Designing for Future
Building Adaptive Reuse

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DECLARATION

This thesis contains no material that has been accepted for the award of another degree at a university or other educational institution. To the best of my knowledge and belief, it contains no material previously published or written by another person or persons except where due reference has been made.

SHEILA CONEJOS, Institute of Sustainable Development and Architecture, Bond University, Gold Coast, Australia, April 2013
ABSTRACT

(350 words)

Adaptive reuse of existing buildings can play a significant role in mitigating climate change by reusing embodied energy and resources in place and acting as a viable alternative to demolition and landfill. It also offers social benefits by revitalising familiar landmarks and preserving cultural and heritage values. Further, it is important that designers should explicitly consider maximising the adaptive reuse potential of new buildings at the time that they are designed and anticipate their future uses aside from its original use.

Reviewing the design principles implemented in the past, this research identifies a knowledge gap pertaining to an absence of clear criteria for future adaptive reuse and the lack of consensus as how to maximise adaptive reuse potential. Thus, this research is an explorative study and retrospectively analyses successful adaptive reuse projects with a view to establishing and testing a multi-criteria decision-making model that can be applied to new design projects. This research develops and applies a new rating tool known as adaptSTAR, which offers holistic and unified design criteria suitable for assessing the adaptive reuse potential of future buildings.

The research study has adopted a sequential mixed mode research methodology carried out in three stages. Stage 1 is qualitative and involves multiple case studies, where primary data is assembled alongside a thorough investigation of secondary data. Stage 2 develops from the outcome of Stage 1 and evaluates a list of potential design criteria to determine their weighted importance via an anonymous online survey sent to selected architects in Australia, and evaluates the case studies including proposing ways in which their original design could have been enhanced. Finally, Stage 3 validates the adaptSTAR model by testing it against Langston’s ARP model.
The findings of this research show that design criteria can be identified and weighted according to seven categories to calculate an adaptive reuse star rating, as well as proving that both the adaptSTAR and ARP models have strong relationships and produce results that are positively correlated. The research demonstrates that by applying adaptSTAR to future building projects, it will contribute to the objective of delivering greater sustainability of the built environment.

**KEYWORDS:** Adaptive Reuse, Sustainability, Design Principles, Obsolescence, Rating Tool, Australia

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To God be the Glory!

Sheila (Selah & Maris)
### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AIA</td>
<td>Australian Institute of Architects</td>
</tr>
<tr>
<td>ARP Model</td>
<td>Adaptive Reuse Potential Model</td>
</tr>
<tr>
<td>BESt</td>
<td>Building Environmental Standard</td>
</tr>
<tr>
<td>BIM</td>
<td>Building Information Modelling</td>
</tr>
<tr>
<td>BMS</td>
<td>Building Management System</td>
</tr>
<tr>
<td>BOMA</td>
<td>Building Owners and Managers Association</td>
</tr>
<tr>
<td>BREEAM</td>
<td>Building Research Establishment Environmental Assessment Method</td>
</tr>
<tr>
<td>BUHREC</td>
<td>Bond University Human Rights and Ethics Committee</td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CNYDDC</td>
<td>City of New York Department of Design and Construction</td>
</tr>
<tr>
<td>EBOM</td>
<td>Existing Building Operations and Maintenance</td>
</tr>
<tr>
<td>GBCA</td>
<td>Green Building Council of Australia</td>
</tr>
<tr>
<td>GGE/ GHG</td>
<td>Greenhouse Gas Emissions/ Greenhouse Gas</td>
</tr>
<tr>
<td>GPO</td>
<td>General Post Office</td>
</tr>
<tr>
<td>HMSO</td>
<td>Her Majesty's Stationery Office</td>
</tr>
<tr>
<td>ICC</td>
<td>Intraclass Correlation Coefficient</td>
</tr>
<tr>
<td>IEQ</td>
<td>Indoor Environmental Quality</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel for Climate Change</td>
</tr>
<tr>
<td>LCA</td>
<td>Life Cycle Analysis</td>
</tr>
<tr>
<td>LEED</td>
<td>Leadership in Energy and Environmental Design</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>RAIA</td>
<td>Royal Australian Institute of Architects (now AIA)</td>
</tr>
<tr>
<td>UDIA</td>
<td>Urban Development Institute of Australia</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>USGBC</td>
<td>U.S. Green Building Council</td>
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PUBLICATIONS ARISING FROM THIS THESIS

The results of this thesis are published in peer reviewed journals and conference proceedings:


