The adaptive reuse predicament:
An investigation into whether building regulation is a key barrier to adaptive reuse of vacant office buildings

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A thesis submitted in partial fulfilment of the
requirements of University of Adelaide
for the award of Doctor of Philosophy

August 2020

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I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

Gillian Armstrong (Candidate)

Date: 01.08.2020

Abstract

The problem of vacant buildings affects cities globally, and office vacancy rates have become a specific political issue in Australian CBDs. Specifically, arguments made in public debate claim that building regulation inhibits the take-up for adaptive reuse of vacant office buildings to mitigate obsolescence. Technical performance standards within Australia's National Construction Code (NCC) are cited as a key barrier to adaptive reuse in public discourse and by previous studies.

This thesis pursued an inductive methodology investigating which aspects of NCC standards are barriers to adaptive reuse. The research focuses on the office building population within Adelaide, South Australia. The mixed-methods research design includes analysis of public debate in news articles, a survey of professionals in Australia experienced in adaptive reuse, semi-structured interviews with stakeholders in Adelaide, and an examination of untenanted and 'greyspace' vacancy types in Adelaide's building population using a novel quantitative method developed in this research, referred to as the Vacancy Visual Analytics Method (VVAM).

Contrary to popular belief, this study did not find conclusive evidence that building regulation inhibits adaptive reuse of office buildings. While content analysis of news articles and data from the survey and semi-structured interviews highlighted that building regulation is typically presented as a barrier to adaptive reuse, there is a lack of convincing detail, beyond generalised anecdotes. The examination of vacancy, through VVAM, questions simplistic representations of aggregated vacancy rates, present in the public debate, and the need for adaptive reuse to address the perceived obsolescence. Examination of the sample (n=118) revealed that while 56 buildings had high vacancy (office-use vacancy rate above 50%), around 65.3% of high vacancy (276,644m2) resides within only 24 relatively new primary offices. Findings also revealed that only 4 large-scale ($GLA_{BUILDING}$>3000m2) secondary buildings had potential for whole building adaptive reuse; however, the vacancy in these 4 buildings was predominantly greyspace, and contextual factors made whole building adaptive reuse unlikely. On a scale smaller than whole building adaptive reuse, 21 large secondary buildings emerged as potentially suitable for mixed-use-multi-level adaptive reuse. Further examination revealed 17 of these buildings had less than 2 stacked floorplates which were wholly untenanted, reducing the viability of multiple level adaptive reuse. The distribution of vacancy across the population reduced the suitability of whole building and mixed-use-multi-level adaptive reuse as a city-wide strategy to solve perceived vacancy problems.

This study concludes that aggregated market vacancy rates are poor predictors of the suitability for adaptive reuse as an urban regeneration strategy to mitigate obsolescence in existing buildings. Therefore, a reduction in building regulation requirements would not necessarily lead to greater adaptive reuse of under-used office buildings as the distribution of vacancy does not lend itself to whole building adaptive reuse. This research provides new critical perspectives on the relationship between adaptive reuse and building regulation. Research findings can help shape policy development in urban planning, and interrogate agendas seeking to reduce NCC regulation of existing buildings. Findings can also inform building owner feasibility decisions for adaptive reuse development and has implications for changing stakeholders' attitudes towards regulation in architectural practice.

Keywords

Building regulation; adaptive reuse; urban regeneration; office building stock; barriers.

Publications associated with this research

Armstrong, G., Queale., M., Voigt, B. (2019) *The Shape of Vacancy*. Internal report for State Heritage Unit, Department of Environment and Water, South Australian State Government. Unpublished. (See appendix 7-E)

Acknowledgements

I wish to express my sincere gratitude to my principal supervisor, Professor Veronica Soebarto, for her immense support throughout the course of this research. Many thanks also to my co-supervisor, Professor Jian Zuo, who kept my momentum flowing through the quantitative phases of this study. Without Veronica and Jian's contributions, my personal development throughout my PhD journey would have been much less.

I wish to acknowledge three enablers of research who sit outside of academia, in the worlds of state and local government. I owe an important debt to the former Lord Mayor of Adelaide, Martin Haese, who significantly helped me build my network of data gatekeepers, at a time when office vacancy had become a sensitive and politicised environment to navigate. Without this mentoring, my quest to secure taxation data would not have been possible, nor the development of VVAM, the novel method developed in and relied upon by this study. The support from Robyn Taylor, Senior Policy Planner at Adelaide City Council, has also been instrumental, particularly in aiding the recruitment of participants when my 'plan A' was not fruitful. These thanks extend to Michael Queale at State Heritage Unit, for an opportunity to test my VVAM on a live project within State Government. I would also like to acknowledge research participants. Their willingness to engage has enabled me to ensure this study has potential for addressing a real-world issue affecting my favourite environment: mercurial cities.

Formal thanks must go to the Australian Building Codes Board for financial support of this research in its early stages. I also wish to acknowledge the contribution of my former supervisor, Professor George Zillante, who directed my initial research journey, reviewing building regulation technical codes as a barrier to addressing empty buildings.

The unconditional love and support of my husband, David, has been instrumental. This short sentence does not begin to cover my gratitude for his part in this journey, with his constant reassurance, and patience as a midnight sounding board. Finally, I wish to say a huge thank you to my tweens, Ruby and Joseph, who are now much better chefs than any of their peers due to the all-consuming nature of this PhD in the last 12 months.

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Abbreviations

ABCB	Australian Building Code Board
ABS	Australian Bureau of Statistics
AFP	Average Floor Plate Area (m^2)
API	Australian Property Institute
ACC	Adelaide City Council
AIA	Architects Institute of Australia
AIBS	Australian Institute of Building Surveyors
BCA	Building Code of Australia, now referred to as the NCC
BEEC	Building Energy Efficiency Certificates
BRAC	Building Rules Assessment Commission
CAD	Computer-Aided Design
CBD	Commercial Business District
CBD Program	Commercial Building Disclosure Program
CGLA	Component of Gross Lettable Areas
COAG	Council of Australian Governments
DAC	Development Assessment Commission
DDA	*Disability Discrimination Act 1992*
DPTI	Department of Planning, Transport and Infrastructure
GLA	Gross Lettable Area (m^2)
ICOMOS	International Council on Monuments and Sites
IPMS	International Property Measurement Standards
MUMLAR	Mixed-use multi-level adaptive reuse
NABERS	National Australian Built Environment Rating System
NCC	National Construction Code
NLA	Nett Lettable Area (m^2)
OECD	Organisation for Economic Co-operation and Development

OMR	Office Market Reports
PAR	Pocket adaptive reuse
PBR	Provisional building rules or building rules consent
PCA	Property Council of Australia
PDP	Provisional development plan
RICS	Royal Institute of Chartered Surveyors
SOA	Single Ownership Areas
SAILIS	South Australian Integrated Land Information System
SPP	State Planning Policy
SPP3	State Planning Policy 03 Adaptive Reuse
TAR	Temporary adaptive reuse
TIS	Tenancy Information Schedule
VVAM	Vacancy Visual Analytics Method
WBAR	Whole building adaptive reuse

Chapter 1: Introduction

> "Only when buildings are treated as a reusable resource rather than a product that is consumed and discarded will a step toward achieving sustainable outcomes will be attained" (Bullen & Love, 2010:221).

1.1 Problem statement

Our fascination with adaptive reuse stems from witnessing an existing building escape premature demolition and the creative thinking involved in re-inventing the building. While the process of reusing existing buildings for new purposes has its roots in ancient times, recent attention locates the benefits of the reuse of these buildings within the broader discourse of sustainability, urban resilience, economic regeneration (Wilkinson & Remøy, 2018; Bullen & Love, 2011b). The reported benefits in literature has produced a blanket advocacy for higher uptake of adaptive reuse, to address premature obsolescence caused by broader societal, cultural and economic shifts occurring globally, particularly through a trend in for city-centre living "from outer periphery, suburban and rural housing towards the centre of cities" (Webb & Webber, 2017:48). Urban policies have been developed for cities globally, enabling renewed interest and advocacy for adaptive reuse, beyond heritage conservation, to resolve the problem of obsolete buildings to revitalise CBDs and urban cores (Gov SA, 2018; UK Parliament, 2013; City of Melbourne, 1993). Increasing the uptake of adaptive reuse is often the purpose of research articles and emerging urban planning policy alike.

Despite the widespread advocacy, research literature frames adaptive reuse as 'novel', often raising questions as to why building owners, suffering long-term vacancy, do not readily choose to undertake adaptive reuse more often. Researchers state that adaptive reuse uptake is low across many cities globally, including in Australia (Bullen & Love, 2011a), The Netherlands (Remøy & van der Voordt, 2014), the UK (Grinnell et al., 2011) and Canada (Shipley et al., 2006). This framing of adaptive reuse constructs a key argument central to this problem statement: the presence of under-used buildings indicates that factors are restricting the uptake of adaptive reuse.

The presence of vacancy is one indicator of obsolescence in existing buildings. Nevertheless, aggregated vacancy rates published by property market actors are too simplistic to sufficiently understand vacancy, and access to non-aggregated data is often not readily available (Muldoon-Smith, 2016). Coupled with this deficit in the availability of vacancy data, research and policy developments that discuss adaptive reuse as an urban regeneration strategy to solve premature obsolescence are often reliant on descriptive accounts of stakeholder interviews and generalisations from single-building case studies of unique heritage structures.

This thesis argues that generalisations from small-scale studies are problematic, and uncritical reporting of stakeholder's views may contain social and financial bias. A recent paper by Foster & Kreinin (2020) also notes this methodological weakness in adaptive reuse of heritage buildings. O'Callaghan & Lawton (2016) suggest, "potential impacts of these [adaptive reuse] strategies need to be more critically considered within the context of the city's wider political economy, particularly in the context of the transformation of post-crisis cities" (p.69). While advocacy is loud and plentiful, there is an urgent need for a greater and a more nuanced understanding of adaptive reuse and a more critical understanding of existing building obsolescence resulting from urban trends and shifts. The urgency is even greater when the lack of adaptive reuse uptake is attributed, in the research literature and public debate, to building regulation such as fire safety, seismic and inclusive access provisions.

Recent public discourse calls for a reduction of red-tape regulation to solve the perceived high levels of building vacancy in Adelaide, South Australia (SA). The debate has targeted Australia's National Construction Code (NCC) as a critical barrier to adaptive reuse of empty office buildings. The problem has been referred to as the "adaptive reuse predicament" (Evans, 18 Aug. 2015). The NCC as a barrier to adaptive reuse is the focus of this research.

Of high relevance to this study, SA state government and Adelaide City Council did not keep records of building vacancy at the time of writing, despite vacancy rate appearing as an important theme in public discourse in discussions about building regulation as a key inhibitor of adaptive reuse. To add to this challenge for research, access to PCA vacancy data was not forthcoming. The lack of vacancy data access had a profound effect upon the research design and direction, and thus, the issue of 'missing data' is described further in this chapter under section 1.7 Development of research design.

1.2 Background to building regulation in Australia

This background section provides a brief overview of building regulation across all States and Territories in Australia. It is necessary to provide this as there is no authoritative text which describes Australian building regulation legal framework and enforcement practice. Australian building regulation is called *The National Construction Code Series*, under which sits Volumes One (multi-residential, commercial, industrial, and public buildings and structures with building classes 2-9), Volume Two (residential and non-habitable buildings and structures with building classes 1 and 10), and finally Volume Three (the Plumbing Code) (ABCB, 2020). *The National Construction Code Series* was formerly known as the *Building Code of Australia* (BCA) (State Library Victoria, 2019 Dec 29), and the current version at the time of writing is NCC 2019 Series (ABCB, 2020).

1.2.1 Australian legislation: federal, state and territory, and local

The Australian Constitution is the basis for all legislation in Australia, detailing the responsibilities and executive powers of the Australian Government (PEO, 2017). As development approval (DA), including building regulation, are not explicitly mentioned in the Australian Constitution, there is a standard convention that DA regulation falls under the remit of state and local government (ABCB, n.d.). Legislation passed at Federal level takes precedence over state and local levels. This hierarchy is essential to note where legislation is relevant to building regulation, such as the Disability Discrimination Act (DDA) (1992). See figure 1.1 and appendix 1-A.

