicle pollution. Sinusoidal humps are much more comfortable for cyclists to negotiate. | х | | L | | | | | | М | S | Н | | Υ | Υ |
| C2 | Optimise traffic signals | Review the scope for introducing a 'green wave', where multiple traffic signals along a route are synchronised to minimise the frequency with which vehicles come to a complete stop, and enable a smoothest possible flow of traffic. The University of Leicester has found that a 10% reduction in emissions may be achievable in some cases. | х | | L | | | | | | L-M | S-M | М | Υ | Υ | Υ |
| С3 | Junction improvements | Investigate options for reducing queuing and delays at junctions near the school to lessen pollution from idling traffic, whilst also improving road safety. However, the benefits of doing so would have to assessed against potentially longer waiting times for pedestrians. Traffic modelling would need to be undertaken to consider wider network impacts, and the risk of potentially inviting more traffic through the junction if the current delays are suppressing demand. | х | | L | | | | | | М-Н | M-L | L | | Υ | Υ |
| D | Reducing drop-off activity | | | | | | | | | | | | | | | |
| D1 | Public Space Protection Orders | Public Space Protection Orders enforced by ANPR cameras are a way of restricting drop-off activity in school peak periods and thereby reducing emissions and improving road safety. Unlike School Streets it doesn't impact on through traffic therefore is suitable for use on main roads. Permits are not required for residents or other users which is the case with School Streets. PSPO's can be used to address 'activities carried on in a public placewhich have a detrimental effect on the quality of life'. Activities in this case is vehicle drop off/pick up which creates unsafe streets. PSPO may typically be used when all other measures have failled to solve the problem. PSPO signs are introduced alongside the kerb. The drop off/pick up activities need to be evidenced, which is why ANPR cameras are used. Fixed Penalty Notices are issued for contraventions (exemptions can be used e.g. deliveries, school buses). It can up to 3 months to receive payment for the contravention as, unlike with Penalty Charge Notices, it may have to go through the Magistrates Court. Due to the camera coverage required, the capital costs can be quite high to implement the PSPO scheme, and revenue is likely to be less than with some parking schemes and moving traffic offences as there will be fewer contraventions. LB Havering has introduced PSPOs at four schools in the borough. | х | | Ĺ | x | | | | | М | М | M | | Y | Υ |
| D2 | School Keep Clear markings | Introduce or extend school keep clear markings outside the school gates to ensure safe access for approaching pedestrians, and lessen exposure to emissions amongst concentrated numbers of children. If a school keep clear marking exists then consider introducing another marking on the opposite side of the road. These are uncommon but are allowed under the Traffic Signs Regulations and General Directions. | х | | L | х | | | | | L | S | М-Н | | Υ | Υ |
| D3 | Double/single yellow lines | Introduce parking restrictions to manage and discourage problem parking around the school if roads are currently unrestricted. It should be noted that drivers are allowed to stop on yellow lines for as long as is reasonably necessary for the purpose of picking up or dropping off passengers. | Х | | L | х | | | | | ٦ | S | М | | Υ | Υ |
| D4 | Improve enforcement of restrictions | Increase patrolling and enforcement on school keep clears and double yellow lines. This will reduce vehicle pollution as well and minmise traffic disruption and improve road safety. | Х | | L | х | | | | | г | S-M | М | | Υ | Υ |
| Е | Improved pedestrian and cyclist environment | | | | | | | | | | | | | | | |
| E1 | Improved pedestrian environment - e.g. footway widening, kerb build-outs | Investigate the scope for improving the approach to the school for pedestrians and children scooting and cycling, introducing sections of kerb build-outs, pedestrian refuges, surface treatments, raised tables, narrowing kerb radii and introducing school crossing patrols. All of these measures serve to reduce the dominance of traffic, reduce traffic speed, encourage more sustainble travel and make the routes to school more pleasant, safe and attractive. Footway widening and planting/trees can also minimise exposure to pollution. | х | х | L | х | х | | | | L-M | S-M | Н | Υ | Υ | Υ |
| E2 | Improved crossing facilities on desire lines | Investigate scope for improved ('formal') crossing provision so minimise crossing delay and reduce the associated exposure to pollution. Such measures will also improve road safety and can be introduced with traffic management. The crossing facilities can be uncontrolled (e.g. podestrian refuge) or controlled (e.g. zebra and puffin crossings). | | х | L | х | х | | | | L-M | S-M | н | Υ | Υ | Υ |
| E3 | Traffic calming | Install traffic calming to slow traffic and deter drivers from rat-running. A lower traffic speed will foster a more pedestrian friendly environment. However, it is important to consider the traffic reduction and road safety benefits alongside the potential negative air pollution impacts from increased stop-start traffic movement. Certain types of traffic calming such as sinusoidal road humps can mitigate excessive breaking/accelerating. | х | | L | х | х | | | | L-M | S-M | Н | Υ | Υ | Υ |
