

bre

# Summary Report BRE Biophilic Office

1 year of monitoring



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## BRE's CEO

People are a vital part of any successful organisation and we know that the conditions in which people work have a strong influence on their physical and mental health, and consequently on their wellbeing, productivity and creativity. Employers increasingly recognise the importance of this linkage as the war for talent grows and employee expectations change.

For many of us, particularly those working in offices, the Covid-19 pandemic has changed the way we live and work. At the same time, it has reminded many of us of the value we place on nature and our connection to the natural world.

As we change our workspaces to accommodate different models of working, the evidence-based approach of projects such as the BRE Biophilic Project enable us to identify solutions in biophilic office design which will improve people's health and wellbeing, and therefore productivity and success, wherever they are working.



“Biophilic design brings the outdoors into the built environment.”



Buildings have a direct impact on our health and wellbeing, with better designed workplaces offering the potential for better performing organisations and healthier and happier employees.

Biophilic design is a human-centred approach that acknowledges our connection with nature. It brings both the direct connections to the natural world such as plants, light, water and fresh air, alongside the in-direct references such as natural materials, colours and textures into the built environment. While numerous case studies have shown that this approach can have health and wellbeing benefits, they have not demonstrated the specific and long-term impacts of a full biophilic design office refurbishment.

## Executive Summary

The aim of the Biophilic Office Project at BRE's Watford Campus was to fill the gap by measuring the effects of biophilic refurbishment on the occupants of a 650 m<sup>2</sup>, standard, 1980s office building. This working office has been monitored for 12 months prior to a refurbishment phase which planned three levels of biophilic design.

This report gives an overview of the pre-refurbishment phase of the BRE Biophilic Office Project. The office space and its occupants have been thoroughly monitored to establish the indoor environmental quality (IEQ), the occupants' perceptions and responses, and their typical behaviours. The results are compared with those obtained from the monitoring of a control building – another, similar building on the same campus.

# 650 m<sup>2</sup>

Size of research project office



## Executive Summary

More than 12.8 million working days were lost to work-related stress, depression or anxiety in 2018/19, in the UK, according to the Health and Safety Executive.\*<sup>1</sup> It is increasingly recognised that buildings have a direct impact on our health, and that better designed workplaces can lead to better performing employees.

The importance of this to business – as well as to people’s wellbeing – has been highlighted in a review of health, wellbeing and productivity in offices by the World Green Building Council\*<sup>2</sup>, which found that 90% of office-based business costs are related to staff salaries and benefits. Wellbeing has become a strategic imperative, with 78% of multinationals regarding it as a critical part of business plans.



90%  
of our time is spent indoors\*<sup>3</sup>



66%  
of the developed world  
will be urbanised by 2050



66%  
of office workers have no  
access to natural light in  
the UK\*<sup>4</sup>

For references see page 32.



78%

of multinationals deem wellbeing a critical part of business plans.

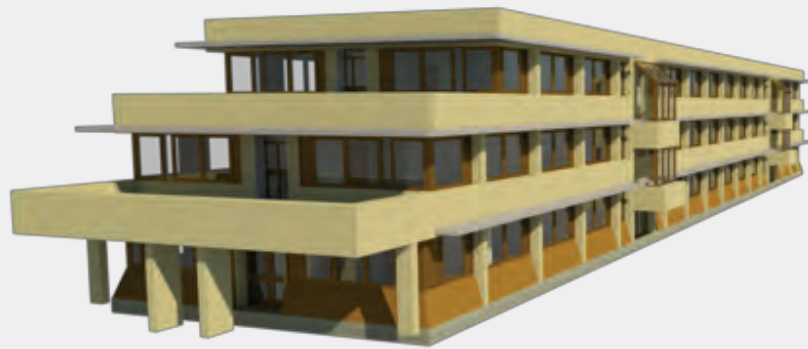
The term “*biophilia*” was initially coined by Erich Fromm and later popularised by renowned biologist EO Wilson who described it as, “*An evolved affinity to certain natural features and scenes*”.

Biophilic design draws on research showing that exposure to natural features and environments is associated with a raft of positive emotional, cognitive, behavioural and physiological responses, and that those who live closer to nature tend to display better health than those in less natural environments. Professor Stephen Kellert said that, “We will never be truly healthy, satisfied or fulfilled if we live apart and alienated from the environment from which we evolved”.