With respect to disability discrimination legislation, similar legislation was enacted in the US, UK and EU countries, prior to, or around the same time as Australia's DDA (Handley, 2001). The adoption within NCC provisions for disabled access and amenities, however, is a relatively new requirement. While various states made some access provisions prior to the introduction of the DDA, disability provisions within the NCC were not fully adopted across Australia until 2011 (Jackson, 2018).

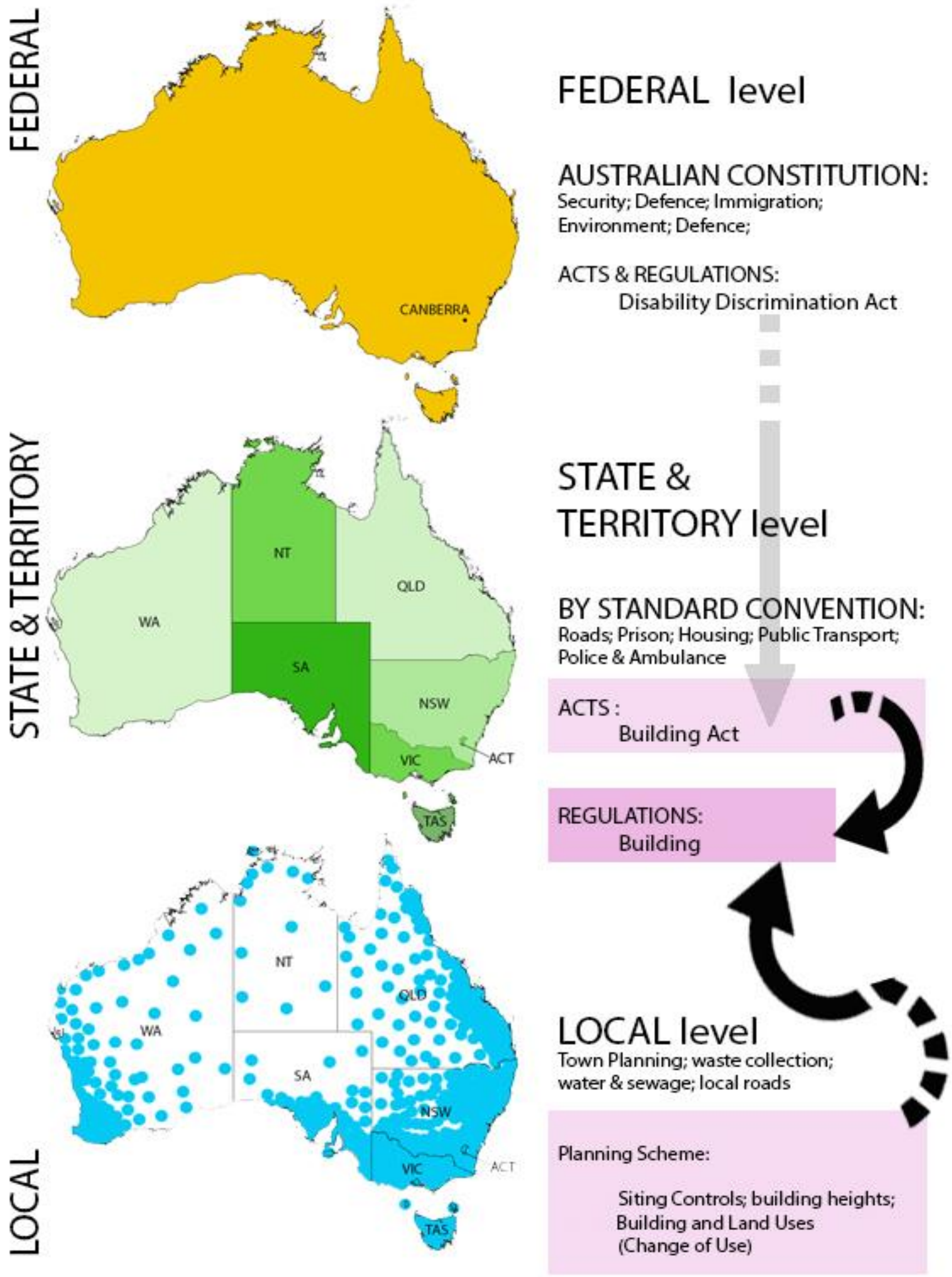

Figure 1.1 Hierarchy of building regulation legislation

The above figure is modified from 'Hierarchy of building Control Documents' diagram in (Building Commission Victoria, n.d., p.2; ABCB, n.d.,b) and figures in Capetanakis, (2004) The Acts and Regulations are prepared by the States' Building Commission or equivalent organisation/body and approved by the individual State Governments as Acts of Parliament (Building Commission Victoria, n.d., p.2). The state's Acts and Regulations legislate on a wide range of issues relating to all built environment development: including setting out its objectives, principles and processes for both planning and building regulation. Beneath this sit, State-specific variations or additional standards which extend or change the scope of the NCC. Common to all states, the NCC performance standards sits beneath the Acts and Regulations. Lastly, other codes referenced within the NCC, then sit below, such as the Australian Standards. See figure 1.2 below.

Building Acts		*State and Territory Acts*
Building (or Development) Regulations		*State and Territory Regulations*
State Variations eg: SA: Minister's Specifications or Guidelines	**National Construction Code** (NCC), also known as the Building Code of Australia (BCA) and the	*Mandatory Technical Standards*
Other Codes such as Australian Standards		*Referenced Documents*

Figure 1.2 Building regulation legislation enacted in Australian States and Territories

The above figure is modified from 'Hierarchy of building Control Documents' diagram in (Building Commission Victoria, n.d., p.2; ABCB, n.d.,b)

Although building control legislation comes under state governance (see figures 1.2 and 1.3), the current nationwide adoption of a single building code, the NCC, effectively - operates as if it were federal (Zillante, 2007; Capetanakis, 2004). The intergovernmental forum, the Council of Australian Government, allows the federal government and the state governments to take coordinated action to create national agreement to adopt legislation (Council of Australian Governments, *n.d.*).

The intergovernmental organisation, which is responsible for upkeeping the NCC is the Australian Building Codes Board (ABCB, 2012). The Australian Building Code Board (ABCB) produces, publishes and maintains the NCC via expert representatives from the industry (Allen Consulting Group, 2009). Until June 2020, the ABCB was part of the national regulatory Council of Australian Government (COAG), and although ABCB has no legal force of their own, must adhere to COAG's principles for good regulatory practice (HIA, 2015:2). It is also useful to separate the two contingent parts of the building regulations: 1) the technical codes and 2) the enforcement systems. Amid the COVID-19 pandemic, the federal government disbanded COAG and the National Committee was established in its place. At the time of writing, further details about how the National Committee would operate for building regulation are yet to be released.

While the NCC is effectively federal level, enforcement delivered by a mixture of State government mechanisms and certifiers operating in both local governments and by private industry, see figure 1.1. The state governments also have the power to make and apply building legislation codes and enforcement practices for local contexts through variations to the NCC codes (Zillante, 2007:39). The state of South Australia has had a long-standing and active history of establishing formal legislation for building control (Building Acts) which dates back to the late 19th Century (Adelaide City Council, 1997).

1.2.2 Development approval process in South Australia

While this thesis examines building regulation, it is useful to discuss how building regulation interacts with other development approval processes, and their legislation or policy support adaptive reuse. Development control in South Australia is known as Development Approval. It is enforced through relevant authorities of two systems: planning approval and building regulation compliance. See figure 1.3 below.

Development Approval	=	Provisional Development Plan (PDP) consent	+	**Provisional Building Rules (PBR) consent**

Figure 1.3 Development Approval (DA) in Australia

Within South Australia, these two control mechanisms issue approvals for new and existing developments, and are respectively referred to as: 'development plan consent' or 'provisional development plan (PDP) consent'; and 'building rules consent' or 'provisional building rules (PBR) consent' (GovSA, August 2013). There are four other types of Development Approval consent dealing with other planning matters such as division of land, encroachment and prescribed matters. Heritage listing of an existing building also needs consideration. Within SA, heritage consideration is made as part of the PDP consent and approval.

1.3 Research questions

In light of the problem statements in section 1.1, this study has developed the following three research questions (RQ1, RQ2, and RQ3) to evaluate to what extent Australia's NCC building regulation is a barrier to adaptive reuse in office buildings in Adelaide, South Australia:

RQ1. What is the perception of industry stakeholders about building regulation in relation to adaptive reuse of office buildings across Australia?

RQ2. Focussing on Adelaide, what evidence is there to support stakeholder views of building regulation and adaptive reuse?

RQ3. Does building regulation need to be reformed to encourage adaptive reuse of office buildings?

1.4 Research objectives

This study investigates evidence to support the prevailing view, held by stakeholders, that building regulation is a key barrier to adaptive reuse. The study focuses on non-heritage, multi-storey office buildings located in Adelaide, South Australia. Multi-storey is not currently clearly defined in National Construction Code. In this thesis therefore, multistorey is simply defined as 3 storeys or above. This specific group of buildings is selected as they are highlighted as ideal candidates for adaptive reuse, as discussed in section 1.5 Scope of this study contained in this chapter. Four specific objectives guide this study, and the research design.

Objectives A and B were developed to help answer research question RQ1:

A. To systematically examine stakeholders' perceptions of NCC as a barrier to adaptive reuse in Australia, both industry professionals in practice and published literature research

B. To evaluate if stakeholders, within the Adelaide CBD office building market, hold the view that NCC regulation is a barrier to office building adaptive reuse.

Objectives C and D were developed to help answer research questions both RQ2 and RQ3:

C. To seek and evaluate the evidence to support stakeholders' views of NCC regulation as a barrier to adaptive reuse, and detail which NCC provisions are problematic.

D. To identify which aspects of building regulation, if any, prevent greater uptake of adaptive reuse to help inform policy initiatives which seek to address barriers to adaptive reuse in practice

1.4.1 Change-of-use trigger for existing building NCC compliance

There is a continuous review process to update standards within the NCC by the ABCB. Documentation within the NCC does not address when existing buildings need to comply with new regulations. As stated earlier, NCC compliance for existing building is detailed in the various Acts and Regulations of each State or territory (NSW Heritage Council, n.d.). See appendix 1-A. There is no automatic requirement for any existing building in Australia to immediately undertake new work to comply with newly updated NCC standards. The requirement to upgrade an existing building to current NCC standards is triggered if a building's fabric or structure changes, or if there is a change in a building's functional use (Department of Premier and Cabinet SA, *n.d.)*. The legislation which sets out the change-of-use requirement is outlined in what follows.

In South Australia, all building works including change of use development, are required to comply with The Building Rules in addition to PDP consent under The Development Act 1993 (Department of Premier and Cabinet SA, *n.d.)*. The Building Rules for Adelaide CBD consist of Development Regulations 2008, the NCC and any Australian Standards referenced within NCC documentation, and the Minister's Specifications.

'(3) The object of this Act is to provide for proper, orderly and efficient planning and development in the State and, for that purpose—

(a) to establish objectives and principles of planning and development; and

(d) to establish and enforce cost-effective technical requirements, compatible with the public interest, to which building development must conform; and

(e) to provide for appropriate public participation in the planning process and the assessment of development proposals; and

(f) to enhance the amenity of buildings and provide for the safety and health of people who use buildings; and

(g) to facilitate—

(i) the adoption and efficient application of national uniform building standards; and

(ii) national uniform accreditation of buildings products, construction methods, building designs, building components and building systems.'

Figure 1.4 Extract from Development Act 1993 (GovSA, 2014:01)

53A—Requirement to up-grade building in certain cases

(1) If an application for a building rules consent relates to building work in the nature of an alteration to a building constructed before the date prescribed by regulation for the purposes of this subsection and the building is, in the opinion of the relevant authority, unsafe, structurally unsound or in an unhealthy condition, the relevant authority may require, as a condition of consent, that building work that conforms with the requirements of the Building Rules be carried out to the extent reasonably necessary to ensure that the building is safe and conforms to proper structural and health standards.

