A Green Wall for Deansfield Primary School

November 2020

Eltham Enviros

Air pollution: a constant worry

- London's air is one of the most polluted in Europe far from the recommended levels set by the EU and/or WHO
- Comparatively, Deansfield is rather well located. But the air pollution created by road traffic on the nearby Rochester Way is significant.
- Air pollution particularly affects children. Regular exposure to high levels of air pollutants such as PM2.5, Nitrogen dioxide (NO2) and ozone, has been linked to respiratory and cognitive issues

- **Improving school air quality** is a current concern all over the country, and in London in particular
- An Air Quality Audit for Invicta and Haimo schools listed “green screens” as one of several actions to improve air quality within the school (source: The Mayor’s School Air Quality Audit Programme)
- Always keeping in mind that this green wall is only part of the solution (expanding the ULEZ for HGVs…)

The Mayor’s school air quality audit programme

The Mayor is concerned about poor air quality around London’s schools. Breathing in dirty air can affect children’s health and well being. That’s why he has audited 50 primary schools in the city’s most polluted areas.

The audits have made recommendations to reduce emissions and exposure. They include:

- moving school entrances and play areas away from busy roads
- 'no engine idling' schemes to reduce emissions from the school run
- reducing emissions from boilers, kitchens and other sources
- local road changes including better road layouts, restricting the most polluting vehicles around schools and pedestrianisation by school entrances
- adding green infrastructure like ‘barrier bushes’ along busy roads and in playgrounds to help filter fumes
- encouraging students to walk and cycle to school along less polluted routes

The audits were funded with £250,000 from the **Mayor’s Air Quality Fund**. They were carried out by **engineering consultancy WSP**.

Hedges to reduce pollution

- Recent RHS research on the benefits of hedges to reduce air pollution

Plant traits linked to enhanced delivery of environmental benefits

Cooling	Pollutant trapping	Rainfall capture
♦ large leaf area	♦ large leaf area	♦ large leaf area
♦ presence of leaf hairs	♦ presence of leaf hairs	♦ presence of leaf hairs
♦ light leaf colour	♦ rough surfaces	♦ rough surfaces
♦ high ET rate		♦ high ET rate

These insights into the links between plant traits and the benefits they provide were the result of RHS-led and -supported research (see references below, 4–8).

Evapo-transpiration

Evapo-transpiration (ET) is water loss through leaf stomatal pores, a process unique to plants. This cools leaves as well as the surrounding air, which is particularly useful in hot dry weather. Through ET, plants also draw water from the soil, for instance after heavy rain, reducing flooding risks.

Choosing hedge species with traits linked to more environmental benefits

		UK native?	Hedge height†
Cotoneaster* spp.	Evergreen	N	1–1.5m
***Crataegus monogyna* (hawthorn)**	Deciduous	Y	1.5–3m
***Cupressus* × *leylandii* (Leyland cypress)**	Evergreen	N	1–15m
***Cupressus macrocarpa* (Monterey cypress)**	Evergreen	N	1–3m
***Elaeagnus* × *ebbingei* (oleaster)**	Evergreen	N	0.5–1.5m
***Fagus sylvatica* (common beech)**	Deciduous	Y	1.2–6m
Osmanthus* × *burkwoodii	Evergreen	N	0.5–1.5m
***Rosa canina* (dog rose)**	Deciduous	Y	1–3m
***Taxus baccata* (English yew)**	Evergreen	Y	1.2–6m
***Thuja plicata* (western red cedar)**	Evergreen	N	1.5–3m
***Viburnum tinus* (laurustinus)**	Evergreen	N	1–2m

* *Cotoneaster* can be considered not as a typical hedge, but as an addition to mixed hedging as it has functional properties which enable it to efficiently reduce rainfall runoff and trap pollution
† Evidence suggests that to be efficient in particulate pollution screening hedges should be 1.5–2m high and at least 1m wide (9)