| E4 | Improve Visibility of the School | Increase prominence of school to encourage more responsible driving and parking amongst passing traffic. Ways to do this include using different footway or carriageway materials, banners, murals or displays, or themed bollards outside the school. | Х | | L | х | | | | | L | S | Н | | Υ | Υ |
| E5 | Cycle hangers | Where school grounds have limited space, on-street cycle hangers can be used to increase scooter and cycle parking spaces, to encourage sustainable / healthy travel behaviour. | х | | L | | х | | | х | L-M | S | М | | Υ | Υ |
| F | Promote a switch to low emission vehicles | | | | | | | | | | | | | | | |
| F1 | Ultra-low Emission Zone (ULEZ) & Low Emission Zone (LEZ) | Engage with discussions on ULEZ and other consultations on air quality affecting your school neighbourhood. | Х | Х | н | | х | | | | Н | М | М | | Υ | Υ |
| F2 | Comprehensive charging provision for ULEVs | Provide access to a range of electric vehicle charging points to facilitate the uptake of ULEVs amongst existing car owners. Ensure new development near the school encourages sustainable travel by including provisions for electric vehicle, such as bays with charging points. | Х | | L | | х | | | | М | М | М | Υ | Υ | Υ |



| G | Parking/loading | | | | | | | | | | | | | | |
|----|---|---|---|---|---|---|---|--|--|---|-----|---|---|---|---|
| G1 | Identify a Park & Stride site | Seek an agreement with a local business or institution for parents to park at their premises and walk the remainder of the journey, to lessen emissions and vehicle movements around the school. | х | L | | | | | | L | М | М | Υ | | |
| G2 | | Remove or relocate bays further away from the school or amend restrictions to reduce emissions from parking movement and drop off activity. If bays are removed/relocated then adequate restrictions should be put in their place. Restriction amendments could include increasing residents-only provision (reduce pay and display) and/or introduce car club or electric vehicle bays. | х | М | | | | | | L | S-M | М | | Υ | Υ |
| G3 | Introduce kerb blip loading restrictions | Introduce single or double kerb blips to restrict loading close to the school. | Х | ٦ | | | | | | L | S | М | | Υ | Υ |
| G4 | Enforce parking restrictions | Increase patrolling and enforcement of restrictions. If the Borough adopts the necessary legislation it could use mobile CCTV vans to periodically enforce parking on school keep clear markings at drop-off and pick-up time. | Х | Г | Х | | | | | ٦ | S | М | | Υ | Υ |
| G5 | 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%. Several other boroughs have introduced surcharges, including Camden and Islington. | х | М | | | | | | М | М | L | | Υ | Υ |
| G6 | Introduce or amend CPZ restrictions around school to restrict non-residents parking | Consult with residents in adjacent residential areas used by parents dropping off / picking up children about the appetite for implementing a controlled parking zone for residents to prevent unsafe parking and idling vehicles, or amending the operational hours of an existing CPZ to include hours of typical drop-off / pick-up activity associated with the school. Any impacts of displaced parking would need to be considered. | х | М | х | | | | | М | M | L | | Υ | Υ |
| G7 | Parking restrictions with ULEV car clubs | Consider Introducing parking restrictions to discourage car ownership in the medium to longer term in areas of high accessibility to public transport. This would enable the roadspace to be managed more effectively with a greater emphasis on pedestrians and cyclists, and lessen incidents of congestion as cars. The introduction of car club vehicles, particularly ULEV car club vehicles locally would help expedite this process. | х | П | | х | | | | М | L | П | | Υ | Υ |
| Н | Buses | | | | | | | | | | | | | | |
| H1 | Bus stop relocation | In some cases bus stops near the school may serve as a major source of emissions from buses frequently braking and accelerating hard when pulling up to the stop. They may also result in queuing traffic and congestion, and it may be possible to relocate the stop to lessen these issues. Consideration needs to be given to how this affects the catchment, including for pupils and staff, as poorer accessibility may lead to reduced bus use in favour of the car. | х | М | | | х | | | М | М | L | | Υ | |
| H2 | 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 procured 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. | х | Н | | | х | | | Н | М | М | | Υ | |
| I | Freight and Deliveries | | | | | | | | | | | | | | |
| 11 | Engage with local businesses to reduce freight/ delivery emissions | Engage with local businesses and institutions to promote and explore the potential for consolidation, re-timing, collectivisation and pick-up drop off facilities. The establishment of a Business Improvement District or equivalent would provide a suitable forum. | х | М | х | | | | | L | М | L | | Υ | |
| 12 | Promote low emission vehicles for freight and deliveries | Engage with local businesses and institutions to promote the use of low emission deliveries, including measures to encourage and support improvements to commercial fleets, the wider use of low emission last mile deliveries, including cycle cargo freight. | х | М | | х | | | | L | М | L | | Υ | |
| 13 | Delivery and Servicing Plans (DSPs) for new developments | The borough can investigate opportunities to restrict servicing activity associated with local businesses during key times when children are most exposed to emissions. This can typically be secured via Delivery and Service Plans (DSPs) for new developments, albeit there are often difficulties in introducing such restrictions for existing businesses and ensuring that any such commitments are adhered to unless there are sufficient resources to enforce them. | х | L | | | | | | L | М | L | | Υ | Υ |
