MAYOR OF LONDON

The Mayor of London's Nursery Air Quality Audit Programme

Ethelred Nursery School, London Borough of Lambeth

FEBRUARY 2020

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ACKNOWLEDGEMENTS & CONTRIBUTIONS

Ethelred Nursery School – Sarah Ros (Deputy Head Teacher), Tony (Caretaker)
London Borough of Lambeth – Sabrina Chiaretti (Sustainability Officer), Laura Cheyne (School Travel Officer), Hanna Radlowska (Sustainability Officer)

MEMBERS OF THE PROGRAMME ADVISORY GROUP

Annette Figueiredo - Programme Lead, Principal Policy & Programme Officer, Greater London Authority
Agnieszka Griffin - Senior Policy Officer, Greater London Authority
Sarah Macfadyen – Policy Manager, British Lung Foundation
Ben Connor - Senior Policy & Programmes Officer, Greater London Authority
Sara Ramsay - Youth Programmes, Greater London Authority
Ben Gascoyne - Senior External Affairs Officer, University College London
Liz Prosser - Healthy Early Years Manager - Healthy Schools London, Greater London Authority
Magda Balicka - Principal Policy and Projects Officer (Early Years), Greater London Authority
Dr Simon Lenton - Royal College of Paediatrics and Child Health
Paula Martin - Air Quality Analyst, Transport for London
Fiona Coull – Graduate Consultant, Greater London Authority
Olly Offord, Project & Policy Officer, Communities & Intelligence, GLA.
Naveed Ahmed - Principal City Planner, Transport Strategy & Planning, Transport for London

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.

Supplier

Glenn Higgs, Technical Director, Project Director, WSP
Matt Croucher, Sustainable Transport, Project Manager, Auditor, WSP
Justin Lingard and Peter Walsh, Air Quality, WSP
Alessandro Ciampechini and Andrew Marsh-Patrick, Sustainable Places & Energy, WSP

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Published by
Greater London Authority
City Hall
The Queen's Walk
More London
London SE1 2AA
www.london.gov.uk
enquiries 020 7983 4000
minicom 020 7983 4458
ISBN
Photographs ©

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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** (39.64µg/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. However, in two months, the measured NO_2 concentrations slightly exceeded the legal limits (annual mean NO_2 national Air Quality Objective of 40µg/m³).

NO_2 concentrations fall to 32.60µg/m³ in the **playground**, which is screened from traffic by the nursery building, which wraps around much of the playground. Concentrations at the **nursery entrance** are higher (37.28µg/m³) as the entrance exposed to the passing traffic on Kennington Road. Inside the nursery, the **indoor** concentrations fall by 14-21µg/m^3 compared to external concentrations. Whilst concentrations were found to be below national legal limits, known as Air Quality Objectives, there is no 'safe' level and children would still benefit from further reductions. Children will also be adversely affected by their journeys to and from nursery.

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. Exposure can cause irritation to the eyes and upper airways. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs[1]) concentrations should be below 300 µg/m^3. In Ethelred the top 10 VOCs detected were found to be 110.6 µg/m^3. The majority of VOC chemical species identified were recognised as being hydrocarbons, likely to be products of partial combustion derived from street sourced pollutants.

Formaldehyde are emitted from vapours arising from solvents and adhesives. In a nursery setting these are likely to originate from glues, adhesives and finishing's. Exposure can cause burning sensations of the eyes, nose, and throat, coughing, wheezing, nausea and skin irritation. The World Health Organisation (WHO) indoor air quality guideline[2] for short- and long-term exposures to formaldehyde is 100 µg/m^3. In Ethelred they were found to be 8.69 µg/m^3.

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

The wider area around the nursery was assessed using the London Atmospheric Emissions Inventory (LAEI), which showed that pollution levels reducing with distance from the **heavily trafficked Kennington Road**. NO_2 concentrations are predicted to be highest along the eastern boundary of the nursery, which is closest to the main road.

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

Nearly 50% of NO_x emissions in London are from road transport. Larger diesel vehicles in particular are major contributors to local air pollution. Approximately **12,500 vehicles per day travel**

[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).

within 200m of the nursery. Whilst buses make up only 9% of vehicle movements, they contribute 67% of the transport related NO_x emissions, 42% of the transport related PM_{10} and 28% of $PM_{2.5.}$. Cars account for 12% of emissions.

Key observations – summary of potential issues

- **Heavily trafficked** road nearby with large numbers of taxis, buses and vans.
- **Petrol station** immediately adjacent to the nursery, which attracts large number of vehicles to stop for refuelling, and is a source of emissions in its own right.
- **Construction activity** around the nursery, with associated dust and emissions, plant and heavy goods vehicle movements.
- Some **conflicts with pedestrians**, and barriers posed by the main road, resulting in some unsafe crossing and road safety issues, potentially dissuading more travel by sustainable modes.
- **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.
- The building was only recently constructed and completed to a high standard, and benefits from centralised ventilation in the form of **Air Handling Units with HEPA filters**.
- The playground and external classroom doors are largely screened from major nearby emissions sources, though a section of the **playground is partially exposed** to the nearby construction site on Lollard Street.
- **Some incidences of overheating**, dry air and odours from kitchens and nearby petrol station.
- **Children's Centre first floor terrace** is located at end of the site more exposed to emissions from Kennington Road, though we understand it is used infrequently.
- **Buggy and scooter parking space** is limited, and there may have been an under provision relative to the terms of the planning permission.

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:

- **Introduce Green screening around Nursery Entrance** – introducing green screening or a barrier to lessen exposure for parents and children waiting for the nursery to open, who are currently exposed to the emissions from traffic on the nearby Kennington Road. This would need to be vandal proof. Alternatively, parents and children could be permitted to enter building earlier, but this may entail additional staffing costs to supervise, if for example parents/ children were to be allowed to wait in the playground.
- **Encourage parents to approach the nursery along less polluted routes**, for example taking parallel routes to Kennington Road where possible. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots. The preparation of 'Welcome Packs' for new pupils / parents would also help promote these routes.

- **Reducing construction related emissions** – including enforcement of the requirements to erect cladding/ screening around the construction site opposite the nursery to act as a barrier to dust and particulates. Future freight / construction vehicles associated with new developments can be required to use only Euro 6 compliant vehicles and ULEVs as they become available, with consolidation of trips and re-timing of deliveries to off-peak periods as part planning permissions. Construction Logistics Plan (CLPs) guidance could ensure construction vehicles avoid nursery start / finishing times.
- **Tree planting in the Playground** - Consider planting a tree and shrubs in the playground to provide some additional screening from the nearby roads where there is a gap in buildings surrounding the playground. This will also provide added visual amenity and privacy from the roadside and adjacent apartments. Ongoing maintenance for Green Infrastructure, plants and trees would also need to be considered.

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

Nursery Grounds

Introduce Green screening around Nursery Entrance
Additional buggy/ scooter/ cycle parking
Green Screening
Tree planting in the Playground

Nursery Building

Inspect and optimise operation of heating and ventilation
Add indoor plants
Review purchasing choices and switch to low-VOC content furnishings
Switch to lower VOC cleaning products

Behavioural Measures

Promote cleaner routes to the nursery
Prepare 'Welcome Packs' for new pupils / parents
Achieve Gold accreditation in STARS
Engagement Activities
Attain a Gold Award in Healthy Early Years London scheme
Staff Engagement
Monitor London Air website / app
Managing art and craft materials
Cleaning practices to reduce VOC

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:

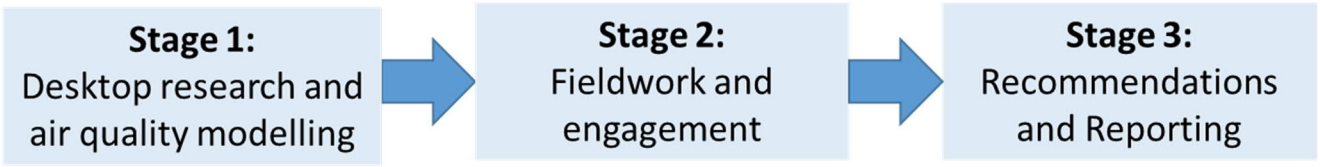
- Audit and identify the sources of poor outdoor air quality and exposure by children at 20 state-funded nurseries and their surrounding nursery catchment areas, including NO_2, PM_{10} and $PM_{2.5}$.
- Audit and identify the sources of poor indoor air quality and potential exposure by children attending the nurseries, and establishing a baseline of indoor air quality.
- Assess the feasibility of installing air filtration systems at the selected nurseries' sites.
- 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 – ETHELRED NURSERY SCHOOL

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

Table 1 – Audit Details

Date of Audit	Tuesday 15th January 2019	
Nursery Representatives	Sarah Ros (Deputy Head Teacher), Tony (Caretaker)	
Borough Representatives	London Borough of Lambeth – Laura Cheyne (School Travel Officer), Hanna Radlowska (Sustainability Officer)	
WSP Auditors	Matt Croucher, Josh Milne	
Itinerary	**Timings**	**Description**
	0800 - 0830hrs	Initial observations and site familiarisation by WSP auditors
	0830 – 0900hrs	Site walk and observations with borough air quality officers/ school transport officer/ nursery staff
	0900 – 0930hrs	Audit of building and grounds to appreciate the layout of the building/playgrounds etc. accompanied by the bursar/caretaker
	0930 – 1100hrs	Brainstorming Workshop with key staff from the nursery and borough officers.
	1100 - 1200hrs	Further observations and completion of site audit template

3. CONTEXT AND INITIATIVES

3.1. NURSERY CONTEXT

Figure 2 - Nursery Context

Borough: Lambeth

Address: 1 Gundulf Street, SE11 6BG

Pupil Numbers: 60

Age Range:
2-5 years

Gender:
Mixed

Type: Local authority nursery school

Children who speak English as an additional language:

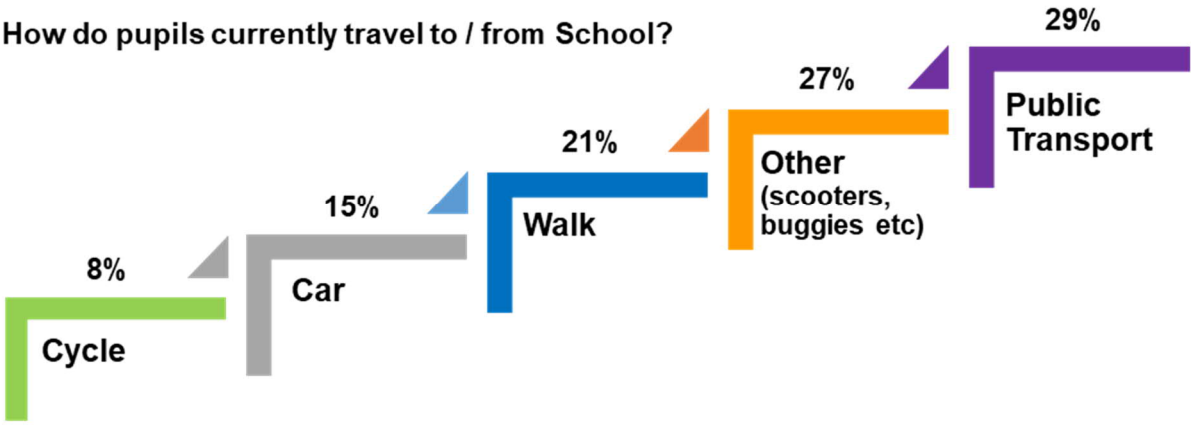
Higher than average

Deprivation Rank: 5

Children with disabilities or special educational needs:

Higher than average

How do pupils currently travel to / from School?