References

1 Cameron, R.W., Blanuša, T., *et al.*, 2012. The domestic garden – its contribution to urban green infrastructure. *Urban Forestry & Urban Greening*, **11**(2): 129–137.
2 Loram, A., Tratalos, J., Warren, P.H. and Gaston, K.J., 2007. Urban domestic gardens (X): the extent & structure of the resource in five major cities. *Landscape Ecology*, **22**(4): 601–615.
3 Perry, T. & Nawaz, R., 2008. An investigation into the extent and impacts of hard surfacing of domestic gardens in an area of Leeds. *Landscape and Urban Planning*, **86**(1): 1–13.
4 Cameron, R.W. & Blanuša, T., 2016. Green infrastructure and ecosystem services. *Annals of Botany*, **118**(3): 377–391.
5 Blanuša, T. and Vaz Monteiro, M.M., 2018. Green streets: classifications, plant species, substrates, irrigation and maintenance, In: Perini, K. & Perez, G. (eds) *Nature-based Strategies for Urban and Building Sustainability*. Elsevier.
6 Vaz Monteiro, M., Blanuša, T., *et al.*, 2017. Functional green roofs: importance of plant choice in maximising summertime environmental cooling and substrate insulation potential. *Energy and Buildings*, **141**: 56–68.
7 Blanuša, T., Vaz Monteiro, M.M., *et al.*, 2016. Planting choices for retrofitted green roofs. In: Wilkinson, S. and Dixon, T. (eds.) *Green Roof Retrofit: Building Urban Resilience*. Wiley-Blackwell.
8 Blanuša, T., Fantozzi, F., *et al.*, 2015. Leaf trapping and retention of particles by holm oak and other common tree species in Mediterranean urban environments. *Urban Forestry & Urban Greening*, **14** (4): 1095–1101.
9 Abhijith, K.V., *et al.*, 2017. Air Pollution Abatement Performances of Green Infrastructure in Open Road and Built-up Street Canyon Environments. *Atmospheric Environment*. 162: 71–86.

