

# Mums Versus Mould & Pathogen Reduction Systems Islington Case Study

Testing the PRS' "*Breathe Easy*" Sustainable Air Solution

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*"I can breathe better and I feel calmer and happy. My skin is also better."*

*Child S*

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*"The **PRS** equipment has been life changing for my family and I. Our mental and physical health has improved. In particular sleep has improved substantially for every member of our household. One of my children who was prescribed melatonin, has not needed to take this medication for most of the duration of the time we had **PRS** installed."*

*Mother **M** on the impact of **PRS** Technology*

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## Executive Summary and Positioning

- This report adopts the following structure:
  - Executive summary and contextual positioning;
  - Narrative from the perspective of the family in **Part 1**;
  - Technical Results and Conclusions of the **PRS** deployment in **Part 2**;
  - The detailed Health Diary of the period before and after deployment summarised in **Part 3**; and
  - The **PRS** sampling and testing regime detailed more fully in **Part 4**.
- This report sets out the story of a family whose health was life-alteringly, and for one member, life-threateningly impacted by poor air quality in social housing. It details the collaborative intervention that materially improved their health and living conditions.
- The intervention offers both hope for a return to health for afflicted families and a practical pathway to compliance with Awaab's Law <sup>1</sup>for duty holders with responsibility for the state and condition of housing.

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<sup>1</sup> Refers to infant Awaab Ishak fight against a Rochdale Housing Association for allocating housing 'unfit for human habitation, he died in 2020 as a result of exposure to black mould. Outcry resulted in changes to Landlord and Tenant Act 1985, mandating a timely response to dangerous damp and mould, with other hazards

- The North London-based family that is the subject of this case study has lived in the property since 2012 and experienced chronic physical and mental afflictions ultimately tied to damp and mould exposure. Baseline testing demonstrated Aspergillus/Penicillium concentrations at 10–14× outdoor levels, Cladosporium at 2–3× normal levels, and the presence of Chaetomium – an indicator of water-damage in buildings. However, for the majority of their time in their home, the link between the housing condition and disrepair and their complex ill-health issues was not identified so the underlying causes were not addressed.
- Led by Lisa Malyon, voluntary campaign group **Mums Versus Mould** began raising awareness of the broad health impacts of such living conditions. As an advocate for this family and many others like them, Lisa had been seeking scalable, sustainable solutions to improve these living conditions. Most mould biotoxin exposure is airborne, making air quality management foundational to ending this family's suffering and meeting the healthy living conditions objective. Ms. Malyon in October 2025 began enlisting the support of air quality management, technology and service providers and related subject matter experts including: law firm **DWF**, air quality technology and management firm **Pathogen Reduction Solutions ("PRS")**, air ventilation servicing firm

*managed through staged implementation from 2025 through 2027. New duties extended to Private Sector in the "Renters' Rights Act 2025". These require serious mould to be dealt with quickly and emergency hazards in 24 hours.*

**Farmwood Mechanical and Electrical Services Ltd ("Farmwood") and The University of Bath.**

- The resulting pilot intervention described in this report, with **PRS "Breathe Easy"** Sustainable Air Solution technology applied over a roughly three-week period before the family was temporarily decanted to another location, produced substantial improvements in the family's health and wellbeing, and material reductions in the microbial load within the residence.
- **PRS** operation quickly resulted in a roughly 88% reduction in key mould species, significant IAQ improvements, relative humidity stabilisation, and rapid resolution of occupant symptoms including seizures, eczema, breathing difficulty, sleep disturbance, anxiety and depression.

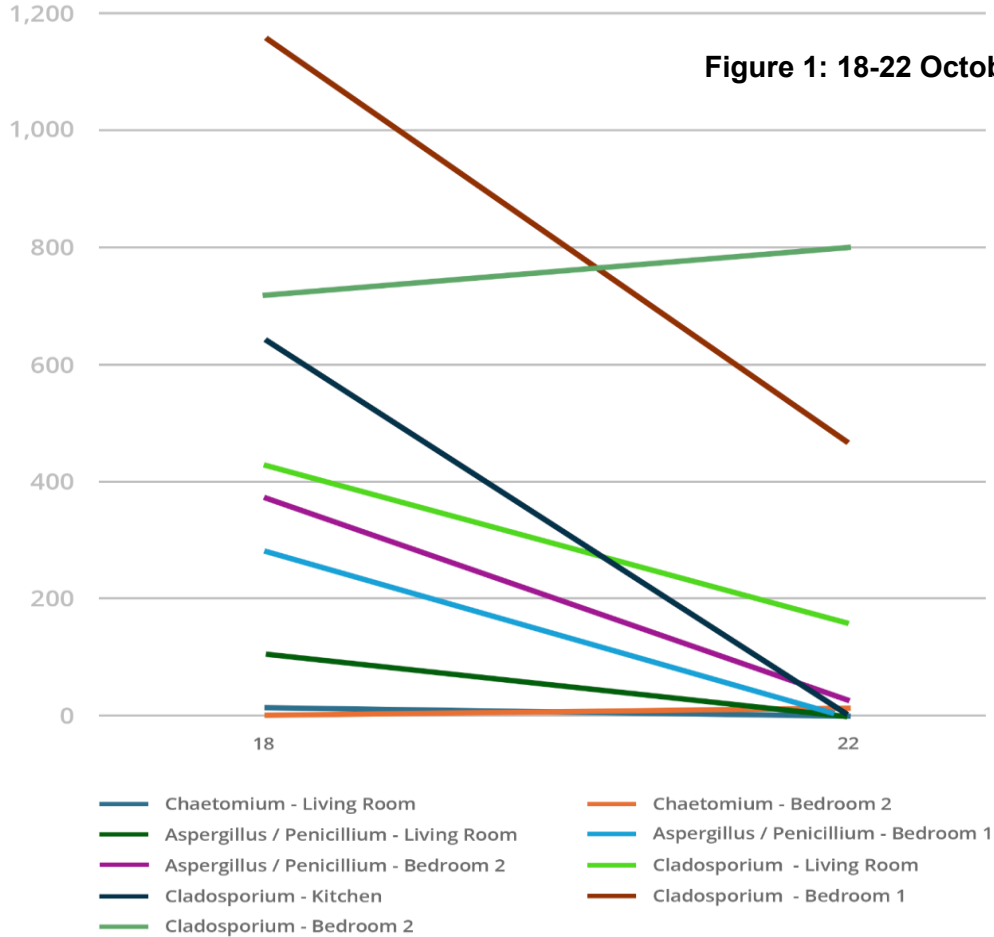
**Key Takeaways from the Pilot:**

- **PRS** was deployed solely as a temporary exposure-mitigation measure to protect occupants from airborne mould spores, fragments and associated bioaerosols while the underlying causes of damp and mould were being investigated and awaited remediation. **PRS** does not remediate building defects, repair leaks, or eliminate moisture ingress, and has never been presented as a substitute for structural or fabric works.
- **Rapid, substantial improvements in health are possible with the right air sanitisation technology, practically applied "clinically and functionally significant" for one**

**family.** Within a couple of days after **PRS'** commissioning, the family began experiencing material improvements in both their physical and mental health. The report includes detailed accounts during the pilot from the family members' evolving improvements in health and wellbeing: sleep improved, mental health improved, skin issues reduced and critically, there were fewer seizure-related symptoms and no seizures. Seizures were previously so severe that physicians expressed concern about him breaking his neck or back during these events.

- **PRS demonstrates effectiveness at mitigating the harmful effects of poor air quality, with mitigation being one of two serial steps in addressing this social housing challenge.** Identifying and remediating the root causes of the damp and mould in these residences can take time. Based upon testing before installation and periodically during the pilot, the **PRS** solution proved effective at improving air quality conditions – including inactivating airborne mould spores – and thereby, making the location safe awaiting full remediation. Because it works rapidly, it is suitable for emergency situations.

➤ Results of two sets of air quality samples taken a week apart shown in figure 1 below, showing the reduction in specified species:



- **PRS** targets the exposure route most directly linked to symptoms: the air the occupants breathe. Its UVC optical-cavity system destroys spores and fungal fragments in real time during air recirculation - something no dehumidifier, extractor fan, or cleaning programme can achieve.
- **The pilot illustrates one very practical, serial pathway to compliance with Awaab's Law – mitigation of harmful conditions while root causes of damp and mould are identified and remediated.** First introduced in November 2022 following the death of Awaab Ishak due to mould exposure and effective 27 October 2025, Awaab's Law is designed to protect tenants from emergency hazards generally and the health and safety risks associated with damp and mould conditions specifically. Relevance to Awaab's Law and Housing Duty of Care, Awaab's Law establishes clear obligations for social housing providers to address emergency hazards, including damp and mould, within defined timescales. The duty is expected to extend to private landlords in time. However, remediation of structural defects often requires extended investigation and works programmes. There is also a shortage of damp diagnostics and mould remediation experts, which highlights the importance of technologies like **PRS**.
- This pilot demonstrates a practical, evidence-based mitigation pathway whereby immediate health risk can be

reduced through airborne exposure control while root-cause remediation is planned and undertaken. **PRS** should therefore be considered a temporary public-health protection measure, supporting compliance with statutory duties without substituting for permanent fabric repair and remediation. Whilst there may be other technologies in the market that seek to address the same challenging issues, the PRS technology was seen to be fast acting and well-suited to providing an "emergency response" where such is called for under the applicable duties.

- Note that other technologies may be available that seek to address these issues, although this test was to assess the efficacy of the PRS solution.

### Ventilation

- Ventilation is frequently presented as a primary mitigation strategy for damp and mould; however, in practice it often functions as a risk multiplier when systems are poorly designed, poorly maintained, or unsuited to the occupancy and building fabric. The findings in this case highlight that ventilation effectiveness cannot be assessed solely by the presence of air movement, but must consider system performance, control, suitability, and interaction with moisture sources.

- In damp-affected dwellings, inadequate ventilation can amplify mould risk through several mechanisms: insufficient air change rates fail to remove moisture generated by normal occupancy; poorly distributed airflow creates stagnant micro-environments where humidity remains elevated; and intermittent or occupant-dependent systems (e.g. window opening or extractor use) provide inconsistent protection. Where ventilation systems are undersized, poorly commissioned, or non-functional, they may give the appearance of compliance while offering little real control of airborne exposure.
- Importantly, increased ventilation alone does not necessarily reduce mould risk if incoming air is cold, humid, or polluted, or if the system lacks the capacity to maintain relative humidity below fungal growth thresholds. In such cases, ventilation can paradoxically increase condensation, drive moisture into colder building elements, and sustain conditions favourable to mould proliferation. This is particularly relevant in older or thermally inefficient housing stock, where ventilation strategies are often misaligned with fabric performance.
- In the present case, indoor nitrogen dioxide (NO<sub>2</sub>) levels were consistently lower than outdoor concentrations, indicating limited effective air exchange despite the presence of nominal ventilation pathways. At the same time, relative humidity remained persistently elevated during baseline monitoring, confirming that ventilation, as configured and used, was insufficient to control moisture or airborne microbial load.

- These observations support the interpretation that ventilation should be viewed as one component within a broader environmental control strategy, rather than a standalone solution. Where ventilation performance is inadequate or inappropriate, airborne mould spores, fragments, and associated particulates can accumulate and persist, amplifying health risks even in the absence of visible surface growth.
- The rapid improvement observed following deployment of the **PRS** system suggests that direct treatment of recirculated indoor air can mitigate exposure in situations where ventilation alone fails to provide effective protection. This does not replace the need for appropriate ventilation and building repair but highlights the importance of engineered air treatment as a complementary control, particularly during periods when structural remediation or system upgrades are delayed.
- From a policy and enforcement perspective, these findings underscore the need for ventilation assessments under Awaab's Law to move beyond simple presence-based checks and towards performance-based evaluation, including moisture control, effective air distribution, and airborne exposure reduction.

#### **Key Context to this Pilot**

- Other pilots are underway, but this one social housing family experience and risk mitigation effectiveness, warrants further structured evaluation on: (i) the need for urgent intervention,

(ii) the opportunity for near immediate improvement in the health of the families affected, and (iii) the practical pathway to protecting this population in compliance with Awaab's Law while damp and mould root cause conditions are actively identified and remediated.

- **Social and Private Housing Conditions – the large and growing damp and mould threat to human health and wellbeing.** Damp and mould are not cosmetic defects, they are environmental exposures capable of causing measurable harm – and harm that is not yet acknowledged by the NHS – such as the human neurological and inflammatory response to mould spores and the secondary metabolites (mycotoxins) that they can release<sup>2</sup> UK housing stock continues to present indoor air conditions associated with asthma exacerbation, neurological disruption, sleep impairment, chronic respiratory inflammation and psychological stress. Remediation efforts to date have relied heavily on chemical wash surface cleaning,

stain-block painting, ventilation advice, and temporary decants approaches shown to fail when airborne microbial loads remain unaddressed.

- Over 200,000 households reportedly have categorised damp and mould concerns, likely growing in number with warming and increasingly volatile weather conditions so a measured, highly replicable and condition severity-prioritised approach is required, starting with risk mitigation. This can afflict social and private rental homes and privately owner occupied and high churn cases such as student housing and military housing.
- Other properties such as schools and prisons are acknowledged to have damp, water-damage and mould related risks and liabilities.

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<sup>2</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0889159119303010>

Social Housing Living Condition Statistics			
Total UK population	58.6	million	
Total UK households	24.8	million	
Avg people per household	2.4		
Est households in social housing	4.0	million	
% of total UK households in social housing	16.1%		
Est population in social housing	9.5	million	
	<b>Homes</b>	<b>Implied</b>	
<b>Social housing damp and mould conditions*</b>	<b>Midpoint</b>	<b>People</b>	<b>% Range</b>
Category 3 "Notable"	140,000	331,149	3.0% 4.0%
Category 2 "Serious"	60,000	141,921	1.0% 2.0%
Category 1 "Serious and immediate threat"	8,000	18,923	0.2%
<i>Total</i>	<i>208,000</i>	<i>491,993</i>	
<i>* Regulator of Social Housing estimates in 2023; note: housing ombudsman reported a 77% rise in complaints for the 2022-23 period vs 2020-21 period</i>			

**Figure2 : Social Housing Living Condition Statistics**

- **Costs:** Published statistics identify a £13bn annual remediation and health/disease claims from mouldy homes. According to the Building Research Establishment ("**BRE**") the NHS incurs an estimated £1.4bn cost annually for treating people affected by mould and poor-quality housing, with a full societal cost of £18.5bn annually.
- Failure to deal effectively with inadequate housing stock through time, with substantial under investment in repairs and maintenance, has led to this afflicted part of the housing sector creating a massive externality borne primarily by the victims, and consequently, the NHS<sup>3</sup>.

<sup>3</sup> BRE estimate 2021 Report. FOIL 2025 estimated that ill-health due to unsafe **private** rented homes costs the NHS £340 million annually – not including **public** sector related costs.

## **Legal Context: Observations from the Legal Perspective**

### **Note: Legal discussion not specific to this Pilot**

- Building disrepair and related health effects sit in what can be a complex legal area compared to some others which may appear superficially similar where harm to health or the environment occurs. Water pollution for example is normally fairly clear cut in terms of ascertaining liabilities and the source-pathway-receptor chain and the application of the polluter pays principle. Similarly, with health and safety events in the workplace, the duties and responsibilities are generally clear and liabilities strict.

### **Relevant Complicating Factors**

- However, in comparison, the lines of liability can be more complex when dealing with damp, water-damage and mould-related risks that can emerge and impact occupier health over an extended period.
- Certain features of the property sector add complexity. These include the range of property ownership types and tenures (and how that may have changed through time with different people owning, managing and leasing certain properties), the lack of required record keeping maintaining information on key features of the property to inform future tradespersons, situation specific arrangements and property characteristics, the range of approaches to energy efficiency retrofits (with additions of cladding, insulation and double glazing changing the home's pathology). The range of water-damage, damp

and mould management (or lack thereof) in any property over time. Different levels of occupancy and overcrowding and sometimes tenant behaviours.

- Further, the human health consequences of exposure to biotoxins and pathogens resulting from such housing disrepair are highly variable (i.e. not every occupant has the same response, based on similar exposure so the causal linkage to ill health in any individual case). This is especially true if the issue is hidden for some time (as was the situation in this case study).

### **Lack of Frontline Awareness: Trades and Healthcare Workers**

- Furthermore, despite the fact that the health consequences of water-damage and mould related biotoxins are reasonably well-understood at a scientific and academic level, this has not filtered down widely to the front-line building trades and health professionals and occupiers This state of affairs leaves much to be desired and can clearly be improved.
- The range of situations varies hugely. Building defects can result from disrepair, bad design or poor maintenance. Damp may be caused by water ingress (roof, guttering) or penetrating or rising damp, or from flooding or accidental water events such as a burst pipe. Issues may also be caused or exacerbated by inadequate ventilation & high absolute humidity and overcrowding. This may dictate that a building fails to meet the Relevant Standards (BS 5250 /

Building Regs Parts C, F, L / Housing Health & Safety, Social Housing (Regulation) Act).

- Water-damage, mould and damp problems can prevent occupants living normally and safely in their home. Individual occupiers may have varying levels of sensitivity to exposures (which can be exacerbated in the young, old, or those with health vulnerabilities such as auto-immune disease). There are a range of often life-altering side effects associated to exposure to toxins from water damaged materials including mould, bacteria, algae (including mycotoxins, endotoxins, algal toxins, dust mites, etc). This can impact life in a variety of ways (attendance at work, school, relationships).
- Loss and damage sustained by occupants for injury or illness includes (or is alleged to include) the following conditions (noting that there may be other causes of these conditions in any given circumstance):
  - Respiratory illnesses and infections (inc. asthma, hay fever, bronchitis);
  - Skin complaints (rashes, hives);
  - Immune System (*Hypersensitivity Pneumonitis*);
  - Mould infestation (*Aspergillus fumigatus*);
  - Neurological (nervous shock, dementia);
  - Pain Syndromes (inflammation, complex regional pain syndrome (CRPS));

- Autism/ADHD;
- Fertility; or
- Psychiatric (stress, anxiety, depression).

