MAYOR OF LONDON

The Mayor of London's Nursery Air Quality Audit Programme

*K*intore Way Nursery School and Children's Centre, London Borough of Southwark

FEBRUARY 2020

CONTENTS

TABLES

FIGURES

THE MAYOR'S NURSERY AIR QUALITY AUDIT PROGRAMME

Kintore Way Nursery School – London Borough of Southwark

ACKNOWLEDGEMENTS & CONTRIBUTIONS

Kintore Way Nursery School – Rebecca Sherwood (Executive Headteacher), Joy Ross (School Business Manager)
London Borough of Southwark – Bill Legassick (Air Quality Officer), Gary Douglas (School Transport 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, Auditor, Project Director, WSP
Matt Croucher, Sustainable Transport, Project Manager, WSP
Justin Lingard and Peter Walsh, Air Quality, WSP
Alessandro Ciampechini and Andrew Marsh-Patrick, Sustainable Places & Energy, WSP

COPYRIGHT

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 ©

Copies of this report are available
from www.london.gov.uk

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** (**50µg/m³**), with local road traffic emissions contributing significantly to roadside concentrations.

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

NO_2 concentrations fall to **33µg/m³** in the **playground**, which is screened from traffic by the road facing nursery building. Concentrations at the **nursery entrance** were higher (**41µg/m³**) than in the

playground. Whilst some concentrations were found to be below national legal limits, known as Air Quality Objectives, there is no 'safe' level and children would still benefit from further reductions. Children will also be adversely affected by their journeys to and from nursery. **Inside the nursery**, the indoor concentrations fall to between **20-26µg/m^3**.

Volatile Organic Compounds (VOCs) are emitted from vapours arising from petrol and solvents. In a nursery setting these are likely to originate from a wide variety of products, including furnishing, carpets, upholstery, cleaning products and air fresheners. In the UK, building regulations recommend total Volatile Organic Compounds (TVOCs) concentrations should be below 300 µg/m^3. In the nursery they were found to be **57 µg/m^3**.

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 for short and long-term exposures to formaldehyde is 100 µg/m^3. In Kintore Way they were found to be **17 µg/m^3**.

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

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

Particulate Matter (PM_{10} and $PM_{2.5}$)[1] 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 **6,900 vehicles per day travel** within 200m of the nursery. **Buses** make up only **4%** of these **vehicle** movements, but contribute **22%** of the transport related **NO_x emissions** locally. **HGVs** only account for **8%** of the total **traffic** but contribute **39%** of **NO_x emissions**. Cars account for 25% of emissions.

Key observations – summary of issues

- Drop off activity in the side road next to the nursery creates air quality issues and road safety issues
- Heavily trafficked roads nearby (Grange Road and Dunton Road) with some traffic congestion

[1] 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).

- Nursery entrance fronts onto the main road
- Some issues with drop off activity in the loading bays near to the nursery
- Some idling activity close to the nursery
- The building is reliant on natural ventilation and the opening of windows in the sensory room and to a lesser extent the classroom by the side road will increase emissions levels
- The boiler trends board is corrupted and therefore does not link to the thermostat
- Whilst below legal levels, the emissions levels in the playground are high
- The parking area for scooters and bikes does not have a fixed storage system and is not covered
- The insulation lagging on the kitchen exhaust vent is coming away
- There is a lack of green plants within the building
- There is a relatively small coverage of greening and trees in the playground
- Emissions in the classroom may increase in the summer months due to the opening of the butcher's curtains to provide cooling.

Audit Recommendations

Based on the preceding desktop research, site audits and stakeholder feedback, a range of **recommended measures and initiatives** have been identified to deliver improvements to air quality, both indoor and outdoor, and reduced exposure to air pollution. See Table 4 for full list of measures. Some of the more key measures were considered to be:

- **Install demountable bollards and continuous ('blended') crossing** on the side road next to the nursery to minimise drop off activity. Create a 'continuous crossing' by continuing the footway material across the side road and continuing the edge of footway kerb across the side road. Continue the double yellow lines on the carriageway across the side road. This will stop parents from parking on the side road and will deter them from parking on the main road.
- **Improve ventilation for the sensory room** - the sensory room fronts onto the main road. Ventilation is poor and therefore the windows need to be opened. This lets in pollution which the monitoring shows to be high. There is an opportunity to knock through to the next-door room. The adjoining wall is not a supporting wall so the cost would be relatively low.
- Add **free standing planters on footway** near to nursery entrance - approximately 10m either side of the tree outside the nursery entrance. This will help to reduce exposure to the high level of emissions that the monitoring showed to exist outside the entrance.
- **Playground greening** - the monitoring results showed that the NO_2 emissions levels in the playground are relatively high. Consideration should be given to introducing additional trees and planting in the playground to reduce exposure to emissions.
- Introduce a **fixed storage system** and **cover** for the **scooter and cycle parking area** - this area would benefit from the introduction of a fixed storage system and an overhead cover to protect the area from the elements.
- '**Parents Handbook'** - prepare a 'Parents Handbook' for new parents/ pupils that contains information about pollution issues and how they can help to reduce the sources and exposure to emissions.

Next Steps

In working with the nursery and air quality and transport borough officers to complete the air quality audit, we found there to be a passionate group of individuals, who were enthusiastic about improving local air quality for the children, and the wider community as a whole.

The **borough and nursery should investigate the scope for rapidly delivering key measures** from the recommendations.

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

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

Summary of Nursery-related recommendations

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

Nursery Grounds

Playground Greening
Introduce fixed storage system and cover for scooter and cycle parking area

Nursery Building

Replace boiler trends board
Improve ventilation for sensory room
Air Filtration Systems
Replace insulation on kitchen pipe
Add indoor plants
Review purchasing choices and switch to low-VOC content furnishings
Switch to lower VOC cleaning products

Behavioural Measures

Achieve Bronze accreditation in STARS
Engagement and Awareness Activities
Gain accreditation on Healthy Early Years London scheme
Staff Engagement
Prepare 'Parents Handbook' for new parents/ pupils
Anti-idling campaign
Promote cleaner routes to the nursery
Managing art and craft materials
Cleaning practices to reduce VOC
Monitor London Air website / app

1. INTRODUCTION

1.1. BACKGROUND

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

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

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

Why Nurseries?

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

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

The Mayor's Nurseries Air Quality Audits

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

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

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

Schools.[2] 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[3]. 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

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

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

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

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

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

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

1.2. OBJECTIVES

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

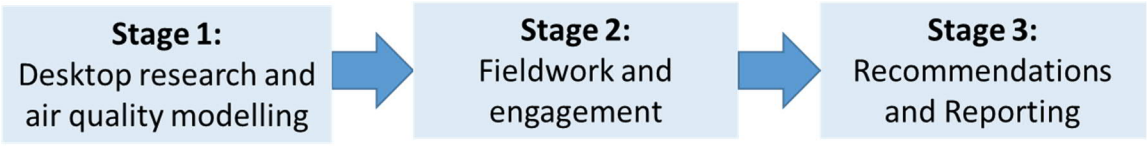
- Audit and identify the sources of poor outdoor air quality and exposure by children at 20 state-funded nurseries and their surrounding nursery catchment areas, including NO_2, PM_{10} and $PM_{2.5}$.
- Audit and identify the sources of poor indoor air quality and potential exposure by children attending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

2. AUDIT APPROACH

2.1. OVERALL AUDIT APPROACH

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

Figure 1 – Overview of Approach



2.1.2. Each audit consists of broadly three key stages:

Stage 1: Desktop research and air quality modelling

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

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

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.

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 – KINTORE WAY 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	Friday 11th January 2019	
Nursery Representatives	Rebecca Sherwood (Executive Headteacher), Joy Ross (School Business Manager)	
Borough Representatives	London Borough of Southwark – Bill Legassick (Air Quality Officer), Gary Douglas (School Transport Officer), Paul Newman (Principal Environmental Health Officer), Councillor Richard Livingstone	
WSP Auditors	Glenn Higgs	
Itinerary	**Timings**	**Description**
	0845 - 0915hrs	Initial observations and site familiarisation by WSP auditors
	0915 – 0930hrs	Site walk and observations with borough air quality officers/ school transport officer/ nursery staff
	0930 – 1015hrs	Audit of building and grounds to appreciate the layout of the building/playgrounds etc. accompanied by the bursar/caretaker
	1015 – 1115hrs	Brainstorming Workshop with key staff from the nursery and borough officers.
	1115 - 1200hrs	Further observations and completion of site audit template

3. CONTEXT AND INITIATIVES

3.1. NURSERY CONTEXT

Borough: Southwark

Address: Grange Road, SE1 3BW

Pupil Numbers: 260

Age Range: 2-5 years

Gender: Mixed

Type: Local authority nursery school

Deprivation Rank: 3

Children who speak English as an additional language:

Higher than average

Children with disabilities or special educational needs:

Higher than average

3.1.1. **Kintore Way Nursery** is located in South London and lies within the London Borough of Southwark.

3.1.2. At the time of the audit the nursery had **262 children and 60 staff**.

3.1.3. The main entrance is on **Grange Road**, a 20-mph street.

3.1.4. Approximately **6,900 vehicles per day travel** on the core roads within a 200m radius of the nursery[4]. This is within the last quartile in terms of traffic volumes amongst of the 20 nurseries assessed as part of this programme. For context, in the UK in 2017[5] the average traffic flow on urban minor roads was 2,100 vehicles, and 19,200 vehicles on an urban A-road.

[4] 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.

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

3.1.5. Regarding the **mode of travel** to the nursery, it was confirmed at the audit that a recent hands-up survey showed around 49% of children walk to the nursery, 19% drive by car, 16% use public transport, 7% scoot and 4% of parents choose cycling as a mode of transporting their children to school. 5% use other modes. It is thought that around 10% of teachers drive to the nursery.

3.1.6. The nursery opening time for pupils is 9:00am, with a cut off at 9:20am. Compared to other nurseries this is relatively late, the reason being that lots of siblings attend St. James' CE Primary School nearby and parent drop children off there first.

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.