3.1.1. **Ethelred Nursery School** is located in South London within the Borough of Lambeth. The nursery has recently moved to its current site from its previous location on Wincott Street, a short distance northeast of the new site.

3.1.2. At the time of the audit the nursery had **86 children** on the roll, higher than the figure reported in the Edubase database maintained by the Department of Education.

3.1.3. The nursery has capacity for growth in the number of children it can take on its role, and has grown in recent years.

3.1.4. The main entrance is on **Kennington Road (A23)**, a 20-mph street. Approximately **12,500 vehicles per day travel** on the core roads within a 200m radius of the nursery[9]. This is within the 2nd quartile in terms of traffic volumes amongst of the 20 nurseries assessed as part of this programme. For context, in the UK in 2017[10] the average traffic flow on urban minor roads was 2,100 vehicles, and 19,200 vehicles on an urban A-road.

3.1.5. The desktop review and subsequent discussions with the nursery confirmed that around **29% of children arrive at the nursery via public transport**, 27% travel by other modes (scooter or buggy), 21% walk, 15% by car and 8% cycle.

3.1.6. Staff explained that the **nurseries catchment area has remained fairly consistent** over recent years, with many of the families living very locally, though some travel in from closer to Brixton.

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

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

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

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

Figure 3 – Outer Context Plan

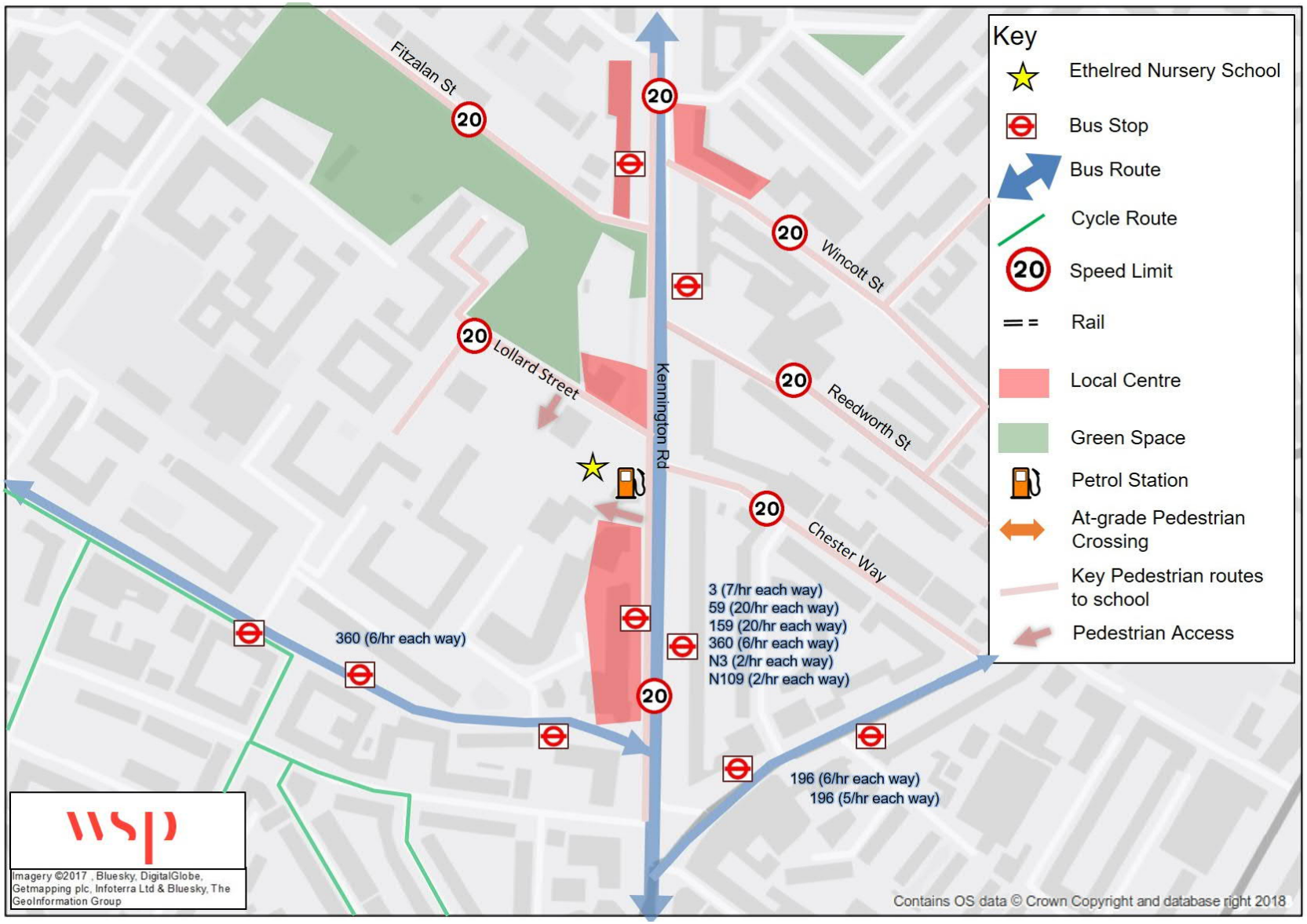
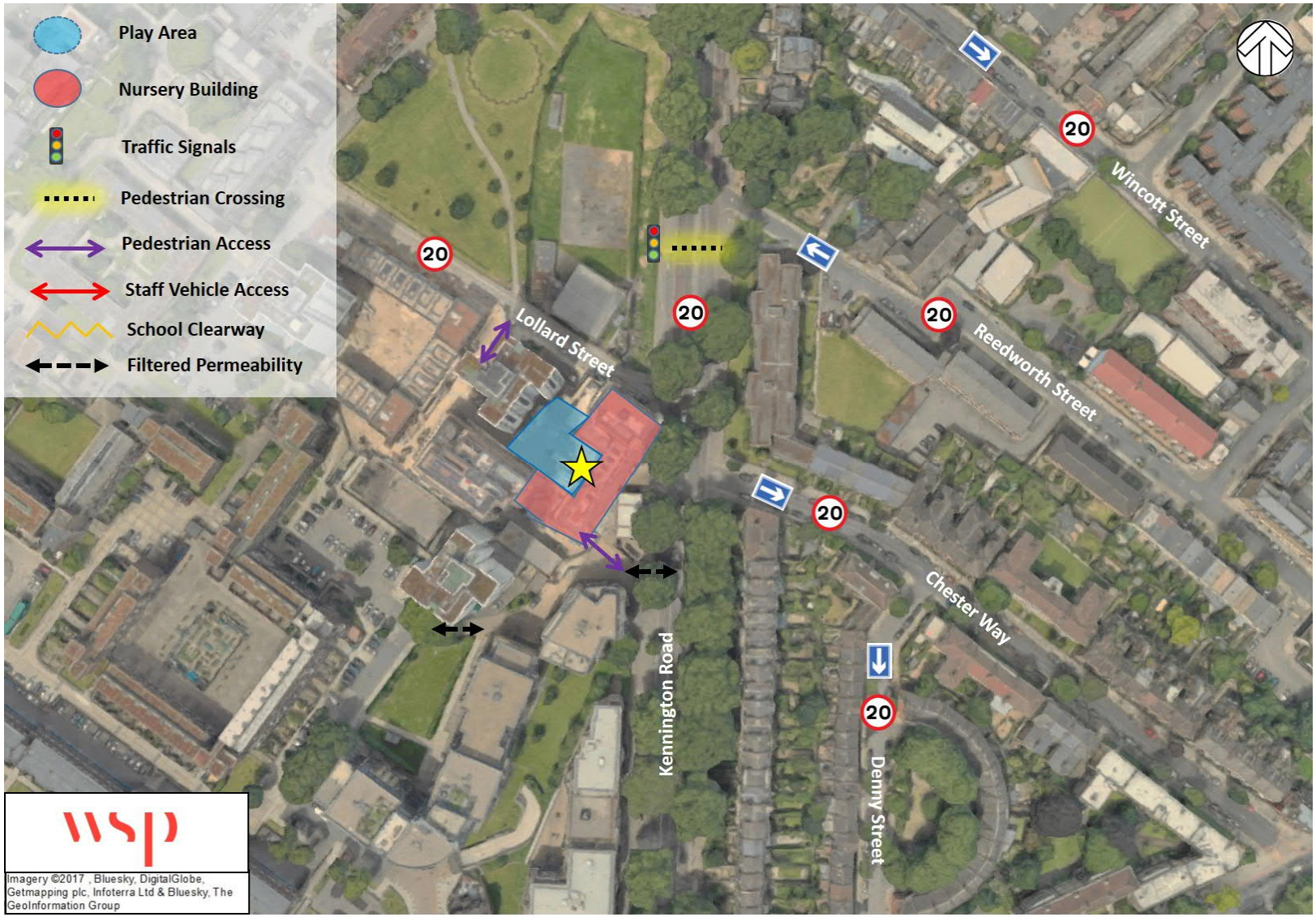


Figure 4 – Inner Context Plans



3.2. PLANNED SCHEMES & RECENT INITIATIVES

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

NEW FREE SCHOOL - FORMER ETHELRED YOUTH CENTRE SITE

3.2.2. Construction is underway on the site immediately north of the nursery SEN Free School to be operated by the National Autistic Society. The school will be aa 78 place secondary Free School for children and young people with Autistic Spectrum Disorder (ASD).

3.2.3. The school will include a 210sq m hall and associated community facilities which will be available to community groups for up to 25 hours a week.

Impact of scheme:
- Air pollution associated with construction activity.
- Potential for additional traffic once completed.

PETROL STATION

3.2.4. We understand from the nursery staff that there may some interest in redeveloping the petrol station adjacent to the nursery on Kennington Road, potentially as flats with a ground floor retail unit.

Impact of scheme:
- Air pollution associated with construction activity.
- Potential for reduced traffic activity and other emissions once completed.

3.2.5. 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)

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

3.2.7. The London-wide Low Emission Zone (LEZ) is being tightened to a Euro VI emissions standard for heavy duty vehicles (buses, coaches, Heavy Goods Vehicles (HGVs) from October 2020. The ULEZ will be expanded for light duty vehicles (such as cars, vans and motorcycles) so that all vehicles are subject to emissions standards, within an area roughly bounded by the North and South Circular Roads, from October 2021. It is forecast that an expanded ULEZ and tighter LEZ standards will result in 15 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.

