MAYOR OF LONDON

The Mayor of London's Nursery Air Quality Audit Programme

Pembury House Nursery School and Children's Centre, London Borough of Haringey

FEBRUARY 2020

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THE MAYOR'S NURSERY AIR QUALITY AUDIT PROGRAMME

Pembury House Nursery School – London Borough of Lewisham

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DISCLAIMER

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

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NON-TECHNICAL EXECUTIVE SUMMARY

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

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

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

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

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

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

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

Audit Findings

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

The results of the three-month baseline monitoring showed that NO_2 concentrations were highest at the **roadside** (64µg/m³), with local road traffic emissions contributing significantly to roadside concentrations.

The three months of baseline NO_2 monitoring provides a snap-shot of concentrations in and around the nursery across the winter and spring months. In each month, the measured NO_2 concentrations exceeded the legal limits (annual mean NO_2 national Air Quality Objective of 40µg/m³).

NO_2 concentrations fall to 38µg/m³ in the **playground**, which is partially screened from traffic by fencing and some trees and shrubs. Concentrations at the **nursery entrance** are of a higher level (41µg/m³) to the playground. Inside the nursery, concentrations fall to 22-23µg/m^3.

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

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 (TVOCs[1]) concentrations should be below 300 µg/m^3. In the nursery they were found to be 73.5 µg/m^3. The majority of VOCs identified were likely to be from the fragrances, perfumes and alcohols in, cleaning materials and solvents.

Formaldehyde are emitted from vapours arising from solvents and adhesives. In a nursery setting these are likely to originate from glues, adhesives and finishing's. Exposure can cause burning sensations of the eyes, nose, and throat, coughing, wheezing, nausea and skin irritation. The World Health Organisation (WHO) indoor air quality guideline[2] The World Health Organisation (WHO) indoor air quality guideline for short and long-term exposures to formaldehyde is 100 µg/m^3. In Pembury House they were found to be 8.75 µg/m^3.

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 High Road (A1010). NO_2 concentrations are predicted to be highest along the northern boundary of the nursery, which is closest to the main road.

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

Nearly 50% of NOx emissions in London are from road transport. Larger diesel vehicles in particular are major contributors to local air pollution. Approximately **11,500 vehicles per day travel** within 200m of the nursery. Buses make up only 10% of these vehicle movements, but contribute 65% of the transport related NOx emissions locally. Similarly, HGVs only account for 3% of the total traffic but contribute 10% of emissions. Cars account for 16% of emissions.

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

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

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

Key observations – summary of potential issues

The high levels of traffic on Lansdowne Road and High Road the large numbers of taxis, buses and vans, with queueing back from the traffic lights at High Road and past the nursery.

- High levels of kerb side activity related to the adjacent businesses
- Parents and children wait in an exposed area outside the front of the nursery with no shelter from some of the higher levels of emissions coming from the nearby by main road.
- Construction activity close to the nursery, with associated dust and emissions, plant and heavy goods vehicle movements.
- Barriers posed by the main road, resulting in road safety issues, potentially dissuading more travel by sustainable modes.
- The building is reliant on natural ventilation, with poor insulation potentially worsening the need for ventilation in hot weather, and requiring longer run times of nurseries boilers, a further source of local emissions.
- The playground and external classroom doors are largely screened from major nearby emissions sources, though a section of the playground is partially exposed.
- Some incidences of overheating, dry air and odours from kitchens and nearby petrol station.
- Buggy and scooter parking space is limited.

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:

- **Heating, cooling and ventilation** – improve the heating control to maintain a stedy even temperature in the building to prevent over run of the gas boilers and opening of windows in winter. Ventilation improvements to prevent mould.
- **Traffic Calming** - A package of measures on Lansdowne Road including pedestrian crossing facilities for the two bus stops, traffic calming, control of kerb side loading and enhancing the presence of nursery with pop up children characters may all go to encourage walking and cycling to the nursery, combined with measures to improve the visibility of the nursery from the roadside, and to raise awareness on issues related to idling vehicles outside the nursery.
- **Green infrastructure** – At main entrance on Lansdowne Road and between building gap to Rehola Close with additional planting in the rear playground, potentially in the form of a section of living wall to minimise the loss of space. Tree planting on grass verge at Rehola Close at High Road
- **Encourage parents to approach the nursery along less polluted routes**, for example, avoiding Lansdowne Road and the High Road. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots.

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
Introduce Air Filtration Systems
Monitor London Air website / app
Add indoor plants
Switch to lower VOC cleaning products

Behavioural Measures

Promote cleaner routes to the nursery
Engagement Activities
Behaviour change
Attain a Gold 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 cardio-vascular diseases. Young children are amongst the most vulnerable of the at-risk groups, as their lungs are still developing, and toxic air can stunt their growth, causing significant health problems in later life. The World Health Organization (WHO) also recognises younger children as being a vulnerable group to air pollution, making nurseries a key consideration in improving air quality.

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

The Mayor's Nurseries Air Quality Audits

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

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

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

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

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

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

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

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

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

vehicle only streets, measures to promote deliveries by cycle cargo bikes and low emission vehicles, and bold proposals to promote walking and cycling.

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

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

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

1.2. OBJECTIVES

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

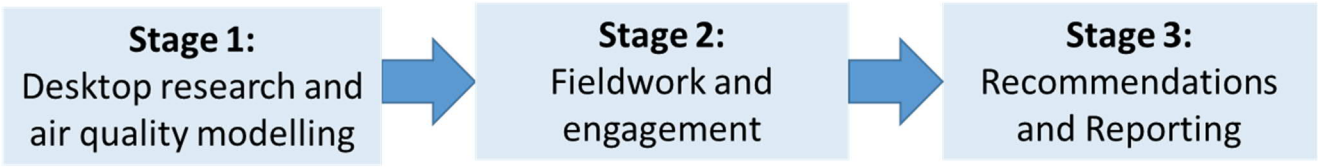
- Audit and identify the sources of poor outdoor air quality and exposure by children at 20 state-funded nurseries and their surrounding nursery catchment areas, including NO_2, PM_{10} and $PM_{2.5}$.
- Audit and identify the sources of poor indoor air quality and potential exposure by children attending the nurseries, and establishing a baseline of indoor air quality.
- Assess the feasibility of installing air filtration systems at the selected nurseries.
- 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 STARS[8] travel plan progress was also reviewed for reference ahead of the audits.

Stage 2: Fieldwork and consultation

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

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

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

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

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

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

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

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

Stage 3: Recommendations and Reporting

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

2.2. AUDIT SCHEDULE – PEMBURY HOUSE NURSERY SCHOOL

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

Table 1 – Audit Details

Date of Audit	Monday 17th December 2018	
Nursery Representatives	Sue Moss – Head Angela Lenton – Assistant Head Nursery Caretaker	
Borough Representatives	Eliane Foteu Lead - Pollution Wendy Thorogood – School Travel Plan Coordinator	
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 - 1115hrs	Further observations and completion of site audit template

3. CONTEXT AND INITIATIVES

3.1. NURSERY CONTEXT

Figure 2 - Nursery Context

Borough: Haringey

Address: Lansdowne Road, N17 9XE

Pupil Numbers: 175

Age Range:
3-5 years

Gender:
Mixed

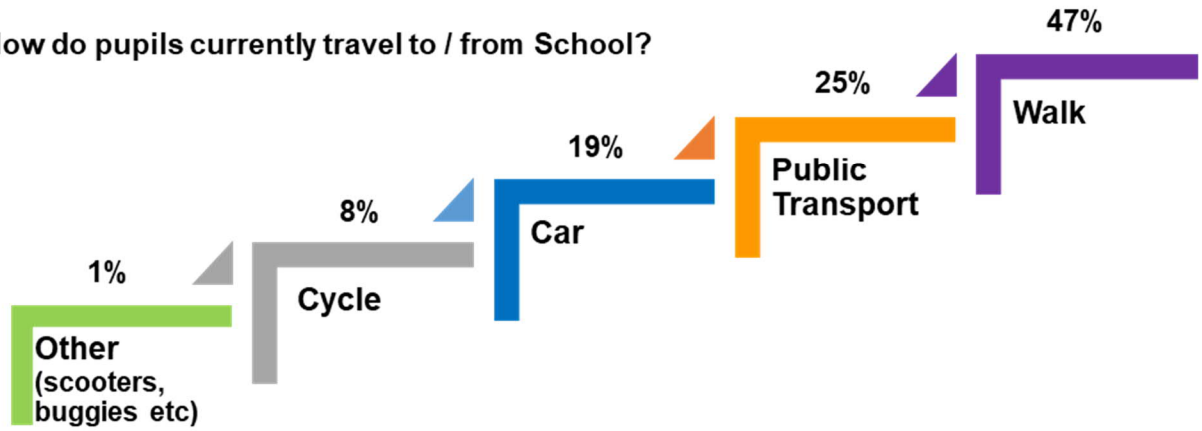
Type: Local authority nursery school

Deprivation Rank:
2

Children who speak English as an additional language:

Higher than average

How do pupils currently travel to / from School?



3.1.1. Pembury Nursery is situated in north east London close to White Hart Lane and Tottenham football club in the London Borough of Haringey.

3.1.2. The nursery has two sites. The main site and the purpose of this audit is situated on Lansdowne Road where the main entrance is located. The second site is located a ten-minute walk south in to the residential streets and located in Hartington Park.

3.1.3. **Approximately 11,500 vehicles per day** travel on the core roads within a 200m radius of the nursery3. 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 2017[9] the average traffic flow on urban minor roads was 2,100 vehicles, and 19,200 vehicles on an urban A-road.

3.1.4. At the time of the audit the nursery had **175 children**.

3.1.5. The nursery has a **high proportion (47%) of children walking and traveling by bus (25%)** to the nursery. The nursery has worked hard to promote sustainable travel and has been quite successful.

3.1.6. Children **traveling to nursery by car make up a relatively high proportion of journeys**. It is understood that a significant proportion of the catchment area is social housing, resulting in families relocating often, but for continuity they prefer to continue sending their children to the nursery, resulting in an **expanding catchment**, and this greater distance between home and nursery encourages the use of the private car.

3.1.7. The nursery is currently operating at three quarters capacity, and **expects attendance to increase** in the coming years owing to gentrification of the surrounding areas.