Figure 2 – Outer Context Plan

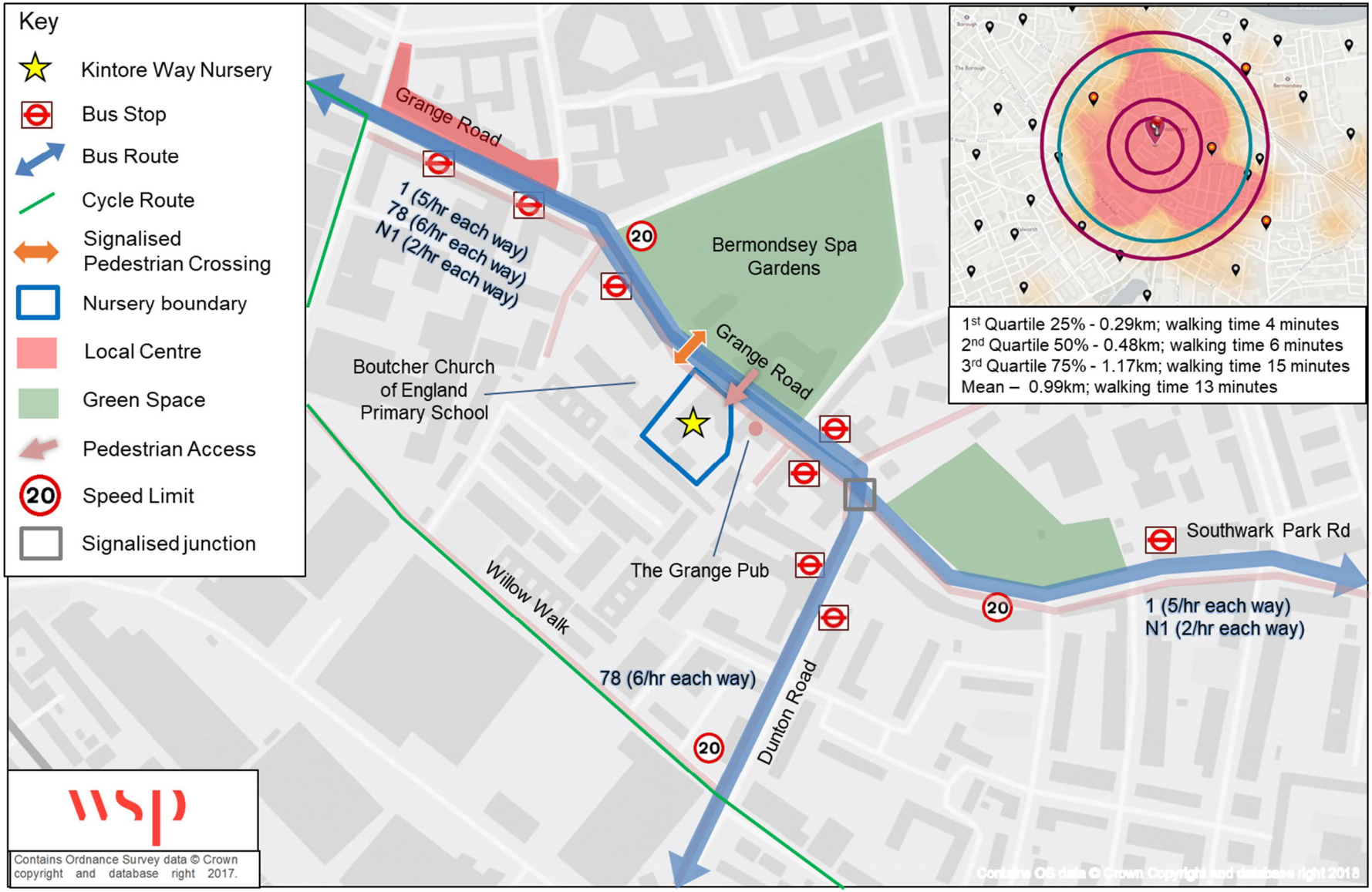
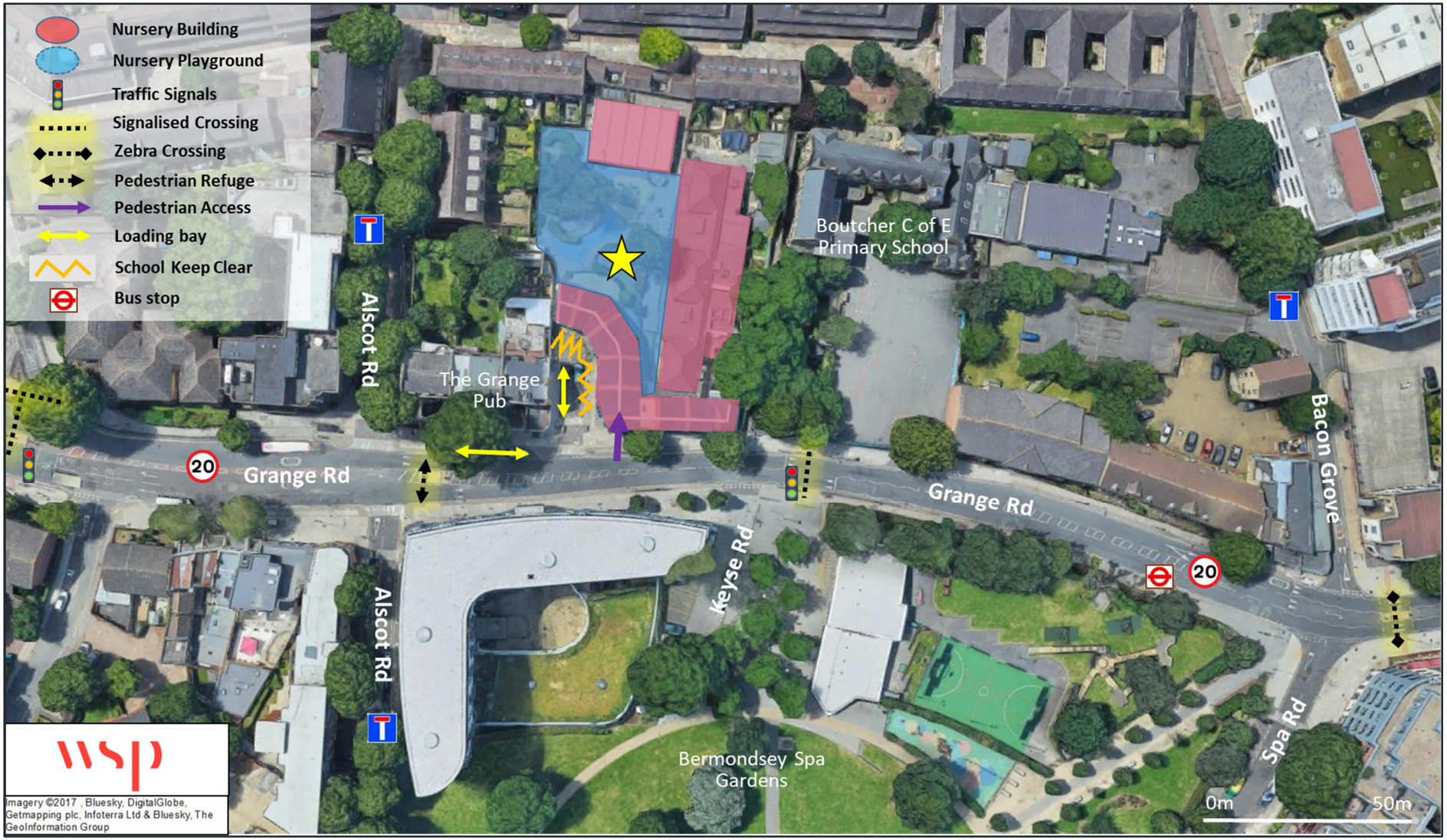


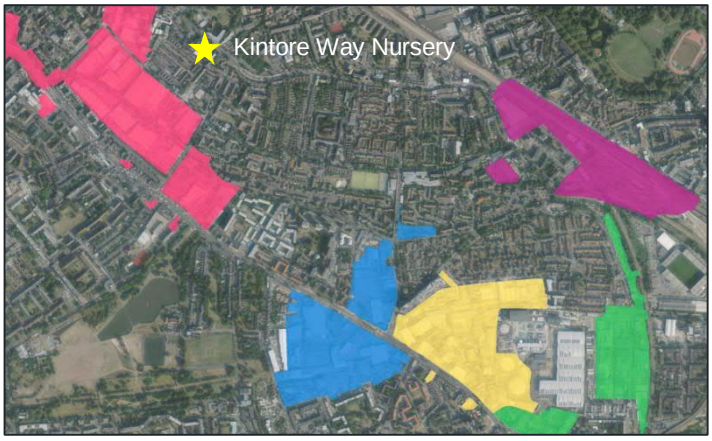
Figure 3 – Inner Context Plans



3.2. PLANNED SCHEMES & RECENT INITIATIVES

DEVELOPMENT SCHEMES

OLD KENT ROAD OPPORTUNITY AREA



3.2.1. Old Kent Road is one of several areas in London which were designated as Opportunity Areas in the London Plan. This means that they have been identified as places which can accommodate significant growth in housing and other land uses.

3.2.2. Over the next 20 years the area will undergo a dramatic transformation with the development of 20,000 new homes, 10,000 new jobs, new tube stations as part of the Bakerloo Line extension as well as new schools, a health centre, parks, shops and a sports centre.

3.2.3. As shown in the diagram above, Kintore Way Nursery is located just to the north of the Mandela Way and Crimscott Street zone of the Opportunity Area. The plans for this zone are new homes around a new park, a new primary school and a mix of new employment spaces.

Potential impacts of development on Kintore Way Nursery:

- Air pollution associated with construction activity on the site
- Air pollution, noise and road safety issues associated with construction traffic
- Potential for additional traffic once completed

LOCAL SCHEMES

BAKERLOO LINE EXTENSION

3.2.4.

3.2.5. Transport for London are proposing to extend the Bakerloo Line to Lewisham, serving Old Kent Road and New Cross Gate. The extension will improve connectivity, increase the capacity and resilience of the transport network and reduce journey times between key destinations. This will help London to grow by supporting new homes and jobs, particularly in the Old Kent Road Opportunity Area.

3.2.6. The nearest of the three-new stations would be at the Bricklayers Arms, around 10 minutes' walk from Kintore Way Nursery.

Potential impacts of the tube extension on Kintore Way Nursery:

- Benefits of better accessibility by public transport from those travelling from further away

3.2.7. The plans have been consulted on and discussions are ongoing regarding if/ when to progress with the scheme, including whether to include the Bricklayers Arms station as part of the tube line extension. If it goes ahead then it is due to be implemented by 2029.

3.2.8. **ANTI IDLING ENFORCEMENT**

3.2.9. In January 2018, LB Southwark introduced an initiative to enable Council parking enforcement officers to issue an £80 penalty charge notice to motor vehicles who refuse to switch off their engines when asked.

3.2.10. The Council has also led and encouraged a number of voluntary anti-idling patrols at known idling hot-spots to raise driver awareness of the health risks associated with engine idling.

Potential impacts of the initiative on Kintore Way Nursery:

- Powers in place and a programme of support from volunteers to mitigate issues with idling if required

3.2.11.

3.2.12.

WIDER SCHEMES

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

3.2.13. 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.

3.2.14. 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 13 per cent less harmful nitrogen oxide (NOx) from road transport in the borough from 2021.

Impact of scheme:

- Reduced air pollution as more polluting vehicles are discouraged from travelling in the ULEZ.

LOW EMISSION BUSES

3.2.15. Since 2018, all new double deck buses are hybrid or zero emission. The Mayor has also launched an £85m programme to upgrade around 5,000 buses so that the entire fleet meets the Euro VI emissions standard in 2020. Around 75 per cent of all TfL buses – including all buses operating in the ULEZ – now meet or exceed the strict ULEZ emission standards. By October 2020 every TfL bus in London – over 9,000 buses - will meet or exceed the ULEZ standards. This will mean that next year the entire city will become a Low Emission Bus Zone.

