

Clean air and noise control

Covid, forest fires and climate change

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What is the Edinburgh Access Panel?

- One of around 50 Panels in Scotland, formed in 1980s. Our members are individuals with disabilities, representatives of disability organisations and others with talents / skills that help the group.
- We meet regularly – usually monthly. Edinburgh City Council officers attend our meetings, following up issues for us.
- We believe that Edinburgh should become the model for a fully accessible city.
- We consider planning applications, act as invited consultees on larger development projects – with the aim of improving accessibility for physically disabled and sensory impaired people, mostly re: the built environment.

What is 'Inclusive Design'?

- “Inclusive Design is the design of an environment so that it can be accessed and used by as many people as possible, regardless of age, gender and disability.”
- “Inclusive design keeps the diversity and uniqueness of each individual in mind.”
- “An environment that is designed inclusively is not just relevant to buildings; it also applies to surrounding open spaces, wherever people go about everyday activities.”

Inclusive design helps us all

With bpa-architecture, we offer advice on 'Inclusive Design'

Clean air and noise control

These are two very important aspects of a healthy and inclusive environment.

Our two books, published in January 2022 by HammondCare Dementia Centre, deal with these issues, with a slant on older people and those with dementia.

Free downloads and links to other relevant publications are available through the following link:

https://hubs.li/Q010TCg_0



Pollution in the UK...

The UK's Environment Agency report, notes:

- Air pollution is the single biggest environmental threat to health in the UK, shortening tens of thousands of lives each year.”
- After air pollution, noise causes the second highest pollution-related burden of disease in Europe, and is responsible for more life years lost than lead, ozone or dioxins.
- Mental health conditions are increasing - they are the largest single cause of disability in the UK, and can be caused or affected by pollution, flooding and climate change.

Pollution in Europe...

- One in every eight deaths in Europe can be linked to pollution, according to a new report by the EU's environment agency (EAA 2020)."
- It said factors such as air and noise pollution, as well as poor water quality and exposure to chemicals, contributed to 13% of all deaths.
- The report also noted that poorer communities and vulnerable people were the hardest hit by pollution.
- The remaining deaths were linked to extreme weather such as heatwaves.

Pollution Globally...

The World Health Organisation notes:

- Air pollution kills an estimated 7 million people worldwide every year of which, 4.2 million as a result of exposure to ambient (outdoor) air pollution
- WHO data shows that almost all of the global population (99%) breathe air that exceeds WHO guideline limits containing high levels of pollutants, with low and middle-income countries suffering from the highest exposures. WHO is supporting countries to address air pollution.

Who are most vulnerable?

Whilst everyone is affected by poor air quality, some of us are more vulnerable, for example:

- pregnant women
- children
- older people and people with dementia
- adults with long-term health conditions
- ...and additionally, people with impairments associated with ageing e.g., poor mobility, impaired senses and poor lung capacity.



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What are the most common air pollutants?

Particulate matter:

- PM10: inhalable particles, diameter 10 micrometres (microns) or less.
- PM2.5: fine inhalable particles, diameter 2.5 micrometres or less.
- UPM: (ultra-fine particles), which are possibly the most damaging.

It comes from:

- motor vehicles, wood-burning heaters and industry.
- During bushfires or dust storms, particle pollution can reach extremely high concentrations.

Particulate matter causes:

Throat, eye, nose irritation, worsens asthma and lung diseases and reduces life expectancy.

What are the most common air pollutants?

Gases, the main ones:

- Ozone (O_3) – which reacts with sunlight causing smog and reacts with some cleaning products – dominant product Formaldehyde
- Nitrogen oxides (NO & NO_2) – vehicle exhausts; coal/wood burning; diesel, gas stoves, cigarettes etc.
- Carbon monoxide (CO) – motor vehicles; industry; gas / wood-burning heaters
- Carbon Dioxide (CO_2) – deforestation; fossil fuels; combustion; respiration.
- Sulphur dioxide (SO_2) – natural emissions; combustion of fuels with high sulphur content.

Linked with: breathing problems, neurodegenerative diseases, cancers etc.

<https://www.health.nsw.gov.au/environment/air/Pages/outdoor-air-pollution.aspx> (accessed 11/04/2022)

Indoor / outdoor air pollutants

“Wood burners emit more particle pollution than traffic, UK data shows”

One of the biggest surprises air pollution researchers have encountered in the last decade is the huge impact of wood-burners on the air of western cities.

“It has completely crept under the radar,” says Dr Gary Fuller, at King’s College London.