3.1.8. 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] DfT Road Traffic Estimates: Great Britain 2017 (2018)

Figure 3 – Outer Context Plan

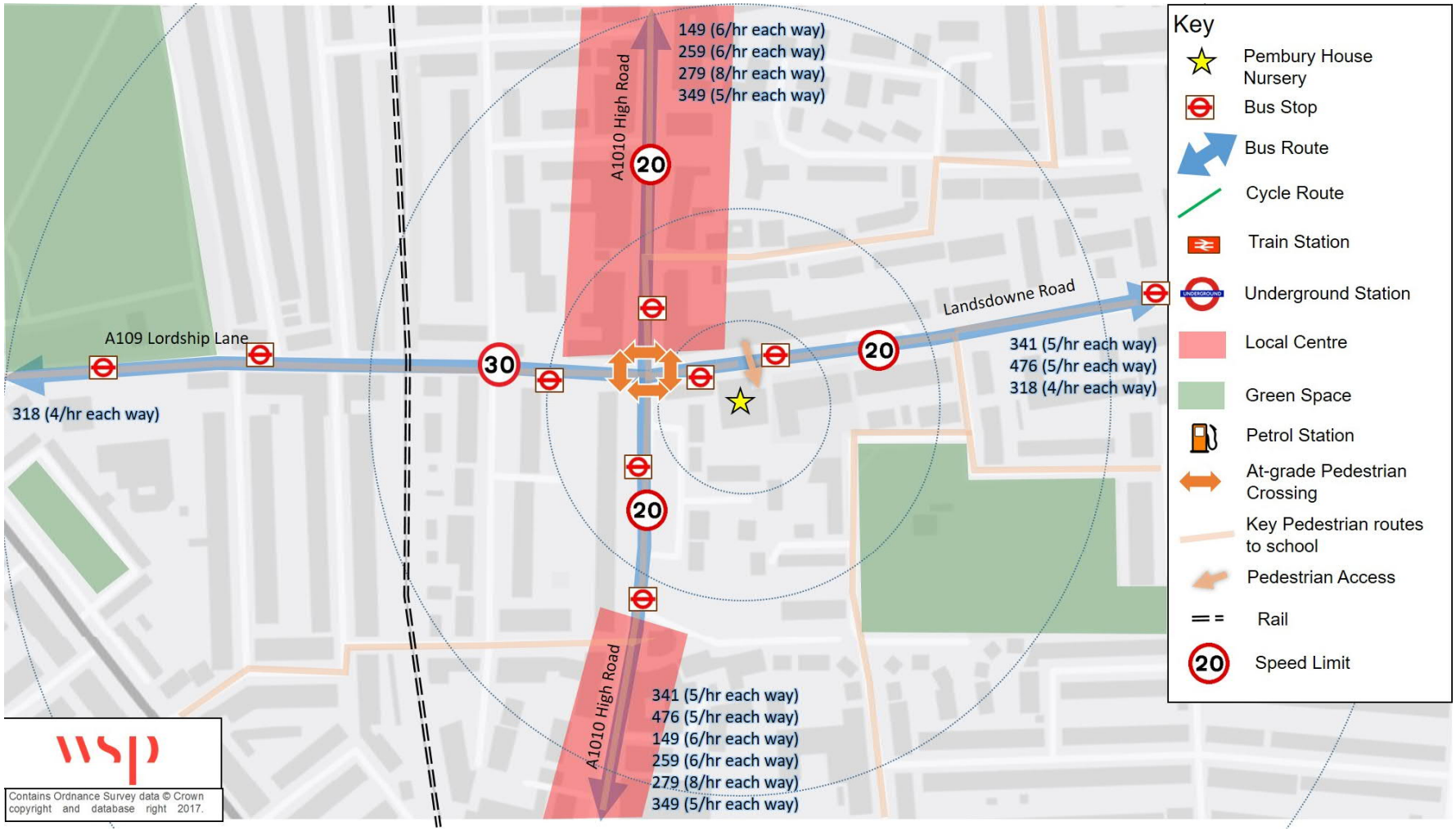
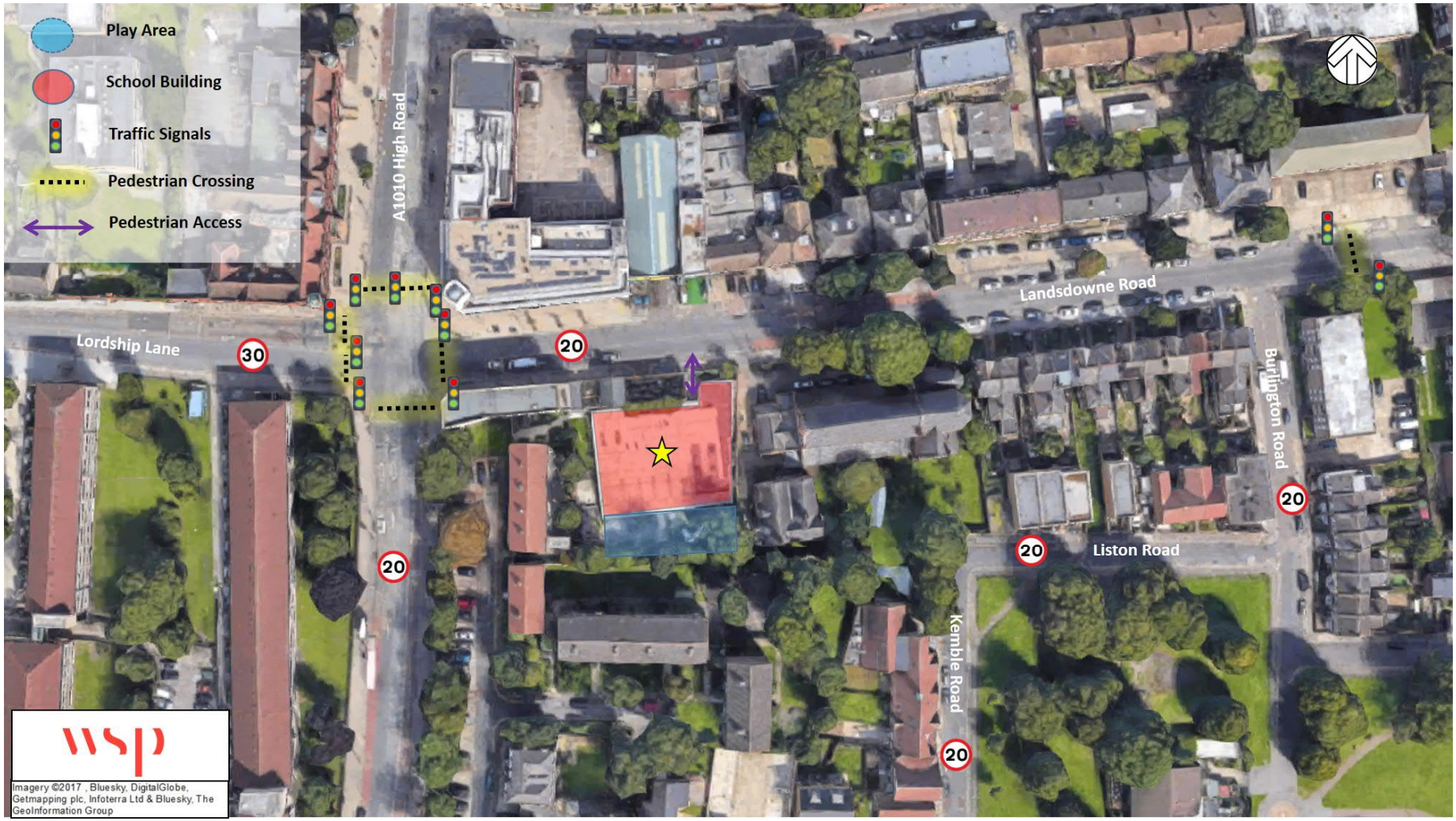


Figure 4 – Inner Context Plans



3.2. PLANNED SCHEMES & RECENT INITIATIVES

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

TOTTENHAM HOTSPURS FOOTBALL CLUB

3.2.2. Tottenham Hotspurs football club ground has recently been redeveloped with a larger capacity, and also plans to hold other events such as concerts and NFL matches. During events the road network around the ground will be managed, and Lansdowne Road where the nursery is located will become the boundary, and is expected to carry more traffic and rerouted buses. It will become the location of the taxi rank and coach drop off/pick up. The impact of events is a particular concern to the nursery.

Impact of scheme:

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

3.2.3. 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)

3.2.4. 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.

3.2.5. 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 28 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

3.2.6. 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.

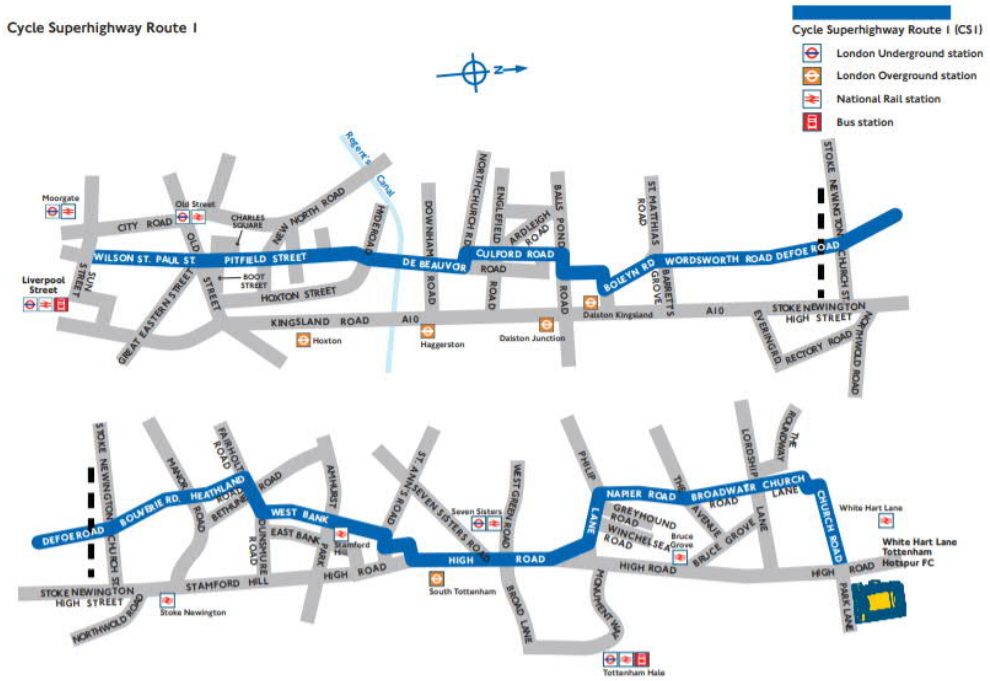
3.2.7. Twelve new low Emission Bus Zones are being introduced in areas where Londoners are exposed to some of the highest levels of nitrogen dioxide pollution. The Mayor has completed ten of these zones, reducing NOx emissions from buses by an average of 90 per cent along some of the capital's most polluted roads. The Mayor will complete delivery of all 12 routes ahead of schedule in 2019 rather than 2020. Of relevance locally is the low emission bus zones from Edmonton to Seven Sisters – this follows the A10 High Road and can be found within walking distance of the site

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

LOCAL SCHEMES

CYCLE SUPER HIGHWAY 1 (CSH1)

3.2.8. The cycle super highway route connects Liverpool Street with Tottenham, providing more space for cyclists, with new cycle lanes, junction improvements, new Advanced Stop Lines, cycle feeder lanes, and speed reduction measures.

