

The Mayor of London's Nursery Air Quality Audit Programme

Kay Rowe Nursery School, London Borough of Lewisham



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THE MAYOR'S NURSERY AIR QUALITY AUDIT PROGRAMME

Kay Rowe Nursery School – London Borough of Newham



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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.

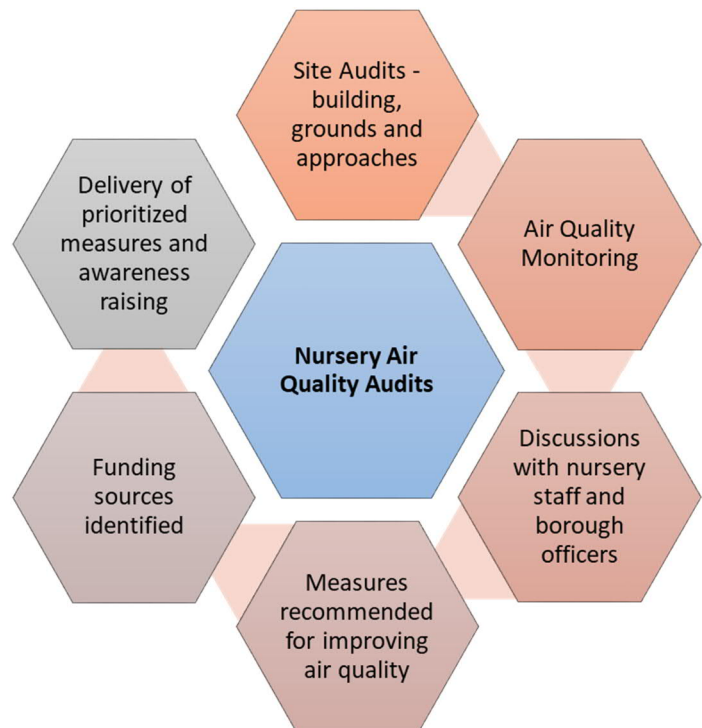
Indoor air pollution is still a relatively new area of study, and our understanding is still evolving as further evidence is collected on the complex interactions taking place, and the extent to which they affect our health.

Audit Findings

Nitrogen oxides (NO_x) - Short-term exposure to concentrations of NO₂ can cause inflammation of the airways, increasing susceptibility to respiratory infections and to allergens.

The results of the three-month baseline monitoring showed that NO₂ concentrations were highest at the **roadside** (41µg/m³), with local road traffic emissions contributing significantly to roadside concentrations.

The three months of baseline NO₂ monitoring provides a snap-shot of concentrations in and around the nursery across the winter and spring months. In one of the three months, the measured NO₂ concentrations exceeded the legal limits (annual mean NO₂ national Air Quality Objective of 40µg/m³).



NO₂ concentrations fall to 37µg/m³ at the **nursery entrance**, which is set back a short distance from the roadside, and partially screened by trees and shrubs. 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 17-19µg/m³.

Volatile Organic Compounds (VOCs) are emitted from vapours arising from petrol and solvents. In a nursery setting these are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs¹) concentrations should be below 300 µg/m³. In the nursery they were found to be 89.8 µg/m³. The majority of VOCs identified were likely to be from the fragrances, perfumes and alcohols in, cleaning materials and solvents.

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.

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 guideline². The World Health Organisation (WHO) indoor air quality guideline for short and long-term exposures to formaldehyde is 100 µg/m³. In Kay Rowe they were found to be 9.25 µg/m³.

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 Woodgrange Road. NO₂ concentrations are predicted to be highest along the western boundary of the nursery, which is closest to the main road.

Particulate Matter (PM₁₀ 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 PM₁₀, known as PM_{2.5}, is formed by combustion and is believed to be the main cause of the harmful effects of particulate matter.

Nearly 50% of NO_x emissions in London are from road transport. Larger diesel vehicles in particular are major contributors to local air pollution. Approximately **12,300 vehicles per day** travel within 200m of the nursery. Buses make up only 2% of these vehicle movements, but contribute

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 PM₁₀ 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).

26% of the transport related NO_x emissions locally. Similarly, HGVs only account for 1% of the total traffic but contribute 10% of emissions. Cars account for 45% of emissions.

Key observations – summary of potential issues

- Heavily trafficked road with large numbers of cars and taxis.
- Drop off and pick up by parents in private vehicles parking inconsiderately on zig zags and in middle of the road to drop off/pick up, creating an unsafe environment for children walking and potentially discouraging more from walking, scooting or cycling as a consequence.
- Idling vehicles outside the nursery, and on Woodgrange Road.
- Delivery activity servicing the nearby commercial premises.
- Barrier to pedestrians posed by the busy Woodgrange Road and short invitation to cross at the pedestrian crossing.
- Streets congested with parked vehicles.
- Classrooms are reliant on natural ventilation through windows and doors, with greater exposure to air pollution throughout the building.
- Older parts of the building are poorly insulated, resulting in greater heat loss, and so potentially increased run times by nursery boilers, and therefore greater emissions.
- Playground fronts onto the road, with bamboo screening applied to the security fencing, with some mature trees and shrubs.
- The redevelopment of the Methodist Church could impact the nursery grounds especially during construction with dust and emissions from plant. Also, the completed building may have gas boiler flues directed towards the nursery grounds which may increase exposure.
- The building suffers from hot cold and hot spots and is very hot in summer leading to windows being opened and heating running often adding to the background emissions. Heating system in older section of nursery has been installed piecemeal. One boiler room which contains cleaning products ventilates into the classroom.

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 key measures were considered to be:

- **School Street** – The introduction of School Street restriction at drop off and collection times would encourage walking and other sustainable modes of travel to nursery. It would also improve road safety, which has been a concern with parents stopping and turning in Osborne Road.
- **Heating and Cooling** - The uneven temperatures in the building at different times of the year especially in the older part of the building create additional burning of the gas boilers and opening of windows to ventilate exposing children to emissions. The new part of the nursery benefits from air source heat pumps and electric heating. Local emissions would reduce if this system was implemented in the older section of the nursery replacing the gas appliances.

- **Green Infrastructure** - While the frontage of the school benefits from substantial trees the reallocation of road space to provide pocket parks would offer another opportunity to install planting and greening, providing additional screening to the nursery site.

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 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 or TfL, are as follows. See Table 4 for further details on these measures.

Nursery Grounds

Green Infrastructure

Nursery Building

Improved heating and insulation
Relocate or seal boiler room
Monitor London Air website / app
Add indoor plants
Switch to lower VOC cleaning products

Behavioural Measures

Engagement Activities
Behaviour change
Attain a Silver Award in Stars
Staff Engagement
Prepare 'Welcome Packs' for new pupils / parents
Promoting Park & Stride
Promoting car sharing
Anti-idling campaign
Walking Buses

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 cardiovascular 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 (NO₂) and particulate matter (PM₁₀ 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 increasing⁵. 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 standards 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

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:

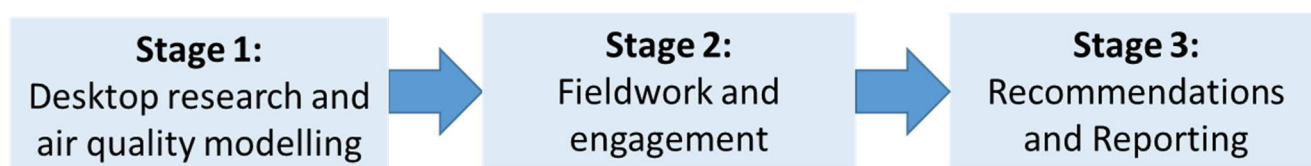
- Audit and identify the sources of poor outdoor air quality and exposure by children at 20 state-funded nurseries and their surrounding nursery catchment areas, including NO₂, PM₁₀ and PM_{2.5}.
- Audit and identify the sources of poor indoor air quality and potential exposure by children attending the nurseries, and establishing a baseline of indoor air quality.
- Assess the feasibility of installing air filtration systems at the selected nurseries.
- Trial and monitor the effectiveness of air filtration systems in at least 5 of the nurseries.
- 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 STARS⁸ 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.

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 (NO₂), 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 NO₂ 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 - KAY ROWE 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	Tuesday 18th December 2018	
School Representatives	Sarah Porter – Head Teacher	
Borough Representatives	Richard Wadley – Sustainable Transport Officer Tim Baker – Environmental Control Officer	
WSP Auditors	Martin Battle	
Itinerary	Timings	Description
	0800 – 0900hrs	Initial observations and site familiarisation by WSP auditors
	0915 – 1030hrs	Brainstorming Workshop with key staff from the nursery and borough officers.
	1030 – 1045hrs	Site walk and observations with borough air quality officers/ school transport officer/ nursery staff
	1045 – 1100hrs	Audit of building and grounds to appreciate the layout of the building/playgrounds etc. accompanied by the bursar/caretaker
	1100 - 1130hrs	Further observations and completion of site audit template

3. CONTEXT AND INITIATIVES

3.1. NURSERY CONTEXT

Figure 2 - Nursery Context

Borough: Newham

Address: Osbourne Road, E7 0PH

Pupil Numbers: 130

Age Range:
2-5 years



Gender:
Mixed

Type: Local authority nursery school



Children who speak English as an additional language:

Higher than average

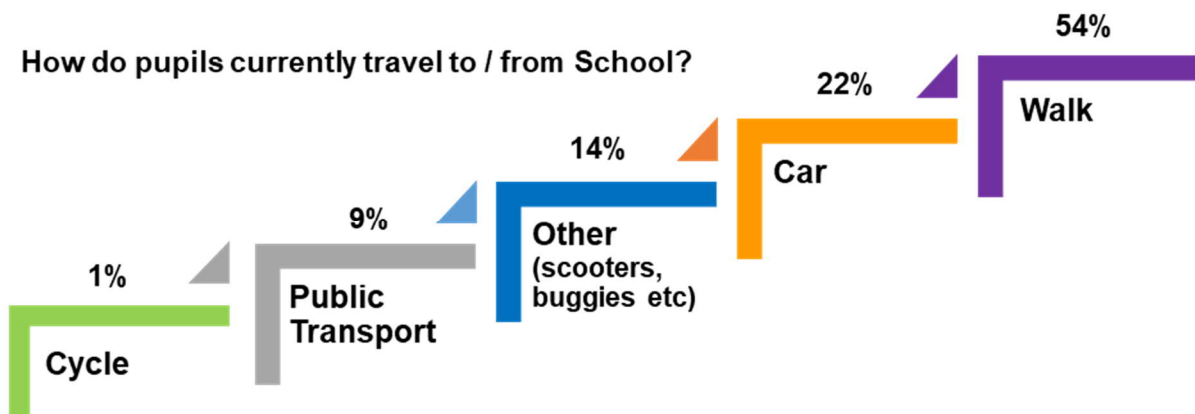


Children with disabilities or special educational needs:

Higher than average

Deprivation Rank:
2

How do pupils currently travel to / from School?