3.2.16. Twelve new low Emission Bus Zones are being introduced in areas where Londoners are exposed to some of the highest levels of nitrogen dioxide pollution. The Mayor has completed ten of these zones, reducing NOx emissions from buses by an average of 90 per cent along some of the capital's most polluted roads. The Mayor will complete delivery of all 12 routes ahead of schedule in 2019 rather than 2020. Bus route 78, which travels pass the nursery, will need to be a low emission bus as it crosses the Camberwell to New Cross low bus emission zone shown in the image above.

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

MAYOR OF LONDON'S SUPPLEMENTARY PLANNING GUIDANCE FOR THE CONTROL OF DUST AND EMISSIONS DURING CONSTRUCTION AND DEMOLITION

3.2.17. This Supplementary Planning Guidance (SPG) establishes best practice in mitigating impacts on air quality during construction and demolition work. It incorporates detailed guidance to address emissions from Non-Road Mobile Machinery (NRMM), which includes generators and construction equipment.

3.2.18. NRMM used on construction sites in Greater London must meet emission standards for NO_x and particulate matter. All eligible NRMM must meet the required emissions standards, unless it can be demonstrated that it is not feasible. Developers are required to provide a written statement of their commitment and ability to meet the policy within their Construction and Demolition Air Quality Statement and Environment Management plans.

3.2.19. The SPG provides a methodology for assessing the potential impact of construction and demolition activities. It then identifies the relevant controls and mitigation measures that should be put in place to minimise any adverse impacts, formalised as an Air Quality and Dust Management Plan.

Impact of scheme:
- Reduced air pollution from construction sites.

NURSERY STARS ACTIVITIES

3.2.21. 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.

3.2.22. 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. Nurseries can achieve bronze, silver or gold level STARS accreditation.

3.2.23. Kintore Way Nursery does not currently hold STARS accreditation. However, the nursery is aiming to gain Bronze level accreditation in June or July 2019. It should be noted that Kintore Way Nursery is currently working with Southwark Council to complete its School Travel Plan for this year.

Impact of scheme:
- More sustainable travel which can lead to a reduction in transport-related pollution.

HEALTHY SCHOOLS LONDON

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

HEALTHY SCHOOLS LONDON

3.2.25. Kintore Way Nursery is currently Bronze accredited with the Healthy Schools programme.

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

4. AIR QUALITY AUDIT FINDINGS

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

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

4.1. BASELINE AIR QUALITY

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

NURSERY AIR QUALITY MONITORING

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 Sheringham Nursery, five NO_2 diffusion tubes, one formaldehyde diffusion tube and one VOC diffusion tube were deployed in the following locations:

Nitrogen Dioxide (NO_2)

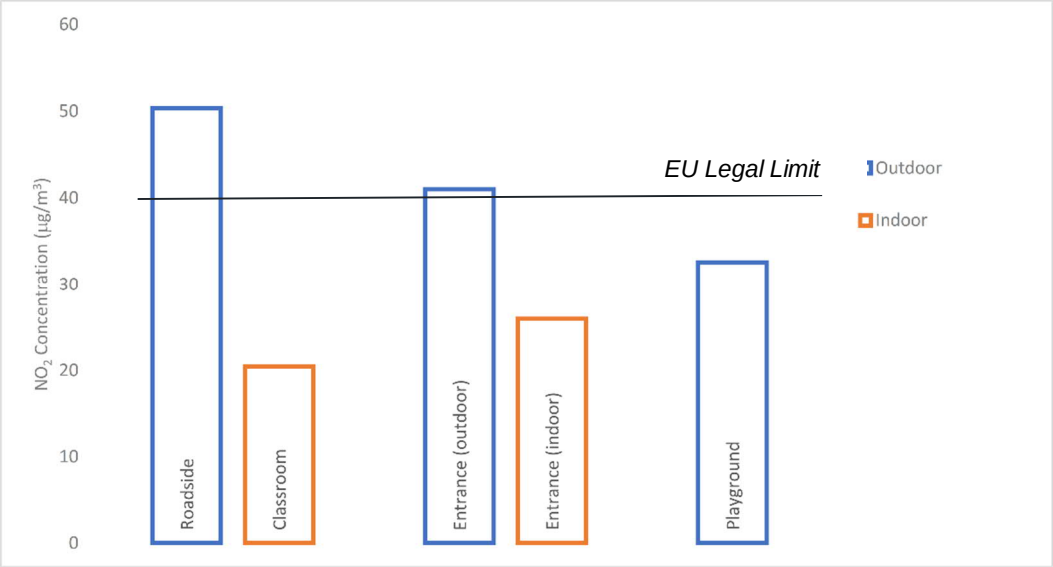
- roadside outside the nursery
- immediately outside the nursery entrance
- playground
- immediately inside the nursery entrance
- inside a nursery classroom.

Formaldehyde and VOCs

- Inside a nursery classroom.

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

Figure 4 - Comparison of the average NO_2 concentrations at Kintore Way Nursery School ($\mu g/m^3$)



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

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

Diffusion Tube Location	Indoor / Outdoor Location	Baseline NO_2 Monitoring Results - NO_2 ($\mu g/m^3$)			
		January	February	March	Average
Roadside	Outdoor	54.98	55.04	41.11	50.37
Playground	Outdoor	36.38	35.36	26.01	32.58
Nursery entrance	Outdoor	44.25	44.18	34.59	41.01
Nursery entrance	Indoor	30.48	29.32	18.04	25.95
Classroom	Indoor	21.96	21.70	17.65	20.44
Ratio of indoor to outdoor (I/O) concentrations		0.69	0.66	0.52	0.63

4.1.9. NO_2 concentrations were found to be highest at the **roadside** (**50µg/m³**), with local road traffic emissions contributing significantly to roadside concentrations.

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

4.1.11. NO_2 concentrations fall to **33µg/m³** in the **playground**, which is screened from traffic by the roadside facing nursery building. Concentrations at the **nursery entrance** are of a much higher level (**41µg/m³**) to the playground. Concentrations at the **nursery entrance**, which is not screened from the road, are slightly higher than in the playground (35.05µg/m³).

4.1.12. **Inside the nursery**, concentrations fall to between **20-26µg/m³**, depending on location. 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. From the GLA research, 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 **0.63** at Kintore Way Nursery School, indicating that uncontrolled infiltration rates are at the higher end of the higher end of the spectrum, and so offer less protection to its occupants than a more air tight building.

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

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

Pollutant	Baseline Formaldehyde and VOC Monitoring (µg/m³)			
	December	January	February	Average
VOCs	36.30	78.80	57.00	57.40
Formaldehyde	18.75	21.78	10.67	17.07

4.1.17. **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[6]) concentrations should be below 300 µg/m³. In Kintore Way they were found to be **57 µg/m₃**.

4.1.18. **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

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

Health Organisation (WHO) indoor air quality guideline[7] for short- and long-term exposures to formaldehyde is 100 µg/m^3. In Kintore Way they were found to be **17 µg/m^3**.

LONDON ATMOSPHERIC EMISSIONS INVENTORY MAPPING

4.1.19. 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.

4.1.20. 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.

4.1.21. 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.

4.1.22. Figure 6 shows the 2013 LAEI baseline annual mean NO_2 concentrations within the vicinity of Kintore Way Nursery School.

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

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

Figure 5 - LAEI Baseline Annual Mean NO_2 Concentrations within the Immediate Area of Kintore Way Nursery School

4.1.24. 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.

4.1.25. The pie chart below shows that while **buses** make up only **4%** of **vehicle** movements, they contribute **22%** of the transport related **NO_x emissions** locally. Similarly, **HGVs** only account for **8%** of the total traffic but contribute **39%** of NO_x **emissions**. However, it should be noted that with TfL's commitment to upgrading the whole bus fleet to the cleanest Euro VI vehicles as a minimum, by October 2020, that the emissions contributed by buses will be expected to fall significantly.

Figure 6 – Average Road Transport – by Vehicle Type (within 200m of nursery)

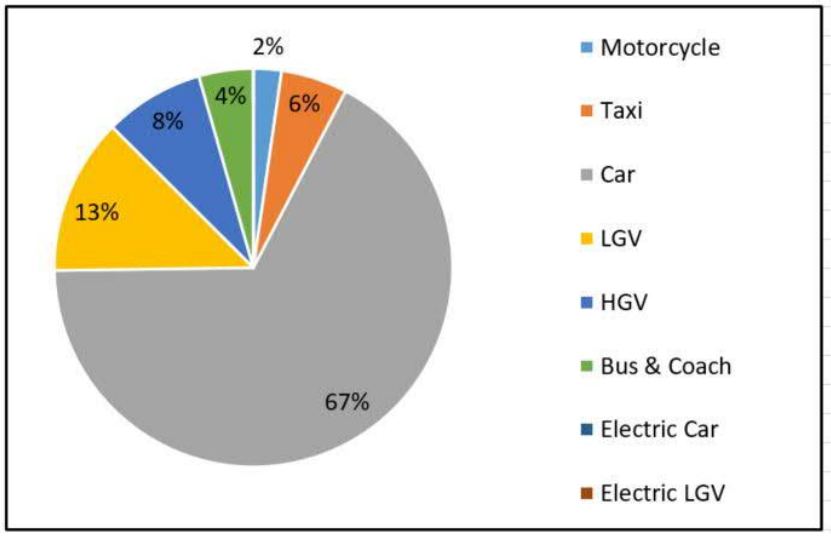
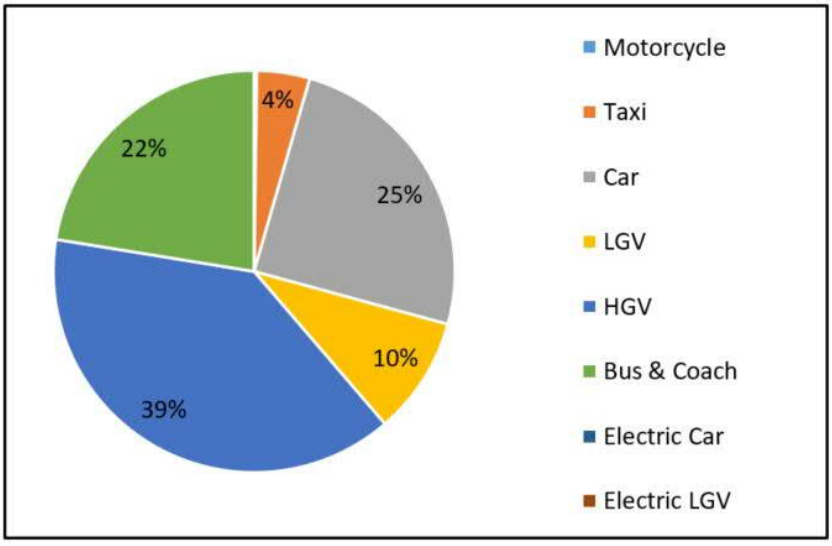


Figure 7 – Average Road Transport NO_x Emissions by Vehicle Type (within 200m of nursery)



4.1.26. 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 up **4%** of **vehicle** movements, and contribute **15%** of the transport related **PM_{10} emissions** locally, and **10%**

of **$PM_{2.5}$**. **HGVs** constitute **8%** of the total **traffic** but account for **40%** of the **PM_{10}** emissions and **25%** of the **$PM_{2.5}$** emissions.