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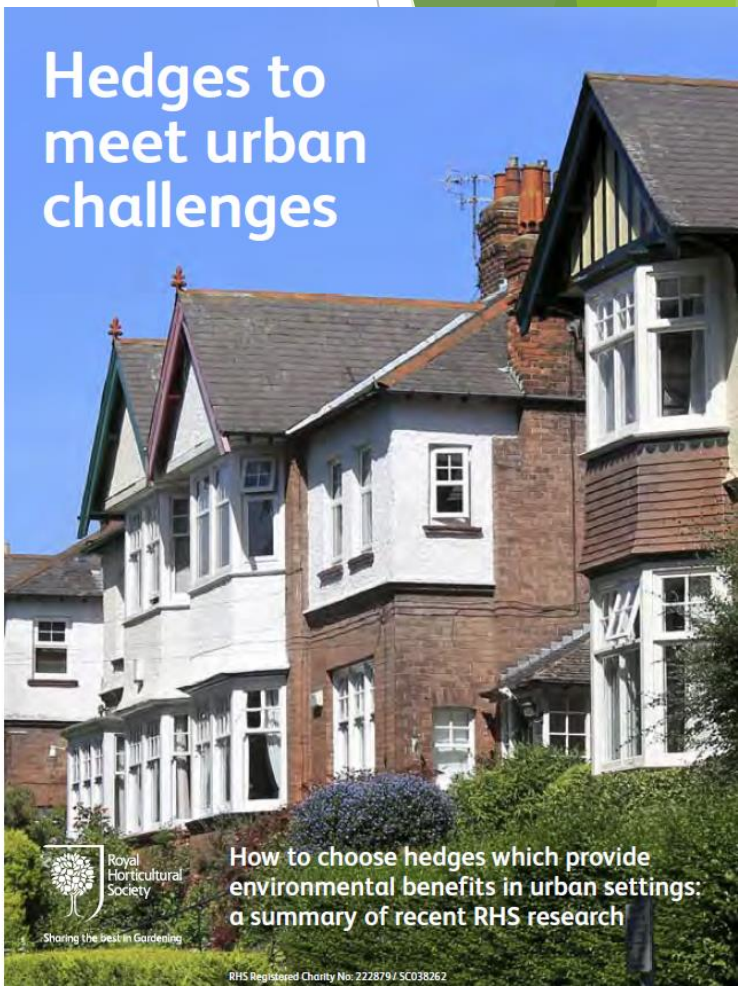
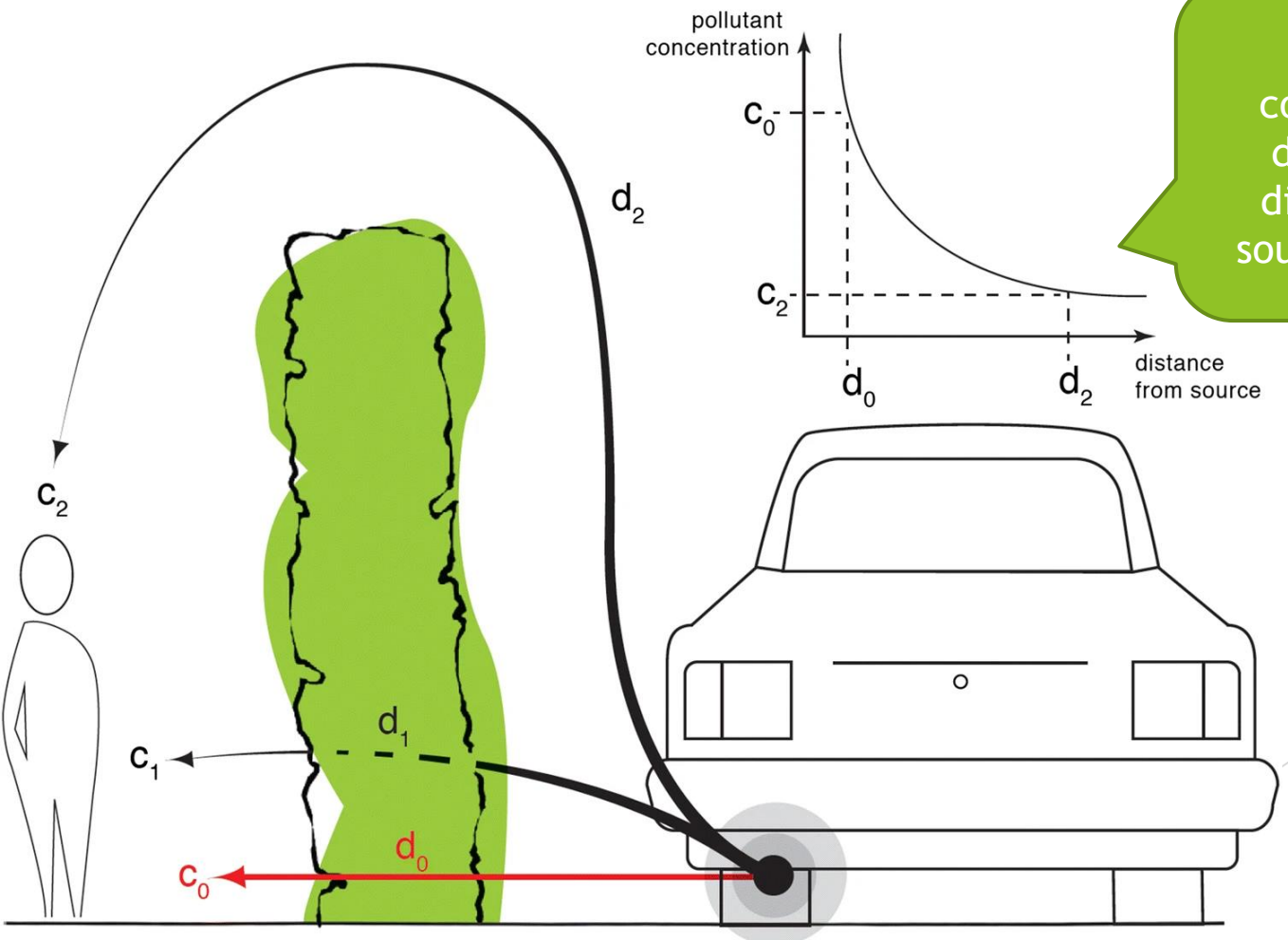
For growing and selection information, go to **rhs.org.uk/advice/garden-features/hedges**



How does it work?