(2) If—

(a) application is made for building rules consent for building work in the nature of an alteration of a class prescribed by the regulations; and

(b) the relevant authority is of the opinion that the affected part of the building does not comply with the performance requirements of the Building Code in relation to access to buildings, and facilities and services within buildings, for people with disabilities, the relevant authority may require, as a condition of consent, that building work or other measures be carried out to the extent necessary to ensure that the affected part of the building will comply with those performance requirements of the Building Code.

(3) However, the regulations may specify circumstances in which a relevant authority may not require building work or other measures, or a specified kind of building work or measure, to be carried out under subsection. (2).

Figure 1.5 Extract from Development Regulations 2008 (GovSA, 2014:63)

The Development Act 1993 details all forms of developments requiring. Provisional Development Plan (PDP) consent (GovSA, 2014). Planning policy and approval processes control land use, heritage, environmental issues and overall building design such as scale, siting and aesthetics. PDP consent is granted following an assessment of the proposal's compatibility with the local government Development Plans. For Adelaide CBD, adaptive reuse and within-use conversion are recognised within the *Development Plan for Adelaide (City)* (GovSA, June 2017). Requirements for change-of-use conversion projects to obtain PDP consent are complex, as they are detailed across different sections of two separate pieces of legislation:

- Development Act 1993 (GovSA, 2014) See figure 1.4.
- Development Regulations 2008 (GovSA, 2016a) See figure 1.5.

In South Australia's *Development Act 1993* (GovSA, 2014)*,* the objectives, principles and processes of building regulation are covered by the Objects (3: a, d, e, f, g).

Section 53A of South Australia's Development Act 1993 sets out the requirements for existing buildings to comply with NCC regulation (GovSA, 2014). Figure 1.6 provides an extract of the provisions in South Australia. The critical terminology, which is central to this thesis and contained within Section 53A, explicitly states that NCC compliance only needs to be "carried out to the extent reasonably necessary". Building certifiers determine what is 'reasonably necessary'. Certifiers are usually building surveyors who are state registered/licenced or registered with the relevant government department in each Australian state (Licence Check, n.d.).

A legislative 'trail' is detailed below in figure 1.6 to understand the provisions affecting change-of-use projects within the Development Act 1993 (GovSA, 2014) and the Development Regulations 2008 (GovSA, 2016a) and which set out the requirements for existing buildings to comply with current NCC standards.

All developments must be approved: '…no development may be undertaken unless the development is an approved development' Part 4, Division 1, Section 32 Public Notice Categories (GovSA, 2014)

The term 'development' is defined under Part 1 Section 4 of the Development Act as, 'Development means - (a) building work; or (b) a change in the use of land…' (GovSA, 2014)

Land use classes are determined by the provisions within NCC documents, and are setout in Part 13, section 82 of the Development Regulations 2008 (GovSA, 2016a)

For building regulation purposes, the States' legislation considers the classifications of building uses published in the NCC to be valid: '(66) Classification of buildings :(1) Subject to this section, a building must have a classification determined in accordance with the regulations' (GovSA,

Section 53A within the Development Act 1993 sets out:

'Requirement to up-grade building in certain cases' *(*GovSA, 2014:63)

Figure 1.6 SA Legislation enacting NCC requirements in change-of-use development

In South Australia, the Department of Planning, Transport and Infrastructure (DTPI) oversee building regulation administration and enforcement (DTPI, *n.d.*). Within the DTPI, there exists an independent statutory body, the Development Assessment Commission (DAC). DAC was setup under South Australia's *Development Act 1993* (GovSA, *n.d.)* and is the organisational host for the Building Rules Assessment Commission (BRAC) which takes numerous advisory and determining roles in regards to building regulation legislation[1]. BRAC is a "peer referral group of technical experts" (BRAC, *n.d.*). One role of BRAC is to assess "applications [which are] seeking to vary the performance requirements of the building code of Australia…and to assist councils and private certifiers by providing an expert opinion on whether a building solution complies with the performance requirements of the Building Code of Australia" (BRAC, *n.d.*).

The Minister's Specifications, e.g., SA 76 Maintenance of Essential Safety Provisions (2015), deal with issues not covered by the NCC but have been deemed necessary in the state of South Australia (Department of Premier and Cabinet SA, *n.d.)*. One other important recent legislation in South Australia is the Minister's Specifications 2015 *Upgrading health and safety in existing buildings*, shown in figure 1.2 (GovSA, 2017). This legislation is also often referred to as the Minister's Code during its public consultation stage but eventually published as the Ministers' Specification in 2017. The Ministers' Specification (GovSA, 2017) is important to this research as it seeks to provide clarification and guidance for modifying existing buildings, including adaptive reuse development. Chapters 04, 06 and 08 of this thesis discuss the Minister's Specification (GovSA, 2017) as it is an emerging policy at the time of writing this research.

This background section has summarised Australian building regulation, which applies to all States and Territories in Australia. As highlighted, there are variations permitted between Australia's States and Territories. Perhaps this variation is one reason for the absence a single authoritative text to describes Australian building regulation framework and enforcement practice, as highlighted at the beginning of this section.

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[1] Private communication with a DTPI project building officer 01.02.17, Emma Bradley

1.5 Research methods in brief

To answer the research questions and achieve the objectives, five research methods have been developed.

To answer RQ1: literature review, which will be discussed in Chapter 02, and content analysis of public debate, discussed in Chapter 04.

To answer RQ2: questionnaire survey, which will be discussed in Chapter 05, semi-structured interviews, presented in Chapter 06, and a quantitative study of vacancy in Adelaide's office building population, discussed in chapter 07.

To answer RQ3: synthesis and discussion of findings from content analysis of public debate (Chapter 04), questionnaire survey (Chapter 05), semi-structured interviews (Chapter 06), and a quantitative study of vacancy in Adelaide's office building population (Chapter 07).

It should be noted that the quantitative study of vacancy in Adelaide's office building population was undertaken because it became clear in the early stages of the research that little was known about vacancy in the office buildings. This in fact is one of the main contributions of the research as it addresses the current gap in knowledge about office building vacancy.

1.6 Development of research design

News articles featuring stakeholders in Adelaide claimed that there are a lot of vacant office buildings in Adelaide (Washington and Siebert, 2016 March 17; Evans, 2015 August 18), and attempts to implement adaptive reuse often fail due to barriers presented by the NCC (Gannon, 2017 April 07; Novak, 2016 December 29; Sutton, 2018 July 27). Therefore, the research journey began by forming a hypothesis to examine which parts of NCC building regulation were a barrier to adaptive reuse of vacant office buildings in Adelaide CBD. The hypothesis which this study intended to test was as follows:

> *"Current building control policy and its enforcement are significant inhibitors of adaptive reuse projects involving unlisted existing buildings occupying central urban locations within Adelaide, South Australia."*

This hypothesis was designed to investigate building regulation and was developed from the wealth of criticism directed at building regulation from published sources read during the initial phases of the study. The research set out to explore the real-world problem of regulatory barriers to adaptive reuse of office buildings suffering from perceived high vacancy levels. The inductive journey navigated several unexpected difficulties and what follows is a brief outline of the research journey travelled.

The researcher initially predicted that the study would identify which specific NCC standards and enforcement practice are problematic to adaptive reuse; therefore, the research design initially intended to collect data using an electronic survey of built environment professionals across Australia and face-to-face interviews with building owners. The anonymised electronic survey was also designed to recruit participants for the face-to-face interviews.

As the research progressed, however, doubt began to emerge about the objectivity of the study's initial hypothesis, which questioned the validity of the framing of the research problem. Early-stage informal discussions were held to inform the research design and included architects and building surveyors experienced in adaptive reuse. Informal discussions contradicted the findings offered by published studies found in the initial reading of literature (Bruce et.al., 2015; Udawatta et.al., 2016; and Bullen & Love, 2011) and also in the prevailing narratives projected in public debate for empty buildings in Adelaide. These initial discussions were not a reliable method for data collection as they were informal and small in number (2). They did, however, begin to cast doubt on the initial hypothesis and predictions. The doubts raised from informal discussion raised three new questions:

- What role does cost play in determining which aspects of NCC standards are problematic by stakeholders?
- Are office buildings indeed empty in Adelaide CBD?
- Furthermore, is the vacant space located in small scale or large scale office buildings (1-3 storeys or large scale multistorey)?

The researcher identified the need to find a reliable source of secondary data to understand vacancy in Adelaide CBD. A survey was conducted as the first data collection method to progress the research while the search for sources of vacancy data was underway. The survey was also designed to recruit participants for further data collection using face to face or telephone interviews of survey respondents, to gain an in-depth understanding of the NCC problems that could not be collected using a survey. Two further issues arose from the survey, which affected the initial research design:

1. Due to low response and high attrition, the survey did not recruit sufficient participants for interviews with stakeholders as was planned.
2. Qualitative comments gathered using the survey added to a growing doubt about the underlying assumption on which the study's hypothesis was initially based.

This weakness in the survey design does not enable the researcher to draw any firm conclusions. However, the failure led to a productive re-evaluation of the research design, and the production of new research objectives which are detailed in section 1.3. The redesign highlights the importance of having a testable hypothesis. Assumptions made in the survey meant that the original hypothesis could not be proven or disproven. These assumptions included that vacancy rates and comments relied upon in the public debate were accurate and that were a number of office buildings standing vacant in Adelaide CBD; vacancy is evidence of problems in building regulation for adaptive reuse; and adaptive reuse is an obsolescence mitigation strategy which SA building owners are willing to use. A redesign and a set of research objectives were necessary so that other methods could be used to examine the research questions. Nevertheless, the survey did provide qualitative data which raised critical questions. It offered the opportunity to question findings from previous research studies and the views of stakeholders and considered whether there were faulty assumptions about the relationship between adaptive reuse, existing building obsolescence and building regulation.

'Missing vacancy data' is an important factor which shaped the final research design of this study. Public debate, analysed in chapter 04, tended to focus on office vacancy as an indicator of the need to adaptively reuse secondary grade buildings in the CBD, with building regulation positioned as a barrier to this form of urban regeneration. Critical analysis of literature suggested shortcomings in studies which descriptively gather stakeholders' views about building regulation as a barrier to adaptive reuse. Given the public debate and this limitation in some research studies, the researcher was convinced of the need to examine office building vacancy beyond the rates published in public discourse, and as a means to shed light on whether building regulation was indeed a barrier to adaptive reuse of offices. The researcher made efforts to obtain secondary data to examine office building vacancy beyond aggregated rates, published by the Property Council of Australia. A timeline of the investigations to secure access to vacancy are represented in figure 7.2 located in chapter 07. Despite initial agreement, vacancy data was not forthcoming from the PCA, who manage and maintain the only source of vacancy data for Adelaide. This outcome drove the need to develop ways to quantify vacancy through other means and led the researcher to develop a novel method using secondary data collected for local council taxation purposes. Chapter 07 details this method. One additional benefit of constructing the vacancy data was that it could be used to identify and contact building owners for semi-structured interviews in the face of low rates of Survey participants willing to take part in further research. The 'missing vacancy data' issue turned out to be an extremely productive force shaping the research design and this study as a whole.

The resulting mixed-method research design and the objectives A-D, are a product of the research journey travelled in this inductive study, as later discussed in chapter 03. The thesis structure below details the content of each chapter and how collectively they respond to the need for research to accommodate alternative outcomes than the hypothesis predicted initially. The final research design offered a space to generate new knowledge to explain the relationship between NCC regulation, adaptive reuse and vacancy.

1.7 Scope of this study

The literature review conducted for this study highlighted that there is no universally accepted definition of the term 'adaptive reuse'. Adaptive reuse can occur on a temporary or permanent basis (Wilkinson & Remøy, 2018; O'Callaghan & Lawton, 2016). Holden (2018) proposes a different type of development type referred to as 'top-up', whereby a new use is introduced to a largely unaltered existing building through adding an extension such as new residential apartments or hotel on the top of a multi-storey car park. This study, however, focuses upon permanent adaptive reuse, where-by the existing building's use-class changes on a whole-building basis. The definition of adaptive reuse adopted by this thesis is developed from Armstrong (2017) and is as follows: ***a process of in-situ technical modifications to avoid substantial disposal of the existing building fabric and structure, enabling a permanent change of whole building class-use use to suit new socio-technical use requirements and delay eventual obsolescence***. The background, section 1.2 of this chapter 01, explains how this study's definition has developed in light of previous definitions given in research studies.