The multisensory, quasi-natural environments created by a biophilic design approach, foster health and wellbeing improvements and cultivate a connection to nature in what is typically the least natural of environments. The aim of this project is to provide both qualitative and quantitative data to better understand how we can benefit from an improved connection to nature in the workplace.

## 1.Introduction

“Growing and deepening the evidence base for health, wellbeing and productivity impacts of restorative office refurbishment.”



The aim of the Biophilic Office Project was to “grow and deepen the evidence base for health, wellbeing and productivity impacts of restorative office refurbishment”. It aims to:

- *investigate practical interventions that office owners can implement to improve health and wellbeing,*
- *quantify these as part of the decision-making process,*
- *measure better business outcomes – occupant productivity,*
- *provide practical guidance to engage refurbishment contractors, real estate owners and designers.*

### Test building

These aims are being addressed through a long-term, detailed case study centred on the first floor of a 1980s concrete frame building (B18), situated on the BRE campus in Watford, referred to as the “test building” in this report.

## 2. Description of the project

The test building consists of small to medium size offices, located alongside a central corridor. There is a balcony at the western end of the building.

Three business teams occupy the test building. The number of staff has varied slightly throughout the baseline study, with 30 people on average being present over the course of the study period.

A section of the test building is occupied by the Environmental Room (see page 14), where biophilic products and strategies can be individually tested to understand the impact on occupants of a single change or of the deployment of an innovative technology.

Under used balcony at the end of the building.



## 2. Description of the project



“The results of the Control building enable the researchers to establish if occupants’ feedback is linked to the building or external factors.”



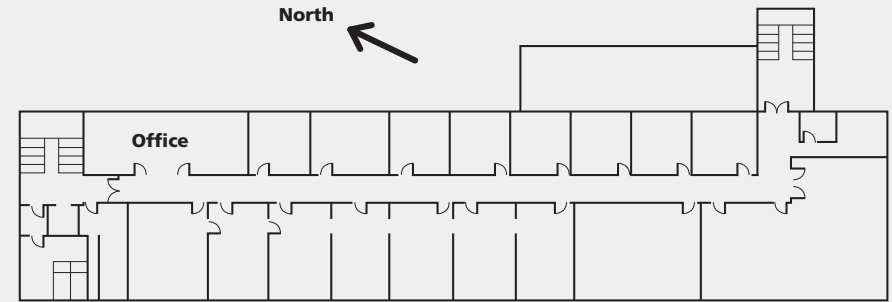
## Control building

The second floor of a building on the same campus (B17), with similar construction, layout, age and occupancy patterns, was chosen as a control building. With various external factors (eg: national or global influences, company culture) to consider, results from the control building will help determine whether observation on the occupants in the test building are the result of the impact of the building or of external factors.

## 2. Description of the project

## Monitoring

The test and control buildings were monitored for 12 months to document their physical conditions and indoor environments and to understand the occupants' use, perceptions and responses to the office environment, and their health and wellbeing. A study of 12 months with repeated evaluations during that period has enabled the capture of seasonal variation in responses.



The following measurements were taken on both the test and the control buildings:

- *IEQ, including indoor air quality (IAQ), temperature, relative humidity and ventilation,*
- *daylight and artificial lighting,*
- *acoustic environments,*
- *occupant wellbeing and performance.*

## 2. Description of the project

In consultation with the test building occupants and the project's Core Partners, Oliver Heath Design has developed an exciting interior design with a strong biophilic design approach. The building has been subdivided into three main zones named after influential biophilia pioneers and researchers: Erich Fromm, Stephen Kellert and Edward O. Wilson.

## Fromm Zone

The Fromm – “Accessible” – Zone looks at biophilic design elements that could be added at the end of any standard refit or existing office, highlighting design solutions that are available to all workplaces:

- *pots plants, both small and medium sized – direct connection to nature,*
- *nature inspired artwork and paint colours – indirect connection to nature,*
- *high-backed chairs, away from desks and near windows – retreat spaces and prospect,*
- *a nature education package – connection to natural systems and community enhancement.*



## 3. Design approach



Diverse spaces allowing flexible and activity-based working.