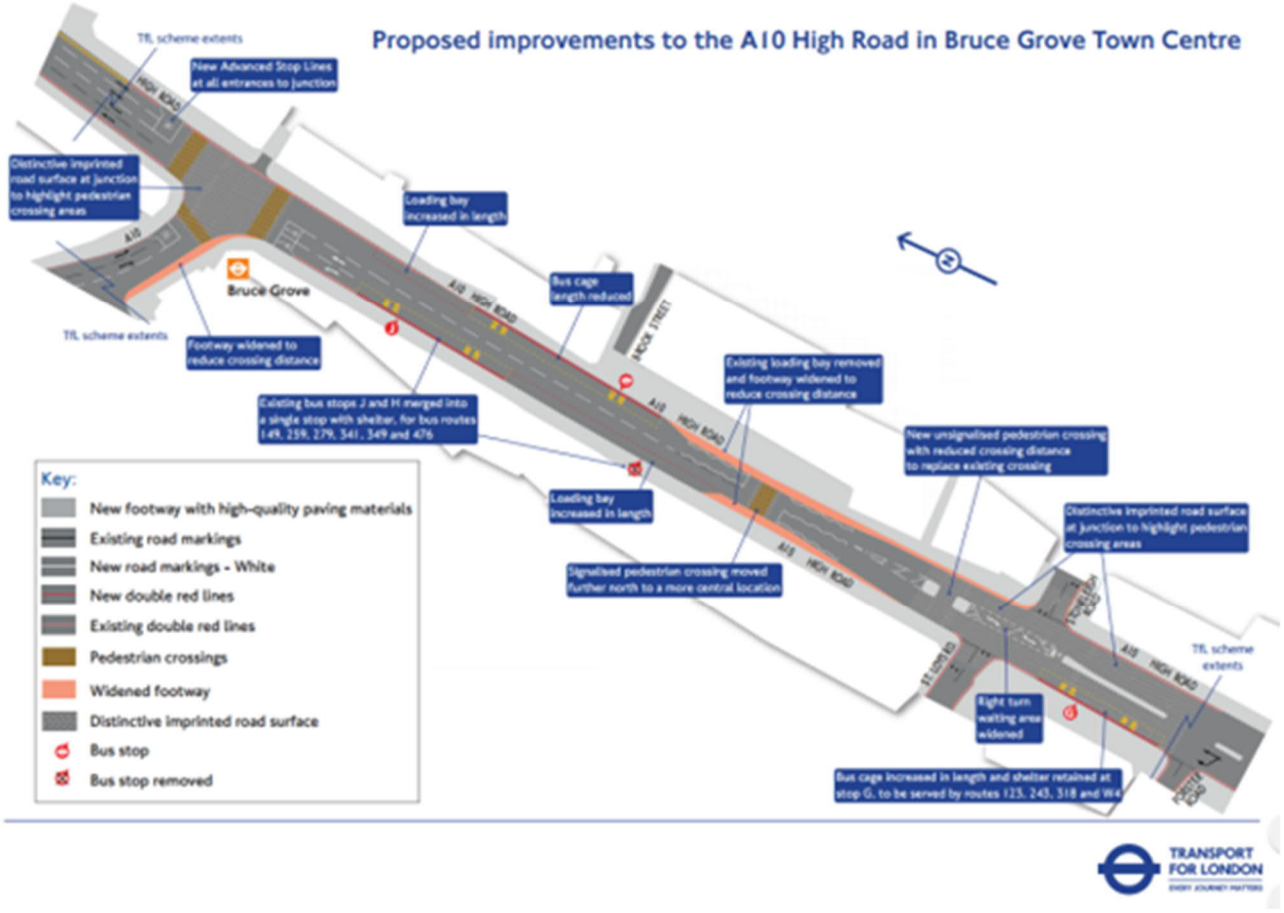


Impact of scheme:
- Improved travel options locally via sustainable travel (walking and cycling).

BRUCE GROVE TOWN CENTRE

3.2.9. Transport for London and London Borough of Haringey have developed plans for the A10 High Road as the part of the wider plan for regenerating of the Tottenham area. The Bruce Grove improvements propose changes between Forster Road and Bruce Grove which is 250 metres north of Holy Trinity Primary School. The proposals include improvements to pedestrian facilities and the

town centre environment but also maintaining movement of traffic. Changes to off-peak loading / unloading facilities on the High Road, and opportunities for planting and creation of greener spaces have been proposed. The plans were consulted in 2017 and comments received in May 2017. Construction started in 2018 and with completion in Spring 2019.



Impact of scheme:

- Improved travel options locally via sustainable travel (walking and cycling); and
- Improved public realm, providing a safer environment for pedestrians.

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. Pembury House Nursery School holds Silver status of the STARS programme as of September 2017, and has been active in undertaking range of STARS activities, with the following recorded from 2017-2018:

- Pedestrian skills training

- Walking Bears a resource to encourage parents to develop children's road safety skills
- Bike training
- Communication with parents
- Staff involvement in active travel
- Public transport for school trips
- Scooter parking
- Walk to school week/month
- Awarded silver in the Eco Schools programme

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

3.2.14. Pembury House Nursery School is currently silver accredited with the Healthy Schools programme.

Impact of schemes:

- Awareness raising and promotion of sustainable travel options, lessening sources of emissions and incidences of exposure.

4. AIR QUALITY AUDIT FINDINGS

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

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

4.1. BASELINE AIR QUALITY

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

4.1.2. Three pollutants were monitored in and around the nursery, these were **nitrogen dioxide (NO_2)**, **formaldehyde (CH_2O)** and **Volatile Organic Compounds (VOCs)**. All three pollutants can cause respiratory inflammation which can exacerbate to respiratory problems such as asthma and bronchitis at high levels.

4.1.3. NO_2 is both a primary and secondary pollutant, derived from emissions of nitrogen oxides (NO_x) from combustion sources. In London key sources include road vehicles and domestic boilers. Vehicle emissions contribute significantly to local increases in concentrations especially near busy roads.

4.1.4. VOCs are made up of a range of organic compounds, including formaldehyde. They have a significant photochemical oxidant forming potential and contribute to the formation of secondary pollutants, such as NO_2. They arise from a wide variety of products commonly used in homes and workplaces, including furnishing, carpets, upholstery, cleaning products and air fresheners.

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

4.1.6. Baseline air pollutant monitoring was undertaken for three months. At Pembury House Nursery School, five NO_2 diffusion tubes, one formaldehyde diffusion tube and one VOC diffusion tube were deployed in the following locations:

Nitrogen Dioxide (NO_2)

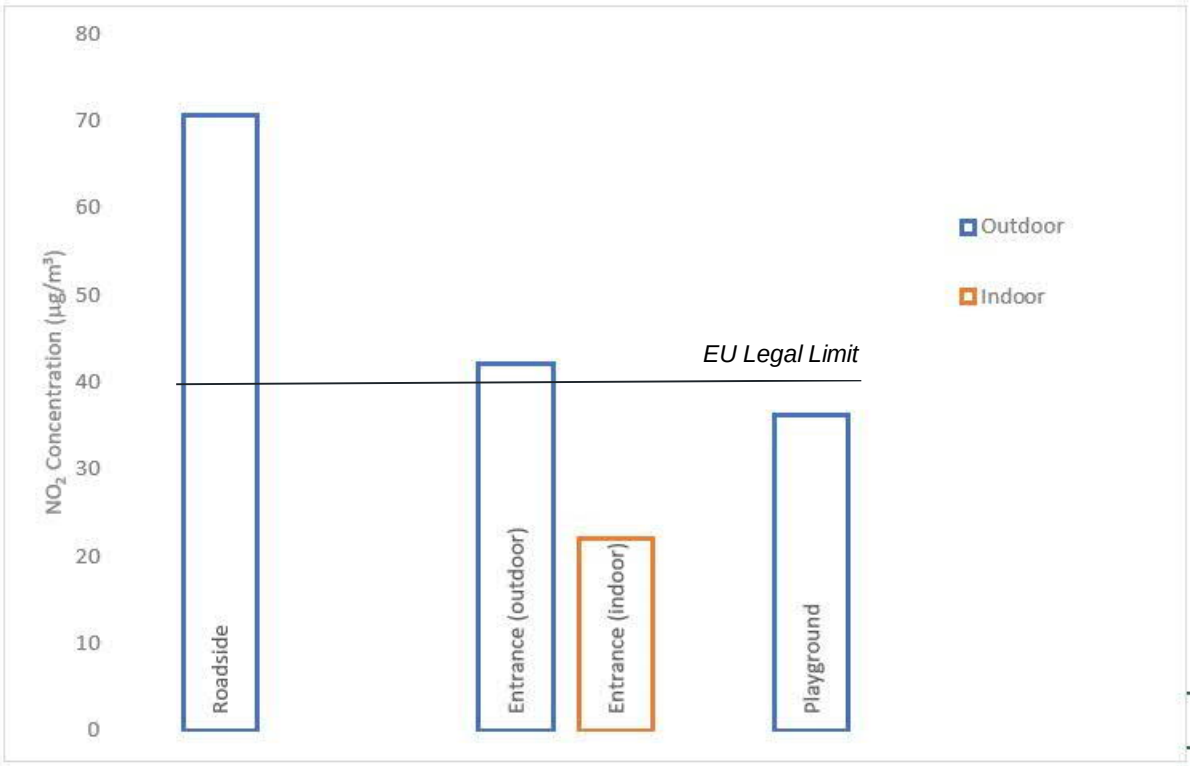
- roadside outside the nursery
- immediately outside the nursery entrance
- playground
- immediately inside the nursery entrance
- inside a nursery classroom.

Formaldehyde and VOCs

- Inside a nursery classroom.

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

Figure 5 - Comparison of the average NO_2 concentrations at Pembury House Nursery School ($\mu g/m^3$)



4.1.8. The results of the three-month baseline NO_2 monitoring at Pembury House Nursery School, shown in Table 2.

Table 2 – Pembury House Nursery School: Three Month Baseline NO_2 Monitoring Results ($\mu g/m^3$)

Diffusion Tube Location	Indoor / Outdoor Location	Baseline NO_2 Monitoring Results - NO_2 ($\mu g/m^3$)			
		January	February	March	Average
Roadside	Outdoor	62.11	70.67	58.54	63.77
Playground	Outdoor	39.11	36.22	-	37.67
Nursery entrance	Outdoor	45.07	42.14	34.78	40.66
Nursery entrance	Indoor	22.90	22.16	19.66	21.57
Classroom	Indoor	26.24	-	18.75	22.50
Ratio of indoor to outdoor (I/O) concentrations		0.51	0.53	0.57	0.57

4.1.9. NO_2 concentrations were found to be highest at the **roadside** (63.774µg/m³), with local road traffic emissions contributing significantly to roadside concentrations.

4.1.10. The three months of baseline NO_2 monitoring provides a snap-shot of concentrations in and around the nursery across the winter and spring months, when concentrations are likely to be at their highest due to elevated NO_x emissions driven by the cold weather. However, in each month, the measured NO_2 concentrations exceeded the annual mean NO_2 national Air Quality Objective (AQO) of 40µg/m³.