LOCAL SCHEMES

CYCLEWAYS 6 AND 7

3.2.8. When complete, the North-South Cycleway (CS6) will provide a safe and direct route for cyclists through central London between Elephant and Castle and King's Cross. The first section of route between Elephant and Castle and Stonecutter Street opened in Spring 2016.

3.2.9. Cycleway 7 runs from Balham through Kennington and onto Elephant and Castle and Southwark bridge, and in combination with CS6 caters for access to the nursery from the north and south.

Impact of scheme:

- Improved travel options locally via sustainable travel (walking and cycling).

AIR-MAZING JOURNEYS PROJECT

3.2.10. Lambeth commissioned Sustrans to work with ten schools to raise awareness about air pollution through promotion of sustainable travel, monitoring air quality and education. As part of the project they have installed nitrogen dioxide diffusion tubes to measure levels of air pollution around schools, and will over a four-month period be monitoring particulate matter, holding car-free and walk to school days as well as healthy travel challenges, mapping cleaner routes to schools and some bespoke activities like counting lichen on trees.

Impact of scheme:

- Improved travel options locally via sustainable travel (walking and cycling).

LAMBETH CLEAN AIR WEEK

3.2.11. Since 2017 Lambeth have delivered a well received and wide-ranging programme of events and awareness raising initiatives across the borough on the topic of air quality, and deploying gamification techniques as part of their extensive engagement with schools.

3.2.12. They plan to build on the success of the first three years and are organising more events in 2020 to continue to raise awareness and engage with the local community on the issues and encourage positive behaviour change.

Impact of schemes:

- Improved travel options locally via sustainable travel (walking and cycling).

NURSERY STARS ACTIVITIES

3.2.13. 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.

3.2.14. 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.

3.2.15. Ethelred Nursery School recently held Bronze status of the STARS programme, though this expired in August 2018. The nursery has been active in undertaking range of STARS activities, including:

- Health benefits of active travel
- Walking trips - walk on school trips and use the time to teach road safety skills
- School travel noticeboard and web page - information on the notice board, things like the cycle training for parents.
- Cycle parking installed
- Working with local charities - Roots and Shoots
- Zigzag lines enforcement
- "Bike it - you can too' – a women only cycling training event

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

4. AIR QUALITY AUDIT FINDINGS

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

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

4.1. BASELINE AIR QUALITY

4.1.1. The air quality audit used a combination of modelled and measured data to establish the local, baseline pollution climate 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 Ethelred 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)

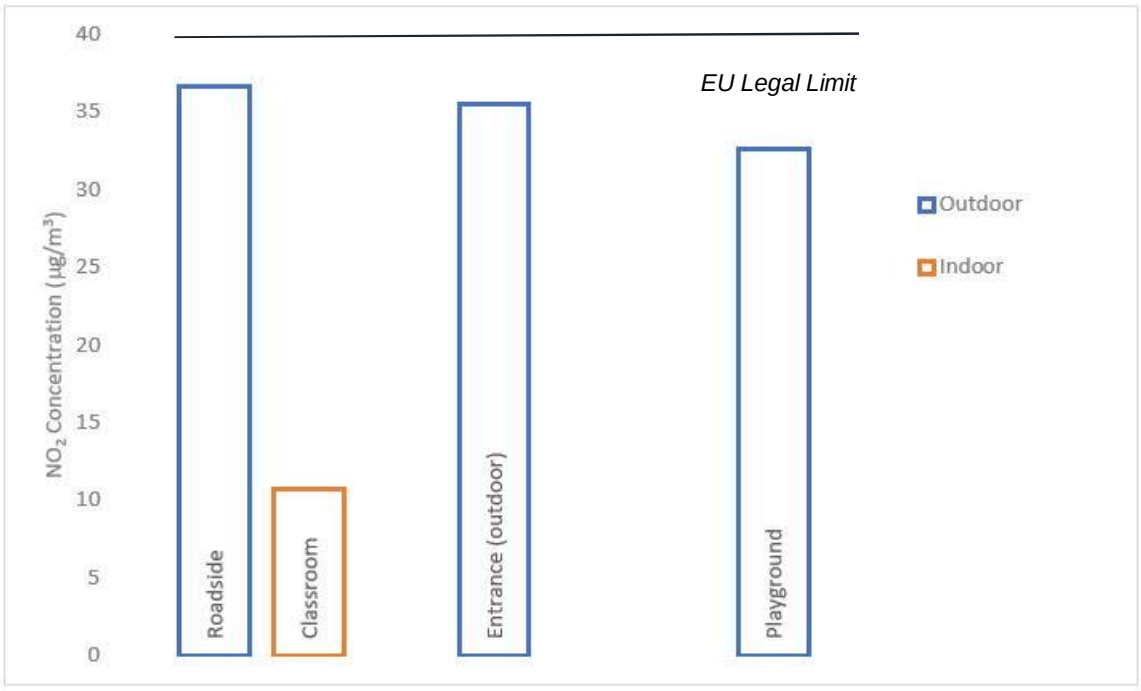
- roadside outside the nursery
- immediately outside the nursery entrance
- playground
- immediately inside the nursery entrance
- inside a nursery classroom.

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 Ethelred Nursery School (µg/m³)



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

Table 2 – Ethelred Nursery School: Three Month Baseline NO_2 Monitoring Results (µg/m³)

Diffusion Tube Location	Indoor / Outdoor Location	Baseline NO_2 Monitoring Results - NO_2 (µg/m³)			
		December	January	February	Average
Roadside	Outdoor	41.16	41.10	36.66	39.64
Playground	Outdoor	35.71	34.32	32.60	34.21
Nursery entrance	Outdoor	36.83	39.46	35.54	37.28
Nursery entrance	Indoor	20.21	19.99	-	20.10
Classroom	Indoor	15.87	16.74	10.67	14.43
Ratio of indoor to outdoor (I/O) concentrations		0.55	0.51	-	0.54

4.1.9. NO_2 concentrations were found to be highest at the **roadside** (39.64µg/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 two months, the

measured NO_2 concentrations slightly exceeded the annual mean NO_2 national Air Quality Objective (AQO) of 40µg/m³.

4.1.11. NO_2 concentrations fall to 32.60µg/m³ in the **playground**, which is screened from traffic by the nursery building, which wraps around much of the playground. Concentrations at the **nursery entrance** are higher (3728µg/m³) as the entrance exposed to the passing traffic on Kennington Road.

4.1.12. **Inside the nursery**, concentrations fall by 19.78µg/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 0.54 at Ethelred 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 – Ethelred Nursery School: Three Month Baseline Formaldehyde and VOC Monitoring Results (µg/m$_3$)

Pollutant	Baseline Formaldehyde and VOC Monitoring (µg/m³)			
	December	January	February	Average
VOCs (Top 10 VOCs)	69.4	76.4	185.9	110.6
Formaldehyde	7.08	7.21	11.77	8.69

4.1.16. **Volatile Organic Compounds (VOCs)** are emitted from vapours arising from petrol and solvents. In a nursery setting are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. Exposure can cause irritation to the eyes and upper airways. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs[12]) concentrations should be below 300 µg/m^3. In Ethelred the top 10 VOCs detected were

[12] TVOCs denote a wide ranging group of organic chemical compounds. For simplicity they are commonly reported together.

found to be 110.6 µg/m^3. The majority of VOC chemical species identified were recognised as being hydrocarbons, likely to be products of partial combustion derived from street sourced pollutants.

4.1.17. **Formaldehyde** are emitted from vapours arising from solvents and adhesives. In a nursery setting these are likely to originate from glues, adhesives and finishing's. Exposure can cause burning sensations of the eyes, nose, and throat, coughing, wheezing, nausea and skin irritation. The World Health Organisation (WHO) indoor air quality guideline[13] for short- and long-term exposures to formaldehyde is 100 µg/m^3. In Ethelred they were found to be 8.69 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.

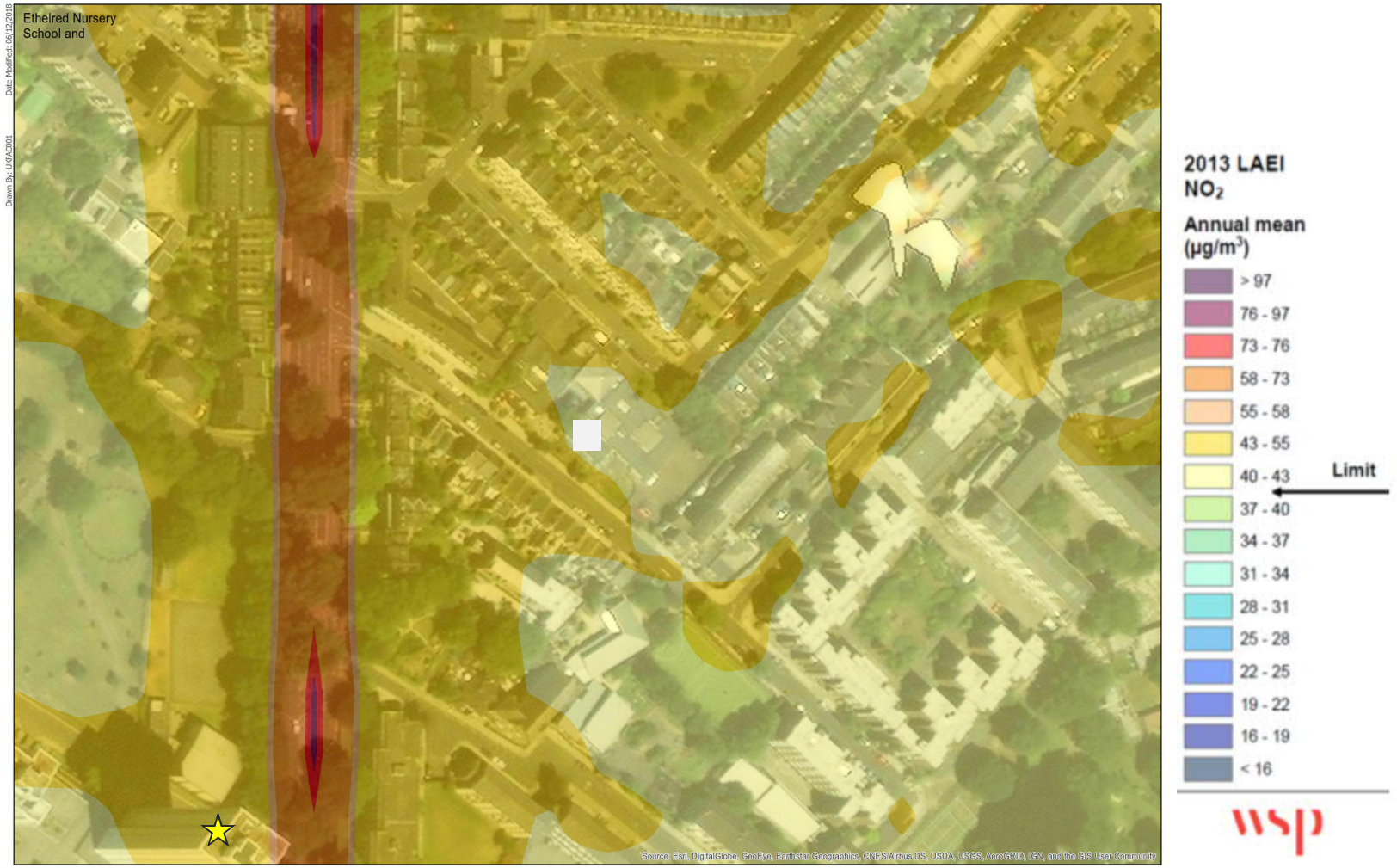
4.1.20. The LAEI uses air pollution emission estimates from a wide range of sources including transport, industrial, domestic and commercial combustion, agriculture and long-range transport using the most up-to-date activity data, emission factors and projection factors.