| 14 | Re-time Borough commercial waste collection | Where applicable seek to reschedule the time for commercial waste collection so it does not coincide with the school arrival/departure times, to lessen exposure to their emissions, and the additional congestion amongst general traffic. This would however need to be carefully assessed to ensure that by re-timing their collections they do not simply end up near a different school. The borough can also specify the use of low emission vehicles. | х | L | | | | | | M | М | М | | Υ | Υ |



Highway Measures

| J | Construction | | | | | | | | | | | | | | | |
|----|--|--|---|---|---|---|---|---|---|--|---|---|-----|---|---|---|
| | impacts of freight traffic | Enshrine within planning permissions a requirement for freight and construction vehicles associated with new developments to be Euro 6 compliant vehicles, and ULEVs as they become available, with consolidation of trips and re-timing of deliveries to off-peak periods as part of planning permissions. Construction Logistics Plan (CLPs) guidance could ensure construction vehicles avoid school start / finishing times. Restrict the number of construction vehicles during key times when children are most exposed to emissions. This approach is applied within a number of boroughs who specifically restrict construction vehicles between 0930 – 1500hrs during term time if there is a school in the wicinity of the site or proposed access and / or egress routes. | х | | М | х | | | | | | L | М | L | Y | |
| J2 | Managing the impact of dust and emissions during construction and demolition | 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 – https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and | х | х | L | | | | | | х | L | S | М | Υ | |
| J3 | Retrospective discussions with already permitted developments to lessen the impacts | Seek to discuss potential options for managing/reducing current/ongoing development construction traffic with key nearby developments to explore what options there may be to: review routings to sites, times of days, opportunities for consolidation, support in promoting lower emission fleet usage. | х | | М | х | | | | | | L | L | L | Υ | |
| J4 | 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. | х | | L | | | × | (| | | L | S | М | | |
| | Planning Policy and Strategy | | | | | | | | | | | | | | | |
| ΝI | 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. | х | х | Н | х | | | | | | н | L | L | Υ | Υ |
| L | Green Infrastructure | | | | | | | | | | | | | | | |
| L1 | Green screens | Exposure to roadside pollutants can be reduced through the introduction of green screening. Certain types of plants can help trap airborne particles and act as a pollution sink. The most effective types are generally those with a dense vegetation layer and a high leaf density, and/or waxy leaves (such as ivy). Recent research has shown that green screening such as ivy can reduce exposure by over 20%. The benefits from green screens will be heavily depending on their proximity to the pollution source and school location, as well as the screen height and orientation to the prevailing wind or wind circulation. Green screen provide aethetic benefits as well as increased privacy, biodiversity and noise reduction. Green screens can be installed or grown along fences and other barriers/structures. The screens can be planted directly into the ground or into planters and are maintained with the option of a drip line irrigation system. It should be noted that green screens need ongoing maintenance which has associated time/cost considerations which need to be borne in mind. There are many precedents of green screening at primary schools in London, including Bowes Primary School (Enfield), Oxford Gardens School (Kensington & Chelsea) and Sir John Cass School (City of London) | | х | L | | х | × | | | | L | S | н | Y | Y |
| L2 | | Install trees and planting to capture some emissions from traffic, thus reducing exposure to children when approaching the school and when within the school grounds/buildings. Trees and planting can be provide outside the school entrances, along the school boundary and on key walking routes to school. If to be introduced on footways then care should be taken that adequate width will remain. It should be noted that careful planning is required for the introduction of trees to ensure that the right species is used to maximise exposure reduction benefits, retain sightlines, provide shade, minimise maintenance etc. If used in the wrong location then trees can block airflow and therefore trap pollution, so due consideration should be given to these aspects. | | х | L | | х | | | | | L | S-M | М | Y | Υ |
| L3 | Green Gateways | introduce planting on the footway and/or buildouts to create 'green gateways' to the school. This will help to intercept some particulates, encourage more considerate driving and create a more pleasant environment which will help to lead to more trips being made by foot or bike. | | х | L | | х | | | | | L | S | н | Υ | Υ |
| L4 | Pocket parks | Introduction of green infastructure on reclaimed spaces taken from roads around the school. These would need to be introduced in combination with road closures, filtered permeability or significant road space reallocation. The greening can help to absorb/block pollutants and help to create a more pleasant enviroment which will encourage more walking and cycling to school. | | Х | L | | | | | | | М | S-M | н | Υ | Υ |