4.1.11. NO_2 concentrations fall to 37.67µg/m³ in the **playground**, which is partially screened from traffic by fencing and some trees and shrubs. Concentrations at the **nursery entrance** are of a higher level (40.66µg/m³) to the playground.

4.1.12. **Inside the nursery**, concentrations fall by 15-42µg/m^3 compared to external concentrations. It should be noted that indoor NO_2 is not regulated against EU limits, it is regulated against HSE exposure limits.

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

4.1.14. The NO_2 I/O ratio was 0.53 at Pembury House Nursery School, indicating that uncontrolled infiltration rates are at the lower end of the spectrum, and so **offer 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 – Pembury House Nursery School: Three Month Baseline Formaldehyde and VOC Monitoring Results (µg/m^3)

Pollutant	Baseline Formaldehyde and VOC Monitoring (µg/m³)			
	January	February	March	Average
VOCs	73.5	141.0	153.1	124.1
Formaldehyde	7.74	10.61	7.9	8.75

4.1.16. **Volatile Organic Compounds (VOCs)** are emitted from vapours arising from petrol and solvents. In a nursery setting are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. Exposure can cause irritation to the eyes and upper airways. In the UK, building regulations recommend total Volatile Organic Compounds

(TVOCs[10]) concentrations should be below 300 µg/m^3. In Pembury House they were found to be 124.1 µg/m^3. 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.

4.1.17. **Formaldehyde** are emitted from vapours arising from solvents and adhesives. In a nursery setting these are likely to originate from glues, adhesives and finishing's. Exposure can cause burning sensations of the eyes, nose, and throat, coughing, wheezing, nausea and skin irritation. The World Health Organisation (WHO) indoor air quality guideline[11] for short- and long-term exposures to formaldehyde is 100 µg/m^3. In Pembury House they were found to be 8.75 µg/m^3.

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

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

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

4.1.21. Figure 5 shows the 2013 LAEI baseline annual mean NO_2 concentrations within the vicinity of Pembury House 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 High Road (A1010). NO_2 concentrations are predicted to be highest along the northern boundary of the nursery, which is closest to the main road.

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

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

Figure 6 - LAEI Baseline Annual Mean NO_2 Concentrations within the Immediate Area of Pembury House Nursery School

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

4.1.24. The pie chart below shows that while buses make up only 10% of vehicle movements, they contribute 65% of the transport related NO_x emissions locally. Similarly, HGVs only account for 3% 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)

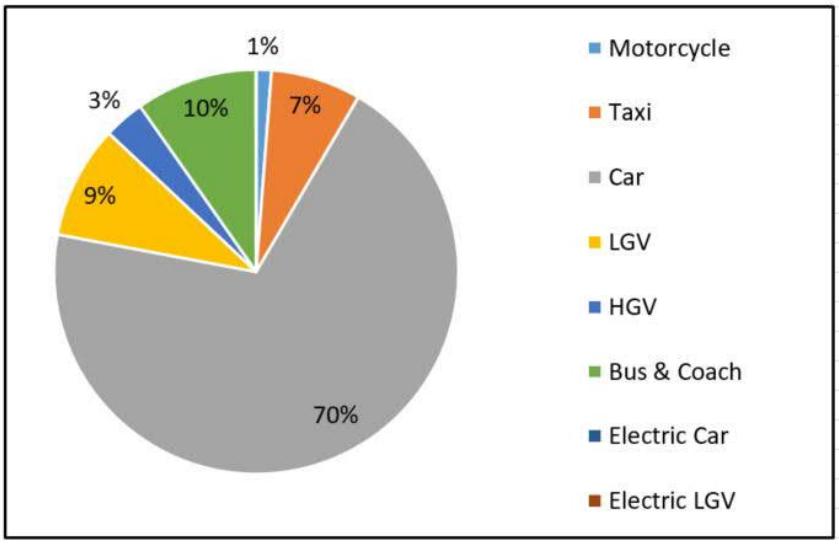
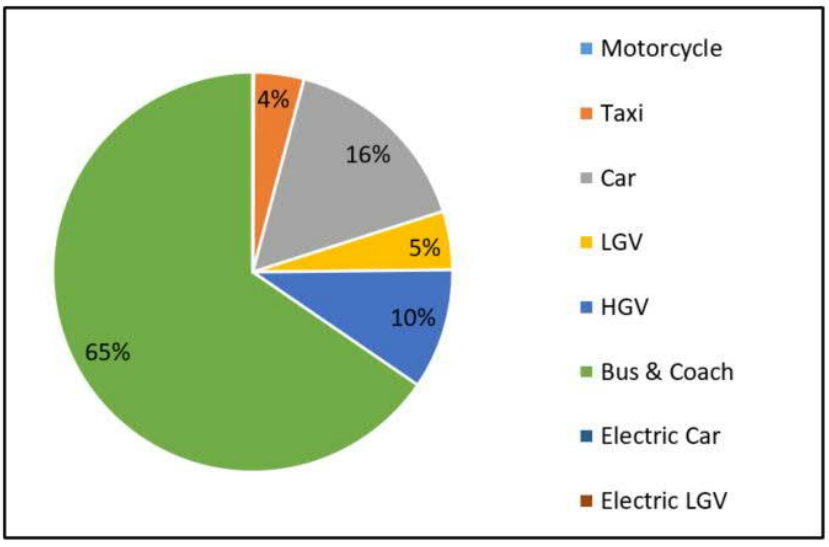


Figure 8 – Average Road Transport NO_x Emissions by Vehicle Type (within 200m of nursery)



4.1.25. The pie charts below illustrate that PM_{10} and $PM_{2.5}$, like NOx, are emitted in higher levels by large vehicles such as buses, HGVs and LGVs, though not to the same extent. Buses make 10% of vehicle movements, and contribute 43% of the transport related PM_{10} emissions locally, and 30% of $PM_{2.5}$.

Figure 9 – Average Road Transport PM_{10} Emissions by Vehicle Type (within 200m of nursery)

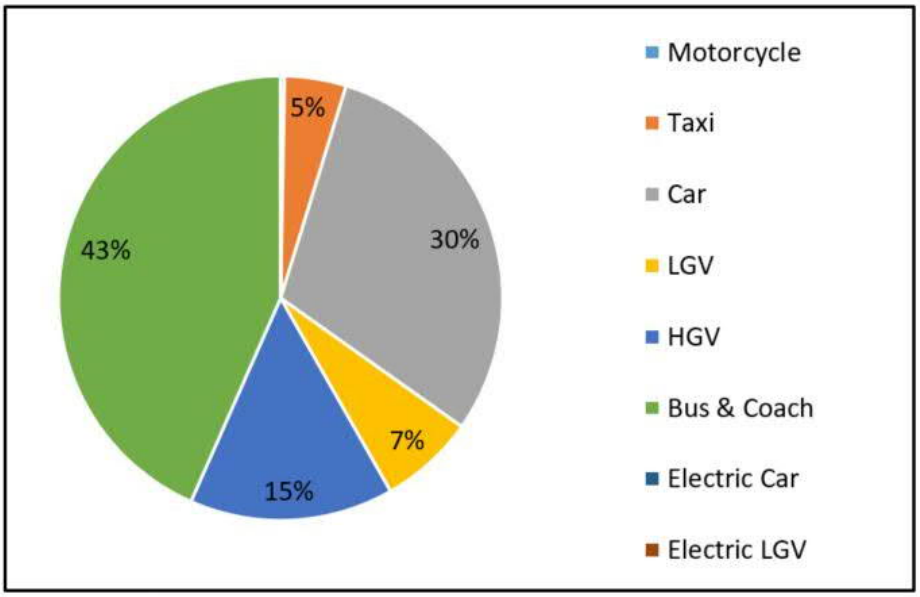
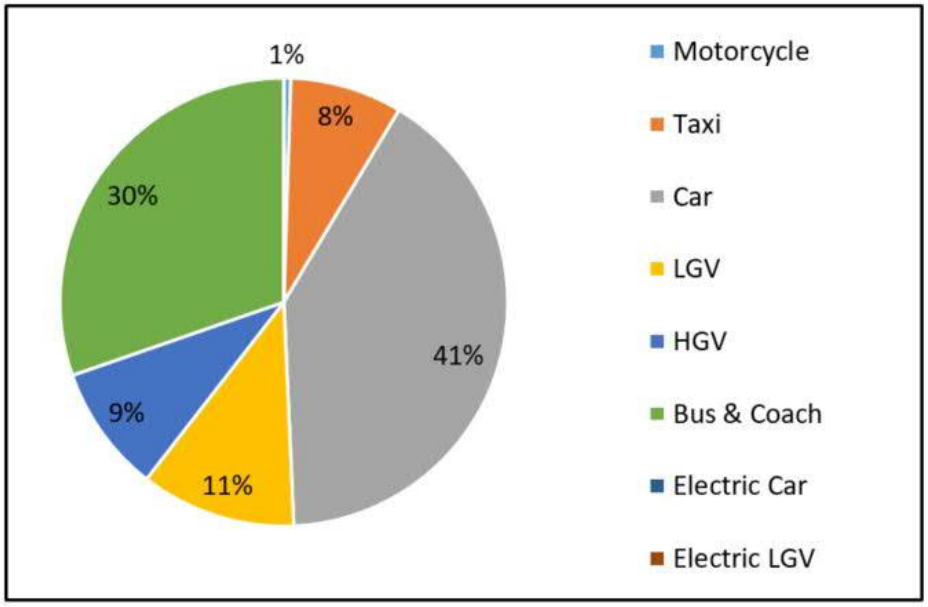