4.1.27. **Figure 8 – Average Road Transport PM_{10} Emissions by Vehicle Type (within 200m of nursery)**

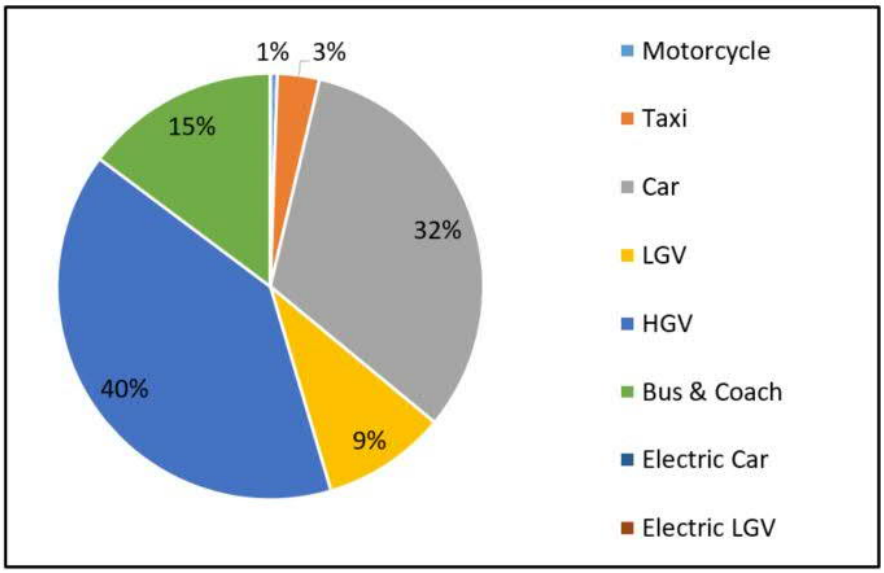
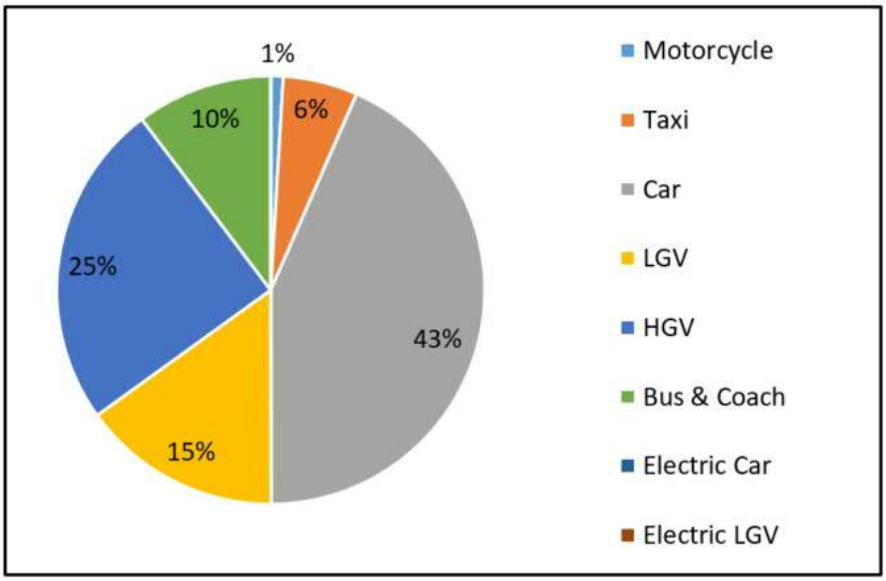


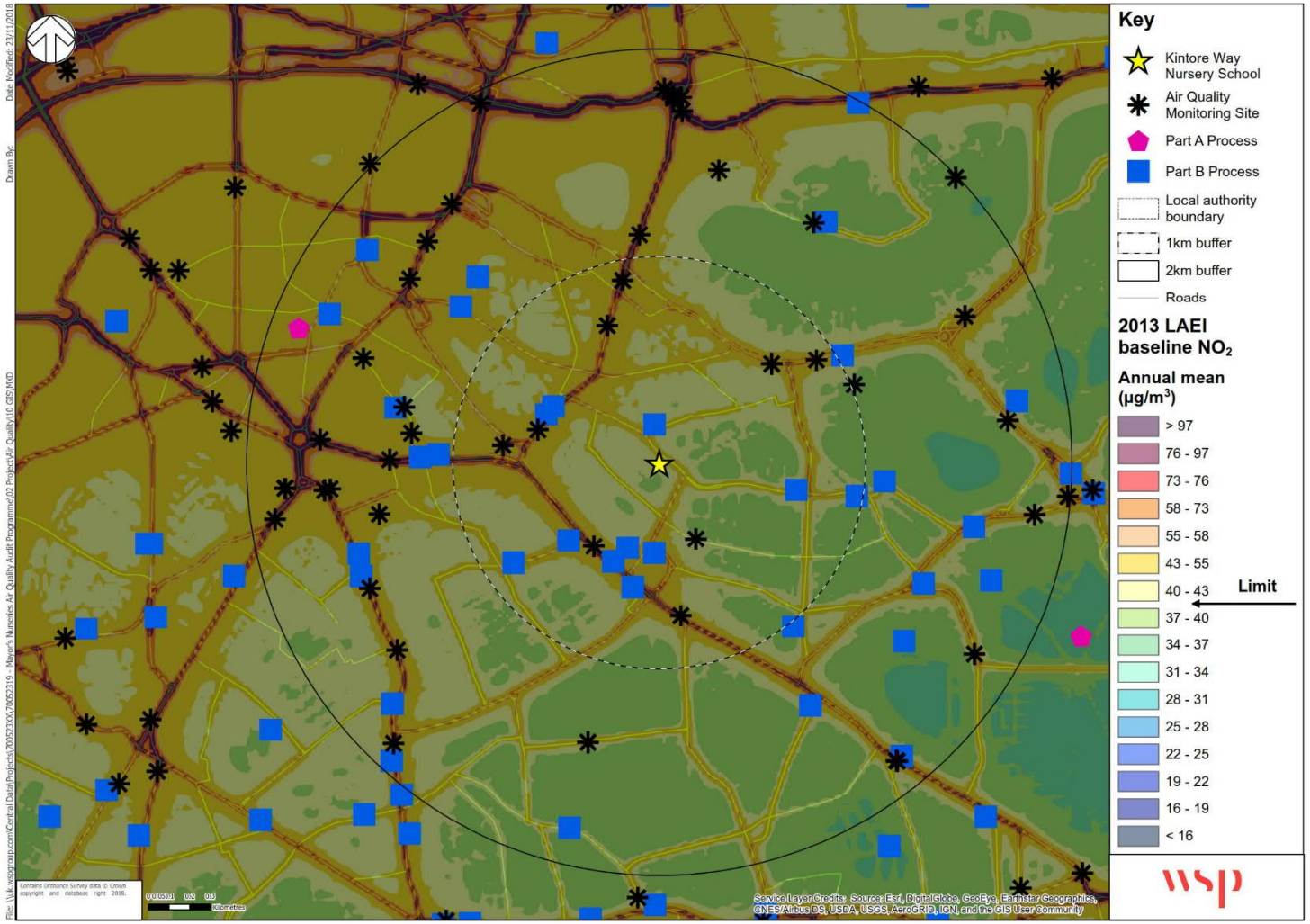
Figure 9 – Average Road Transport $PM_{2.5}$ Emissions by Vehicle Type (within 200m of nursery)



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

4.1.29. 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 10 – 2013 LAEI Baseline Annual Mean NO_2 Concentrations within 2km of Kintore Way Nursery School



4.1.30. 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 11 - 2013 LAEI Baseline Annual Mean PM_{10} Concentrations within 2km of Kintore Way Nursery School

