

AIR QUALITY AT TWO OUTDOOR LOCATIONS TO DETERMINE WHICH IS THE BETTER SOURCE FOR AIR SUPPLY TO AN OFFICE

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1. INTRODUCTION:

Figure 1 shows the office of a small accountancy business. The building is situated in a busy part of London. Staff within the building have complained about 'stuffy' and even 'poor' air quality. This perception is magnified by the fact that the entrance faces directly on to a busy road.

The owners of the business attempted to address the wellbeing of their staff by considering the option of installing a mechanical ventilation unit that would provide additional ventilation. The unit was expected to draw fresh air in from outside of the building. The location of the air intake posed a dilemma, as the shortest duct run was to the roadside. The much longer duct run involved descending to the basement level and running the full length of the building to a back door exit. The exit area is affected by some bird fouling.

3. RESULTS:

Figure 2 shows the results of the air quality assessments at three locations.

Office:

- Ventilation was not optimal resulting in elevated CO₂ concentration.
- Inadequate ventilation resulted in higher indoor temperature.
- Humidity levels were lower than best practice.

Roadside:

- Ambient air flow was high in relation to indoor acceptable rates.
- O₃ concentrations were high in relation to indoor acceptable levels.

Basement:

- Ambient humidity levels were low where measured.

Table 1: International benchmarks for IEQ

Parameter	Guideline limit or range
✓ Carbon dioxide, CO ₂	1000ppm (ASHRAE)
✓ Carbon monoxide, CO	9ppm (LEED/WELL/NABERS)
✓ Ozone, O ₃	80ppb (LEED/WELL)
✓ PM ₁₀ & PM _{2.5}	50µg & 15µg/m ³ (WELL/NABERS)
TVOC & Formaldehyde	500 & 100µg/m ³ (WELL/NABERS)
✓ Air speed	< 0.2 m/s (NABERS)
✓ Temperature	21-24°C (ASHRAE)
✓ Relative humidity, RH	30-70% (ASHRAE)
Acoustic comfort, dB	35 - 45 dB (NABERS)
Lighting, lux	Horizontal > 320 lux / Vertical > 160 lux (AS1680)

Figure 1: open plan area of an accountancy office based in London

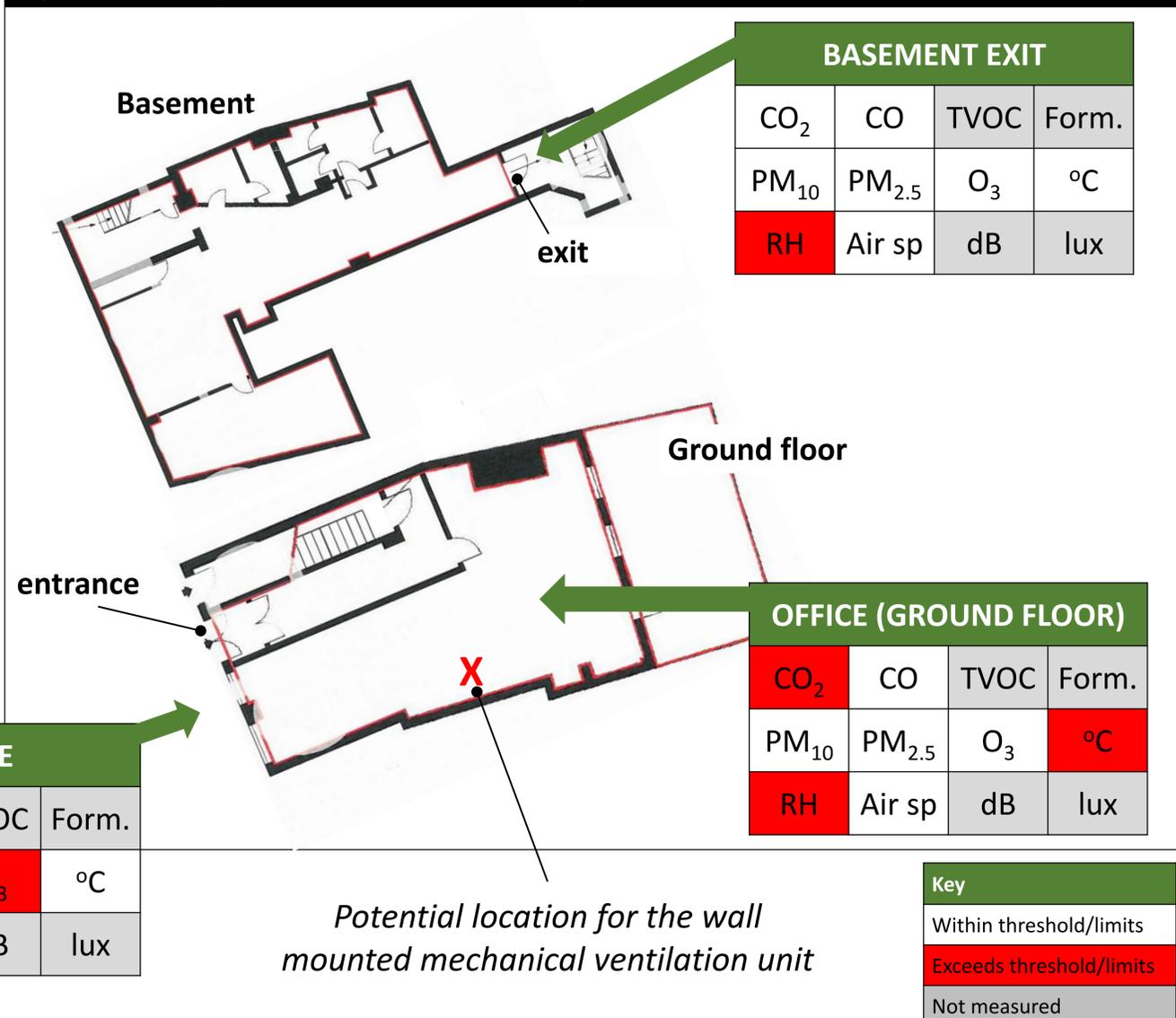


2. METHODOLOGY:

Air quality in the office, outside by the roadside and in a backyard basement exit area, was measured on the same day in summer. 8 of the 12 key parameters identified in Table 1 were examined. Within the office sampling was taken over a period of an hour with 1 minute intervals. The outdoor samples were run for approximately 15 minutes, again with 1 minute sampling intervals.

Measurements were taken using scientific instruments that had calibration certificates.

Figure 2: floor plans of the office showing IAQ measurement locations



4. CONCLUSIONS:

- ❑ Contrary to perception, indoor particulate concentrations were acceptable during the mid afternoon measurement period.
- ❑ Air quality at the roadside was generally acceptable and could be used as a source of additional ventilation.
- ❑ A more complete solution as to which side of the building to draw air in from would be gained by measuring more parameters (e.g. external noise from both locations could be a deciding factor).

References

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