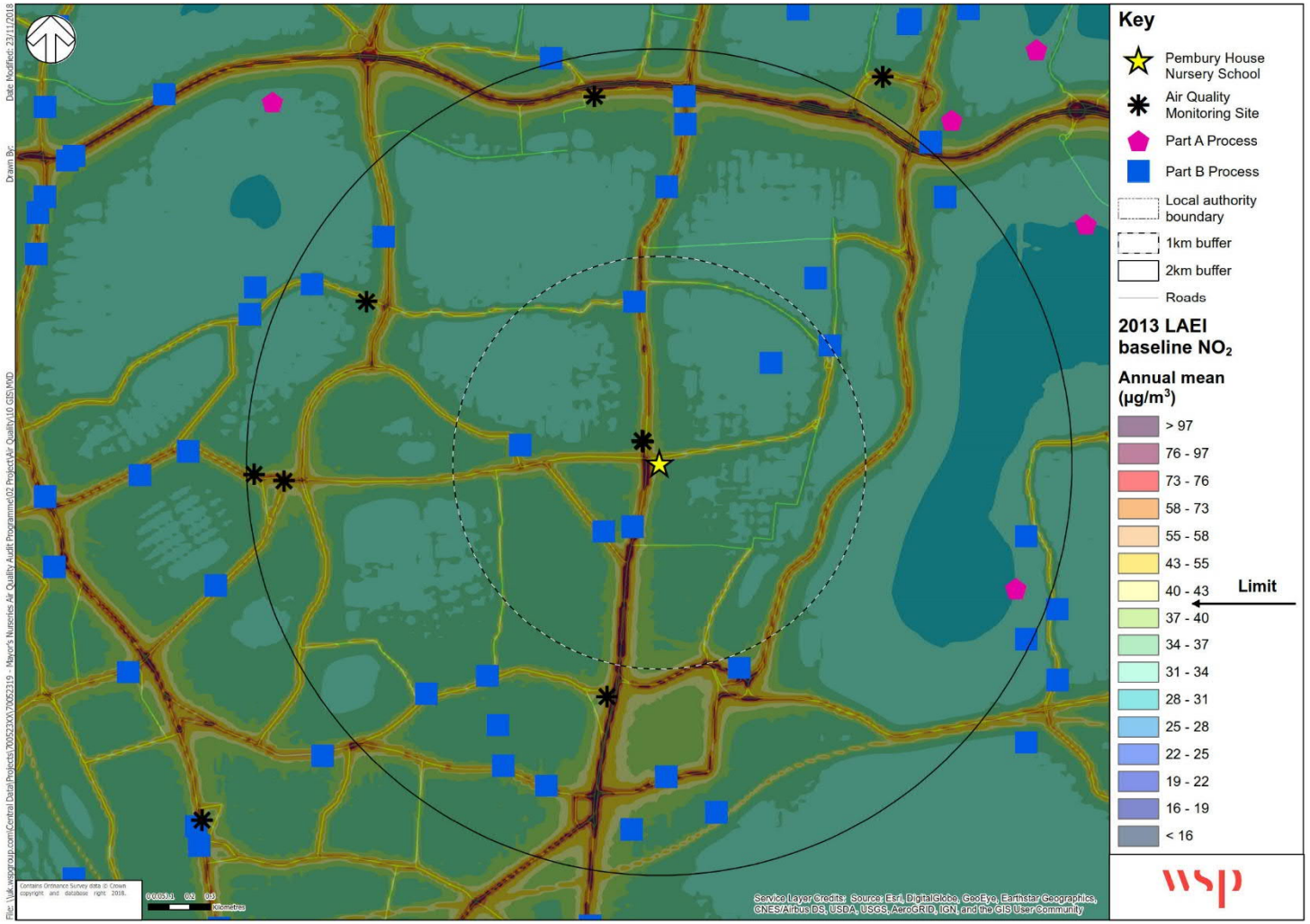
Figure 10 – Average Road Transport $PM_{2.5}$ Emissions by Vehicle Type (within 200m of nursery)



4.1.26. Figures 11-13 show the 2013 LAEI baseline annual mean NO_x, PM_{10} and $PM_{2.5}$ concentrations in within 2km of Pembury House Nursery School. The contours (changes in colours) show how the pollution gradient changes, with distance, away from the heavily trafficked roads and other key sources.

4.1.27. PM_{10} and $PM_{2.5}$ sources are much more universal and dispersed than NO_2 sources. A proportion of $PM_{2.5}$ and PM_{10} is imported via weather events from regions outside of London, with other contributions coming from combustion processes, cleaning street sweeping/ dust re-entrainment, construction dust, etc. Therefore, concentration profiles of PM_{10} (Figure 12) and $PM_{2.5}$ (Figure 13) appear less defined than for NO_2.

Figure 11 – 2013 LAEI Baseline Annual Mean NO_2 Concentrations within 2km of Pembury House Nursery School



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

Figure 12 - 2013 LAEI Baseline Annual Mean PM_{10} Concentrations within 2km of Pembury House Nursery School

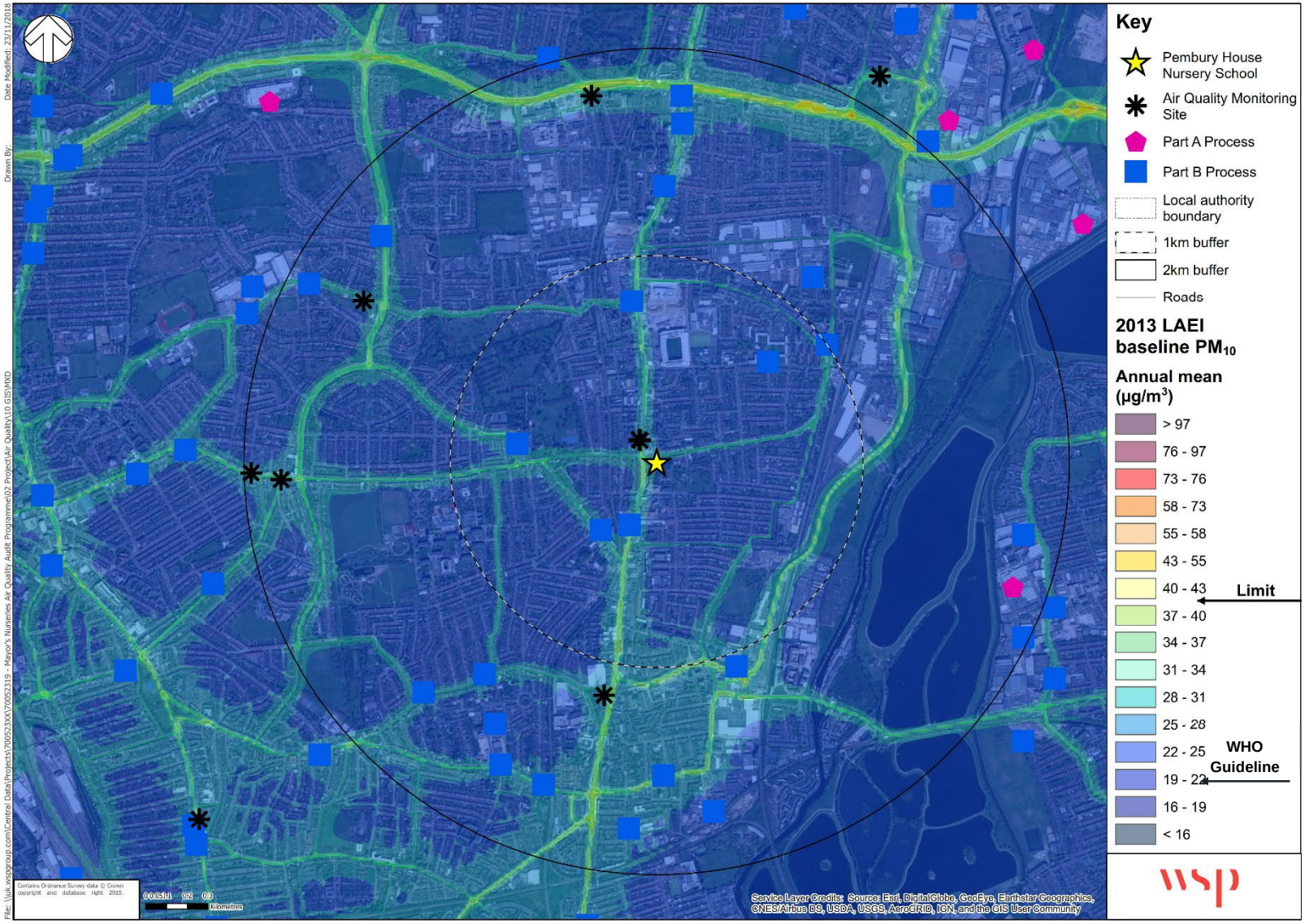
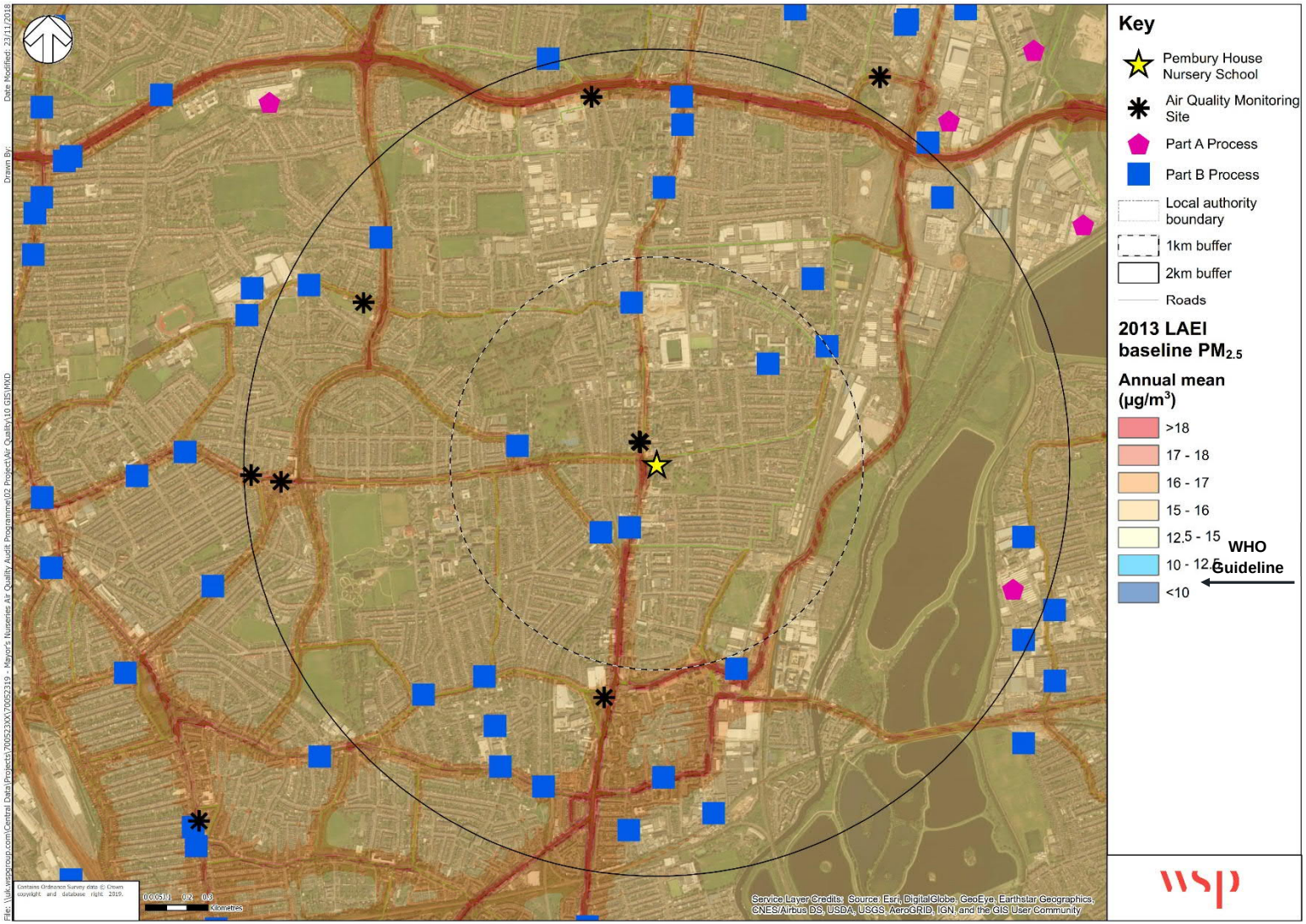


Figure 13 - 2013 LAEI Baseline Annual Mean $PM_{2.5}$ Concentrations within 2km of Pembury House Nursery School



4.2. HIGHWAYS – KEY OBSERVATIONS

4.2.1. The nursery main site is located on Lansdowne Road approximately 60 metres east of the traffic signalled junction with High Road (A1010).