### **Potentially Responsible Parties ("PRPs")**

#### **Who are the likely Targets/Participants in Legal Action?**

- As is apparent from this complexity there are a web of parties involved who *could* be implicated with some responsibility in any given specific situation and some of these parties may (in theory) have claims against others (so there isn't always necessarily a clear line from "victim" to an obvious sole "defendant" who has failed them). Many of the organisations involved may not readily have access to required capital to deal with the issues arising which can in some instances create circumstances in which victims may be failed.
- It will often be fairly obvious to an injured tenant that it is those who are most directly connected "up the chain" (i.e. their landlord or registered provider) who has the clearest duty and responsibility. Hence housing owners are often the clearest "target", especially councils and registered providers of social housing. This may include owners of private rented housing, temporary hotels, military accommodation; and Student Housing, for example.
- In these situations, the question arises whether they are providing unsafe accommodation to vulnerable occupants. Alongside exposure to health claims, there is an impact on

asset value and the risk of homes being condemned due to condition which reduces housing stock.

➤ Other potential parties can include:

- Councils with housing allocation responsibilities (*Are they allocating tenants to the right property, is it safe?*)
- Manufacturers of mitigation technology e.g. filters or air purification systems, e.g. Positive Input Ventilation or **PIVs** (*Is it the right specification of product for this circumstance? Are they properly described and are claims / advertisements of efficacy accurate? Are they over-claiming effectiveness? Has the technology been proven effective in lab tests?*)
- Retailers or Wholesale Distributors of such technology (*Is consumer protection legislation applicable?*)
- Installers of the technology (*Exposed to professional indemnity claims if they get things wrong?*)
- Surveyors /Specifiers specifying the technology (*Exposed to professional indemnity claims if they get things wrong?*)
- Regulators e.g. Housing team at Council, HSE, Trading Standards (*Did they comply with appropriate statutory duties?*)

- Each of their insurers? Does the policy respond? Subject to careful consideration of policy terms, limitations and exclusions.
- Employers e.g. for certain victim groups e.g. staff in impacted schools or NHS facilities? (*e.g. were they exposed to harm through employment? Have Health and Safety at Work Act 1974 and related duties been fully complied with?*)
- NHS is taking the brunt of these health externalities with expensive long-term treatments (*Might the health industry that is currently absorbing these costs seek redress? from whom?*)

### Potential Legal Actions

- IAQ, water-damage, biotoxins and mould claims may involve various types of litigation, and range of potential targets of that litigation (see *Potentially Responsible Parties* or PRPs discussed above). Each situation in which harm occurs can be complicated and unique. There is no simple one size fits all solution. There is a mixture of health issues / victim sensitivity / property specific issues. This can bring in a potential range of claims under contract, tort, breach of statutory duty and the criminal code.
- As introduced above - at the core there may be: (i) personal injury / product liability civil cases; (ii) mis-selling / consumer-type cases; (iii) housing and social housing complaints about the environment, raising environmental, regulatory and

potentially human rights grounds; (iv) public law / judicial review challenge (e.g. to councils purchasing PIVs as a blanket solution if these are unsuited to a given home), on the basis of rationality and human rights.

- Additionally, one would consider the law relating to:
  - Health & Safety
  - Consumer protection
  - Housing Act / Housing Health & Safety Ratings (HHSRS)
  - Environmental law (including biocide use / chemical regulations)
  - Human rights
  - Proceeds of Crimes Act (*who saved money not fixing this properly and does that constitute a "proceed of crime"?*)
  - Advertising standards
  - Equality Act Discrimination (*is there a worse impact on people with certain characteristics: fuel poor / old / particular ethnic groups / disability?*)
  - Breach of statutory duties by regulators / standard setting agencies

- Director duties (decision makers in these organisations), including non-executive directors.

## Governance

- From cases that **Mums Versus Mould** is supporting there appear to be some **corporate governance failings** akin to some aspects that arose in the **Post Office** scandal (for example: denial, dismissal, distraction, gaslighting, a habit of victim blaming, tendency to minimise the consequences, a fear of the "floodgates" being opened so a need to hold the line") and the **Grenfell Tower/cladding** scandal (there as here, root causes arguably include failings of governance and regulatory oversight, failure in housing standards, naivety in the procurement and specifications of supposed cures or cynically cutting corners to save money).
- The new "**Hillsborough Law**" and "duty of candour" on public bodies may have an impact and may exercise public bodies involved.
- With all that said it may not be a surprise that some victims find that the range of potentially responsible parties they are looking to for support and solutions are not always prompt in dealing with issues arising. However well-meaning those involved may be, it is a complex area and requires substantial resources which is in short supply.

# Part 1 Overview Narrative Report



## Part 1.) Overview Narrative Report

***This is one family's story of their health battles while living with a high microbial load and poor indoor air quality, and their improvement after securing intervention support from Mums Versus Mould – the voluntary campaign group, Pathogen Reduction Solutions (PRS), The University of Bath, and Law firm DWF.***

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### 1. Introduction

This document relates to a family living in social housing affected by high microbial load in their North London property (the "**Property**"). For the purposes of this case study, the family's names have been anonymised and individuals are referred to as follows:

- Mother: **M**
- Mother's children: *Adult Child W* (Aged 20), *Adult Child X* (Aged 19), *Child Y* (Aged 15) and *Child Z* (Aged 13)
- Mother's sister: *Child S* (12)

**M**'s story is difficult. It is hard to hear, challenging to absorb, and impossible to justify. Those difficulties pale beside the reality she and her family lived through in a Social Housing Provider ("**SHP**") maisonette in Islington, where years of leaks, damp and mould slowly dismantled their health and stability. We do not name the **SHP** in this document, but its senior management is fully aware of the intervention.

Listening to **M**, we hear the story of a mother whose resilience highlights the urgent need for systemic change. Her account is not an outcry to apportion blame but a call for accountability, transparency and reform within a housing system that is currently failing many families.

What follows is a detailed, evidence-based account of how one London family was left to navigate chronic mould exposure, worsening illnesses, institutional resistance and the long road toward recognition and safety. It highlights the lack of awareness of the signs to watch for amongst health and housing professionals, and the very limited "toolbox" of mitigation and remedial solutions that they typically deploy.

This narrative was prepared by trainee solicitors Victoria Shaw and Joy Blankson-Hemans at DWF whose time was provided voluntarily, based on a detailed interview with **M** and review of documents provided by the family; it necessarily adopts the family's perspective and it has not been possible to independently verify the events. We are grateful for the input provided.

## 2. Family Background

**M**'s family is made up of her four sons and younger sister, for whom she has been the legal guardian since her father's death. In 2012, **SHP** (then operated by a legal predecessor entity) facilitated **M**'s allocation to the Property in Islington after the sale of their previous Tottenham residence. On paper, the move was to provide a fresh start but in reality, they walked into a home in a state of serious disrepair.

Upon viewing the Property, **M** recalls arriving to find bare concrete floors and floorboards, signs of water damage and varying degrees of mould and staining across ceilings and walls. **SHP** did not offer any meaningful inspection, and **M** was not provided with sufficient information about the true condition of the Property. She also later learned that the previous tenant had been very unwell and disabled, and the Property clearly needed to be updated. Of particular concern was a dangerously high staircase which posed a danger to her *Child Y*, who had significant learning disabilities and could not appreciate the risk of a fatal fall when playing around the area.

**M** hoped the Property would be refurbished or at the very least brought up to standard for a family of 6. However, when this was put to **SHP**, **M** was told no major works would be done and the family were left to carry out remedial works at their own expense.

A selection of photographs is included in the **Appendix**.

## 3. Early Emergence of Health Issues

Before moving to the Property, the family was in decent and stable health. Afterwards, the decline was steady and then steep with the entire family experiencing unexplained and worsening health issues.

**M** initially sought help from **SHP** and was met with superficial and short-lived responses. At first, she reported problems as they arose, not realising these were symptoms of a wider, systemic, pattern of leaks, rising damp and structural defects. She attempted to navigate **SHP**'s mosaic of online systems, phone calls and complaint webforms, explaining that her home was "getting worse every year".

*"I was constantly fatigued, experienced 'air hunger', like I couldn't get enough air when I breathed. I was always anxious and had negative intrusive thoughts."*

### *Adult Child W*

From 2012 to 2015, *Adult Child W* was riddled with recurring fevers, headaches and episodes which led to absences from school; *Child Z* developed swollen adenoids, a constant blocked nose, and mouth breathing; *Adult Child X* developed anxiety and night terrors; and *Child Y* regressed developmentally and lost the limited language he had. The longer they remained in the Property, the more entrenched, bleak and complex the health picture became.

When temporarily removed away from the Property the family symptoms improved (for example *Adult Child W*'s incidents of fever reduced). On return to the Property, the health of all family members significantly worsened. *Adult Child W*'s symptoms surged and he experienced his first recognised generalised seizures.

The strain of the repeated health calamities contributed to the breakdown of **M**'s marriage and subsequently she became a single mother left to piece her household back together.

#### 4. **The Mounting Health Toll**

In 2018, the boiler malfunctioned and water leaked into *Adult Child W*'s bedroom. His health deteriorated sharply and he was admitted to hospital for two weeks following prolonged seizures. Medical investigations were carried out including an MRI and two lumbar punctures but doctors were unable to identify the cause of the seizures. By 2019, *Adult Child W* was diagnosed with epilepsy and an anxiety disorder. His seizures and hospital admissions continued, severely affecting his schooling and mental health.

In 2021, the Property suffered additional leaks and the family was left with a two-month respiratory illness. *Adult Child X* was rushed to hospital with a severe infection which was later treated as suspected sepsis. Both older boys' GCSEs were badly affected and had to be reset.

#### 5. **Mental Health Impact**

The physical harm sits alongside deep psychological trauma.

*Adult Child W*'s epilepsy, intrusive thoughts and periods of cognitive fog have shaped his entire adolescence and early adulthood. He describes feeling robbed of a normal childhood, teenage and young adult life, and continues in therapy to manage the impact on his education, friendships and sense of self. *Adult Child X* struggles with severe anxiety, insomnia and social withdrawal. *Child Y*'s developmental regression, sleep disturbance, tics and behavioural

challenges have required specialist schooling and intensive support. *Child Z* has had his sleep quality significantly disrupted by years of mouth breathing as a result of a constant blocked nose. *Child S*, with sensitive eczema, describes feeling anxious and lacking confidence.

*"From a young age since being in this house I remember just struggling to be comfortable and feeling healthy. There was always something wrong with someone in our family. It was a constant cycle."*

*Adult Child X*

For **M**, the state of her family and constant efforts to improve their health has prevented her from working, forming friendships, and having any semblance of a social life.

It is clear that a decade in such a toxic environment has left scars that will not quickly heal.

The cumulative physical and mental health effects have led the family to seek medical help repeatedly, including urgent support from local NHS doctors and hospitals. The costs to the NHS of dealing with these issues has been considerable. Put in the context of an overstretched and overwhelmed healthcare system, it becomes evident that this is a far-reaching social issue with significant ripple effects.

#### 6. **SHP Responses**

**SHP**'s responses show a pattern of minimal intervention.

In April 2022, **M** was notified that her case was not a rehousing matter and her repair requests did not qualify for investment. This included her Aids & Adaptations request to safeguard the staircase which remained a danger to *Child Y*. **M** eventually borrowed £8000 to repair the kitchen and carried out self-repairs to the Property.

In August 2023, frustrated by the deteriorating health of her family, **M** sent a further complaint on the subsisting leaks in the Property which was now heavily mould infested. **SHP**, despite holding historic documentation of **M** and her family, responded with requests for further details of her family and of the leaks.

In October 2023, **M** sought intervention from local claimant solicitors to formally put the issues forward in a Letter of Claim. The letter detailed rising damp, saturated floors, rotting wood, damaged tiles and rampant mould spreading across multiple walls. These issues were plainly linked to unresolved leaks and failed repairs. **SHP** settled the claim for a low sum, and carried out remediation to the bathroom, bedroom and hallway flooring. However, what is notably missing throughout is a sustained attempt to find and fix the root issues. No air tests or surveys were carried out to investigate and mould washes continued by the dozen.

## 7. **Mums Versus Mould and PRS**

For years, **M** tried to find a solution. She spoke to doctors (including a private doctor in the Netherlands for *Child Z*), changed diets and cleaned regimentally. She continued to raise concerns with **SHP** about her family's health problems and they continued to undergo surface cleaning without any thought as to causation of the issues.

The family did not feel that the matters that they raised were taken seriously, until **M** found the **Mums Versus Mould** online community.

### *Mums Versus Mould: Lisa's Origin Story*

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#### *Case study: Lisa Malyon (Extracted from 2025 Royal College of Physicians Publication):*

*Lisa Malyon and her newborn daughter lived in a damp property for a year before their health drastically deteriorated. Constant chest infections eventually stopped responding to antibiotics. Lisa – then aged 38 – collapsed with chest pain and was rushed to hospital to be diagnosed with pneumonia.*

*She comments:*

*"The respiratory consultants initially thought the mass on my lung may be cancer, but it was a fungal infection. It took five days in hospital to eventually respond to medication.*

*I thought I was clued up about the risks of the indoor environment as my mum is a nurse and my dad is a builder, but it turns out I was clueless. Every week I use 'mould remover' and spray it directly onto the mould. Little did I know this was feeding the mould and further contaminating our air and spreading the microscopic mould spores, fragments, and volatile organic compounds to other areas of the house for us all to inhale. The chest infections for us both continued, and I was prescribed a mucolytic to help me clear my chest every morning.*

*The only time we felt better was when we were out of the house, so we decided to move. After moving, my health made a miraculous recovery, but my poor daughter's lungs have been damaged forever. Phoebe takes a preventative steroid inhaler morning and night to support her struggling lungs to defend themselves against infections. When she doesn't have the inhaler, she struggles to breathe and her little voice weakens – it's heart-breaking. Her lungs will never recover as the damage was done when her lungs were still developing.*

*My heart goes out to every mother who lives in a damp property and can't escape it. That's why I have created Indoor Air Aware and the **Mums Versus Mould** online community to empower families to protect their health against the microbial contamination that results from a water-damaged home."*

*Lisa runs a Community Interest Company that coordinates 4 joined up not for profit campaigning initiatives:*

*[Indoor Air Aware](#) – Helping every household improve indoor air quality*

*[UK Centre for Mould Safety](#) – Britain's authority on safe mould removal*

*[Mums Versus Mould](#) – Facebook community to prevent / remove mould safely*

*[WattsWatt](#) – A national energy service helping homes to access more heat hours*

*Quoted in: [Public unaware of the health harms of air pollution, warns Royal College of Physicians | RCP](#)*

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With **M**'s permission, Lisa voluntarily engaged in correspondence on the family's behalf with **SHP** and other key stakeholders, commissioned and performed mould survey work and facilitated the production of mould tests and lab assessments (detailed elsewhere in this report)..

**M**'s research also led her to run a urine test for *Adult Child W*. The results showed elevated markers consistent with mould and mycotoxin exposure. This prompted referral to a Natural Medical Consultant at an IBS and Auto Immune clinic whose involvement confirmed *Adult Child W* had mould toxicity. The consultant's report also validated that the family was living in an environmentally dangerous home with multiple leaks and mould. For **M**, this was the first time a healthcare professional put in writing that the home itself was making her family sick.

In October 2025, Lisa introduced the family to Steven McNab at **DWF** solicitors who provides pro bono legal support and volunteering assistance to Indoor Air Aware – the community interest company that runs the **Mums Versus Mould** community and campaign.

Serendipitously, **DWF** also work with a science led *cleantech* and *proptech* company focused on providing safe air solutions for indoor spaces: "**Pathogen Reduction Services**" or "**PRS**". **DWF** has been working with **PRS** for a number of years on large scale deployment of their award-winning technology in commercial buildings. **PRS'**

multi-patented technology application improves pathogen resilience for human health of building occupants but also delivers energy savings typically in the of 10-30% range, reducing building operating costs and improving environmental sustainability. **PRS** technology has been proven in both lab and full-scale field environments to be highly effective at killing viruses (e.g., SARS-CoV-2, common flu, measles), bacteria and moulds.

**PRS** had deployed smaller self-contained units in both smaller scale commercial and residential settings and so McNab suggested a challenge: could **PRS** mitigate the unacceptable indoor air and microbial contamination problems faced by Lisa's clients? **PRS** was confident and co-founder Ian Sinclair and his team were introduced to Lisa at a workshop, and with the support of Nathan Wood from **Farmwood**, they agreed on a pilot deployment of their freestanding technology with **Mums Versus Mould** and its alliance partners.