In this thesis, building regulation is understood as the technical compliance with NCC performance standards and their enforcement in practice, specifically in the adaptive reuse of non-heritage, multi-storey office buildings. Research literature identifies NCC performance standards as problematic for adaptive reuse development (Conejos et al., 2016; Dyson *et al.*, 2016; Udawatta et al., 2016; Bruce et al., 2015; Tan *et al.*, 2014; Bullen & Love, 2011b; Langston *et al.*, 2008). The inclusion of enforcement, in this study, arises from recommendations in research literature outlined in chapter 02 (Lord *et al.*, 2016; Imrie & Street, 2009b; Levi-Faur, 2011; Fischer & Guy, 2009; Van der Heijden & de Jong, 2009).

Office buildings were chosen as a focus of this study because initial research indicated that this use of building is regarded as a particular problem in the context of adaptive reuse in South Australia and elsewhere, such as in the UK and the Netherlands (Muldoon-Smith, 2016; Remøy & van der Voordt, 2014; Wilkinson et al., 2009; Ness, 2002). Several reasons underpin the choice of buildings without heritage status as the focus of this study outlined next. The majority of buildings in most cities today are without heritage designation which can protect existing buildings from premature demolition. It is important to consider the preservation of this larger group of existing buildings to maximise the environmental benefits of adaptive reuse and reduction in construction waste. Premature building dilapidation can occur more rapidly when buildings are under-utilised. (Remøy & van der Voordt, 2014; Zheng et al 2014; Langston et al, 2013; Ho et al, 2011; Wilkinson et al, 2009; Lee & Chan, 2008; Bullen, 2007; Shipley et al, 2006). A further pragmatic reason for the selection of non-heritage buildings for this study is because heritage-listed buildings incur the additional regulation associated with heritage status. This research considers the reduction of the number of potential regulation variables to be important when examining barriers to adaptive reuse. Non-heritage office buildings are in many ways simpler to examine as the number of heritage conservation considerations are less for these buildings.

This study selected Adelaide as a site for research on account of several reasons. Adelaide CBD is one of four Australian state capital cities perceived as having recent and prolonged periods of vacancy in building populations within its Central Business District (PCA, 2017). Adelaide is the largest urban conurbation within the state of South Australia (SA), an Australian state which currently has a low predicted growth rate when compared with other Australian states such as New South Wales (NSW) and Victoria (VIC). The Australian Bureau of Statistics (ABS) predicts South Australia's population growth will be between 0.1% and 0.9% p.a. up to 2027, with median age remaining as the second-highest of all states (ABS, 2018). The state also had a net loss in interstate migration in 2016-17 (ABS, 2018). In addition to population data, Wolff & Weichmann's (2014) framework of urban shrinkage indicators, vacancy rates can offer insightful perspectives on a city's urban growth and shrinkage. In 2017, published vacancy rates for the CBD's commercial buildings hovered around 16.1% (Knight Frank, Aug. 2017). This rate was above the average historic vacancy rate of 12.4% (PCA, July 2018). Media attention to the perceived vacancy problem depicted the vacancy problem was due to the "adaptive reuse predicament" (Evans, 18 Aug. 2015). Adaptive reuse to address vacancy had become a politicised issue in the upcoming state government elections, by both main political parties promising to introduce policy initiatives to support adaptive reuse (Wills, 18 March 2016). By 2018, a range of policy initiatives to increase adaptive reuse uptake had been drafted and adopted through extensive public consultation, including draft State Planning Policy 03 (SPP03) Adaptive Reuse (GovSA, 2018) and Ministers Specification in SA for Upgrading health and safety in existing buildings (GovSA, 2017), to address perceived barriers to adaptive reuse stemming from Australia's building regulation compliance, the NCC. The reader should note that consideration of planning regulation is not in the scope of this thesis.

This study calls upon concepts of office building quality, office building size, and non-heritage status of office buildings in defining the building population examined in chapter 07. The following sections (1.7.1 to 1.7.3) detail how these three concepts of quality, size, and heritage status are defined before their use as selection criteria for the list of office buildings included in the study and illustrated in appendix 1-B.

1.7.1 Quality grade

In Australia, the Property Council of Australia (PCA) provide a framework for assessing office building quality in their publication, *A Guide to Office Building Quality* (PCA, 2012). This guidance categorises office buildings into five quality grades, ranging from Premium, A, B, C, and D. However, as the guide explains the PCA do not publicly classify office buildings and no public register of office buildings by quality grade exists (PCA, 2012:7). The guide implies a note of caution, highlighting that grading an office building requires judgment rather than a religious application of criterion included. The PCA explain that ranking an office building is a subjective judgment and the "ultimate measure of quality is the rent or financial value an occupant is willing to pay…" (p.7). The guide includes two matrixes, titled 1. *New Buildings* and 2. *Existing Buildings*. Each matrix details criteria for office buildings whose development applications were submitted: 1. after 2012, and 2. those approved before 2012. The guide includes 60 criteria for post-2012 office buildings and 60 criteria for pre-2012 office buildings. The categories include environmental, configuration, mechanical, tenant services, lifts and electrical.

This review of literature discloses that conceptual models of office building obsolescence, offered by research, associate vacancy with lower grades office buildings. In addition, initial investigations found the public debate in Adelaide connects vacancy with lower-grade office buildings grades. There appears to be an assumption that perceived high vacancy in secondary grade buildings needs policy action for its resolution. In their research study focussed on Adelaide, Bruce *et al*. (2015) highlight stakeholder views in Adelaide, "it is clear that some structures that have been vacant for some time now present far too many barriers and that no reasonable government based incentive scheme will result in these buildings being re-used" (p.158). Herein lies a problematic assumption, as vacancy in office buildings by quality grade is poorly understood and often only evidenced by sources which are not open to research scrutiny.

Research studies in the field have adopted the PCA (2012) guidance to grade office building quality, for example, Wilkinson & Reed (2011) and Bruce *et al.* (2015). Office building grades are also relevant to this thesis as stakeholders apply the categories of quality in public discourse about vacancy rates in office buildings in Adelaide. Chapter 04 analyses the public discourse and finds office building grades are essential to understanding stakeholders' discussion of vacancy, obsolescence and adaptive reuse. The quality categories are also used in Chapter 07 to examine vacancy across primary and secondary grade office buildings.

1.7.2 Office building size

One way of grouping office buildings for vacancy analysis is by size or number of storey levels. Davies & Trabucco (2018) highlight the need to retain taller buildings for longer, and that buildings can require continuous evolution to stay relevant and adapt to their market place (p.359). Andrews *et al* (2016) confers with this, albeit in a building regulation efficacy, and suggest that resources should "target their resources toward a subset of projects that promise a bigger bang for the enforcement buck. They [building code officials] could focus their efforts on larger projects" (p.119). This insight supports the significance of this thesis, which examines the taller buildings in the office population within Adelaide, rather than the 1-3 storey smaller scale properties.

1.7.3 Non-heritage status

The heritage status of a building is of particular relevance to this study. Buildings without current heritage status can be viewed as offering value when viewed as a collection of buildings at a whole city-scale (Hofmann, 2002:12; Loli & Bertolin, 2018:11). The collection is unique to each city and adds a sense of place, which is valuable to both the character of a city and the identity of a country (Loli & Bertolin, 2018:11). This perspective widens the benefits of adaptive reuse to include non-heritage and whole building populations, which highlights the significance and contribution of this thesis.

1.8 Significance

This study is relevant to sustainable urban policy and governance of existing building stocks. In addition, it has direct bearing upon potential solutions to mitigate premature obsolescence in the built environment, and how professionals view building regulation when existing buildings undergo adaptive reuse. A critical contribution of adaptive reuse is as a sustainable strategy for economic and urban revitalisation in cities globally. Increasingly, adaptive reuse is used to address vacancy in urban building populations that have suffered from declining demand, including non-heritage commercial buildings which are vacant or underused (Wilkinson & Remøy, 2018; Muldoon-Smith & Greenhalgh, 2016; Brouwer, 2014; Shen & Langston, 2010; Bullen, 2007).

The relevance of the research questions central to this thesis is supported by Geraedts et al. (2018:122), who identify critical problems in the field of adaptive reuse:

- Which factors hinder adaptive reuse?
- What are the main opportunities and risks, and how can they be reduced or eliminated?

Following Geraedts' (2018) analysis, the significance of this study relates to how both public discourse and literature frame building regulation as a barrier to adaptive reuse. Public debate presents high vacancy levels as evidence of a regulatory problem in Australia. However, relaxation of building regulation presents significant risks for public safety, social equity and environmental objectives. The significance of this study is that it critically investigates the evidence supporting claims that building regulation is inhibiting adaptive reuse uptake, using Adelaide CBD as a site for investigation.

Vacancy rates are often cited in research and policy which discuss adaptive reuse. Burkholder (2012) suggests, "planning must consider the larger picture of what vacancy provides as fodder for its future development. While most of this would be completed incrementally, a larger agenda must be established to address vacancy at scale" (p.1166). Recent international research, however, finds that conceptual understanding of office building vacancy is too simplistic or poorly understood (Muldoon-Smith, 2016). This research provides an essential understanding of vacancy, to evaluate adaptive reuse as a sustainable urban regeneration strategy to address premature obsolescence and economic decline. This more nuanced understanding of vacancy is urgently needed when high vacancy levels are cited in lobbying to reform policy, such as calls for 'red-tape reduction' to streamline planning approval processes and building regulation compliance for existing buildings (Clifford et al., 2018; Evans, Feb. 02 2017; Wills, 18 March 2016; O'Callaghan & Lawton, 2016; Overmeyer & Misselwitz, 2011).

1.9 Thesis structure

This thesis organises the study into eight chapters. Chapters 04 to 07 are the data gathering chapters in this mixed-methods research design. Each of these chapters contains a method section, data analysis and findings. Chapters 04 and 06 are exclusively qualitative, chapter 05 takes a mixed approach, and chapter 07 adopts quantitative analysis. Brief descriptions of each chapter outline the structure of this thesis and are presented below:

- **Chapter 01** introduces the reader to this research. The chapter begins with the problem statement, research questions and objectives underlying this study. It ends by outlining background information, which builds an understanding of building regulation in Australia and concepts to define the process of adaptive reuse.
- **Chapter 02** details the relationship between office buildings obsolescence, vacancy, and adaptive reuse are examined through a review of scholarly literature. This chapter also highlights critical issues in contemporary regulation to build a meaningful understanding of regulatory barriers for adaptive reuse. Following this, Chapter 02 then details a review of the literature discussing adaptive reuse and building regulation to inform *research question RQ1*, before concluding by identifying the gaps in the literature to which this thesis responds.
- **Chapter 03** presents the rationale for the mixed methods methodology and research design before detailing the research questions and ethical considerations. The research design of this study incorporates four discrete methods. The reader should note that Chapter 03 does not describe individual methods. Instead, this thesis locates the method sections within the corresponding data analysis chapters: Ch04, Ch05, Ch06 and Ch07. As this study

comprises four discrete methods, this structure was adopted for pragmatic reasons. Locating each method close to the data findings also helps the reader make sense of how each of the four methods informs the resulting findings.