- Upon hitting the leaves, air pollutants will either bounce away and be sent upward, or be trapped on the leaves and be washed away by rain



Pollutant concentration decreases as distance from source increases

Source: https://link.springer.com/article/10.1007/s13280-019-01164-3

Key aspects

- **Thickness, density, and height of the hedge**: it must be thick and dense to stop as much air pollutants as possible. And the higher the better as it improves dispersion and decreases the concentration of pollutants in the air

Based on the RHS research:

- Ideal width: 1.5 m or more
- Ideal height: 1.5-2 m high or more

- **Choosing the right varieties of plants**: those with large leaves, rough leaves, many needles, etc. are particularly good.

What can we expect

- The School Air Quality Audit deemed that a green wall is a “low impact” solution. However, it is one of the few actions the school can implement itself – as opposed to waiting for outside measures to be taken by the borough or government (such as the ULEZ)
- According to the RHS Dr Tijina Blanusa, a 1m-deep privet hedge could decrease fine particles pollution by approx. 20%
- According to another experiment done at the Lordship Lane Primary School, the pollution levels were reduced as much as 53%
- Any improvement is good!

Advantages of a green wall

- Reduces air pollution
- Reduces noise pollution
- Is beneficial to animal life

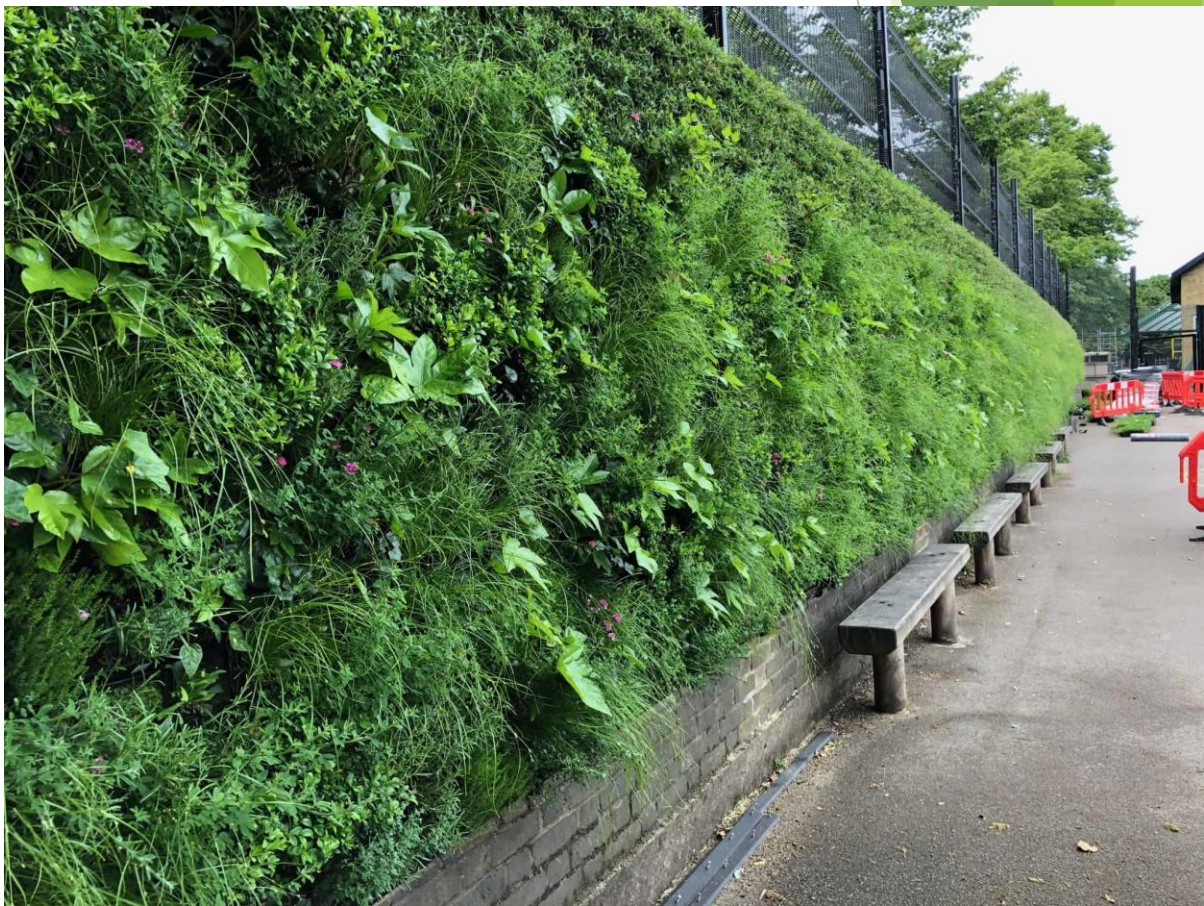


Photo: living wall at St Mary's Catholic Primary School in Chiswick, July 2019

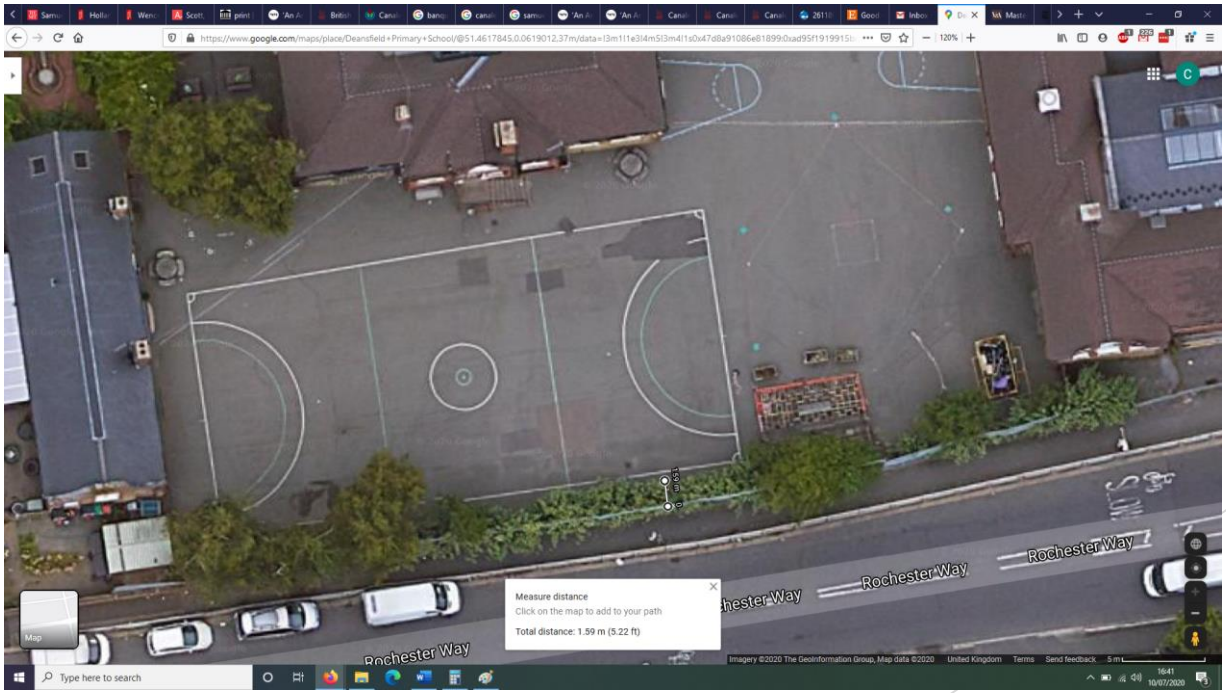
How do we proceed?