- 40% of particles in British cities are from wood burning, more than double that of that from vehicles
- In Dublin, wood and peat burning can cause 70% of particles

Airports:

There is increasing evidence of potential health impacts from both aircraft **noise** and aircraft-associated **air pollution** exposure to local communities around airports.

Indoor / outdoor air pollutants

Volatile Organic Compounds (VOCs)

There are many – a full list in the book – including:

- Benzene: solvent in paints glues, plastics, inks, rubber
- Formaldehyde: used in making building materials and many household products and also occurs naturally.

All have risks to health especially from those commonly used such as air fresheners, disinfectants, cleaning wipes etc.



Indoor / outdoor air pollutants

We are learning more every day...(New Scientist 2022)

- Scented surface cleaning products can expose you to a similar amount of pollutant particles as a **busy urban road used by 28,000 vehicles a day**. The findings suggest that professional cleaners may be especially at risk of harm caused by indoor pollutants.
- Surface cleaning containing fragrant chemicals (monoterpenes) that smell like citrus or pine can evaporate into the air and react with unstable molecules e.g., ozone, to produce pollutant particles called secondary organic aerosols (SOAs). Formaldehyde also.
- Being in a room during 1.5 hours of mopping would expose the lungs to similar pollutant particle levels as spending 1.5 to 6 hours by a busy road.

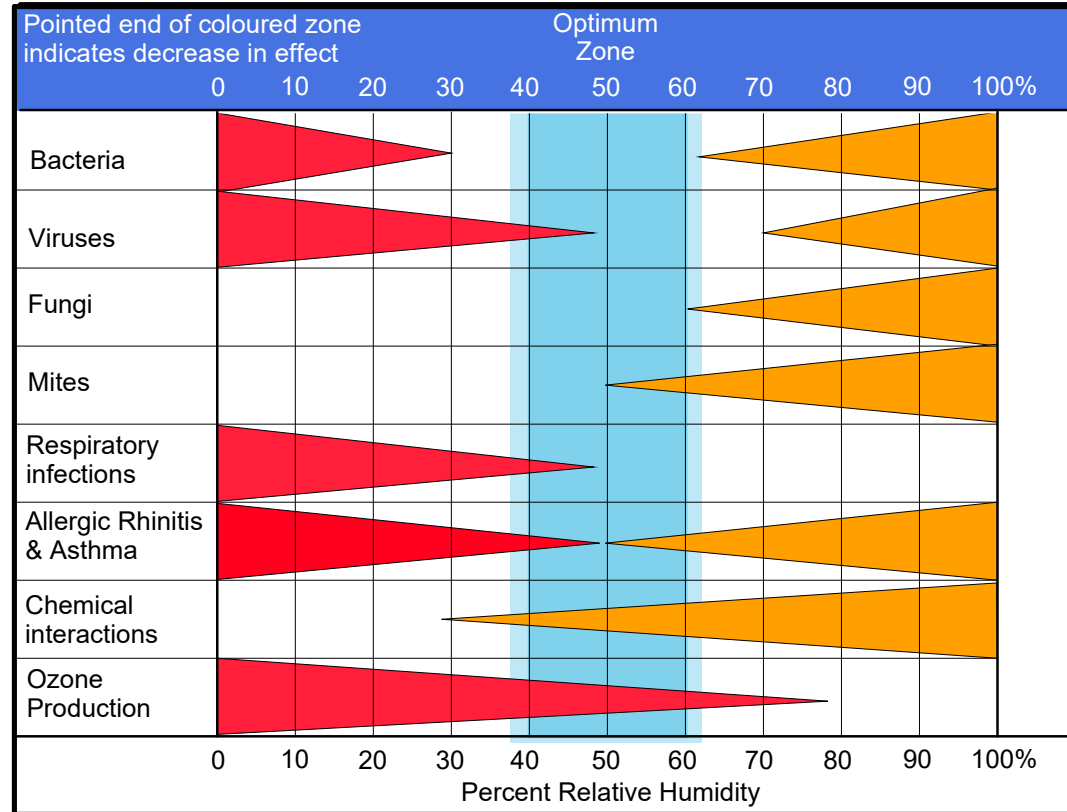
Excess moisture & humidity

Optimum relative humidity is between 40% and 60%

What does this mean?

Good design, good ventilation!

- Warmer houses in colder climates
- Good insulation
- Extractor fan in bathroom / shower room
- Clothes drying in rooms separate to ones we live in.