- **Chapter 04** analyses public debate surrounding adaptive reuse in Adelaide through a content analysis of articles published by news media outlets. This analysis uses recommendations from Philo (2017) to guide content analysis. It focuses on how debate discusses building regulation as a barrier to adaptive reuse of secondary grade office buildings. The chapter provides a timeline detailing local and state government policy action affecting existing building adaption, alongside charting the levels of vacancy, published in media articles as aggregated vacancy rates (%), for secondary office buildings in Adelaide CBD.
- **Chapter 05** summarises the responses to the survey, an Australia-wide electronic survey which gathered professionals' views of building regulation compliance experienced in undertaking adaptive reuse projects.
- **Chapter 06** presents an analysis of in-depth semi-structured interviews to examine building regulation as a potential barrier to adaptive reuse, from the perspective of building owners and policymakers in local and state government departments overseeing Adelaide CBD. It seeks to gather the evidence from building owners to support the widely held perception of building regulation disclosed by findings in chapters 04 and 05.
- **Chapter 07** presents a new method, the Visual Analytic Method, developed to quantify vacancy in existing buildings and to enable an analysis of the distribution of vacancy across a population of buildings. It constructs a building population of 118 non-heritage multistorey office buildings located with the boundaries of Adelaide CBD as a method to evaluate the suitability of adaptive reuse and the likelihood of NCC regulation acting as a critical barrier to adaptive reuse uptake to address vacancy.
- **Chapter 08** synthesises key findings from all chapters, before concluding with this study's research contributions and recommendation for policy.
- **Chapter 09** concludes the thesis, offering insights into areas that need further investigation in this field of research.

Chapter 2: Literature review

> "Mainstream architecture recognised that major building types, from factories to libraries to airports to offices, on both sides of the Atlantic faced challenges of technological and organisational obsolescence" (Abramson 2016:75)

2.1 Organisation of chapter

While the process of reusing buildings for new purposes has its roots in ancient times, recent attention locates adaptive reuse within the broader discourse on heritage conservation, sustainability, urban regeneration (Shahi, *et. al.,* 2020). The social, environmental and economic benefits of adaptive reuse within these discourses have promoted widespread advocacy for higher adaptive reuse uptake. In the context of this study, support for adaptive reuse has been an important part of calls to address high vacancy, perceived to be an indicator of obsolescence in office buildings. This review takes a critical look at what current literature discloses about office building obsolescence, vacancy, and adaptive reuse. This chapter also reviews literature which discusses perceptions of building regulation as a barrier to higher reuse uptake. Section 2.1, therefore, begins by focusing on how research in the field understands office building obsolescence and vacancy. Section 2.2 then examines how research has explored building regulation as a broader topic, before section 2.3 evaluates whether building regulation is a key barrier to adaptive reuse. Finally, Section 2.4 highlights the specific gaps found in this chapter which this research seeks to address.

2.2 Office buildings obsolescence, vacancy, and adaptive reuse

The review of literature in the first two sections in this chapter (2.2 and 2.3) were carried out to examine the broader topics of obsolescence, vacancy and adaptive reuse (section 2.2), and building regulation (section 2.3). The review critically examined 350 scholarly articles. These articles were identified using electronic databases such as Scopus, Web of Science, and Google Scholar. The search was intended to clarify concepts/ definitions in the literature; identify key characteristics connected to concepts within the research (adaptive reuse, obsolescence and building regulation); and to critically analysed to uncover gaps in knowledge.

2.2.1 Obsolescence: categories, models, theories and concepts

Adaptive reuse is eloquently described as the "architecture of obsolescence" by Abramson (2016:127). Obsolescence in the built environment has received a steady flow of attention in research, with the application of a range of perspectives: categories of obsolescence, depreciation, vacancy, and obsolescence mitigation, and its broader urban impact. Obsolescence is defined in section 3.14 of ISO 15686 as the "loss of ability of an item to perform satisfactorily due to changes in performance requirements" (ISO/IEC, 2017:3.14). Ness & Atkinson (2001) offer a definition more comprehensive in scope than ISO15686, "Obsolescence cannot be easily rectified by the normal processes of building maintenance or repair and requires major capital expenditure" (p.3). This definition covers a greater number of factors which can lead to obsolescence other than a building's service life.

Numerous categories of obsolescence have been identified, including physical, functional, economic or financial, technological, legal, environmental, locational, aesthetic, and social obsolences (Greenhalgh & Muldoon-Smith, 2017; Grover and Grover, 2015; Remøy & van der Voordt, 2014; Langston et al., 2008). Thomsen et al. (2015) provide a useful recent review of conceptual models of obsolescence, recommending that future research should examine cause and effect processes leading to obsolescence. An early theoretical paper by de Jonge (1990), which focuses on existing building adaption and maintenance, proposed connections between different categories of obsolescence. These categories include economic obsolescence and physical obsolescence. De Jonge (1990) posits that a building's structure can outlast its functional use or economic viability. A conceptual diagram representing the obsolescence process, by Greenhalgh & Muldoon (2017:6), seems to imply that all categories lead to economic obsolescence as the end result. See figure 2.1. Indeed, this hierarchy elevating economic obsolescence above other categories is highlighted by Grover & Grover (2015) as they use the phrase "incapable of being economically modified to meet new legal demands" (p.304).

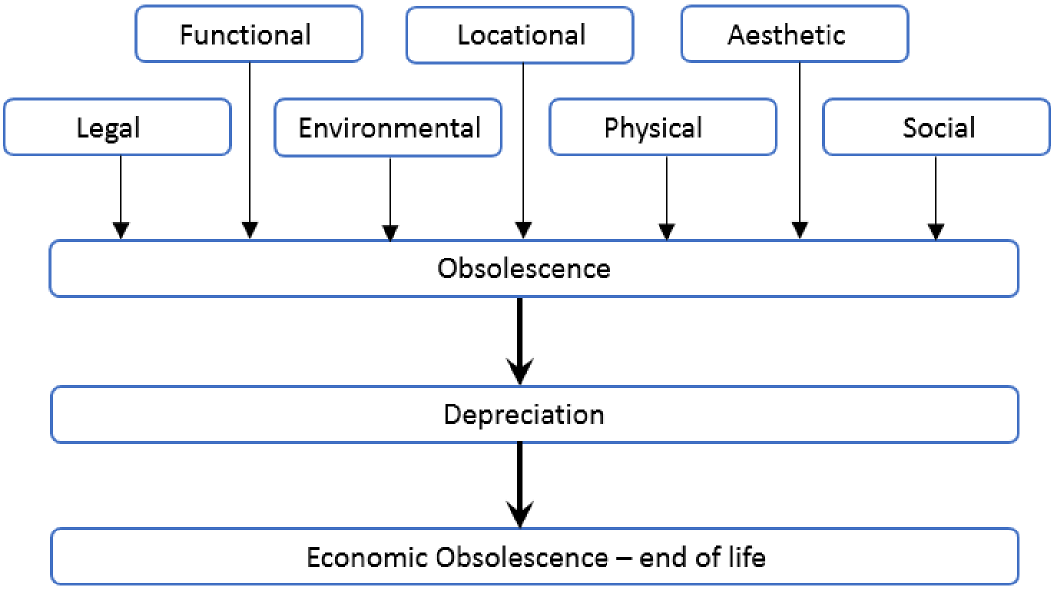


Figure 2.1 The Obsolescence Process

Reproduction of diagram by Greenhalgh & Muldoon-Smith (2017:6), reproduced with the author's permission.

Economic lenses are prevalent in, and often central to, research examining obsolescence in the built environment. Obsolescence is often linked to building value depreciation by an established body of literature (Bokhari & Geltner, 2018; Crosby et al., 2012; Corgel, 2007). Ness & Atkinson (2001) highlight the connection between obsolescence and depreciation: "Such 'obsolescence' can be measured in terms of the decrease in a building's value" (p.3). Measuring depreciation, as this quote demonstrates, is an economic concept, rooted in the disciplines of accountancy and economics (Crosby et al., 2012:229).

The notion of depreciation connects the three key categories of existing building obsolescence: physical, functional and economic (Bokhari & Geltner, 2018). Mathematical models of depreciation are determined by a building's age and the impact of wear and tear versus refurbishment investment (Corgel, 2007). In contrast, however, Grover & Grover (2015) contend that "that depreciation methods are not suitable for assessing obsolescence" (p.311) because it can be the result of factors which are not measured by depreciation. Grover and Grover (2015) highlight the unpredictability of building obsolescence, citing unforeseen changes in local property demand conditions or loss-of-life disasters affecting perceptions of a particular building type.

The literature presents the idea that vacancy moves through property markets from premium space to lower quality buildings, an idea that is often present in public debate examined in chapter 04. A study by Bryson (1997) suggests that obsolescence occurs as a cyclical or 'spiralling' process (p.1444). This idea is also central to Atkinson (1988) which developed the 'sinking stack theory' to explain the how obsolescence moves through housing stock from new build to low-quality stocks (Langston et al., 2008; Ness & Atkinson, 2001; Atkinson, 1988). Hassler (2009) also discusses the concept of 'churn' to describe the process of building stock survival (Hassler, 2009:554). In addition to a downward trajectory of vacancy, Atkinson (1988), Bryson (1997) and Hassler (2009) were also concerned with patterns of obsolescence at a city-wide or building population scale, rather than measuring depreciation from an analogue perspective: building by building. This city-wide approach aligns with the research design of this thesis, in particular, the method developed for this study detailed in Chapter 07.

Economic cycles are a further factor related to the idea of a downward spiral or sinking of built assets to inevitable obsolescence. Opposing views about the existence of property cycles are reviewed by Leccis (2017), who conclude that there is firm evidence of property cycles existing but there are problems with predictability as "forecast reliability might be compromised by the search for [real estate] consensus, the fear of big changes and the consequent tendency to smooth over the results to obtain predictions closer to actual reality and easier to be accepted by clients. In addition, interaction among professionals from different firms influences data interpretation so that they reach similar conclusions" (p.36).

Bryson (1997) also uses the term 'locational obsolescence', describes its occurrence as "when an area within a city suffers from devaluation" (p.1446). A recent paper by Hughes & Jackson (2015) extends an understanding of this topic, proposing a model of locational obsolescence in retail buildings (Hughes & Jackson, 2015:147). As shown in Figure 2.2, Hughes & Jackson (2015) provide a framework for considering all categories of obsolescence connecting the interaction between "national (and global) trends with local socioeconomic and market contexts" (p.238).

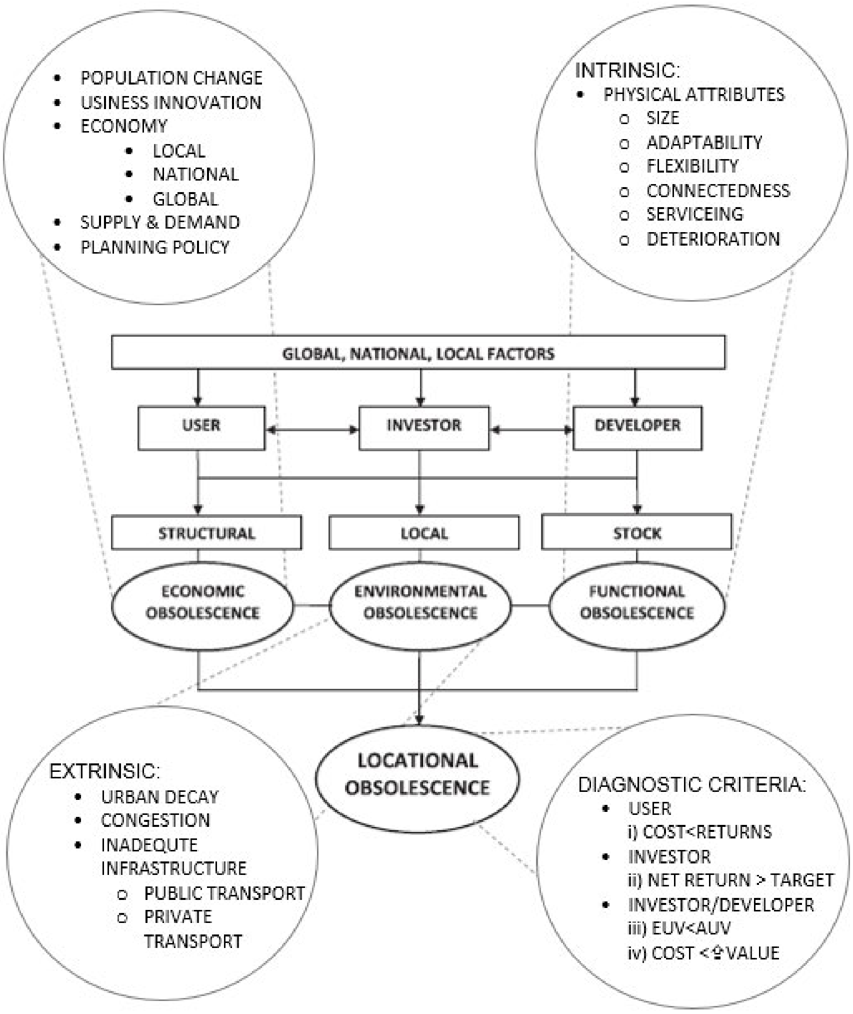


Figure 2.2 Model of Locational Obsolescence by Hughes & Jackson (2015:247)