Overall it is a costly project, but with a **long-term viability**. We propose to do it in several “chunks”.

- **Step 1: filling the gaps in the existing hedge along the courtyard along Rochester Way** (from the Glenesk building to the gate to the Reception garden)
- **Step 2: continuing the hedge to include the Reception garden**
- Step 3: extending the hedge to the back of the Glenesk building and the bicycle garage area
- After that, we could pursue this project with a green wall along Glenesk road…

Step 1
Completing the existing hedge

- Option 1: we have got a quote from Scotscape – between ca. £1,300 and £1,550
- Option 2: we buy and plant the shrubs ourselves (quote coming from Classiflora from Helen)
- We are putting in an application for funding with the Council's Ward Budget - they seem confident we should get the full amount for the first chunk
- We are hopeful the plants could be in place by the end of the school year

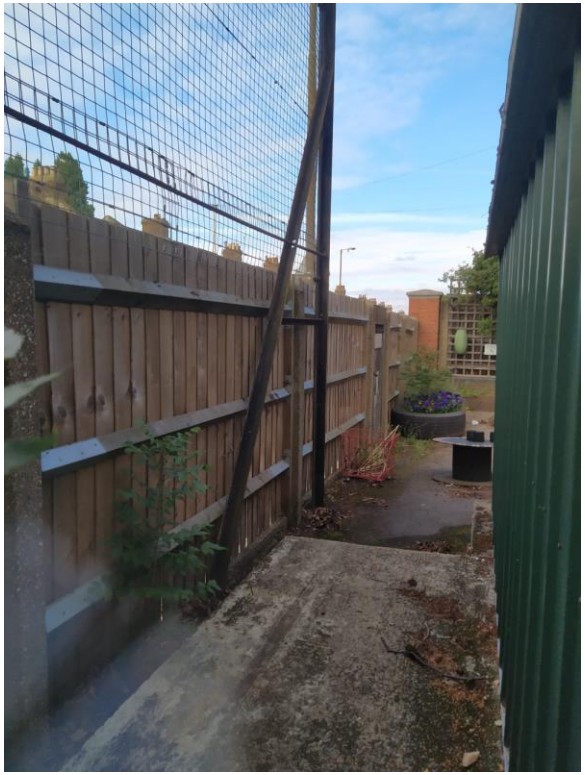


Step 2: Adding a hedge/green screen in the Reception Garden

This is the place where the children are the closest to Rochester Way

Several challenges:

- Small space, most of which should be kept for the children
- There's no open ground, which means we either use planters which need an irrigation system, or some of the concrete has to be removed to plant a hedge in the ground. Both options are more costly
- Narrow point of access from the courtyard (no room for a planter)



- Could the access to the garden be on the other side of the shed?
- Is the wooden door important or can it be blocked?
- Would Reception teachers be opened to redesigning this outdoor space?