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### **Pathogen Reduction Solutions**

*PRS is a dynamic UK-based science and engineering company that has developed a multi-award-winning, patented optical-cavity UVC system designed to inactivate airborne pathogens, mould spores, bacteria, and harmful bioaerosols in real time. PRS technology integrates on the supply side of existing ventilation systems or operates as a standalone unit, safely treating air as it circulates through a home or building.*

*In social and other housing environments, PRS enables homes with chronic damp and mould to recirculate indoor air safely, substantially*

*reducing airborne spores and improving respiratory conditions within days. The PRS application delivers measurable benefits across multiple dimensions: cleaner, safer air; reduced occupant health risk; and fewer hospital visits, easing pressure on NHS resources.*

*Originally developed during the COVID-19 pandemic to address airborne pathogen transmission, PRS is now being deployed across targeted commercial settings (including hospitals and offices) and residential housing. The system transforms indoor air safety into a deliverable and measurable outcome. PRS works alongside legal, academic, housing, insurance, and technology partners to provide an evidence-based mitigation pathway that protects vulnerable families while permanent remedial works address the root causes of moisture ingress and mould proliferation. In this role, PRS helps mitigate immediate health impacts while longer-term fixes are implemented, supporting compliance with housing duty-of-care obligations under Awaab's Law and related legislation.*

*PRS Founder and CEO Ian Sinclair is a Commissioner of the Global Commission on Healthy Indoor Air, an initiative led by the International WELL Building Institute (IWBI) and announced at the United Nations. The Commission brings together more than 100 global leaders from 30 countries - including former U.S. Surgeons General, senior scientists, public-health authorities, and sustainability leaders - to elevate indoor air quality as a critical public-health priority.*

*As a Commissioner, Ian is contributing to a Global Framework for Action and the development of national blueprints to strengthen indoor air quality across regions. He believes healthy indoor air is a*

*basic human right and regards poor indoor air quality as "the new asbestos" - a silent, systemic threat to global health. While more than 90% of the world's population now drinks safe water, only around 10% breathe clean indoor air. Through real-world deployment of PRS, he is focused on delivering measurable improvements that protect people today while supporting a healthier, lower carbon-built environment for the future.*

Concurrently, Lisa received further negative health updates from the family who were not getting adequate support from their landlord. Lisa was alarmed by the risk of repeated seizures and the imminent risk and fatal harm posed to *Adult Child W*. Lisa challenged **PRS** and **DWF** to mobilise for an urgent pilot deployment to tackle this challenge. **PRS** subsequently mobilised an urgent and expedited response to bring forward the pilot project.

**The University of Bath** became directly involved in the study through its Biology and Biochemistry team at the **Milner Centre for Evolution**. A team led by renowned mycology specialist Dr Daniel Henck and supported by his student Matthew Wareham, reviewed the trial phase testing protocols, data measurement and success criteria prior to the study's commencement. These had been developed by **PRS** with input from ventilation specialists Nathan Wood at **Farmwood** (a longstanding trusted advisor to Lisa). This independent academic review assured Lisa and the family that the study was going to be performed in a robust manner despite the urgency of the deployment. **Farmwood** also generously performed the majority of sampling and supported with technology provision.

Within ten days, two specialist **PRS** air-treatment units had been assembled, commissioned, tested, deployed and installed in the Property, along with dehumidifiers and a raft of high-tech monitoring technology which meets the relevant lab-test standards.

During the urgent installation phase, two members of the **PRS** installation team reported transient symptoms consistent with short-term exposure to a high-bioburden indoor environment. These effects resolved without medical intervention.

This observation reinforces the severity of the environmental conditions present at the Property at the time of installation and highlights the importance of appropriate personal protective equipment ("**PPE**") and respiratory protection ("**RPE**") and exposure controls when working in heavily contaminated dwellings.

Matthew Wareham from **The University of Bath** developed a detailed health survey that was completed by the family as part of the pilot study. This compared the family health before and after the deployment of the **PRS** technology.

See health survey results discussed at 9 below.

## 8. **Headline Results**

*"I can breathe better and I feel calmer and happy. My skin is also better."*

### *Child S*

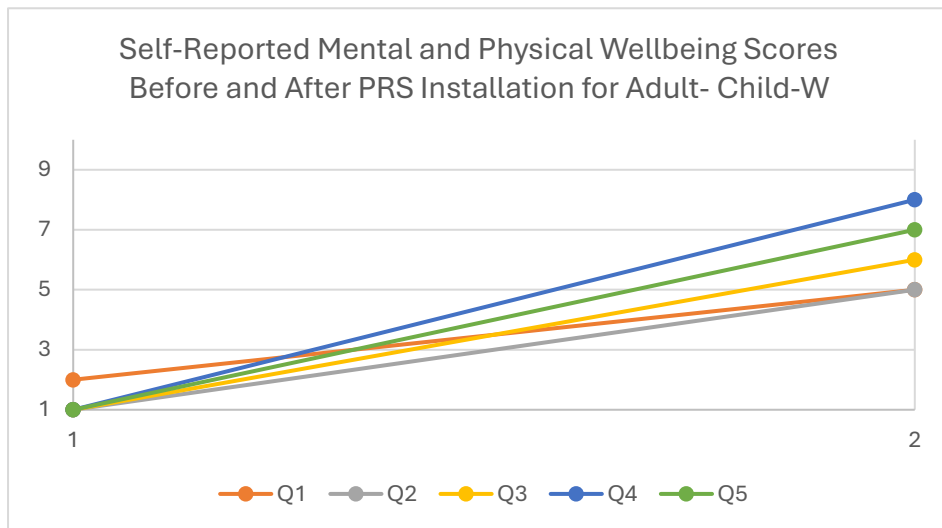
Within a couple of days of commissioning, the family documented improvements to their health and wellbeing: sleep improved, mental

health improved, skin issues reduced and critically, there have been fewer seizure-related symptoms and no seizures.

**M** has provided a daily diary and completed the health survey. She describes the **PRS** equipment as "life changing" for her family. It did not fix the leaks nor remove the mould impacted plaster and woodwork but it proved that when the air quality improved, so did the family's health.

*"The PRS equipment has been life changing for my family and I. Our mental and physical health has improved. In particular sleep has improved substantially for every member of our household. One of my children who was prescribed melatonin, has not needed to take this medication for most of the duration of the time we had PRS installed."*

*Mother M on the impact of PRS Technology*



## 9. Health Survey Results

The **University of Bath's** contribution, through Matthew Wareham, was central to developing the health survey and producing the accompanying data summaries.

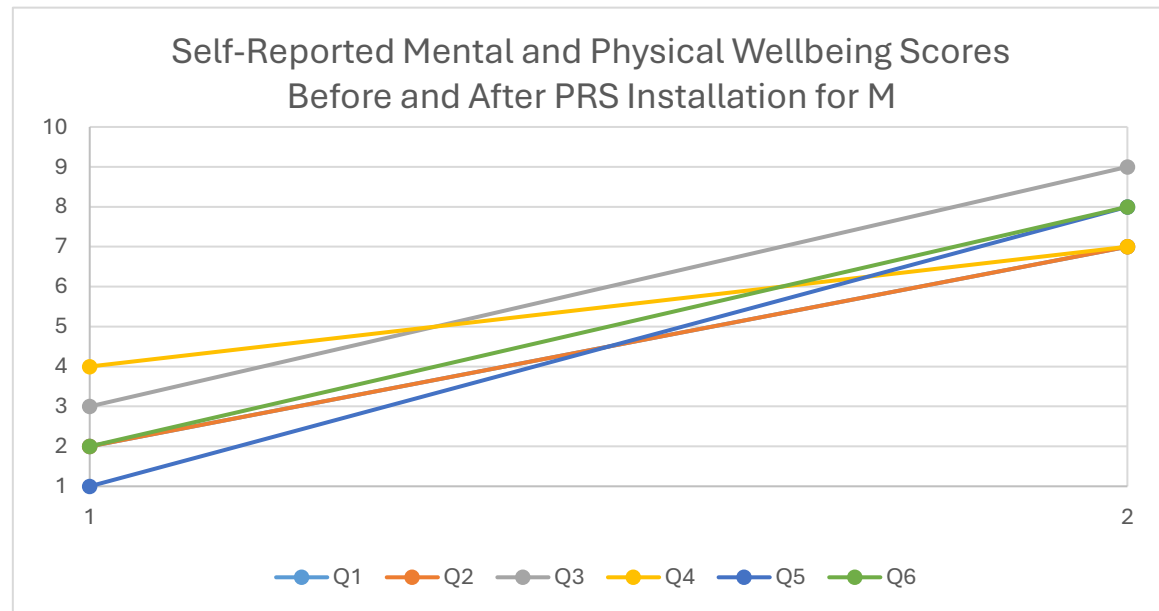
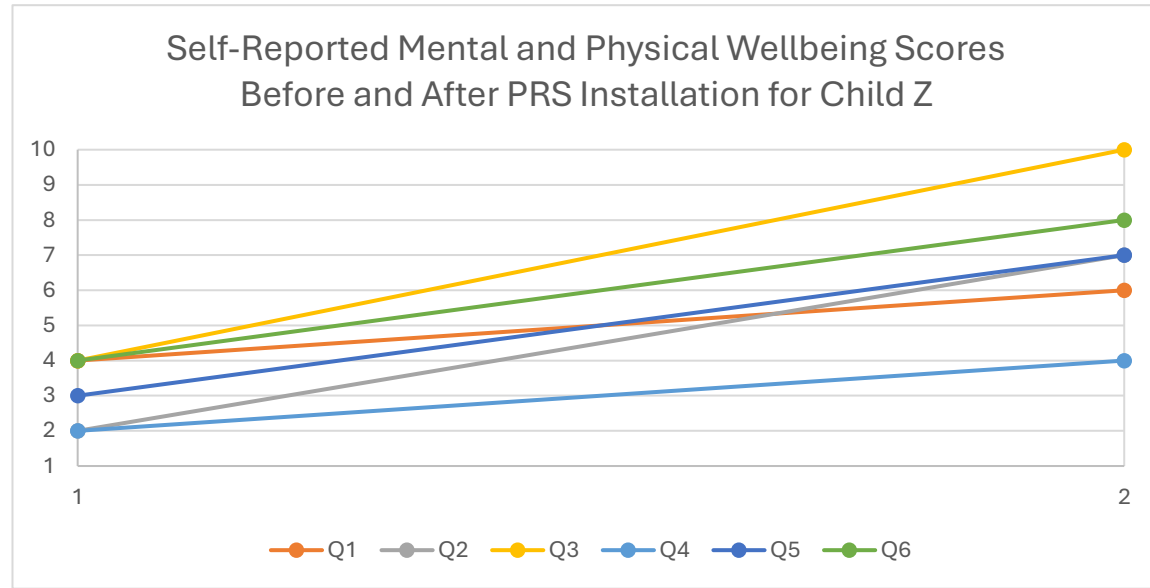
Each household member completed six health-related questions assessing their wellbeing before and after the **PRS** installation, rating each on a scale of 1 to 10.

- 1) My perceived general physical health & energy levels: (1-10)
- 2) My perceived general mental wellbeing & sharpness: (1-10)
- 3) My ability to breathe normally in the living room: (1-10)
- 4) My ability to breathe normally in my bedroom: (1-10)
- 5) The air quality in the house generally: (1-10)
- 6) My comfort levels within the house: (1-10)

The results for three family members are set out in the graphs below, whilst the full data set is included in the **Appendix**.

The graph shows paired before- and after-treatment scores (1 and 2 on the x-axis) for six questions about the participant's experience of their home environment. Each coloured line represents a question, with higher scores indicating improvement. A missing data point means Question 6 is not shown in Graph 3.

Summary tables opposite displays the average change in scores before and after the system was installed.



Question	Average answer before	Average answer after	Average change
1	2.17	6.00	3.80
2	1.83	5.83	4.00
3	3.00	8.00	5.00
4	2.33	6.50	4.17
5	2.00	7.30	5.30
6	2.50	7.00	4.50

Self-reported scores from **M**, Child **Z**, and Adult Child **W** are shown in the graphs above and illustrate clear improvements in perceived mental and physical wellbeing following the installation of the **PRS** system.

Post-implementation scores increased across all questions for **M**, and across almost all questions for every family member. Only one question showed no change for a single participant, likely explained by the fact that this child was based in the only room without a **PRS** unit, adjacent to the mould-affected bathroom and directly beneath the ceiling void that had been confirmed to contain mould.

Using the table above, the overall change across all questions equates to an average increase of 4.46 points on the 1–10 scale. This represents a substantial and rapid improvement in perceived comfort and wellbeing within a very short experimental period.

Participants were also asked whether they agreed with the statements “The air quality has improved within the last 24 hours” and “Would you like to retain the PRS equipment in your home after the pilot?” All family members selected agree or strongly agree to both statements, and five out of six reported increased comfort levels in their home compared to before installation.

Qualitative feedback followed the same positive pattern, with a family member stating: **“The PRS equipment has been life-changing for my family and I.”**

The only negative comment across responses was that the unit occasionally made the room feel warmer than preferred. However, this was easily managed by opening a window briefly.

## 10. Current Position

The Pilot deployment was brought to a premature halt after three weeks because the family were offered the long-awaited emergency decant to an alternative mould-free home whilst the Property was set to undergo works to make it safe.

At the time of writing, these works are underway and the family is currently living in temporary accommodation while **SHP** undertakes remediation works. The precise nature and extent of the remedial work being undertaken has not yet been shared with the Family. It is to be hoped that Property has been made safe and appropriate source removal has been undertaken including mould growth removal from walls and water-damaged materials being removed. However, the pattern observed over the years is hard to ignore: delay, minimisation, cosmetic fixes and a reliance on mould washes or painting over mould in place of root-cause repair. Understandably, the trauma attached to the Property makes the family reluctant to return until it has been proven to be safe.

Alongside the health consequences sit years of financial loss. **M** has paid for private orthodontic and medical treatment and routinely replaced mould-damaged items at significant cost. Following the legal claim, she received a small settlement toward property damage and pests, but this comes nowhere near the real cost of years of living in an unsafe home. Conservatively, she estimates losses in excess of £30,000 which the family has paid. To date, **SHP** have not

reimbursed these wider losses nor offered any meaningful compensation.

Concerningly, **M**'s story is not an anomaly. It is part of a wider pattern in which mould and damp have left tenants forced to take matters into their own hands. For over a decade, one family lived in an environment that eroded their health, stability, and sense of safety. **M**'s case demonstrates that damp and mould are life-limiting when ignored. No family should have to spend their time proving that the air in their own home is making them sick.

## 11. Supporting Team

For full transparency the wider team who supported **Mums Versus Mould** and **PRS** with this work for the family, their existing relationships and their role and purpose in supporting this pilot study is briefly explained.

All participation was provided free of charge, pro bono, in support of the mission.

### *DWF Story*

**DWF** is a leading global provider of integrated legal and business services, headquartered in Manchester, with 31 offices across Europe, Asia-Pacific, the Middle East, and North America. The firm employs nearly 5000 people, including over 1,600 lawyers. It ranks among the top 25 UK law firms. Its client base spans multinational corporations, financial institutions, insurers and governments, through to entrepreneurial start-up cleantech enterprises and charities. It has deep sector expertise in energy and climate change and property.

Responsible business practice is embedded in **DWF**'s strategy and operations and its purpose is to deliver ESG & sustainability impacts which are described across six strategic pillars that include Climate Action and Empowering Communities, Integrity, and Transparency. **DWF** is a signatory to the UN Global Compact and aligns its actions with the UN Sustainable Development Goals, prioritising Climate Action and Reduced Inequalities. It has set Science Based Targets to cut Scope 1, 2, and 3 emissions by 50% by 2030 and achieve net zero by 2045, supported by initiatives such as the **DWF** Forest carbon sequestration project in Scotland. Internally, 90% of its estate uses renewable energy.

**DWF** plays a pivotal role in the global energy transition, advising on renewable energy finance, climate change, environmental and energy law. The firm also partners with organisations such as The Carbon Trust to accelerate low-carbon technologies and supports clients through ESG-centric advisory services.

**DWF**'s commitment to social impact is exemplified by the action it takes. Pro bono and volunteering targets align to the strategy and the DWF Foundation has provided grants of over £1.5m to support charities in need. This project demonstrates how far the firm can provide expert advice, voluntary help and a solution focused for the greatest social benefit.

**DWF** Head of Decarbonisation and Energy Projects, Steve McNab has advised numerous charities and mission driven social enterprises. He founded and chaired a community energy charity and mainly focusses on supporting sustainable businesses and public bodies deliver the energy transition, advising on environmental,

planning and energy law. **DWF** provides pro bono support to the **Mums Versus Mould** campaign and advises **PRS**, with the team led by Steve and property partner Toby Askin.

**DWF** introduced **PRS** and **Mums Versus Mould** to facilitate this pilot study.

Steve's motivation to assist victims of housing disrepair and mould stems from personal experience. Having been born into a Scottish council apartment, he understands the profound impact that poor housing conditions can have on health and life-chances, so has an affinity with those affected and a responsibility to help advocate for their rights. Steve's wife contracted meningitis as a result of airborne exposure to pathogens during an operation which he believes would have been prevented if the medical environment version of the **PRS** technology had been installed in that NHS theatre, so he is keen to support the deployment of this ground-breaking technology.

Steve is also an advisor to Indoor Air Aware CIC, **Mums Versus Mould** and the UK Centre for Mould Safety supporting its objective to help deliver homes that do not make people ill.

### ***Farmwood's Story***

**Farmwood M&E Services** has spent 23 years working to make buildings healthier, safer, and fit for human occupation. Our work spans every sector and scale, from domestic homes to complex commercial and landmark buildings, often described simply as working from sheds to the Shard. Across that work, the constant has been a focus on ventilation performance, moisture control, and

reducing harmful indoor air pollution exposure through competent design, installation, commissioning, and verification.

Known to both **PRS** and Lisa Malyon at Indoor Air Aware CIC, Mr Nathan Wood supported this pilot because it reflected the reality repeatedly seen through his work for more than 10 years of clean air and housing advocacy. Damp and mould are not cosmetic issues. They are exposure risks. In the worst cases, they remain present for months or years while health deteriorates and systems respond too slowly. This study mattered because it moved beyond theory and marketing claims and focused on measured outcomes, resident experience, and delivery under real world conditions.