Case studies



School Site Measures: school grounds

| | | | Purp | ose | = | | | | Wider | Bene | efits | | | | | | | Suita | bility |
|----|--|---|----------------|-----------------|-----------------------------------|-------------|------------------------------------|----------------|--------------------------------------|--------------|-------------------------------|-------------------------|-------------------|------|----------------|---------------------|--------------------|------------|-------------|
| | Toolkit Measures | Description | Reduce Sources | Reduce Exposure | Potential Air Quality Improvement | Road safety | Promotion of sustainable transport | Visual amenity | Security, privacy Noise reduction | Biodiversity | Improved learning environment | Reduced operating costs | Awareness raising | Cost | Deliverability | Stakeholder Support | Suitable for trial | Main roads | Minor Roads |
| 2. | SCHOOL SITE MEASURES (Key | Stakeholder: School/ Borough) | | | | | | | | | ĺ | | | | | Ì | | | |
| M | School Grounds | | | | | | | | | | | | | | | | | | |
| N | Additional scooter/ cycle parking | Increase scooter and cycle parking spaces to encourage sustainable / healthy travel behaviour, particularly near the main entrance. Restricted space means opportunities to provide this outside the school grounds should be explored, such as lockable cycle hangers. | Х | | L | | х | | | | | | - 1 | (L | S | Н | | | |
| N | | Consider options to reduce the number of staff travelling to / from school by private vehicle, through promoting and prioritising spaces for car sharing and low emission vehicles. This needs to be balanced with potential staff retention / recruitment impacts. | Х | | L | | Х | | | | | | | L | М | L | | | |
| N | | Raise awareness with delivery drivers/companies of the detrimental impacts of idling activity. | X | | L | | | | | | | | | L | S | Н | | | |
| IV | Re-timing for deliveries | Re-time deliveries to not coincide with arrival or pick up times. | Χ | | L | Х | | - | | | | | | | S | М | | | |
| N | Reduce number of deliveries, staff/visitor vehicle trips and/or use more sustainable modes | Reduce number of deliveries through better stock management, encourging home delivery etc. Use suppliers who promote use of low emission vehicles, possibility through a borough procurement framework. Explore opportunities for school related deliveries to be undertaken via cycle freight. This could be in collaboration with other neighbouring schools | х | | L | | х | | | | | | | L | М | М | | | |
| N | Relocate pedestrian entrances | Create or re-open a pedestrian entrance away from more polluted areas, especially if children are often likely to congregate outside the school gates for extended periods whilst waiting to enter. | | Х | L | | | | | | | | | L | S | М | | | |
| N | Green screens | Exposure to roadside pollutants can be reduced through the introduction of green screening. Certain types of plants can help trap airborne particles and act as a pollution sink. The most effective types are generally those with a dense vegetation layer and a high leaf density, and/or waxy leaves (such as ivy). Recent research has shown that green screening such as ivy can reduce exposure by over 20%. The benefits from green screens will be heavily depending on their proximity to the pollution source and school location, as well as the screen height and orientation to the prevailing wind or wind circulation. Green screen provide aethetic benefits as well as increased privacy, biodiversity and noise reduction. Green screens can be installed or grown along fences and other barriers/structures. The screens can be planted directly into the ground or into planters and are maintained with the option of a drip line irrigation system. It should be noted that green screens need ongoing maintenance which has associated time/cost considerations which need to be borne in mind. There are many precedents of green screening at primary schools in London, including Bowes Primary School (Enfield), Oxford Gardens School (Kensington & Chelsea) and Sir John Cass School (City of London). | | х | L | | | x | x | x | | | | М | М | М | | | |
| N | Trees, shrubs, planters | Install trees and planting to capture some emissions from traffic, thus reducing exposure to children within the school grounds/buildings. Trees and planting can be provided inside the school boundary. | | | | | | | | | | | | | | | | | |
| | Green spaces | Introduce additional green spaces within the school grounds for use at play time and as part of educational programmes, including initiatives such as edible gardens. | | Х | L | | | | | Х | | | Х | L-N | | Н | | | |
| M | Pupil & staff cycle parking | Provide additional covered cycle parking spaces to encourage sustainable / healthy travel behaviour | Х | | L | | Х | | | - | \vdash | _ | _ 2 | L | S | Н | | | |
| М | Reduce waiting times to enter school grounds | Explore options for being able to let children into the playground or other areas set back/ screened from areas of poor air quality soon upon arrival, rather than waiting outside the gates if this results in exposure to emissions. This will require additional staff time to supervise the playground. | | Х | L | | х | | | | | | | L | S | н | Υ | | |