4.2.2. High Road is **heavily trafficked** with cars, vans and lorries, and is a **key a bus corridor**, with 35 buses per hours. Lansdowne Road is a busy through road and bus route.

4.2.3. The nursery building is located on a plot **behind a car tyre business**. To the east of plot is a church and to the south and west are low rise flats. Opposite the nursery is a **car garage and furniture warehouse** the land use to the east of the nursery is residential while High Road is mainly commercial. These commercial premises in close proximity to the nursery result in frequent vehicle movements and deliveries from van and lorries, further contributing to local emissions around the nursery site.

4.2.4. The nursery pedestrian entrance is close to the traffic signalled junction with High Road, and owing to this proximity vehicles were observed queueing back past the entrance in two lanes, with emissions from idling engines

4.2.5. There are **no school keep clear markings** but a sign plate enforcing a no stopping on school zig zags. It is assumed that the zig zag markings have worn away and not been replaced. Double yellow lines are present. Immediately to the east of the entrance is a bus stop clearway. The auditor was informed and observed that drop off and collection by car at the nursery entrance is not an issue. The queuing traffic for the signals, bus stop and pedestrian guard railing would make this difficult.

4.2.6. **Parents and children wait on the footway** to enter the nursery, where they would be exposed to emissions from traffic.

4.2.7. Travel to the nursery by bus and walking is relatively high, and this has been achieved through the **travel plan**, and levels are staying high. The borough officers visit the nursery regularly to promote sustainable travel. Parents are heavily involved in school trips where public transport is used. A meeting with parents is called before a trip to discuss travel arrangements.

4.2.8. The east and westbound bus stops are located conveniently close to nursery. However, there is **no pedestrian crossing close to the bus stops**. Parents with small children either have to detour to the High Road junction, or west of Burlington Road for a controlled crossing point, or cross unaided and between parked vehicles. This could discourage traveling to nursery by public transport.

4.2.9. Children are taken to the nearby Bruce Castle Park frequently. They are walked along Lansdowne Road, cross the High Road junction and follow Lordship Lane to the park. All are busy roads with higher levels of emissions. Children are occasionally taken on day trips by public transport. The children are typically walked to Bruce Grove overground station, which is a 10 minute **walk along the busy High Road**. Children are also walked between the two nursery sites where they walk along Lansdowne Road to Burlington Road, where currently there is **construction works** ongoing to build flats.

4.2.10. The nursery had a complaint that the footways surrounding the nursery were not cleansed regularly and there were issues of fly tipping. This may have the result that parents are put off walking to the nursery.

4.2.11. Funerals at the adjacent **St Marys Church** have a dispensation to allow vehicles to park and wait on Lansdowne Road, which can be a significant number of vehicles.

4.2.12. The furniture warehouse opposite takes its **deliveries** on street in addition to the car tyre business and garage opposite attracting many vehicles, it ensures that the road outside the nursery is a very busy location.

4.2.13. There is no off-street parking available at the nursery. Staff who do drive tend to park on the surrounding streets close to the secondary site at Hartington Park. However, the lack of parking has resulted in difficulties recruiting staff.

Summary – Key Issues

- The high levels of traffic on Lansdowne Road and High Road the large numbers of taxis, buses and vans, with queueing back from the traffic lights at High Road and past the nursery.
- High levels of kerb side activity related to the adjacent businesses
- Parents and children wait in an exposed area outside the front of the nursery with no shelter from some of the higher levels of emissions coming from the nearby by main road.
- Construction activity close to the nursery, with associated dust and emissions, plant and heavy goods vehicle movements.
- Barriers posed by the main road, resulting in road safety issues, potentially dissuading more travel by sustainable modes.

Nursery entrance Lansdowne Road viewed west to High Road junction and east

Vehicle workshop and furniture warehouse opposite nursery entrance

4.3. NURSERY GROUNDS / BUILDING - KEY OBSERVATIONS

4.3.1. The nursery is a single storey building, built in the 1970s, and extensively refurbished in the 1990s.

4.3.2. The majority of the building is screened from Lansdowne Road by the tyre business building with the entrance of the nursery protruding to the street at the eastern end.

4.3.3. The grounds extend west to a gap in the tall buildings on to High Road and Rheola Close. There is a pedestrian gate here but it is not used. Emissions from High Road are able to reach the grounds through this gap.

4.3.4. The nursery is reliant on **natural ventilation** through opening doors and windows, with a number of the rooms reported to get excessively hot. The classrooms feature high ceilings and large windows, and given the age of the building are likely to be poorly insulated, which would result in greater heat loss, and so potentially increased run times by the nurseries boilers, and therefore greater emissions. It also results in higher temperatures during warmer weather, requiring windows/doors to be opened and so greater exposure.

4.3.5. The **main class room** is positioned at the southern end of the site, away from the entrance and Lansdowne Road, and faces a playground garden. The main classroom has a vaulted ceiling that falls from the centre of the building at a height of approximately three metres to the southern wall and playground garden. Two external doors are left open and PVC free flow curtains (butchers curtains) are used to retain heat.

4.3.6. Children free-flow between the classroom and **playground garden** to the rear of the site. The playground wraps around to the western side where there is a gap in the buildings to Rheola Close as described above. Low rise flats bound the southern boundary. The garden has been greened and contains a number of mature trees.

4.3.7. Lunches are delivered daily, and the school has a small **kitchen** with a gas cooker and extraction equipment situated next to the boiler room. In the north-west corner of the building is a room where the children have their lunch.

4.3.8. The nursery receives only 1 or 2 **deliveries** a week typically, with vehicles accessing via the front of the building.

4.3.9. The nursery is heated by a gas central heating system. The boiler room is situated at the 'back' of the building closest to the tyre business and the boiler flues exhaust above the roof height of the building. The **boilers and control system** are modern, but the auditor was informed that the building has hot and cold spots, and in summer overheating can be a problem. Standalone circulating fans are used during hot periods to maintain an air flow.

4.3.10. The room that fronts the busy Lansdowne Road is reported to often be cold, and electric heaters are used. However, this room is not used by the children and for adult learning only. The windows can be opened, and on occasion are opened to cool and air the building. The nursery actively monitors its energy use. The building suffers from **condensation and damp**, and books can go **mouldy**. At the time of the audit one of the roof lights was leaking.

4.3.11. The nursery reported **solvents from the tyre business** can on occasion be smelt in the nursery and grounds. It was reported that the dust in the summer time was obtrusive. The head reported that their asthma had got worse since working at the nursery. The incidences of asthma amongst the children and staff is also relatively high.

4.3.12. There was **scooter, buggy and cycle storage** near the entrance and traveling to the nursery by this method is quite popular. However, the site has limited space to provide storage.

4.3.13. It was felt that not enough staff cycle to the nursery, but the **lack of space to leave bikes**, that there were no showers or changing rooms, were a barrier to this.

4.3.14. The school has **laminate flooring** throughout. **Furniture** is a mixture of engineered wood and solid wood.

4.3.15. **Cleaning products** are kept in a locked cupboard off the children's toilets.

4.3.16. 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 stored in a store room, which is not accessible to the children.

4.3.17. There are **no plants within the building** as it lacks natural light.

Summary – Key Issues

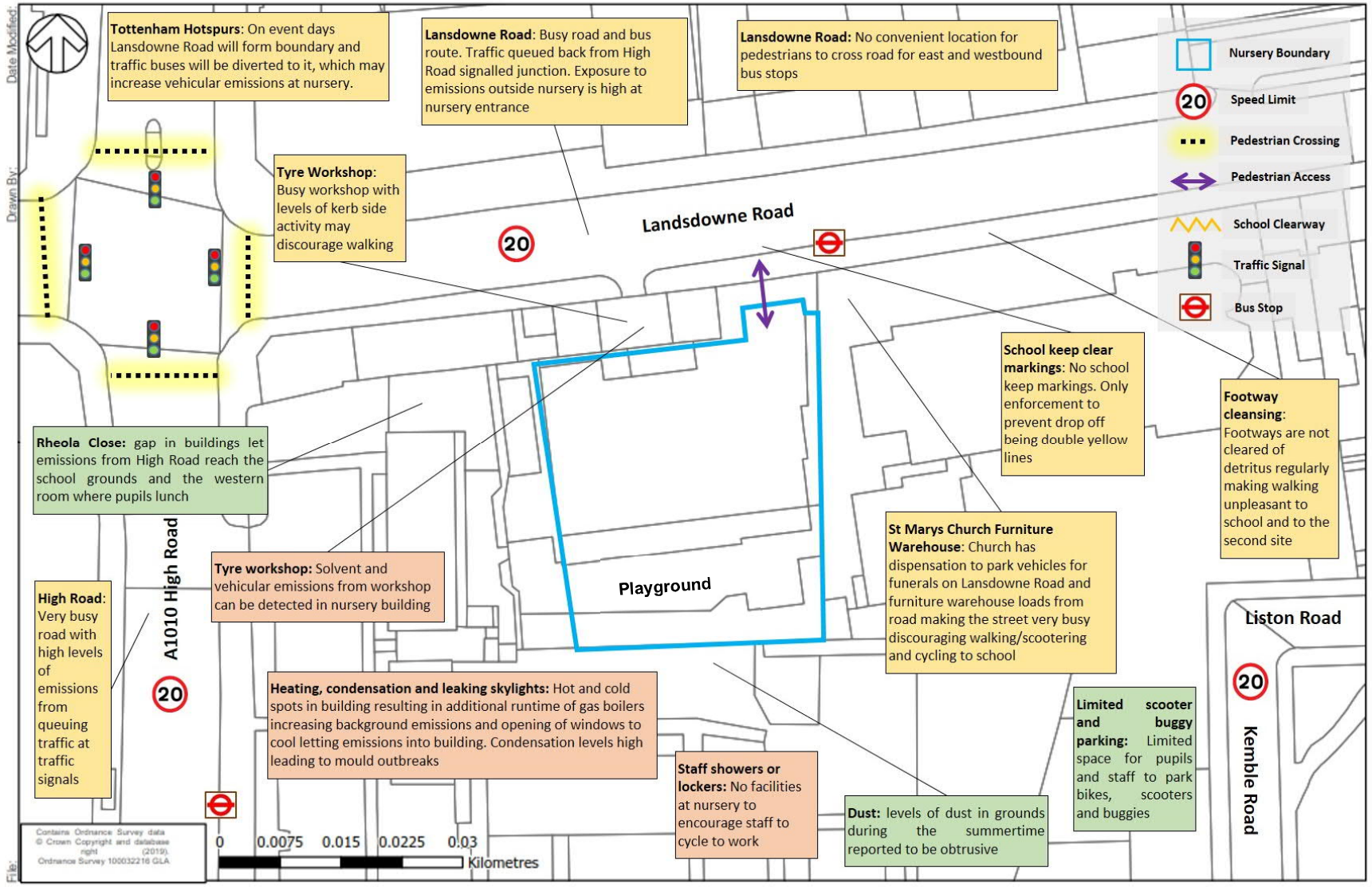
- The building is reliant on natural ventilation, with poor insulation potentially worsening the need for ventilation in hot weather, and requiring longer run times of nurseries boilers, a further source of local emissions.
- The playground and external classroom doors are largely screened from major nearby emissions sources, though a section of the playground is partially exposed.
- Some incidences of overheating, dry air and odours from kitchens and nearby petrol station.
- Buggy and scooter parking space is limited.

