The Mayor of London's Nursery Air Quality Audit Programme

Clyde Nursery School, London Borough of Lewisham

FEBRUARY 2020

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Clyde Nursery School – London Borough of Lewisham

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DISCLAIMER

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

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NON-TECHNICAL EXECUTIVE SUMMARY

Long-term exposure to poor air quality contributes to thousands of premature deaths in London. The Mayor wants London to have the best air quality of any major world city by 2050. Young children are amongst the most vulnerable to air pollution's effects. Toxic air can stunt their growth, causing significant health problems in later life.

In May 2018, the Mayor launched a programme of air quality audits to help clean up toxic air and protect the health of young children in 20 nurseries in some of London's most polluted areas.

The **Air Quality Audit** followed a structured approach, with desktop research and air quality modelling, followed by fieldwork and air quality monitoring. Recommendations were then developed based on the consultations with nursery staff and borough officers.

The audit has assessed both outdoor and indoor air pollution levels.

Outdoor pollutants are generated by industrial processes and traffic emissions, and can migrate indoors through windows, doors and other means of ventilation.

Indoor air pollution arises from a mixture of pollutants generated inside a building including building materials and furnishings, and through activities such as cooking, heating, smoking and use of paints, varnishes, cleaning products and air fresheners.

Indoor air pollution is still a relatively new area of study, and our understanding is still evolving as further evidence is collected on the complex interactions taking place, and the extent to which they affect our health.

Audit Findings

Nitrogen oxides (NOx) - Short-term exposure to concentrations of NO_2 can cause inflammation of the airways, increasing susceptibility to respiratory infections and to allergens.

The results of the three-month baseline monitoring showed that NO_2 concentrations were found to be highest at the **roadside** (35.62μg/m³), with local road traffic emissions contributing significantly to roadside concentrations.

The three months of baseline NO_2 monitoring provides a snap-shot of concentrations in and around the nursery. However, in each month, the measured NO_2 concentrations did not exceed the annual mean NO_2 national Air Quality Objective (AQO) of 40μg/m³.

NO_2 concentrations fall to 30.82μg/m³ in the **playground**, which is set back from Evelyn Street and screened from traffic by the nursery building. Concentrations at the **nursery entrance** are of a

similar level (31.02µg/m³) to the playground. Whilst concentrations were found to be below national legal limits, known as Air Quality Objectives, there is no 'safe' level and children would still benefit from further reductions. Children will also be adversely affected by their journeys to and from nursery.

Inside the nursery, concentrations fall to 20.69µg/m^3 at the nursery entrance and 18.51µg/m^3 in the classroom.

Volatile Organic Compounds (VOCs) are emitted from vapours arising from petrol and solvents. In a nursery setting are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. Exposure can cause irritation to the eyes and upper airways. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs[1]) concentrations should be below 300 µg/m^3. In Clyde they were found to be 313.3 µg/m^3. VOC chemical species in the Clyde Nursery were identified as being likely to be indoor pollutants, and included fragrances, perfumes and alcohols, likely to be products derived from use of cleaning materials and solvents.

Formaldehyde are emitted from vapours arising from solvents and adhesives. In a nursery setting these are likely to originate from glues, adhesives and finishing's. Exposure can cause burning sensations of the eyes, nose, and throat, coughing, wheezing, nausea and skin irritation. The World Health Organisation (WHO) indoor air quality guideline[2] for short- and long-term exposures to formaldehyde is 100 µg/m^3. In Clyde they were found to be 5.9 µg/m^3.

> Overall the monitoring found that indoor air quality at the nursery met legal standards, however there are no entirely safe levels of exposure to harmful pollutants, and the children would still benefit from further reductions.

The wider area around the nursery was assessed using the London Atmospheric Emissions Inventory (LAEI), which showed that pollution levels reducing with distance, away from the heavily trafficked Evelyn Street. NO$_2$ **concentrations are predicted to be highest along the eastern boundary of the nursery**, which is closest to the main road.

Particulate Matter (PM$_{10}$ and PM$_{2.5}$)[3] is derived from a wide range of sources, including industrial processes, road traffic, dust and brake and tyre wear. The fine component of PM$_{10}$, known as PM$_{2.5}$, is formed by combustion and is believed to be the main cause of the harmful effects of particulate matter.

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[1] TVOC is a grouping of a wide range of organic chemical compounds to simplify reporting when these are present in ambient air or emissions.

[2] Chapter 5.8 Formaldehyde. WHO Air Quality Guidelines – Second Edition, 2001

[3] PM$_{10}$ is particulate matter with an aerodynamic diameter of less than 10 micrometres (10µm). PM$_{2.5}$ is particulate matter with an aerodynamic diameter of less than 2.5 micrometres (2.5µm).

Nearly 50% of NOₓ emissions in London are from road transport. Larger diesel vehicles in particular are major contributors to local air pollution. Approximately **17,300 vehicles per day travel** within 200m of the nursery. Buses make up only 4% of these vehicle movements, but contribute 32% of the transport related NO_x emissions locally. Similarly, HGVs only account for 4% of the total traffic but contribute 22% of emissions. Cars account for 26% of emissions.

Key observations – summary of potential issues

- Heavily trafficked roads nearby with large numbers of car, vans, buses and HGVs; traffic volume at highest rate during morning peak-hour or due to traffic delays at Rotherhithe and Blackwall Tunnels;
- Key sources of pollutions include idling vehicles on A200 Evelyn Street; the high volume of HGV's and construction traffic to local committed developments adds to this impact;
- Use of Rolt Street as a turning point is noted to cause obstructions to both the staff car park and emergency vehicle access point.
- Slightly circuitous pedestrian routing from the north/east via a narrow path with no active frontages and limited lighting, which may discourage parents from walking to nursery.
- The majority of classroom spaces are located away from primary sources of pollution; however, the requirement for natural ventilation of the building year-round is increasing exposure to pollution on a regular basis;
- The Rose Garden backs onto the northern section of Rolt Street by the staff car park access. The Rose Garden is the closest space used by students to the A200 Evelyn Street, therefore is observed as an area with the highest likelihood of exposure to air pollution.
- In places, the poor condition of heating control units is causing overheating of the building, leading to energy inefficiencies and increased exposure to external pollution from boilers as windows remain open to offset excess heat.

Audit Recommendations

The Mayor is implementing a significant programme of London-wide measures to improve air quality, including the introduction of the Ultra-low Emission Zone, tougher emission standards for the London wide Low Emission Zone, and the introduction of low emission buses, which will contribute significantly to addressing some of the issues identified.

Based on the preceding desktop research, site audits and stakeholder feedback, a range of **recommended measures and initiatives** have been identified. See Table 4 for full list of measures. Some of the more key measures were considered to be:

- **Additional pedestrian entrance, reduced on-site parking and green screening** - Consider introducing a new pedestrian entrance direct from Evelyn Street through the staff car park. This would remove the need for many parents and children to use the path to the rear with no active frontages and limited lighting, and may encourage more parents to walk to nursery. It would also slightly reduce the period of exposure when walking to the nursery. This could be delivered in combination with initiatives to encourage parents to approach the nursery along less polluted routes, for example minimising walk times along Evelyn Street by taking parallel routes where possible. In combination with the new entrance, green screening/climbers could be installed on the chain link fencing on the car park perimeter fronting on to Evelyn Street.
- **Improved heating and insulation** - Review scope for improving building insulation, reducing heat gain in hot weather, **replace aging radiators** and pipework where they are inefficient and

will have a low heat-transfer. **Upgrade windows** where possible to double glazed or add secondary glazing, to reduce heat loss, lessen energy usage, and potentially boiler run-times. Reducing energy usage, and potentially boiler run-times and associated emissions.

- **Parking Management** - Investigate introducing a number of formal parking bays and restrictions on Rolt Street where parking is not appropriate, to prevent unsafe parking obstructing fire access and to discourage frequent turning and engine idling next to the Nursery. Coupled with **increased patrolling and enforcement to discourage parking on the school keep clear markings** This can be done in parallel with an **anti-idling 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.

Next Steps

In working with the nursery and air quality and transport borough officers to complete the air quality audit, we found there to be a passionate group of individuals, who were enthusiastic about improving local air quality for the children, and the wider community as a whole. The **borough and nursery should investigate the scope for rapidly delivering key measures** from the recommendations. To take forward the recommendations, the nursery and borough council will need to continue to work closely, building on the

relationships already in place. A wide range of **potential funding** sources are identified within the report (See Appendix F), and borough councils and nurseries are encouraged to apply for these where appropriate to maximise the potential for delivering the recommendations.

To take forward the recommendations, the nursery and borough will need to continue to work closely, building on the relationships already in place. A wide range of **potential funding** sources are identified within the report (See Appendix F), and boroughs and nurseries are encouraged to apply for these where appropriate to maximise the potential for delivering the recommendations.

Each nursery will be given a starter grant of £4,500 by the GLA to help kick-start the implementation of recommendations. The GLA will liaise with the nurseries and boroughs to agree which recommendations the grant will be used for.

Summary of Nursery related recommendations

The full range of recommendations primarily applicable to the nursery, as opposed to highways measures to be delivered by the borough council or TfL, are as follows. See Table 4 for further details on these measures.

Nursery Grounds

Additional Pedestrian Entrance and reduce on-site parking
Green Screening
Additional buggy/ scooter/ cycle parking
Electric Vehicle Charge Point

Nursery Building

Improved heating and insulation
Replace aging radiators
Installation of Air Conditioning Units
Upgrade windows
Add indoor plants
Review purchasing choices and switch to low-VOC content furnishings
Switch to lower VOC cleaning products
Considering replacing the boiler with a Heat Pump

Behavioural Measures

Promote cleaner routes to the nursery
Achieve Gold accreditation in STARS
Engagement Activities
Attain a Gold Award in Healthy Early Years London scheme
Staff Engagement
Prepare 'Welcome Packs' for new pupils / parents
Anti-idling campaign
Monitor London Air website / app

1. INTRODUCTION

1.1. BACKGROUND

1.1.1. Long-term exposure to poor air quality contributes to thousands of premature deaths in London. There is strong scientific evidence of the acute health effects of short-term exposure to very high pollution levels experienced during air pollution episodes.

1.1.2. Tackling air pollution is one of the Mayor of London's top priorities, and he recognises that co-ordinated action is required to reduce exposure, especially amongst the most vulnerable such as young children, whose lungs are still developing.

1.1.3. The London Environment Strategy, published in May 2018, seeks to reduce the number of Londoners whose lives are blighted by poor air quality. The mayor wants London to have the best air quality of any major world city by 2050, going beyond the legal requirements to protect human health and minimise inequalities. This include commitments to act to improve air quality in and around schools and nurseries and provide enhanced information to Londoners.

Why Nurseries?

1.1.4. The Mayor is particularly concerned about the impacts of poor air quality on vulnerable groups such as children, the elderly and those with pre-existing health conditions such as asthma and cardio-vascular diseases. Young children are amongst the most vulnerable of the at-risk groups, as their lungs are still developing, and toxic air can stunt their growth, causing significant health problems in later life. The World Health Organization (WHO) also recognises younger children as being a vulnerable group to air pollution, making nurseries a key consideration in improving air quality.

1.1.5. A study led by Kings College in East London found that primary school children had on average 5% lower lung capacity than those growing up in rural areas. A UNICEF report published in December 2017 highlights the impact of air pollution on the critical growth that occurs in the brain in the first 1,000 days of life, making children exposed to pollution more vulnerable to developmental problems. UNICEF estimate that 17 million children globally are breathing air so toxic it is affecting their brain development. Air pollution exacerbates asthma, which affects 1 in every 11 children in England.

The Mayor's Nurseries Air Quality Audits

1.1.6. In May 2018, the Mayor launched a programme of air quality audits to help clean up toxic air and protect the health of young children in 20 nurseries in some of London's most polluted areas. The nurseries were selected based on assessments of predicted annual mean nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) levels near the nursery, and in agreement with the respective local authority.

1.1.7. The aim is to establish a robust process and toolkit of measures, which the London boroughs and nursery schools can roll out, so that every nursery that is located in an area of high pollution can benefit from this approach.

1.1.8. This programme builds on the approach founded in the Mayor's School Air Quality Audit Programme completed in March 2018, and the audit reports the Mayor recently commissioned on indoor air quality in London's primary schools, which included the Toolkit of Measures to Improve Air Quality at

Schools.[4] The programme is led and funded by the Greater London Authority (GLA) and the audits were conducted by global engineering consultancy WSP, who have visited each of the nurseries, assessing indoor and outdoor air pollution sources, and how children travel to the nurseries.

1.1.9. Road transport is a major contributor to emissions, and has a significant impact on air quality, accounting for around half of NO_x emissions. Whilst private car use is decreasing, congestion is increasing[5]. Without significant intervention, as the Capital grows rapidly these trends are set to continue.

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

- **The Ultra Low Emission Zone** (ULEZ) launched in central London on 8 April 2019. It replaced the T-Charge (Toxicity Charge) and means that vehicles that do not meet the strict ULEZ emissions stands are charged to drive in the zone, 24 hours a day, every day of the year. It is expected that the ULEZ will reduce road transport emissions of nitrogen oxides (NO_x) by around 45 per cent in the central London zone.
- **Expanding the ULEZ and tightening the Low Emission Zone (LEZ).** The ULEZ will expand to inner London, up to the North and South Circulars, in October 2021, and emissions standards for heavy vehicles in the London-wide LEZ will be tightened (to Euro 6) in October 2020.
- **Cleaning up London's buses.** The Mayor is transforming London's bus fleet with a retrofit programme covering thousands of buses, and only procuring hybrid or zero emission double decks since 2018.
- **Cleaning up the taxi fleet**. From 2018, TfL has stopped new diesel taxis from being licensed in London and all new taxis need to be zero emission capable. TfL provide financial incentives to enable this switch to cleaner taxis and over 175 rapid charge points have been installed, with many dedicated to the trade.
- **Low emission neighbourhoods –** have been funded across London to pioneer measures to promote the use of low emission vehicles and improve local air quality, including low emission

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[4] https://www.london.gov.uk/sites/default/files/school_aq_audits_-_toolkit_of_measures_dr_v3.3.pdf

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

- vehicle only streets, measures to promote deliveries by cycle cargo bikes and low emission vehicles, and bold proposals to promote walking and cycling.
- **The London Environment Strategy** – is an ambitious strategy, with a particular focus on air quality published in 2018, and seeks to address the most urgent environmental challenges facing London, to safeguard its environment over the longer term. This strategy establishes aims for London, which include having the best air quality of any major city, and a zero-carbon city by 2050, with energy efficient buildings, clean transport and clean energy. The Mayor is providing funding through his Greener City Fund to create and improve green spaces and to plant trees.
- **The Draft London Plan -** published in November 2017, places a considerable emphasis on air quality. The aim of policies is to ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality.
- **Healthy Streets Approach** - the Mayor is embedding the 'Healthy Streets' approach in transport strategy. This promotes a holistic approach to improve the health, liveability, social cohesion and economic prosperity of an area.
- **The Mayor's Transport Strategy 2018 -** The Mayor has set out ambitious plans to improve transport in London over the next 25 years. The Mayor's ambition for 80% of trips in London to be made on foot, by cycle or using public transport by 2041, and a commitment to make the entire transport system zero-emission by 2050.