| М | Relocate playgrounds and free- flow spaces | Relocate playgrounds and free-flow spaces to less polluted areas of the school grounds where practical. Consider the potential for making greater user of areas more sheltered from traffic emissions, or potentially just on alert days where pollution is especially high. Operationally the school would need to be able to manage and supervise the space and movements of children to and from the area for it to be workable. | | х | M | | | | x x | | | | | M-H | Н | М | | | |
| М | Co-ordinate start/ finish times | Engage with nearby schools/nurseries and consider the scope for staggering start/ finish times to lessen congestion and associated | Х | Х | L | Х | | | | | | | | L | S | L | | | |
| М | with nearby schools Reconsider playground layouts to reduce exposure | emissions. In some cases it may be appropriate to discourage regular use of more heavily polluted areas of the school grounds, and re-purpose the area for use by facilities such as scooter / cycle parking or storage, which could be re-located to these areas if it will in turn free up less polluted but equally usable play space elsewhere. | | х | L | | | | | | | | | L | S | М | | | |
| М | Sheltered waiting areas for parents/ guardians | Provide a sheltered area for parents to wait in that is dry to encourage them not to wait in car with the engine running, and to walk, scoot or cycle instead. A simple, low-cost structure would suffice to act as a wet weather shelter for parents and pupils to wait under during drop-off and pick-up periods This structure could also be used for other purposes by the school. | х | х | L | | х | | | | | | | L | S | М | | | |





School Site Measures: school building

| ool Building | | | | | | | | | | | | | | | | | | |
|---|--|--|--|--|-------------------|--|---------------------------|--|--|--|--|--|--|--|--|--|---|--|
| | | | | | | | | | | | | | | | | | | |
| | Review and consider replacing the older boilers which were considered to be operating to a fair condition, but are likely to be of limited efficiency and contribute to worsening local air quality. Consider replacing with an Ultra Low NOx gas boiler with dry NOx emissions not exceeding 40 mg/kWh (at 0% 02). Where possible replace with Heat Pumps with zero local emissions, particularly where more significant building changes are planned. As whilst there are significantly higher costs to install and require remedial works, they will reduce ongoing costs and greatly reduce emissions, increasingly so as electricity generation becomes increasingly decarbonised. | х | | L | | | | | | | х | | L-H | S-M | М-Н | | | |
| Install Optimising Compensator Control System for School Boilers | Installation of an Optimising Compensator Control System to reduce time the boiler is used based on e.g. weather, occupancy of school etc. This should reduce the site gas usage due to more efficient control of the heating system, reducing local emissions from gas combustion. | х | | L | | | | | | | х | | L | S | н | | | |
| Boiler flues and extraction equipment | Install snorkels for flues that currently emit emissions into school grounds. Relocate/ divert appliance flues/ kitchen flues that are low level, are in areas where children play spend time and are near or below windows that can be opened. Flues and extraction equipment should ideally be exhausting above roof ridge height like the main boiler flues to aid quick dispersal. | | Х | L | | | | | | | | | L | s | М | | | |
| Reducing over-heating and tackling heat gain | Install thermostatic radiator valves (TRVs) to enable more efficient heating of school, and lessening incidences of winter overheating that result windows and door being opened and worsening exposure to pollution from the nearby roads. Heat gain as a consequence of classrooms with lots of south facing glass (i.e. solar gain) could be lessened through the introduction of internal blinds or film on the glass. | х | | L | | | | | | х | х | | | S | н | | | |
| | Replace aging radiators and pipework where they are inefficient and will have a low heat-transfer. | Х | | L | | | | | | Х | Х | | М | S-M | М | | | |
| | | | | | | | | | | | | | | | | | | |
| Improve product choice (e.g. cleaning products) | Paints, cleaning sprays and other synthetic items contribute to high levels of 'volatile organic compounds' which enter the surrounding air and can be harmful to health. To reduce exposure to these toxins, one should buy products that contain Low-VOCs or No VOCs. The impacts can also be minimised by using them in moderation and at times when children are not at school. | х | Х | L | | | | | | | | | L | S | Н | | | |
| Regular service & maintenance of appliances and equipment | | | | | | | | | | | | | | | | | | |
| of appliances and equipment | Ensure boilers and other key appliances are well maintained and regularly serviced so they are operating efficiently and as cleanly as possible. | х | | L | | | | | | | | | L | s | Н | | | |
| Improve school building insulation | | | | | | | | | | | | | | | | | | |
| Improve school building insulation | Review building insulation and seek to improve energy efficiency, reduce heat loss, lessen energy usage, and potentially boiler run-times. Potentially less heat gain in hot weather, lessening need for ventilation via opening doors/windows. | Х | | L | | | | Х | | Х | Х | | L-M | S-M | М-Н | | | |
| Upgrade windows | Upgrade windows where possible to double glazed or add secondary glazing, to reduce heat loss, lessen energy usage, and potentially boiler run-times. Potentially less heat gain in hot weather. | | Х | L | | | | Х | | Х | Х | | L-H | S-M | М-Н | | | |