Figure reproduced with the author's & publisher's permission

A thought-provoking paper by Thomsen et al. (2015) offers a critical perspective on conceptual models and theories of obsolescence. The authors comment that “In all this literature, obsolescence is treated as a dependent variable, and the factors are presented as independent, potentially causal variables”. They add that the models developed “do not adequately reveal the underlying cause-effect mechanisms” (p.6). Thomsen et al., (2015) also discuss and reproduce an edited version of a ‘model of decay’ by Prak and Priemus (1986), suggesting that it is unique and valuable because the decay model captures possible underlying cause and effect mechanisms leading to obsolescence. This is of high relevance to this thesis as barriers to adaptive reuse are considered to be an underlying cause of office building obsolescence. In addition, Thomsen et al. (2015) specifically cite building regulation as a possible cause and effect factor under the heading of government. Importantly, Thomsen et al., (2015), do not claim that building regulation is necessarily responsible for building decay, but its inclusion, in the ‘decay model’, implies this possibility. While the decay model presented recognises the role of the main actors and cause-and-effect mechanisms, no primary research is presented to substantiate how the agents/mechanisms impact upon building obsolescence.

2.2.2 Types of vacancy

Muldoon-Smith (2016) highlights that simplistic views of vacancy, and the bifurcation of space as either vacant or occupied, are unhelpful in understanding obsolescence, and also to describe buildings in transition (p.20). Literature suggests that mean vacancy rates in existing building stocks need to be disaggregated (Muldoon-Smith & Greenhalgh, 2017; Huuhka, 2016; Couch & Cocks, 2013; Keeris & Koppels, 2006). At a basic level, this is needed to critically answer a fundamental question highlighted by Keeris & Koppels (2006): “a balanced view of the phenomenon of vacancy must be established before it can be concluded that vacancy, in general, can be considered to be a problem” (p.4). Keeris & Koppels (2006) go further and infer that vacancy can be “desirable, acceptable, undesirable and problematical” (p.10). Wilkinson & Remøy (2018) comment that vacancy in office buildings is a relatively new phenomenon and one which is “not a traditional problem with a proven solution” (p.44).

The language to understand vacancy and its various transitioning shades is emerging, along with the idea that office building vacancy is an urban issue for research and policy to consider (Wilkinson & Remøy, 2018). Table 2-1 overleaf, represents a review undertaken by this study to examine the terms to describe vacancy in literature. Many different terms (30) were found, describing an array of conceptual vacancy subtypes. Studies captured by this review mostly focussed on structural, natural and frictional vacancy.

Little attention has been paid to hidden or greyspace office building vacancy (Englund *et al.,* 2005:2; Muldoon-Smith & Greenhalgh, 2017:482-485). There are inherent difficulties in obtaining data to quantify and measure different types of vacancy (Huuhka, 2016). Greyspace is one vacancy type considered to be challenging to detect, which is perhaps why it has had little attention in research. Greyspace is not advertised as available as it is tenanted but considered to be space which is surplus to the tenants' requirements (Muldoon-Smith & Greenhalgh, 2017:485). Barriers to detecting Greyspace, therefore, make it difficult to quantify. It should be noted here that this study is one of the first to quantify Greyspace based on pioneering work by Muldoon-Smith (2016) and Remøy (2010).

The term 'vacancy' is insufficient to usefully describe unused space within commercial office buildings at a city-wide scale (Wilkinson et al., 2009). Muldoon-Smith & Greenhalgh (2017) also suggest that the current understanding of vacancy in the commercial office market is too simplistic. They suggest that this reductive conceptualisation of vacancy causes a misunderstanding of contemporary commercial real estate markets.

Table 2-1 The plethora of vacancy subtypes and categories cited in literature

Literature	Types of Vacancy																													
	Actual	Auxilary	Cyclical	Evolutionary	Final	Frictional	Grey space	Hidden	Inefficient	Inertial	Initial	Short-term	Long-term	Locational	Natural	Normal	Planned	Prolonged	Relative	Obsolescence	Operational	Persistent	Partial	Premium	Problematic	Initial	Strategic	Structural	Transactional	Transformational
Brown, & Teernstra (2008)													●		●	●												●		
Couch & Cocks (2013)			●			●						●	●		●										●			●	●	
Crone (1989)	●														●		●													
Englund et al., (2005)								●																						
Geraedts & Van der Voordt (2007)																		●												
Greenhalgh & Muldoon-Smith (2017)							●												●											
Grover & Grover (2015)																						●								
Huuhka (2016)			●			●						●	●		●										●				●	
Keeris & Koppels (2006)						●									●			●			●					●			●	
Langston et al. (2008)																						●								
Lausberg (2008)	●		●			●					●			●	●					●								●		
Muldoon-Smith & Greenhalgh (2017)		●		●	●		●	●	●	●					●												●	●		●
Rabianski & Gibler (2006)			●			●									●	●	●											●		
Remøy & van der Voordt (2014)																●												●		
Remoy (2010)															●													●		
Wilkinson & Remoy (eds) (2018)						●						●	●										●					●		

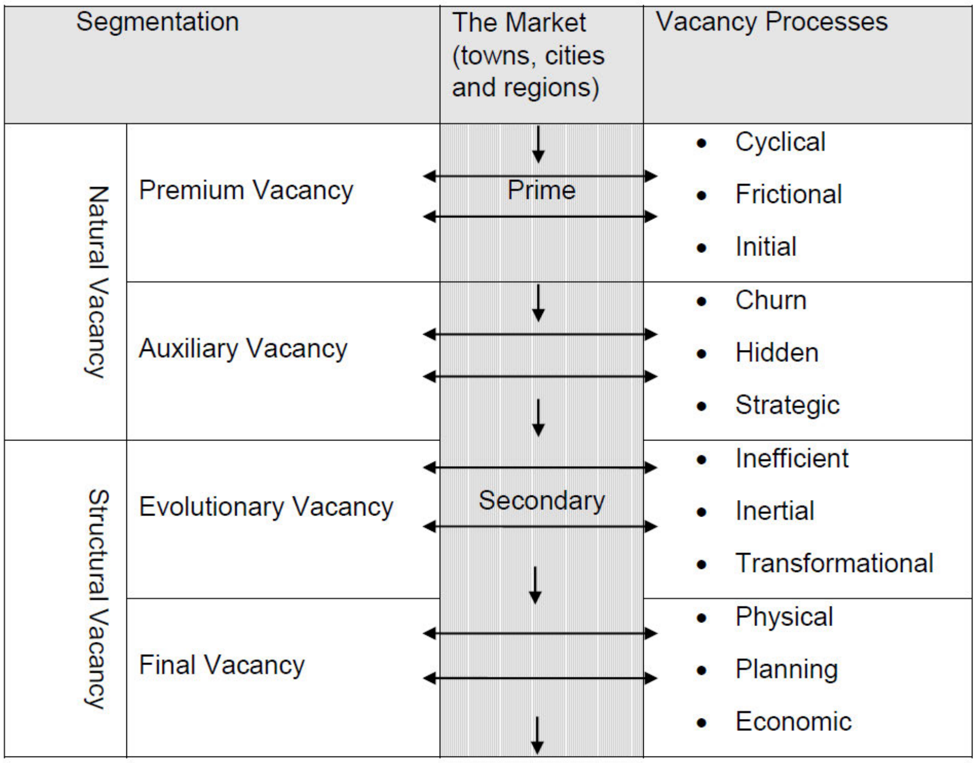


Figure 2.3 Typographical Model of Vacancy

Diagram by Muldoon-Smith & Greenhalgh (2017), reproduced with the author's permission.

The most comprehensive, detailed and recent examination of vacancy in the UK office building market is by Muldoon-Smith & Greenhalgh (2017). Usefully this theoretical framing also detailed several types of vacancy associated with transitioning a building through adaptive reuse, as well as vacancy types considered to be potential drivers of adaptive reuse.

Muldoon-Smith (2016) makes the case that while the prime office market has been examined with sufficient clarity in research, the characteristics of the secondary office building market are predominantly unknown as research into the secondary office market is scarce. This gap in the literature is particularly concerning when examining the research questions of this thesis, which involves an investigation of stakeholders' claims that building regulation is a barrier to reactivating secondary grade office buildings perceived to be vacant.

In Europe, lead authors in this field of office building vacancy include Hilde Remøy (Remøy, 2010; Remøy & Street, 2018), Geraedts and van der Voordt (2003, 2007) and

Muldoon-Smith (2016). Sara Wilkinson (2011, 2014a) has contributed to the research base in an Australian context. Yakubu *et al.,* (2017) have also examined vacancy within New Zealand, albeit not specifically in office buildings per se, but older inner-city buildings, including offices. While these efforts are underway internationally, in Australia, research focussing on vacancy and obsolescence in the secondary grade office buildings is scarce, constituting an area for further investigation.

There are many published studies focusing on commercial building markets, for instance, Szweizer (2018) and Chau & Wong (2016). However, these studies tend to focus on method and econometric data analysis, and definitions of 'vacancy' appear to lie outside of these studies' scopes. The studies also tend to either focus on premium grade buildings stocks or are not granular enough in focus to distinguish between primary and secondary stocks. However, the gap in knowledge to understand vacancy in secondary grade office building stocks is being addressed by a growing body of critical studies.

2.2.3 Obsolescence mitigation techniques

The majority of academic literature on obsolete building mitigation focusses on change of use conversion (Greenhalgh & Muldoon-Smith,2017).

They detail four mitigation techniques for building obsolescence, each with a range of different options, for managing office building assets (pp. 7-11). These options are reproduced in figure 2.3 below. The four techniques are presented on a scale of intervention from low to high: 'asset exploitation'; 'demand repositioning'; 'asset renewal'; and 'removal and redevelopment'. Adaptive reuse is located within two of the options: 'asset renewal' and 'demand repositioning' techniques (Greenhalgh & Muldoon-Smith,2017; Geraedts *et al.*, 2017). Other than the level of intervention, however, it is unclear what the differences are between *repurposing* a building under 'demand repositioning' and *alternative use* under 'asset exploitation'.

Greenhalgh & Muldoon-Smith (2017) also comment on the option of 'mothballing', making the interesting inference that mothballing involves a building to be "consciously removed from its original purpose" (p.9). Under this reasoning, mothballing could be classified as a change of use. Within these 4 categories, adaptive reuse is just one obsolescence mitigation strategy amongst a plethora of options available for building owners to slow or reduce obsolescence in office buildings. The authors' emphasise that, in practice and in research, adaptive reuse has been given the greatest attention thus far out of all mitigation strategies possible (Greenhalgh & Muldoon-Smith, 2017:7).

A further obsolescence mitigation strategy could be offered by a paper by Carmona *et* al. (2017), which emphasises the positive relationship between streetscape improvements and benefits for surrounding buildings. In their conclusion, they highlight that streetscape improvements can create higher end-user demand for office buildings in areas where street designs have been upgraded (Carmona *et* al., 2017). In an adaptive reuse context, this finding is noted with interest during the thematic analysis of semi-structured interview data. Investment in public streetscapes is highlighted as an enabler of demand for the buildings in the immediate surroundings.

Figure 2.4 Obsolescence Mitigation Typology

Conceptual diagram developed by Greenhalgh & Muldoon-Smith (2017:7).
Diagram reproduced with the author's permission.