1.1.11. These measures are already starting to have a measurable impact on pollution levels in London. However, the Mayor also wanted to take early action at 20 nurseries located in areas with some of the highest air pollution levels, so has provided £250k funding to commission this programme.

1.1.12. The Mayor's Nurseries Air Quality Audits Programme follows the approach developed as part of the Mayor's School Air Quality Audit Programme, identifying a combination of hard-hitting measures and quick win improvements, to minimise the impacts of toxic air on nursery children in some of the worse affected areas across London. This is both in terms of reducing the sources of harmful emissions, as well as reducing the exposure to these emissions.

1.2. OBJECTIVES

1.2.1. The key objectives of the Mayor's Nurseries Air Quality Audit Programme are to:

- Audit and identify the sources of poor outdoor air quality and exposure by children at 20 state-funded nurseries and their surrounding nursery catchment areas, including NO_2, PM_{10} and $PM_{2.5}$.
- Audit and identify the sources of poor indoor air quality and potential exposure by children attending the nurseries, and establishing a baseline of indoor air quality.
- Assess the feasibility of installing air filtration systems at the selected nurseries' sites.
- Trial and monitor the effectiveness of air filtration systems in at least 5 of the nurseries sites.
- To identify, evaluate and recommend measures within and around the nurseries' that will help a borough and nursery to reduce particulate matter, emissions and children's exposure to poor air quality, and award grant funding to deliver some of the recommended measures.
- To engage nursery communities and raise awareness about the impacts of air pollution, including an introduction to Transport for London's STARS programme and the GLA's Healthy Early Years London Programme.
- To engage eligible London boroughs and other relevant stakeholders to inform the context and feasibility of the proposed recommendations.

2. AUDIT APPROACH

2.1. OVERALL AUDIT APPROACH

2.1.1.   The Mayor's Nurseries Air Quality Audits follow the structured approach established through the preceding audit programme of Primary Schools, but this time included air quality monitoring of both indoor and outdoor air pollution. The structured approach the audit followed is summarised in Figure 1 below.

Figure 1 – Overview of Approach
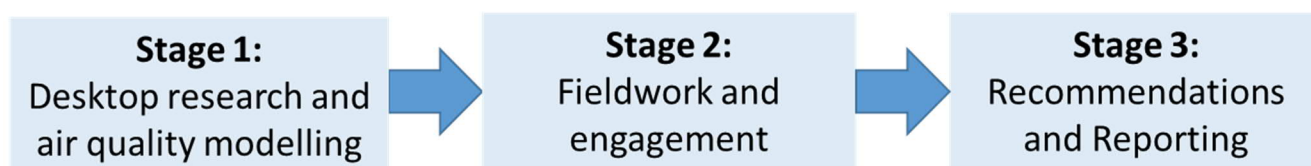
2.1.2.   Each audit consists of broadly three key stages:

Stage 1: Desktop research and air quality modelling

2.1.3.   Prior to the site visit **air quality modelling** was undertaken for the area around the nursery, with an assessment of the contribution to emissions made by each vehicle type on the roads around the nursery.

2.1.4.   A **desktop review** of the local areas around the nursery site, and the wider catchment was also undertaken, to highlight key features for the auditor to assess further on site. This includes sources of pollution, causes of exposure, and notable features in the local area which may have a bearing on the potential mitigation measures (i.e. bus routes, pedestrian crossing locations, nearby construction sites, physical barriers such as railways or rivers). The nurseries STARS[8] travel plan progress was also reviewed for reference ahead of the audits.

Stage 2: Fieldwork and consultation

2.1.5.   A site visit to the nursery was undertaken by the WSP auditor and officers at the borough who deal with air quality, transport planning and school/ nursery travel.

2.1.6.   Observations were undertaken with the borough officers and nursery staff during the peak arrival/ departure time, to capture as much information as possible on drop-off and waiting activity in and around the nursery, **identifying external sources of emissions** close to the nursery, and the areas where the children are exposed to poor air quality when approaching the nursery.

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

2.1.7.   The external observations were then followed by an **audit of the building and grounds** which was undertaken with the assistance of the facilities manager, to enable the auditor to familiarise themselves with its layout, and the proximity of classrooms and playgrounds to areas of poor air quality. The audit included a review of the nurseries boilers, and considered features likely to lead to emissions of indoor air pollutants, such as building ventilation, evidence of fresh air intrusion, and identifying use and location of potential pollutant sources.

2.1.8.   A key element of the audits was to capture the views of nursery staff, the wider nursery community, and relevant borough officers, to gain an understanding of operational considerations, behavioural traits and recent history of the nursery.

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

2.1.10. Nursery staff were also consulted regarding what they felt would be the most suitable and effective form of **engagement activity**, which could be undertaken at the nursery to raise awareness of air pollution, its causes, the health impact, and a range of measures to reduce air pollution.

2.1.11. A 3-month baseline **air quality survey** was undertaken to monitor Nitrogen Dioxide (NO_2), Formaldehyde and Volatile Organic Compounds (VOCs) at sites both inside and outside the nursery building, in order to capture any attenuating influence the indoor environment may have on NO_2 concentrations.

Stage 3: Recommendations and Reporting

2.1.12. The auditor reviewed the findings of the audit and preparatory assessments, with the specialist support of air quality, transport planning and buildings specialists, to develop advice and recommendations. The auditor was also able to draw on an updated version of the toolkit of best practice measures and case study examples, developed for the previous primary school audit programme.

2.2. AUDIT SCHEDULE – CLYDE NURSERY SCHOOL

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

Table 1 – Audit Details

Date of Audit	Monday 10th December 2018	
Nursery Representatives	Cathryn Kinsey (Headteacher), David Thurkle (Premises Officer)	
Borough Representatives	Chris Howard (Senior Environmental Protection Officer)	
WSP Auditors	Matt Croucher, Josh Milne	
Itinerary	**Timings**	**Description**
	1300 - 1330hrs	Initial observations and site familiarisation by WSP auditors
	1330 – 1430hrs	Audit of building and grounds to appreciate the layout of the building/playgrounds etc. accompanied by the bursar/caretaker
	1430 – 1530hrs	Site walk and observations with borough air quality officers/ school transport officer/ nursery staff
	1530 – 1630hrs	Brainstorming Workshop with key staff from the nursery and borough officers.
	1630 - 1700hrs	Further observations and completion of site audit template

3. CONTEXT AND INITIATIVES

3.1. NURSERY CONTEXT

Figure 2 - Nursery Context

Borough: Lewisham

Address: Alverton St, SE8 5NH

Pupil Numbers: 135

Age Range: 3-5 years

Gender Mixed

Type: Local authority nursery school

Deprivation Rank: 1

Children attending Full Time/ Part Time:

Part Time

Full Time
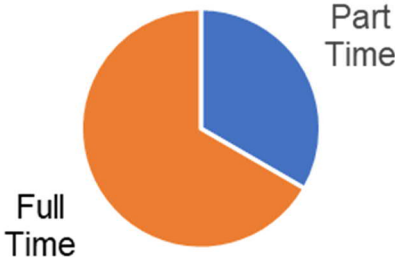
Children with disabilities or special educational needs:

Higher than average

Children who speak English as an additional language:

Higher than average

3.1.1. **Clyde Nursery** is located in South London and within the Borough of Lewisham.

3.1.2. At the time of the audit the nursery had **99 children** in attendance, of which around two thirds are full time (30 hrs per week), and the remainder are part time (15hrs per week).

3.1.3. The nursery is site near Evelyn Street, with the main entrance accessed from **Alverton Street**, a 20-mph street.

3.1.4.   Approximately **17,300 vehicles per day travel** on the core roads within a 200m radius of the nursery[9]. This is within the 1st quartile in terms of traffic volumes amongst of the 20 nurseries assessed as part of this programme For context, in the UK in 2017[10] the average traffic flow on urban minor roads was 2,100 vehicles, and 19,200 vehicles on an urban A-road.

3.1.5.   Whilst no formal data was available, the nursery staff report that the **majority of children walk** to the nursery, and a number cycle or scoot. They estimated that around 33% of children travelled to the nursery by car.

3.1.6.   The **nursery staff** estimated that around 70% of staff drive to work.

3.1.7.   Staff explained that there has been a **decline in the number of children** attending the nursery in recent years, due to broader trend towards declining birth rates in the borough.

3.1.8.   The **nurseries catchment area has expanded** over recent years, including more children travelling from outside of the borough.

3.1.9.   They also noted that the increasing number of part time rather than full time children result in a greater number of movements to and from the nursery over the course of a day. Staff felt that the increasing availability of leasing options for private cars had enabled more parents to travel by car in recent years.

3.1.10. The nursery staff also explained the **funding challenges** they face, meaning they are increasingly limited to only providing core provision, and cannot afford supplementary activities such as taking children off-site on visits.

3.1.11. The subsequent two pages illustrate the context of the nurseries within the local area.

- The **outer context** plan highlights key roads and land uses in the area, including the frequencies of buses, as well as other notable sources of air pollution. The figure also illustrates the key walking routes taken by the children when approach the nursery.
- The **inner context** plan provides detail on the main accesses (both pedestrian and vehicular) to the nursery, and the location of the playgrounds where children are most exposed to air pollution.

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[9] The traffic flows and vehicles splits presented are based on the average number of vehicles on each LAEI modelled road link within 200m radius of the nursery in the LAEI 2013 base.

[10] DfT Road Traffic Estimates: Great Britain 2017 (2018)

Figure 3 – Outer Context Plan

Evelyn Street

47 (6/hr each way)
188 (8/hr each way)
199 (6/hr each way)
N1 (2/hr each way)
N199 (2/hr one way)

Gosterwood Street

Grove Street

Sayes Court Street

Rolt Street

47 (6/hr each way)
188 (8/hr each way)
199 (6/hr each way)
N1 (2/hr each way)
N199 (2/hr one way)

Childers Street

47 (6/hr each way)
188 (8/hr each way)
199 (6/hr each way)
N1 (2/hr each way)
N199 (2/hr one way)

Key

⭐ Clyde Nursery School

🚏 Bus Stop

➜ Bus Route

— Cycle Route

🚉 Train Station

Ⓤ Underground Station

▮ Local Centre

▮ Green Space

⛽ Petrol Station

↔ At-grade Pedestrian Crossing

— Key Pedestrian routes to school

← Pedestrian Access

== Rail

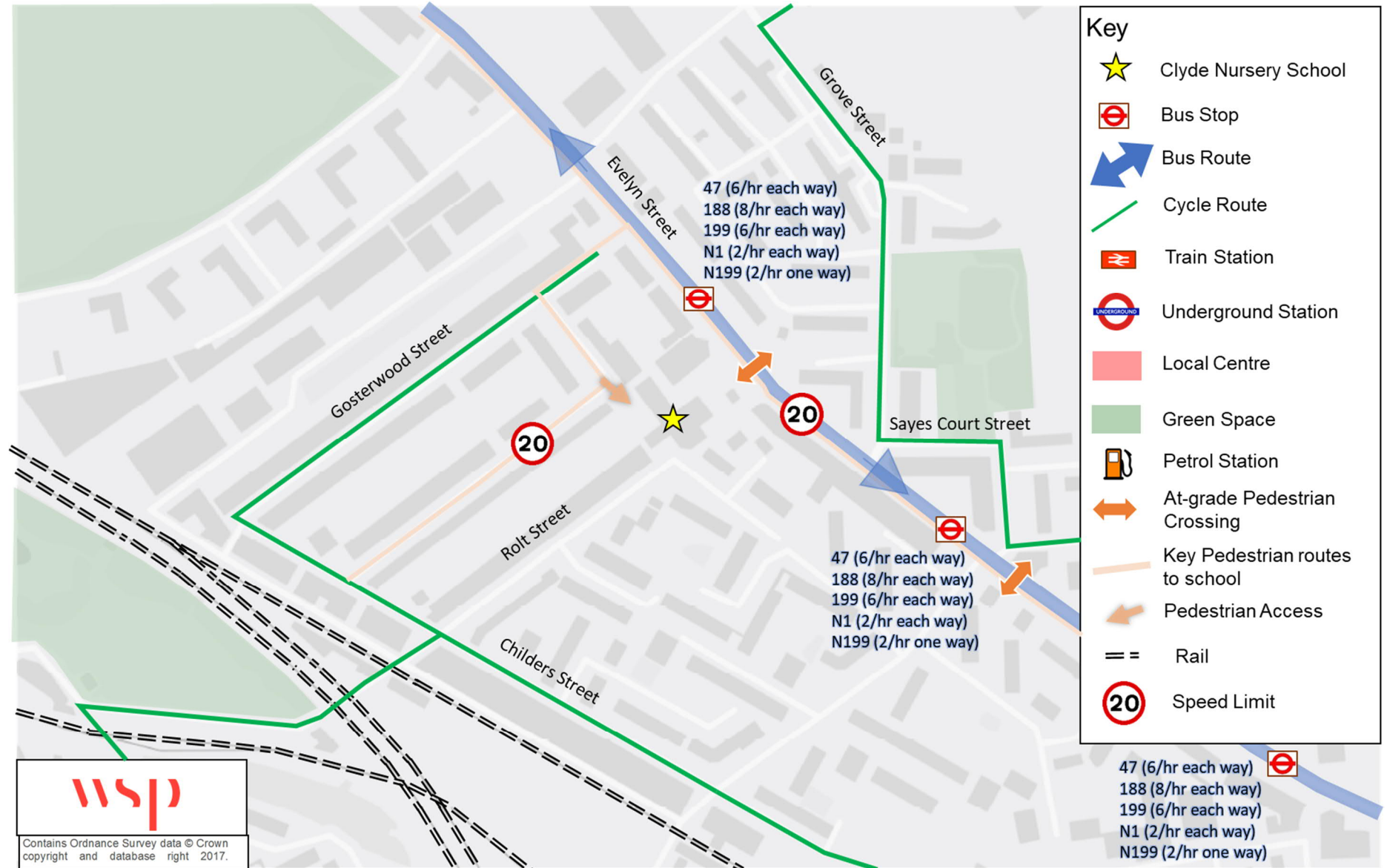20 Speed Limit

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Figure 4 – Inner Context Plans

3.2. PLANNED SCHEMES & RECENT INITIATIVES

3.2.1. There are number of major developments planned or under construction within the immediate locality of the nursery, including:

THE TIMBERYARD DEPTFORD

3.2.2. The Timberyard development, current under construction, can be found north of the nursery to the east of Evelyn Street opposite Deptford Park. The development will deliver a total of 1132 dwellings upon completion across six neighbourhoods. Additionally, a selection of retail and office land use will be provided.