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

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

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

Figure 6 - LAEI Baseline Annual Mean NO_2 Concentrations within the Immediate Area of Ethelred 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 9% of vehicle movements, they contribute 67% of the transport related NO_x emissions locally. 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)

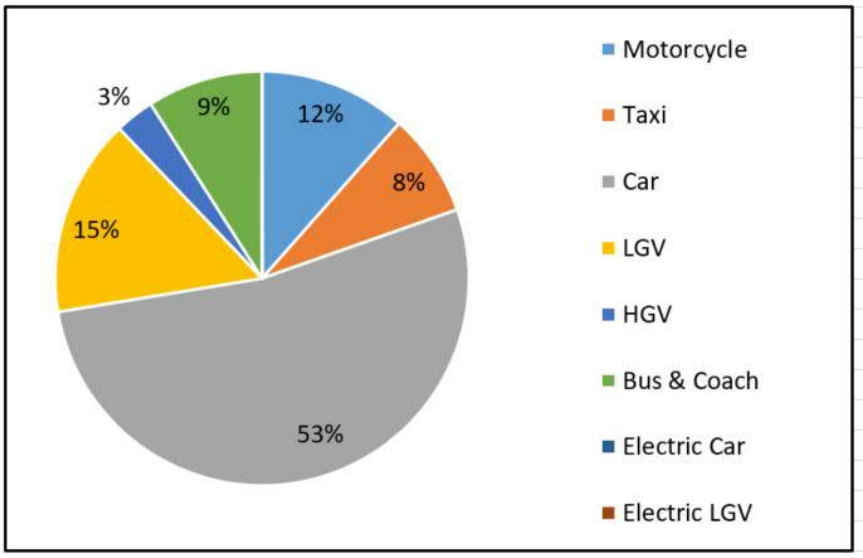
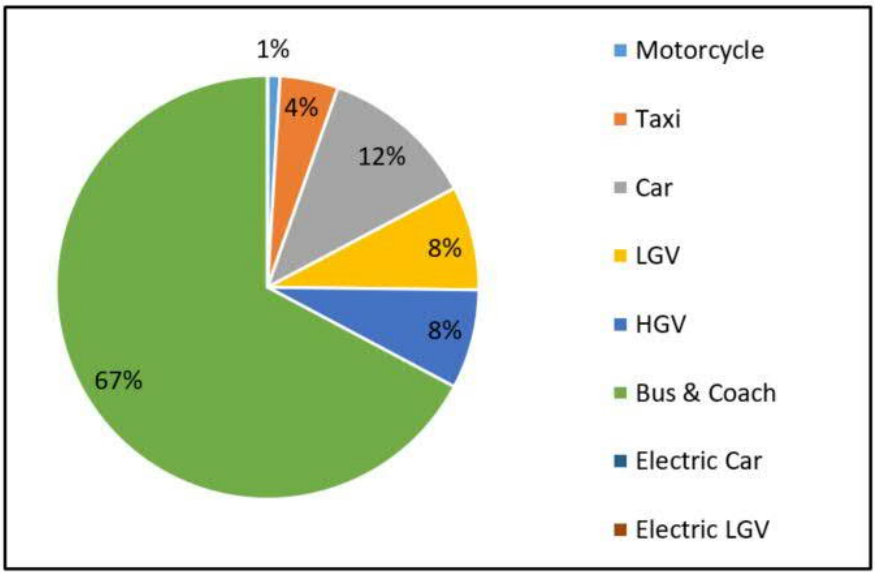


Figure 8 – Average Road Transport NO_x Emissions by Vehicle Type (within 200m of nursery)



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 9% of vehicle movements, and contribute 42% of the transport related PM_{10} emissions locally, and 28% of $PM_{2.5}$.

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

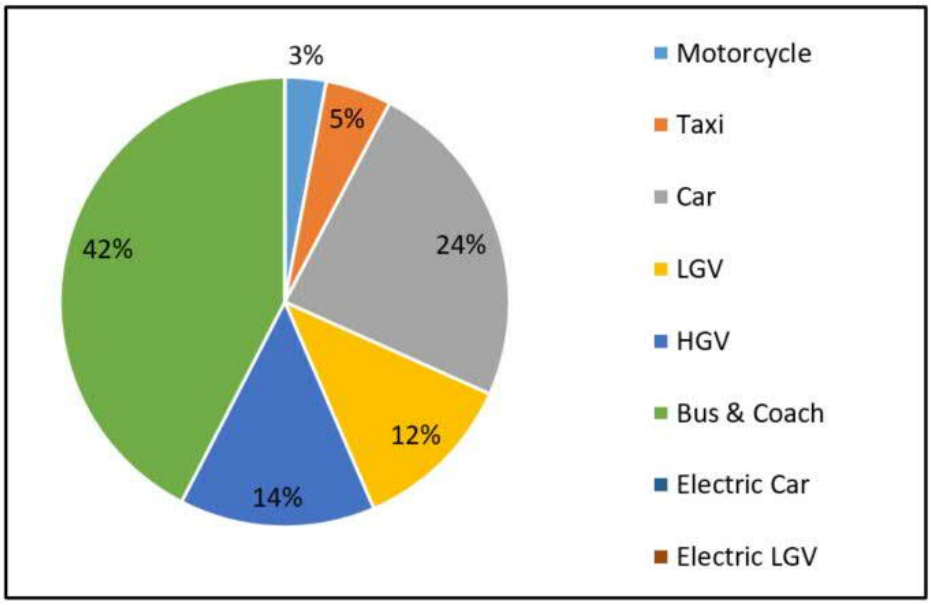
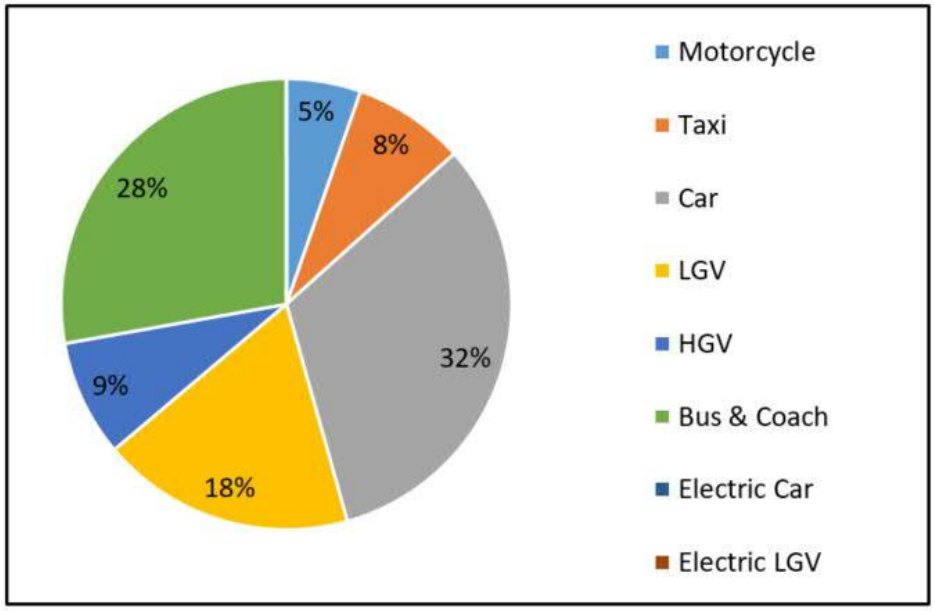


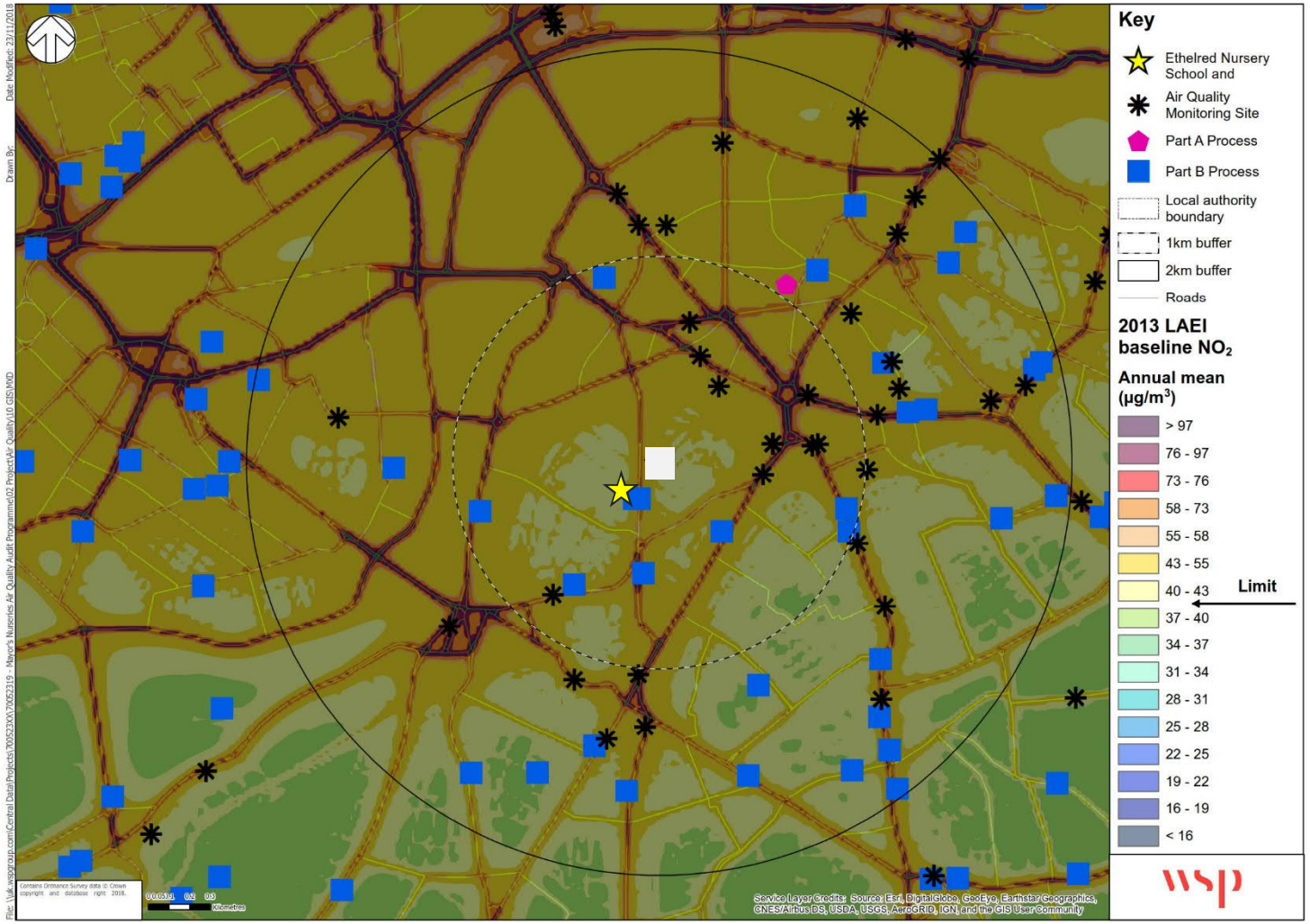
Figure 10 – Average Road Transport $PM_{2.5}$ Emissions by Vehicle Type (within 200m of nursery)



4.1.26. Figures 10-12 show the 2013 LAEI baseline annual mean NO_x, PM_{10} and $PM_{2.5}$ concentrations in within 2km of Ethelred Nursery School. The contours (changes in colours) show how the pollution gradient changes, with distance, away from the heavily trafficked roads and other key sources.