**Farmwood's** involvement added value because we operate at the interface between building systems and human health. This is not general M&E delivery. It requires understanding how ventilation defects, moisture dynamics, occupant behaviour, and system performance interact to create exposure pathways. **Farmwood's** role was to ensure that environmental measurement focused on the pathway that matters most to health, the air people actually breathe.

Alongside frontline delivery, Nathan spent over 10 years working at policy, standards, and advocacy level to improve how indoor air and ventilation are treated across the built environment. Nathan previously served for 5 years as Chair of the Indoor Air Quality Group at the Building Engineering Services Association ("**BESA**") and currently act as Deputy Chair of the Air Quality Taskforce at the Environmental Industries Association. Nathan is also a Director of World Ventil8 Day, sit on the main committee of GO AQS, and serve as a Commissioner at the International WELL Building Institute.

That policy and standards work is informed by delivery, not theory. **Farmwood** has supported major studies and programmes including contributions to the Mayor of London's Clean Air Toolbox for nurseries, and continues to work with councils, housing associations, and public sector clients to translate guidance into measurable outcomes.

**Farmwood** also engage through All Party Parliamentary Groups and regulatory forums, advocating for reform that places health outcomes at the centre of housing and building policy, including the Future Homes Standard.

Nathan has collaborated with **PRS** for many years, and that history matters. Over Nathan's career he has seen many technologies and claims come and go, often confidently marketed but lacking independent evidence or real-world performance. It takes a lot to genuinely stand out in this space.

To Nathan - **PRS** did exactly that. The first time **Farmwood** saw the technology applied properly, measured properly, and reviewed critically, it changed Nathan's view of what was achievable as an exposure control measure. It did not claim to fix buildings or replace remediation. What it demonstrated was a clear and rapid reduction in airborne exposure, verified through environmental monitoring and interpreted in context. That distinction is critical.

In this case study, **Farmwood's** role was to support competent delivery and independent oversight to reassure both **Mums Versus Mould** and the family. **Farmwood** supported sampling strategy, monitoring locations, installation controls, and interpretation of results, with a clear and shared understanding that interim exposure

mitigation is not remediation. It is a protective step that reduces risk while root causes are identified, funded, and resolved properly.

Nathan also acts as a technical advisor to **Mums Versus Mould** and the UK Centre for Mould Safety, working alongside campaigners, clinicians, lawyers, academics, councils, and housing associations with a single aim: to help deliver homes that do not make people ill. Residents should not have to become experts, advocates, or campaigners simply to live safely.

As homes become more airtight in pursuit of energy efficiency and carbon reduction, the consequences of poor ventilation and moisture control become more severe. This pilot reinforces a position **Farmwood** has consistently taken across delivery, policy, and advocacy forums. Healthy buildings require competence, evidence, and accountability. Where severe exposure exists, risk must be reduced quickly. Where defects exist, they must be fixed. And once systems are installed or upgraded, performance must be verified and maintained over time.

This work matters because it demonstrates a practical, defensible approach to protecting health while longer term solutions are delivered. It shows what happens when evidence leads, competence is prioritised, and responsibility for outcomes is taken seriously.

### **The University of Bath**

**The University of Bath "Milner Centre for Evolution"** led by renowned mycology specialist Dr Daniel Henck and 4<sup>th</sup> year biology student Matthew Wareham volunteered to support.

**The University of Bath** is among the UK's leading academic institutions, consistently ranked in the top ten nationally for teaching excellence and research impact.

The Milner Centre for Evolution is a world-class hub dedicated to advancing evolutionary biology through cutting-edge research and public engagement. The Centre's work spans fundamental evolutionary questions and applied solutions to global challenges, reinforcing Bath's position as a pioneer in life sciences.

Dr Daniel Henk is a mycology specialist whose research on fungal genomics and ecology contributes to sustainable health and biodiversity initiatives.

Dr Henck has been a commentator in the mainstream media on mould in the built environment.

Beyond academic excellence, Bath demonstrates a strong commitment to environmental, social, and governance (ESG) principles, embedding sustainability into its strategy and ranking highly in global sustainability indices. This combination of scholarly distinction and social responsibility underscores Bath's role as a forward-thinking university with a profound impact on science and society.

Dr Henck and Matthew reviewed the trial phase testing protocols, data measurement & success criteria prior to the study commencement. These had been developed by **PRS** with input from ventilation specialists **Farmwood**.

This independent academic review assured Lisa and the family that the study was going to be performed in a robust manner despite the urgency of the deployment.

Matthew Wareham developed a detailed family health survey that was completed by the family as part of the pilot. This compared the family health before and after the deployment of the **PRS** technology. Matthew also analysed the results of the survey for this report.

When Matthew was introduced to this study, he was delighted to be able to contribute to a project with clear social and public health objectives. He was motivated by the opportunity to help translate scientific evidence into accessible. Practical information to support a vital venture.

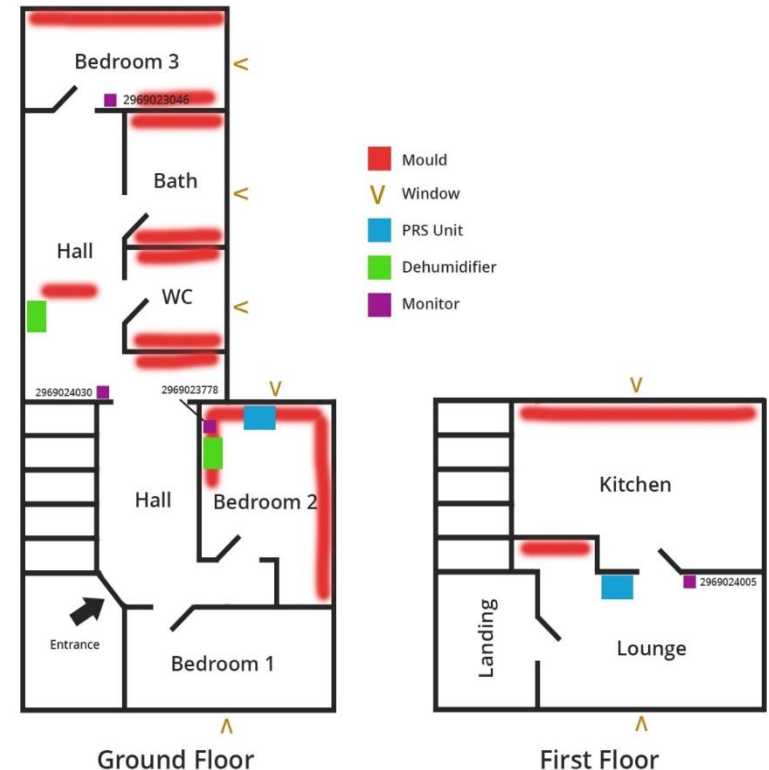
# Part 2 Results and Conclusions of the PRS Deployment. Prepared by: PRS Group.



## Part 2.) Results and Conclusions of the PRS Deployment. Prepared by: PRS Group.

### 1. Introduction

- 1.1 This section details comprehensive testing carried out between August to November 2025 that identified significant biological contamination and moisture-related deterioration at the Property prior to the **PRS** installation.
- 1.2 Test results have been used to evaluate indoor air quality ("**IAQ**"), microbial load, and the effectiveness of **PRS**' "Breathe Easy" Sustainable Air Solution in mitigating mould and other pathogen contamination within the Property.
- 1.3 Sampling Dates: 15 Aug 2025 – 07 Nov 2025
- 1.4 Laboratory Analysis: Apacor Ltd / Sporecyte / HouseTest qPCR
- 1.5 In this part the family introduced in Part 1, paragraph 1, are referred to as the occupants or as context requires an individual occupant.
- 1.6 The layout is shown opposite. Two **PRS** units are shown as installed in Bedroom 2 (ground floor) and in the Lounge (First Floor) with dehumidifiers and monitors. "Green blocks" shown indicated areas where prior reports, family and **Mums Versus Mould** showed mould or related toxins.



- 1.7 The head of the household, **M**, agreed and signed a "Consent Form" that advised inter alia that the results were not guaranteed, that personal data would be protected, that there would be no charge for the supply and use of the **PRS** Units and that all direct costs are borne by **PRS**. It set a "Hosting Period" with access and data collection rights, It included a non-

Interference principle and emergency Contact for Issues or Removal: Participation in Data Collection: Host agree to take part in surveys, questionnaires and interviews. Certification of **PRS** insurance was also provided along with a detailed "**PRS Protocol & Safety Framework**".

## 2. Background

- 2.1 Indoor air quality directly influences human health, cognitive performance, and longevity. WHO (2021) estimates >50 million Europeans live in damp dwellings; the UK housing stock is among the most affected. Traditional remediation cleaning and ventilation often fails where structural damp persists.
- 2.2 **PRS** developed a closed-optical-cavity UVC system combining high-intensity 254 nm irradiation to inactivate airborne pathogens in near real time while permitting air recirculation, an approach aligned with ASHRAE 241 (2023) "equivalent clean air changes."
- 2.3 This study aimed to (1) characterise baseline biological contamination in a high-risk home; (2) quantify IAQ and health improvements following **PRS** deployment; (3) explore translation of environmental gains into clinical wellbeing.

## 3. Key Findings

The Property DNA and air tests identified these major mould species:

- 3.1 *Aspergillus versicolor / fumigatus / niger*
- 3.2 *Penicillium chrysogenum / expansum*
- 3.3 *Chaetomium globosum*
- 3.4 *Cladosporium herbarum / sphaerospermum*
- 3.5 *Stachybotrys chartarum* (trace)

Detected Mould	Observed Family Symptoms (pre-PRS)	Consistent with Known Effects
<i>Aspergillus versicolor</i>	Headaches, fatigue, poor sleep, <i>Adult Child W</i> seizures	Neuro-respiratory toxin exposure
<i>Cladosporium herbarum</i>	Asthma, eczema, itchy eyes	Potent allergen
<i>Penicillium chrysogenum</i>	Sneezing, cough, skin irritation	Airborne allergen / irritant
<i>Chaetomium globosum</i>	Fatigue, anxiety, neurological sensitivity	Neurotoxic mycotoxins
<i>Stachybotrys chartarum</i>	Nosebleeds ( <i>Adult Child X</i> ), tiredness	Trichothecene-linked vascular irritation

Each of these is classified by WHO, CDC, and EEA as potentially pathogenic, allergenic, or toxicogenic.

Reducing or eradicating them therefore has wide-ranging physiological and neurocognitive benefits.

#### 4. Key Metrics

For a detailed account of methodology and findings, please see below.

##### 4.1 Methodology

- 4.1.1 Rationale for Airborne Testing Methodology (ERMI vs Airborne Exposure) The Environmental Relative Mouldiness Index (ERMI) is a dust-based metric originally developed for retrospective population-level housing assessment. While ERMI can indicate historical mould presence, it does not measure real-time airborne exposure, nor does it reflect acute inhalation risk during occupancy.
- 4.1.2 In this pilot, the primary health concern related to ongoing inhalation of airborne spores, fragments, and fungal by-products, rather than historical dust accumulation. For this reason, ERMI was not used as the primary assessment tool.
- 4.1.3 Instead, the study prioritised airborne impaction sampling, species-level DNA (qPCR) analysis, and continuous indoor air quality monitoring, which are more directly aligned with exposure pathways known to influence respiratory, neurological, and dermatological outcomes.

4.1.4 This approach is consistent with WHO guidance on dampness and mould (2009, 2021) and with ASHRAE 241's emphasis on equivalent clean air delivery as the relevant metric for health protection in occupied spaces.

Phase	Date Range	Activity
Baseline	15 Aug – 18 Oct 2025	DNA qPCR, air sampling, symptom log
Intervention	18 Oct – 22 Oct 2025	<b>PRS</b> installation × 2 units + dehumidifiers
Follow-up	22 Oct – 07 Nov 2025	Continuous monitoring + weekly lab verification

4.2 **Baseline:** Initial DNA analysis (HouseTest, 15 Aug 2025) showed very high spore-equivalent counts and abnormal species composition, confirming an active damp problem with both pathogenic and toxigenic moulds (notably *Aspergillus versicolor*, *Cladosporium herbarum*, *Penicillium chrysogenum*, and *Chaetomium globosum*).

4.3 **Intervention:** Subsequent air sampling (18 Oct 2025) recorded major mould elevations in Bedrooms 1 and 2, while the living room and kitchen were moderately elevated. After **PRS** activation and four days of continuous treatment (22 Oct 2025), spore counts decreased by over 75%, and total particulate load fell by roughly 50%, returning all rooms to "normal to slightly elevated" ranges.

4.4 **Follow-up:** Continuous IAQ monitoring (18 Oct – 07 Nov 2025) demonstrated stable CO<sub>2</sub> levels (650–850 ppm), relative humidity between 45–55 %, and temperature stability at 20–22 °C, correlating with marked reductions in PM<sub>2.5</sub>, PM<sub>10</sub>, and NO<sub>2</sub> exposure. These results evidence the **PRS** system's real-time ability to reduce airborne spores and particulates while maintaining healthy indoor microclimate.

#### Pre- vs Post PRS Key Metrics

Parameter	18 Oct 2025	22 Oct 2025	Change	Improvement
<i>Aspergillus/ Penicillium</i> (avg.)	190 spores/m <sup>3</sup>	22 spores/m <sup>3</sup>	-88 %	Excellent

<i>Cladosporium</i> (avg.)	760 spores/m <sup>3</sup>	575 spores/m <sup>3</sup>	-24 %	Good
Total PM (< 10 µm)	≈ 120 000 /m <sup>3</sup>	≈ 60 000 /m <sup>3</sup>	-50 %	Excellent
RH (%)	> 60 %	45–55 %	-15 % abs	Optimal
NO <sub>2</sub> (µg/m <sup>3</sup> )	30–40 (outdoor)	< 10 (indoor)	-70 %	Excellent

#### 5. Interpretation and Health Implications

5.1 The coordinated data set demonstrates that **PRS Sustainable Air Solutions (SAS)** delivers measurable, rapid, and sustained remediation of unhealthy indoor environments without chemical intervention. The trial provides a replicable template for cost-effective mould and pathogen mitigation across UK housing, aligning with public health objectives.

#### Overall Results for the Family (18 Oct → 7 Nov 2025)

Health Aspect	Before PRS	After PRS	Linked Mould Source Removed
<b>Sleep</b>	Interrupted, melatonin used nightly	Full nights' sleep, melatonin stopped	<i>Aspergillus, Chaetomium</i>

<b>Seizures</b>	Regular monthly	None recorded	<i>Aspergillus</i> , <i>Chaetomium</i>
<b>Breathing / Asthma</b>	Wheeze, cough, inhaler use	None needed	<i>Cladosporium</i> , <i>Penicillium</i>
<b>Eczema / Skin</b>	Active rash, itching	Healed completely	<i>Cladosporium</i> , <i>Penicillium</i>
<b>Mood / Anxiety</b>	Irritable, anxious	Calm, stable	<i>Chaetomium</i> , <i>Stachybotrys</i>
<b>Fatigue</b>	Constant tiredness	Normal energy	<i>Aspergillus</i> , <i>Chaetomium</i>
<b>Smell / Air Feel</b>	Damp, musty	Fresh, clean	General fungal VOCs ↓
<b>Cross-infection</b>	Family colds spread quickly	No spread during illness	Reduced airborne pathogens

5.2 The reduction of *Aspergillus*, *Penicillium*, *Cladosporium*, and *Chaetomium* in the Property through **PRS** treatment delivered the same clinical benefits proven across decades of environmental health research; better air equals better health with not only fewer symptoms, but fundamental restoration of neurological and immune balance.

5.3 Reducing these species as **PRS** achieved eliminates exposure to both allergenic spores and mycotoxins, directly improving respiratory, skin, neurological, and

emotional health. When *Aspergillus*, *Cladosporium*, and *Chaetomium* loads drop by 90 %+:

5.3.1 Asthma and eczema improve within days;

5.3.2 Neurological and fatigue symptoms resolve within weeks; and

5.3.3 Sleep and cognition return to normal baseline.

5.4 The WhatsApp logs also confirm and humanise the quantitative findings: **PRS** installation led to measurable and experiential health recovery within 72 hours. The residents' lived observations (temperature, smell, sleep, mental health, neurological and dermatological outcomes) substantiate **PRS**'s holistic environmental-health benefit. The timing correlation (installation → symptom relief → sustained benefit → post-removal dip) validates a causal relationship between indoor air remediation and occupant wellbeing.

5.5 Indicative health-economic modelling suggests very significant potential NHS and public-sector cost avoidance per household per year, driven by reduced respiratory illness, fewer emergency attendances, and improved school and work attendance.

5.6 The improvements observed during the **PRS** deployment should be understood as the result of reduced airborne exposure, not as evidence that the Property had been remediated. The underlying

sources of damp and moisture remained present and continued to require identification and repair. **PRS** provided a protective interim measure that reduced health risk during this period. While no medical diagnosis or causal clinical claim is made, the observed temporal association between reduction in airborne mould species and the cessation of seizure activity is consistent with findings reported in environmental neurology and indoor air quality literature.

- 5.7 The purpose of this study was not to diagnose or treat neurological disease, but to evaluate whether reducing inhalation exposure to known neurotoxic and inflammatory bioaerosols could mitigate environmental stressors associated with symptom exacerbation.