## Kellert Zone

The Kellert – “Integrated” – Zone, focuses on biophilic design solutions that could be easily adopted and integrated at the beginning of any refurbishment:

- *diverse spaces allowing flexible and activity-based working – complexity and order,*
- *encouraging occupant movement with partially obscured views, using plants – mystery*
- *controllable lighting systems – dynamic and diffuse light*
- *quiet working spaces using acoustic tiles – refuge and retreat,*
- *biomorphic floor tiles – biomorphic forms of nature,*
- *a variety of planting and moss walls – visual connection to nature/views on to nature.*

## 3. Design approach

## Wilson Zone

The Wilson – “Innovative” – Zone is being developed with high level biophilic design intervention and innovation. It will showcase new products and systems, and innovative design ideas for a restorative and more efficient workspace. These include:

- *intelligent soundscapes – non-visual connection to nature and minimal distraction,*
- *biodynamic lighting systems – support for balanced circadian rhythms,*
- *active air unit green walls – direct connection with nature, improved thermal airflow variation and air quality,*
- *zoned, diverse spaces using colour from paint, floor covering and furniture – human spatial response, ecological valence colour theory, material connection to nature, wayfinding, prospect and retreat,*
- *acoustic tiles and furniture – diverse spaces,*
- *sheltered meeting areas with plants – human spatial response, mystery.*



Innovative design ideas for a restorative and more efficient workspace.



## 3. Design approach



An inclusive social space that will enhance the sense of community.



## Collaboration Zone

The Collaboration Zone has been created to further investigate the future workplace. Occupants can use this area to chat, relax and eat lunch together in a shared space, creating inclusive social spaces that will enhance a sense of community.

# 3. Design approach

## Indoor Environment Quality

Indoor environment quality (IEQ) is a combination of indoor air quality (IAQ), which relates to concentrations of CO<sub>2</sub> and volatile organic compounds (VOCs), and thermal and relative humidity conditions.

CO<sub>2</sub> is produced by fuel combustion and human respiration and VOCs are emitted by construction and furnishing products, electrical goods, human activity and outdoor sources. A focus on good IAQ is important as low concentrations of CO<sub>2</sub> and VOCs can increase cognitive scores for workers by up to 101%.<sup>\*1</sup>

Workers' performance can be reduced by 6% if their offices are too hot, or by 4% if they are too cold.<sup>\*2</sup>



The IEQ results for the test and control buildings were similar and showed the following:

## CO<sub>2</sub>

Concentrations of CO<sub>2</sub> were found to rise above the CIBSE recommended limit of 1000ppm for substantial periods in the afternoon on work days, especially in the smaller meeting rooms. There was significant variation throughout the year, probably due to differing rates of window opening between colder and warmer periods. The air changes per hour measured in the test building were between 0.5 and 1 air changes per hour, in accordance with the CIBSE Guides A and B.

### VOCs

Total VOC concentrations were

<100 µg m<sup>-3</sup>,

well below the BREEAM guidelines (300 µg m<sup>-3</sup>) – which is good. Concentration variations during the year are likely to be due to differences in ventilation – windows are more commonly opened in summertime, preventing VOC accumulation indoors. Most of the VOCs found were associated with the building occupants and their activities (e.g. cooking and preparation of food or personal care products).

### Temperature and humidity

For much of the year, temperatures were found to vary greatly throughout the day and to be generally outside the optimum in the CIBSE guideline range of

21-23°C,

suggesting that productivity may be negatively affected. Relative humidity was mostly within recommended guidelines

(30-60%)

in all rooms during the whole year.



## 4. Pre-refurbishment monitoring findings



## Lighting

The impacts of lighting go beyond providing enough light to see clearly and avoiding glare and flicker.

Daylight can positively influence wellbeing by providing high levels of light and variability. Exposure to electric light at the wrong times of day can have adverse effects on circadian rhythms, which are linked to the natural light/dark cycle of the day and control alertness and sleep patterns, as well as factors such as body temperature and hormone release.

Light at night, particularly with a higher blue component, can alter the body clock, suppressing melatonin production and disrupting sleep. However, where daylight is limited, exposure to bright electric light at the correct times of day could, in principle, be used to have similar beneficial effects. Providing the right amount, quality and timing of both natural and electric lighting is therefore integral to biophilic design.