Potential impact of development:
- ▪ Air pollution associated with construction activity.
- ▪ Potential for additional traffic once completed.

CONVOYS WHARF

3.2.3. The Convoys Wharf development is the single largest in the Borough of Lewisham, found east of the nursery on the southern bank of the River Thames. The development will provide up to 3500 dwellings, a hotel and a variety of retail land use space. Additionally, the development will provide approximately 1800 car parking spaces alongside public transport improvements, including a river bus service and new bus routes.

Potential impact of development:
- ▪ Air pollution associated with construction activity.
- ▪ Potential for additional traffic once completed.

DEPTFORD FOUNDRY

3.2.4. Deptford Foundry is located southwest of the nursery, where the planned development seeks to provide up to 276 dwellings and commercial employment space.

Potential impact of development:
- ▪ Air pollution associated with construction activity.
- ▪ Potential for additional traffic once completed.

THAMES TIDEWAY TUNNEL

3.2.5. The Thames Tideway Tunnel is a major project being undertaken by Thames Water. A new 25-kilometre interception, storage and transfer tunnel is being constructed, running up to 65 metres below ground and below the River Thames. There are two major works sites within Lewisham, one at Earl Pumping Station and one at Deptford Church Street. The scheme is expected to be complete in 2020, though it could take a further two years to complete and commission the whole tunnel system.

Potential impact of development:
- ▪ Air pollution associated with construction activity.

WIDER SCHEMES

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

3.2.6. The recently launched ULEZ will operate 24 hours a day, 7 days a week within the same area as the current Congestion Charging Zone (CCZ). All cars, motorcycles, vans, minibuses, buses, coaches and heavy goods vehicles (HGVs) will need to meet exhaust emission standards, or pay a daily charge. In the case of petrol cars and vans this means Euro 4, and Euro 6 for diesels. HGVs and coaches are also Euro 6. Further details on emissions standards and classification of vehicles can be found through TfL.

3.2.7. The London-wide Low Emission Zone (LEZ) is being tightened to a Euro VI emissions standard for heavy duty vehicles (buses, coaches, Heavy Goods Vehicles (HGVs) from October 2020. The ULEZ will be expanded for light duty vehicles (such as cars, vans and motorcycles) so that all vehicles are subject to emissions standards, within an area roughly bounded by the North and South Circular Roads, from October 2021. It is forecast that an expanded ULEZ and tighter LEZ standards will result in 20 per cent less harmful nitrogen oxide (NOx) from road transport in the borough from 2021.

Impact of scheme:
▪ Reduced air pollution as more polluting vehicles are discouraged from travelling in the ULEZ.

LOW EMISSION BUSES

3.2.8. Since 2018, all new double deck buses are hybrid or zero emission. The Mayor has also launched an £85m programme to upgrade around 5,000 buses so that the entire fleet meets the Euro VI emissions standard in 2020. Around 75 per cent of all TfL buses – including all buses operating in the ULEZ – now meet or exceed the strict ULEZ emission standards. By October 2020 every TfL bus in London – over 9,000 buses - will meet or exceed the ULEZ standards. This will mean that next year the entire city will become a Low Emission Bus Zone.
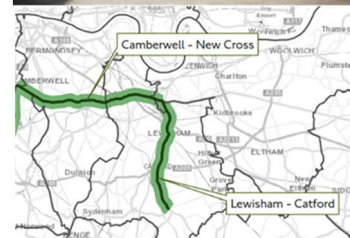
3.2.9. **TWELVE NEW LOW EMISSION BUS ZONES ARE BEING INTRODUCED IN AREAS WHERE LONDONERS ARE EXPOSED TO SOME OF THE HIGHEST LEVELS OF NITROGEN DIOXIDE POLLUTION. THE MAYOR HAS COMPLETED TEN OF THESE ZONES, REDUCING NOX EMISSIONS FROM BUSES BY AN AVERAGE OF 90 PER CENT ALONG SOME OF THE CAPITAL'S MOST POLLUTED ROADS. THE MAYOR WILL COMPLETE DELIVERY OF ALL 12 ROUTES AHEAD OF SCHEDULE IN 2019 RATHER THAN 2020.** Of relevance locally are the proposed low emission bus zones from:

▪ Camberwell to New Cross – from Blackheath Road via Camberwell Green and Peckham High Street to Wood's Road; and
▪ Lewisham to Catford – from Bromley Road via Rushey Green to Lewisham High Street

Impact of scheme:
▪ Reduced air pollution as buses are replaced with low emission buses.

LOCAL SCHEMES

CYCLE SUPER HIGHWAY 4 (CSH4)

3.2.10. The planned CSH4 would create a continuous segregated route between Tower Bridge and Greenwich, providing a clearer and safer cycling route. Part of this scheme would include a two-way segregated cycle track on Evelyn Street, running past the nursery between Deptford and Rotherhithe.
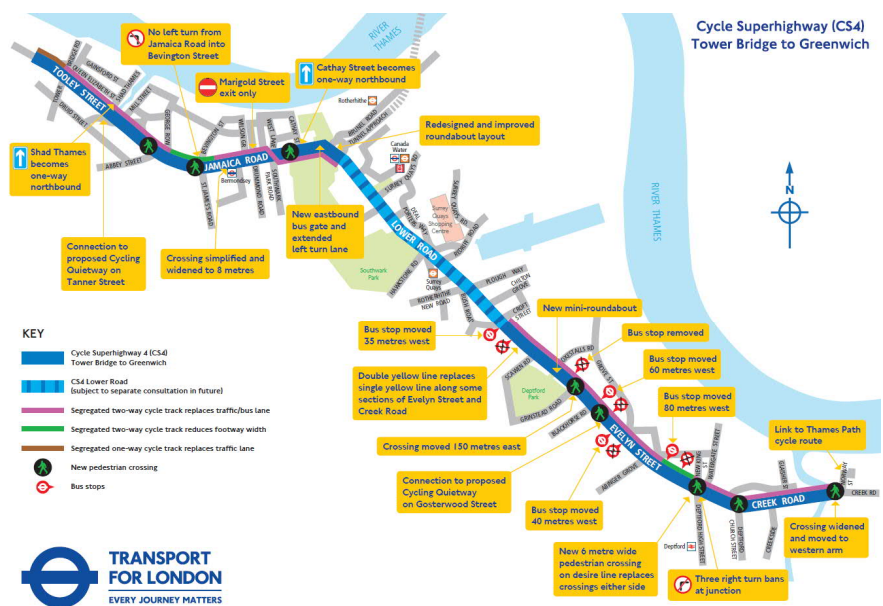
QUIETWAY 1 CYCLE ROUTE – WATERLOO TO GREENWICH

3.2.11. Quietways are part of a London-wide programme to implement a network of continuous and convenient cycle routes on less-busy streets across London, providing cyclists with a safer and quieter route. The Waterloo to Greenwich Quietway runs to Deptford, passing through Canal Road and Childers Street, located in near proximity to the nursery.

Impact of scheme:
▪ Improved travel options locally via sustainable travel (walking and cycling).

NURSERY STARS ACTIVITIES

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

3.2.13. As part of the STARS scheme nurseries receive bespoke guidance from the borough, on-line resources, access to a London-wide community of schools, priority access to funding, accreditation and recognition.

3.2.14. Clyde Nursery School is currently engaged with the STARS programme, and they described a number of the more recent initiatives they have worked with the borough council to deliver:

▪ Encourage parents to travel by DLR
▪ Created buggy/ scooter/ cycle parks
▪ Awareness raising newsletters and workshops with parents
▪ Shower installed for staff cycling to work

Impact of scheme:
▪ Awareness raising and promotion of sustainable travel options, lessening sources of emissions and incidences of exposure).

4. AIR QUALITY AUDIT FINDINGS

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

- Baseline air quality; and
- Observed issues, emission sources and potential exposure

4.1. BASELINE AIR QUALITY

4.1.1. The air quality audit used a combination of modelled and measured data to establish the local, baseline pollution levels in and around each nursery.

4.1.2. Three pollutants were monitored in and around the nursery, these were **nitrogen dioxide (NO$_2$)**, **formaldehyde (CH$_2$O)** and **Volatile Organic Compounds (VOCs)**. All three pollutants can cause respiratory inflammation which can exacerbate to respiratory problems such as asthma and bronchitis at high levels.

4.1.3. NO$_2$ is both a primary and secondary pollutant, derived from emissions of nitrogen oxides (NO$_x$) from combustion sources. In London key sources include road vehicles and domestic boilers. Vehicle emissions contribute significantly to local increases in concentrations especially near busy roads.

4.1.4. VOCs are made up of a range of organic compounds, including formaldehyde. They have a significant photochemical oxidant forming potential and contribute to the formation of secondary pollutants, such as NO$_2$. They arise from a wide variety of products commonly used in homes and workplaces, including furnishing, carpets, upholstery, cleaning products and air fresheners.

4.1.5. Formaldehyde is a notable VOC, and can be released from furniture, finishes and building materials, and is formed in chemical reactions from combustion processes, such as smoking, heating, cooking or candle burning.

4.1.6. Baseline air pollutant monitoring was undertaken for three months. At Clyde Nursey School, five NO$_2$ diffusion tubes, one formaldehyde diffusion tube and one VOC diffusion tube were deployed in the following locations:

Nitrogen Dioxide (NO$_2$)
- roadside outside the nursery
- immediately outside the nursery entrance
- playground
- immediately inside the nursery entrance
- inside a nursery classroom.

Formaldehyde and VOCs
- Inside a nursery classroom.

4.1.7. See Appendix C for further details on the location of the diffusion tubes.

Figure 5 - Comparison of the average NO₂ concentrations at Clyde Nursery School (µg/m³)
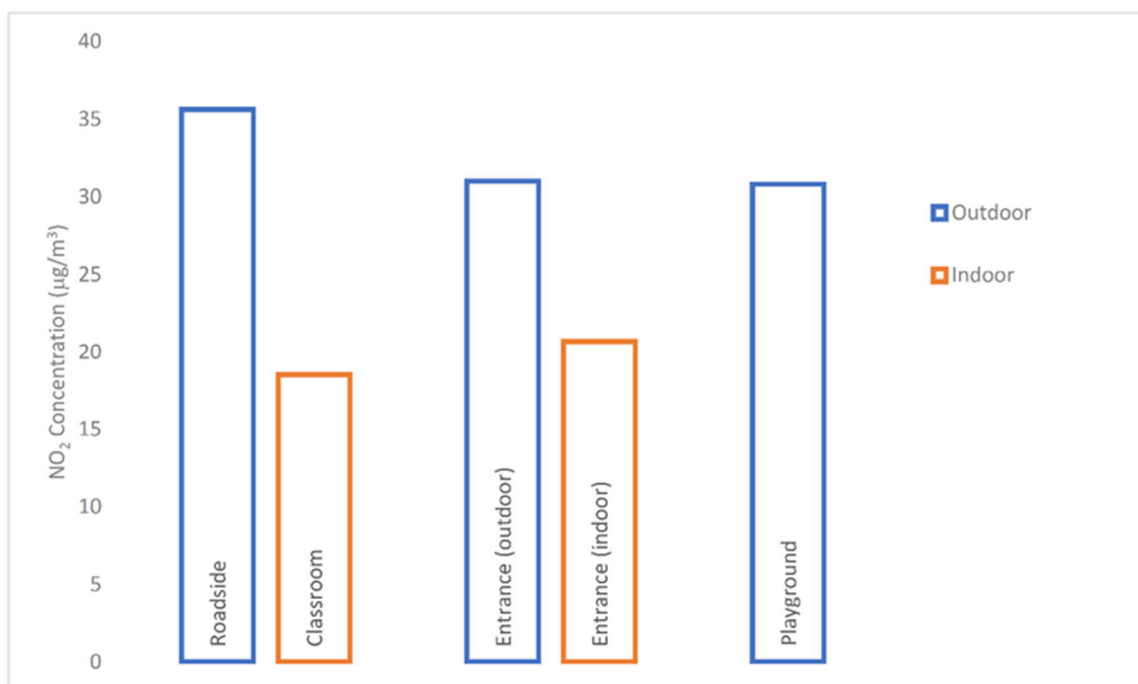
4.1.8. The results of the three-month baseline NO₂ monitoring at Clyde Nursery School, shown in Table 2.