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

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

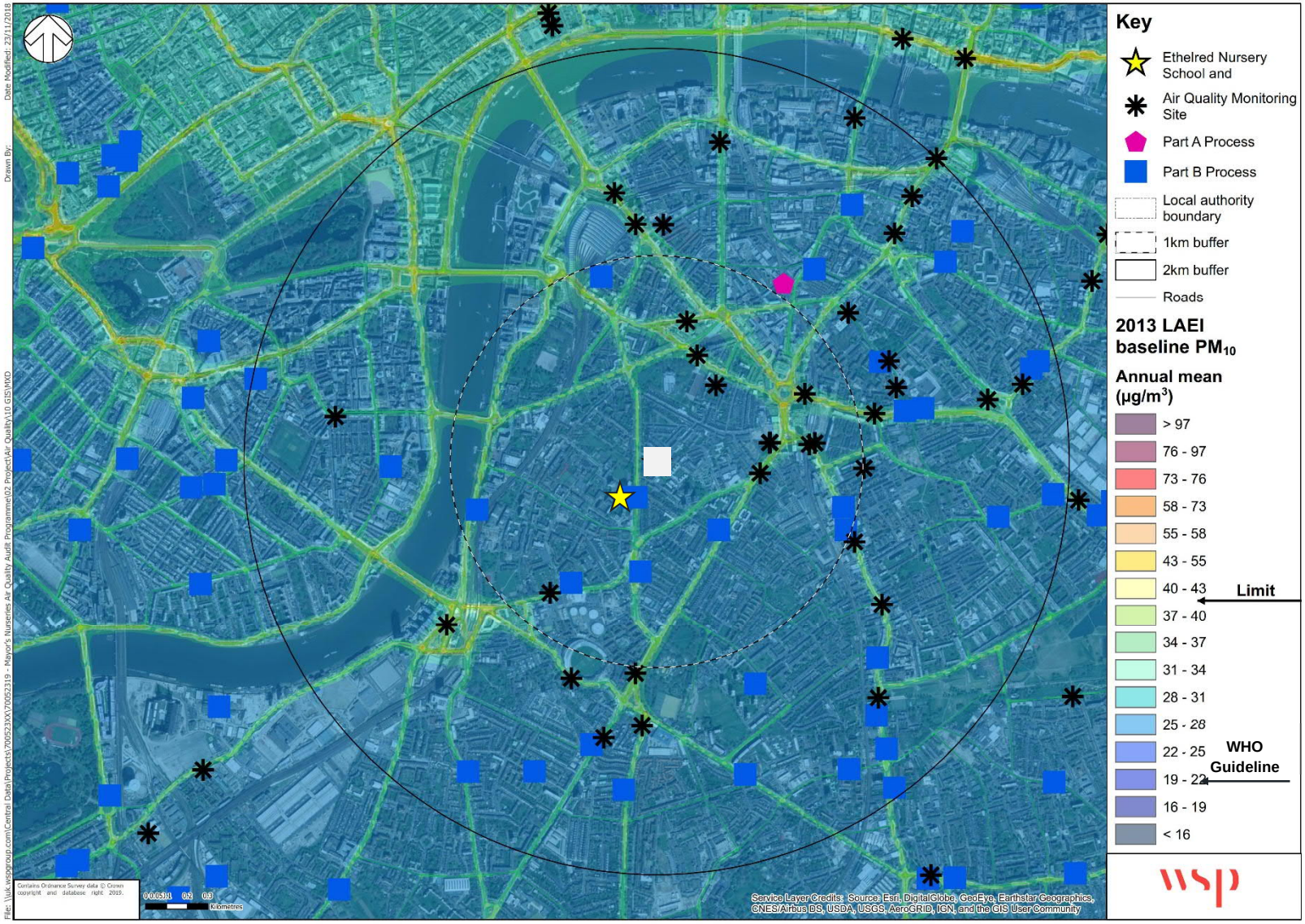
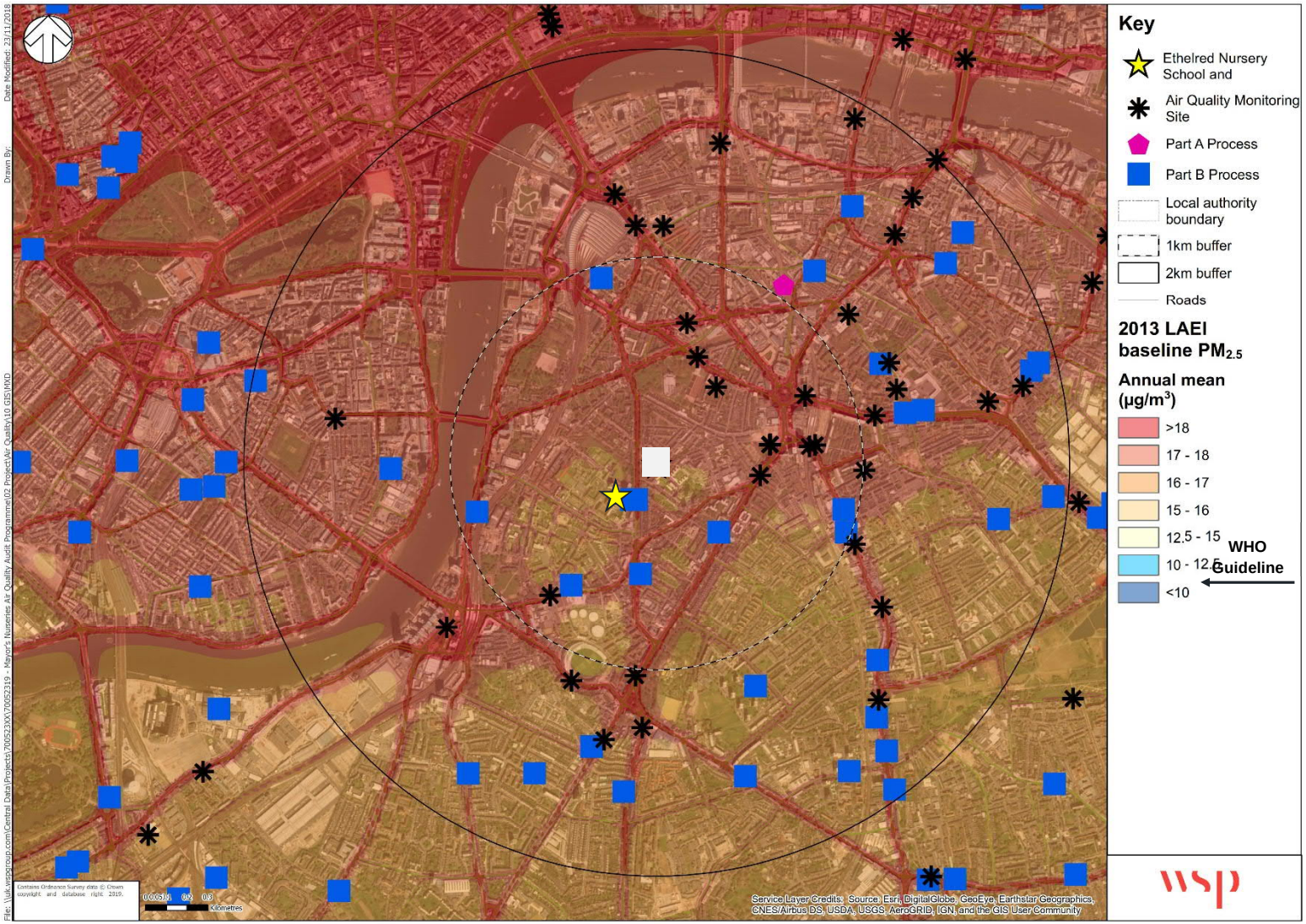


Figure 13 - 2013 LAEI Baseline Annual Mean $PM_{2.5}$ Concentrations within 2km of Ethelred Nursery School



4.2. HIGHWAYS – KEY OBSERVATIONS

4.2.1. The nursery is located a short distance (20m) from the **heavily trafficked** Kennington Road (A23), a wide four lane road carrying large volumes of cars, buses, vans and taxis. The road is a **key bus corridor** with up to 57 buses per hour at peak times, which contributes significantly towards local air pollution.

4.2.2. A **petrol station** is located immediately adjacent to the nursery, between the nursery building and the main road. The petrol station attracted a continual flow of vehicles stopping to refuel, particularly taxis and vans, and so is likely to contribute to an increase in local emissions. Petrol stations are also known to be a source of benzene, including the displacement of vapour from the storage tanks during delivery, from the pumps during refuelling, and through spillage and evaporative losses from storage tanks.

4.2.3. The **majority of children walk, scoot, cycle or travel by public transport** to the nursery, though a small number do travel in by car. There is parking to the rear to the nursery provided as part of the wider residential estate. No vehicle idling was observed, and this is not thought to be an issue amongst staff.

4.2.4. Parents and children approaching from the east must cross the busy Kennington Road. To the north of the Nursery there is a signalised crossing near Lollard Street. They must then cross the two wide entrances to the petrol station, with frequent traffic movements and exposure to the associated emissions. To the south there is an informal crossing and pedestrian refuge, or a signalised crossing at the junction with Kennington Lane. A number of pedestrians were observed crossing away from the formal crossings when there were gaps in the traffic, as there is no crossing on their desire line, and the pedestrian crossing have a long green stage for traffic. Consequently, the road poses a barrier to pedestrians, road safety risks, and **worsens exposure to emissions**.