Providing the right amount, quality and timing of both natural and electric lighting is integral to biophilic design.

## 4. Pre-refurbishment monitoring findings



A review of both the test and control buildings showed that:

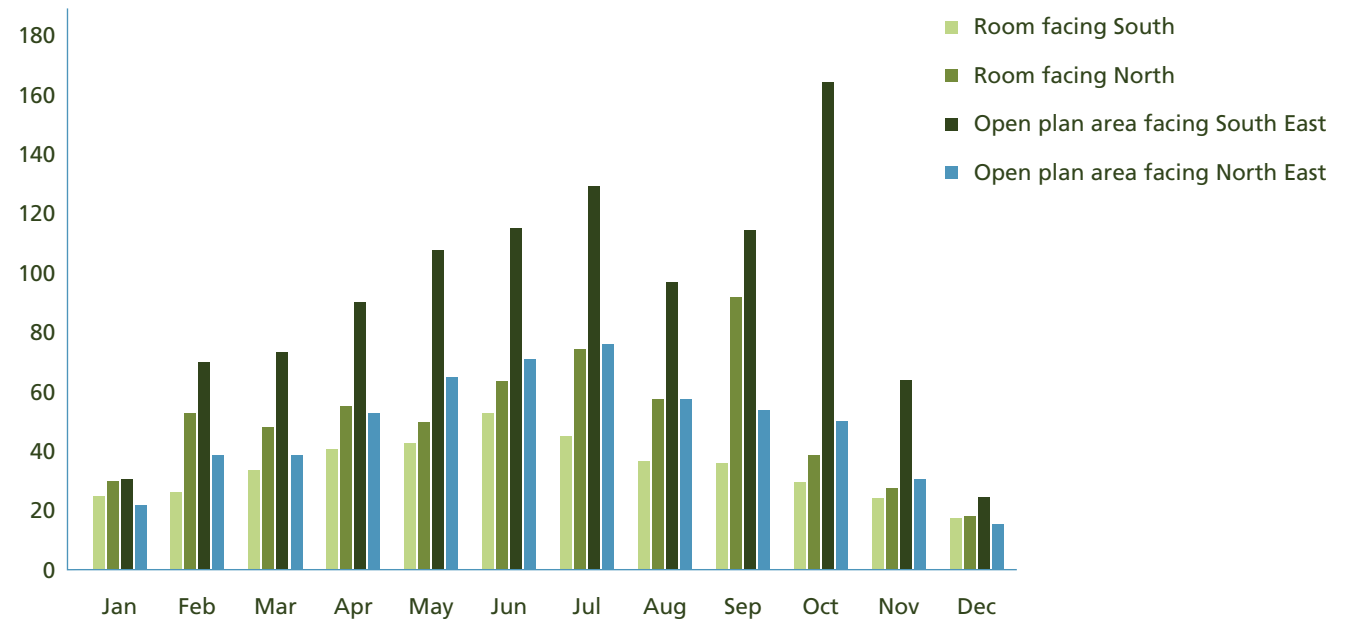
**Electric lighting provision is similar in both spaces.** Both spaces are lit with T8 fluorescent luminaires fitted with a reflector or a prismatic diffuser. Most spaces have warm white lighting, and colour rendering meets standard recommendations in most rooms. Lighting on desk surfaces is below standard recommendations in the test building (500 lux), but within these in the control building.

**Daylight provision appears sufficient.** All office rooms in the test building and most in the control building meet the minimum daylight levels recommended in EN 17037, and all meet BREEAM recommendations. As there are high values of annual sunlight exposure, there is an increased probability of glare, but the occupants are able to control glare with internal blinds.

## 4. Pre-refurbishment monitoring findings

**Electric lighting alone currently provides insufficient circadian stimulation in both buildings.** The results give an indication of the potential for circadian stimulation for the occupants, as well as a basis for comparing the test and control buildings, and the test building before and after refurbishment.

**Indoor light levels include the contribution from both daylight and electric lighting.** They are higher in summer than in winter for most sensor locations – exceptions to this indicate a higher use of electric lighting in particular rooms at other times of year.



## 4. Pre-refurbishment monitoring findings

## Acoustics

Acoustics are important to the effective design, operation and refurbishment of office buildings, as excessive noise from building systems, occupants, equipment and external sources, etc, can cause annoyance and adversely affect occupant concentration, productivity and sleep.