- 3.1.1. Kay Rowe Nursery is located in east London close to Forest Gate railway station in London Borough of Newham. The nursery is located on a residential street, Osborne Road.
- 3.1.2. At the time of the audit the nursery had **130 children**.
- 3.1.3. The nursery has **capacity for up to 200 children**. The main entrance is on **Osborne Road**, a 20-mph street.
- 3.1.4. Approximately **12,300 vehicles per day** travel on the core roads within a 200m radius of the nursery⁹. This is within the 3rd quartile in terms of traffic volumes amongst of the 20 nurseries assessed as part of this programme. For context, in the UK in 2017¹⁰ the average traffic flow on urban minor roads was 2,100 vehicles, and 19,200 vehicles on an urban A-road.
- 3.1.5. The nursery has a **high proportion (54%) of children walking** and **significant proportion arriving by car (22%)**. This has been put down to parents having children attending other schools in the area and parents having to make multiple drop offs even though most live in the Forest Gate area. The nursery and borough has worked hard to discourage private car use, but some parents feel the surrounding roads are unsafe.
- 3.1.6. The nursery has a **growing enrolment**, and this is down to families moving to the area and its gentrification due to the imminent arrival of Crossrail/Elizabeth Line.
- 3.1.7. 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.

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

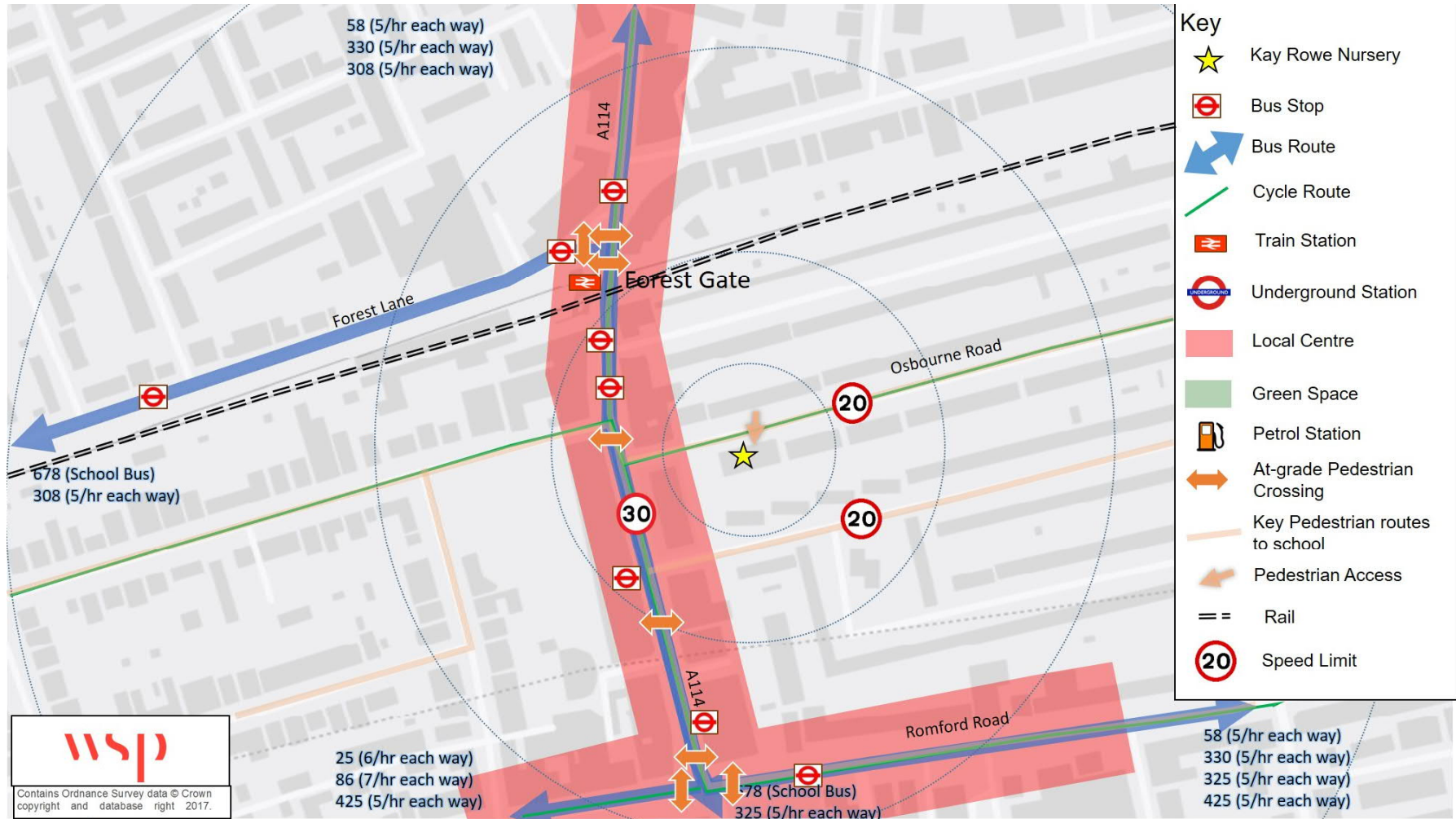


Figure 4 – Inner Context Plans



3.2. PLANNED SCHEMES & RECENT INITIATIVES

- 3.2.1. The nursery has recently completed an extension to add a children's centre and additional office space.
- 3.2.2. Adjacent to the nursery, the Forest Gate Methodist church plans to redevelop their site to construct a new church and residential flats.
- 3.2.3. At the time of the audit a row of shops near the school on Woodgrange Road were due to be demolished and replaced with new shops and around five storeys of flats above.

Impact of scheme:

- Air pollution associated with construction activity.
- Potential for additional traffic once completed.

- 3.2.4. A number of notable schemes and initiatives were also highlighted, that will have a significant bearing on the air quality around the nursery, these include:

WIDER SCHEMES

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

- 3.2.5. 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.
- 3.2.6. 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 23 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

- 3.2.7. 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.

- 3.2.8. 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 low emission bus zones in Stratford and A12 Eastern Avenue (Homerton Road).

Impact of scheme:

- Reduced air pollution as buses are replaced with low emission buses.

CROSSRAIL / ELIZABETH LINE

- 3.2.9. Crossrail will serve the nearby Forest Gate station. The Elizabeth Line will open during 2019/20 and the improved connectivity could be an opportunity to improve public transport mode share among staff and pupils.

Impact of scheme:

- Reduced reliance on polluting vehicles, aided by extended public transport services

NURSERY STARS ACTIVITIES

- 3.2.10. 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.
- 3.2.11. As part of the STARS scheme nurseries receive bespoke guidance from the borough, on-line resources, access to a London-wide community of schools and nurseries, priority access to funding, accreditation and recognition.
- 3.2.12. Kay Rowe Nursery holds Bronze status of the STARS programme as of September 2017, and has been active in undertaking range of STARS activities, with the following recorded since 2017:



- The nursery participates in the Barnardo's Big Toddle walking event
- Walking trips to local attractions
- Cycle parking installed
- Cycle skills sessions for adults
- Annual bike training for children
- Public transport for school trips
- Car sharing promotion to staff and parents
- Eco driving tips for staff and parents
- Children's traffic club
- Cycle scheme enabling staff to discounted bicycles
- School travel noticeboard and website

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 (NO₂)**, **formaldehyde (CH₂O)** 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. NO₂ 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 NO₂. 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 Kay Rowe Nursery School, five NO₂ diffusion tubes, one formaldehyde diffusion tube and one VOC diffusion tube were deployed in the following locations:

Nitrogen Dioxide (NO₂)

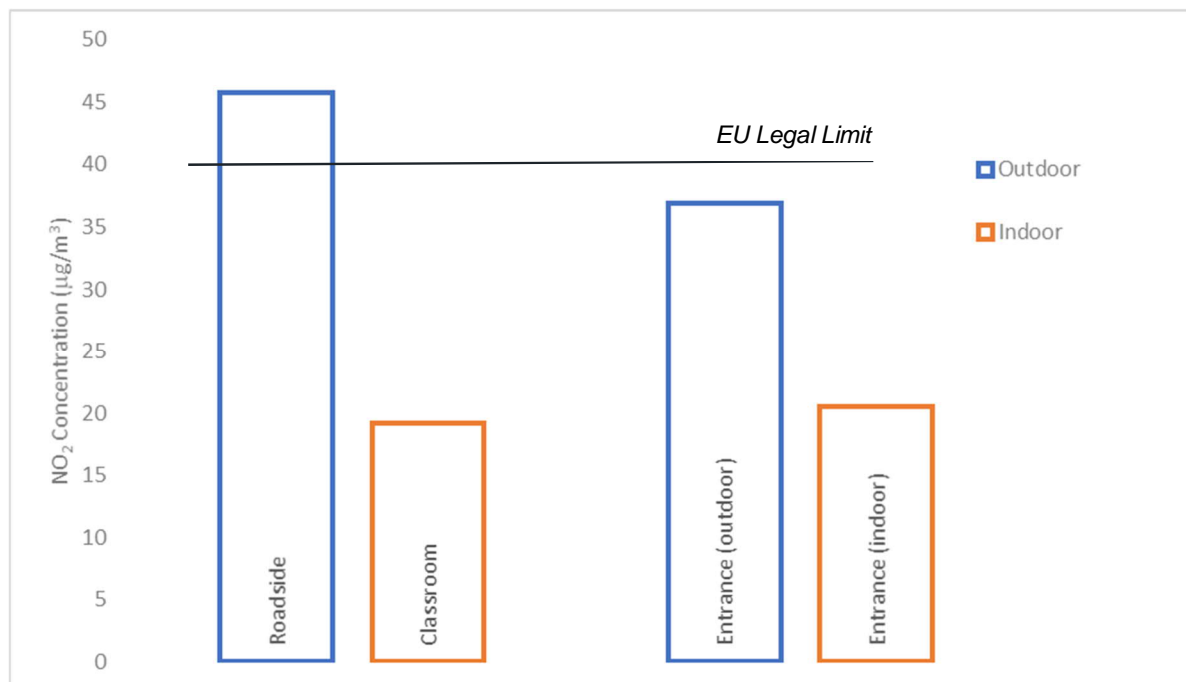
- roadside outside the nursery
- immediately outside the nursery entrance
- playground
- immediately inside the nursery entrance
- inside a nursery classroom.

