

# BUILDING OUTPERFORMANCE RESEARCH FACT SHEET

ONE SHELLEY STREET, SYDNEY

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## Study Name

One Shelley Street, Building and People Performance Study.

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## Conducted By

University of New South Wales ( led by Deo Prasad) and University of Technology, Sydney (led by Leena Thomas) on behalf of Brookfield Multiplex and One Shelley Street's tenant.

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## Objectives

- » Be a market leader in understanding the relationship between high performance building, indoor environment quality, occupant perception and satisfaction with the workplace and worker productivity and health.
- » To independently measure the tenant experience.
- » To provide quantifiable statistics to support the case of ESD buildings providing more comfortable and productive workspaces for end users.

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## Team

- » Brookfield Multiplex, Macquarie Group, Fitzpatrick & Partners, Clive Wilkinson, Cordless Consulting, Veldhoen & Company, WSP Lincoln Scott, ARUP, Woods Bagot

## Why

- » Most of us spend roughly 80% of our time inside buildings. In addition to saving energy and water, green buildings can improve worker comfort and well being.
- » From an organisational perspective salaries make up roughly 80-90% of the business costs. Therefore health and productivity benefits far out weigh the financial savings from energy and water.

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## Study Period

- » Multiple years studying 2,800 people moving from standard A grade office environments to a custom-designed and built 6 star commercial office space.
- » Pre-Occupancy was tested on old premises in 2009 .
- » Post Occupancy tested at One Shelley Street 12 months after move in 2010.
- » Post honeymoon phase to be tested in 2012.

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## Points of Difference

- » The most significant study undertaken in Australia and Internationally as a result of its long-term nature and scale of participants.

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## Methodology

- » Three separate control groups established and measured in pre-occupancy pilot environments and compared to post-occupancy environment.
- » In-depth assessment of occupant experience including a pre and post-occupancy evaluation. Post-Occupancy evaluations run every 12-24months.
- » Measuring differences experienced through change in work environments from standard workstation model to activity based working (\*ABW) environment.
- » Measuring indoor environment quality and comfort levels.
- » Using the Building Use Studies (BUS) survey to evaluate the user experience at One Shelley Street. BUS has been used to evaluate more than 95 buildings in Australia and over 500 buildings in over 17 countries internationally.

\*ABW -workplaces are designed for flexibility, allowing staff to work offsite or move between areas within the office, depending on the tasks they have to tackle that day.

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## Building Use Studies Variables

- » Measures of comfort, satisfaction and summary indices including temperature and air quality (for summer and winter), noise, lighting, design, image, functionality of workspace, perceived health, perceived productivity.
- » Also includes focus group and key stakeholder interviews.

## Indoor Environment Quality Variables

- » Measures temperature, noise, illumination, humidity, VOC, formaldehyde, CO2, Particulate Air Movement.

## Business Measurements

- » Measures absenteeism, monitor business case, measure efficiencies, productivity, engagement, time to market, turnover, feedback from people, P&I impacts, ongoing measuring and monitoring.

## Key Results

- » Perceived productivity and health from all three control groups increased.
- » Survey indicates users are in top 3% of Australian benchmark for Satisfaction, Comfort and Overall Performance.
- » Positive user experience for overall air quality, air freshness and comfort – all of which are closely linked to health and productivity levels.
- » Positive user experience for key indoor environmental variables – including lower concentration of carbon monoxide, carbon dioxide, lower VOC (volatile organic compounds) and almost no formaldehyde.
- » A saving of 20% net lettable area compared to a standard office space.
- » 50% less power and water used.
- » 35% less paper.
- » Macquarie saves 6,000,000 litres of water, 3,500,000 kWhrs of electricity and 3050 tonnes of CO2 each year as a result of the move into the Shelley Street building.
- » \$3.1m savings on lack of churn/year.
- » Occupancy savings of \$100m AUD over 10 years.

## IEQ

- » Zero Formaldehyde found at One Shelley Street.
- » VOC's significantly below recommendation level of NHMRC.

## Building Survey Results

	<b>Group 1 Standard Working group moving to ABW in new environment</b>
Comfort Index (Aus)	97th percentile
Satisfaction Index (Aus)	TOP
Summary (Aus)	97th percentile
Summary (Int)	82nd percentile
Productivity	15%* Improvement

\*Net Improvement between pre and post occupancy studies

### Comfort Index

The comfort index is derived from 7 key comfort variables

- Temperature in summer and winter
- Air in summer and winter
- Noise
- Lighting
- Overall comfort

### Satisfaction Index

The comfort index is derived from 4 key satisfaction variables

- Design
- Needs
- Perceived health
- Perceived Productivity

### Summary Index

Mean of Comfort and Satisfaction Indices

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## Key ESD Features

- » A passive chilled beam HVAC system to create energy efficient space cooling.
- » More than double volumes of fresh air over Australian Standards and a single pass air system means indoor air quality is of the highest possible standard with no recycled air in the building.
- » Harbour heat rejection to reduce water consumption through elimination of cooling towers.
- » Natural daylight penetrates well into the work floors.
- » Controls sense infiltration of natural light at the building perimeter and dynamically adjust artificial lighting to conserve energy.
- » The lamps are held by high frequency ballast which reduces the flicker of fluorescent lights.
- » Glazing and fritted glass facade.
- » A T5 lighting system has been specified, which use a smaller than usual glass tube and provide the most energy efficient lighting.
- » Low flow water fixtures have been specified including toilets, taps and showers and waterless urinals .
- » The harbour water heat rejection means there is no base building water demand other than the sanitary fixtures.
- » Dual pipe work has been fitted allowing for grey and black water recycling.
- » A high performance façade and central atrium promote natural light and mitigate solar load.
- » Carpets, paints and adhesives all contain low volumes of volatile organic compounds, and therefore will be low emission, improving indoor air quality.

## Employee Feedback

- » 60% of the building occupants invited family or friends to see the new workplace in the first 3 months
- » 98% of respondents said that they supported the cultural change embodied in the new workplace
- » 93% of people said 'no' when asked if they'd prefer to return to their old way of working
- » "Working in this building would make it much harder to decide to leave Macquarie"
- » "Daylight, space and collaboration are three key improvements"
- » "This building makes work so much more enjoyable. Working in this environment is excellent"
- » "Having access to 'collaboration' areas to quickly gather and work through an issue rather than having to book a room is an upgrade"
- » "I feel happier to come to work and perhaps am spending more time at work because the environment is more pleasant"