So, what can we do? – Site appraisal

Careful site appraisal

- Be aware of climate, traffic pollution, local industry
- Keep deliveries and car parking away from living space windows
- Use renewable energy where possible
- Use sustainable building materials
- Design to encourage outdoor use.

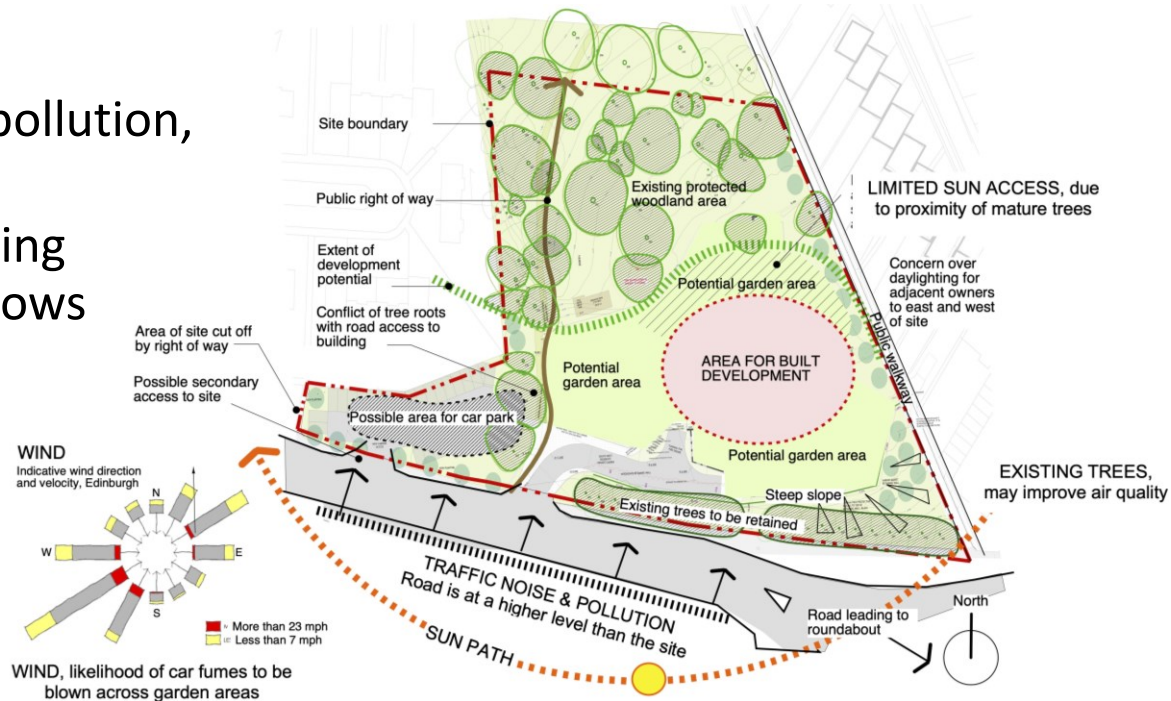


Image: © Annie Pollock

So, what can we do? – Site appraisal

Careful site appraisal

- Site away from noisy areas
- Mitigate by design.

Training

- Ensure designers and staff area are aware of the effects of noise
- Use sound absorbent materials
- Avoid noisy alarms
- Control noise at source.

Some common sounds and their decibel ratings at source	
Unsilenced pneumatic drill (at 7 m distance)	95 dB(A)
Heavy diesel lorry (40 km/h at 7 m distance)	83 dB(A)
Modern twin-engine jet (at take-off at 152 m distance)	81 dB(A)
Passenger car (60 km/h at 7 m distance)	70 dB(A)
Office environment	60 dB(A)
Ordinary conversation	50 dB(A)
Quiet bedroom	35 dB(A)

Image: © Ricky Pollock

So, what can we do? – Site appraisal

Noise and air pollution

- An example of a care home with garden area abutting a busy road...therefore noise pollution.
- Also air pollution – the trees will help, but hedging would be a welcome addition.