Table 2 – Clyde Nursery School: Three Month Baseline NO₂ Monitoring Results (µg/m³)

Diffusion Tube Location	Indoor / Outdoor Location	Baseline NO₂ Monitoring Results - NO₂ (µg/m³)			
		January	February	March	Average
Roadside	Outdoor	37.85	33.38	(5.55*)	35.62
Playground	Outdoor	35.70	30.00	26.77	30.82
Nursery entrance	Outdoor	34.35	32.20	26.51	31.02
Nursery entrance	Indoor	22.84	19.92	19.31	20.69
Classroom	Indoor	20.74	18.61	16.18	18.51
Ratio of indoor to outdoor (I/O) concentrations		0.65	0.65	0.90	0.67

* Outlier result, excluded from average

4.1.9. NO₂ concentrations were found to be highest at the **roadside** (35.62µg/m³), with local road traffic emissions contributing significantly to roadside concentrations.

4.1.10. The three months of baseline NO₂ monitoring provides a snap-shot of concentrations in and around the nursery across the winter and spring months, when concentrations are likely to be at their

highest due to elevated NO_x emissions driven by the cold weather. However, in each month, the measured NO_2 concentrations did not exceed the annual mean NO_2 national Air Quality Objective (AQO) of 40μg/m³.

4.1.11. NO_2 concentrations fall to 30.82μg/m³ in the **playground**, which is set back from Evelyn Street and screened from traffic by the nursery building. Concentrations at the **nursery entrance** are of a similar level (31.02μg/m³) to the playground. It should be noted that indoor NO_2 is not regulated against EU limits, it is regulated against HSE exposure limits.

4.1.12.   **Inside the nursery**, concentrations fall to 20.69μg/m³ at the nursery entrance and 18.51μg/m³ in the classroom. It should be noted that indoor NO_2 is not regulated against EU limits, it is regulated against HSE exposure limits.

4.1.13.   Previous research undertaken for the GLA found that outdoor NO_2 concentrations and the airtightness of the building envelope explained 84% of the variation between classrooms, indicating the influence of strong outdoor pollution sources and the importance of the building envelope. Overall, **indoor to outdoor (I/O) ratios** in both seasons ranged from 0.3-0.5 in an airtight, contemporary school compared with 0.7-0.9 in Victorian schools that have original wooden window frames.

4.1.14.   The NO_2 I/O ratio was 0.67 at Clyde Nursery School, indicating that uncontrolled infiltration rates are at the moderate to higher end of the spectrum, and so offer slightly less protection to its occupants than a more airtight building.

4.1.15.   The results of the three-month baseline VOC and Formaldehyde monitoring are shown in Table 3.

Table 3 – Clyde Nursery School: Three Month Baseline Formaldehyde and VOC Monitoring Results (μg/m³)

Pollutant	Baseline Formaldehyde and VOC Monitoring (μg/m³)			
	January	February	March	Average
VOCs	87.1	733.6	119.1	313.3
Formaldehyde	-	5.71	6.08	5.90

4.1.16.   **Volatile Organic Compounds (VOCs)** are emitted from vapours arising from petrol and solvents. In a nursery setting are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. Exposure can cause irritation to the eyes and upper airways. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs[12]) concentrations should be below 300 μg/m³. In Clyde they were found to be 313.3 μg/m³.

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[12] TVOC is a grouping of a wide range of organic chemical compounds to simplify reporting when these are present in ambient air or emissions.

VOC chemical species in the Clyde Nursery were identified as being likely to be indoor pollutants, and included fragrances, perfumes and alcohols, likely to be products derived from use of cleaning materials and solvents, and averaged 229.9 µg/m^3 across the 3 month sampling.

4.1.17. **Formaldehyde** are emitted from vapours arising from solvents and adhesives. In a nursery setting these are likely to originate from glues, adhesives and finishing's. Exposure can cause burning sensations of the eyes, nose, and throat, coughing, wheezing, nausea and skin irritation. The World Health Organisation (WHO) indoor air quality guideline[13] for short- and long-term exposures to formaldehyde is 100 µg/m^3. In Clyde they were found to be 5.9 µg/m^3.

4.1.18. In addition to the monitoring undertaken at the site, 2013 baseline annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations have been estimated for each nursery from the **London Atmospheric Emissions Inventory** (LAEI) maps.

4.1.19. Briefly, the LAEI model provides mapped annual mean NO_x, NO_2, PM_{10} and $PM_{2.5}$ concentrations on a 20m x 20m basis for the whole of London from a base-year of 2013 for 2020, 2025 and 2030.

4.1.20. The LAEI uses air pollution emission estimates from a wide range of sources including transport, industrial, domestic and commercial combustion, agriculture and long-range transport using the most up-to-date activity data, emission factors and projection factors.

4.1.21. Figure 5 shows the 2013 LAEI baseline annual mean NO_2 concentrations within the vicinity of Clyde Nursery School.

4.1.22. The changes in colours show the change in the change in pollution gradients, with distance, away from the heavily trafficked Evelyn Street. NO_2 concentrations are predicted to be highest along the southern boundary of the nursery, which is closest to the main road.

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[13] Chapter 5.8 Formaldehyde. WHO Air Quality Guidelines – Second Edition, 2001

Figure 6 - LAEI Baseline Annual Mean NO$_2$ Concentrations within the Immediate Area of Clyde Nursery School

4.1.23. Nearly 50% of NOx emissions in London are from road transport. Vehicle emissions data for the LAEI modelled road links within 200m of the nursery, split by source, have been analysed to identify the key sources contributing to NO_2 in the vicinity of the nursery.

4.1.24. The pie chart below shows that while buses make up only 4% of vehicle movements, they contribute 32% of the transport related NO_x emissions locally. Similarly, HGVs only account for 4% of the total traffic but contribute 22% of emissions. However, it should be noted that with TfL's commitment to upgrading the whole bus fleet to the cleanest Euro VI vehicles as a minimum, by October 2020, that the emissions contributed by buses will be expected to fall significantly.

Figure 7 – Average Road Transport – by Vehicle Type (within 200m of nursery)
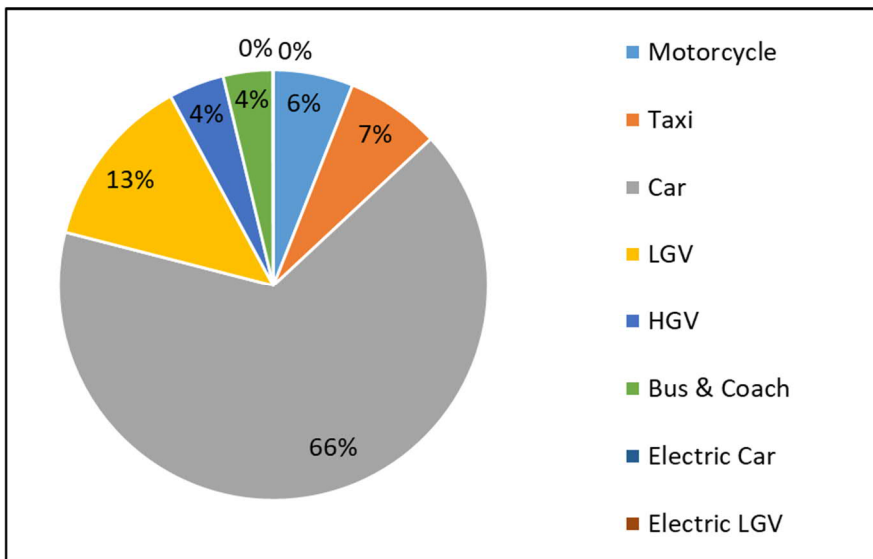
Figure 8 – Average Road Transport NO_x Emissions by Vehicle Type (within 200m of nursery)
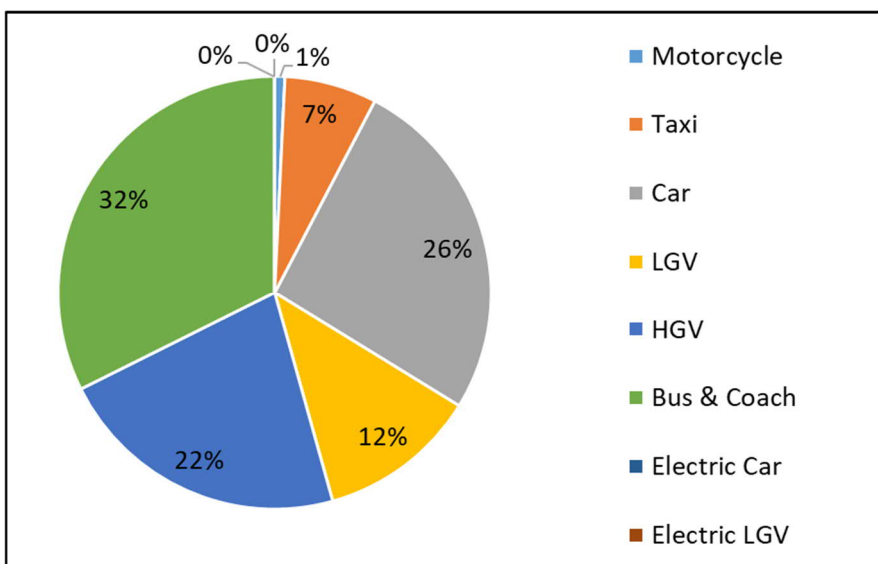
4.1.25. The pie charts below illustrate that PM_{10} and $PM_{2.5}$, like NOx, are emitted in higher levels by large vehicles such as buses, HGVs and LGVs, though not to the same extent. HGVs make up 4% of

vehicle movements, and contribute 23% of the transport related PM_{10} emissions locally, and 23% of $PM_{2.5}$.

Figure 9 – Average Road Transport PM_{10} Emissions by Vehicle Type (within 200m of nursery)
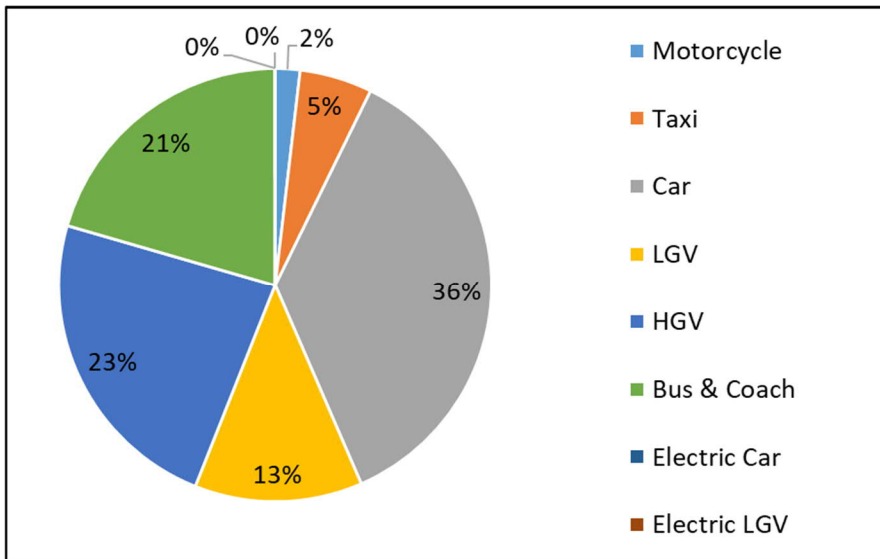
Figure 10 – Average Road Transport $PM_{2.5}$ Emissions by Vehicle Type (within 200m of nursery)
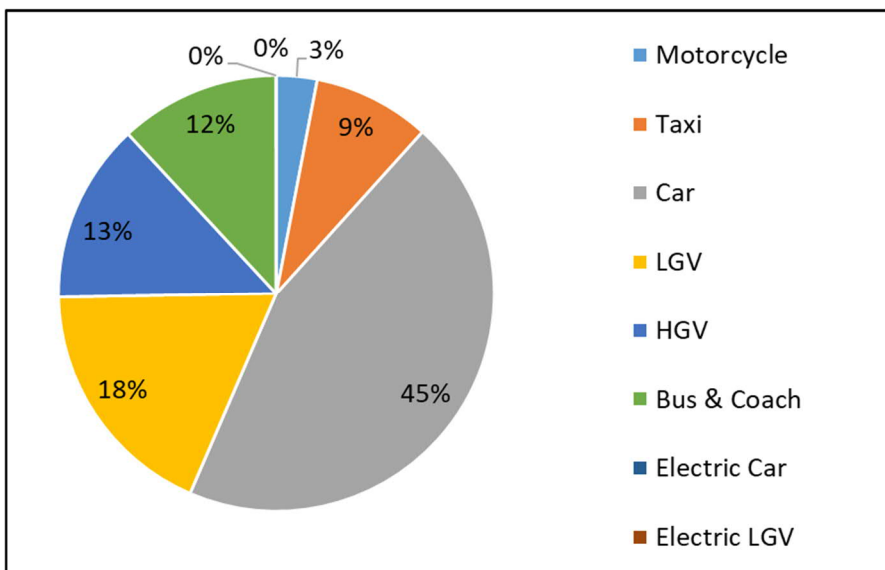
4.1.26. Figures 10-12 show the 2013 LAEI baseline annual mean NO_x, PM_{10} and $PM_{2.5}$ concentrations in within 2km of Clyde Nursery School. The contours (changes in colours) show how the pollution gradient changes, with distance, away from the heavily trafficked roads and other key sources.

4.1.27. PM_{10} and $PM_{2.5}$ sources are much more universal and dispersed than NO_2 sources. A proportion of $PM_{2.5}$ and PM_{10} is imported via weather events from regions outside of London, with other contributions coming from combustion processes, cleaning street sweeping/ dust re-entrainment, construction dust, etc. Therefore, concentration profiles of PM_{10} (Figure 11) and $PM_{2.5}$ (Figure 12) appear less defined than for NO_2.