In the office environment, the three key principles for understanding the acoustic properties are:

1. **Sound Insulation:** *the ability of internal floors, walls and doors separating different spaces to resist sound transmission.*
2. **Indoor ambient noise level:** *the combination of natural and artificial noise sources within and outside of a space, excluding noise associated with daily activities.*
3. **Room acoustics:** *the behaviour of sound in a space can alter our perception of that space. A room with "lively" acoustics can feel bigger than it is, increase ambient noise, and make communication more challenging, requiring people to speak louder. This can lead to anxiety and less effective working.*

If the levels too high, ambient or background noise can be disturbing, reduce productivity and prevent effective communication between co-workers. Conversely, rooms that are very quiet can be perceived as too quiet and smaller than they are. Lack of speech interference from echoes, coupled with low indoor ambient noise levels, can make conversations intelligible across large distances, including by those not involved. This is a significant self-reported cause of distraction by office workers.



## 4. Pre-refurbishment monitoring findings

As indoor ambient noise levels should be measured without noise contributions from the occupants, statistical measurements were used to separate out the quietest times throughout the working day. This allowed measurements to take place over the length of the working day and capture different levels of motorway activity throughout the day while still avoiding the noise generated by the occupants

The  $L_{A90}$  noise level is the noise level that is exceeded for 90% of the time. It gives a good indication of background – without person generated – noise levels. The  $L_{A90}$  measurement for each 15 minute period between 08:00 and 18:00 on all working days within the total meter installation period was included in the analysis to derive an overall  $L_{A90}$  for each office. The offices used for measurements in the control building, B17, were paired with the spaces used in B18 for approximate size and occupancy.

For open plan offices, BS 8233:2014 recommends ambient noise in the region of 45 to 50 dB(A) to give a degree of privacy in open plan offices without being overly intrusive.

Ambient noise levels in both the test and the control buildings were similar, with an  $L_{A90}$  in all spaces of well below 40 dB(A), considerably below the range recommended by BS 8233:2014. This suggests that the general background noise level is too low to provide enough privacy in the open plan offices, and transient events such as door slams or person generated noise (e.g. phone calls) may be distracting.



## 4. Pre-refurbishment monitoring findings



## Occupants

The test and control building occupants were monitored using the following methods:

- 1. Questionnaires:** Occupants were asked to complete four questionnaires during the project:
  - *Baseline:* at the start of the project, covering general information such as working patterns, work location, general health and wellbeing.
  - *Quarterly:* covering satisfaction with the office environment, layout and image, job satisfaction, work style, personal wellbeing.
  - *Monthly 'bite sized':* a few short questions on current mood/emotions, issued at the same time on the same day each month.
  - *Stress:* at the end of each stage of the project, a 10-item questionnaire covering general life stress.
- 2. Cognitive tests:** three computer-based tests, once per quarter to measure task performance:
  - *Simple reaction time tests:* alertness, speed of information processing.
  - *Stroop test:* concentration, attention.
  - *Memory test:* short term memory/mental fatigue.
- 3. Physiological measures:** two physiological measures to monitor stress and anxiety levels:
  - *Heart rate:* Volunteers wore a 'smart watch' to measure heart rate, activity patterns and sleep.
  - *Cortisol and alpha amylase:* commonly used as biomarkers for stress levels, they measure longer-term and short-term responses to stress respectively.

## 4. Pre-refurbishment monitoring findings

## Results

The study has provided insights into the working conditions and occupant working patterns in the two office buildings. It provides the baseline for post-refurbishment comparison, and useful information for choosing the biophilic design strategy.

The questionnaire responses, from both the test and the control buildings, showed that most respondents work full time, and spend much of their time seated at their workstation in their own office, where they feel most productive. The vast majority spend most of their time working on tasks that require focus and concentration, or on more routine/clerical tasks, on their own. Very little time is spent outside the building with 40% of the control group and 25% of the test group reporting that they do not go outside at all during the working day, and most only going out once a day.

With so much time spent in the office, it is important that office and workstation conditions are as comfortable as possible, and that any new design is developed to enhance occupants' experience, support their work and optimise performance.



40%

of the control group

25%

of the test group

reporting that they do not go outside at all during the working day, and most only going out once a day.