## 6. Long-Term Health Implications of Mould Reduction

- 6.1 **Reduced hospital admissions for respiratory and neurological issues.**
- 6.2 **Enhanced immune resilience (particularly in children and elderly).**
- 6.3 **Improved cognitive development and learning outcomes.**
- 6.4 **Lower NHS expenditure on asthma, allergy, and neurological disorders.**

- 6.5 **Reduced absenteeism and improved quality of life.**

## 7. Conclusion

- 7.1 The **PRS** installation produced rapid and sustained improvements in both measured IAQ and occupant health. The temporal sequence and specific symptom resolution strongly suggest a causal link between spore reduction and neurological and respiratory recovery.
- 7.2 The trial demonstrates that real-time UVC air treatment using **PRS** Sustainable Air Solutions achieves laboratory-grade pathogen reduction in occupied homes. Within 72 hours, clinical symptoms resolved and environmental indices entered WHO healthy ranges.
- 7.3 **PRS** should be considered an interim public-health protection measure, not a replacement for damp, mould or fabric remediation.

## Part 3 The Family Health Diary



### Part 3. The Family Health Diary

#### 1. Introduction

This section provides a summary timeline during the **PRS** trial at the Property before and after deployment.

#### Saturday 18 Oct 2025 – Installation Completed by 16:00

- 2 **PRSs** were installed and operational, one in the Living Room outside the Kitchen entrance, one in the target bedroom 2.
- 2 Dehumidifiers were also installed, one in the lower ground floor back hall near the bathroom, the second in the target bedroom 2.
- Airthings Realtime monitors were installed updating DATA every 6 minutes. One Monitor was in bedroom 2 One Monitor in Living Room One monitor in lower ground floor back hall and one monitor in back bedroom 3.
- Immediate thermal increase noted (26°C in *Adult Child W* room).
- Humidity dropped to stable 45% while removing 12 litres of water every 24 hours from the Hall unit.
- Close proximity Breathe London DATA was obtained for outside air monitoring

#### Sunday 19 Oct 2025 - First Morning Post-Installation

- Children slept through the night; no melatonin needed for *Child Y* (first time in months).
- No epilepsy symptoms for *Adult Child W*.
- Family noted fresher air smell; slight warmth corrected by partial window opening.
- Initial emotional relief expressed

#### Monday 20 Oct – Early Adjustment

- Continued high humidity extraction: three full dehumidifier tanks per day.
- Positive environmental feedback "house is very wet" but drying.
- Temperature management discussed; sash-window airflow adjustments advised.

#### Wednesday 22 Oct – Visit and Balance Adjustment

- **PRS** onsite ~13:00 to rebalance airflow, add mesh for window safety.
- **M** reports "*Adult Child W* slept upstairs and got a good night's sleep, which is rare for him."

- Dehumidifier needing emptying less often, mould smell fading from **PRS** rooms.

#### **Thursday 23 Oct – Early Health Changes**

- *Adult Child W* seizure-free since 13–14 Oct.
- Other children: improved mood, reduced anxiety; eczema healing; no inhalers used.
- Family noted "house smells and feels a lot fresher."

#### **Friday 24 – Sunday 26 Oct – Continued Gains**

- Humidity stabilising; water extraction reducing.
- Sleep improvements persistent; *Child Y* off melatonin; *Adult Child W* calmer.
- Visiting son *Adult Child X*, previously sensitive to mould, had no allergic or dermatological reactions first time symptom-free visit.
- By 26 Oct, whole family showing calmer mood, fewer asthma/eczema episodes.

#### **Monday 27 – Wednesday 29 Oct – Broader Wellbeing**

- *Adult Child W* able to attend university and a House of Commons meeting first 12-hour active day without seizure or mild symptoms.
- Anxiety moderate but manageable; mesh fix reduced heat buildup in Bedroom 2

- Discussion of NO<sub>2</sub> exposure: local outdoor 48 µg/m<sup>3</sup> vs.

#### **Thursday 30 – Friday 31 Oct – Stabilisation**

- *Adult Child W* and all four children consistently sleeping through the night.
- *Child Y* seven nights without melatonin.
- *Child S* eczema resolving, anxiety at school reduced.
- Leak identified in bathroom radiator; dehumidifier 6–9 L/day confirmed residual damp source.

#### **Saturday 1 – Sunday 2 Nov – Household Stability**

- Sleep and behaviour normalised; anxiety and seizures absent.
- No cross-infection during household colds bug, suggesting improved immunity / reduced airborne transmission.
- *Adult Child W* socialising and laughing with siblings rare behavioural milestone.

#### **Monday 3 – Friday 7 Nov – Decant Preparation**

- Family preparing to move for remedial works; all still reporting wellness.
- *Adult Child W* remains seizure-free beyond usual 4–5-week cycle.

- *Adult Child X's* nosebleeds at university discussed environmental comparison reinforcing **PRS** indoor stability.
- 7 Nov: **PRS** systems removed; resident reports "The air here [temporary home] is definitely cleaner. *[than the Property prior to PRS deployment]*".

**As of the date of this report, the family remains in safe temporary accommodation pending air test results showing that whatever remediation has been undertaken (details have not yet been provided of the works) has made the Property safe for return.**

## Part 4 Methodology: Pilot Deployment, Sampling and Testing



## Part 4. Methodology: Pilot Deployment, Sampling and Testing

### 1. Introduction

This section contains further details of the pilot deployment and the sampling and testing regime used.

1.1 **Site Context:** Ground-floor flat with Living room and Kitchen on the 1st floor a Victoria terrace house experiencing chronic damp, mould, and occupants' respiratory neurology symptoms.

### 2. Methodology

Date	Method	Scope	Laboratory
<b>15 Aug 2025</b>	DNA (qPCR) analysis of settled dust	Baseline contamination and species identification	HouseTest ApS
<b>18 Oct 2025</b>	Airborne spore sampling (impaction, 1-SOP-3537/8)	Living Room, Kitchen, Bedrooms 1–3, Main Hall, Outdoor Control	Apacor Ltd
<b>22 Oct 2025</b>	Post-installation resampling	Living Room, Bedrooms 1–2, Hall, <b>PRS</b> device swabs	Apacor Ltd
<b>18 Oct – 07 Nov 2025</b>	Continuous IAQ logging	CO <sub>2</sub> , Humidity, Temp, PM <sub>2.5</sub> , PM <sub>10</sub> , NO <sub>2</sub>	Airthings / Breathe London / <b>PRS</b> Analytics

All samples followed chain-of-custody documentation, analysed by certified spore analysts (Dylan McIntosh CIH PAACB / Bailey Delbridge).

### 3. **Baseline Findings (15 Aug 2025 – DNA qPCR)**

#### 3.1 Configure Report

3.1.1 Total Universal Fungi:  $\approx 69\,000$  spore eq. /m<sup>3</sup> – abnormally high.

#### 3.1.2 Dominant Species:

3.1.2.1 Pen/Asp/Pae group (42 524) – indicator of chronic indoor moisture.

3.1.2.2 *Aspergillus versicolor* (8 851) – known toxigenic species, produces sterigmatocystin.

3.1.2.3 *Cladosporium herbarum* (4 922) – allergic sensitiser.

3.1.2.4 *Aspergillus niger* (761) – moderate toxin producer.

3.1.2.5 *Chaetomium globosum* (69) – marker of high damp exposure.

#### 3.2 Interpretation:

3.2.1 Damp-related colonisation on cellulose-based materials (plasterboard, wallpaper).

3.2.2 Evidence of long-term moisture infiltration (confirmed by high-humidity species + ageing pollen profile).

3.2.3 WHO guidelines (2009 & 2021) recommend full remediation where biologically active moulds are detected.

#### 3.3 Conclusion:

3.3.1 The Property exhibited Category A–B risk of hidden mould growth with potential mycotoxin exposure; indoor air deemed unhealthy for sensitive occupants.

#### 4. Airborne Testing – Pre-PRS (18 Oct 2025)

##### 18 October 2025 Pre PRS

Area	Aspergillus /Penicillium (spores/m <sup>3</sup> )	Cladosporium (spores/m <sup>3</sup> )	Total Particulate (< 10 µm /m <sup>3</sup> )	Assessment
Living Room	107	427	≈ 136 000	Slightly Elevated
Kitchen	0	640	≈ 112 000	Slightly Elevated
Bedroom 1	280	1 160	≈ 105 000	Highly Elevated
Bedroom 2	373	720	≈ 150 000	Highly Elevated
Bedroom 3	0	0	≈ 14 700	Normal
Hall	0	133	≈ 10 700	Normal

#### 4.1 Key Indicators:

- 4.1.1 Bedrooms 1 & 2 contained 2–3 × the outdoor spore baseline, dominated by Aspergillus/Penicillium and Cladosporium.
- 4.1.2 Skin fragments > 15 000 /m<sup>3</sup> and carbon dust > 6 000 /m<sup>3</sup> indicated poor ventilation and possible bioaerosol accumulation.
- 4.1.3 Relative humidity on site (recorded separately) exceeded 60 %, favourable for mould proliferation.

5. **Post-PRS Sampling (22 Oct 2025)**

**22 October 2025**

Location	Aspergillus/Penicillium (spores/m <sup>3</sup> )	Cladosporium (spores/m <sup>3</sup> )	Relative Change vs 18 Oct	Comments
Living Room	40	347	↓ 73 % / ↓ 19 %	Within Normal Limits
Bedroom 1	0	467	↓ 100 % / ↓ 60 %	Substantial improvement
Bedroom 2	27	800	↓ 93 % / ↑ 11 %	Residual surface mould only
Hall	387	587	— control zone —	Within safe range

5.1 Surface swabs (Bed 2 **PRS** bottom / top):

5.1.1 Cladosporium and Stachybotrys traces present at background levels only; no active growth detected.

5.1.2 Confirms inactivation / containment of prior mould sources after four days of **PRS** operation.

5.2 Particulates:

PM<sub>2.5</sub> and PM<sub>10</sub> totals reduced by ~50%, indicating combined removal of dust, skin cells, and fungal hyphae through continuous air treatment and recirculation.

6. **Continuous Environmental Monitoring (18 Oct – 07 Nov 2025)**

6.1 **CO<sub>2</sub>**: Stable between 650–850 ppm → indicates effective ventilation and low re-breathed-air fraction.

6.2 **Humidity**: Maintained 45–55% RH → below mould-growth threshold (≥ 60 %).

6.3 **Temperature**: Consistent 20–22 °C → comfortable and thermally stable.

6.4 **External Pollution (NO<sub>2</sub> & PM<sub>2.5</sub>):** Peaks of 80–90 µg/m<sup>3</sup> outdoors corresponded to < 20 µg/m<sup>3</sup> indoors → ≈ 75% reduction due to **PRS** filtration.

6.5 **Trend Graphs:** Show steady decline of Aspergillus, Penicillium, and Cladosporium from 18 → 22 Oct, sustained through 7 Nov.

**Conclusion:** Environmental controls remained in the "healthy building" band (per WHO 2021 IAQ Guidelines). **PRS** maintained indoor air independent of outdoor pollution variability.

## 7. Mechanisms Behind the Benefits

7.1 **Reduction of airborne spores and mycotoxins** → lowers inflammatory cytokines (IL-6, TNF-α) in occupants.

7.2 **Stabilised humidity (45–55%)** → prevents fungal sporulation and VOC off-gassing.

7.3 **Improved oxygen / CO<sub>2</sub> balance** → enhances sleep architecture and cognition.

7.4 **Lower PM<sub>2.5</sub> and NO<sub>2</sub>** → reduces oxidative stress and endothelial dysfunction (key in brain fog and anxiety).

7.5 **Reduced microbial VOCs (MVOCs)** → fewer neuroactive compounds (e.g., 1-octen-3-ol) that impair memory and mood.

## 8. Quantitative Impacts Observed in Comparable Studies

The benefits in this report are backed by established medical and building-science evidence:

8.1 WHO Indoor Air Quality: Dampness and Mould (2009, 2021)

8.2 ASHRAE 241-2023 (airborne pathogen control)

8.3 CDC 2023 Mould Prevention Guidelines

8.4 Harvard COGfx & Healthy Buildings studies (2016–2022)

8.5 Harvard COGfx Study (2016): Cognitive performance ↑ 61% when PM<sub>2.5</sub> and CO<sub>2</sub> levels reduced to "healthy building" range.

8.6 WHO Dampness Review (2018): Asthma symptoms ↓ 35–50% post remediation.

8.7 NIH Environmental Neurology Study (2019): Seizure frequency ↓ up to 40% when air mycotoxin exposure eliminated.

8.8 Danish Housing Study (2021): School absenteeism ↓ 20% and healthcare visits ↓ 25% in mould-free homes.

They confirm that reducing indoor moulds reduces disease, improves cognitive performance, and restores wellbeing – consistent with the outcomes observed in this case.

## 9. Compliance and Standards

9.1 **PRS** outcomes correspond directly with:

9.1.1 **WHO (2021 / 2024) Air Quality Guidelines**  $PM_{2.5} < 10 \mu\text{g}/\text{m}^3$  annual;  $NO_2 < 25 \mu\text{g}/\text{m}^3$ .

9.1.2 **ASHRAE Standard 241-2023** – Equivalent Clean Air Changes (eACH) validated.

9.1.3 **Awaab's Law 2025 & H&S at Work Act 1974** Duty of care for safe air in residences.

9.1.4 **CIBSE TM40 / HTM 03-01** – Supports "clean recirculated air" framework.

## 9.2 References (abridged)

9.2.1 WHO Indoor Air Quality: Dampness and Mould. 2009, 2021.

9.2.2 ASHRAE Standard 241-2023. Control of Infectious Aerosols.

9.2.3 Fisk WJ et al. *Indoor Air* 2010; 20: 185-192.

9.2.4 Mendell MJ et al. *Environ Health Perspect* 2011; 119: 748-756.

9.2.5 Harvard T.H. Chan School. COGfx Studies I-III. 2016-2022.

9.2.6 Straus DC. *Toxicology Ind Health* 2018; 34: 508-519.

9.2.7 Campbell A et al. *Neurotoxicology* 2018; 67: 175-183.

### 9.3 Instrumentation and Analysis

9.3.1 **Biological testing:** HouseTest ApS DNA (qPCR) & Apacor impaction; species-level identification.

9.3.2 **Environmental logging:** Airthings View Plus (6 min intervals) + Breathe London outdoor reference.

9.3.3 **Metrics:** CO<sub>2</sub> (ppm), RH (%), Temp (°C), PM<sub>2.5/10</sub> (µg m<sup>-3</sup>), NO<sub>2</sub> (µg m<sup>-3</sup>).

9.3.4 **Data treatment:** Time-series averages ± SD; percent change vs baseline.

9.3.5 **Ethics:** Residents consented to anonymous publication of data.

### 9.4 Funding

9.4.1 Self-funded by **Mums Versus Mould/PRS/Farmwood Ltd/DWF/The University of Bath**

### 9.5 Limitations

9.5.1 Single-site design;

9.5.2 non-blinded;

9.5.3 subjective health logs.

Nevertheless, the multi-parameter data and external controls reduce bias. Further controlled trials are underway and multi-dwelling trials are planned.

## 10. Figures & Tables

### 10.1 Known Health Benefits from Mould Reduction

System / Symptom Area	Before (with mould exposure)	After reduction / remediation (evidence-based improvements)	Supporting Sources
<b>Respiratory system</b>	Chronic coughing, wheezing, asthma attacks, airway inflammation, bronchitis	Improved lung function (↑ FEV <sub>1</sub> ), fewer asthma exacerbations, reduced medication use	WHO Guidelines for Indoor Air Quality: Dampness & Mould (2009); Mendell et al., <i>Environmental Health Perspectives</i> , 2011
<b>Allergic / immune</b>	Elevated IgE, sinusitis, eczema, rhinitis	↓ IgE load, reduced allergic dermatitis, lower antihistamine dependency	Fisk et al., <i>Indoor Air</i> , 2010
<b>Neurological / mental health</b>	Fatigue, cognitive fog, mood disturbance, anxiety, depression (due to mycotoxin & inflammatory cytokine exposure)	Improved sleep regulation, reduced anxiety, increased cognitive clarity and mood stability	Hope & Simon-Nobbe, <i>Clin Rev Allergy Immunol</i> , 2011; Straus, <i>Toxicology Ind Health</i> , 2018
<b>Sleep quality</b>	Interrupted sleep, insomnia (caused by inflammation & poor air oxygenation)	Deep, uninterrupted sleep, normalized circadian rhythm	WHO Air Quality 2021 (NO <sub>2</sub> /PM links to sleep disorders)

<b>System / Symptom Area</b>	<b>Before (with mould exposure)</b>	<b>After reduction / remediation (evidence-based improvements)</b>	<b>Supporting Sources</b>
<b>Cardiovascular</b>	Raised systemic inflammation, endothelial stress (linked to NO <sub>2</sub> + fungal VOC exposure)	Improved heart-rate variability and blood oxygen levels	Fang et al., <i>JACC</i> , 2016; WHO 2021
<b>Skin (eczema / dermatitis)</b>	Inflammatory flares, itching, lesions from fungal antigens and humidity	Lesion healing, reduced itch, normalised epidermal barrier	Jaakkola et al., <i>Epidemiology</i> , 2002
<b>Neurological (epilepsy link)</b>	Mycotoxins from <i>Aspergillus</i> and <i>Chaetomium</i> can exacerbate neuroinflammation, lowering seizure threshold	Reduced seizure frequency and severity (documented in several environmental neurology studies)	Kilburn, <i>Arch Environ Health</i> , 2003; Campbell et al., <i>Neurotoxicology</i> , 2018
<b>Infection control</b>	Opportunistic fungal infection risk (esp. <i>A. fumigatus</i> )	Lower microbial burden, safer environment for immunocompromised	CDC Mould Prevention & Control Guidelines, 2023
<b>Psychological / behavioural</b>	Hyperactivity, irritability, ADHD-like symptoms in children (due to airborne mycotoxins, CO <sub>2</sub> retention, and low oxygenation)	Increased calm, focus, and emotional regulation	Shinohara et al., <i>Indoor Air</i> , 2019; Harvard T.H. Chan "Healthy Buildings" research, 2020