Figure 11 – 2013 LAEI Baseline Annual Mean NO₂ Concentrations within 2km of Clyde Nursery School
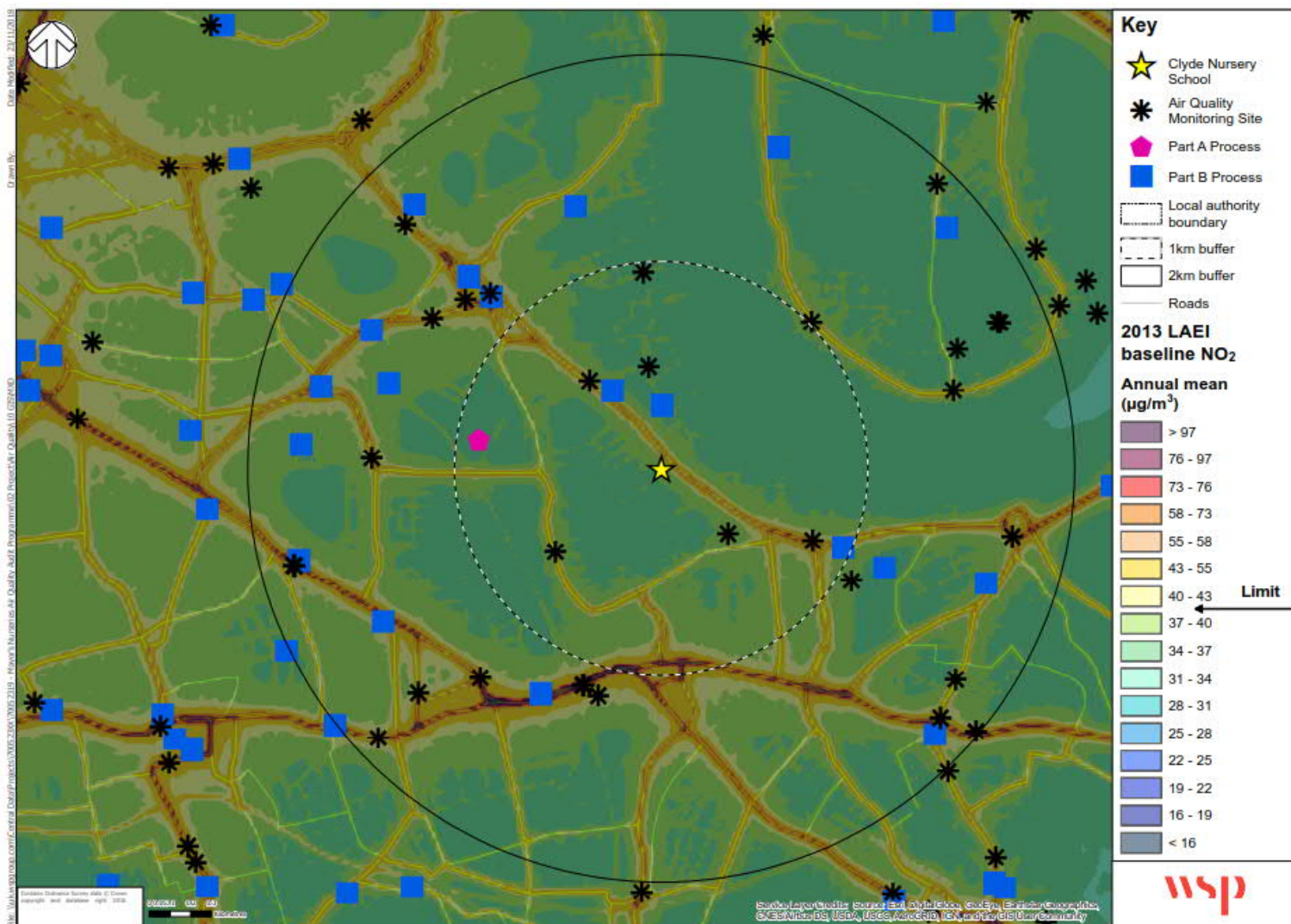
Note: Part A and B Processes include regulated industrial installations that have the potential to cause pollution and are required to have an Environmental Permit to operate, including facilities which carry out industrial processes, waste activities, mobile plant and solvent emission activities

Figure 12 - 2013 LAEI Baseline Annual Mean PM$_{10}$ Concentrations within 2km of Clyde Nursery School
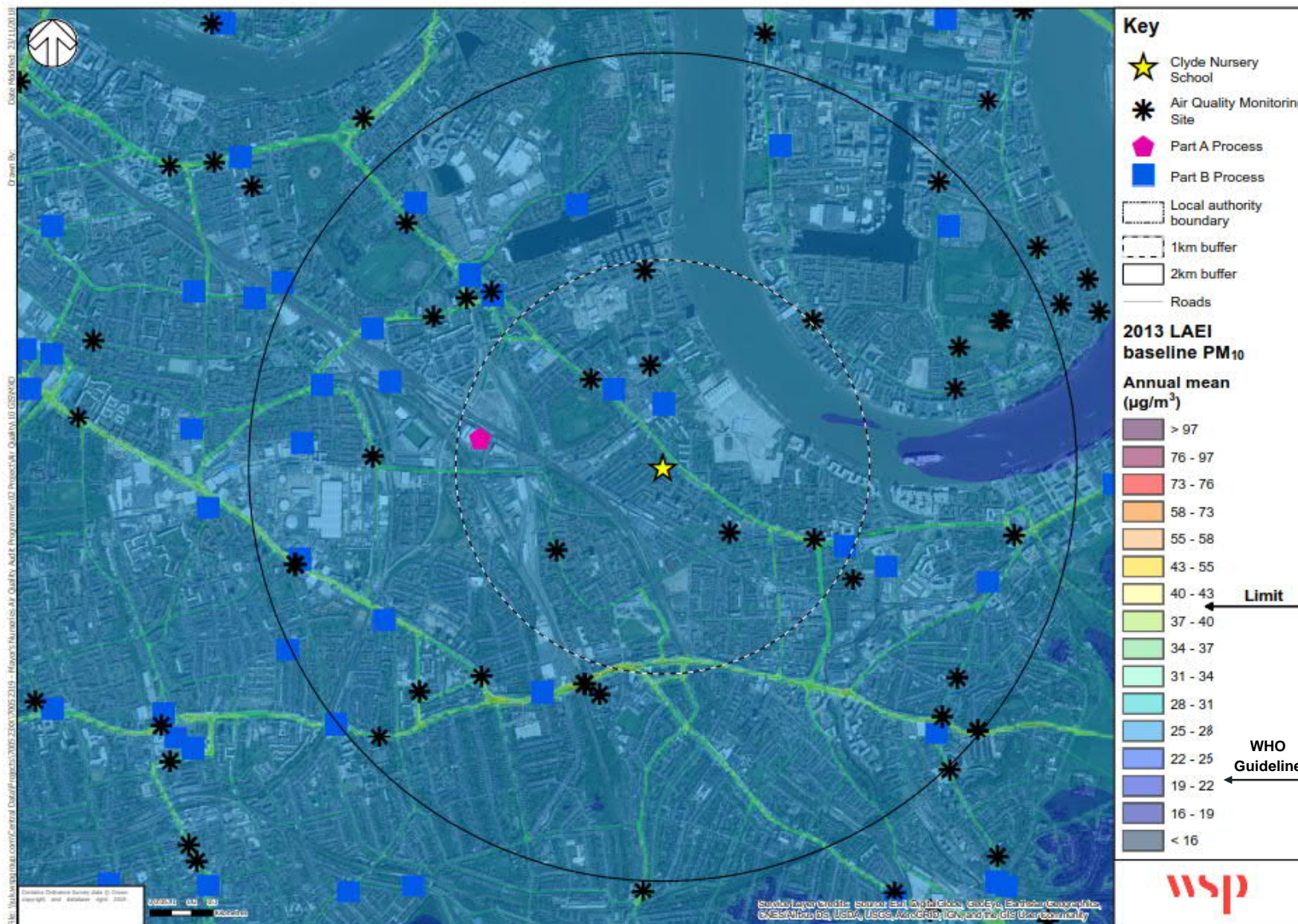
Figure 13 - 2013 LAEI Baseline Annual Mean PM$_{2.5}$ Concentrations within 2km of Clyde Nursery School
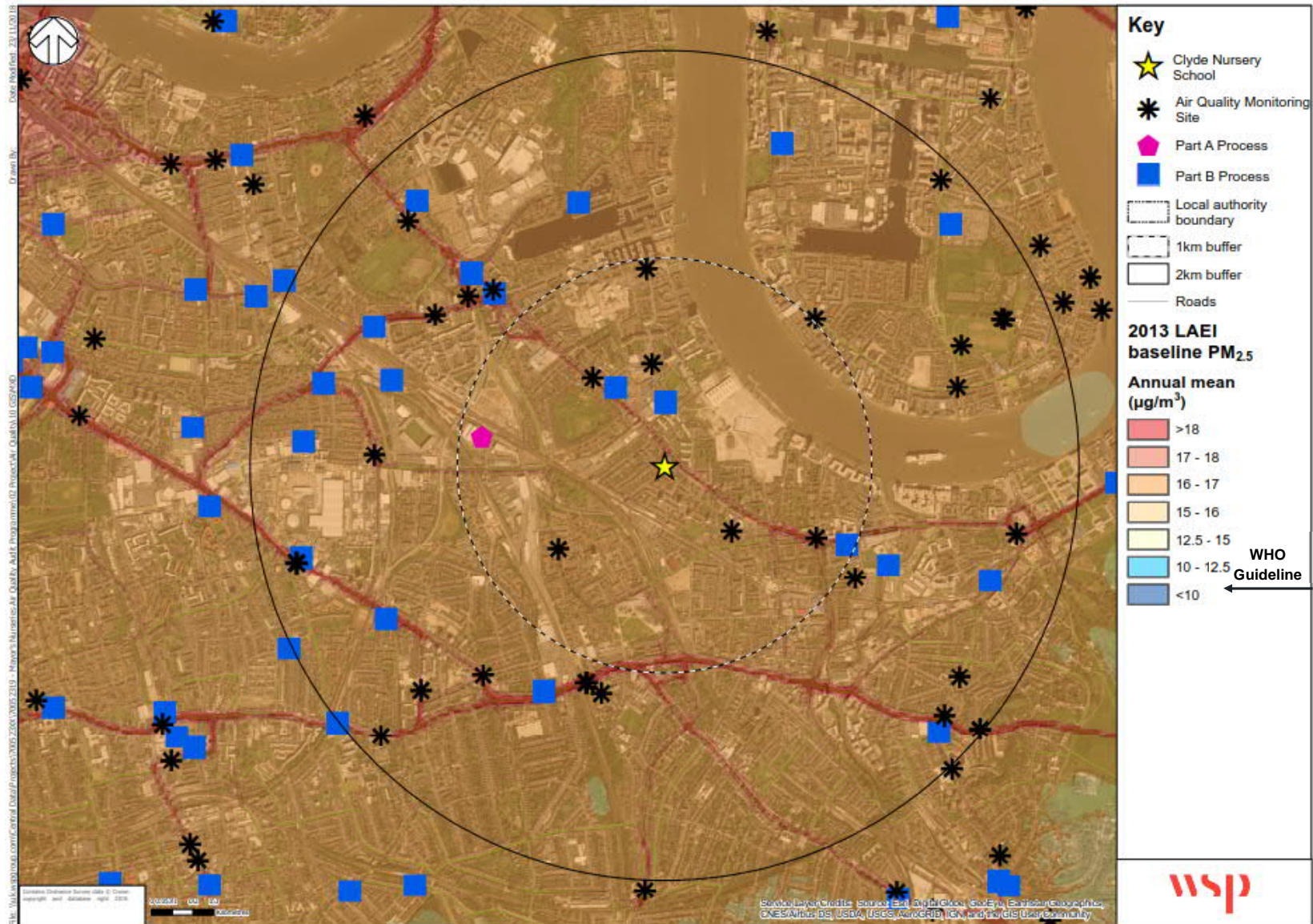
4.2. HIGHWAYS – KEY OBSERVATIONS

4.2.1. The main access to the school is on Alverton Street/ Etta Street that is located just west of the A200 Evelyn Street. A secondary vehicular access to the site (staff only) is located on Rolt Street, directly east of the school site.

4.2.2. The nursery is set back a short distance (40m) from the **heavily trafficked** Evelyn Street, a wide four lane road carrying large volumes of cars, buses, vans and heavy goods vehicles.

4.2.3. We understand that **traffic congestion** on Evelyn Street is a common occurrence, particularly during the morning peak periods, and as a knock-on effect of any delays at the nearby Rotherhithe and Blackwall Tunnels. Traffic queuing and slowly passing the nursery will be worsening local air quality, and creating a traffic dominated environment, potentially discouraging more children from walking, scooting or cycling as a consequence.

4.2.4. Based on observations, there was an even split amongst children approaching the school from the north and south. Children travelling to / from the north **have to cross the busy Evelyn Street**, which is the main source of emissions in the immediate area. A pedestrian crossing adjacent to the nursery site allows children to cross the road in a single crossing.

4.2.5. Parents and children approach from the north and east have to take a slightly circuitous pedestrian route from Rolt Street and loop around the back of the Nursery, along a **narrow path with no active frontages and limited lighting**, which may discourage parents from walking to nursery.

4.2.6. Whilst the majority of children walk, scoot or cycle to the school, some parents were observed **dropping children off outside the entrance** on Alverton Street. Overall however, as very few of the parents drop off their children by car, the activity we observed at the peak arrival time was largely calm and unproblematic. As such it is recognised that this activity is only a small contributor to overall poor air quality around the nursery, and that the majority of air pollution in this location will be associated with wider background emissions

4.2.7. School keep clear markings can be found directly outside the pedestrian entrance, with signage to enforce this. No further parking restrictions were observed beyond this on the roads surrounding the school. Although no vehicles were observed parking on the clearway during the audit, nursery staff advised that this can be a regular occurrence during school pick-up/ drop-off times, despite warnings by members of staff. Some **engine idling** was observed around the site in Alverton Street and Rolt Street.

4.2.8. In addition to the school related traffic, a significant number of **vans and lorries** were observed using the A200 Evelyn Street, as a likely route for servicing committed developments in the surrounding area. Of this traffic, a large number of construction/ demolition vehicles were observed; nursery staff suggest that idling HGV's are a common occurrence during morning peak-hour traffic build up. Two major construction sites are located within close proximity of the nursery; The Timberyard Deptford committed development site can be found just north of the nursery on the A200 Evelyn Street; the Convoys Wharf Regeneration site can be found just east of the nursery, behind Sayes Court Park.