## 4. Pre-refurbishment monitoring findings

## Health

*Most occupants of both offices reported that their general health was good.*

This was borne out by the low rate of reported absenteeism over the year and the positive monthly responses. However, a high percentage reported suffering from specific health issues such as allergies, respiratory issues, or skin conditions such as eczema. In general, more respondents from the test group reported symptoms than those from the control group, with more of the test group attributing these to the work environment.



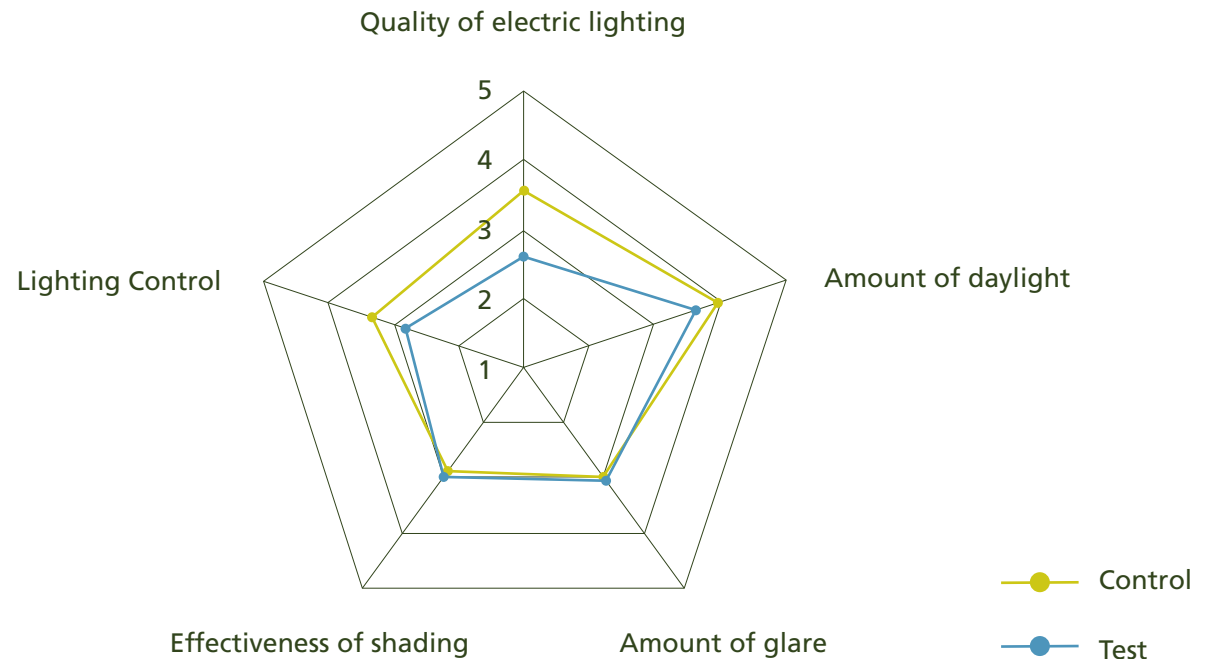
The most consistently reported symptoms attributed to the work environment were dry eyes, itchy/watery eyes, headaches and backaches – which could be linked to the pre-existing health issues reported by some occupants. This should be considered when selecting materials, plants or air scenting products to ensure that pre-existing conditions are not exacerbated.

## 4. Pre-refurbishment monitoring findings



## Temperature and lighting

37% of the occupants in the control group and 45.7% in the test group rated the temperature as 'uncomfortable' or 'very uncomfortable', whereas 28% of both buildings rated the temperature as 'comfortable' or 'very comfortable'. A high percentage of both the control and test groups rated temperature as too hot and variable. Both groups also reported a fairly high level of dissatisfaction with the air quality. Respondents were generally happier with the lighting conditions although the quality of the electric lighting was rated as fairly low in the test group.



## 4. Pre-refurbishment monitoring findings



## Noise

There was general satisfaction with the level of noise disturbance in both offices, even with the noise levels from people in the office. This is not surprising as the offices are generally small, with more than half respondents from both groups occupying offices with 8 occupants or fewer.

## Cognitive tests

Alertness, speed of information processing and reaction times were similar for the two buildings, although there were some seasonal differences.