2.2.4 Types of adaptive reuse

Researchers in the field highlight that adaptive reuse is not a new phenomena (Conejos et al., 2016:1; Plevoets & K. Van Cleempoel, 2011), and suggest adaptive reuse of existing buildings has become an increasing trend within the last two decades (Aigwi *et al.*, 2018; Bullen & Love, 2011a:33). Plevoets & van Cleempoel (2019) claim that adaptive reuse is emerging as a new discipline. Despite the potential contribution to pressing strategic urban challenges adaptive reuse can offer, recent published literature claims there is a lack of adaptive reuse uptake in many if not most cities across the globe (Forsythe & Wilkinson, 2015; Remøy & van der Voordt, 2014; Bullen & Love, 2011a; Grinnell et al., 2011; Shipley et al., 2006). Lack of uptake in the adaptive reuse of office buildings could be evidence of the need for further translational studies which focus on office buildings, and which demonstrate how adaptive reuse can be applied in practice.

As discussed earlier in this literature review, research has connected vacancy with obsolescence, highlighting that vacancy is considered to be one indicator of potential obsolescence in office buildings (Muldoon-Smith & Greenhalgh, 2017:478). Adaptive reuse has been established as an obsolescence mitigation strategy available to building owners and developers to manage their built assets (Greenhalgh & Muldoon-Smith (2017:7). Wilkinson and Remøy (2018) stress the systematic connection between vacancy and change-of-use conversion. Wilkinson (2018:8) offer a useful model of existing building adaption, which includes adaptive reuse, and in which vacancy is featured in 3 of 5 the 'states' affecting end-user demand. See figure 2.5 below. This model is useful due to its inclusion of explicit connections between vacancy, adaptive reuse, and obsolescence mitigation. However, the model does not mention the different degrees to which a building can undergo a change of use conversion. The model appears to focus on whole building adaptive reuse.

While there is an abundance of literature on the adaptive reuse of entire buildings, this review, found few sources which examine the adoption of adaptive reuse on a scale less than the whole building. One key paper stood out as an exception to this. O'Callaghan & Lawton (2016) critically evaluate temporary and partial adaptive reuse in the context of Dublin, Eire. The notion of 'top-up' is also mentioned by Holden (2018). 'Top-up' is a vertical extension to an existing building, sometimes introducing a new use to an existing structure, such as new residential apartments being constructed above an existing car park or retail centre (p.105). However, while 'top-up' can bring new functions to an existing building, it is not strictly adaptive reuse, as it involves the creation of new additional use/space, rather than reuse. Although equally, it could be argued that the structure is being reused for new purposes for which it was not originally designed and therefore fits with definitions for adaptive reuse. Further adaptive reuse types were uncovered in Adelaide when conducting site visits as part of this study to quantify vacancy. Taken together, comments by Holden (2018), O'Callaghan & Lawton (2016), and primary research undertaken for this thesis highlight a gap in research: how to conceptualise different types of adaptive reuse that can occur within a single building. This gap in research is returned to at the end of this chapter in section 2.5.2.

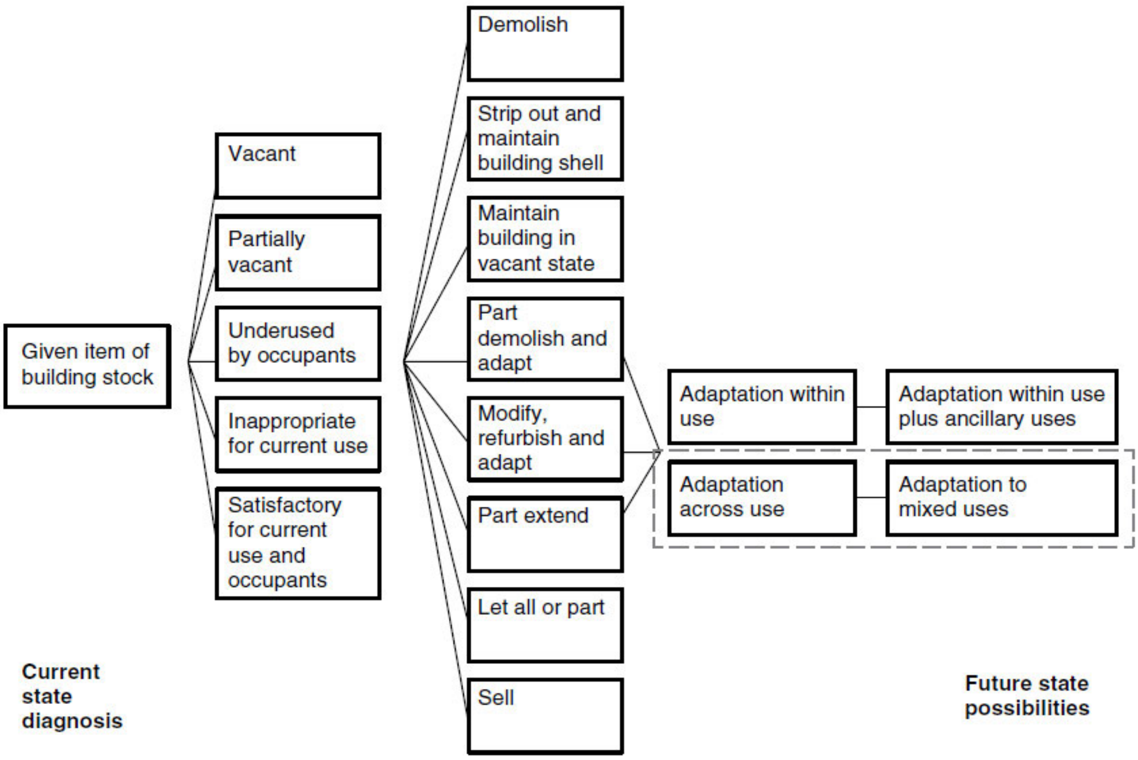


Figure 2.5 Options for adaptation

Diagram by Wilkinson (2011) and reproduced with the author's permission.

2.2.5 Connecting obsolescence with vacancy and adaptive reuse

The obsolescence mitigation typology provided by Greenhalgh & Muldoon (2017), discussed earlier and represented in figure 2.3, is designed to aid decision making by developers, building owners, and investors and identifies adaptive reuse as one strategy from a range of options (Greenhalgh & Muldoon-Smith, 2017; Remøy and van der Voordt, 2014). Alongside this, several research studies have proposed decision-making models with a similar purpose, focusing specifically on employing adaptive reuse to avoid obsolescence (Bullen & Love, 2011a; Langston et al., 2008; Geraedts & Van der Voordt, 2007). Adaptive reuse is included in the model in Greenhalgh & Muldoon's (2017), under obsolescence mitigation strategies 'demand repositioning' and 'asset renewal'.

As noted earlier, the relationship between cause and effect in obsolescence is highlighted by Thomsen *et al.* (2015) remains poorly explored in research. This conclusion infers that there are serious limitations with conceptual models and frameworks which seek to map and guide decision making in adaptive reuse projects. If the causes of obsolescence are not fully understood, then the models can only make assumptions without underpinning evidence. This is important to note, in the context of this study, and which seeks to uncover the evidence surrounding building regulation as a possible cause of obsolescence. While many of these tools identify building regulation as a potential factor, there was no research found to rank or develop a precise understanding of the causal relationship between building regulation as an enabler or barrier to adaptive reuse. All decision-making models make the assumption that regulation presents difficulties, and building codes are persistently framed negatively.

2.2.6 Suitability of adaptive reuse to address vacancy

In the absence of discussion about the scale of adaptive reuse, it can only be assumed that the majority of sources consider adaptive reuse from a whole building scale. The suitability of adaptive reuse, amongst a range of other mitigation strategies, is discussed in greater detail in Geraedts *et al.,* (2018), in light of potential market opportunities and risks (p.123). In summarising Geraedts, *et al.,* (2018), the economic criteria which encourage adaptive reuse are:

1. high levels of vacant buildings
2. sufficient demand for new functions
3. profitable financial return possibilities of new function

The economic lens applied by Geraedts *et al.,* (2018) here provides a useful framework for adaptive reuse suitability to address vacancy because it moves beyond a general promotion of adaptive reuse and considers what the necessary economic conditions are. This lens adds an essential line of inquiry about the extent to which building regulation as a key barrier to adaptive reuse: does Adelaide's office building market meet all or any of these conditions making adaptive reuse an attractive option for developers and building owners in the first place? Semi-structured interviews with building owners and developers, contained in Chapter 06, explore criteria 2 and 3 in the above framework. Chapter 07 sheds light on all criteria: 1, 2 and 3.

According to Hyde (2006:3), decision making by stakeholders can be a complicated process due to a range of factors, including "inadequate alternatives, uncertain consequences, complex interactions, multiple stakeholders, conflicting interests and competing objectives" (Hyde, 2006:3). This aligns with Wilkinson et al. (2009b) who suggest there is a consensus regarding the complexity of feasibility decisions for adaptive reuse projects due to the range of different stakeholders involved in the process. They highlight that each of the stakeholders has differing priorities and perspectives, and this adds to the complexity (p.5) and also report that each stakeholder has different degrees of influence (p.6).

2.2.7 Good vacancy and bad vacancy

Not all vacancy is considered problematic. Indeed, the literature suggests that some level of vacancy is an indicator of a functional commercial building market (Wilkinson & Remøy, 2018; Crone, 1989). A natural vacancy is the concept used to describe a 'healthy' vacancy rate, conducive to market growth and is presented in the literature as an indicator of a balanced relationship between office building supply and demand. While there is no definitive 'healthy' vacancy rate specified in research, several sources suggest a beneficial natural vacancy rate ranges between 3% -10% (Geraedts et al., 2018:123;

Muldoon-Smith & Greenhalgh, 2017:480; Remøy, 2010:32). To put this in perspective, Adelaide's Office Building Market vacancy rate of 16.4% for 2017 (PCA, 2018:29). This was the same period covered by vacancy data presented in Chapter 07.

There are, however, questions about the reliability of the range suggested in the literature for a healthy natural vacancy rate. Further investigation disclosed that these three articles, cited above, tended to rely upon a single study, written in Dutch, by Keeris & Koppels (2006). In addition, an earlier paper, by Crone (1989) suggests that a healthy natural vacancy rate be context-dependent and vary between cities and countries. The aggregated vacancy rate for Adelaide in 2017 (16.4%) could be considered high in comparison to the healthy natural rate suggested, even at the high end of the range (10%). However, Crone's early analysis of US office building markets makes the claim that 10% for some cities would be too low, constraining future growth. A question, therefore, remains over what constitutes a healthy natural vacancy rate for Adelaide in 2017.

The 'indigestible lump' is a striking image used in a doctoral study of oversupply in the Adelaide office building market (Ness, 2002:112). The indigestible lump is used to describe bad vacancy, which cannot be resolved during periods of positive economic growth, and where there is also a rising demand for office space. This image is connected to the aforementioned 'sinking stack' theory and spiralling metaphors visualising the inevitable downward trajectory using vacancy as an indicator of obsolescence in office buildings (Hassler, 2009; Atkinson, 1988; Bryson, 1997). Collectively these representations of vacancy in literature project the idea that there is a bad or indigestible bulge of vacancy residing in the lower office building grades which need to be addressed by policy. This idea may have influenced the representation of vacancy in Adelaide and the perception of high volumes of empty C and D grade office buildings.

2.2.8 Adaptive reuse advocacy through case studies

Advocacy for adaptive reuse, as a strategy for economic and urban revitalisation, has its early roots in heritage conservation and as a reaction to sterile brownfield redevelopments (Saniga, 2012). Increasingly, non-heritage commercial and industrial buildings, perceived to be vacant or underused, are connected with adaptive reuse

(Wilkinson & Remøy, 2018; Muldoon-Smith & Greenhalgh, 2016; Brouwer, 2014; Shen & Langston, 2010; Bullen, 2007). The promotion of adaptive reuse, as discussed earlier in section 2.2.2, is widespread in research and the focus on adaptive reuse dominates as a strategy recommended to reduce premature obsolescence of both heritage assets and relatively new structures (Foster & Kreinin 2020; Greenhalgh & Muldoon-Smith,2017).