Pram/buggy and scooter parking

From Rheloa Close and High Road unused gate to grounds of nursery

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 keep clear markings	Install school keep clear road markings to prevent drop off and collections outside nursery	Promoting walking, scooting and cycling by providing improved local conditions	X			▪ Road safety ▪ Child health and welfare ▪ Promotion of sustainable transport	X			X				X	
2	Provide pop up characters at kerb side	Provide pop up children characters at kerb side to reinforce presence of nursery to passing drivers and prevent drop off/collection of pupils	Promoting walking, scooting and cycling by providing improved local conditions	X			▪ Road safety ▪ Child health and welfare ▪ Promotion of sustainable transport		X		X					X
3	Pedestrian crossing on Lansdowne Road	Provide a safe crossing point on Lansdowne Road close to east and westbound bus stops which is avoids a longer detour to safe facilities	Promoting walking, scooting and cycling by providing improved local conditions	X			▪ 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 while queuing in traffic with parallel awareness raising to launch and enforcement.	Reduce sources and exposure	X			▪ Road safety ▪ Child health and welfare ▪ Promotion of sustainable transport ▪ Supports STARS and HSL objectives	X			X					X
5	Engage with local businesses to reduce freight/ delivery emissions	Engage with local businesses (including Tyre workshop and Furniture Ware) to promote the use of low emission deliveries and explore the potential for consolidation, re-timing, collectivisation and pick-up drop off facilities.	Reduce sources and exposure		X		▪ Road safety ▪ Promotion of sustainable transport	X				X				X
6	Promote cleaner	Encourage children approach the school along less polluted routes, such as avoiding High Road and Lansdowne Road to	Reduce exposure	X			▪ Road safety	X			X					X

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
	routes to school	approach nursery using back streets as much as possible														
7	Tree planting	Tree planting and greening in verge at Rheola Close 'gap' to nursery in buildings to provide additional barrier to emissions from High Road	Reduce exposure				▪ Visual amenity	X			X					X
8	Healthy Streets approach, sustainable transport and roadspace reallocation from vehicular traffic	Promote the Mayor of London's Healthy Streets approach which aims to improve air quality, reduce congestion and help make London's diverse neighbourhoods greener, healthier and more attractive places to live, work, play and do business. Take a proactive role in endorsing the approach and supporting these initiatives.	Reduce sources and exposure			X	▪ Promotion of sustainable travel			X			X		X	
9	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		
10	Non-Road Mobile Machinery Audit	The Council could consider a requirement for a Non-Road Mobile Machinery (NRMM) Audit to be undertaken at construction sites. This requirement is being trialled within some Low Emission Neighbourhoods to help ensure compliance of vehicles used for developments. Currently, NRMM is the third largest contributor of NOx emissions and the fifth largest contributor of PM emissions in London, and any comprehensive plan to reduce London's emissions should attempt to address emissions from construction machinery.	Reduce sources of emissions	X			▪ Reduce noise	X			X					X
11	Control of Dust and Emissions during Construction and Demolition SPG	Introduce a requirement in planning conditions to manage dust and emissions associated with construction based on the Control of Dust and Emissions during Construction and Demolition SPG prepared by the GLA, which includes requirements for construction sites to monitor air quality and share the results with the borough council –	Reduce sources of emissions	X				X			X					X

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
		https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and														
Highway *(Key Stakeholder: TfL)*																
12	Low Emission Buses	Since 2018, all new double deck buses are hybrid or zero emission. The Mayor has also launched an £85m programme to upgrade around 5,000 buses so that the entire fleet meets the Euro VI emissions standard in 2020. Around 75 per cent of all TfL buses – including all buses operating in the ULEZ – now meet or exceed the strict ULEZ emission standards. By October 2020 every TfL bus in London – over 9,000 buses - will meet or exceed the ULEZ standards. Twelve new low Emission Bus Zones are being introduced in areas where Londoners are exposed to some of the highest levels of nitrogen dioxide pollution. The Mayor has completed ten of these zones, reducing NOx emissions from buses by an average of 90 per cent along some of the capital's most polluted roads. The Mayor will complete delivery of all 12 routes ahead of schedule in 2019 rather than 2020.	Reduce sources and exposure			X			X			X		X		
School Grounds *(Key Stakeholder: School/ Borough)*																
13	Green Infrastructure	Install green screening/climbers around the exposed outdoor spaces, the nursery entrance on Lansdowne Road, gable end of Tyre Workshop and 'gap' to Rheola Close. 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	Reduce exposure to emissions	X			▪ Visual amenity ▪ Security, privacy		X			X			X	

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
		reaching school grounds, through the installation of an ivy screen. In this instance the screen was found to be an effective pollution barrier, once the ivy had started growing and a significant impact could be seen once the screen had matured. It led to a decrease in the pollution concentrations on the playground side by 23% for NO_2 and 38% for PM_{10}. Green screens also provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction. The screens can be planted directly into the ground or into planters and are maintained with the option of a drip line irrigation system. It should be noted however that the same level of reduction would not necessarily be achieved in each instance, as the local conditions and designs are specific to each site. It should be noted that green screens need ongoing maintenance.													
School Building *(Key Stakeholder: School/ Borough)*																
14	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			▪ Reduced energy consumption and reduced operating costs ▪ Improved learning environments			X	X					X	
15	Introduce Air Filtration Systems	Consider investing in air filtration systems in classrooms most exposed to poor air quality and reliant on natural ventilation. These systems are relatively high cost, only cover a single room per unit, and do require ongoing maintenance and power consumption, but have demonstrated some encouraging initial scientific evidence of efficacy. They can also assist with virus elimination/ reduction. The findings of the Air Filtration System trials will be available to inform this decision in early 2020. The potential air quality improvement from Air Filtration System is identified as being low,	Reduce exposure	X			▪ Improved learning environment		X			X				X	

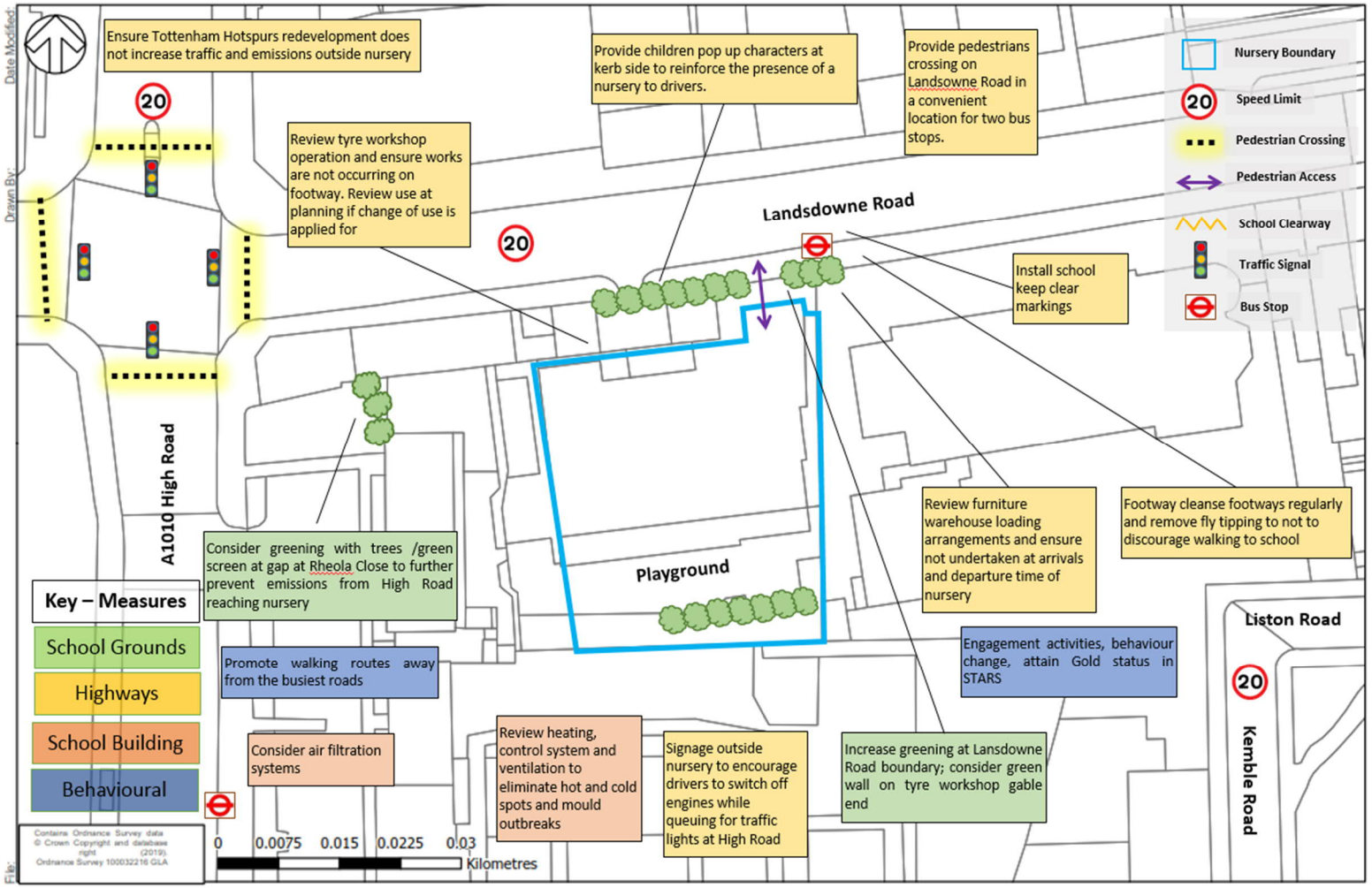
Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
		however this is subject to the findings of the trial.														
16	Monitor London Air 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			▪ Awareness raising Child health and welfare	X			X					X
17	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)*																
18	Promote cleaner routes to the nursery	Encourage parents to approach the nursery along less polluted routes. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots	Reducing exposure	X			▪ Awareness raising	X			X				X	
19	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			▪ Awareness raising ▪ Secure community buy-in for measures	X			X					X
20	Behaviour change	Prepare 'Welcome Packs' for new pupils / parents that includes the promotion of apps / sites such as 'www.walkit.com' to a) promote walking to / from school and b) promote the suitable walking routes to avoid air pollution hotspots.	Behavioural measures / reducing exposure to emissions.	X			▪ Awareness raising ▪ Secure community buy-in for measures	X			X				X	
21	Attain a Gold 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			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
22	Staff Engagement	Awareness raising session amongst staff about the impacts / costs of heating classrooms and share best practice. The	Awareness raising and	X			▪ Awareness raising	X			X					X