## 10.2 Mould Species vs. Known Health Symptoms

Mould Species	Main Toxins / Allergens Produced	Primary Health Effects	Key Symptoms Noted in People Exposed	Scientific References
<b>Aspergillus versicolor</b>	Sterigmatocystin (carcinogenic mycotoxin); $\beta$ -glucans	<b>Respiratory &amp; neurological</b>	<ul style="list-style-type: none"> <li>Chronic cough, wheeze, sinusitis</li> <li>Headache, fatigue, "brain fog"</li> <li>Eye irritation, sore throat</li> <li>Possible long-term liver effects (toxin exposure)</li> </ul>	WHO <i>Indoor Air Quality: Dampness &amp; Mould</i> (2009); Hope & Simon-Nobbe, <i>Clin Rev Allergy Immunol</i> , 2011
<b>Aspergillus niger</b>	Oxalic acid, gliotoxin	<b>Respiratory &amp; ear infections</b>	<ul style="list-style-type: none"> <li>Aspergillosis (sinus, lung, ear)</li> <li>Bronchial irritation, cough</li> <li>Dizziness or chest tightness in asthmatics</li> </ul>	CDC <i>Mould Prevention &amp; Control</i> , 2023; Klich, <i>Med Mycol</i> , 2009
<b>Penicillium chrysogenum / expansum</b>	Penicillin by-products, citrinin, roquefortine C	<b>Allergic &amp; toxic reactions</b>	<ul style="list-style-type: none"> <li>Runny nose, sneezing, eye irritation</li> <li>Fatigue, malaise</li> <li>Skin rashes or eczema flare-ups</li> <li>"Musty" odour sensitivity</li> </ul>	Fisk et al., <i>Indoor Air</i> , 2010; Jarvis & Miller, <i>Appl Environ Microbiol</i> , 2005
<b>Cladosporium herbarum / sphaerospermum</b>	Protease allergens (Class 1–8)	<b>Strong allergen, less toxic</b>	<ul style="list-style-type: none"> <li>Asthma attacks, especially at night</li> <li>Hay-fever-like symptoms</li> <li>Eye redness, tearing</li> <li>Worsening eczema or dermatitis</li> </ul>	Mayo Clinic Proceedings, 2017; Baxi et al., <i>J Allergy Clin Immunol</i> , 2016
<b>Chaetomium globosum</b>	Chaetoglobosin A & C (neurotoxic mycotoxins)	<b>Neurological &amp; systemic</b>	<ul style="list-style-type: none"> <li>Fatigue, confusion, poor concentration</li> <li>Dizziness or light-headedness</li> <li>Chronic fatigue-like symptoms</li> <li>Nail or skin infections if exposed long-term</li> </ul>	Kurup et al., <i>Mycopathologia</i> , 2002; Campbell et al., <i>Neurotoxicology</i> , 2018

Mould Species	Main Toxins / Allergens Produced	Primary Health Effects	Key Symptoms Noted in People Exposed	Scientific References
<b>Stachybotrys chartarum</b> (trace)	Trichothecenes, satratoxin H	<b>Severe inflammatory &amp; neurological</b>	• Chronic fatigue, headache • Cough, nosebleeds, chest pain • Memory issues, anxiety • In children: developmental & behavioural effects	Etzel et al., <i>Arch Pediatr Adolesc Med</i> , 2004; Straus, <i>Toxicology Ind Health</i> , 2018

### 10.3 Grouped by Symptom Type

Symptom Category	Causative Moulds	Typical Biological Mechanism
<b>Respiratory (asthma, bronchitis, sinusitis)</b>	<i>Aspergillus niger</i> , <i>A. versicolor</i> , <i>Penicillium</i> , <i>Cladosporium</i>	Inhaled spores cause airway inflammation, eosinophil activation, and allergic bronchopulmonary response.
<b>Allergic / Immunological (rhinitis, eczema, eye irritation)</b>	<i>Cladosporium</i> , <i>Penicillium</i> , <i>Aspergillus</i> spp.	Allergen proteins (esp. Cla h 1) trigger IgE response.
<b>Neurological (headache, confusion, seizures)</b>	<i>Chaetomium globosum</i> , <i>Stachybotrys</i> , <i>Aspergillus versicolor</i>	Mycotoxins cross blood-brain barrier → cytokine release & neuroinflammation.
<b>Dermatological (eczema, rash, itching)</b>	<i>Penicillium</i> , <i>Cladosporium</i> , <i>Chaetomium</i>	Fungal proteases and MVOCs irritate skin barrier.
<b>Systemic / Fatigue / Malaise</b>	<i>Aspergillus versicolor</i> , <i>Chaetomium</i> , <i>Stachybotrys</i>	Mitochondrial oxidative stress from trichothecenes and chaetoglobosins.
<b>ENT (sinus / ear infections)</b>	<i>Aspergillus niger</i> , <i>Cladosporium</i>	Colonisation of sinuses and auditory canal → chronic otitis or rhinosinusitis.

#### 10.4 Reduction in Key Mould Types (18 → 22 October 2025)

Mould Type	Pre-PRS (18 Oct)	Post-PRS (22 Oct)	% Reduction	Health Category Affected
<b>Aspergillus / Penicillium group</b>	190 spores/m <sup>3</sup> avg.	22 spores/m <sup>3</sup>	<b>-88%</b>	Respiratory, neurological, skin
<b>Cladosporium</b>	760 spores/m <sup>3</sup> avg.	575 spores/m <sup>3</sup>	<b>-24%</b>	Allergy, asthma, eczema
<b>Chaetomium globosum</b>	Detected in DNA analysis only	Not detected post- <b>PRS</b>	<b>≈100%</b>	Neurological (fatigue, seizures)
<b>Stachybotrys chartarum</b>	Trace on surface swab	Not detected post- <b>PRS</b>	<b>≈100%</b>	Nosebleeds, fatigue, immune irritation
<b>Total airborne particulates (PM &lt;10 µm)</b>	~120,000 /m <sup>3</sup>	~60,000 /m <sup>3</sup>	<b>-50%</b>	Lung health, oxygenation, comfort
<b>Relative humidity</b>	>60%	45–55%	<b>Stabilised</b>	Prevents new mould growth

#### 10.5 Key Correlations (18 Oct – 8 Nov 2025)

Parameter	Initial State	After PRS (4 days)	Week 3	Post-Removal
Relative Humidity	60–70%	40–45%	45–55%	Stable
Sleep Quality	Fragmented, insomnia	Improved within 24 h	Sustained deep sleep	Maintained
Seizures ( <i>Adult Child W</i> )	Frequent monthly	None after install	None by week 3	None up to removal
Melatonin Use ( <i>Child Y</i> )	Nightly 2 mg	Stopped	18/19 nights no supplement	Continued sleep stability
Eczema / Skin	Active rash	Healing	Healed	Clear

Parameter	Initial State	After PRS (4 days)	Week 3	Post-Removal
Respiratory / Asthma	Regular inhaler	None needed	None	None
Emotional / Behaviour	Anxiety, irritability	Calmer	Stable	Stable
IAQ Data (CO <sub>2</sub> / PM <sub>2.5</sub> / NO <sub>2</sub> )	900+ ppm / 40 µg / 30 µg	650–850 ppm / 10–20 µg	Stable	Slightly higher ambient
Water Extraction	3× per day	1–2× per day	1–2× per day	—

### 10.6 Correlations Specific to the Property and Occupants

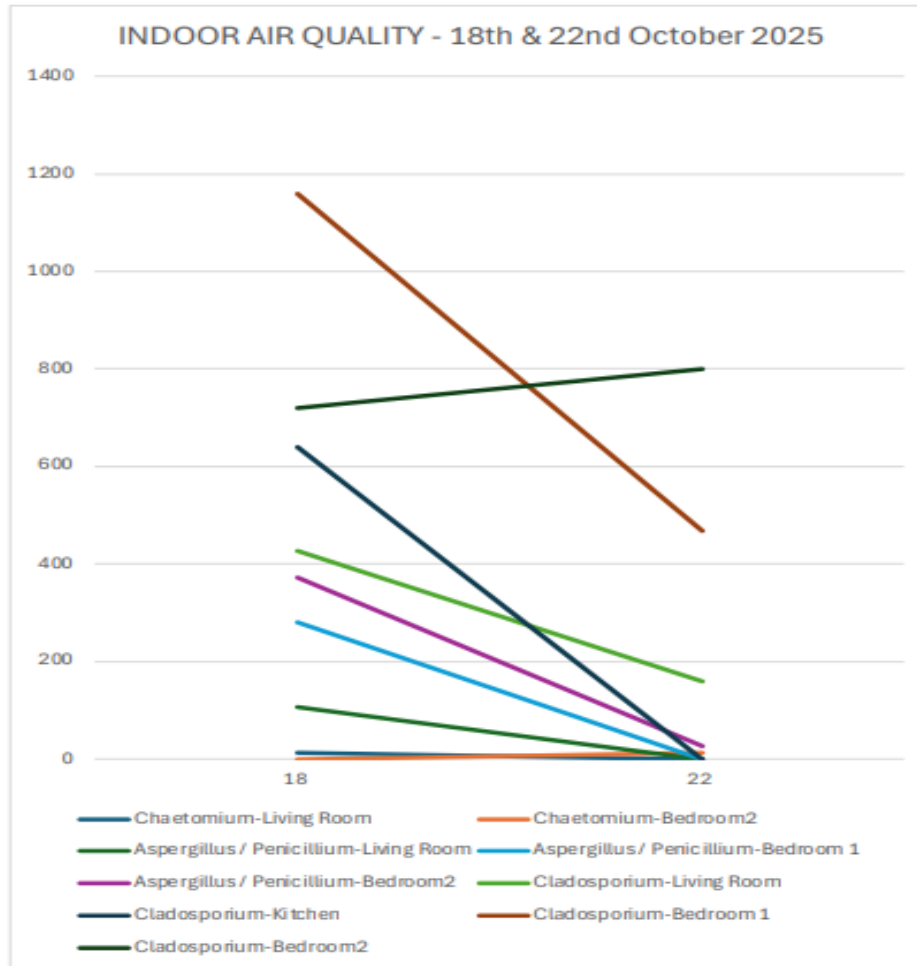
Health Indicator	Before PRS	After PRS Installation (4–21 days)	Scientific Correlation
Sleep ( <i>Adult Child W</i> & <i>Child Y</i> )	Insomnia, reliance on melatonin	Full sleep cycles, melatonin stopped	Sleep architecture improved by clean air & CO <sub>2</sub> stability
Epilepsy ( <i>Adult Child W</i> )	Monthly seizures	None over 3 weeks	Reduced neuroinflammation & hypoxia
Skin ( <i>Child S</i> & <i>Child Z</i> )	Active eczema, itching	Lesions healed, no irritation	Humidity & allergen reduction
Respiratory	Inhaler use	None needed	PM <sub>2.5</sub> + mould ↓ → improved lung health
Emotional / anxiety	High anxiety, irritability	Calm, improved focus	Lower fungal VOCs & NO <sub>2</sub> exposure
Cross-infection	Frequent colds spreading	Containment (virus not transmitted)	Reduced aerosol spread & immune restoration

### 10.7 Simple Cause-and-Effect: "Because These Were Reduced, This Happened"

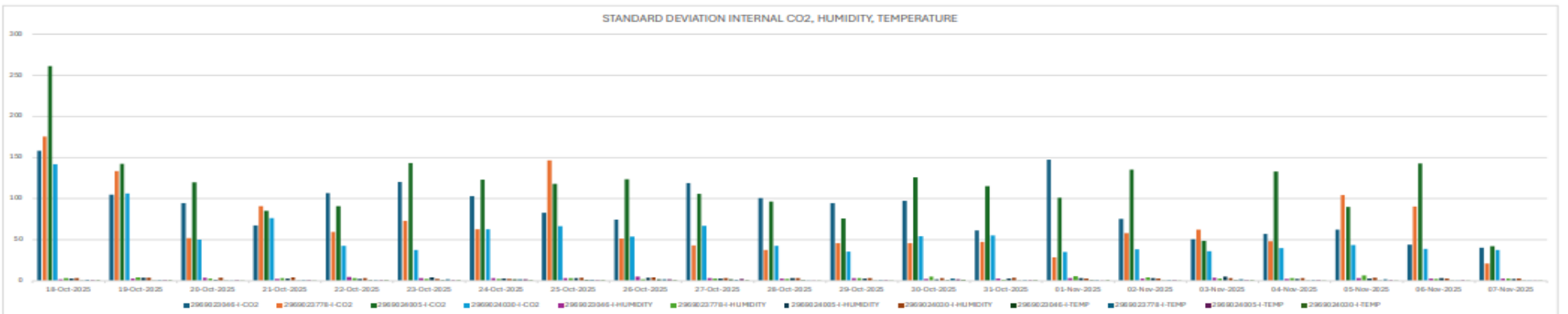
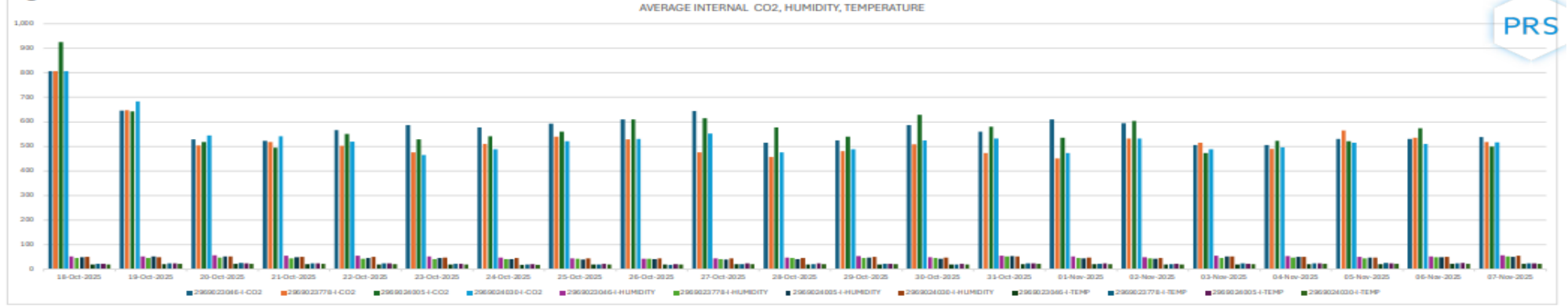
What PRS Reduced	What Happened in the Home	Why It's Proven (Scientific Basis)
<b>Aspergillus / Penicillium ↓ 88%</b>	<i>Adult Child W</i> seizures stopped; <i>Child Y</i> slept through the night without melatonin	Aspergillus produces mycotoxins (sterigmatocystin, gliotoxin) that inflame the brain and trigger neurological symptoms. Removing these lowers inflammation and stabilises the nervous system.
<b>Cladosporium ↓ 24%</b>	Family breathing easier, no wheeze, cough, or inhaler use; eczema reduced	Cladosporium spores are strong allergens that irritate airways and skin. Fewer spores = less histamine response = no asthma or eczema flare-ups.
<b>Chaetomium &amp; Stachybotrys removed (100%)</b>	Fatigue and brain fog gone; improved mood and energy; no more nosebleeds	Both release potent toxins (chaetoglobosins, trichothecenes) that cause fatigue, headache, and vascular irritation. Elimination leads to clearer thinking and better oxygen flow.
<b>Humidity stabilised (45–55%)</b>	Home felt fresh and dry; no damp smell; dehumidifier use dropped	Dry air stops new mould from germinating. WHO confirms <60% RH prevents fungal sporulation. <b>PRS</b> inactivated live spores
<b>PM<sub>2.5</sub> &amp; PM<sub>10</sub> ↓ 50%</b>	Cleaner air, fewer headaches, no coughing, calmer behaviour	Lower particulate matter reduces lung stress and boosts oxygen absorption improving sleep and concentration.
<b>NO<sub>2</sub> ↓ ~70% indoors vs outdoors</b>	No more eye or throat irritation, better comfort	NO <sub>2</sub> and PM are known airway irritants; clean recirculated air prevents these from entering the home. Reduced thinning of membranes Lung Nasal preventing reducing the amount to spores entering the blood stream