4.2.5. For children approaching from the west through the estate, the barrier used to close off access to the turning space in front of the nursery also **obstructed scooters, bikes and buggies**.

4.2.6. It was evident there was **demand for additional cycle parking** locally, with a number of bikes secured to railings.

4.2.7. A group of parents and children were observed **waiting in an exposed area outside the front of the nursery** prior to its opening, with no shelter from some of the higher levels of emissions coming from the nearby by main road.

4.2.8. A number of vehicles were observed to mount the wide footway in front of Octavia House on Kennington Road, where a dropped kerb remains from prior to the redevelopment of the Estate site. Whilst this is only a small number of vehicles, this can result in vehicles coming into **conflict with children** on route to/from the nursery. Staff also notified us of occasional conflicts between children and parents and speeding cyclists on the Kennington Road.

4.2.9. At the time of the audit **construction work** was still ongoing across the wider Estate, of which the nursery is a part, including some of the outdoor spaces and footpaths. Additional construction was just beginning on the site of the former Youth Centre on Lollard Street, immediately to the north of the Nursery. Earth moving plant and vehicles were active on site, but there was no screening or cladding in place around the southern perimeter of the site, meaning the nursery was particularly exposed to dust and particulates. If unmitigated, construction sites also have the potential to generate high levels of dust from site clearance activities, e.g., demolition, and construction. Dust

and particulate matter is generated by mechanical wear, attrition and the handling of common building materials such as concrete, cement, wood, stone and sand.

4.2.10. Diesel engine exhaust emissions from construction vehicles, machinery and heavy equipment, known as **'Non-Road Mobile Machinery** (NRMM)' is another source of PM_{10} and $PM_{2.5}$ on construction sites. NRMM are a source of NO_x emissions, as well as other air pollutants.

4.2.11. Noxious vapours from oils, glues, thinners, paints, treated woods, plastics, cleaners and other hazardous chemicals that are widely used on construction sites, may also contribute to air pollution. NRMM use is regulated in London

4.2.12. A Combined heat and power (**CHP) facilities** is located immediately adjacent to the front of the Nursery, which generates both heat and electricity for the wider estate. In conventional power generation large quantities of energy in the form of heat are wasted. By using this technique, the total energy conversion efficiency can reach 90%. The vents for the CHP appear to be from the rooftop however and are well away from the nursery.

4.2.13. Staff also made the auditor aware of a **sewer** vent located close to the nursery entrance that was frequently a source of strong unpleasant odours.

Summary – Key Issues

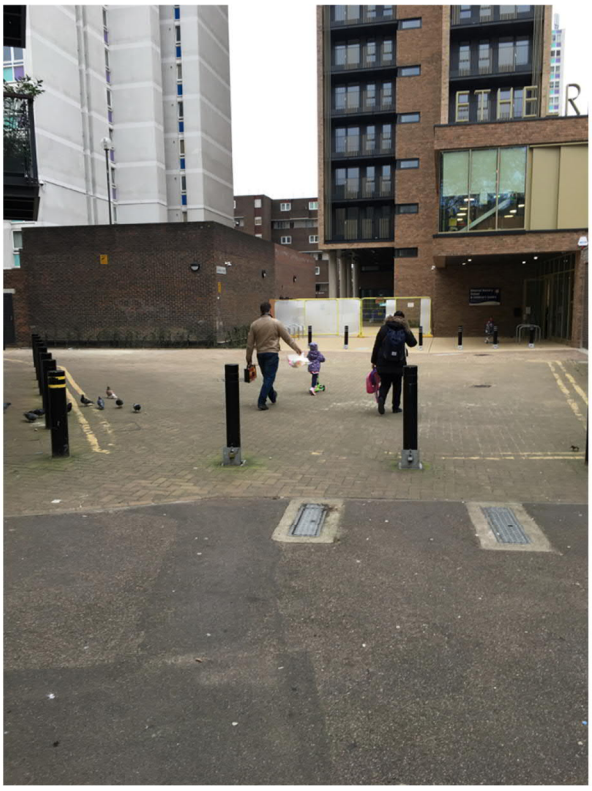
- Heavily trafficked road nearby with large numbers of taxis, buses and vans.
- Petrol station immediately adjacent to the nursery, which attracts large number of vehicles to stop for refuelling, and is a source of emissions in its own right.
- Construction activity around the nursery, with associated dust and emissions, plant and heavy goods vehicle movements.
- Some conflicts with pedestrians, and barriers posed by the main road, resulting in some unsafe crossing and road safety issues, potentially dissuading more travel by sustainable modes.
- 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.

High traffic volumes on Kennington Road (A23), including large numbers of buses and taxis, with a wide pavement used for parking by some vehicles.

Children crossing busy petrol station entrance next to the nursery.

Petrol station on Kennington Road immediately adjacent to the nursery

Estate car parking to the rear used by existing residents and parents dropping off children.



Parents approaching the nursery from the south. CHP site to the left.

Parents waiting in front on the nursery entrance prior to opening, exposed to emissions from the nearby Kennington Road.

4.3. NURSERY GROUNDS / BUILDING - KEY OBSERVATIONS

4.3.1. The nursery gates open at 0915. The morning session runs from 0915 until 1145. The afternoon session runs from 1245-1515. The full-time session runs from 0915 until 1515.

4.3.2. The nursery is housed in a new purpose-built building constructed in 2018, and integrated into part of a larger residential estate consisting of a number of tower blocks. The majority of the nursery building is two storeys with high ceilings.

4.3.3. The building wraps around a central courtyard which serves as the nursery playground. The playground is largely screened from the nearby Kennington Road by the high sided buildings around it, with the exception of a gap to the north where there is a gate onto Lollard Street, where construction work is currently underway. Lollard Street itself however is only lightly trafficked. There a number of planters with shrubs in the playground, and ivy has been planted at the base of the security fence on the western perimeter of the site.

4.3.4. There are two connected **under 3's classrooms** access from the reception area. Each opens out onto the central courtyard, and has its own external play area fenced off from main playground. The children typically free-flow between the classroom and the playground throughout the day, from 0945-1115 and 1330-1440, and come in for lunch breaks. The external doors are left open at these times. The classrooms each have large full height double-glazed windows and high ceilings, and finished to a high standard throughout.

4.3.5. The **over 3's classrooms** are located to the north of the site, and are also accessed via reception, with external doors leading to the **playground**. The children typically free-flow between the classroom and the playground throughout the day.

4.3.6. The first floor of the nursery is a Children's Centre, and used regularly to host training courses, and has a creche, which make use of a roof terrace. The roof terrace is located in the most polluted corner of the site, but is elevated and set back from the main road, and we understand is used infrequently by the children.

4.3.7. A lunch hall and kitchen are located at the far end of the building, accessed via the over 3's classrooms. The **nurseries kitchen** stoves had large modern hoods, and extract systems vent out onto through large ducts away from the building. There was some evidence of cooking odours in the nursery building away from the kitchen.

4.3.8. The nursery features a centralised ventilation system in the form of **Air Handling Units** (AHU's) which draw in and vent out air from the rooftop of the nursery. Consequently, the nursery is not reliant on opening doors and windows to ventilate the building, which would worse exposure to outdoor emissions sources. Furthermore, the AHU is fitted with **HEPA filter**s, which remove 99.95% of particles that have a size greater than or equal to 0.3 µm from the air drawn in to the ventilation.

4.3.9. Radiators in each classroom have **local thermostats and controls**, however teaching staff complained that classrooms were prone to **overheating**, and that explained that even when the heating is turned off radiators are still warm, and can lead them to having to open doors to cool the rooms. Staff also complained of **dry air**, which can be indicative of poor insultation. In the case of Ethelred Nursery, it is more likely to be a consequence of the doors being open and letting in lots of cold air, which holds less moisture than warm air.

4.3.10. The staff advised that the head teachers office and admin offices which back onto the petrol station can be prone to **petrol odours** on occasion.

4.3.11. The nursery roof is equipped with **photovoltaics** and supply clean electricity to the nursery.

4.3.12. There is a storage area for **buggies/ scooters and children's bikes accessed via an external door from the reception area.** The buggy store appeared well used and nearly full on the day of the audit. There were also some cycle hoops provided outside the main entrance. The council staff attending felt the provision did not comply with the terms of the planning permission, and that more cycle parking should have been provided off-site, to lessen the room taken up on site.

4.3.13. The nurseries **plant room** is located on the western side of the site, and contains a tank room, electrical switch room, linked up to the nearby CHP site.

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

4.3.15. 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 off the premises office, which is not accessible to the children.

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

4.3.17. The **classroom floors** comprised lino or vinyl. The rooms are **furnished** with items made from a variety of materials including plastic, metal, and some soft furnishings. The nursery building contained only a limited number of **green plants**.

Summary – Key Issues

- The building was only recently constructed and completed to a high standard, and benefits from centralised ventilation in the form of Air Handling Units with HEPA filters.
- The playground and external classroom doors are largely screened from major nearby emissions sources, though a section of the playground is partially exposed to the nearby construction site on Lollard Street.
- Some incidences of overheating, dry air and odours from kitchens and nearby petrol station.
- Children's Centre first floor terrace is located at end of the site more exposed to emissions from Kennington Road, though we understand it is used infrequently.
- Buggy and scooter parking space is limited, and there may have been an under provision relative to the terms of the planning permission.

Air Handling Units with HEPA filters

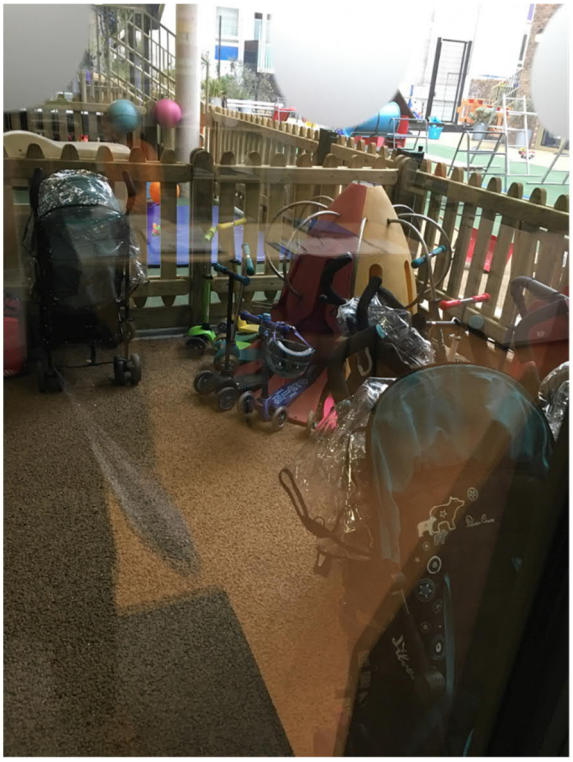
Centralised mehanical ventilation throughout the building

Photovoltaics on the nursery roof

Construction site on Lollard Street opposite the nursery

Nursery playground and the gap in the buildings otherwise screening it from nearby roads