| Replace temporary classrooms with permanent structures | Where applicable replace temporary classrooms with permanent structures to high standards of energy efficiency and thermal insulation. | х | | L | | | | | | х | х | | н | M-L | М | | | |
| Green Roofs | A green roof can contribute towards improving air quality via the filtering mechanism of the plants and substrate. A Sedum Roof can help both with insulation during colder months and a cooling effect during hotter times. It can also benefit biodiversity including insects and birdlife. | | Х | L | |) | (| | х | | | | М | М | М | | | |
| Ventilation / Air Filtration | | | | | | | | | | | | | | | | | | |
| Installation of Air Conditioning Units | Install air conditioning units to prevent overheating and lessening need for ventilation via opening doors/windows, which worsens exposure to air pollution. | | Х | L | | | | | | Х | | | L-H | S-M | М-Н | | | |
| Introduce Air Filtration Systems | 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. However it should be noted that their effectiveness will be reduced when windows and doors are open. | | Х | L | | | | | | х | | | М | М | М | | | |
| Install HEPA Filters in Air Handling Units | High Efficiency Particulate Filters are filters (in this case fitted to ventilation systems) that will filter air to a high standard. HEPA filters would work with a centralised ventilation system (i.e. air handling unit), but won't have much impact on a school reliant on natural ventilation, such as by opening windows and doors. | | Х | L | | | | | | х | | | L | S-M | М | | | |
| purifiers | in a HEPA filter. An activated carbon filter is required to adsorb gases. The type and size of the carbon is important in achieving effective | | х | L | | | | | | х | | | L-M | S-M | М | | | |
| Other | | | | | | | | | | | | | | | | | | |
| Air quality monitoring and information provision eco- monitors and walking route maps. | linked to air quality monitors which are installed temporarily in schools to provide real-time information on air quality and to provide information on ways to lower exposure. The air quality information could be communicated to children by a nominated 'ecomonitor'. The monitoring information can be used to let pupils know which are the least polluted routes to get home - via maps which pupils can prepare or | х | Х | L | | | | | | | | х | L | S | н | | | |
| | Install Optimising Compensator Control System for School Boilers Boiler flues and extraction equipment Reducing over-heating and tackling heat gain Replace aging radiators Improve product choice (e.g. cleaning products) Improve product choice (e.g. cleaning products) Improve product choice (e.g. cleaning products) Improve service & maintenance of appliances and equipment Regular service & maintenance of appliances and equipment Improve school building insulation Improve school building insulation Upgrade windows Replace temporary classrooms with permanent structures Green Roofs Ventilation / Air Filtration Install HEPA Filters in Air Handling Units Other Air quality monitoring and information provision ecomonitors and walking route | School boilers' heating Weeke and consider registering the cider boilers which were considered to be operating to a fair condition, but an islay to be of limited efficiency and contribute to worsening local air quality. Cinsate replacing the a fair condition, but an islay to be of limited efficiency and contribute to worsening local air quality. Cinsate replacing the little Law NOrgas holder with dy NOremissions on exceeding planned. As whish there are significantly higher costs to install and require remodal works, they will reduce ongoing costs and greatly reduce censives, accessaging to as electricity goverantion become interesting the describations of the contribution of t | Upgade aging bollers Upgade aging bollers | Section Soliterar hearting Service Ser | Section Section | Relevant do consider replacing the clader betters which were considered to be operating to a flar condition, but are likely to be of initised efficiency and contribute to viorienting local air quality. Consider replacing with multipact law NOs gas believe with by NOxemskinms not severally at the public of the | Personal political health | Depends aging bolies Depends aging bolies | Compensation Comp | Selected Selector's heating New and consisted replacing the order toolers which were considered to be opporting to a fair condition, but are shally to be of limited discovery and contribute to investment plots of a supplied to investment plots of a supplied to investment plot of a supplied to investment plots of a supplied to investment plot of a supplied to investment plots o | Receive and consister replacing the older botters which were considered to be operating to a fair condition. But are likely to be of immined indications and combined to severanting both air quality. Consider replacing with an Clase Low ND, pp. bublishes with 60 ND, exceptional product and combined to severanting both air quality. Consider replacing with an Clase Low ND, pp. bublishes with 60 ND, exceptional product and consideration and combined to severanting both air quality. Consideration of the considera | Review and consider explaining the distinct between the considered to be operating to a fair constitute, but are likely to be of finited functions and consider explaining the distinct was explained and provided the second considered to the operating to a fair constitute to washing food and