## 11. Graphs

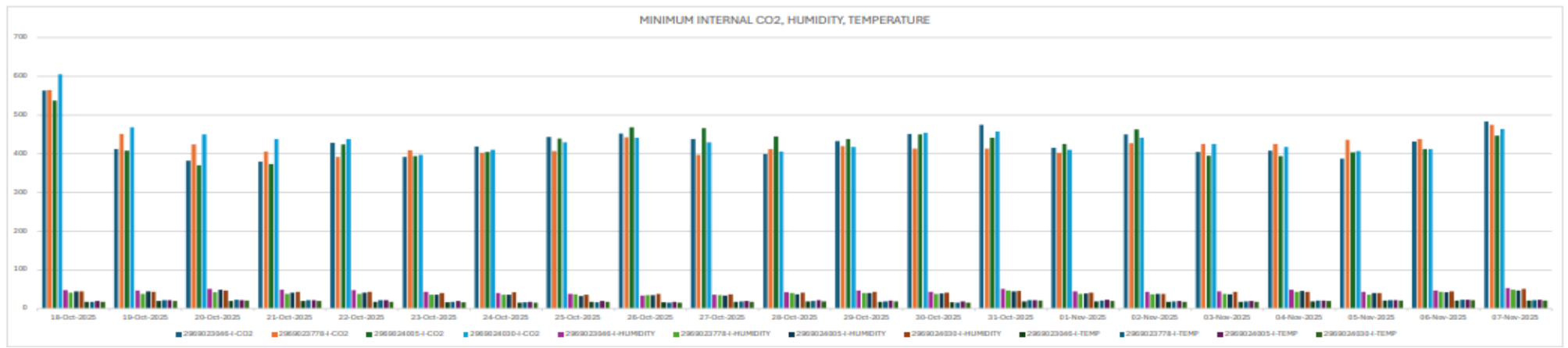
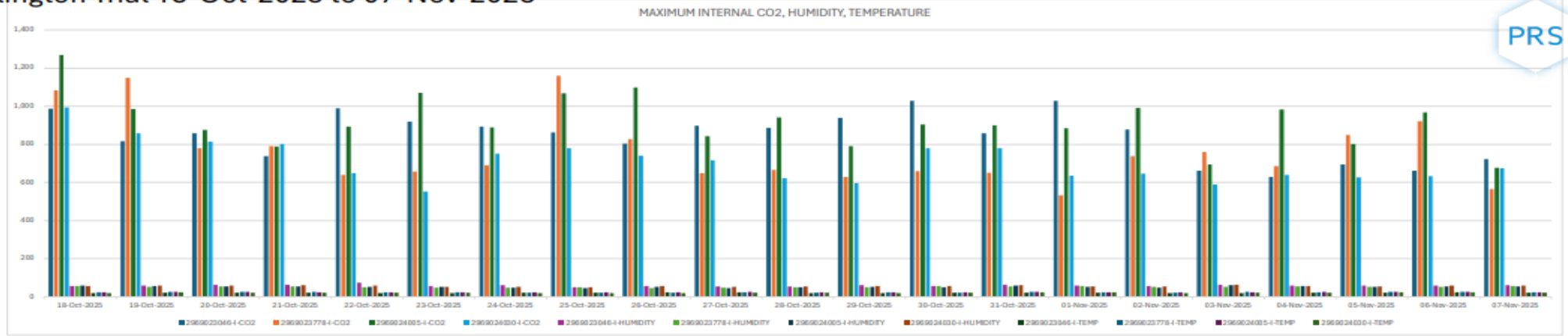
### 11.1 Islington Trial 18-Oct-2025 to 07-Nov-2025



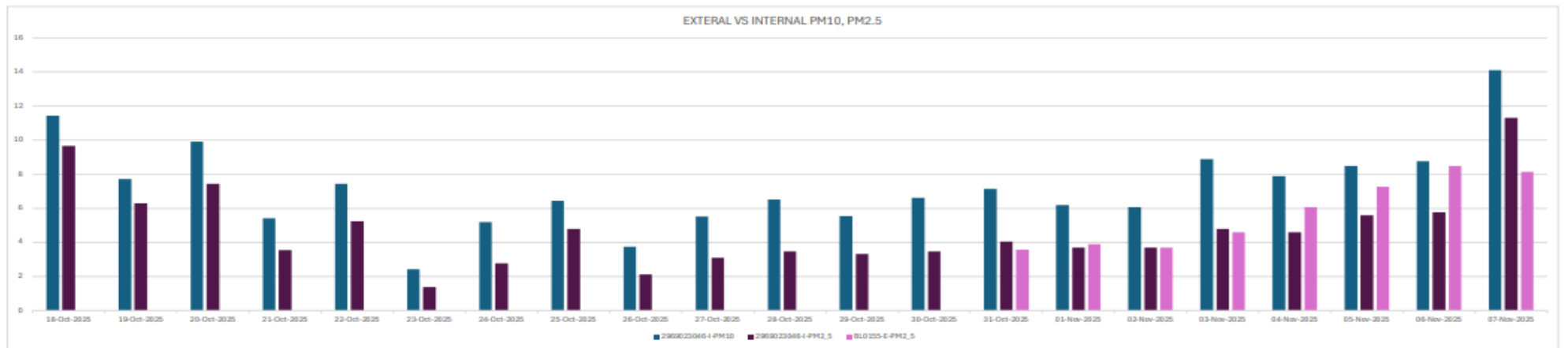
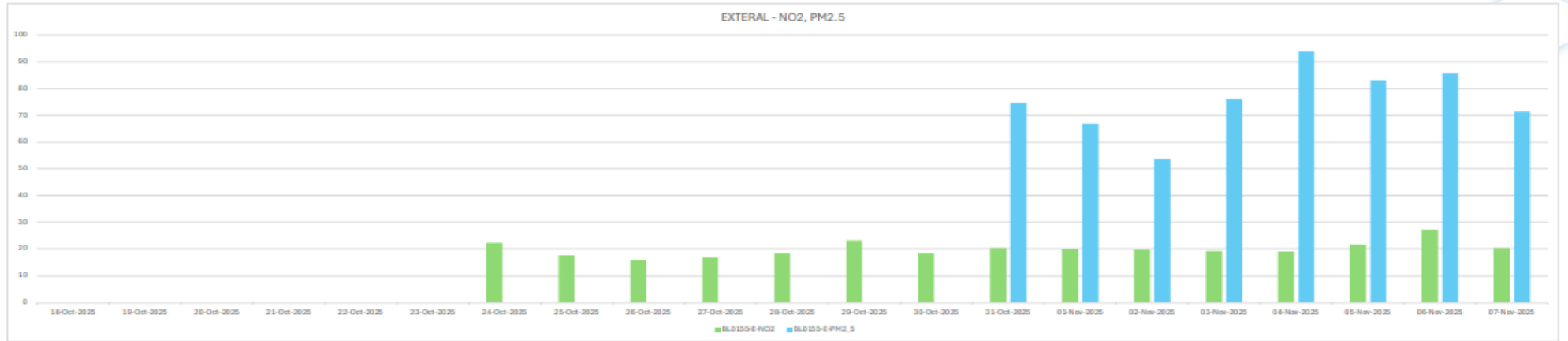
# Islington Trial 18-Oct-2025 to 07-Nov-2025



# Islington Trial 18-Oct-2025 to 07-Nov-2025



# Islington Trial 18-Oct-2025 to 07-Nov-2025



## Bath University Health Questionnaire Scoring Summary Results

		Physical Health & Energy Levels		Mental Wellbeing & Sharpness		Breathing in the Living Room		Breathing in Your bedroom		General Air Quality		Comfort Levels within the House		Total Ratings	
		Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1	<b>M</b> Mother	2	7	2	7	3	9	4	7	1	8	2	8	14	46
2	<b>W</b> Adult Child Aged 20	1	5	1	5	1	6	1	8	1	7	1	6	6	37
3	<b>X</b> Adult Child Aged 19	3	7	3	7	4	8	2	9	3	9	3	8	18	48
4	<b>Y</b> Child Aged 15	1	7	1	7	3	8	4	8	3	8	2	8	14	46
5	<b>Z</b> Child Aged 13	2	3	2	2	3	7	1	3	1	5	2	3	11	23
6	<b>S</b> Child Aged 12	4	6	2	7	4	10	2	4	3	7	4	8	19	42
<b>Totals</b>													<b>82</b>	<b>242</b>	

## APPENDIX 1 - TIMELINE

This is a detailed timeline following the family's experience with microbial contamination in their North London property (the "**Property**"). The family's names have been anonymised and individuals are referred to as follows:

- Mother: **M**
- Children: *Adult Child W* (Aged 20), *Adult Child X* (Aged 19), *Child Y* (Aged 15) and *Child Z* (Aged 13)
- Mother's sister: *Child S* (12)

Date	Event
2012	<ul style="list-style-type: none"> <li>▪ Family bid for and allocated the Property and Tottenham residence sold.</li> <li>▪ Property in poor condition with water damage and bare flooring. Kitchen consisted of only five cupboards, noted as inadequate for a family of six.</li> <li>▪ Family painted, decorated and installed new flooring themselves.</li> </ul>
2012–2015	<p><b>Health deterioration</b></p> <ul style="list-style-type: none"> <li>▪ <i>Adult Child W</i> began experiencing recurring fevers and headaches leading to frequent school absences. No obvious cause established. Increased anxiety developed overtime.</li> <li>▪ <i>Child Z</i> developed swollen adenoids, constant blocked nose, and mouth-breathing. Latter affected jaw development and oral health.</li> <li>▪ <i>Adult Child X</i> developed anxiety, night terrors and infrequent nosebleeds.</li> </ul>

Date	Event
	<ul style="list-style-type: none"> <li>▪ Child <b>Y</b> experienced developmental regression and loss of limited language. Also displayed allergy symptoms and swollen eye bags.</li> <li>▪ All children develop insomnia disturbed sleep.</li> </ul>
<b>2015</b>	<p><b>Weather break</b></p> <ul style="list-style-type: none"> <li>▪ Family travelled to Somaliland for two years, following advice that a change of climate may help unexplained health decline. Husband of <b>M</b> remains in UK for work.</li> <li>▪ Children's health improved almost immediately upon arrival.</li> </ul>
<b>2017</b>	<ul style="list-style-type: none"> <li>▪ Family returned to the UK after two years so <i>Adult Children W</i> and <b>X</b> could resume secondary education.</li> <li>▪ <i>Adult Child W</i>'s symptoms returned within months, including his first recognised generalised tonic-clonic seizure. Other children's symptoms also returned.</li> <li>▪ Continuing health issues placed strain on the family and contributed to breakdown of <b>M</b>'s marriage</li> </ul>
<b>2018</b>	<p><b>Boiler leak and subsequent medical escalation</b></p> <ul style="list-style-type: none"> <li>▪ Boiler malfunctioned and leaked into <i>Adult Child W</i>'s bedroom.</li> <li>▪ <i>Adult Child W</i>'s health deteriorated significantly, with prolonged seizures, recurring sickness and stuttering. Medical investigations included: MRI and two lumbar punctures. Doctors were unable to identify a cause.</li> </ul>
<b>2019</b>	<ul style="list-style-type: none"> <li>▪ <i>Adult Child W</i>'s seizures continue and hospital stays increase. Diagnosed with Epilepsy (idiopathic) and anxiety disorder. Mental health and school performance affected.</li> <li>▪ <i>Adult Child X</i> anxiety worsens and nosebleeds increase in frequency.</li> </ul>
<b>2020</b>	<b>14 December 2020 - School correspondence re: seizure and absence</b>

Date	Event
	<ul style="list-style-type: none"> <li>▪ <b>M</b> notified the school that <i>Adult Child W</i> experienced a short seizure on the evening of 12 December 2020 and spent the night in hospital. Confirmation that the seizures were not related to Covid-19. Request for timetable to review against mock assessments and for teachers to be informed.</li> <li>▪ School acknowledged the absence, confirmed a note was made with the attendance team, and offered support. Noted that <i>Adult Child W</i> would miss Art assessment and it would have to be picked up in the new year.</li> </ul>
2021	<p><b>Two-month respiratory illness and further leaks</b></p> <ul style="list-style-type: none"> <li>▪ Property suffered additional leaks in 2021. One in bathroom and one from overflow pipe affecting an external wall and impacting two bedrooms.</li> <li>▪ <i>Adult Child W</i> experiences escalating and violent tonic colonic seizures.</li> <li>▪ Family experienced a two-month respiratory illness.</li> <li>▪ <i>Adult Child X</i> was hospitalised with a severe infection treated as suspected sepsis.</li> </ul> <p><b>Impact on education (GCSEs)</b></p> <ul style="list-style-type: none"> <li>▪ GCSE exams were significantly affected by illness and had to be resat.</li> </ul>
Early 2022	<ul style="list-style-type: none"> <li>▪ <b>M</b> implements clean organic diet for household in an attempt to address symptoms. Hours spent cooking and cleaning and significant rise in spending.</li> </ul>
8 February 2022	<p><b>Complaint Form submission re: Disrepair complaints</b></p> <ul style="list-style-type: none"> <li>▪ Complaint Form submitted by <b>M</b> detailing poor state of Property.</li> <li>▪ Kitchen needing urgent repair and bathroom has significant mould.</li> </ul>

Date	Event
	<ul style="list-style-type: none"> <li>▪ Concerns raised regarding impact on mould on seizures.</li> <li>▪ Inspection requested by <b>M</b>.</li> </ul>
10 February 2022	<p><b>SHP Response re: Disrepair complaints</b></p> <ul style="list-style-type: none"> <li>▪ Response from SHP stating that there are no works planned for kitchen in the next three years in line with Investment Delivery plan. Offered that the matter is raised as a repair issue.</li> <li>▪ In relation to bathroom, damp survey and mould wash proposed.</li> </ul>
3 March 2022	<p><b>Complaint Form submission re: Urgent Rehousing</b></p> <ul style="list-style-type: none"> <li>▪ <b>M</b> raises additional complaints due to four-year saga and delay with Aids and Adaptations request for Child <b>Y</b>.</li> <li>▪ Emphasises child's specialist school had written "countless letters and emails" due to dangerous conditions of Property.</li> <li>▪ Notes work previously approved by two surveyors was later cancelled</li> <li>▪ Describes home as overcrowded as Child <b>S</b> now also living in Property.</li> <li>▪ Requests urgent rehousing</li> </ul>
7 March 2022	<p><b>SHP Response re: Urgent Rehousing</b></p> <ul style="list-style-type: none"> <li>▪ Acknowledgement of complaint and request for details of housing arrangements to assess as a rehousing case. Advised that if overcrowding is not determined, the Aids &amp; Adaptation case raised will be escalated.</li> </ul>
7 March 2022	<p><b>Email from M to SHP re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ <b>M</b> confirms housing arrangements and emphasises that this case has been ongoing for four years</li> </ul>

Date	Event
	<ul style="list-style-type: none"> <li>▪ Photo provided of dangerous staircase condition which poses as a safety threat for <b>Child Y</b> as it is currently too high and there is a risk of a fatal fall</li> </ul>
14 March 2022	<p><b>SHP Response re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ Email from SHP stating that requests have been raised to Rehousing Services and Aids &amp; Adaptations teams respectively. Home swap offered as an alternative.</li> </ul>
09 April 2022	<p><b>Email from M to SHP re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ <b>M</b> expresses disappointment with staircase outcome as Aids &amp; Adaptation determine that it is not a qualifying issue. Reiteration of Child <b>Y</b> disabilities and risk of falling from staircase being fatal.</li> </ul>
14 April 2022	<p><b>SHP Response re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ Email from SHP advising that the staircase decision is final. Alternative is for a Resident Improvement Request to be made under which SHP will offer agreement for self-repairs.</li> </ul>
09 April 2022	<p><b>Email from M to SHP re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ Request for Resident Improvement Request made</li> <li>▪ <b>M</b> raises further issue with decision reasoning and requests clarification on delays</li> </ul>
21 April 2022	<p><b>SHP Response re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ Email from SHP requesting details of work for Resident Improvement Request</li> <li>▪ Cites delays regarding ceiling decision were due to need for confirmation of works, involvement of Aids &amp; Adaptations Team, lockdown impact during 2020-2021 and recent surveyor attendance leading to determination that the work does not qualify</li> </ul>

Date	Event
21 April 2022	<p><b>Email from M to SHP re: Staircase Height</b></p> <ul style="list-style-type: none"> <li>▪ Email from <b>M</b> regarding staircase ceiling safety works and photographs provided. <b>M</b> states desire to have ceiling height lowered to 3 metres from 7-8 metres to discourage climbing. Work to be done as soon as possible.</li> <li>▪ Flagged fencing work carried out at Property was not explained by relevant parties</li> <li>▪ <b>M</b> clarifies that the work will not change anything structurally and is simply needed to secure lower ceiling. Previous surveyor wrongly stated there will be electrical changes.</li> </ul>
2022	<ul style="list-style-type: none"> <li>▪ <b>M</b> borrows £8000 to replace kitchen.</li> <li>▪ SHP representative attends Property and states that there is no further work to be done as self-repairs have been done.</li> </ul>
August 2023	<p><b>Complaint Form submission re: Poor Housing Condition</b></p> <ul style="list-style-type: none"> <li>▪ <b>M</b> raises additional complaint form on mould and damp in Property and notes that mould washes are not effective.</li> <li>▪ Advised that there has been no investigation despite numerous notifications of a leak.</li> <li>▪ <b>M</b> flags Property has had to be replaced on several occasions due to infestation</li> <li>▪ Worsening health condition of children emphasised</li> <li>▪ Legal action threatened</li> </ul>
30 August 2023	<p><b>SHP Response re: Poor Housing Condition</b></p> <ul style="list-style-type: none"> <li>▪ Email from SHP requesting update on leak to raise as an issue with plumber for further investigation.</li> </ul>

Date	Event
	<ul style="list-style-type: none"> <li>▪ Requested age of children at Property and health conditions to be raised to a case handler to oversee repairs</li> </ul>
<p><b>30 August 2023</b></p>	<p><b>Email from M to SHP re: Poor Housing Condition</b></p> <ul style="list-style-type: none"> <li>▪ Details of children and up to date summary of health conditions provided.</li> <li>▪ Flagged that there is a historic file containing details of leak and SHP repairs thus far. Advised that issues of damp and mould subsist.</li> <li>▪ Requested that a representative attend to inspect issues.</li> </ul>
<p><b>20 October 2023</b></p>	<p><b>Letter of Claim and early legal settlement</b></p> <ul style="list-style-type: none"> <li>▪ <b>M</b> instructs local claimant solicitors to issue a formal Letter of Claim to SHP regarding the condition of the Property. Inspection requested within letter.</li> <li>▪ SHP carry out remediation to bathroom, bedroom and hallway flooring; redecorate bathroom and carry out mould washes. Noted that PPE was not worn.</li> <li>▪ SHP do not carry out any air tests. Dehumidifier promised but never fulfilled.</li> <li>▪ Claim settled for a low sum.</li> </ul>
<p><b>07 May 2024</b></p>	<p><b>Letter from Medical Professional on Child Z</b></p> <ul style="list-style-type: none"> <li>▪ Letter from Cranio-Maxillofacial Surgery department in Netherlands following consultation with Child <b>Z</b></li> <li>▪ Diagnosis includes insufficient lip closure, mouth breathing, tongue displacement and questionable sleep apnoea. Referred for further diagnostic clarification at Great Ormond St hospital for a sleep study and possible Jaw surgery.</li> </ul>