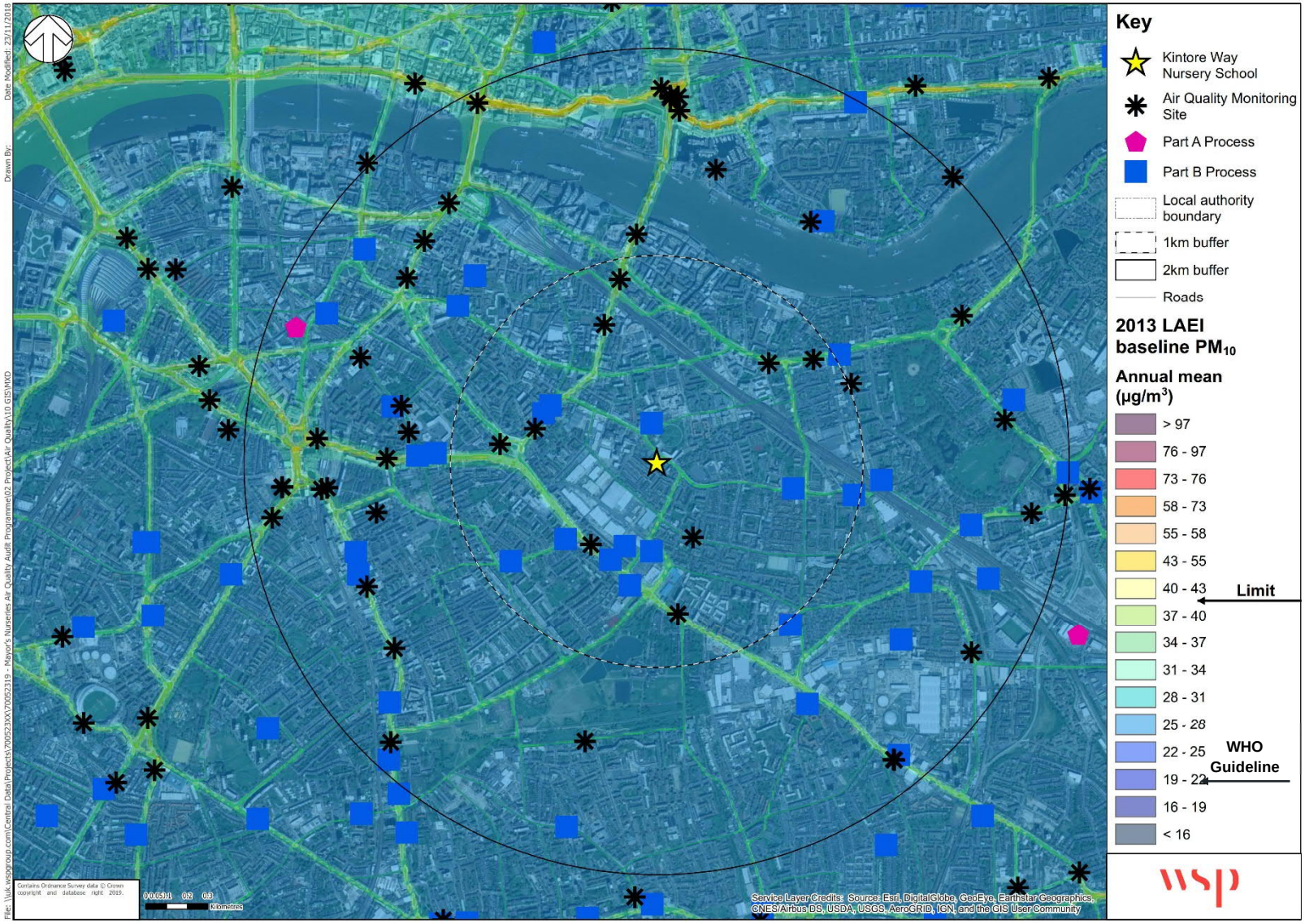
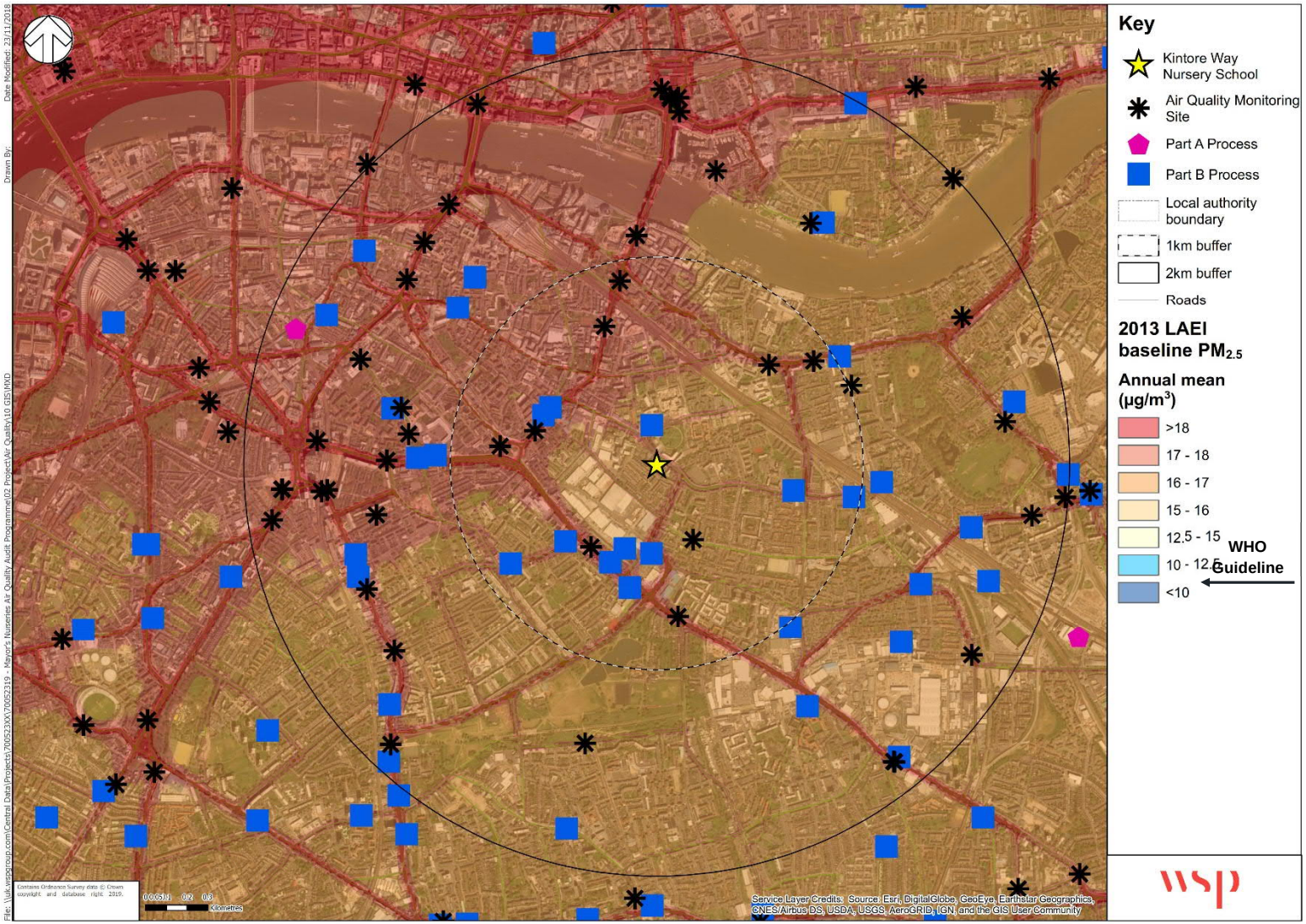


Figure 12 - 2013 LAEI Baseline Annual Mean $PM_{2.5}$ Concentrations within 2km of Kintore Way Nursery School



4.2. HIGHWAYS – KEY OBSERVATIONS

4.2.1. The nursery is located on Grange Road with the **entrance fronting** directly **onto the road**. The footway is relatively wide outside the nursery, ranging from 4m to 6m right outside the entrance. As shown in the photo below, the street is tree-lined with a large semi-mature tree directly outside the nursery entrance.

4.2.2. Grange Road is a busy A-road but is relatively free flowing, partly because of the distance to the nearest signalised junctions which are 600m to the west (Tower Bridge Road) and just over 100m to the east (Dunton Road). However, **some congestion occurs** with traffic backing up along the eastbound approach to the Dunton Road junction. A **relatively high proportion** of **traffic** is made up by **HGVs** (8%) and this contributes a high proportion of NO_x (39%), PM_{10} (40%) and $PM_{2.5}$ (25%).

4.2.3. There is a single-stage **signalised crossing** connecting Bermondsey Spa Gardens and Boucher Primary School just to the west of Kintore Way Nursery. There is some traffic congestion when the crossing is in operation during peak periods. There were reports that there is a long delay before the green man is called. However, testing during the audit did not find this to be the case.

4.2.4. The road has a 20mph speed limit and from observations the traffic **speed** did **not** appear to be **excessively high** which will be partly as a result of the build outs and raised junctions and crossings which provide traffic calming.

4.2.5. Along Grange Road there are **three bus routes** which have a combined frequency of 11 buses per hour during the school peak periods. The nearest eastbound and westbound stops are around 70m to the east, just before the Dunton Road junction. Buses make up 4% of the total traffic volume but constitute **22%** of the **road transport NOx** emissions.

4.2.6. The nursery opens relatively late at 9am, with a cut off time of 9:20am. This is because lots of siblings attend St James C of E Primary School nearby so get dropped off there first. This is useful because it takes nursery travel to the edge of the usual morning peak traffic period which is around 7-9am.

4.2.7. The morning school peak period is busier than the afternoon peak. A hands-up survey showed that a relatively **high proportion** (72%) of children **walk, scoot** or take **public transport** to school: walking 49%, scooting 7%, bus/rail/tube 16%. The proportion of children travelling by car is 19%, and 4% of children cycle.

4.2.8. There are many different **walking routes** to the nursery, many of which are along low pollution roads and paths, including through Bermondsey Spa Gardens. Walking along longer sections of Grange Road and Dunton Road should be avoided where possible.

4.2.9. The monitoring outside the nursery showed that **NO_2 levels** are **above** the **legal limit**. The majority of this is likely to come from road traffic. Drop off activity also contributes to the poor air quality levels, although the issues with this are mitigated by the fact that there are double yellow lines along the length of the road near to the nursery which deters parents from dropping off at this location. It was reported during the audit that there is good enforcement of the parking restrictions.

4.2.10. Close to the nursery entrance there is a **short side road**. This would at first appear to be private land but in fact it is public highway, and the presence of school keep clear markings and a give way marking confirm this. These road markings are faded. This road is used by parents as a drop off point. Vehicles often park across the footway which means that parents and children have to step into the main road to pass. This activity **causes air quality and road safety issues**.

4.2.11. The nursery occasionally put bollards out to prevent the drop off activity, and sometimes the pub puts benches out.

4.2.12. Opposite The Grange pub there are two **loading bays**. Some parents use these spaces to drop off their children. The other area that is used as a drop off point is Keyne Road which is opposite the nursery. Drop off activity in the loading bays and on Keyne Road is not considered to be a significant issue. There is some abuse of the loading bays during the day from people using the GP surgery opposite, but as the bays are well enforced it is not a cause for concern.

4.2.13. There is **some idling activity** from parents parking in the **side road** by the pub and in the **loading bays**.

4.2.14. The Boutchers School next door is considering introducing a **staff/visitor car park** within the grounds next to the nursery. This is not likely to create pollution problems due to the expected low levels of traffic and the fact teachers will arrive/leave outside the school peaks and their cars will be stationary during the day. Also, the primary school plans to introduce greening. The impacts of these plans should be monitored though.

4.2.15. The nursery has food deliveries everyday but these are between 7-8am so are before the nursery arrival time. Other deliveries are made one or twice a week. Loading takes place either in the loading bays or directly outside the nursery.

4.2.16. Close to the nursery, just off Alscot Way, there is a large chimney for the district heating system. Discussions during the audit suggested that this does not create local air quality issues.

4.2.17. As discussed earlier, the **Old Kent Road Opportunity Area** is located quite close to the nursery (around 300m). Construction sites have the potential to generate high levels of dust from site clearance activities. **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.

4.2.18. 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. However, NRMM use is regulated in London.

4.2.19. Construction site also generate **additional traffic**, particularly from HGVs. This can create additional pollution on road around the site.

4.2.20. **Summary – Key Issues**

- Drop off activity in the side road next to the nursery creates air quality issues and road safety issues
- Heavily trafficked roads nearby (Grange Road and Dunton Road) with some traffic congestion
- Nursery entrance fronts onto the main road
- Some issues with drop off activity in the loading bays near to the nursery
- Some idling activity close to the nursery

Drop off activity in side road causes obstruction and air quality issues

Heavily trafficked roads nearby: Grange Road (shown) and Dunton Road

Nursery entrance fronts directly onto busy A-Road

Some idling issues from use of loading bays and side road by pub. Congestion with traffic queuing back from Dunton Road junction and signalised crossing opposite Bermondsey Spa Gardens

4.3. NURSERY GROUNDS / BUILDING - KEY OBSERVATIONS

NURSERY GROUNDS

4.3.1. The nursery was built in 1939 and was then extended in 2006. The more recent addition is the building which faces Grange Road and the side road by The Grange pub. The nursery has one **entrance** and this **fronts onto** the **main road**. There is are no parking facilities at the nursery.

4.3.2. The original building runs perpendicular to the main road and faces the alleyway (Kintore Way) which separates the nursery from Boutchers Primary School. A further recent addition is the building which houses the hall and nursery office which is away from the road at the back of the nursery site.

4.3.3. The nursery has **one main play area** which is split into several zones. It is **set back** from the **main road** and is shielded from Grange Road by the nursery extension. However, the levels of **NO_2** concentrations in the playground from the diffusion tube monitoring were found to be **33µg/m³** which is only **just below** the **legal limit**. The playground has some greening and trees although their coverage is relatively limited.

4.3.4. In addition to the main play area, there is a small SEN garden at the side of the school.

4.3.5. The back garden of The Grange pub shares a boundary with the playground. The pub built a **pizza oven** in the garden and the emissions from this caused problems for the nursery. However, following discussions with the pub it was agreed that they would only use the oven outside of nursery opening hours and as such there have been no further issues.

4.3.6. The nursery does not yet have **STARS accreditation** however they are aiming to achieve Bronze level STARS by June/July 2019.

NURSERY BUILDING

Building layout

4.3.7. The nursery has around **30 rooms** in total. The road facing part of the building houses offices, the reception and a sensory room. The original building has three main classrooms, named rainforest, river and mountain. Rainforest and river are the largest rooms and are interlinked. These rooms open onto the playground. This building also contained the toilets and the kitchen, which open onto a side area which abuts the alleyway between the nursery and the Boutchers Primary School.

4.3.8. Like most nurseries, Kintore Way operates a **free-flow system** where children can move from inside to outside as they please. **Butcher's curtains** are used in main classrooms in order to retain some heat in the winter and minimise the levels of harmful pollutants from entering the building. These are opened up during the summer months to allow more air flow and to help cool the classrooms.

4.3.9. At the back of the site behind the hall building there is relatively large area for **scooters and bikes**. However, there is no fixed storage system and this area is not covered.

Heating system

4.3.10. The hot water and heating for original building and the 2006 extension comes from a **boiler room** which is located at the side of the building by the alleyway. The boiler room is accessed externally from the side area.

4.3.11. There are **two gas boilers** in the one room so the heating is centrally distributed. The 'trends board' for these is corrupted so does not react to the thermostat. Therefore, the heating system is likely to be running without temperature controls which may result in a 10%-15% higher spend on gas per year. The boilers do not have a supply fan. The boilers are maintained regularly and are in good condition.

4.3.12. The two boiler flues protrude from the boiler room roof at around 15ft in height. They are sufficiently high and far away from the playground to not constitute an issue to the nursery children.

4.3.13. The boilers provide hot water and supply the heating system which uses radiators throughout the nursery apart from in two rooms where there is underfloor heating. The radiators are individually controlled so the heat levels can be adjusted in each room as needed.

4.3.14. The standalone building which houses the hall and nursery office has **air conditioning** in each of these rooms. This building has two small boilers.

Ventilation

4.3.15. The nursery uses **passive ventilation** from opening windows and doors. The **sensory room** is located next to the main road. The windows for this room are opened because it is small and gets stuffy. This leads to increased levels of pollutants in this room.

4.3.16. One of the classrooms has **windows** which **open** onto the **side road** by the pub. Emissions from idling vehicles may enter the building if the windows are opened.

4.3.17. The conditions in other rooms vary but some get stuffy, especially in the summer.

4.3.18. The **kitchen** has large modern hoods and with an extract system to roof level. This is away from the playground. The extract has a connecting pipe whose insulation lagging is coming away. There was no evidence of strong odours outside the building which indicates that the extract is working effectively.

Product storage and building conditions

4.3.19. Paints and other maintenance products are stored outside in a separate building. There was not a strong odour of **cleaning products** in the building, and these are stored in a cupboard which is located away from the classrooms.

4.3.20. The nursery mainly has lino or vinyl flooring, apart from in some rooms where there are carpets.

4.3.21. The rooms are **furnished** with items made from a variety of materials including wood (some of which are likely to be MDF), plastic, metal, as well as some soft furnishings. Most furniture is at least a few years old and therefore presents a low risk in terms of VOCs.

4.3.22. There are no evident signs of damp or mould in the building.

4.3.23. The nursery building has a **limited** number of **green plants**.

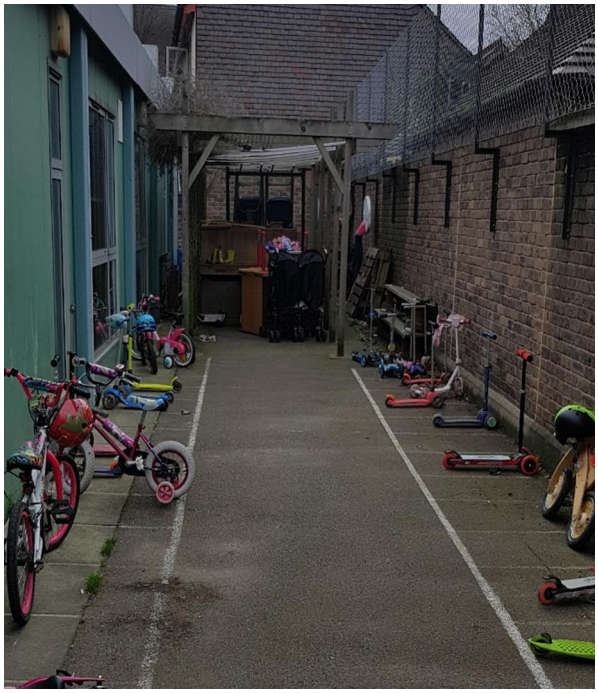
Summary – Key Issues

- The building is reliant on natural ventilation and the opening of windows in the sensory room and to a lesser extent the classroom by the side road will increase emissions levels
- The boiler trends board is corrupted and therefore does not link to the thermostat
- Whilst below legal levels, the emissions levels in the playground are high
- The parking area for scooters and bikes does not have a fixed storage system and is not covered
- The insulation lagging on the kitchen exhaust vent is coming away
- There is a lack of green plants within the building
- Relatively small coverage of greening and trees in the playground
- Emissions in the classroom may increase in the summer months due to the opening of the butcher's curtains to provide cooling.

Windows fronting main road opened in sensory room

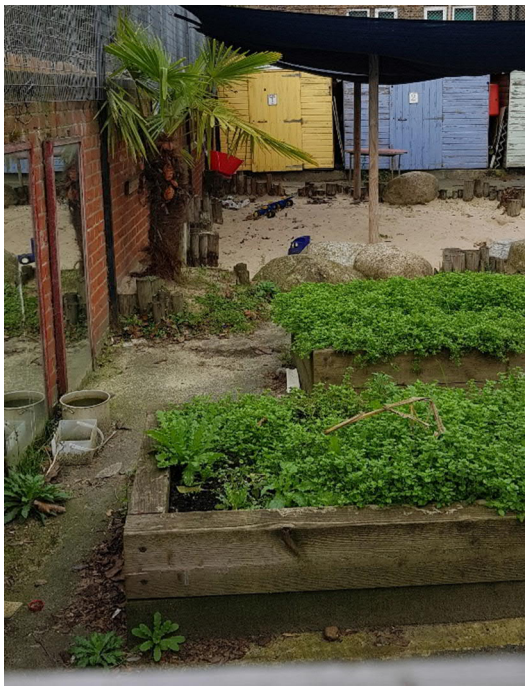
Insulation lagging for kitchen extract coming away

Boiler trends board corrupted



Lack of fixed storage system and cover for scooter and cycle parking area

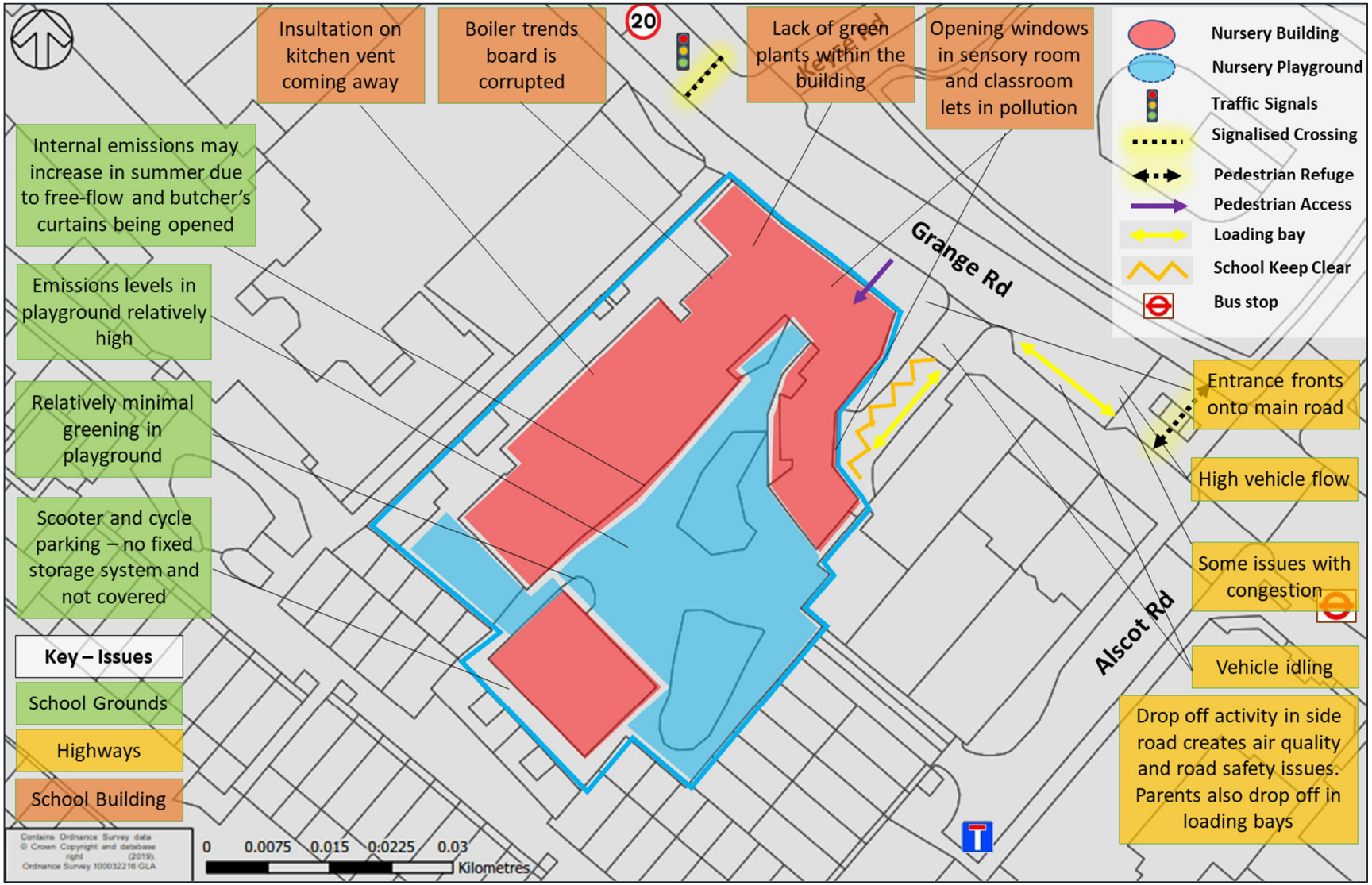
Free flow system may increase emissions in summer months