quality. Classifier replacing what is than Law NS.gas before with by NS.censions according to the international and the consideration of t | Reader and consistent represcript the other bolisms which were considered to be operating to a tist condition, but are issay to be of immedia for the condition of the condition | Recience and consideration the control of the contr | School butter hearing Review and consider registering the claim bottoms with wear considered to be operating to a filtr consister, the product of the control of the contr | School briller wheeling News and consider replacing the date beliefs which were considered to be operating to a fair confilling. Let all will be a familiar of the configuration | Schools between wheating Services and consistent regularizing the cloder bolates which were considered to be operating to a fair conductor, but are likely to be of instead officiency and constitute is wearable great and analysis. Considering the property of the conductor and the | Scheller Verbridge (1986) Service and consider replacing the other lockers which were considered to be operating as a fair condition, but are likely to be of finited effectively and contributed to be operating to a fair condition, but are likely to be of finited effectively and contributed to be operating to an all particles of the contributed to be operating to an all particles of the contributed to be operating to an all particles of the contributed to be operated |



Behavioural Measures

| 3. BI | EHAVIOURAL MEASURES (Ke | y Stakeholder: School/ Borough) | | | | | | | | | | | | | | |
|-------|---|---|---|---|---|---|---|--|---|---|---|-----|-----|---|---|--|
| T1 | Attain improved STARS accreditation status, ultimately Gold status. | Strive for an improved STARS status, which would entail delivering a range of measures promoting active travel and reduced emissions. The STARS framework also helps document and track progress, and implement recommendations. | х | | L | | | | | х | | L | S-M | Н | | |
| T2 | Promote cleaner walking routes to school | Encourage children to approach the school using routes that minimise exposure to the most polluted areas, using parallel side streets and off-street green routes where possible. Utilise apps such as www.walkit.com to produce bespoke walking route plans for pupils. | Х | Х | L | | Х | | | Х | Х | L | S | Н | | |
| Т3 | Promoting Park & Stride | Promote park & stride amongst the parents and children. A waking bus from the site would entail some additional staff costs. | Х | | L | | Х | | | X | Х | L | S-M | Н | | |
| T4 | Promoting car sharing | Make use of websites such as Liftshare.com to help find prospective car sharing partners, or the school could act as a forum to manage car sharing amongst the school community. | Х | | L | | Х | | | | Х | L | S | Н | | |
| T5 | Walking Route Maps / Leaflets | Pupils are exposed to polluted streets while walking to/from the school. Maps could be created to highlight the least polluted routes. This should be done in conjunction with leaflets raising awareness about the science behind air pollution and its effects, with pupils involved with the design and development of the leaflets, including drawings. | | Х | L | | х | | | х | x | L | S | Н | | |
| Т6 | Parent and Public Workshops | Hold parent and public workshops to educate the community on the problems associated with air pollution and the type of measures that can have a positive impact on reducing poor air quality | Х | Х | L | | | | | х | Х | L | S | Н | Υ | |
| T7 | Prepare 'Welcome Packs' for new pupils / parents | 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. | Х | Х | L | Х | Х | | | х | Х | L | S | Н | Υ | |
| T8 | Deliver Air Quality focused lesson/s to children | Deliver air quality related lesson plan with bespoke materials, and London school curriculum, raising awareness of the issues and the type of measures that can have a positive impact on improving air quality. Lesson plans are available from sources inclusing LSx and as part of National Clean Air day resources. | х | Х | L | | | | | х | х | L | S | Н | Υ | |
| Т9 | Awareness raising session amongst staff | Awareness raising session amongst staff about managing air quality through classroom ventilation and heating, including practical guidance | Х | Х | L | | | | | х | | L | S | Н | | |
| T10 | Daily monitoring of London Air website/ app | Daily monitoring of London Air website / app to understand air quality on the day and whether e.g. opening of windows, will increase exposure of air pollution to staff and students. | Х | Х | L | | | | Х | х | | L | S | Н | | |
| T11 | Add Air Quality to Junior Citizenship Scheme | Junior Citizenship Schemes are run in a number of boroughs for Year 6 students (and occasionally Year 5s). Schemes are run either by the Safety and Citizenship team or by other agencies, such as the Metropolitan Police or local boroughs. Pupils complete a circuit of scenarios in small groups, learning through experience and real-life risk situations that test their ability to make responsible decisions. Different scenarios involved might include: Travelling by bus, Underground, Road safety. Sessions focus on developing respect, responsibility and awareness in young travellers, including: Awareness of possible dangers and personal safety, Journey planning and Active travel choices (such as cycling, walking). An additional module could be added on the topic of air quality, its causes, impacts and measure to reduce sources and exposure. | X | Х | L | | | | | x | | L | S | н | | |