Date	Event
	<ul style="list-style-type: none"> <li>▪ Sleep study revealed Child <b>Z</b> not a candidate for surgical intervention. <b>M</b> opts for private orthodontic treatment costing £6000 to help expand airway and reverse some of the narrowing caused by years of swollen adenoids and mouth breathing. Treatment is ongoing.</li> </ul>
24 May 2024	<p><b>Letter from Medical Professional on <i>Adult Child W</i></b></p> <ul style="list-style-type: none"> <li>▪ Letter from GP following telephone attendance at Neurology Clinic. Noted that <i>Adult Child W</i> experiencing further seizures and regular headaches. Trial medication started and plan to improve sleep and diarise episodes implemented.</li> </ul>
26 July 2024	<p><b>Letter from Medical Professional to School on <i>Adult Child W</i></b></p> <p>Letter from GP confirming <i>Adult Child W</i> suffers with epilepsy and frequent seizures. Extra support requested for upcoming A-levels.</p>
May 2025	<p><b>Mums Versus Mould</b></p> <ul style="list-style-type: none"> <li>▪ <b>M</b> joined the "<b>Mums Versus Mould</b>" Facebook group and requests further support on mould related issues, surveys and remediation.</li> <li>▪ Directed to Lisa Malyon.</li> <li>▪ Lisa undertakes multiple actions on the family's behalf, including: <ul style="list-style-type: none"> <li>○ Correspondence with SHP</li> <li>○ Commissioning and performing mould survey work</li> <li>○ Facilitating production of mould tests and laboratory assessments</li> <li>○ Raising the matter directly with the CEO of SHP</li> </ul> </li> </ul>

Date	Event
02 July 2025	<p data-bbox="551 264 1256 296"><b>Letter from Medical Professional on <i>Adult Child W</i></b></p> <ul style="list-style-type: none"> <li data-bbox="551 328 1939 400">▪ Letter from GP providing medical summary on <i>Adult Child W</i> and impact on academic performance and overall quality of life</li> <li data-bbox="551 432 1715 464">▪ Noted general escalation of seizure episodes since 2013 and a very high peak in 2021</li> <li data-bbox="551 496 2029 608">▪ <i>Adult Child W</i> epilepsy appears treatment resistant and noted some medications are no longer effective. <i>Adult Child W</i> also requires 5-7 days of recovery following seizures which has had a marked effect on academic performance.</li> <li data-bbox="551 639 1099 671">▪ At present, seizures are under control.</li> </ul>
August 2025	<ul style="list-style-type: none"> <li data-bbox="551 711 2029 783">▪ New leak from internal pipe causes water to leak through ceiling light. SHP removes light fixings but leak does not resolve.</li> <li data-bbox="551 815 1581 847">▪ Significant mould begins to grow and SHP treats with further mould washes</li> <li data-bbox="551 879 1805 911">▪ Increase in mould washes and mould disturbance leads to more seizures from <i>Adult Child W</i></li> </ul>
August 2025	<ul style="list-style-type: none"> <li data-bbox="551 943 1783 975">▪ Indoor testing reveals high levels of Group 2 biological agents and biologically active mould</li> </ul>
03 September 2025	<p data-bbox="551 1007 1559 1038"><b>Medical Intervention from Natural Medicine Consultant for <i>Adult Child W</i></b></p> <ul style="list-style-type: none"> <li data-bbox="551 1070 1671 1102">• <b>M</b> arranges a specialist urine test for <i>Adult Child W</i> at IBS and Auto Immune Clinic.</li> <li data-bbox="551 1134 1951 1206">• Medically tested for mould toxicity which showed elevated markers consistent with mould and mycotoxin exposure.</li> <li data-bbox="551 1238 1973 1310">• Diagnosed with mould toxicity and noted several studies link this to seizures. Recommended avoidance of further exposure to water damaged environments.</li> </ul>

Date	Event
October 2025	<p data-bbox="555 268 965 296"><b>Introduction to PRS and DWF</b></p> <ul data-bbox="555 331 1966 533" style="list-style-type: none"> <li data-bbox="555 331 1966 368">▪ Lisa Malyon introduces family to Ian Sinclair at <b>PRS</b> and Steven McNab at <b>DWF</b> and risk concerns raised</li> <li data-bbox="555 395 1966 469">▪ Due to the imminent risk and potential for life-changing or fatal harm to <i>Adult Child W</i>, <b>PRS</b> pilot project expedited.</li> <li data-bbox="555 496 1966 533">▪ Within 10 days, <b>PRS</b> equipment assembled, deployed and installed at the Property.</li> </ul>
November 2025	<p data-bbox="555 568 819 596"><b>Emergency Decant</b></p> <ul data-bbox="555 632 1877 705" style="list-style-type: none"> <li data-bbox="555 632 1877 705">▪ Family received an emergency decant offer from SHP to move to alternative mould-free temporary accommodation. <b>PRS</b> pilot deployment halted.</li> </ul>

## APPENDIX X – Health Questionnaire Extract Appendix

### Overview of Family Health – Before PRS Installation

Date	Event
<b>M</b>	Insomnia, anxiety, acne
<b>Adult Child W</b>	Irritability, Nausea, Restlessness, Anxiety, Intrusive thoughts, Epileptic auras, Absence seizures, generalised seizures, Insomnia, Lack of focus
<b>Adult Child X</b>	Anxiety, Procrastinating, Insomnia, Itchy scalp, Acne, Irritable nose, Blocked ears, Nosebleeds, Lack of focus, Allergies, acne
<b>Child Y</b>	Allergies, Insomnia, Hyperactivity, Stimming, Stomach pain/diarrhoea, Echolalia, Vocal tics, Facial tics, Lack of focus
<b>Child Z</b>	Eczema, Asthma, mild behaviour challenges, Irritability, Anxiety (feeling cold in chest and head), Lack of focus, Allergies, suspected mild seizures
<b>Child S</b>	Anxiety, Eczema, Allergies (irritable eyes), Light sensitivity, Emotional sensitivity (cries a lot at school)

## APPENDIX 2 – PRS PILOT DESIGN AND TESTING DETAIL

### 1. METHODS

#### 1.1 Study Design

A real-world observational intervention study with pre-**PRS** baseline, **PRS** operating phase, and post-**PRS** observation.

#### 1.2 Setting and Participants

Six-person family in an Islington social housing flat with multiple-year history of damp and mould exposure and severe health symptoms.

Participants provided informed consent for anonymised data use.

#### 1.3 Environmental Sampling Protocol

Sampling conducted by **Farmwood**; analysis by Apacor (UK-accredited laboratory).

##### **Air Samples**

- Active air sampling (CFU/m<sup>3</sup>, species identification)
- Passive Petri dish deposition sampling
- Surface swabs
- Outdoor reference samples for indoor/outdoor (I/O) ratio analysis

**Table 1. Environmental Sampling Locations and Methods**

<b>Location</b>	<b>Sampling Method</b>	<b>Purpose</b>
Bedroom 1	Active Air Sample, Passive Plate	High-exposure sleeping area
Bedroom 2	Active Air Sample, Passive Plate	Child exposure assessment
Living Room	Active Air Sample, Surface Swab	Shared family space
Kitchen	Surface Swab	Moisture and food-related contamination
Hallway	Passive Plate	Air movement pathway
Bathroom	Surface Swab	High moisture zone
Outdoor Reference	Active Air Sample	Indoor/Outdoor ratio adjustment

#### 1.4 Indoor Air Quality Monitoring

Sensors: Airthings View Plus / Wave Mini

Parameters:

- PM<sub>1</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>
- TVOC
- NO<sub>2</sub>
- CO<sub>2</sub>
- RH (%)

- Temperature

Collected every 5–10 minutes.

### 1.5 **PRS UVC Optical-Cavity System**

Description:

- High-flux UVC chamber ( $\approx 500 \text{ W/m}^2$ )
- 254 nm germicidal lamps
- Zero-ozone certified (UL2998)
- Fully contained radiation pathway (ISO 15858 compliant)
- 0.1–0.2 sec pathogen inactivation residence time

### 1.6 **Health & Safety**

**PRS** technology is installed and operated continuously under a full "**Risk Assessment Method Statement**" RAMS pack.

This provides assurance on competence and safe working. Team is fully aware of the risks and appropriate risk mitigation and appropriate PPE given the hazards, and controls for heavily contaminated environments.

Evidence of **PRS** Insurance was shared with the family in the initial briefing.

### 1.7 **Health Surveys**

Structured surveys at baseline, mid-intervention, and post-intervention covering:

- Respiratory
- Dermatological
- Neurological (including seizures)

- Sleep quality
- Behaviour and emotional wellbeing
- Fatigue and daily functioning

Daily symptom logs via WhatsApp provided high-resolution temporal correlation.

#### 1.8 **Statistical Analysis**

- Paired sample comparisons
- Wilcoxon Signed Rank Test for IAQ data
- Log<sub>10</sub> reduction calculations
- I/O ratio analyses
- Effect size reporting
- 95% CI intervals planned for spore reduction

#### 1.9 **Ethics Statement**

All participants consented to the non-identifiable use of environmental and health data for scientific reporting and improvement of public health practice. An agreed Consent Form was completed.

## 2. RESULTS

### 2.1 Baseline Environmental Burden

#### 2.1.1 Airborne Fungal Load (18 Oct)

Species	Indoors (max)	Outdoors	I/O Ratio
Aspergillus/Penicillium	373 spores/m <sup>3</sup>	27	10–14×
Cladosporium	1160 spores/m <sup>3</sup>	347	2–3×
Chaetomium	Present	Not detected	N/A
Total viable colonies	High	Low	Elevated

#### 2.1.2 IAQ, RH, and PM Levels

- RH >70–78% (supports fungal growth)
- PM<sub>2.5</sub> above WHO thresholds intermittently
- TVOCs elevated
- NO<sub>2</sub> indoors < outdoors (poor air exchange; outdoor pollutants not entering)

### 2.2 Post-PRS Environmental Outcomes

#### 2.2.1 Fungal Reduction

Approximate reductions:

- Aspergillus/Penicillium ↓ ~88%

- Cladosporium ↓ **24%**
- Chaetomium → **Not detected**
- Total CFU/m<sup>3</sup> sharply decreased

### 2.2.2 IAQ Improvements

- PM<sub>2.5</sub> downward trend
- RH stabilised at 45–55%
- TVOC reductions
- CO<sub>2</sub> stable
- No NO<sub>2</sub> ingress

## 2.3 Health Outcomes

### Respiratory

- Coughing resolved
- Breathing easier
- Chest tightness gone
- Night-time breathing normalised

### Dermatological

- Child **S** eczema substantially improved

### Neurological

- **Child W's seizures completely stopped during PRS operation**

- Behaviour stabilised
- Cognitive clarity improved

#### **Sleep**

- Whole family sleeping through the night
- Anxiety reduced
- Mood stabilised

### **3. DISCUSSION**

This pilot demonstrates that mould and IAQ-related illness cannot be remediated through cleaning, painting, ventilation advice, or temporary dehumidification alone. The **PRS** system addressed airborne microbial load which is the primary exposure route, resulting in both environmental and clinical improvements.

The speed of improvement mirrors findings in environmental health literature relating to:

- Mycotoxin airway exposure
- PM<sub>2.5</sub> neuroinflammatory pathways
- RH-driven microbial proliferation

#### **VOC Limitation Acknowledged**

VOC speciation was not completed; TVOC trends used instead. Future trials should incorporate full VOC profiling.

### **4. LIMITATIONS**

- Single dwelling
- Non-randomised
- Dehumidifiers used

- Short monitoring period
- Health outcomes partly subjective
- VOCs not speciated

These do not reduce the significance but define future study needs.

## 5. **INDEPENDENT SCIENTIFIC OVERSIGHT**

The study protocol including sampling strategy, IAQ monitoring, microbiological workflow, and health survey plan was independently reviewed by Dr Daniel Henk (Milner Centre for Evolution, University of Bath).

*"No major issues... trial phases and sampling strategy seem reasonable." (Email dated 17 October 2025)*

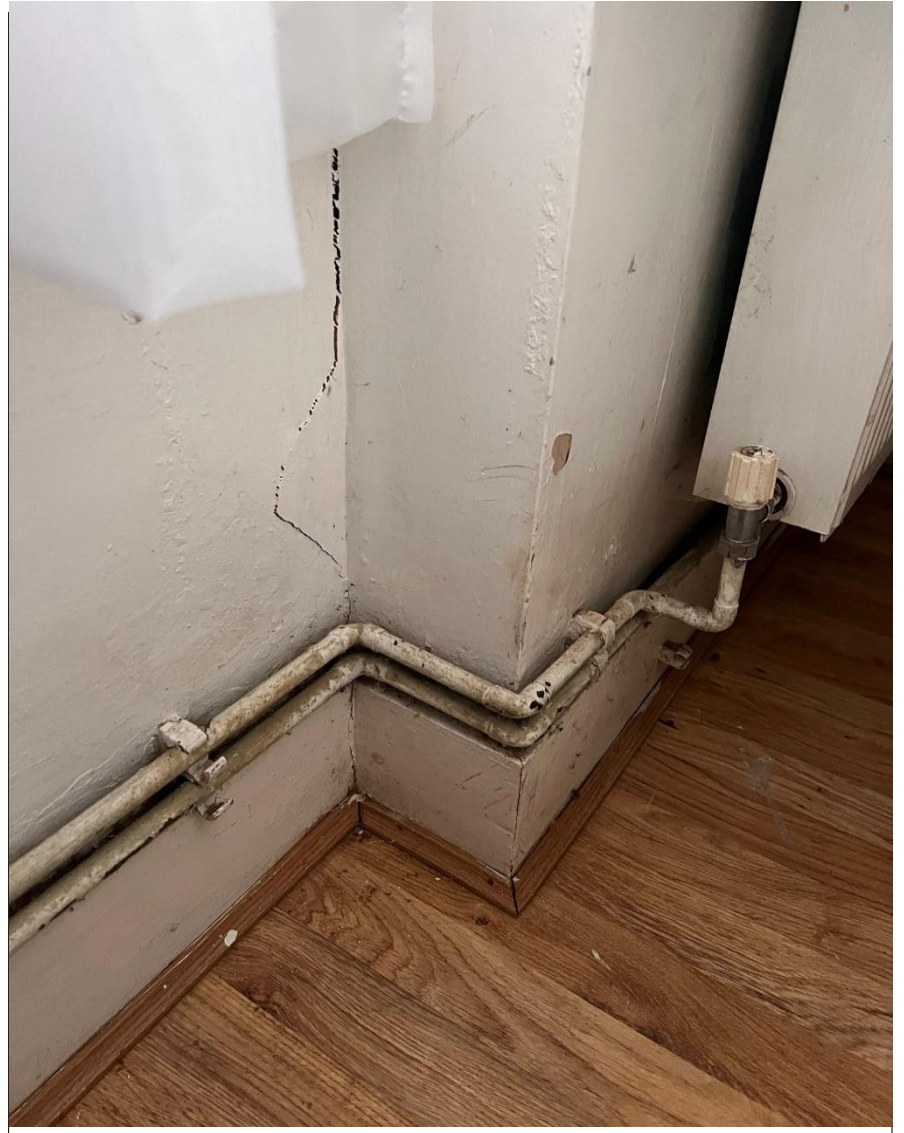
This external validation strengthens methodological credibility and meets academic expectations for environmental health research.

**APPENDIX 3 – PILOT SITE AND INSTALL PHOTOGRAPHS**





Appendix 3 – Pilot Site and Install Photographs





17 October 2025

**To Whom It May Concern**

Dear Sirs,

We hereby confirm that we are the appointed Insurance Brokers to Pathogen Reduction Solutions Ltd and hereby certify that the following described insurances are in force at this date:

**Type of Insurance:** Combined Liability Insurance

**Insured:** Pathogen Reductions Solutions Limited

**Period of Insurance:** May 1<sup>st</sup> 2025 to April 30<sup>th</sup> 2026 both days inclusive British Standard Time

**Insurers:** J R P Underwriting

**Policy numbers:** RL1659525 / 24CLM500169

**Cover:** Legal liability for damages including claimant's costs and expenses arising from bodily injury to or death, illness or disease of any one or more Persons Employed arising out of any one occurrence caused during any Period of Insurance within the Territorial Limits arising out of and in the course of employment by the insured in the Business

**Limit:** **Employers Liability** – No less than GBP 5,000,000 any one Occurrence and in the annual aggregate as defined in the policy, except for Terrorism and Asbestos, which is limited to GBP 5,000,000 in the aggregate

**Public Liability** – GBP 5,000,000 any one occurrence, plus costs and expenses, unlimited in the period of insurance and in the annual aggregate for Products Liability

**Territorial Limit:** **Employers Liability** – Great Britain Northern Ireland the Isle of Man and the Channel Islands or an offshore installation within the territorial waters around Great Britain Northern Ireland the Isle of Man and the Channel Islands. Employees of the Assured during temporary visits abroad in a non-manual capacity, provided that such Person Employed is ordinarily resident within these territories

**Public Liability** – Worldwide

Subject to the policy (policies) terms, conditions, limitations, exclusions and cancellation provisions.

Yours faithfully,



Allan Taitt  
Associate Director  
Gallagher