Under 3's classroom external door onto playground

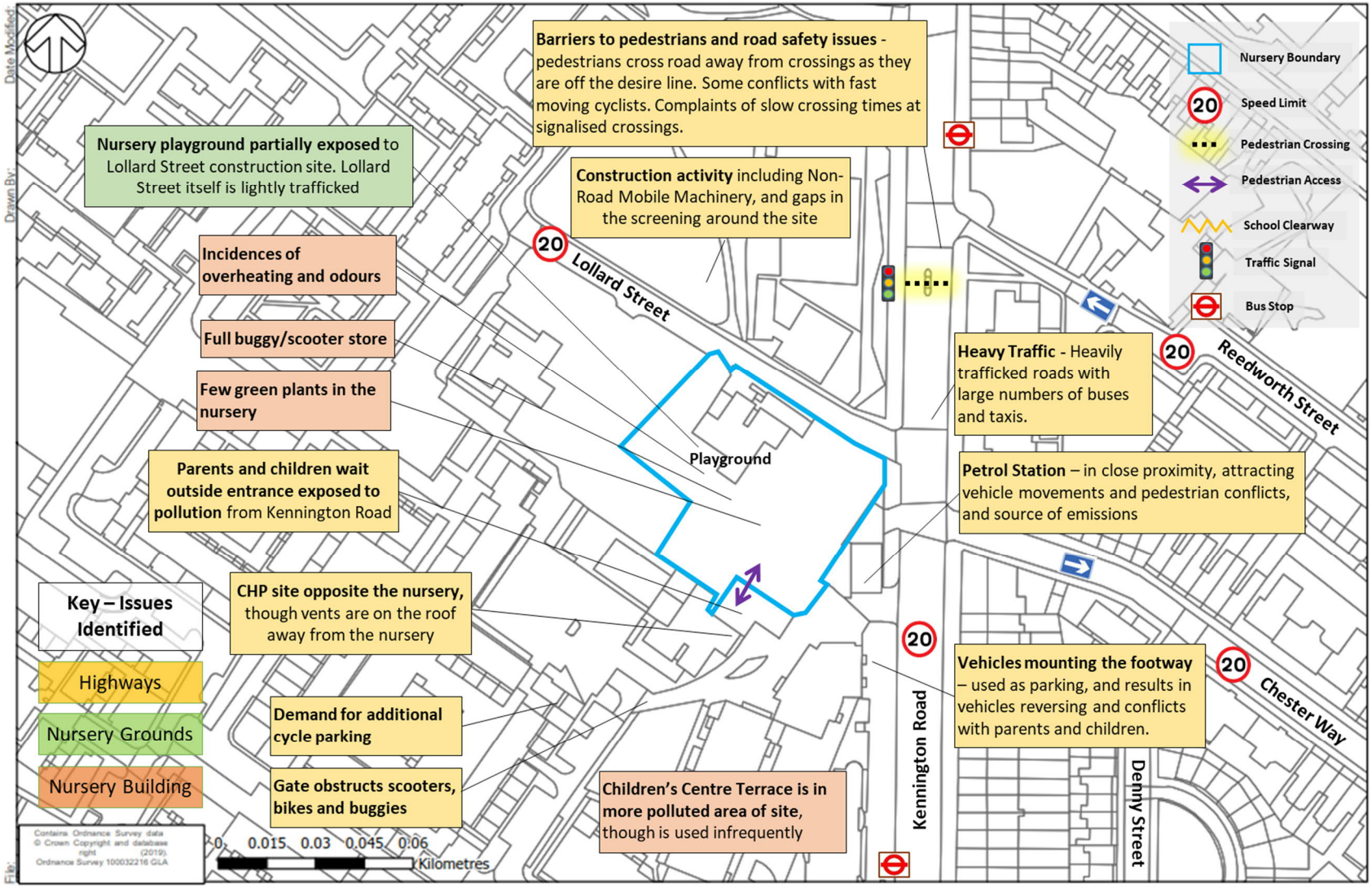


Buggy and scooter store

Radiator in Over 3's classroom

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, TfL)*																
1	Improve pedestrian crossings	Review current pedestrian crossing facilities in the vicinity on Kennington Road to see if additional crossings can be provided to discourage unsafe crossing on desire lines. Review scope for reducing wait time at existing crossings, to lessen time spent at the roadside and exposure to emissions. Kennington Road is a TLRN route so these measures would have to be approved by TfL	Promoting walking, scooting and cycling by providing improved local conditions	X			▪ Road safety		X			X			X	
2	Restrict footway parking	Consider proactive enforcement or introducing bollards or planters to prevent unsafe parking on the footway from Kennington Road in front of the nursery, to reduce conflicts with children and reversing vehicles. It will be necessary though to establish that the access is not required for emergency access. Kennington Road is a TLRN route so these measures would have to be approved by TfL	Reduce sources and exposure	X			▪ Road safety	X				X		X		
3	Reducing construction related emissions	Enforce requirements to erect cladding/ screening around the construction site opposite the nursery. Future freight / construction vehicles associated with new developments can be required to use only Euro 6 compliant vehicles and ULEVs as they become available, with consolidation of trips and re-timing of deliveries to off-peak periods as part planning permissions. Construction Logistics Plan (CLPs) guidance could ensure construction vehicles avoid nursery start / finishing times.	Reduce sources and exposure	X			▪ Road safety	X				X			X	
4	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	
5	Additional parking charges for more	Consider introducing surcharges on top of existing parking charges for more polluting vehicles. A trial in Westminster found that the number of dirtier diesel vehicles using the parking bays dropped by 12%. The revenue raised can be used to contribute towards measures to improve air quality.	Reduce sources and exposure			X			X			X		X		

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
	polluting vehicles															
6	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. It is though noted that depending on when planning permission was granted, an NRMM condition may not be on the planning decision notice for the nearby site.	Reduce sources of emissions	X			▪ Reduced noise	X			X				X	
7	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	
8	Review Planning Processes for Nursery Sites	Review the current planning processes to ensure air quality officers have the opportunity to review and advise over the location of a nursery site, particular when a proposed site is in close proximity to a petrol station.	Reduced exposure	X				X			X					X
9	Promote sustainable transport, travel demand management and low emission vehicles	Promote a shift towards the use of sustainable modes of transport, including walking, cycling, public transport, car clubs and low emission vehicles, as well as travel demand management, with supportive measures such as improved cycle infrastructure, electric vehicle charge points and car club bays.	Reduce sources of emissions	X			▪ Promotion of sustainable travel	X			X				X	
10	Additional cycle parking	Consider introducing additional cycle parking or hangers to cater for demand in local area (for use by local residents/ visitors), where bikes are currently locked to fencing.	Promoting walking, scooting and cycling by providing	X			▪ Promotion of sustainable travel	X			X				X	

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
			improved local conditions													
Nursery Grounds *(Key Stakeholder: Nursery/ Borough)*																
11	Introduce Green screening around Nursery Entrance	Introduce green screening or a barrier to lessen exposure for parents and children waiting for the nursery to open, who are currently exposed to the emissions from traffic on the nearby Kennington Road. This would need to be vandal proof. Alternatively, parents and children could be permitted to enter building earlier, but this may entail additional staffing costs to supervise, if for example parents/ children were to be allowed to wait in the playground. 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.	Reduce exposure	X			▪ Visual amenity	X			X			X		
12	Additional buggy/ scooter/ cycle parking	Introduce secured scooter and cycle parking spaces at entrance the site near the reception entrance, to encourage sustainable / healthy travel behaviour.	Reduce sources of emissions	X			▪ Promotion of sustainable transport	X				X			X	
13	Green Screening	Consider installing sections of green screening/climbers around the southern flank of the Children's Centre terrace on the first floor. It is noted however that this space was not used regularly at the time of the audit, so may not be a priority.	Reduce exposure to emissions	X			▪ Visual amenity ▪ Security, privacy		X			X			X	

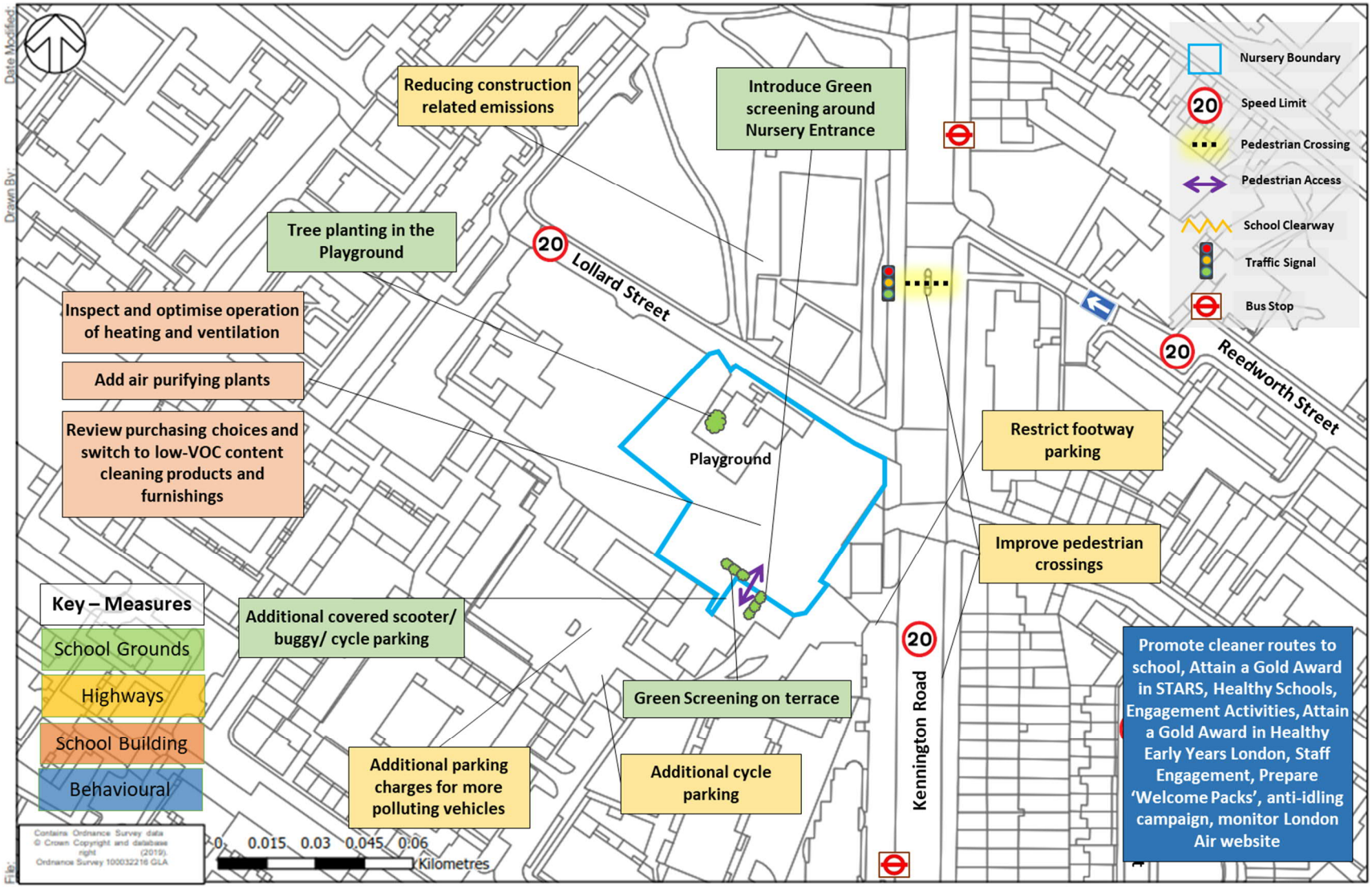
Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
14	Tree planting in the Playground	Consider planting a tree and shrubs in the playground to provide some additional screening from the nearby roads where there is a gap in buildings surrounding the playground. Ongoing maintenance for Green Infrastructure, plants and trees would also need to be considered.	Reduce exposure to emissions	X			▪ Visual amenity ▪ Security, privacy	X				X				X
Nursery Building *(Key Stakeholder: Nursery/ Borough)*																
15	Inspect and optimise operation of heating and ventilation	Review the operation of the exiting heating and ventilation systems to establish the cause of the reported issued with overheating, unresponsive heating controls and kitchen/ petrol station related odours permeating some of the class rooms. More effective and efficient heating would lessen incidences of winter overheating that result windows and door being opened and worsening exposure to pollution from the nearby roads.	Reduce sources and exposure	X					X			X			X	
16	Add indoor plants	Consider deploying additional air purifying plants. Whilst the research to date is inconclusive, and further testing is required, some studies have found certain house plants can remove CO_2, and that the growing substrate, and the microorganisms within, are involved in the removal of pollutants. A limitation is that tests often include a greater number of potted plants than would be feasible indoors to achieve measurable concentration reductions, so the density provided by green walls may be more suitable, and studies are now beginning to investigate green walls and, additionally, how the substrate may influence removal – as measured with VOCs. (University of Birmingham and the Royal Horticultural Society). Plants also have a number of wider health benefits, including promoting reductions in stress. https://www.cibsejournal.com/technical/plants-as-a-building-service/ provide	Reduce exposure to emissions	X			▪ Improved learning environments ▪ Visual amenity	X			X					X
17	Review purchasing choices and switch to low-VOC content furnishings	Ensuring that when introducing new furniture, the use of hazardous compounds and residues is limited. Review purchasing choices and switch to low-VOC content furnishings, including pre-owned furniture, and following schemes such as the EU Ecolabel, or a UK specific version if introduced as referenced in DEFRA's Clean Air Strategy 2019.	Reduce sources and exposure	X				X				X			X	
18	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	