Option 1 - Ivy screens in planters

Scotscape gave us an estimated price for one planter (1m long): £610 +VAT

Above: ivy screens at Wyvil Primary School in South Lambeth, Feb. 2019

(right) Ambler Primary School, ivy screens, 2018

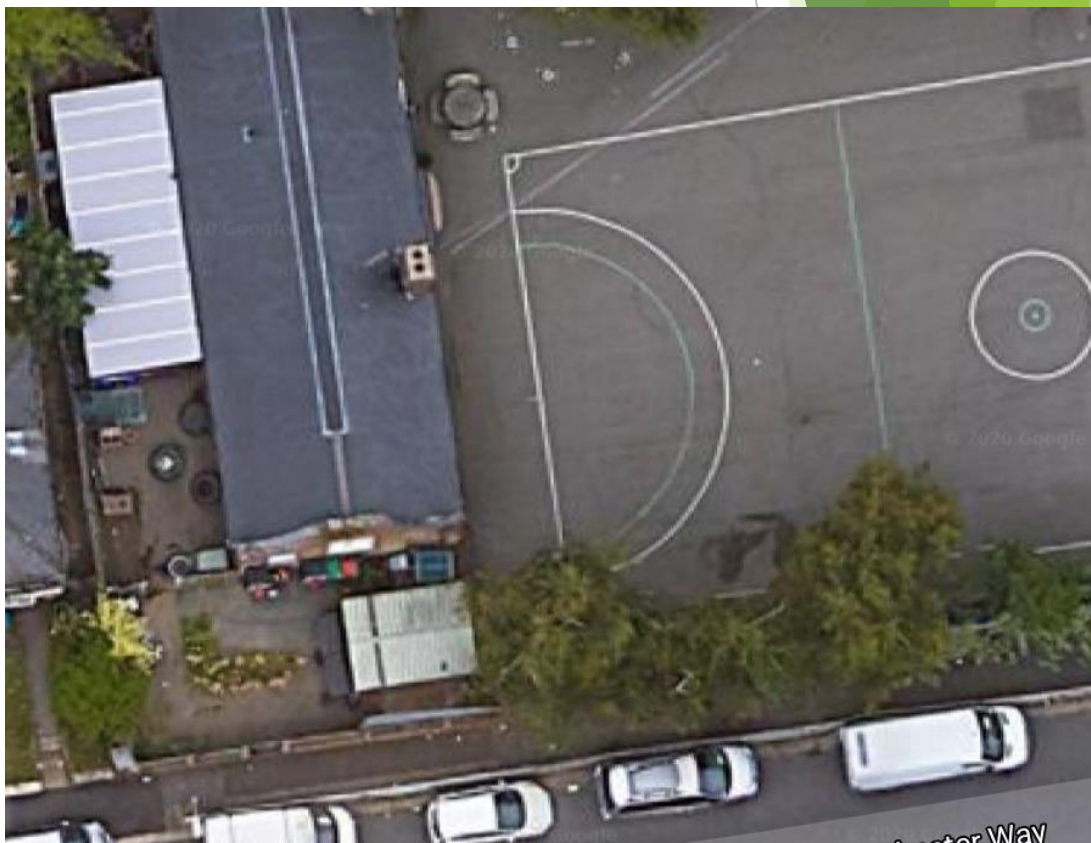
Option 2 – A hedge planted in the ground

- We would have to remove the concrete on the ground, and the wooden fence
- It would take up a band wide of ca. 1.5 m along the road

Photos: Clifford Bridge Primary School near Coventry; and Fern Hill Primary School

Option 3 - Installing a new wooden fence or brick wall, and re-arranging the space to reduce the children's exposure

- For instance, moving the storing boxes and other units along the fence, and having the planters elsewhere



Steps for the reception garden

- Appeal to parents with relevant skills
- Design and estimate of cost
- Fundraising
- Realisation

Getting the children involved

- **Monitoring air quality within the school's grounds**

We could work with LSx (London Sustainability Exchange) as they have already done lots with children and schools – or use the School Air Quality Audit's Toolkit

- **Understanding what a green infrastructure is and how it works.** Comparing different solutions for our problem: a green screen, green wall, living wall, etc. – which one would work best for Deansfield?

- **Helping designing the hedge and reorganising the little garden** (looking at the different functionalities and making them work together, health and safety)

- **Participating in the fundraising**: coming up with ideas and helping run the fundraising campaigns

Questions: What do we need from you today

1. Reactions to what you've heard: do you have any questions? Overall are you in favour of addressing these issues?
2. If yes, do you agree with the 'chunking' idea? Would you prioritise the chunks differently?
3. How would you like us to work with you? E.g. could we lead on gathering quotes and ideas and bring them to you for consultation, engagement with children and eventual decisions?
4. Agree timeline for next steps and close