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 Kay Rowe Nursery School (µg/m³)



4.1.8. The results of the three-month baseline NO₂ monitoring at Kay Rowe Nursery School, shown in Table 2.

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

Diffusion Tube Location	Indoor / Outdoor Location	Baseline NO ₂ Monitoring Results - NO ₂ (µg/m ³)			
		December	January	February	Average
Roadside	Outdoor	37.50	38.80	45.78	40.69
Nursery entrance	Outdoor	33.83	39.39	36.92	36.71
Nursery entrance	Indoor	17.18	20.44	20.56	19.39
Classroom	Indoor	14.31	18.74	19.19	17.41
Ratio of indoor to outdoor (I/O) concentrations		0.51	0.52	0.56	0.53

4.1.9. NO₂ concentrations were found to be highest at the **roadside** (40.69µg/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. In one of the three months, the

measured NO₂ concentrations exceeded the annual mean NO₂ national Air Quality Objective (AQO) of 40µg/m³.

- 4.1.11. NO₂ concentrations fall to 36.71µg/m³ at the **nursery entrance**, which is set back a short distance from the roadside, and partially screened by trees and shrubs.
- 4.1.12. **Inside the nursery**, concentrations fall by 18-24µg/m³ compared to external concentrations. It should be noted that indoor NO₂ 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 NO₂ 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 NO₂ I/O ratio was 0.53 at Kay Rowe Nursery School, indicating that uncontrolled infiltration rates are at the lower end of the spectrum, and so the **building offers reasonable protection to its occupants**.
- 4.1.15. The results of the three-month baseline VOC and Formaldehyde monitoring are shown in Table 3.

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

Pollutant	Baseline Formaldehyde and VOC Monitoring (µg/m ³)			
	December	January	February	Average
VOCs	89.8	89.8	89.8	89.8
Formaldehyde	10.8	8.05	8.9	9.25

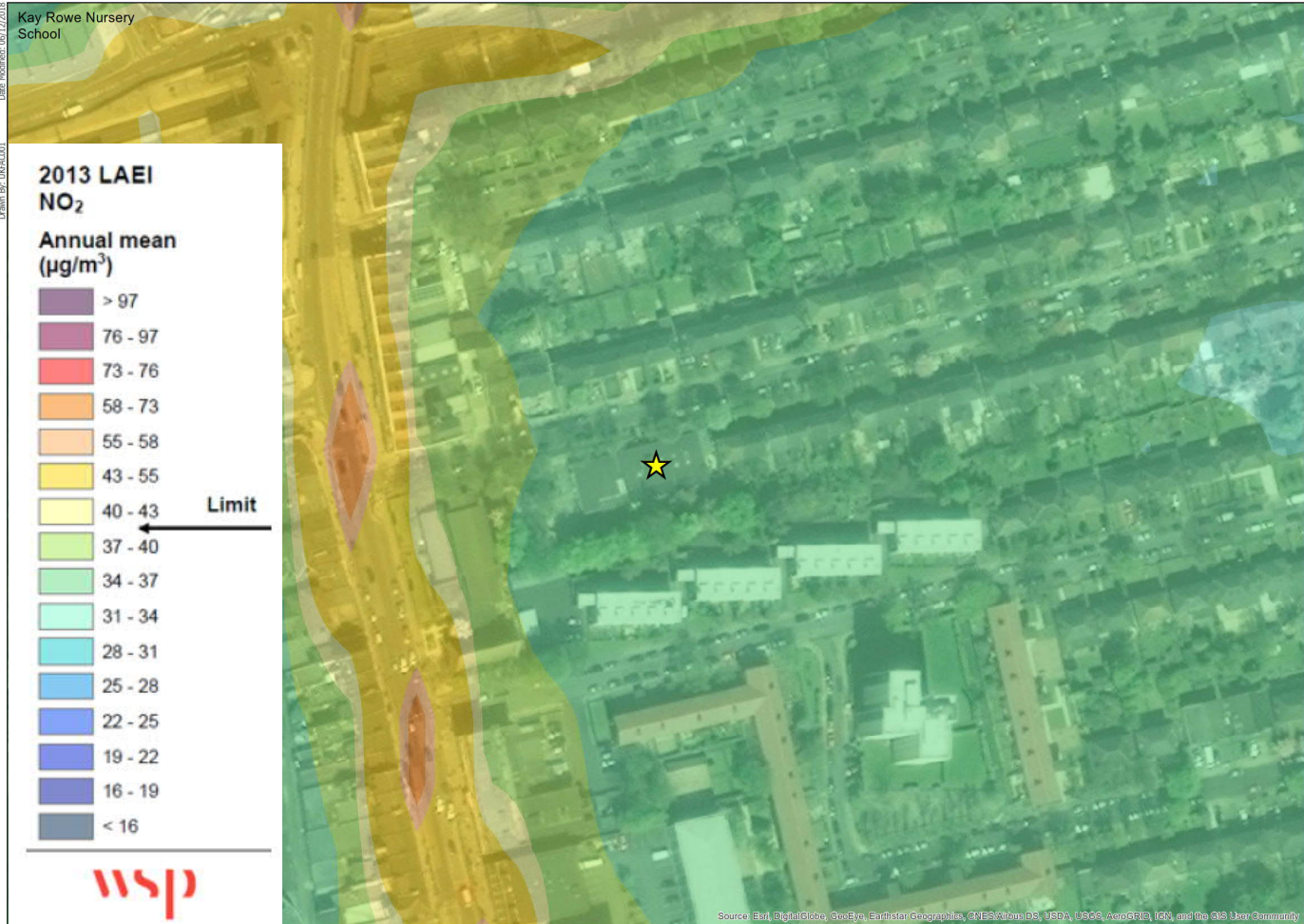
- 4.1.16. **Volatile Organic Compounds (VOCs)** are emitted from vapours arising from petrol and solvents. In a nursery setting are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. Exposure can cause irritation to the eyes and upper airways. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs¹¹) concentrations should be below 300 µg/m³. In Kay Rowe they were found to be 89.8 µg/m³. The majority of VOC chemical species 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.

¹¹ TVOC is a grouping of a wide range of organic chemical compounds to simplify reporting when these are present in ambient air or emissions.

- 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 guideline¹² for short- and long-term exposures to formaldehyde is 100 µg/m³. In Kay Rowe they were found to be 9.25 µg/m³.
- 4.1.18. In addition to the monitoring undertaken at the site, 2013 baseline annual mean NO₂, PM₁₀ 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, NO₂, PM₁₀ 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 NO₂ concentrations within the vicinity of Kay Rowe Nursery School.
- 4.1.22. The contours (changes in colours) show the change in the change in pollution gradients, with distance, away from the heavily trafficked Woodgrange Road. NO₂ concentrations are predicted to be highest along the western boundary of the nursery, which is closest to the main road.

¹² Chapter 5.8 Formaldehyde. WHO Air Quality Guidelines – Second Edition, 2001

Figure 6 - LAEI Baseline Annual Mean NO₂ Concentrations within the Immediate Area of Kay Rowe Nursery School



4.1.23. Nearly 50% of NO_x emissions in London are from road transport. Vehicle emissions data for the LAEI modelled road links within 200m of the nursery, split by source, have been analysed to identify the key sources contributing to NO₂ in the vicinity of the nursery.

4.1.24. The pie chart below shows that while buses make up only 2% of vehicle movements, they contribute 26% of the transport related NO_x emissions locally. Similarly, HGVs only account for 1% of the total traffic but contribute 10% 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)

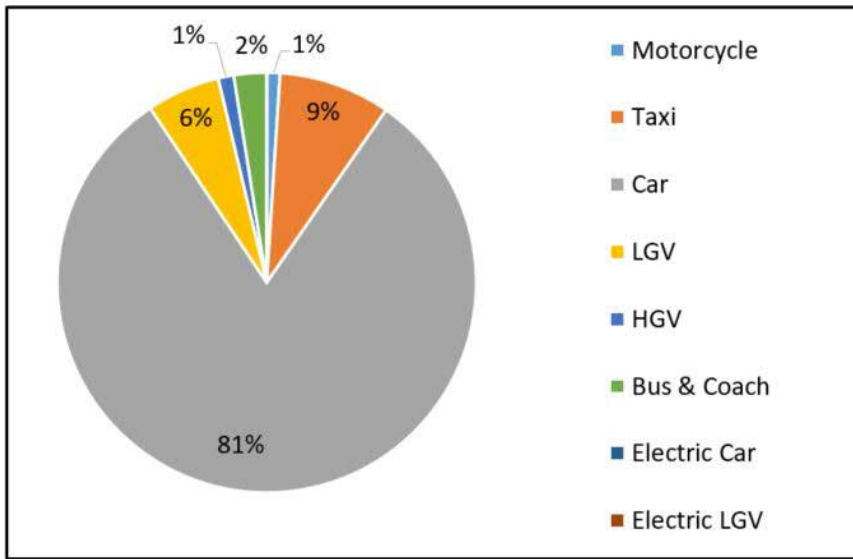
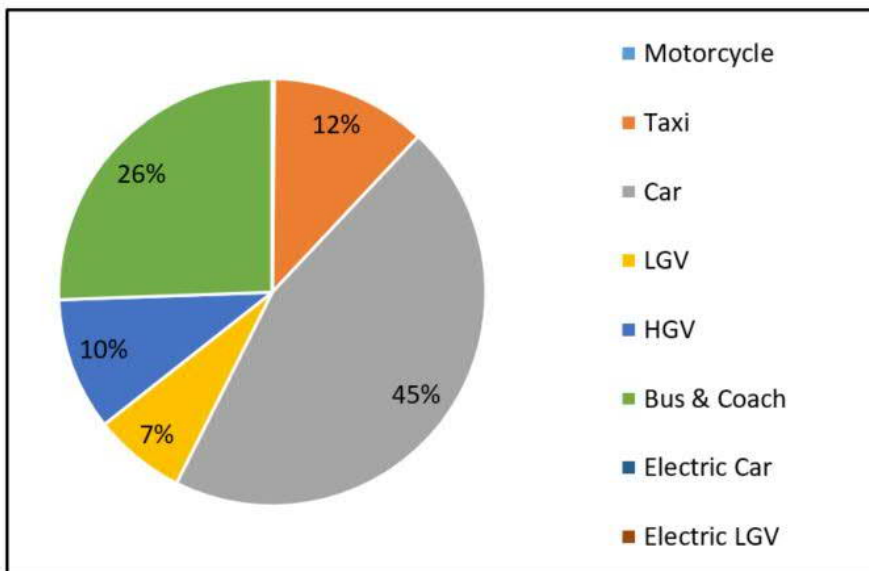


Figure 8 – Average Road Transport NO_x Emissions by Vehicle Type (within 200m of nursery)



4.1.25. The pie charts below illustrate that PM₁₀ and PM_{2.5}, like NO_x, are emitted in higher levels by large vehicles such as buses, HGVs and LGVs, though not to the same extent. Buses make 2% of vehicle movements, and contribute 17% of the transport related PM₁₀ emissions locally, and 9% of PM_{2.5}.

Figure 9 – Average Road Transport PM₁₀ Emissions by Vehicle Type (within 200m of nursery)

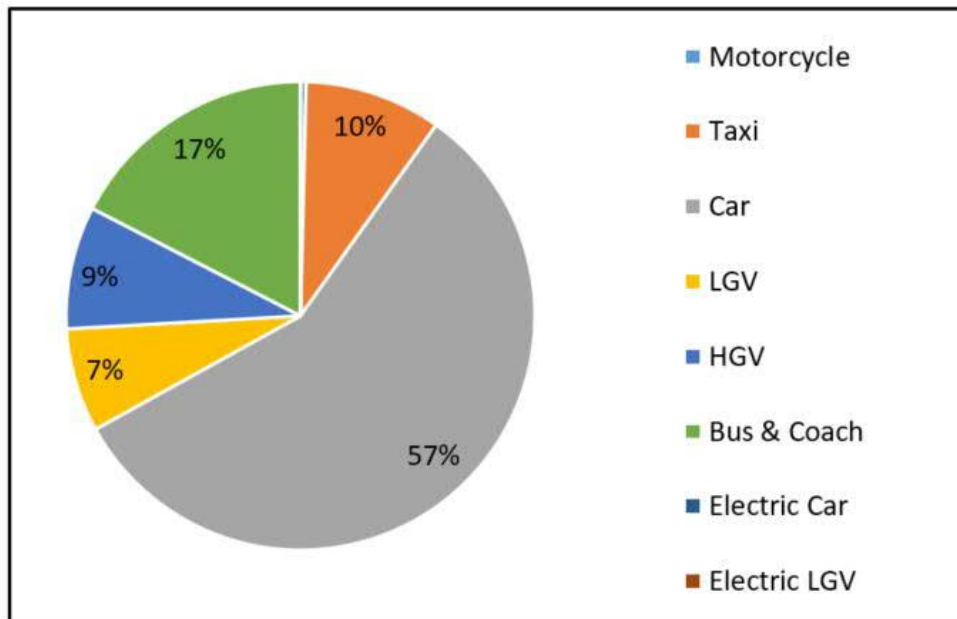
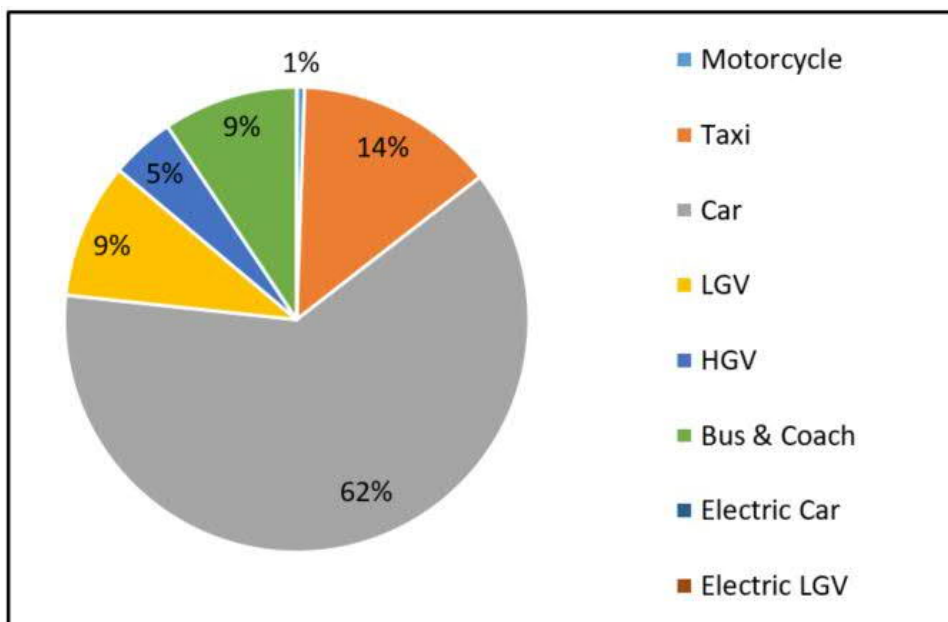
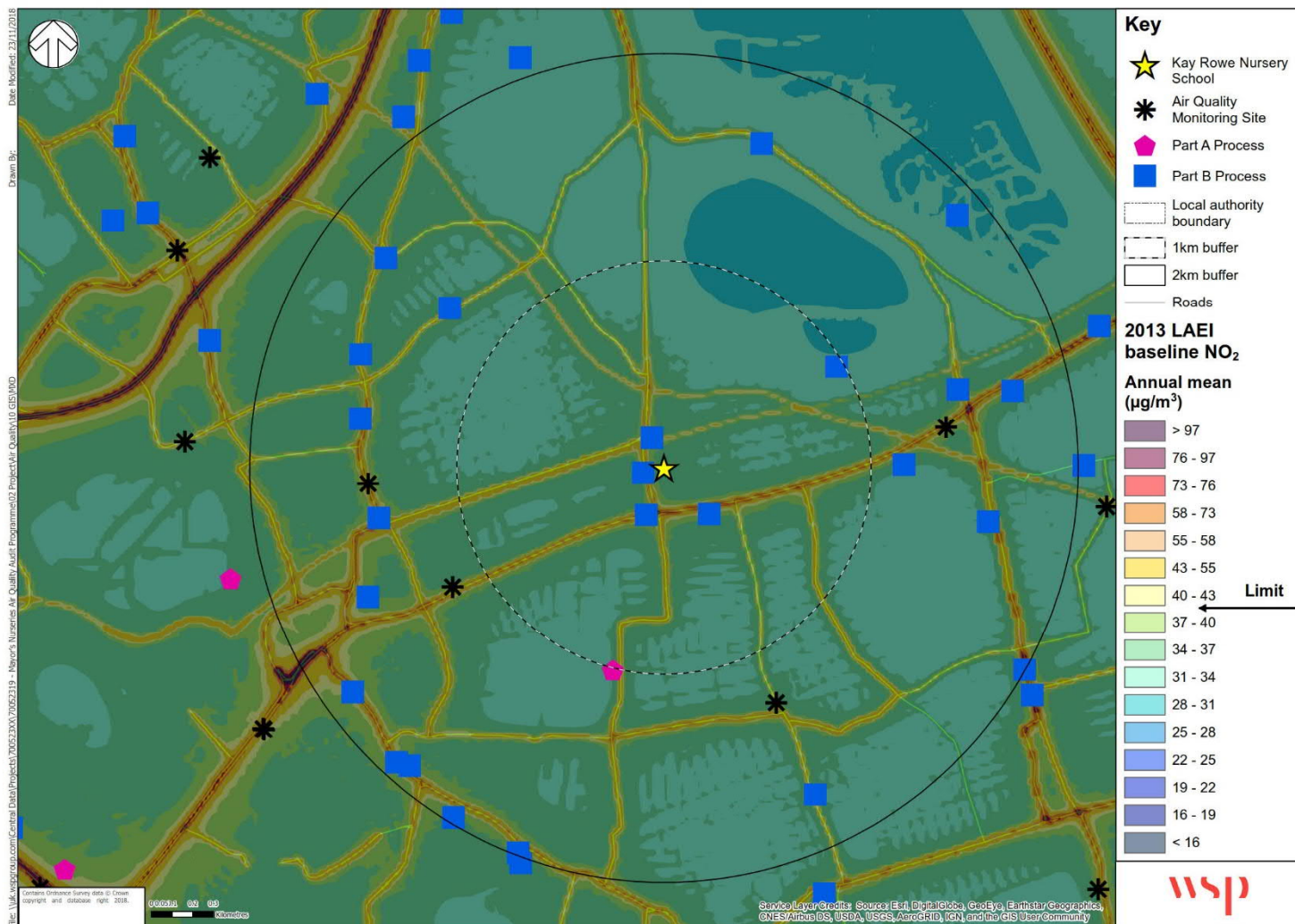


Figure 10 – Average Road Transport PM_{2.5} Emissions by Vehicle Type (within 200m of nursery)



- 4.1.26. Figures 11-13 show the 2013 LAEI baseline annual mean NO_x, PM₁₀ and PM_{2.5} concentrations within 2km of Kay Rowe 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. PM₁₀ and PM_{2.5} sources are much more universal and dispersed than NO₂ sources. A proportion of PM_{2.5} and PM₁₀ 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 PM₁₀ (Figure 12) and PM_{2.5} (Figure 13) appear less defined than for NO₂.

Figure 11 – 2013 LAEI Baseline Annual Mean NO₂ Concentrations within 2km of Kay Rowe 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 PM₁₀ Concentrations within 2km of Kay Rowe Nursery School

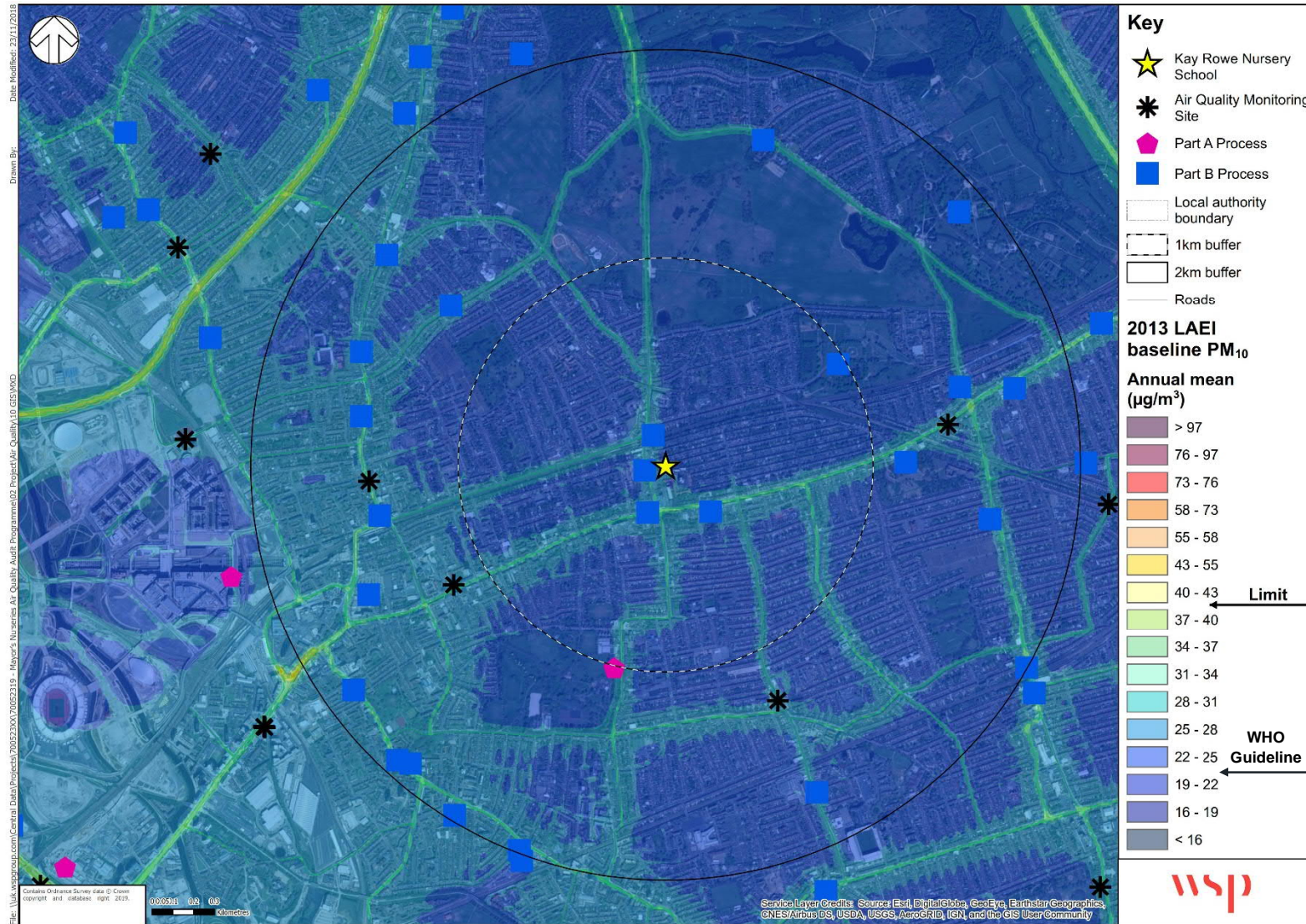
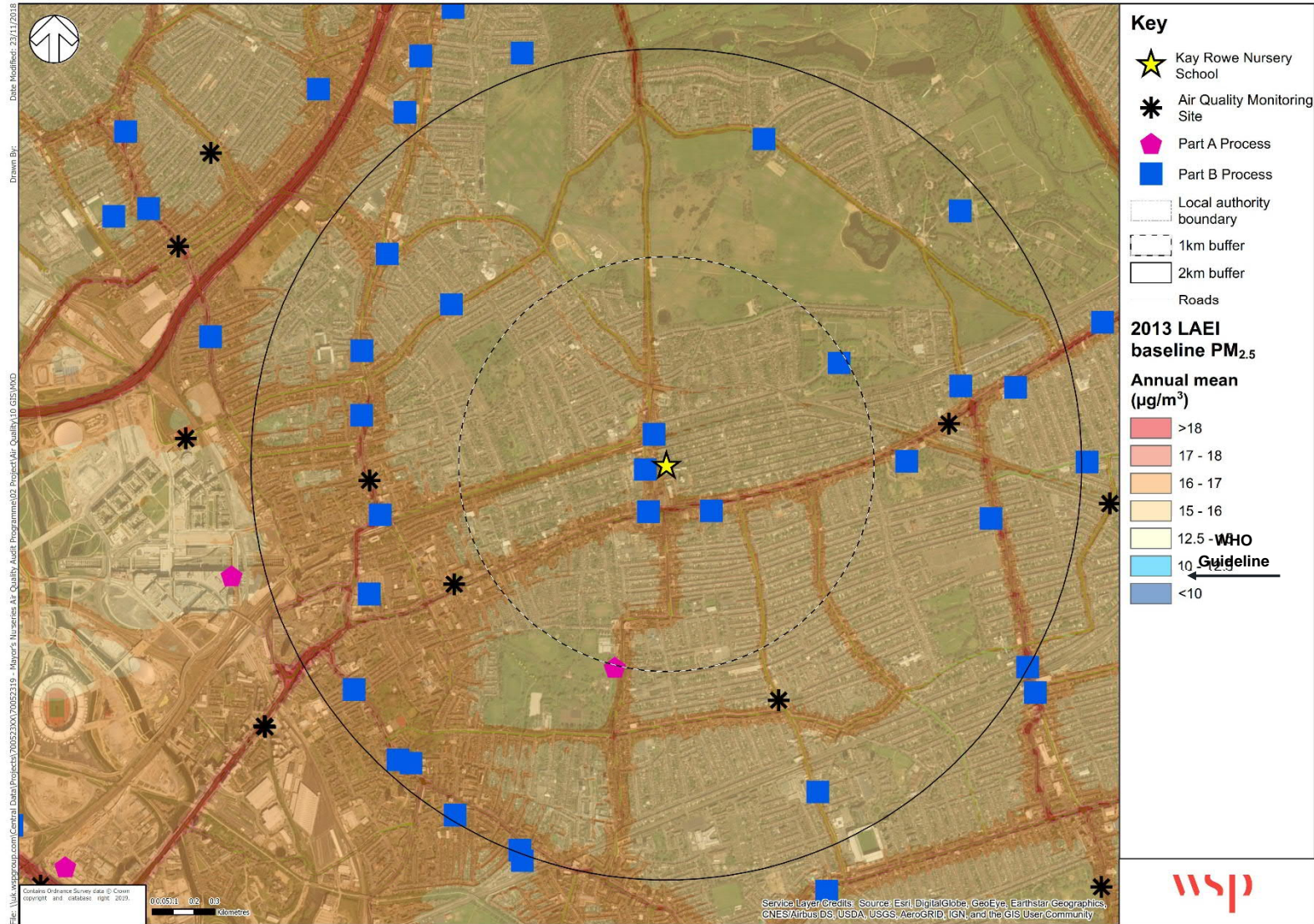


Figure 13 - 2013 LAEI Baseline Annual Mean PM_{2.5} Concentrations within 2km of Kay Rowe Nursery School



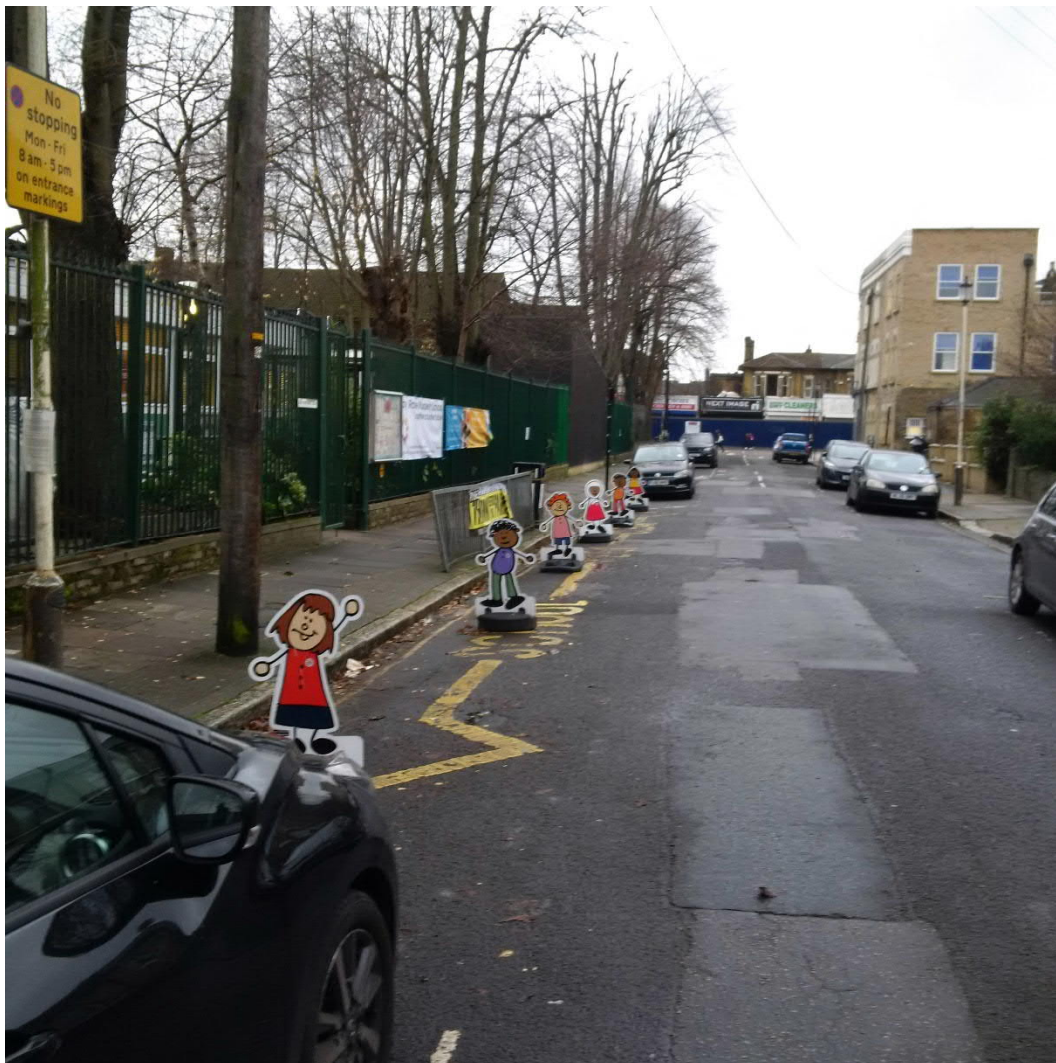
4.2. HIGHWAYS – KEY OBSERVATIONS

- 4.2.1. The nursery building is situated on Osborne Road which is a residential street, 85 metres to the west is the A114 Woodgrange Road, a busy **commercial street and bus route**, with around 15 buses an hour in operation.
- 4.2.2. Woodgrange Road provides a north south route from the A12 in Wanstead to Plaistow and is **heavily trafficked**. The nursery shares its western boundary with the Forest Gate Methodist Church which fronts Woodgrange Road, as previously discussed this site is proposed to be redeveloped. The southern boundary fronts low rise flats while the eastern boundary fronts Victorian housing.
- 4.2.3. The nursery has one pedestrian entrance to Osborne Road. It has no vehicular entrance or off-street parking. Osborne Road and the surrounding streets are within a **controlled parking zone, with high levels of utilisation of available parking spaces**. The nursery frontage has school keep clear zig zags markings and a short length of pedestrian guard railing to prevent children from running straight into the road from the nursery gate.
- 4.2.4. Parents driving to the nursery and stopping inappropriately to pick up and drop off is an issue. On the day of the audit parents were observed stopping in the middle of the road to drop off. Waiting with the **engines idling**, three-point turns in the road and parking across drop kerbs. This activity will be contributing to worsening local air quality and exposure, and **creating an unsafe environment for children** waking amongst queueing traffic and crossing between parking vehicles with limited visibility, **potentially discouraging more children from walking, scooting or cycling as a consequence**.
- 4.2.5. The nursery advised that the installation of pop-up children characters on the zig zag markings has improved the situation by raising awareness of the presence of the nursery, and helped prevent inconsiderate parking on the zig zags. However, they inform that one of the characters was recently run over by parent performing a turn in the road. Also, the implementation of the controlled parking zone has helped dissuade parents using cars, and stopped a number of nursery staff driving to school. The community police have been attending and enforcing when necessary. However, after the initial improvements the level of driving to school is now increasing. There is a **feeling amongst some parents that the walking routes to the nursery are unsafe and therefore they prefer to drive**.
- 4.2.6. The nursery wishes to attain a silver status STARS, but need to increase the levels of walking to school. The **nursery is proactive with its encouragement of sustainable travel**. It provides welcome packs and home visits to parents. It has walk to school weeks and cycling days, with cycle mechanics on site. In the case of parents breaking the rules or parking inconsiderately the nursery follows up with them. Children are taken once a week to Wanstead Park by bus and every six weeks they are taken to the coast by train. Other school trips include visits to local shops by walking.
- 4.2.7. The nursery informed the auditor that there was concern in regard to the short period of time given to pedestrians at the nearby **crossing on Woodgrange Road**. Also, the number of injury accidents recorded at the junction with Romford Road.
- 4.2.8. **Delivery and servicing vehicles** supplying the commercial premises on Woodgrange Road can lead to localised congestion and idle engines. A number of vehicles park in Osborne Road to access the shops.

4.2.9. The nursery has **cycle and scooter parking** which is well used, but lacks visitor cycling spaces. It also required a significant amount of space to store buggies, up to 25 on some occasions.

Summary – Key Issues

- Heavily trafficked road with large numbers of cars and taxis.
- Drop off and pick up by parents in private vehicles parking inconsiderately on zig zags and in middle of the road to drop off/pick up, creating an unsafe environment for children walking and potentially discouraging more from walking, scooting or cycling as a consequence.
- Idling vehicles outside the nursery, and on Woodgrange Road.
- Delivery activity servicing the nearby commercial premises.
- Barrier to pedestrians posed by the busy Woodgrange Road and short invitation to cross at the pedestrian crossing.
- Streets congested with parked vehicles.



Pop up children characters on keep clear markings

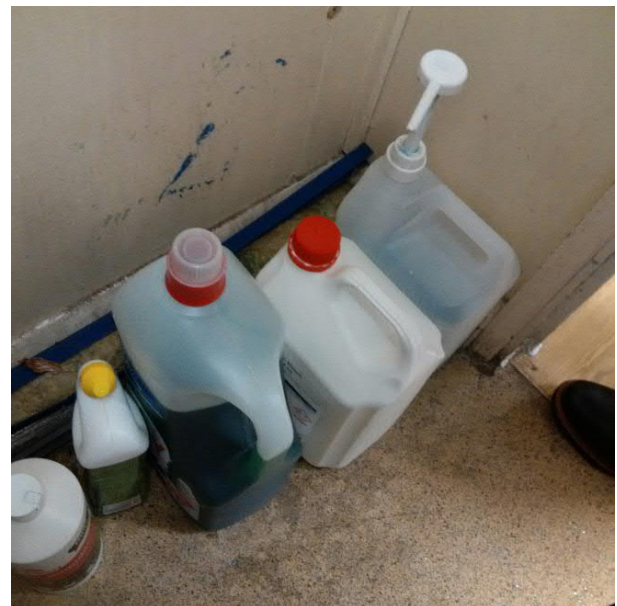
4.3. NURSERY GROUNDS / BUILDING - KEY OBSERVATIONS

- 4.3.1. The nursery is a single storey **wooden building** and was built in the 1960's. An extension has been built to the west elevation in the past 3 years.
- 4.3.2. The building sits on a rectangular plot and the building sits close to the Osborne Road boundary, which results in a narrow area to the front of the building for bike and scooter parking.
- 4.3.3. Generally, the offices and ancillary rooms are located on the Osborne Road elevation while the larger classrooms face the garden on the southern elevation, away from the road. The nursery class rooms are open to the garden, and the PVC free flow curtains (butchers curtains) that have been installed have helped regulate the temperature better.
- 4.3.4. The classroom is on the southern elevation and away from the residential street of Osborne Road. The playground and classrooms do not front the main source of local emissions being Woodgrange Road and shielded by low rise flats and the Methodist church from it. The rooms are reliant on natural ventilation.
- 4.3.5. The original building and extension are very different in construction and heating. The older section of the building is wooden construction and has replacement uPVC double glazed windows, which can be opened.
- 4.3.6. The **heating system** in the older section is gas central heating with radiators. The system has the appearance of being added to in a piecemeal fashion and for this reason there are two boiler rooms. One boiler room is contained in a cupboard in the nursery class room snug, in which the walls and doors do not meet the ceiling allowing the cupboard to ventilate into the class room. This boiler room also contained the gas meter and **cleaning products**.
- 4.3.7. The second boiler room in the old section of the nursery is contained within a storeroom which was off limits to the children. Both boiler rooms flues extended above the roof height to allow dispersion.
- 4.3.8. The old section of the nursery suffers with inconsistent temperatures throughout, some rooms, particularly the offices, are prone to overheating, whilst others are often cold and this is likely down to poor insulation.
- 4.3.9. The new extension is also single storey but is of more substantial construction with modern levels of insulation and has aluminium framed windows. The building uses an air source **heat pump** to heat air. There is also electric heating in some rooms. It appears that the system can also cool in summer.
- 4.3.10. It is understood that the repairs and changes to the **heating system** is undertaken through a private body employed by the borough. The nursery has sought to make changes and improvements to the heating system but this has proved prohibitively expensive.
- 4.3.11. The nursery plot is surrounded by **large mature trees**. The western boundary abuts the Methodist Church and as discussed earlier this site is due to be redeveloped. The trees had been pruned significantly at the time of the audit between the nursery and church ground. There was concern at the nursery of the impact to the grounds of the nursery especially during construction. No plans for the **redevelopment** of the site have been seen, but concerns include the siting of gas boiler flues and the proximity to the nursery grounds.
- 4.3.12. There is no off-street parking for staff or deliveries. Most staff travel to nursery by public transport and if drive must park on the surrounding streets that are part of a controlled parking zone.

- 4.3.13. 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.
- 4.3.14. Classroom **floors** are predominantly comprised of lino or vinyl, with some areas of carpet tiles.. 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.
- 4.3.15. The nursery building contained only a **limited number of green plants**.

Summary – Key Issues

- Classrooms are reliant on natural ventilation through windows and doors, with greater exposure to air pollution throughout the building.
- Older parts of the building are poorly insulated, resulting in greater heat loss, and so potentially increased run times by nursery boilers, and therefore greater emissions.
- Playground fronts onto the road, with bamboo screening applied to the security fencing, with some mature trees and shrubs.
- The redevelopment of the Methodist Church could impact the nursery grounds especially during construction with dust and emissions from plant. Also, the completed building may have gas boiler flues directed towards the nursery grounds which may increase exposure.
- The building suffers from hot cold and hot spots and is very hot in summer leading to windows being opened and heating running often adding to the background emissions. Heating system in older section of nursery has been installed piecemeal. One boiler room which contains cleaning products ventilates into the classroom.