4.2.9. The staff vehicular access on Rolt Street is sometimes used by **idling or turning vehicles**. On-street parking on either side of Rolt Street reduces the amount of turning space. Vehicles were observed turning and waiting outside of the vehicular entrance gate, obstructing the road. Nursery Staff spoke of vehicles parking outside of the nursery gates, at times blocking the fire engine access area.

4.2.10. As previously mentioned, a pedestrian crossing is located immediately adjacent to the school on the A200 Evelyn Street. A further crossing can be found south east of the nursery on the A200, between Sayes Court and a local parade of shops. Those travelling from the north (Pepys Estate) have fewer crossing options.

4.2.11. The roads around the school and the nearby main roads have 20mph speed limits, however traffic speeds often appear in excess of these limits, including speeding traffic along the A200 Evelyn Street.

Summary – Key Issues

- Heavily trafficked roads nearby with large numbers of car, vans, buses and HGVs; traffic volume at highest rate during morning peak-hour or due to traffic delays at Rotherhithe and Blackwall Tunnels;
- Key sources of pollutions include idling vehicles on A200 Evelyn Street; the high volume of HGV's and construction traffic to local committed developments adds to this impact;
- Pedestrian approach routes on Alverton Street/ Etta Street do not appear to be majorly hindered by vehicular activity, however those approaching from the north and west are subjected to the high levels of congestion and resulting pollution produced on the A200 Evelyn Street; and
- Use of Rolt Street as a turning point is noted to cause obstructions to both the staff car park and emergency vehicle access point.
- Slightly circuitous pedestrian routing from the north/east via a narrow path, with no active frontages and limited lighting, which may discourage parents from walking to nursery.

Etta St (SW bound) – Vehicles known to idle/ park on school clearway during morning peak period

Averton St (NW bound) – Parking spaces are consumed very quickly leaving no space for pick-up/ drop-off

Rolt Street (SW Bound) – Parked vehicles clustered outside Nursery Staff Car Park

A200 Evelyn St (NW Bound) – Off peak traffic volume, Nursery perimeter fence visible on centre-left

A200 Evelyn St (SE Bound) – High HGV traffic volume adjacent to pedestrian route

A200 Evelyn St (NW Bound) – Nursery perimeter fence and adjacent pedestrian crossing

4.3. NURSERY GROUNDS / BUILDING - KEY OBSERVATIONS

4.3.1.   The school site has one main pedestrian access from Alverton Street to the west; an enclosed path connects the main gate to the building reception.

4.3.2.   The main school building is a two-storey building, built in 1963. A more recent extension was added to the west of the building, known as 'Green Class', which is used as an extension of teaching space.

4.3.3.   The nursery building is set back a reasonable distance (40m) from Evelyn Street, and furthermore the classrooms where the children spend the majority of their time when inside the building all face away from the main road. The areas of the nursery building within which children are closest to the pollution source is the green class and play room.

4.3.4.   All rooms are **reliant on natural ventilation** through windows and doors. Nursery staff complained of excessive temperatures on the building's upper floor during summer. Issues controlling heating system in places mean windows and doors are opening to off-set the excess heat. The classrooms feature high ceilings and large windows (combination wooden-framed single and double glazing); given the age of the building, these are likely to be **poorly insulated**, which would result in greater heat loss, and so potentially increased run times by school boilers, and therefore greater emissions. As windows and doors are open the majority of the time to off-set heat, there is greater exposure to air pollution throughout the building.

4.3.5.   Students typically spend the majority of the day outside, weather permitting. A third of students attend the nursery for the entire day (8:30am – 3:15pm).

4.3.6.   The main playground is located to the west of the site, backing onto Alverton Street and a pedestrian footway connecting Alverton Street to Rolt Street. The **playground is effectively screened from Evelyn Street** by the nursery building.

4.3.7.   The main playground/ site boundary to the west is surrounded by a wooden and metal fence with **bamboo screening**. Fire damage was observed on the boundary to the pedestrian footpath due to a recent incident of arson; wooden fence panels here were replaced but damage was still evident on the metal fencing and foliage. The Oasis and Rose Garden both have a reasonable amount of **screening provided by foliage** that grow above the perimeter fence.

4.3.8.   Further outdoor spaces are found to the south and east of the site; the Oasis Garden to the south backs on to the southern section of Rolt Street; the Rose Garden backs onto the northern section of Rolt Street by the staff car park access. The **Rose Garden** is the closest space used by students to the A200 Evelyn Street, therefore is observed as an area with the highest likelihood of exposure to air pollution.

4.3.9.   The school features distributed **boiler units** around the main building, varying in age; the newest are between 3-4 years old and assessed to be in a good condition. The flues exit high on the school roof well away from the playground.

4.3.10. The building features a combination of gas and electric fuel sources. Heating is provided primarily via local heating units around the building, controlled by simple thermostats. The green class extension also features heated flooring.

4.3.11. The **staff car park** is located east of building and sits between the A200 Evelyn Street and main entrance to the building reception. There are approximately 20 spaces, half of which were in use on the day of the audit.

4.3.12. Whilst shelters for bikes and scooters are provided adjacent to the staff car park, these appeared only lightly used. There was **evidence of some demand for scooter/ cycle parking** for the children near the main entrance, with a number parked but with no shelter provided.

4.3.13. School deliveries take place via the staff car park; deliveries normally take place once a day in the morning.

4.3.14. As would be expected in a nursery, **paints and glue sticks** were used widely by the children throughout the classrooms, and consequently the odour was noticeable around these areas. When not in use they are placed in an external store cupboard.

4.3.15. There was not a strong odour of **cleaning products** in the building, and when not in use they are stored in the Caretakers Store to the east of the building, away from the classrooms behind closed doors, which is not accessible to the children.

4.3.16. The **classroom floors** are predominantly comprised of lino or vinyl, with some areas of carpet tiles, including in the Early Years Group room. The rooms are **furnished** with items made from a variety of materials including wood (some of which are likely to be MDF), plastic, metal, wicker, as well as some soft furnishings. The nursery building contained only a limited number of **green plants**.

Summary – Key Issues

- The majority of classroom spaces are located away from primary sources of pollution; however, the requirement for natural ventilation of the building year-round is increasing exposure to pollution on a regular basis;
- The Rose Garden backs onto the northern section of Rolt Street by the staff car park access. The Rose Garden is the closest space used by students to the A200 Evelyn Street, therefore is observed as an area with the highest likelihood of exposure to air pollution.
- In places, the poor condition of heating control units is causing overheating of the building, leading to energy inefficiencies and increased exposure to external pollution from boilers as windows remain open to offset excess heat.

Older single pane slatted windows; key area of heat loss and in-efficiency

Main Playground – boundary with pedestrian footpath; arson damage is highlighted

Older heating units on upper floor; issues with control units prevent these from being switched off in summer

Reception area – Suitable distance between main building and car park. Cycle parking has very limited use

Staff car park – boundary fence with A200 Evelyn Street has no screening, increasing likelihood of pollution exposure

Heat curtains on main doors used to help prevent heat loss when open. Older heating units visible above door.

4.4. KEY OBSERVATIONS – SUMMARY OF ISSUES

Figure 14 - Summary of Potential Issues Map

Engine idling: small numbers of vehicles stopping, some on School Keep Clears and some idling their engines, worsening exposure to children entering the nursery.

Pedestrians approaching from the north and east are exposed to emissions from the busy and wide Evelyn road, which poses a barrier to the nursery.

Nursery playground partially screened by bamboo screening, shrubs and trees, though Etta Street is very lightly trafficked

Perimeter fencing adjacent to main road provides little screening, but the area is only used for staff parking.

Circuitous route with narrow path with no active frontages and limited lighting, may discourage parents from walking to nursery.

Significant number of vans and lorries, including construction/ demolition vehicles.

Turning vehicles and engine idling - Rolt Street is filled with parked cars and used as a turning point, causing obstructions to the staff car park and emergency vehicle access point.

Inefficient heating System and poor insulation leading to causing overheating of the building and increased boiler run times.

Building reliant on natural ventilation worsening exposure to emissions, though classroom spaces are located away from primary sources of pollution

Rose Garden - Located on more polluted side of building; but is screened by foliage and high walls, and used in frequently by the children.

Heavy Traffic - Heavily trafficked roads with large numbers of car, vans, buses and HGVs. Prone to congestion when there are delays at Rotherhithe and Blackwall Tunnels.

Key – Issues Identified

Highways

Nursery Grounds

Nursery Building

Nursery Boundary
20 Speed Limit
Pedestrian Crossing
Pedestrian Access
Vehicle Access
School Clearway
Traffic Signal

Playground

Playground

Alverton Street

Etta Street

Rolt Street

Rolt Street

Evelyn Street

Contains Ordnance Survey data
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Ordnance Survey 100032216 GLA

0   0.0075   0.015   0.0225   0.03
Kilometres

5. RECOMMENDATIONS

5.1. DEVELOPING THE RECOMMENDATIONS

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

5.1.2. These recommendations are drawn from a comprehensive Air Quality Audit **Toolkit of Measures**, researched and developed as part of the Mayor's Primary School Air Quality Audit Programme, and updated as part of this programme (see Appendix E for further details).

5.1.3. The toolkit has been compiled from a review of best practice approaches and new technologies, including both well established and simple measures, and more innovative or harder hitting measures. The measures include both physical measures and softer behavioural measures.

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

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

5.1.6. Table 4 on the following page sets out the list of recommendations. For the purposes of this assessment they have been categorised as proposals associated with:

- **Highways** – where recommendations would predominantly be delivered by either the borough council or TfL, who manage the highways.
- **Nursery grounds** – where the nursery, often supported by the borough council, would typically deliver the types of measures recommended.
- **Nursery building** – as with the nursery grounds, the building measures would primarily be delivered by the nursery and borough council.
- **Behavioural** – many of the behavioural measures can be delivered at minimal cost by the nursery, sometimes with the support of the borough council or TfL.
- **Wider measures** – these are larger schemes or policy changes, which would need to be delivered by TfL, the borough council or the UK Government.

5.1.7.   In order to enable comparison of each measure, and to assist the nursery, borough and other stakeholders, in determining which measures to prioritise, each has been assessed against a series of key criteria:

- **Potential Air Quality Improvement**

  - Low – nominal measureable change but a tangible reduction in sources or exposure
  - Medium – a small measurable change in air quality
  - High – a large measureable improvement in air quality

- **Wider Benefits**

  - Such as improved safety, visual amenity, child health and welfare, improve learning environments, costs savings, promotion of sustainable transport, contributes to STARS or Healthy Early Years London.

- **Cost** *(Note these reflect the overall costs, but these may vary amongst difference stakeholders)*.

  - Low - <£10k
  - Medium - £10k-100k
  - High - >100k

- **Deliverability**

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

- **Stakeholder Support**

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

5.1.8.   These are high level comparative analyses intended to offer a means of considering the recommendations against one another in relative terms.

5.1.9.   Further, more detailed research and options development would be required to quantify these recommendations in greater detail, such as would be undertaken in a subsequent feasibility study.

5.1.10. The implementation of the measures will be dependent on securing funding to enable delivery over time (see section 5.8), as well as undertaking feasibility assessments and scheme prioritisation.

Table 4 – Recommended measures for consideration

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
Highway *(Key Stakeholder: Borough)*																
1	Anti-Idling	Whilst engine idling was not a major issue at the site, it may be beneficial to introduce anti-idling signage/ banners at the front of the nursery, with parallel awareness raising to launch and enforcement, to drive a more general improvement amongst local drivers.	Reduce sources and exposure	X			▪ Supports STARS and HSL objectives	X			X			X		X
2	Parking Management	Investigate introducing a number of formal parking bays and restrictions on Rolt Street where parking is not appropriate, to prevent unsafe parking obstructing fire access and to discourage frequent turning and engine idling next to the Nursery.	Reduce sources and exposure	X			▪ Road safety	X			X			X		
3	Parking enforcement	Increase patrolling and enforcement to occasional parking on the school keep clear markings by the nursery, to discourage parking that obstructs pedestrians when crossing, and results in minor congestion, worsening local emissions.	Reduce sources and exposure	X			▪ Road safety	X			X				X	
4	Contractors construction forum	Build on existing approach by council for reducing construction emissions. Investigate opportunities to formalise or reinforce current informal agreements to restrict the number of construction vehicles during key times when children are most exposed to emissions. Future freight / construction vehicles associated with new developments can be required to use only 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 planning permissions. Construction Logistics Plan (CLPs) guidance could ensure construction vehicles avoid nursery start / finishing times.	Reduce sources and exposure	X			▪ Road safety	X				X			X	
5	Reducing Construction Related Emissions	Investigate opportunities to formalise or reinforce current informal agreements to restrict the number of construction vehicles during key times when children are most exposed to emissions. Future freight / construction vehicles associated with new developments can be required to use only 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 planning permissions. Construction Logistics Plan (CLPs) guidance could ensure construction vehicles avoid nursery start / finishing times.	Reduce sources and exposure	X			▪ Road safety	X				X			X	