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
		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.	behavioural measures				▪ Supports STARS and HSL objectives									
23	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			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
24	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			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X				X	
25	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			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X				X	
26	Anti-idling campaign	Awareness raising campaign to reinforce and refresh the effectiveness of existing signage, including a banner, combined with enforcement. Develop an awareness raising banner and leaflets incorporating designs by the children. Also request that bus and coaches turn their engines off when waiting for extended periods, i.e. laying over or waiting to collect children.	Reducing sources and exposure	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X				X	
27	Walking Buses	A walking school bus is a group of children walking to school with one or more adults, and can be as informal as two families taking turns walking their children to school to as structured as a route with meeting points, a timetable and a regularly rotated schedule of trained volunteers. A bicycle train is a further	Reducing sources and exposure	X			▪ 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
		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.														
Wider Measures *(Key Stakeholder: Borough/ TfL/ GLA/ Central Government)*																
28	Targeted scrappage scheme for polluting vehicles being driven in London	Ensure parents and staff are aware of the low income scrappage scheme being introduced by the Mayor and TfL, so that those that are eligible apply to the scheme. Encourage central Government to at a minimum match-fund the Mayor's scrappage commitments, to help enable even more Londoners to switch from polluting vehicles to ultra-low emission vehicles and more sustainable forms of transport.	Reduce sources and exposure			X				X			X	X		

5.2. KEY RECOMMENDATIONS

Figure 15 – Summary Recommendations Map



5.3. PRIORITISED MEASURES FOR THE NURSERY

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

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

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

- **Heating and Cooling** - A key issue for the staff at the nursery is the uneven temperatures in the building at different times of the year. This was due to lack of local control and levels of insultation in the two parts of the building which were constructed at different times. Recently installed butcher's curtains at the openings to the grounds have helped maintain constant temperatures. Ventilation appears also to be an issue as condensation was causing mould outbreaks. The windows in the building are modern but may have reduced air circulation causing humidity to rise. The buildings heating system and control should be reviewed in addition to the insulation and ventilation. If overheating in summer continues to be an issue cooling systems could be considered.
- **Traffic Calming, anti-idling campaign and engagement with local businesses** - The high levels of traffic on High Road and Lansdowne Road are a key problem for the nursery contributing towards worsening local air quality directly through the vehicle emissions, but also serving to create a hostile environment for those walking, cycling and scooting, and posing a road safety risk. A contributing factor is that there are no school keep clear markings and higher levels of kerb side activity related to the nearby businesses. The nursery's presence might not be obvious to passing drivers. A package of measures including pedestrian crossing facilities for the two bus stops, traffic calming, control of kerb side loading with engagement with local businesses, an anti-idling campaign directed to traffic queueing for the traffic signals, and enhancing the presence of nursery with pop up children characters to improve the visibility of the nursery from the roadside may all go to encourage walking and cycling to the nursery and lessen idling by.
- **Green Infrastructure** - The nursery was keen to implement as much greening as possible in and around its grounds. Including at the main entrance to Lansdowne Road, the 'gap' to Rehola Close and in the school grounds and boundary with neighbouring properties. A dense vegetation layer with a high leaf density can as much as halve the levels of pollution just behind the barrier, though the benefit tails off with increasing distance. The benefit is mainly attributable to their effect on dispersion, though the deposition of some pollutants onto the leaf surfaces from air that passes through the vegetation will also have a small but beneficial effect. A study by Kings College London assessed the efficacy of green screens in preventing vehicle emissions from nearby roads reaching school grounds, through the installation of an ivy screen. In this instance the screen was found to be an effective pollution barrier, once the ivy had started growing and a significant impact could be seen once the screen

had matured. It led to a decrease in the pollution concentrations on the playground side by 23% for NO_2 and 38% for PM_{10}. Green screens also provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction. The screens can be planted directly into the ground or into planters and are maintained with the option of a drip line irrigation system. It should be noted however that the same level of reduction would not necessarily be achieved in each instance, as the local conditions and designs are specific to each site. It should be noted that green screens need ongoing maintenance.

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. Pembury Nursery has achieved Silver accreditation. Our recommended measures for the nursery include a number or initiatives that would also count towards the achieving their Gold STARS scheme accreditation, including: 'anti-idling awareness raising measures' and 'park and stride'. STARS activity cards are available for these measures, as well as wide range of other topics https://stars.tfl.gov.uk/Explore/Idea.

5.5. HEALTHY SCHOOLS LONDON

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

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

5.5.2. The nurseries must complete the following statements:

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

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

5.6. AIR QUALITY ALERTS

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

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

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

5.7. ENGAGEMENT

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

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

HEALTHY EARLY YEARS LONDON (HEYL)

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

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

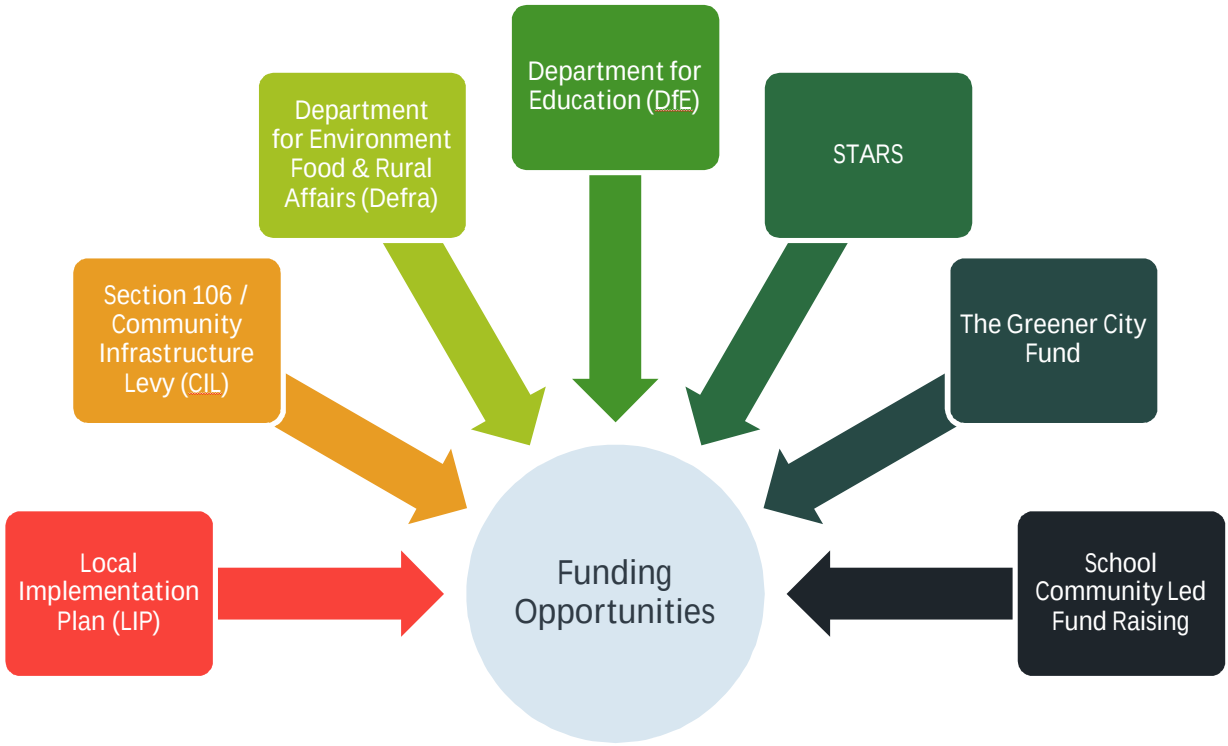
- Active travel is supported and encouraged, both for journeys to and from the setting and for trips (e.g. walking, scooting)
- The setting is signed up to receive air quality alerts from www.airtext.info/alerts

- There are activities and information available for parents and carers to support sustainability including: active travel, recycling or energy saving
- Practitioners are able to discuss and advise parents and carers on active travel

5.8. FUNDING OPPORTUNITIES

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

Figure 16 – Summary of Funding Opportunities



Local Implementation Plan (LIP)

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

Section 106 / Community Infrastructure Levy (CIL)

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

TfL Liveable Neighbourhoods

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

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

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

Department for Education (DfE)

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

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

Greener City Fund

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

RE:FIT

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

TfL STARS Reward Scheme

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

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

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

Nursery Community Led Fund Raising Initiatives

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

Other Funding Sources

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

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

Other sources of funding for green infrastructure

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

- The Tree Council's **Trees for Schools** programme
- The **Woodland Trust** offers free trees for schools and nurseries.
- The **Gregg's Foundation Environmental Grants** offer up to £2,000 for projects that improve the physical environment
- **Tesco Bags of Help** offer up to £4,000 to projects including school and nursery grounds
- **The Big Lottery Fund's Awards for All programme** offers up to £10,000 for projects that "improve the places and spaces that matter to communities", including nurseries
- **Trees for Cities** –match-fund the creation of Edible Playground teaching garden space, School Greening projects and Trees for Schools
- **Groundwork London** –support nurseries in designing and implementing green interventions.[12] Groundwork London's Our Space award[13] offers grants between £500 and £5,000.

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

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

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

5.9. MONITORING

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

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

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

5.9.4. Where possible such monitoring should cover:

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

6. NEXT STEPS

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

6.1.2. The borough and nursery should investigate the scope for rapidly delivering key measures from the recommendations, to achieve a combination of quick win improvements for the nursery, whilst also thinking more holistically about how some of the medium to longer term recommendations can be progressed, to deliver more transformational change. By participating in this audit, the following steps have been completed:

- **Identified the sources of poor outdoor air quality** and exposure at nursery and within the surrounding catchment areas.
- **Identified the sources of poor indoor air quality** and potential exposure by children attending the nurseries, and established a baseline of indoor air quality.
- **Engaged the borough and other relevant stakeholders** to inform the context and feasibility of the proposed recommendations.
- **Identified, evaluated and developed recommended measures** within and around the nurseries' that will help a borough and nursery to reduce particulate matter, emissions and children's exposure to poor air quality.
- **Raised awareness within the nursery community** about the impacts of air pollution.

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

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

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

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