Relatively limited greening in playground

4.4. KEY OBSERVATIONS – SUMMARY OF ISSUES

Figure 13 - Summary of Potential Issues Map



5. RECOMMENDATIONS

5.1. DEVELOPING THE RECOMMENDATIONS

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

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

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

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

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

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

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

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

- **Potential Air Quality Improvement**
  - Low – nominal measureable change but a tangible reduction in sources or exposure
  - Medium – a small measurable change in air quality
  - High – a large measureable improvement in air quality
- **Wider Benefits**
  - Such as improved safety, visual amenity, child health and welfare, improve learning environments, costs savings, promotion of sustainable transport, contributes to STARS or Healthy Early Years London.
- **Cost** *(Note these reflect the overall costs, but these may vary amongst difference stakeholders*).
  - Low - <£10k
  - Medium - £10k-£100k
  - High - >£100k
- **Deliverability**
  - Quick Win – readily deliverable within 12 months
  - Medium term – deliverable within 1-3 years
  - Longer term – only deliverable in the longer term (i.e. over 3 years)
- **Stakeholder Support**
  - Low – likely to be significant objections which could delay/prevent the scheme
  - Medium – may be some objections and will require consultation but not significant delays
  - High – likely to have strong support from key stakeholders

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

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

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

Table 4 – Recommended measures for consideration

Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
Highway *(Key Stakeholder: Borough)*																
1	Install demountable bollards & continuous ('blended') crossing on side road to minimise drop off activity	Introduce demountable bollards along the building line at the back of the footway which can be lowered by the school staff or pub staff when there is a need to access the loading area. Create a 'continuous crossing' (also known as 'blended crossing') by continuing the footway material (paving slabs and block paving) across the side road and continuing the edge of footway kerb across the side road. Continue the double yellow lines on the carriageway across the side road. This will stop parents from parking on the side road and will deter them from parking on the main road.	Reduce sources and exposure				Road safety Promotion of sustainable transport									
2	Add free standing planters on footway near nursery entrance	Add free standing planters on the wide footway alongside the kerb approximately 10m either side of the tree outside the nursery entrance. This will help to reduce exposure to the high level of emissions that the monitoring showed to exist outside the entrance. Ideally the planters would contain a form of dense vegetation such as hedges. 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. 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 the greening would need some ongoing maintenance. Care needs to be taken with placement of planters to ensure that they are located close enough together to discourage	Reduce exposure				Visual amenity									

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
		pedestrians from passing between them to cross the road which would create a road safety issue.														
4	Loading bay enforcement	Anecdotal evidence suggested that the loadings bays on the main road near to the nursery are relatively well enforced. However, from observations during the audit there was some abuse from drop-off activity. Recommend that enforcement beats should occasionally include the nursery peak periods to discourage drop off activity in loading bays.	Reduce sources				Road safety									
5	Anti-Idling awareness	Whilst engine idling was not a major issue at the site, it may be beneficial to introduce a banner outside the nursery to raise awareness of the issues with idling and discourage idling behaviour. Southwark runs an air quality initiative called #Onething and one of the actions is to reduce idling. At the audit LB Southwark said that they have three styles of banner and that one can be given to the nursery. Recommend introducing an anti-idling banner.	Reduce sources and exposure				Supports STARS and HSL objectives									
6	Review and monitor parking proposals and impact of parking at Boutchers School	Boutchers School is planning to introduce a staff/visitor car park within their grounds next to the nursery. Review the location of the parking relative to Kintore Way nursery and any plans to mitigate associated vehicle emissions. Following introduction of the parking area monitor the vehicle activity and whether the proposed mitigation measures have been introduced.	Reduce sources and exposure				Promotion of sustainable transport Noise reduction									
7	Cargo bike for inter-site deliveries	Kintore Way has a sister school which is Gloucester Way Primary School. This is located just over a mile away – around 10 minutes by bike. Some deliveries are currently made between the sites by van or car, including school meals which are made at Kintore Way. Consider the feasibility and benefits of using a cargo bike to make the deliveries instead of using motor vehicles. The Department for Transport is currently operating a scheme to support the purchase of cargo bikes. They will contribute 20% of the purchase price of new e-cargo bikes, up to a maximum of £1,000 per bike.	Reduce sources and exposure				Road safety									
8	Monitor impact of new development traffic	As part of Old Kent Road Opportunity Area development Travel Plan monitoring, review the impact of any additional traffic movements along Grange Road from the development area. This is to ensure it does not result in a high level of additional motor vehicle trips or congestion that will exacerbate pollution issues around the nursery.	Reduce sources and exposure				Road safety Noise reduction									

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
9	Healthy Streets approach, sustainable transport and roadspace reallocation from vehicular traffic	Continue to 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 for initiatives that are developed for the nursery catchment area.	Reduce sources and exposure				Promotion of sustainable travel									
10	Non-Road Mobile Machinery Audit	The Council could consider a requirement for a Non-Road Mobile Machinery (NRMM) Audit to be undertaken at construction sites. This requirement is being trialled within some Low Emission Neighbourhoods to help ensure compliance of machinery used for developments in line with the Mayor of London's Supplementary Planning Guidance 'The Control of Dust and Emissions during Construction and Demolition SPG'. Currently, NRMM is the third largest contributor of NOx emissions and the fifth largest contributor of PM emissions in London.	Reduce sources of emissions				Reduced noise									
11	Control of Dust and Emissions during Construction and Demolition SPG	Ensure compliance for construction site with the GLA's 'The Control of Dust and Emissions during Construction and Demolition' Supplementary Planning Guidance (2014) and LB Southwark's 'Technical Guidance – Demolition and Construction' (2016).	Reduce sources of emissions													
Nursery Grounds (*Key Stakeholder: Nursery/ Borough)*																
12	Playground Greening	Consider installing sections of green screening/climbers. A dense vegetation layer with a high leaf density can as much as halve the levels of pollution just behind the barrier, though the benefit tails off with increasing distance. The benefit is mainly attributable to their effect on dispersion, though the deposition of some pollutants onto the leaf surfaces from air that passes through the vegetation will also have a small but beneficial effect. A study by Kings College London assessed the efficacy of green screens in preventing vehicle emissions from nearby roads reaching school grounds, through the installation of an ivy screen. In this instance the screen was found to be an effective pollution barrier, once the ivy had started growing and a	Reduce exposure to emissions				Visual amenity Biodiversity									

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
		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														
13	Introduce fixed storage system and cover for scooter and cycle parking area	The scooter and bike parking area at the rear of the nursery is relatively spacious and secure, and well arranged. However, it would benefit from the introduction of a fixed storage system and an overhead cover to protect the area from the elements. LB Southwark commented at the audit that funding for this may come from their school travel planning budget.	Behavioural measures				Reduced noise									
Nursery Building (*Key Stakeholder: Nursery/ Borough)*																
14	Replace boiler trends board	The boiler trends board is corrupted and as such does not respond to the thermostat. This means that is not able to dynamically adjust the heating which may lead to overheating and inefficient operation of the boiler. The result is that windows may be opened more often than they need to be and there may be an increase in boiler emissions. It is recommended that the trends board is assessed and repaired or replaced if necessary.	Reduce sources of emissions				Reduced energy consumption and reduced operating costs									
15	Improve ventilation for sensory room	The sensory room fronts onto the main road. Ventilation is poor and therefore the windows need to be opened. This lets in pollution which the monitoring shows to be high. The options to improve the ventilation are to increase the size of the room or move it to another location within the nursery site. The latter option would be expensive given the type of the equipment that is installed and the power required for this. There are few alternative locations. There is an opportunity to knock through to the next-door room. The adjoining wall is not a supporting wall so the cost would be relatively low.	Reduce exposure to emissions				Child health and welfare Reduced noise									

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
		The sensory room requires a very controlled level of noise and light and as such air filtration systems are not a viable alternative to the options given above.														
16	Replace insulation on kitchen pipe	Replace insulation on kitchen exhaust pipe to improve efficiency and mitigate possibility of emissions leakage.	Reduce exposure				Reduced energy consumption and reduced operating costs									
17	Air Filtration Systems	Consider investing in air filtration systems in classrooms most exposed to poor air quality and reliant on natural ventilation. These systems are relatively high cost, only cover a single room per unit, and do require ongoing maintenance and power consumption, but have demonstrated some encouraging initial scientific evidence of efficacy. They can also assist with virus elimination/ reduction. The findings of the Air Filtration System trials will be available to inform this decision in early 2020. The potential air quality improvement from Air Filtration System is identified as being low, however this is subject to the findings of the trial.	Reduce exposure to emissions				Improved learning environments Child health and welfare									
18	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				Improved learning environments Visual amenity									
19	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													