	Measure	Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
6	Healthy Streets approach, sustainable transport and roadspace reallocation from vehicular traffic	Promote the Mayor of London's Healthy Streets approach which aims to improve air quality, reduce congestion and help make London's diverse neighbourhoods greener, healthier and more attractive places to live, work, play and do business. Take a proactive role in endorsing the approach and supporting these initiatives.	Reduce sources and exposure			X	▪ Promotion of sustainable travel			X			X		X	
7	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%. The revenue raised can be used to contribute towards measures to improve air quality.	Reduce sources and exposure			X			X		X			X		
8	Non-Road Mobile Machinery Audit	The Council could consider a requirement for a Non-Road Mobile Machinery (NRMM) Audit to be undertaken at construction sites. This requirement is being trialled within some Low Emission Neighbourhoods to help ensure compliance of vehicles used for developments. Currently, NRMM is the third largest contributor of NOx emissions and the fifth largest contributor of PM emissions in London, and any comprehensive plan to reduce London's emissions should attempt to address emissions from construction machinery.	Reduce sources of emissions	X			▪ Reduced noise	X			X				X	
9	Control of Dust and Emissions during Construction and Demolition SPG	Introduce a requirement in planning conditions to manage dust and emissions associated with construction based on the Control of Dust and Emissions during Construction and Demolition SPG prepared by the GLA, which includes requirements for construction sites to monitor air quality and share the results with the borough council.	Reduce sources of emissions	X				X			X				X	
Highway (Key Stakeholder: TfL)																
10	Low Emission Buses	Since 2018, all new double deck buses are hybrid or zero emission. The Mayor has also launched an £85m programme to upgrade around 5,000 buses so that the entire fleet meets the Euro VI emissions standard in 2020. Around 75 per cent of all TfL buses – including all buses operating in the ULEZ – now meet or exceed the strict ULEZ emission standards. By October 2020 every TfL bus in London – over 9,000 buses - will meet or	Reduce sources and exposure			X				X	X				X	

Measure	Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
			Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
	exceed the ULEZ standards. Twelve new low Emission Bus Zones are being introduced in areas where Londoners are exposed to some of the highest levels of nitrogen dioxide pollution. The Mayor has completed ten of these zones, reducing NOx emissions from buses by an average of 90 per cent along some of the capital's most polluted roads.				High				High		Medium Term			Medium	

Nursery Grounds *(Key Stakeholder: Nursery/ Borough)*

Measure	Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
11 Additional Pedestrian Entrance and reduce on-site parking	Consider introducing a new pedestrian entrance direct from Evelyn Street through the staff car park. This would remove the need for many parents and children to use the narrow path to the rear with no active frontages and limited lighting, and may encourage more parents to walk to nursery. It would also slightly reduce the period of exposure when walking to the nursery, and make the nursery more visible from the roadside. It would however be important to ensure children are not left waiting on Evelyn Street for the gate to open, as exposure will be higher at this entrance to the existing entrance. This would likely necessitate losing some parking spaces, reducing a further source of emissions, and would require an electronic gate with a buzzer to be installed, and may require an obsolete phone box to be removed. Alternatively, additional lighting could be introduced on the path to the rear, but it would remain without natural surveillance.	Reduce exposure to emissions	X			• Security, privacy		X			X				X
12 Green Screening	In combination with the above measure, consider installing sections of green screening/climbers. A dense vegetation layer with a high leaf density can as much as halve the levels of pollution just behind the barrier, though the benefit tails off with increasing distance. The benefit is mainly attributable to their effect on dispersion, though the deposition of some pollutants onto the leaf surfaces from air that passes through the vegetation will also have a small but beneficial effect. A study by Kings College London assessed the efficacy of green screens in preventing vehicle emissions from nearby roads reaching school grounds, through the installation of an ivy screen. In this instance the screen was found to be an effective pollution barrier, once the ivy had started growing and a significant impact could be seen once the screen had matured. It led to a decrease in the pollution concentrations on the playground side by 23% for NO_2 and 38% for PM_{10}. Green screens also provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction. 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 however that the same level	Reduce exposure to emissions	X			• Visual amenity • Security, privacy		X			X			X	

|	Measure	Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
		of reduction would not necessarily be achieved in each instance, as the local conditions and designs are specific to each site. It should be noted that green screens need ongoing maintenance		(green)					(orange)						(orange)	
13	Additional buggy/ scooter/ cycle parking	Introduce covered scooter and cycle parking spaces at the site currently used for scooters, near the reception entrance, in addition to those to the rear, to encourage sustainable / healthy travel behaviour, particularly near the main entrance.	Reduce sources of emissions	X			▪ Promotion of sustainable transport	X				X			X	
14	Electric Vehicle Charge Point	Explore opportunities for funded electric vehicle charging points for the staff car park to cater for staff with electric vehicles.	Reduce sources and exposure	X			▪ Promotion of sustainable transport	X			X					X
Nursery Building *(Key Stakeholder: Nursery/ Borough)*																
15	Improved heating and insulation	Review scope for improving building insulation, reducing heat gain in hot weather, and where not already in place, install thermostatic radiator valves to enable more efficient heating. Lessening incidences of winter overheating that result windows and doors being opened, and worsening exposure to pollution from the nearby roads. Reducing energy usage, and potentially boiler run-times and associated emissions.	Reduce sources and exposure	X			▪ Reduced energy consumption and reduced operating costs ▪ Improved learning environments			X		X			X	
16	Replace aging radiators	Replace aging radiators and pipework where they are inefficient and will have a low heat-transfer.	Reduce sources of emissions	X			▪ Improved learning environment ▪ Reduced operating costs		X			X			X	
17	Installation of Air Conditioning Units	Consider installing air conditioning units to prevent overheating and lessening need for ventilation via opening doors/windows, which worsens exposure to air pollution.	Reduce exposure to emissions	X			▪ Improved learning environments		X			X			X	
18	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.	Reduce exposure to emissions	X			▪ Noise reduction ▪ Improved learning environment ▪ Reduced operating costs		X			X			X	

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
19	Add indoor plants	Consider deploying additional air purifying plants. Whilst the research to date is inconclusive, and further testing is required, some studies have found certain house plants can remove CO_2, and that the growing substrate, and the microorganisms within, are involved in the removal of pollutants. A limitation is that tests often include a greater number of potted plants than would be feasible indoors to achieve measurable concentration reductions, so the density provided by green walls may be more suitable, and studies are now beginning to investigate green walls and, additionally, how the substrate may influence removal – as measured with VOCs. (University of Birmingham and the Royal Horticultural Society). Plants also have a number of wider health benefits, including promoting reductions in stress. https://www.cibsejournal.com/technical/plants-as-a-building-service/ provide.	Reduce exposure to emissions	X			▪ Improved learning environments ▪ Visual amenity	X			X					X
20	Review purchasing choices and switch to low-VOC content furnishings	Ensuring that when introducing new furniture, the use of hazardous compounds and residues is limited. Review purchasing choices and switch to low-VOC content furnishings, including pre-owned furniture, and following schemes such as the EU Ecolabel, or a UK specific version if introduced as referenced in DEFRA's Clean Air Strategy 2019.	Reduce sources and exposure	X				X				X			X	
21	Switch to lower VOC cleaning products	Switch to lower VOC alternative cleaning products, such as unperfumed cleaning products.	Reduce sources and exposure	X				X			X				X	
22	Considering replacing the boiler with a Heat Pump	In the longer term the gas boiler could potentially be replaced with a heat-pump system. Such a system would run on electricity only, and would therefore not have any combustion on site. Heat pumps deliver a net gain relative to boilers from an energy and environmental perspective, however the typical payback period can be 7/8 years for buildings such as nurseries.	Reducing sources and exposure	X			▪ Reduced energy consumption and reduced operating costs			X	X		X		X	
Behavioural Measures *(Key Stakeholder: Nursery/ Borough)*																
23	Promote cleaner routes to the nursery	Encourage parents to approach the nursery along less polluted routes, for example taking parallel routes to Evelyn Street where possible. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots	Reduce exposure	X			▪ Awareness raising	X			X				X	

	Measure	Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
24	Achieve Gold accreditation in STARS	Strive for gold status, which would entail achieving a range of measures promoting active travel and reduced emissions, also signposting additional initiatives and avenues of support. The framework also helps document and track progress, and implement recommendations.	Behavioural measures / reducing exposure to emissions	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
25	Engagement Activities	Deliver air quality related activities to raise awareness of the issues, and the type of measures that can have a positive impact on reducing poor air quality	Awareness raising and behavioural measures	X			▪ Awareness raising ▪ Secure community buy-in for measures	X			X					X
26	Attain a Gold Award in Healthy Early Years London scheme	By achieving a gold award as part of the Healthy Early Years London scheme, the nursery will have supported a wide range of measures to promote active travel, receiving air quality alerts, and sustainability related activities amongst parents and carers, many of which contribute towards improved air quality.	Behavioural measures / reducing exposure to emissions.	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
27	Staff Engagement	Awareness raising session amongst staff about air pollution, ventilating and heating the classrooms, lessening the children's exposure.	Awareness raising and behavioural measures	X			▪ Awareness raising	X			X					X
28	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 the nursery and b) promote the suitable walking routes to avoid air pollution hotspots.	Reducing sources and exposure	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
29	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.	Reducing sources and exposure	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X				X	
30	Monitor 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.	Reducing exposure to emissions	X			▪ Awareness raising ▪ Child health and welfare	X			X					X

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
31	Managing art and craft materials	Art and craft materials could be separated from wider classroom activities, undertaken in separate rooms or well-ventilated areas, reducing exposure by the children.	Reduce exposure	X				X			X				X	
32	Cleaning practices to reduce VOC	Training of cleaners to reduce detergent use, avoid use of cleaning solvents within classrooms, encourage ventilation of classrooms post cleaning to purge residual VOCs.	Reduce exposure	X				X			X				X	
Wider Measures *(Key Stakeholder: Borough/ TfL/ GLA/ Central Government)*																
33	Targeted scrappage scheme for polluting vehicles being driven in London	Ensure parents and staff are aware of the low income scrappage scheme being introduced by the Mayor and TfL, so that those that are eligible apply to the scheme. Encourage central Government to at a minimum match-fund the Mayor's scrappage commitments, to help enable even more Londoners to switch from polluting vehicles to ultra-low emission vehicles and more sustainable forms of transport.	Reduce sources and exposure			X				X			X	X		

5.2. KEY RECOMMENDATIONS
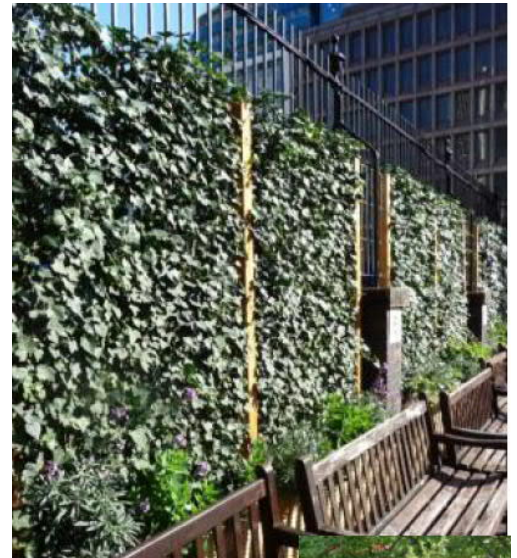
Figure 15 – Summary Recommendations Map
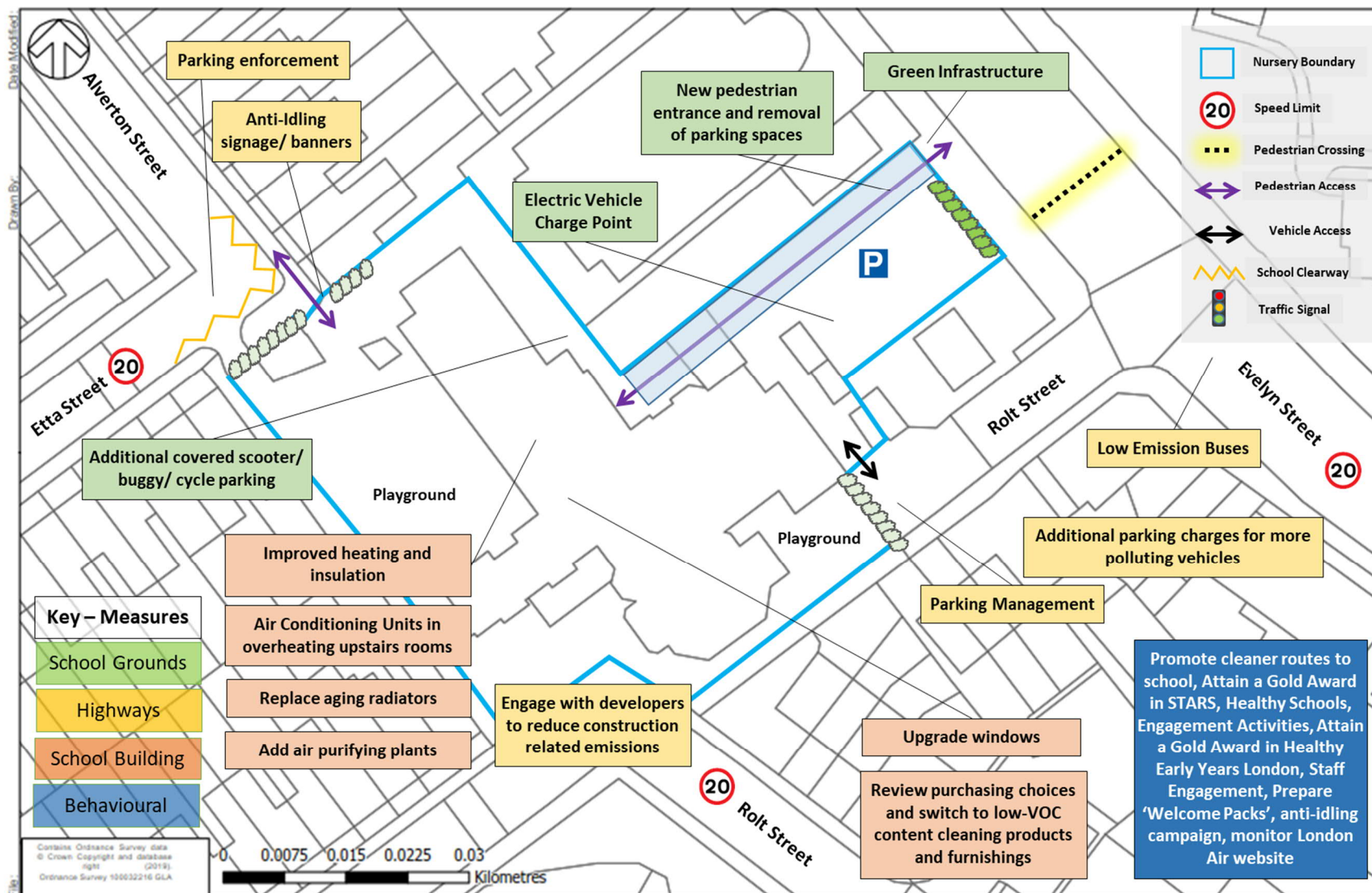
5.3. PRIORITISED MEASURES FOR THE NURSERY

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

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

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

- **Additional pedestrian entrance, reduced on-site parking and green screening** - Consider introducing a new pedestrian entrance direct from Evelyn Street through the staff car park. This would remove the need for many parents and children to use the narrow path to the rear with no active frontages and limited lighting, and may encourage more parent to walk to nursery. It would also slightly reduce the period of exposure when walking to the nursery, and make the nursery more visible from the roadside. It would however be important to ensure children are not left waiting on Evelyn Street for the gate to open, as exposure will be higher at this entrance to the existing entrance. This would likely necessitate losing some parking spaces, reducing a source of emissions in the process, and would require an electronic gate with a buzzer to be installed, and may require an obsolete phone box to be removed. This could be delivered in combination with initiatives to encourage parents to approach the nursery along less polluted routes, for example minimising walk times along Evelyn Street by taking parallel routes where possible. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots. In combination with the new entrance, green screening/climbers could be installed on the chain link fencing on the car park perimeter fronting on to Evelyn Street. A dense vegetation layer with a high leaf density can as much as halve the levels of pollution just behind the barrier, though the benefit tails off with increasing distance. The benefit is mainly attributable to their effect on dispersion, though the deposition of some pollutants onto the leaf surfaces from air that passes through the vegetation will also have a small but beneficial effect. A study by Kings College London assessed the efficacy of green screens in preventing vehicle emissions from nearby roads reaching school grounds, through the installation of an ivy screen. In this instance the screen was found to be an effective pollution barrier, once the ivy had started growing and a significant impact could be seen once the screen had matured. It led to a decrease in the pollution concentrations on the playground side by 23% for NO_2 and 38% for PM_{10}. Green screens also provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction. 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 however that the same level of reduction would not necessarily be achieved in each instance, as the local conditions and designs are specific to each site. It should be noted that green screens need ongoing maintenance..