| T12 | Anti-idling campaign | Awareness raising campaign to reinforce and refresh the effectiveness of existing signage, including a banner, combined with enforcement. Develop an awareness raising banner and leaflets incorporating designs by the children. Also request that bus and coaches turn their engines off when waiting for extended periods, i.e. laying over or waiting to collect children. | Х | | L | | | | | x | x | L | S | Н | | |
| T13 | Attain an improved Award in Healthy Schools London, ultimately a Gold Award | This will entail reviewing the school's practices in promoting health & wellbeing that must be evidenced (via a Review Tool). | х | Х | L | | | | | х | x | L | S-M | н | | |
| T14 | Awareness raising events amongst the wider community | Raise awareness on the issue of air quality amongst the wider community at a borough or neighbourhood level, through events and programme such as Lambeth Sustainability Week. | Х | х | L | | | | | х | | L | S-M | М | | |
| T15 | Cycle training and promotional initiatives | Cycle training and other promotional measures can be provided to the school children, but also to staff, as detailed on the STARS website. Additionally where new cycle routes such as Cycle Superhighways are completed close by to schools, these can serve as an additional focus for promoting greater travel by cycling. | Х | | L | х | х | | | | х | L | S | М | | |
| T16 | Gamification to promote active travel | Gamification tools can be effective in promoting active travel. Beat the Street' is a community-wide programme which aims to improves the health and wellbeing of these areas by getting people of all ages moving. Participants collect a Beat the Street RFID card to tap them against sensors called 'Beat Boxes' located on lamp posts across the area. Players receive points for each box they tap and receive prizes for tapping the most boxes; this motivates entire schools, community groups and businesses into becoming more active. | х | | L | | х | | | | x | L-M | М | М | | |
| T17 | Restrict or reduce personal deliveries | Personal deliveries to workplaces accounts for a significant proportion of total freight traffic in London and their associated emissions. Restricting staff related deliveries to the school and promoting the use of 'Click & Collect' or 'Pick-up, drop-off' (PUDO) centres like Doddle can contribute towards enhancing air quality by reducing vehicle mileage, and removing the emissions from the school. | Х | | L | | | | | | | L | S | М | | |
| | CPD supporting teachers subject knowledge on air quality | Awareness raising session amongst staff about the impacts / costs of heating classrooms and share best practice. The Mayors London Curriculum Programme offers a wide range of high-quality teaching resources supporting most subjects on the national curriculum, CPD for teachers and events for children. A programme of targeted activity for air quality is being assembled to be delivered through the London Curriculum, with a focus on supporting 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. | Х | X | L | | | | | x | x | L | S-M | М | | |
| T19 | Walking Buses | A walking school bus is a group of children walking to school with one or more adults, and can be as informal as two families taking turns walking their children to school to as structured as a route with meeting points, a timetable and a regularly rotated schedule of trained volunteers. A bicycle train is a further variant on this, with adults supervising children riding their bikes to school. These can be planned in conjunction with cleaner walking routes to school initiatives to avoid the most polluted streets where possible. This would count as a STARS Other Walking Activity' and could contribute to progress. | Х | | L | | х | | | х | х | L | S | М | | |



Wider Measures

| | | | Purp | ose | ŧ | | ١ | Nider | Benet | fits | | | | | | | Suitab | ility |
|------|--------------------------------|---|----------------|-----------------|---------------------------------|------------------------------------|------------------|-----------------|--------------|-------------------------------|-------------------------|--|------|----------------|---------------------|--------------------|------------|-------------|
| | Toolkit Measures | Description | Reduce Sources | Reduce Exposure | Potential Air Quality Improveme | Promotion of sustainable transport | Security privacy | Noise reduction | Biodiversity | Improved learning environment | Reduced operating costs | Awareness raising Support STARS and HSL objectives | Cost | Deliverability | Stakeholder Support | Suitable for trial | Main roads | Minor Roads |
| 4. V | DER MEASURES (Key Stakeh | older: Borough/ TfL/ GLA/ Central Government) | | | | | | | | | | | | | | | | |
| U1 | or polluting vehicles entering | 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. | Х | | Н | | | | | | | | Н | L | L | | | |
| U2 | | Lobby national government to reform Vehicle Excise Duty to reflect emissions of local pollutants as well as CO2, and remove the ongoing incentivisation this lends to diesel vehicles. | Х | | Н | | | | | | | | М | L | L | | | |
| U3 | neating 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. | х | | Н | | | | | | | | М | L | L | | | |
| U4 | | Support and promote dialogue at a national level conceming 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. | Х | | М | | | | | | | | М | L | L | | | |
| U5 | 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. | х | х | Н | | | | | | | | Н | L | L | | | |