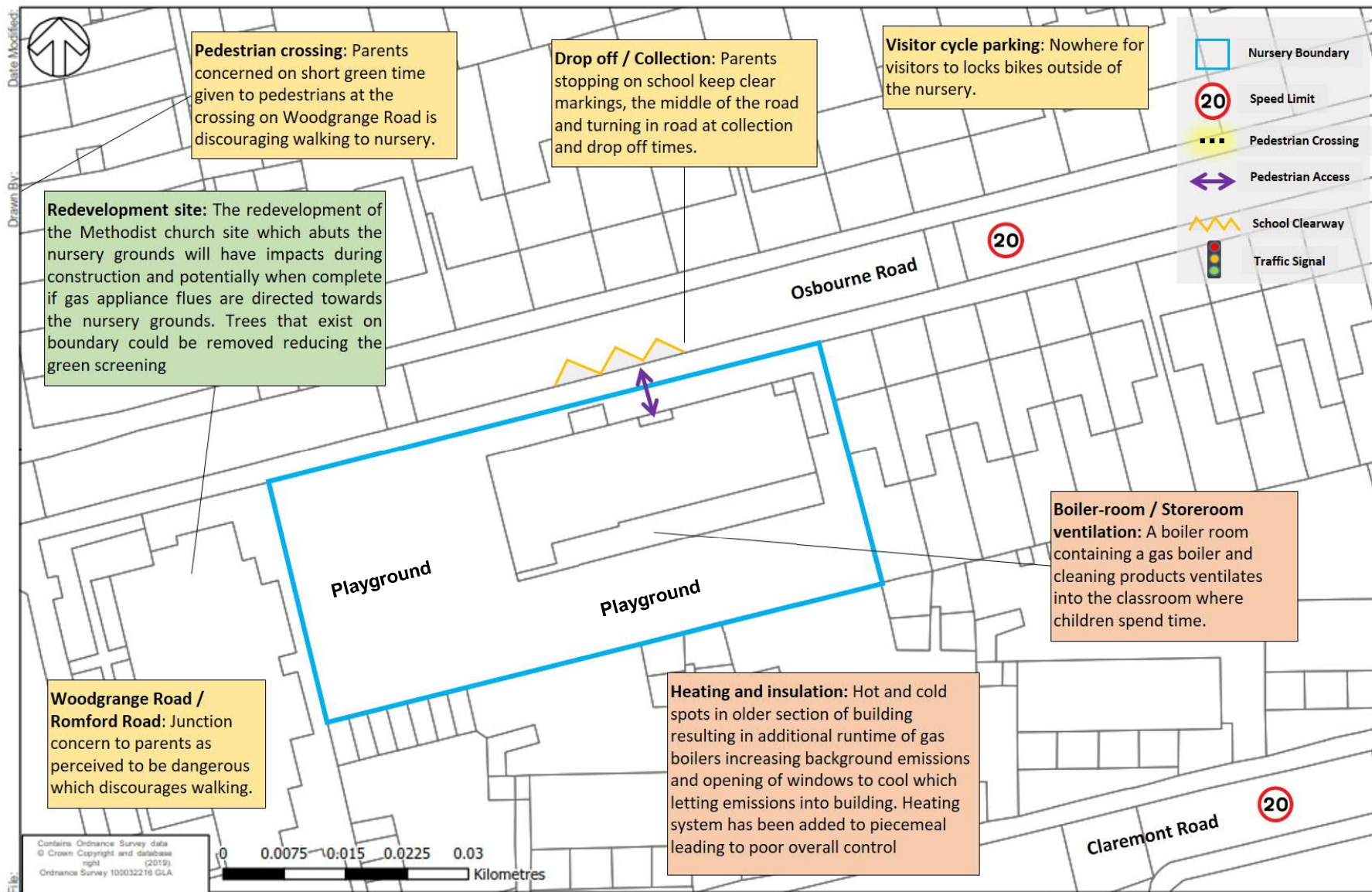
Boiler room and storage cupboard ventilating into classroom



Boiler flues of older section of building and air heating system in new section

4.4. KEY OBSERVATIONS – SUMMARY OF ISSUES

Figure 14 - Summary of Potential Issues Map



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	School Street	Close Osborne Road between Woodgrange Road and Richmond Road at drop off and collection times.	Promoting walking, scooting and cycling by providing improved local conditions	X			<ul style="list-style-type: none"> Road safety Child health and welfare Promotion of sustainable transport 	X				X			X	
2	Road space reallocation for pocket parks and planting/ greening and visitor cycle parking	Reallocate the road space outside the nursery on Osborne Road school keep clear markings for which could be used for pocket parks incorporating seating, planting/ greening and visitor cycle parking	Promoting walking, scooting and cycling by providing improved local conditions	X			<ul style="list-style-type: none"> Road safety Child health and welfare Promotion of sustainable transport 		X		X					X
3	Pedestrian crossing on Woodgrange Road	Review traffic signal timings of pedestrian crossing on Woodgrange Road	Promoting walking, scooting and cycling by providing improved local conditions	X			<ul style="list-style-type: none"> Road safety Child health and welfare Promotion of sustainable transport 	X			X				X	
4	Anti-Idling	Provide signage at the front of the nursery to encourage drivers to switch off engines with parallel awareness raising to launch and enforcement.	Reduce sources and exposure	X			<ul style="list-style-type: none"> Road safety Child health and welfare Promotion of sustainable transport Supports STARS and HSL objectives 	X			X					X
5	Woodgrange Road / Romford Road	Review junction pedestrian crossings to ensure safe and adequate for parents with young children		X			<ul style="list-style-type: none"> Road safety Child health and welfare Promotion of sustainable transport 		X			X			X	
8	Healthy Streets approach,	Promote the Mayor of London's Healthy Streets approach which aims to improve air quality, reduce congestion and help make	Reduce sources and exposure			X	<ul style="list-style-type: none"> Promotion of sustainable travel 			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	
	sustainable transport and roadspace reallocation from vehicular traffic	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.														
9	Implement parking restrictions	Consider introducing parking restrictions to discourage car ownership in the medium to longer term, given the location and accessibility of public transport. This would enable the road space to be managed more effectively with a greater emphasis on pedestrians and cyclist, and lessen incidents of congestion as cars are unable to pass on the narrow road due to parked cars. The introduction of car club vehicles locally would help expedite this process.	Reduce sources and exposure	X			<ul style="list-style-type: none"> Promotion of sustainable travel 		X			X		X		
10	Additional parking charges for more polluting vehicles	Consider introducing surcharges on top of existing parking charges for more polluting vehicles. A trial in Westminster found that the number of dirtier diesel vehicles using the parking bays dropped by 12%. Westminster's, and Islington also looking to introduce a similar scheme.	Reduce sources and exposure			X			X			X		X		
11	Non-Road Mobile Machinery Audit	The Council could consider a requirement for a Non-Road Mobile Machinery (NRMM) Audit to be undertaken at construction sites. This requirement is being trialled within some Low Emission Neighbourhoods to help ensure compliance of vehicles used for developments. Currently, NRMM is the third largest contributor of NOx emissions and the fifth largest contributor of PM emissions in London, and any comprehensive plan to reduce London's emissions should attempt to address emissions from construction machinery.	Reduce sources of emissions	X			<ul style="list-style-type: none"> Reduce noise 	X			X				X	
12	Control of Dust and Emissions during Construction and	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	

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
Demolition SPG	https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and														
Highway (Key Stakeholder: TfL)															
13	Low Emission Buses	<p>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.</p> <p>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.</p>	Reduce sources and exposure			X				X		X			X
School Grounds (Key Stakeholder: School/ Borough)															
14	Green Infrastructure	<p>Install green screening/climbers around the exposed outdoor spaces, the nursery entrance on Osborne Road.</p> <p>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.</p> <p>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</p>	Reduce exposure to emissions	X			<ul style="list-style-type: none"> ▪ 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
	<p>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 NO₂ and 38% for PM₁₀. Green screens also provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction.</p> <p>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.</p>														
School Building (Key Stakeholder: School/ Borough)															
15	Improved heating and insulation	Review heating and local control system for more efficient heating of building, and lessening incidences of winter overheating that result windows and door being opened and worsening exposure to pollution from the nearby roads. Also upgrade insulation where possible to further reduce heat loss, lessen energy usage, and potentially boiler run-times. Potentially less heat gain in hot weather.	Reduce sources and exposure	X			<ul style="list-style-type: none"> Reduced energy consumption and reduced operating costs Improved learning environments 			X		X			X
16	Relocate or seal boiler room	Relocate or seal and ventilate externally store room containing gas boiler, gas meter and cleaning products from classroom	Reduce exposure to emissions	X			<ul style="list-style-type: none"> Improved learning environments 		X			X			X
17	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	Reduce exposure to emissions	X			<ul style="list-style-type: none"> Improved learning environments 	X			X				X