The longest average reaction time was in the test building in the summer. The results in the speed-of-response test were, on average, a whole second faster in the test building than the control building. However, there was no pattern in the memory test in the number of correct responses.

## Office quality

Factors relating to the quality and image of the offices were rated poorly by test group respondents, in particular 'Décor', and 'Look of the office'. This is linked to low satisfaction with support facilities and amenities, most of which were rated poorly in both buildings, with the test group giving lower ratings. Although respondents from both groups generally rated their office as a comfortable place to work, they were not happy with its look and feel.

Test building occupants felt that its layout was not conducive to concentrated working or working creatively. Control building respondents were generally more positive.

# 4. Pre-refurbishment monitoring findings



## Summary and next steps

The results of the pre-refurbishment study show that the test and control buildings are similar in terms of indoor environment and use. The buildings are typically ventilated by opening the windows, providing a simple way to reduce the build up of CO<sub>2</sub>. There is no other issue with indoor air quality with most VOCs attributable to occupants and results sitting well below recommended thresholds. Both buildings reveal temperature variations throughout the day which can be uncomfortable, as confirmed by the occupant survey. The electric lighting in the test building at desk surfaces is below standard recommendations, but does not appear to be a significant issue for the occupants. Most rooms in both buildings meet the minimum daylight levels recommended in EN 17037. Noise is not an issue in either buildings as the offices are generally small (typically < 8 people per office).

## 5. Summary and next steps

The occupant data has shown that most individuals spend the whole day in the office. The occupants in the test building were particularly unhappy with the office décor and look. Other aspects of the survey data revealed the poor function of the office for specific tasks and this will likely impact on the business performance which is also being measured. This supports the case for refurbishment of the office to yield better business outcomes, as well as improving occupant wellbeing.

The next phase of the project should have been the refurbishment using three zones of biophilic design developed by Oliver Heath Design, which, unfortunately, will not happen for B18. However, the concepts will be integrated into a room on the BRE Innovation Park.



## 5. Summary



### THE BRE TRUST

The BRE Trust uses gift aid from its subsidiaries in BRE Group to fund new research and education programmes to achieve its goal of “building a better world together”. Since its creation in 1997, it has funded more than £20m of research, published over 300 new and updated titles and supported more than 300 post-graduate students.

Under its Wellbeing programme, the BRE Trust improves people’s lives by supporting better living and working environments essential for good physical and mental health. In particular, it has provided funding to support activities for the BRE Biophilic Office Refurbishment project, such as the creation of this publication.

> <https://www.bretrust.org.uk/>

### AKZONOBEL

Here at AkzoNobel Decorative Paints UK & Ireland we want to play a positive role in creating a brighter, more sustainable future for our planet and our communities. Enabling us all to continue to thrive and feel productive, despite the ever-growing demands on our daily life requires a fresh look at interior spaces and building design.

AkzoNobel are working alongside like-minded partners on initiatives that help designers, property managers and building owners to fulfill their building’s potential to maximise look, feel, function and sustainability. We believe that considered, well executed colour and design, supported by evidence based insights, promotes enhanced wellbeing and productivity.

> <https://www.akzonobel.com/en>

### AMBIUS

Recent research tells us that interior plants are good for buildings and people in a variety of subtle ways. Interior landscaping plays a vital role in providing a pleasant and tranquil environment in which to move, work or relax. Office plants have even been shown to reduce staff sickness and increase productivity.

At Ambius we help clients create the right interior environment for their business. We work closely with our customers to select plants, containers and accessories to suit individual budgets, available space and lighting for business environments.

> <https://www.ambius.co.uk>

### AVISON YOUNG

Avison Young is a global real estate firm owned and operated by its Principals. The company comprises 5,000 professionals in 120 offices in 20 countries. We provide industry-leading advice to clients throughout the property lifecycle on a local, national and global scale.

We believe that great ideas can come from anywhere within our business and that our strength lies in the innovation and outcomes that our combined knowledge and expertise can create. The places in which we work, live and play have the power to make us healthier and happier and we strive for real estate to have a positive impact on people’s lives.

> <https://www.avisonyoung.co.uk>

## 6. Partner Profiles



## BIOTECTURE

Established in 2007, Biotecture is an innovative UK based company, that designs, supplies, installs and maintains green infrastructure. Our vision is to transform urban environments for the well-being of people and planet. Green infrastructure occurs in the liminal space where architecture meets nature.

We design plant walls to not just look stunning, but to enhance the environment. Our plants reconnect people with nature, providing a calming and restorative effect that creates positive emotions. Our active air walls remove pollutants by drawing air through leaves and roots. Biophilic benefits that lead to a harmonious and stimulating work environment.

<https://www.biotecture.uk.com/>

## COELUX

CoeLux®, founded in 2009 near Lake Como (Italy) and distributed worldwide, is a high-tech company that patents, prototypes and produces innovative solutions that recreate the true effect of natural sunlight in indoor spaces. By developing an innovative solution for lighting, architecture and the real estate industry that aims to create the perception of an extraordinarily large space, CoeLux uses a true physical reproduction of atmospheric optical phenomena indoors. CoeLux systems simulate the true effect of natural sunlight entering through a window, with a realistic sun perceived from an infinite distance surrounded by an intense clear blue sky.

Studies conducted in collaboration with international research institutes and universities have highlighted the positive effects of CoeLux on people in the workplace, such as increased melatonin production, reduced stress and improved willingness to work.

<https://www.coelux.com/>

## ECHOPHON

Saint-Gobain Ecophon develops, manufactures and markets acoustic products and systems that contribute to a good working environment by enhancing peoples' wellbeing and performance. This comes from a deep understanding of how human beings perceive sound and the effect the natural outdoor environment has had on shaping our hearing abilities. Our promise 'A sound effect on people' is the core backbone of everything we do.

Ecophon has business units in 14 countries, delegations in another 30 countries worldwide, and approximately 800 employees. The head office is located in Hyllinge, just outside Helsingborg, Sweden. Ecophon is part of the global Saint-Gobain Group.

<https://www.ecophon.com/>

## INTERFACE

Interface is a global flooring company specialising in carbon neutral carpet tile and resilient flooring, including luxury vinyl tile (LVT) and nora® rubber flooring.

Our passion for biophilic design comes from the belief that people need to be at the centre of any design. Interface products offer connected, integrated solutions which are both flexible and functional and fit in with any aesthetic. Our expertise in manufacturing and installing these products helps to create +Positive spaces. We want companies of all sizes to make sure considerations over biophilic design are at the centre of their plans

<https://www.interface.com>

# 6. Partner Profiles



### Oliver Heath Design

Established in 2003 Oliver Heath Design is a sustainable architecture and interior design practice focused on improving health and wellbeing in the built environment. Through the delivery of research papers, RIBA accredited seminars, completed design projects and extensive media exposure they are now recognized as leaders in the field of Biophilic design.

Oliver Heath Design take an evidence-based approach, translating research and theory into spatial design. This allows them to create more productive, happier and healthier spaces to live and work in and deliver tangible financial benefits to the triple bottom line of people, planet, and profit. Past clients include Bloomberg, Booking.com, The Crick Institute, and Interface.

> [www.oliverheathdesign.com](http://www.oliverheathdesign.com)

### ROYAL AHREND

Royal Ahrend is an office furnisher present in more than 25 countries worldwide. Ahrend understands the needs of its end users and uses this knowledge to develop innovative design concepts and products that promote well-being, health, creativity and productivity.

The biophilic design approach supports its human centric approach. The workspace can be heated, cooled, cleans air and tailored to provide the user the right light for its needs. The various activities are supported by offering suitable spaces for concentrated work, collaboration, relaxation and community development. Ahrend is convinced that vital work environments attracts good and talented people and is the most important means by which organisations can realise their ambitions.

<https://www.ahrend.com/en/>

### Waldmann

Waldmann, a family owned lighting manufacturer founded in 1928, has always put human experience and benefit at the forefront of all products whether they are task lights for swiss watch-makers, specialist lights for the inside of factory machines, or biodynamic lights to support the circadian rhythms of the occupants of care homes and offices.

With ergonomics, glare control, and perfect lighting distribution, the intent of the intricate design of Waldmann products is not just to avoid the detrimental effects of bad lighting but to enhance the wellbeing of users and their ability to do the task in front of them.

<https://www.waldmann.com>

## 6. Partner Profiles

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