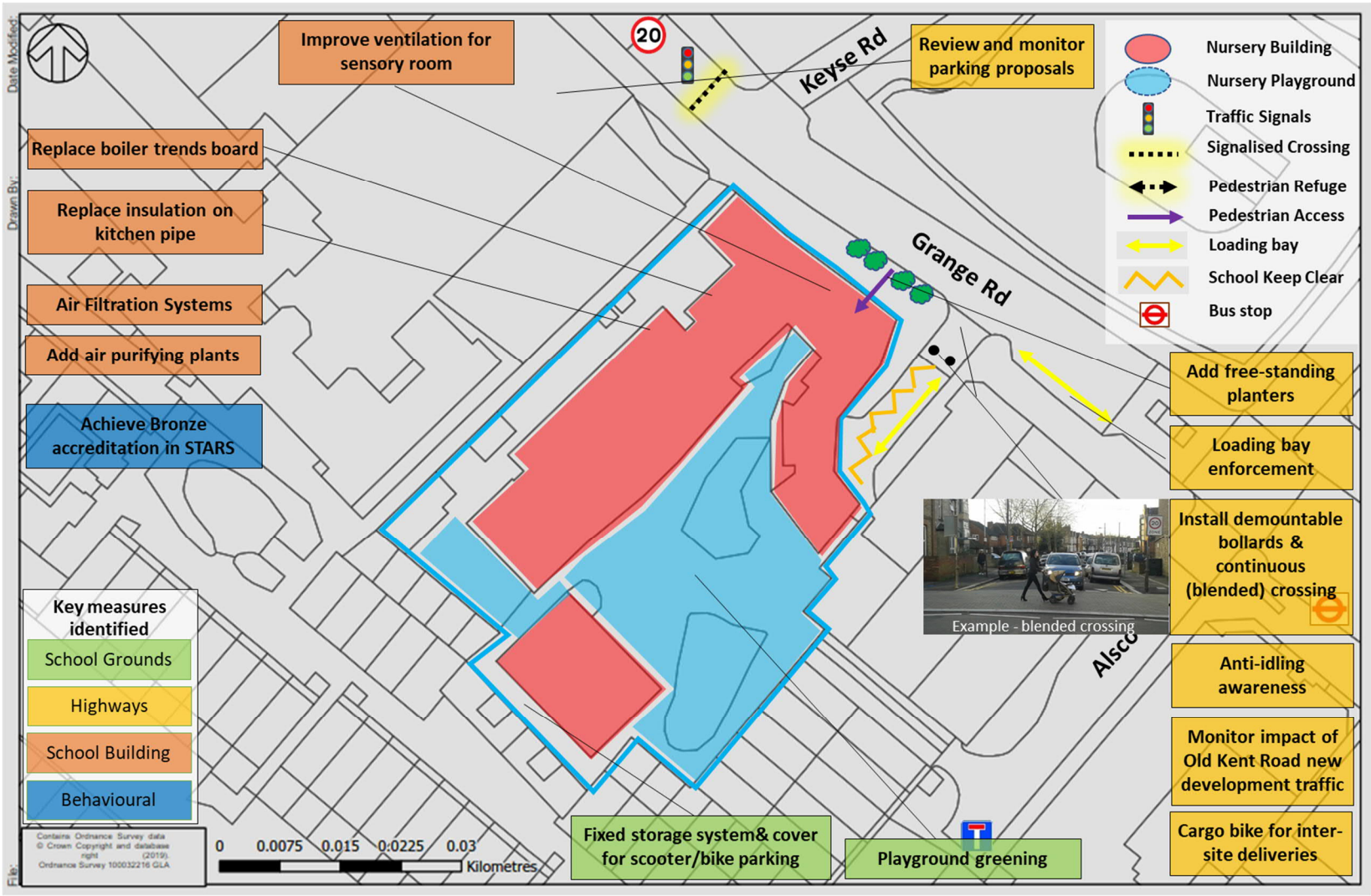
Measure		Description	Purpose	Potential Air Quality Improvement			Wider Benefits	Cost			Deliverability			Stakeholder Support		
				Low	Medium	High		Low	Medium	High	Quick Win	Medium Term	Long Term	Low	Medium	High
20	Switch to lower VOC cleaning products	Switch to lower VOC alternative cleaning products, such as unperfumed cleaning products.	Reduce sources and exposure													
21	Considering replacing the boiler with a Heat Pump	In the longer term the gas boiler could potentially be replaced with a heat-pump system. Such a system would run on electricity only, and would therefore not have any combustion on site. Heat pumps deliver a net gain relative to boilers from an energy and environmental perspective, however the typical payback period can be 7/8 years for buildings such as nurseries.	Reducing sources and exposure				Reduced energy consumption and reduced operating costs									
Behavioural Measures *(Key Stakeholder: Nursery/ Borough)*																
22	Achieve Bronze accreditation in STARS	Aim to attain Bronze level STARS accreditation. LB Southwark has agreed with the nursery that the aim is for this to be achieved by June/ July 2019.	Behavioural measures / reducing exposure to emissions				Awareness raising Supports STARS and HSL objectives									
23	Engagement and Awareness 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. The nursery produces a newsletter so air quality related initiatives and activities can be included in the newsletter – including the measures that are introduced from the audit recommendations.	Awareness raising and behavioural measures				Awareness raising Secure community buy-in for measures									
24	Gain accreditation on Healthy Early Years London scheme	Healthy Early Years London (HEYL) is an awards scheme funded by the Mayor of London which supports and recognises achievements in child health, wellbeing and development in early years settings. There are four levels of Awards. Aim to achieve the first level which is 'First Steps'.	Behavioural measures / reducing exposure to emissions.				Awareness raising Supports STARS and HSL objectives									
25	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				Awareness raising									
26	Prepare 'Parents Handbook' for new	Prepare 'Parents Handbook' for new parents/ pupils that contains information about pollution issues and how they can help to reduce the sources and exposure to emissions. The document can promote the use of apps / sites such as 'www.walkit.com' to a) promote walking to / from the nursery and	Reducing sources and exposure				Awareness raising									

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
	parents/ pupils	b) promote the suitable walking routes to avoid air pollution hotspots.					Supports STARS and HSL objectives									
27	. Anti-idling campaign	. Use nursery newsletter to increase awareness issues with idling and the important of switching off engines. Monitor idling activity and if need be intervene using the Council's powers introduced in 2018 to fine drivers. However, experience of anti-idling activity in other areas of London has shown that verbal requests for drivers to switch off their engines are usually effective and may suffice.	. Reducing sources and exposure				Awareness raising Supports STARS and HSL objectives									
28	. Promote cleaner routes to the nursery	. Encourage parents to approach the nursery along less polluted routes, for example travelling through Bermondsey Spa Gardens and Alscot Way. Walking along Grange Road and Dunton Road should be avoided as far as possible. . This can have a real impact on short-term exposure and is something that parents can be proactive with. Walking at the back of the footway rather than close to the kerb can also make a difference. 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				Awareness raising									
29	. 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				Awareness raising Child health and welfare									
30	. 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													
31	. 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													
. ***Wider Measures*** *(Key Stakeholder: Borough/ TfL/ GLA/ Central Government)*																
32	Targeted scrappage scheme for polluting vehicles	. 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	. Reduce sources and exposure													

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
	being driven in London	Londoners to switch from polluting vehicles to ultra-low emission vehicles and more sustainable forms of transport.														

5.2. KEY RECOMMENDATIONS

Figure 14 – 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 key measures which were considered to be a priority are (in no particular order):

- **Install demountable bollards and continuous ('blended') crossing** on side road to minimise drop off activity - introduce demountable bollards along the building line at the back of the footway which can be lowered by the school staff or pub staff when there is a need to access the loading area. Create a 'continuous crossing' (also known as 'blended crossing') by continuing the footway material (paving slabs and block paving) across the side road and continuing the edge of footway kerb across the side road. Continue the double yellow lines on the carriageway across the side road. This will stop parents from parking on the side road and will deter them from parking on the main road.
- **Improve ventilation for sensory room** - the sensory room fronts onto the main road. Ventilation is poor and therefore the windows need to be opened. This lets in pollution which the monitoring shows to be high. The options to improve ventilation are to increase the size of the room or move it to another location within the nursery site. The latter option would be expensive given the type of the equipment that is installed and the power required for this. There are few alternative locations. There is an opportunity to knock through to the next-door room. The adjoining wall is not a supporting wall so the cost would be relatively low. The sensory room requires a very controlled level of noise and light and as such air filtration systems are not a viable alternative to the options given above.
- **Add free standing planters on footway near nursery entrance** - add free standing planters on the wide footway alongside the kerb approximately 10m either side of the tree outside the nursery entrance. This will help to reduce exposure to the high level of emissions that the monitoring showed to exist outside the entrance. Care needs to be taken with the placement of planters to ensure that they are located close enough together to discourage pedestrians from passing between them to cross the road which would create a road safety issue.
- **Playground greening** - the monitoring results showed that the NO_2 emissions levels in the playground are relatively high (although below legal limits). Consideration should be given to introducing additional trees and planting in the playground to reduce exposure to emissions. 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.

- **Introduce a fixed storage system and cover for scooter and cycle parking area** - the scooter and bike parking area at the rear of the nursery is relatively spacious and secure, and well arranged. However, it would benefit from the introduction of a fixed storage system and an overhead cover to protect the area from the elements. LB Southwark commented at the audit that funding for this may come from their school travel planning budget.
- '**Parents Handbook' for new parents/ pupils** - prepare a 'Parents Handbook' for new parents/ pupils that contains information about pollution issues and how they can help to reduce the sources and exposure to emissions. The document can promote the use 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.

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. Kintore Way is not currently accredited with STARS. Our recommended measures for the nursery include a number or initiatives that would also count towards achieving a Bronze STARS scheme accreditation, including: 'anti-idling awareness raising measures' and the 'scooter/bike parking improvements'. 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

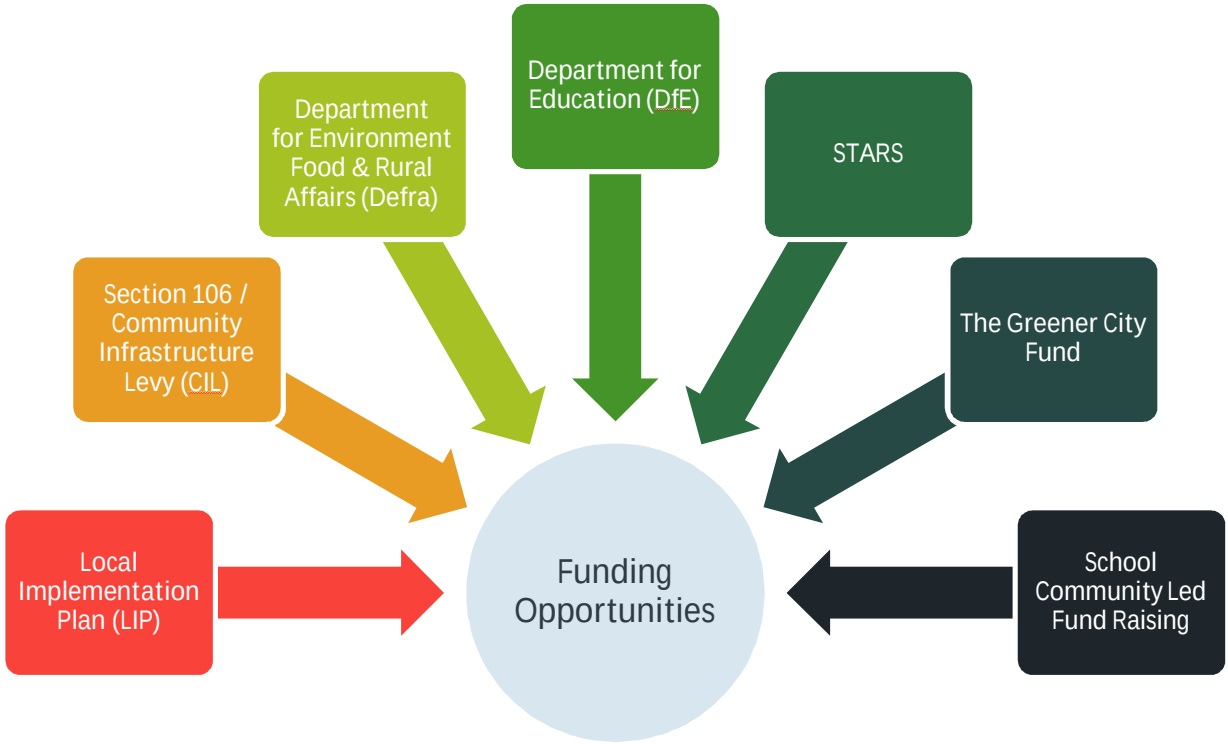
Awards: HEYL First Steps, Bronze, Silver and Gold. HEYL can be used as an improvement tool to support practice in all Early Years settings including active travel:

- 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 15 – 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.

5.8.8. **Greener City Fund**

5.8.9. 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

5.8.10. 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

5.8.11. 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.

5.8.12. 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

5.8.13. 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

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

5.8.15. 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

5.8.16. 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.[8] Groundwork London's Our Space award[9] offers grants between £500 and £5,000

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

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

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

5.9. MONITORING

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

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

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

5.9.4. Where possible such monitoring should cover:

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

6. NEXT STEPS

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

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

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

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

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

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

Other formats and languages

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

Greater London Authority
City Hall
The Queen's Walk
More London
London SE1 2AA

Telephone **020 7983 4000**
www.london.gov.uk

You will need to supply your name, your postal address and state the format and title of the publication you require.

If you would like a summary of this document in your language, please phone the number or contact us at the address above.