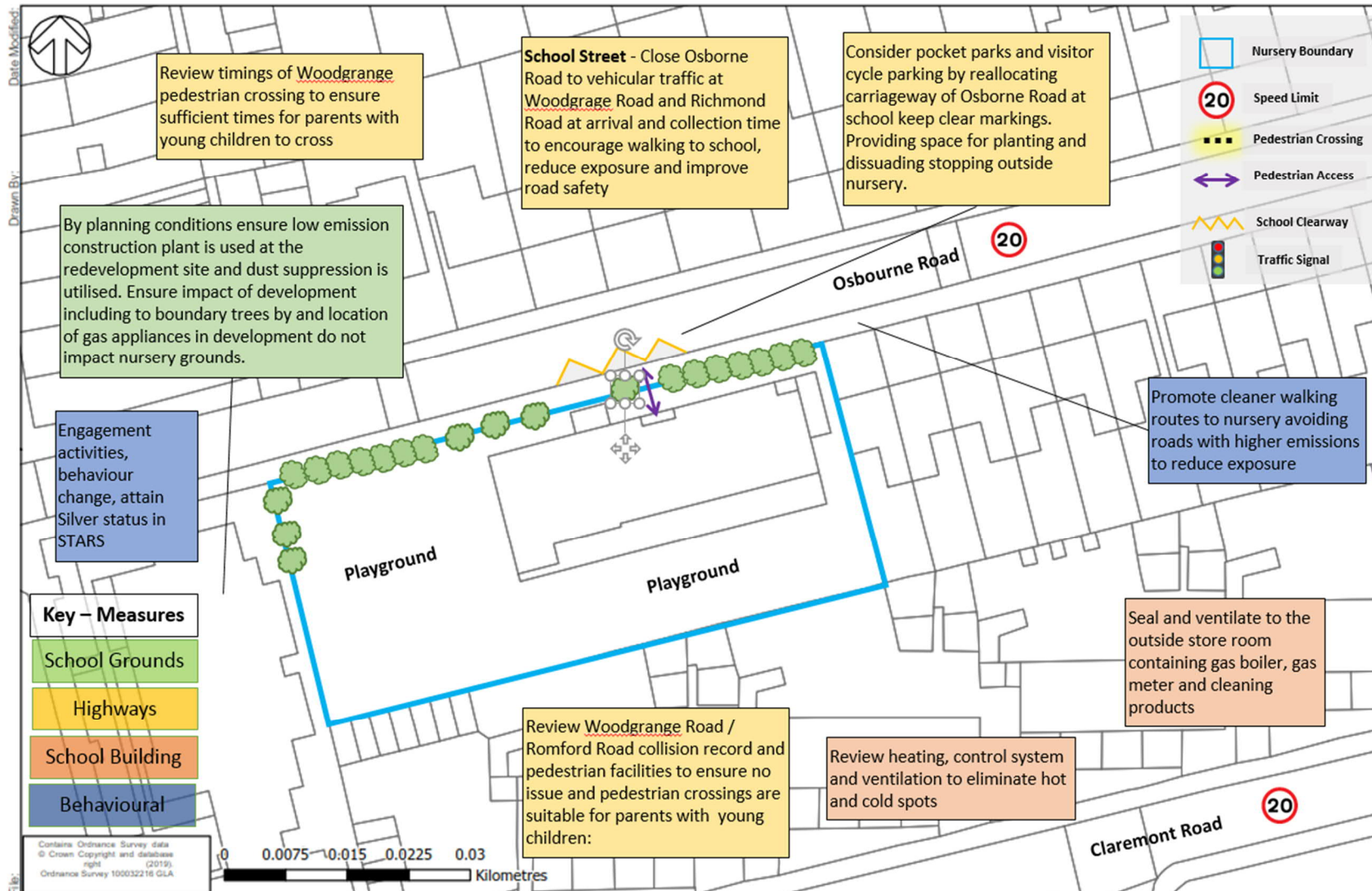
Measure	Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support				
			Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High		
		investigate green walls and, additionally, how the substrate may influence removal – as 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															
18	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. Sign up to receive air quality alerts when very high air pollution is forecast, and information on how to reduce pupils' personal exposure.	Reducing exposure to emissions	X			<ul style="list-style-type: none"> Awareness raising Child health and welfare 	X			X					X	
19	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		
Behavioural Measures (Key Stakeholder: School/ Borough)																	
20	Promote cleaner routes to school	Encourage children approach the school along less polluted routes, such as avoiding Woodgrange Road and Romford Road to approach nursery using back streets as much as possible	Reduce exposure	X			<ul style="list-style-type: none"> Road safety 	X			X						X
21	Engagement Activities	Deliver lesson plans with bespoke materials, poster and London school curriculum (see Appendix C), raising 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			<ul style="list-style-type: none"> Awareness raising Secure community buy-in for measures 	X			X						X
22	Behaviour change	Prepare 'Welcome Packs' for new pupils / parents that includes the promotion of apps / sites such as 'www.walkit.com' to a) promote walking to / from school and b) promote the suitable walking routes to avoid air pollution hotspots.	Behavioural measures / reducing exposure to emissions.	X			<ul style="list-style-type: none"> Awareness raising Secure community buy-in for measures 	X			X				X		
23	Attain a Silver Award in Stars	This will entail reviewing its practice in promoting health & wellbeing and evidence achieving the planned outcomes.	Behavioural measures / reducing exposure to emissions.	X			<ul style="list-style-type: none"> Awareness raising Supports STARS and HSL objectives 	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	Staff Engagement	Awareness raising session amongst staff about the impacts / costs of heating classrooms and share best practice. The Mayors London Curriculum Programme offers a wide range of high-quality teaching resources supporting most subjects on the national curriculum, CPD for teachers and events for children. A programme of targeted activity for air quality is being assembled to be delivered through the London Curriculum, with a focus on supporting teacher subject knowledge and confidence to tackle air quality as a science subject recognising that this requires a wide knowledge and skill base of science, statistics and mapping.	Awareness raising and behavioural measures	X			<ul style="list-style-type: none"> Awareness raising Supports STARS and HSL objectives 	X			X					X
25	Prepare 'Welcome Packs' for new pupils / parents	Prepare 'Welcome Packs' for new pupils / parents that includes the promotion of apps / sites such as 'www.walkit.com' to a) promote walking to / from school and b) promote the suitable walking routes to avoid air pollution hotspots.	Reducing sources and exposure	X			<ul style="list-style-type: none"> Awareness raising Supports STARS and HSL objectives 	X			X					X
26	Promoting Park & Stride	Promote park & stride amongst the parents and children. A waking bus from the site would entail some additional staff costs.	Reducing sources and exposure	X			<ul style="list-style-type: none"> Awareness raising Supports STARS and HSL objectives 	X			X				X	
27	Promoting car sharing	Make use of websites such as Liftshare.com to help find prospective car sharing partners, or the school could act as a forum to manage car sharing amongst the school community.	Reducing sources and exposure	X			<ul style="list-style-type: none"> Awareness raising Supports STARS and HSL objectives 	X			X				X	
28	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			<ul style="list-style-type: none"> Awareness raising Supports STARS and HSL objectives 	X			X				X	
29	Walking Buses	A walking school bus is a group of children walking to school with one or more adults, and can be as informal as two families taking turns walking their children to school to as	Reducing sources and exposure	X			<ul style="list-style-type: none"> 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	
		structured as a route with meeting points, a timetable and a regularly rotated schedule of trained volunteers. A bicycle train is a further variant on this, with adults supervising children riding their bikes to school. These can be planned in conjunction with cleaner walking routes to school initiatives to avoid the most polluted streets where possible. This would count as a STARS 'Other Walking Activity' and could contribute to progress.				<ul style="list-style-type: none"> Supports STARS and HSL objectives 										
Wider Measures (Key Stakeholder: Borough/ TfL/ GLA/ Central Government)																
30	Targeted scrappage scheme for polluting vehicles being driven in London	<p>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.</p> <p>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.</p>	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):

- **School Street** – The introduction of School Street restriction at drop off and collection times would encourage walking and other sustainable modes of travel to nursery. It would also improve road safety, which has been a concern with parents stopping and turning in Osborne Road. Closing the road for the short periods would not have a significant impact to traffic as there are other parallel alternative routes. The nursery were strongly in favour of this measure.
- **Heating and Cooling** - The uneven temperatures in the building at different times of the year especially in the older part of the building create additional burning of the gas boilers and opening of windows to ventilate exposing children to emissions. This was due to lack of local control and levels of insulation in the two parts of the building which were constructed at different times. While butcher's curtains at the openings to the grounds has helped maintain constant temperatures. The new part of the nursery benefits from air source heat pumps and electric heating. Local emissions would reduce if this system was implemented in the older section of the nursery replacing the gas appliances.
- **Green Infrastructure** - The nursery was keen to implement as much greening as possible in and around its grounds specially to shield itself from the up and coming redevelopment of the Methodist Church. The frontage of the school benefits from substantial trees and 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 NO₂ and 38% for PM₁₀. 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



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. Kay Rowe Nursery School has achieved Bronze accreditation. Our recommended measures for the nursery include a number of initiatives that would also count towards the achieving their Silver 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 of 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)

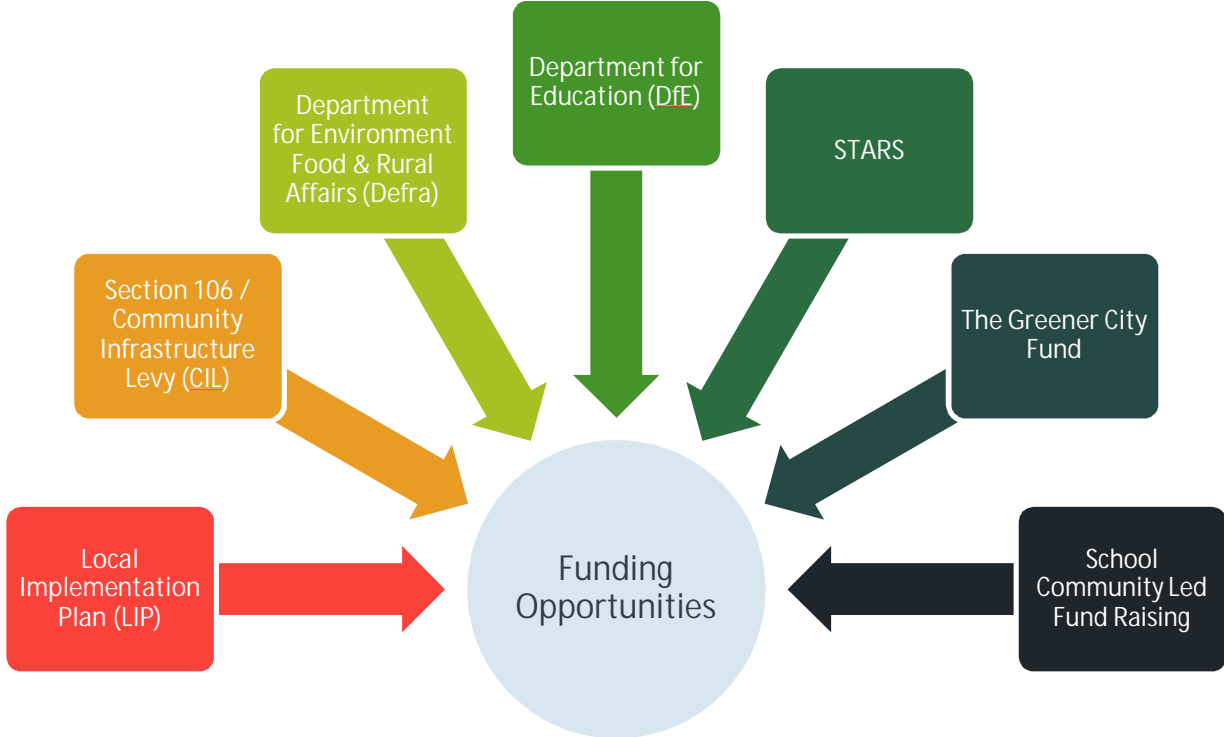
- 5.7.3. Building on the success of Healthy Schools London, Healthy Early Years London is an awards scheme funded by the Mayor of London that supports and recognises early years setting achievements in child health, wellbeing and school readiness. Healthy Early Years London focuses on the whole child 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.¹³ Groundwork London's Our Space award¹⁴ offers grants between £500 and £5,000.

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

¹³ <https://www.groundwork.org.uk/Sites/london/pages/school-air-quality-greening>

¹⁴ <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.

Where possible such monitoring should cover:

- Key pollutants (NO_x, PM₁₀, 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.

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