- **Improved heating and insulation** - Review scope for improving building insulation, reducing heat gain in hot weather, replace aging radiators and pipework where they are inefficient and will have a low heat-transfer. Upgrade windows where possible to double glazed or add secondary glazing, to reduce heat loss, lessen energy usage, and potentially boiler run-times, and where not already in place, install thermostatic radiator valves to enable more efficient heating. Lessening incidences of winter overheating that result windows and doors being opened, and worsening exposure to pollution from the nearby roads. Reducing energy usage, and potentially boiler run-times and associated emissions.

- **Parking Management** - Investigate introducing a number of formal parking bays and restrictions on Rolt Street where parking is not appropriate, to prevent unsafe parking obstructing fire access and to discourage frequent turning and engine idling next to the Nursery. Coupled with increased patrolling and enforcement to discourage parking on the school keep clear markings This can be done in parallel with an anti-idling 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.

5.4. STARS ACCREDITATION SCHEME FOR NURSERIES

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

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

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

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

5.4.5. Clyde Nursery School does not currently hold accreditation. Our recommended measures for the nursery include a number or initiatives that would count towards achieving a STARS scheme
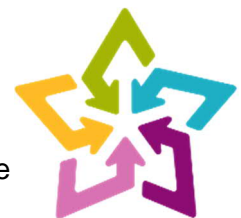
accreditation, including: 'anti-idling awareness raising measures' and 'park and stride'. STARS activity cards are available for these measures, as well as wide range of other topics https://stars.tfl.gov.uk/Explore/Idea.

5.5. HEALTHY SCHOOLS LONDON

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

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

5.5.2. The nurseries must complete the following statements:

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

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

5.6. AIR QUALITY ALERTS

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

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

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

5.7. ENGAGEMENT

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

5.7.2. Following consultation with the nurseries and borough council as part of the audit process, bespoke awareness raising posters and web material were provided for each nursery – see Appendix D.

HEALTHY EARLY YEARS LONDON (HEYL)

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

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

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

5.8. FUNDING OPPORTUNITIES

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

Figure 16 – Summary of Funding Opportunities
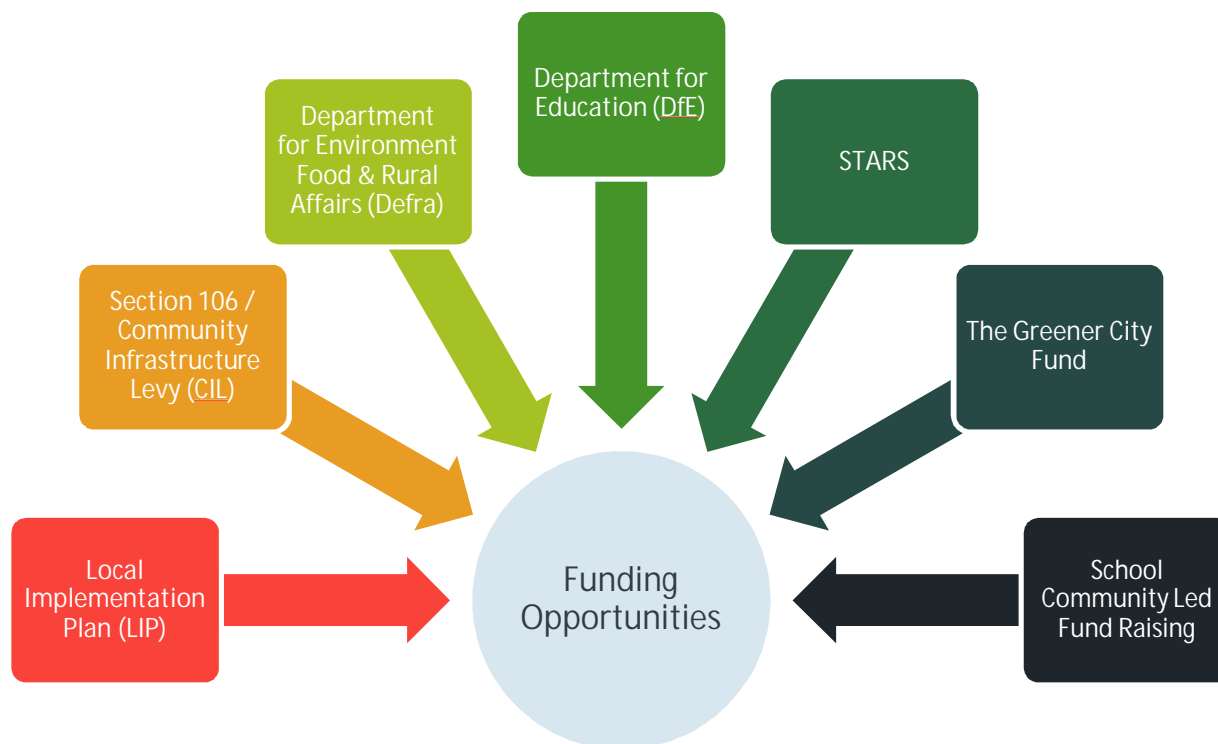
Local Implementation Plan (LIP)

5.8.2.   A primary source of funding is linked to the Local Implementation Plan (LIP) 3 that will provide spending from April 2019 until April 2020. The guidance on bidding specifically referenced the need to improve air quality at schools and nurseries.

Section 106 / Community Infrastructure Levy (CIL)

5.8.3.   Section 106 (S106) agreements and Community Infrastructure Levy (CIL) are potential sources of funding towards measures to address local air pollution. A Community Infrastructure Levy (CIL) is a planning charge introduced by the government via the Planning Act 2008.

TfL Liveable Neighbourhoods

5.8.4.   A Liveable Neighbourhood scheme will deliver attractive, healthy and safe neighbourhoods for people and involves changes to improve conditions for walking and cycling and reducing traffic dominance – all of which can play a part in reducing air pollution. The programme has a budget totalling £85.9m over the five financial years (2017/18 – 2021/22), excluding the funding for the remaining Major Schemes that will be completed during this period.

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

5.8.5.   Defra's air quality grant scheme provides funding to eligible local authorities to help improve air quality. The scheme helps local authorities to make air quality improvements and to meet their statutory duties under the Environment Act 1995.

Department for Education (DfE)

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

5.8.7.   Additionally, the Salix Energy Efficiency Loan Scheme provides funding for nurseries through DfE, to reduce energy costs through the installation of energy efficiency technologies.

Greener City Fund

5.8.8.   The Mayor's Greener City Fund (www.london.gov.uk/greenercity) includes a range of programmes to create and improve green spaces and encourage tree planting in London. This is part of the Mayor's commitment to making a London a National Park City. The Community Tree Planting Grant and Community Green Space grant schemes are open to applications from nurseries.

RE:FIT

5.8.9.   RE:FIT London is jointly funded by the GLA and the European Union European Regional Development Fund. The programme helps public sector organisations save carbon, energy and money by retrofitting buildings to make them more energy efficient. The RE:FIT London Programme Delivery Unit is an expert team which provides free end to end support to deliver projects.

TfL STARS Reward Scheme

5.8.10.   Whilst there is no specific funding attached to STARS, as gaining STARS accreditation helps boroughs reduce car travel, and increase cycling and walking, they often choose to link it to incentives – such as local grant funding through their LIP programmes.

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

- **Local Clinical Commissioning Groups (CCG)**
- **Health and Wellbeing Boards:**
- **Charitable Trusts**
- **Local business funding**
- **Consortium approach** – pooling funding with other boroughs and achieve economies of scale

Nursery Community Led Fund Raising Initiatives

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

Other Funding Sources

5.8.13.   There are several grant funding bodies who may be interested in funding recommendations particularly if a borough links up with a community organisation.

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

Other sources of funding for green infrastructure

5.8.15. Potential sources of funding for green infrastructure in nurseries include:

- The Tree Council's **Trees for Schools** programme
- The **Woodland Trust** offers free trees for schools and nurseries.
- The **Gregg's Foundation Environmental Grants** offer up to £2,000 for projects that improve the physical environment
- **Tesco Bags of Help** offer up to £4,000 to projects including school and nursery grounds
- **The Big Lottery Fund's Awards for All programme** offers up to £10,000 for projects that "improve the places and spaces that matter to communities", including nurseries
- **Trees for Cities** –match-fund the creation of Edible Playground teaching garden space, School Greening projects and Trees for Schools
- **Groundwork London** –support nurseries in designing and implementing green interventions.[16] Groundwork London's Our Space award[17] offers grants between £500 and £5,000.

5.8.16. See Appendix F for further information on potential funding sources.

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[16] https://www.groundwork.org.uk/Sites/london/pages/school-air-quality-greening

[17] https://www.groundwork.org.uk/Sites/london/pages/our-space-award

5.9.   MONITORING

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

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

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

5.9.4.   Where possible such monitoring should cover:

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

6.   NEXT STEPS

6.1.1.   In working with the nursery and borough officers to complete the air quality audit, we found there to be a passionate group of individuals, who were eager to make a difference, and enthusiastic about delivering a range of solutions to improve local air quality for the children, and the wider community.

6.1.2.   The borough and nursery should investigate the scope for rapidly delivering key measures from the recommendations, to achieve a combination of quick win improvements for the nursery, whilst also thinking more holistically about how some of the medium to longer term recommendations can be progressed, to deliver more transformational change. By participating in this audit, the following steps have been completed:
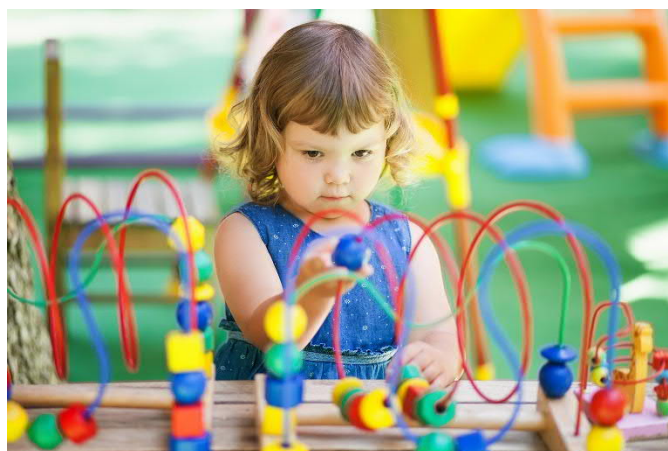
- **Identified the sources of poor outdoor air quality** and exposure at nursery and within the surrounding catchment areas.
- **Identified the sources of poor indoor air quality** and potential exposure by children attending the nurseries, and established a baseline of indoor air quality.
- **Engaged the borough and other relevant stakeholders** to inform the context and feasibility of the proposed recommendations.
- **Identified, evaluated and developed recommended measures** within and around the nurseries' that will help a borough and nursery to reduce particulate matter, emissions and children's exposure to poor air quality.
- **Raised awareness within the nursery community** about the impacts of air pollution.

6.1.3.   In order to take forwards the recommendations identified within this report, the nursery and borough council will need to continue to work closely, building on the relationships already in place. A wide range of potential funding sources are identified within the report, and borough councils and nurseries are encouraged to apply for these where appropriate to maximise the potential for delivering the recommendations. The nursery has an important leadership role in ensuring that measures to reduce exposure and emissions are included in the nurseries strategic plans.

6.1.4.   STARS is an ongoing process, and the nursery should continue working towards the targets they have set, and continue adding to their air quality related activities, and uploading evidence to contribute towards achieving and sustaining higher levels of accreditation. An important outcome from this project will be to build on our knowledge of how effective different measures prove to be over time, so that the findings can be used to continually update and refine the toolkit of measures for use in future audits. The findings of the Air Filtration System trials currently underway will be made available as an update to the toolkit of measures.

6.1.5.   We also hope that the borough and nursery will come together as part of a wider School and Nursery Air Quality forum, to share their experiences with other nurseries and boroughs facing similar challenges. A wide range of guidance and useful literature is available to support further studies, schemes or initiatives for improving local air quality – see Appendix A.

Other formats and languages

For a large print, Braille, disc, sign language video or audio-tape version of this document, please contact us at the address below:

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