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
Behavioural Measures *(Key Stakeholder: Nursery/ Borough)*																
19	Promote cleaner routes to the nursery	Encourage parents to approach the nursery along less polluted routes, for example taking parallel routes to Peckham High Street where possible. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots	Reduce exposure	X			▪ Awareness raising	X			X				X	
20	Prepare 'Welcome Packs' for new pupils / parents	Prepare 'Welcome Packs' for new pupils / parents that includes the promotion of apps / sites such as 'www.walkit.com' to a) promote walking to / from the nursery and b) promote the suitable walking routes to avoid air pollution hotspots.	Reducing sources and exposure	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
21	Achieve Gold accreditation in STARS	Strive for gold status, which would entail achieving a range of measures promoting active travel and reduced emissions, also signposting additional initiatives and avenues of support. The framework also helps document and track progress, and implement recommendations.	Behavioural measures / reducing exposure to emissions	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
22	Engagement Activities	Deliver air quality related activities to raise awareness of the issues, and the type of measures that can have a positive impact on reducing poor air quality	Awareness raising and behavioural measures	X			▪ Awareness raising ▪ Secure community buy-in for measures	X			X					X
23	Attain a Gold Award in Healthy Early Years London scheme	By achieving a gold award as part of the Healthy Early Years London scheme, the nursery will have supported a wide range of measures to promote active travel, receiving air quality alerts, and sustainability related activities amongst parents and carers, many of which contribute towards improved air quality.	Behavioural measures / reducing exposure to emissions.	X			▪ Awareness raising ▪ Supports STARS and HSL objectives	X			X					X
24	Staff Engagement	Awareness raising session amongst staff about air pollution, ventilating and heating the classrooms, lessening the children's exposure.	Awareness raising and behavioural measures	X			▪ Awareness raising	X			X					X

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
25	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
26	Managing art and craft materials	Art and craft materials could be separated from wider classroom activities, undertaken in separate rooms or well-ventilated areas, reducing exposure by the children.	Reduce exposure	X				X			X				X	
27	Cleaning practices to reduce VOC	Training of cleaners to reduce detergent use, avoid use of cleaning solvents within classrooms, encourage ventilation of classrooms post cleaning to purge residual VOCs.	Reduce exposure	X				X			X				X	
Wider Measures *(Key Stakeholder: Borough/ TfL/ GLA/ Central Government)*																
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):

- **Introduce Green screening around Nursery Entrance** – introducing green screening or a barrier to lessen exposure for parents and children waiting for the nursery to open, who are currently exposed to the emissions from traffic on the nearby Kennington Road. This would need to be vandal proof. Alternatively, parents and children could be permitted to enter building earlier, but this may entail additional staffing costs to supervise, if for example parents/ children were to be allowed to wait in the playground. A dense vegetation layer with a high leaf density can as much as halve the levels of pollution just behind the barrier, though the benefit tails off with increasing distance. The benefit is mainly attributable to their effect on dispersion, though the deposition of some pollutants onto the leaf surfaces from air that passes through the vegetation will also have a small but beneficial effect. A study by Kings College London assessed the efficacy of green screens in preventing vehicle emissions from nearby roads reaching school grounds, through the installation of an ivy screen. In this instance the screen was found to be an effective pollution barrier, once the ivy had started growing and a significant impact could be seen once the screen had matured. It led to a decrease in the pollution concentrations on the playground side by 23% for NO2 and 38% for PM10. Green screens also provide aesthetic benefits as well as increased privacy, biodiversity and noise reduction. The screens can be planted directly into the ground or into planters and are maintained with the option of a drip line irrigation system. It should be noted however that the same level of reduction would not necessarily be achieved in each instance, as the local conditions and designs are specific to each site. It should be noted that green screens need ongoing maintenance.
- **Encourage parents to approach the nursery along less polluted routes**, for example taking parallel routes to Kennington Road where possible. This can have a real impact on short-term exposure and is something that parents can be proactive with. The nursery could promote apps / websites such as 'www.walkit.com' to a) promote walking, and b) promote the suitable walking routes to avoid air pollution hotspots. The preparation of 'Welcome Packs' for new pupils / parents would also help promote these routes.
- **Reducing construction related emissions** – including enforcement of the requirements to erect cladding/ screening around the construction site opposite the nursery to act as a barrier to dust and particulates. Future freight / construction vehicles associated with new developments can be required to use only Euro 6 compliant vehicles and ULEVs as they become available, with consolidation of trips and re-timing of deliveries to off-peak periods as part planning permissions. Construction Logistics Plan (CLPs) guidance could ensure construction vehicles avoid nursery start / finishing times.
- **Tree planting in the Playground** - Consider planting a tree and shrubs in the playground to provide some additional screening from the nearby roads where there is a gap in buildings surrounding the playground. This will also provide added visual amenity and privacy from the roadside and adjacent apartments. Ongoing maintenance for Green Infrastructure, plants and trees would also need to be considered.

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. Ethelred Nursery School has achieved Bronze 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.

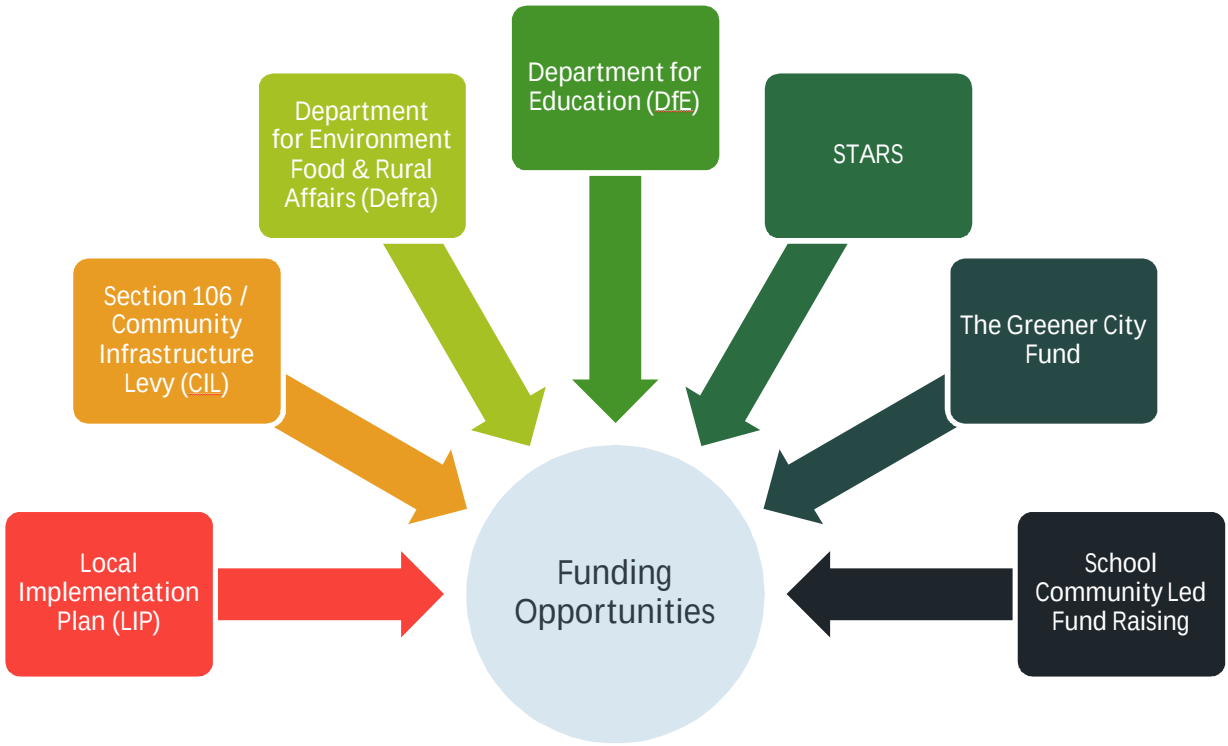
5.7.4. HEYL complements and enhances the statutory Early Years Foundation Stage (EYFS) framework, providing further focus on children, families and staff health and wellbeing. There are 4 levels of Awards: HEYL First Steps, Bronze, Silver and Gold. HEYL can be used as an improvement tool to support practice 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.[14] Groundwork London's Our Space award[15] offers grants between £500 and £5,000.

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

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

[15] 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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