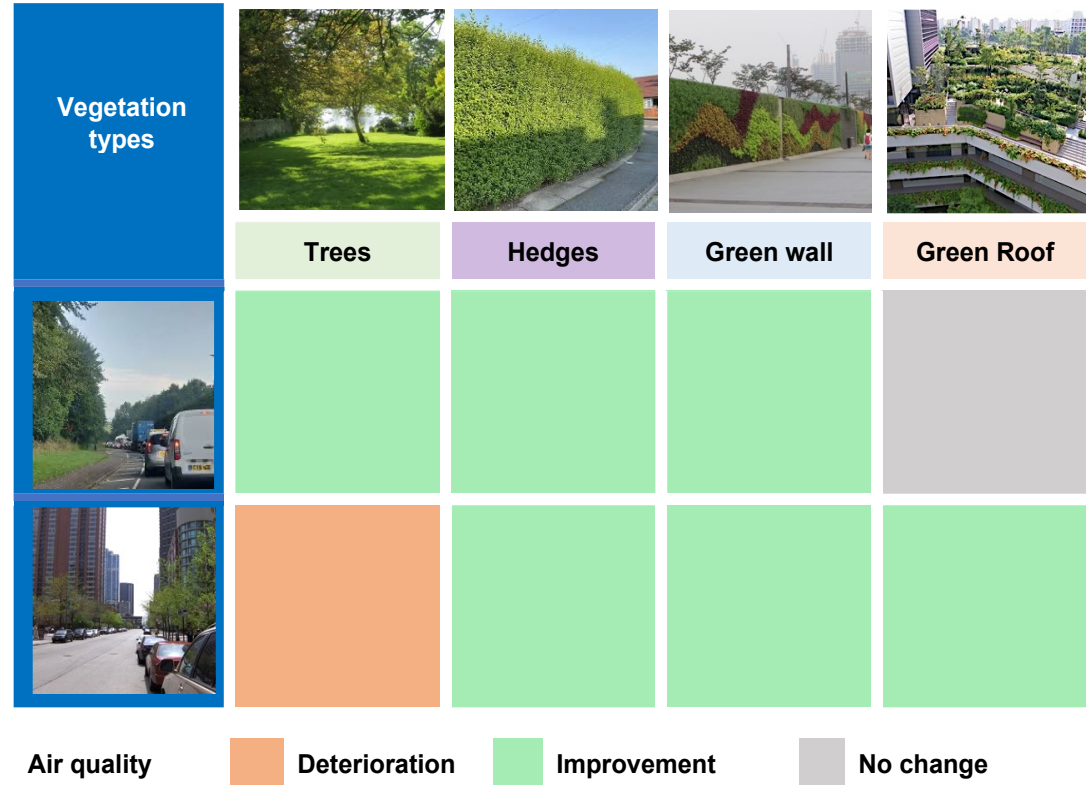
Image: © Annie Pollock

So, what can we do? – Planting

Planting: trees, hedges...

- Planting can help reduce pollution
- Trees, shrubs, green walls, green roofs
- Important to choose the right species.

BUT – Trees do not lessen noise pollution unless the plantation is around 30 metres deep!



So, what can we do? – Planting



Photo: © Care UK, architects bpa-architecture



Photo: © Laura Cionici and Stefano Boeri Architects

Growing plants vertically on building walls, generally referred to as ‘living walls’, could remove nearly 10 times as much NO_2 and nearly 12 times as much PM_{10} from street-canyon air as horizontally grown rooftop vegetation.

Kessler R (2013) ‘Green walls could cut street-canyon air pollution’, *Environmental Health Perspectives*, 121(1):a14, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3553448/>

What have we learned ? – Covid-19

Good ventilation is key

- Plenty of access to fresh air is essential
- Ventilation systems must bring in fresh air and not circulate existing air
- Smaller residential clusters in care homes make isolation easier without having to restrict all residents to their bedrooms.



Photo © Damian Utton

What have we learned? – Wildfires

Ventilation

- The usual advice is: *‘stay indoors with doors and windows tightly closed’*
- But here there’s a conflict with advice on COVID-19 for vulnerable residents, to avoid ventilation systems which recirculate indoor air.
- With wildfires, to prevent smoke inhalation from highly polluted, smoky outdoor air (which could pose a bigger danger to life than the pandemic), ventilation will have to be recirculated.

With a ‘fresh air ventilation system’, the fresh air setting should be turned off – resetting the system once the smoke outside clears.



Wildfire, 9am, San Francisco,
Photo © SR Kaderali

What have we learned? – Climate change

Design to minimise environmental challenges

Using our knowledge on air quality, site buildings where people live and work:

- To ensure the best air quality, especially for those who may be unaware of their environment or unable to make decisions, e.g., children, older people and those with dementia
- To minimise use of cars, e.g. near shops, public transport, community facilities etc.
- Use clean, renewable energy wherever possible
- Insulate buildings to ensure warm or cool environments as required
- Maintain regularly mechanical systems to ensure heating, cooling and ventilation works well and efficiently.

END, credits and thanks

Photos:

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