This review identified that case studies were often used to illustrate the benefits of adaptive reuse. A recent study by Foster & Kreinin (2020) noted this prevalence of case studies, particularly featuring the adaptive reuse of unique or iconic heritage structures. Typically each case study focusses on a single building, rather than comparative or multiple adaptive reuse typologies. They suggest that the growing body of adaptive reuse literature tends to provide translational studies which focus on small scale application to heritage assets (Foster & Kreinin, 2020). This methodological gap in literature is important for this study because it highlist two issues. Firstly, there is a methodological weakness in the field because there are few studies synthesising adaptive reuse case studies as a city wide scale. Foster & Kreinin (2020) are critical of the lack of synthesis of findings from adaptive reuse research, commenting 'The recent academic and policy interest in the adaptive reuse of buildings, particularly in urban areas, has resulted in hundreds of individual adaptive reuse project studies. However, overviews and syntheses of the current work in the field are scant' (p.6). Secondly, it is not yet clear how the benefits of adaptive reuse, grown from an advocacy for heritage reuse, apply to other building types, such as non-heritage commercial and industrial buildings, or even temporary adaptive reuse as discussed by O'Callaghan & Lawton (2016).

2.2.9 Measuring adaptive reuse potential

Decision making and the process of considering the feasibility of existing building adaption is a growing area of research. Jagarajan *et al.* (2017) identify adaption decision making as a key area of research, identifying 12 different tools from published studies (p.1363). It is important to note here that building adaption is a broader field than adaptive reuse. For adaptive reuse, there are numerous different tools disclosed by literature to assess adaptive reuse potential within a heritage context (Conejos *et al.,* 2017; Mısırlısoy *et al.,* 2016; Wang & Zeng, 2010). Tools to evaluate adaptive reuse potential of office buildings are of particular relevance to this thesis (Geraedts *et al.*, 2017). There are also tools to examine adaptive reuse potential at a city-wide scale (Aksözen *et al.,* 2017). Systematic attempts have been made by researchers to offer helpful tools to aid adaptive reuse uptake. Examples of these can be found in literature, notably: the Conversion Meter by Geraedts *et al.,* (2018: 126-149), fuzzy adaptive reuse selection model by Tan *et al.,* (2014); ARP model by Langston *et al.,* (2013); and adaptSTAR by Conejos *et al.,* (2013) which is a tool to rate future adaptability in new build.

Tools to facilitate adaptive reuse were first introduced relatively recently, with a conceptual framework known as Adaptive Reuse Potential (ARP) (Langston *et al.,* 2008). A network of Australian based researchers, including Professor Craig Langston, have further developed a related tool called AdaptSTAR (Conejos *et al.,* 2017), which is an accepted, well-published tool for assessing adaptive reuse potential within the field (Conejos *et al.,* 2017; Dyson *et al.,* 2016; Hong & Chen, 2017; Wilkinson & Remøy, 2018).

Geraedts *et al.*, (2017) also present a tool renamed: Conversion Meter, which examines decision making for office building conversions to residential. This assessment potential tool involves a series of checklists over six steps (0-5) to assess the potential of the physical attributes of existing office buildings and their suitability for conversion to residential use (pp. 7-12).

This thesis is not evaluating Langston & Conejos' ADAPTstar model or Geraedts' Conversion Meter per se, but it does examine the claims about barriers to adaptive reuse and which are embedded in these tools. The literature review highlights that perceptions of regulatory barriers are largely unevidenced beyond stakeholder anecdotes, yet have been widely accepted and incorporated into the model under the headings of legal and technical factors. This potential weakness, in critically understanding barriers to adaptive reuse, is particularly problematic as it potentially reinforces bias against building regulation. Building assessment tools, such as adaptSTAR, operate at a single building case study scale (n=1). This focus, however, has limitations when examining blanket claims about systematic barriers to adaptive reuse operating across a city-wide scale.

Foster & Kreinin (2020) highlight a lack of research in the field of adaptive reuse that synthesise more than one case study or provide an overview of existing research are scant (p.6). In other fields, beyond adaptive reuse, emerging research does provide models to understand building stocks at a city-wide scale. One recent study, examined existing building populations in Zurich, Switzerland, albeit from a demolition perspective (Aksözen *et al.,* 2017). Demolition, or building mortality, is connected to adaptive reuse as obsolescence is often a primary stimulus of decisions to repurpose or demolish a building. For examining generalised claims about adaptive reuse, a cross-sectional methodology which considers a building population across a city is of more use than one which is purely at a single building scale such as adaptSTAR. Aksözen *et al.,* (2017) develop their Mortality Analysis method, which allows analysis of existing building demolition at three levels: city, district and at a granular individual building scale. As Aksözen *et al.* (2017) notes, "this paper does not consider obsolescence as a cause but rather as an explanatory variable" (p.260). While useful methodologically, mortality analysis alone cannot address the research questions of this thesis because it examines demolition events rather than their causes and the building owners' decision process before demolition. Data for understanding the drivers and barriers to adaptive reuse needs to include qualitative understandings of these human decisions. This gap in the literature is important for developing the methodology in this thesis to answer the research questions.

Literature also discloses that adaptive reuse research is spread across a wide range of building typologies. When examining building regulation barriers to adaptive reuse, this lack of comparability is a potential problem, as building regulation barriers will vary from one type of building, e.g., adaptive reuse of grain silos in Italy (Giuliani *et al.*, 2018), to other building categories, e.g., a range of award-winning heritage conversions in Australia (Conejos *et al.,* 2016). Due to variances in building regulation requirements, comparative case studies should, therefore, be selected by considering factors including intervention level; existing building scale; existing building construction type; building typology; building age; building location; and proposed new use. These numerous variables in adaptive reuse projects must, therefore, call for a need for caution, when making generalised inferences about building regulation barriers, from research which adopts case study methods.

Approaches to assessing existing building potential, like adaptSTAR, can be seen to have similarities with other decision frameworks used other fields of research such as 'Decision Support System' (DSS) (Tripathi, 2011). According to Tripathi (2011), DSS is a "computer-based information systems designed in such a way that help managers to select one of the many alternative solutions to a problem" (p. 112). One such evolution of tool for assessing adaptive reuse potential follows Kazak *et al.* (2017) recent research work into the usefulness of Spatial Decision Support Systems (SDSS) for assessing site location potential for energy infrastructure (Kazak *et al.,* 2017; Shi, 2010). Interestingly, both Kazak *et al.,* (2017) and Aksözen, *et al.,* (2017) use geographical information system (GIS). While Aksözen *et al.,* (2017) is not a SDSS, it provides a useful model to inform existing building decision making, particularly in asking questions about where an existing building sits within the stock at a city scale. It should be emphasised that a SDSS for adaptive reuse does not yet exist. Even tools which examine adaptive reuse at a single building scale, such as adaptSTAR are still in their infancy. Data is not however available to explore adaptive reuse at a city-wide level, beyond the simple mapping of change of use or demolition events (Wilkinson & Reed, 2011).

2.3 Building regulation in Australia

This section reviews the literature to build a more meaningful understanding of the context of regulatory barriers for adaptive reuse. As highlighted in the Background section of Chapter 01, it is essential to note that building regulation is currently an under-developed field of research both in Australia and internationally. This is highlighted by the fact there is not one single textbook explaining building regulation for professionals in Australia. There is a lack of research in regulation, as underlined by van der Heijden & de Jong (2009:1038). This situation presented challenges in undertaking this section of the review but also highlights its contribution to the research field of adaptive reuse.

One text, by Imrie & Street (2011) has been profoundly helpful to scope out the role and features of building regulation in Australia and elsewhere. To evaluate whether building regulation is a barrier to adaptive reuse, logically, regulation needs to be unpacked and critically understood. Jones (2013), who reviews Imrie & Street (2011), suggests that their account of regulation has a clear theoretical approach, making it a valuable and reliable source for this review. In addition, there is currently no single text which adequately describes the building regulation practice in Australia.

2.3.1 Defining building regulation

In Australia and internationally, the term 'regulatory policy' is a much larger volume of legislative codes and customs than just building regulation codes. Building codes reside in a broader framework of policymaking and enforcement mechanisms "in which regulations and architects' practices are conjoined through the context of specific social, political, and institutional processes" (Imrie & Street, 2011:15). Other research focusses on codes contained within voluntary environmental standards and rating systems (van der Heijden, 2013a). Examples of these are Greenstar (Green Building Council of Australia) and EnviroDevelopment (Urban Development Institute of Australia). These standards and rating systems exist alongside mandatory building regulation and far exceed minimum building code performance requirements.

One influential definition of regulation, although a little uninspired, is provided by Black (2002:8): "In the first, regulation is the promulgation of rules by government accompanied by mechanisms for monitoring and enforcement, usually assumed to be performed by a specialist public agency." Cochran et al. (2009) describe building regulation as an essential category of public policy globally. In the context of scholarly research into public policy to explore notions of regulation and regulatory governance, Levi-Faur (2011), however, highlight that regulation is difficult to define as a concept due to wide variance in its use and "means different things to different people" (p.4). Levi-Faur (2011) goes further and describes regulation as a distinct type of policy (p.5). Therefore, when viewing regulation as a form of policy, Dye's (1992) perspective is useful in that he observes, “Policy is whatever governments choose to do nor not to do” (Dye, 1992: 2). This definition of policy indicates that action is a central or crucial aspect of policy. Regulation can be defined as the action or application of policy. Capturing this view of regulation, Levi-Faur (2011:6) highlights that regulation can not only involve rulemaking but monitoring and enforcement. It could be argued that monitoring and enforcement practices make regulation distinct from other forms of policy. Cairney (2012) separates different types of regulated and non-regulated policy, including some policies which use economic incentives to encourage behaviour rather than regulation through legal enforcement (p.26).

Regulation is a contested term dependent upon the political, social or professional contexts of those using it. Black (2002) highlights that categories can be found in how individuals define regulation and that these categories include functionalist and conventionalist definitions. Black (2002) goes on to suggest that a functional definition of regulation may be a common starting point to understand the term ‘regulation’. But a functionalist approach has major weaknesses it that it separates out the term from the community in which it operates (p.18). Black goes on to propose that a conventionalist definition of regulation is the most helpful because it “is one which is embedded in current practices rather than extracted from them. It asks ‘what is regulation used to mean’ in a particular community” (p.19). Following Black (2002) & Levi-Faur (2011), this thesis will adopt a conventionalist definition of regulation and seek to understand how it operates in the communities involved in enforcing the NCC Volumes One and Two in the process of adaptive reuse projects. NCC Volumes One and Two are also known as the Building Code of Australia (BCA).

Decentralisation of regulation enforcement occurred within Australia in the 1990s (Van der Heijden, 2010). At the same time, decentralisation of enforcement was coupled with a centralising shift in building code provisions, to a nationally agreed single policy adopted progressively by all states and territories by the early 1990s (CIE, 2012). These shifts not only occurred in Australia but in the UK and elsewhere globally (Imrie & Street, 2011). This simultaneous shift of centralisation and decentralisation stemmed from calls for greater “economic efficiency and cost objectives relating to facilitating broader governmental goals of competitiveness and wealth creation” (Imrie & Street, 2011:71).

These shifts were also argued to encourage alternative solutions when compared with prescriptive building codes (Visscher *et al.*, 2016:467). In terms of adaptive reuse of existing buildings, performance standards are an important change from rigid deemed-to-satisfy solutions. A performance-based standard offers a compliance route which can accommodate design idiosyncrasies resulting from attempting to retrofit new solutions to existing buildings. There are also calls for a move towards international standardisation of building codes (Imrie & Street, 2011:76). Australian Building Codes Board (2007) state: "Regulation should be compatible with relevant international or internationally accepted standards and practices to minimise the impediments to trade" (p.7). Faulconbridge's (2009) research into the consumption of regulation by global architecture practices suggests internationalisation of regulation is already occurring (p.2545).

These major developments have occurred over the last three decades, including the nationwide adoption of a single set of regulatory codes, the introduction of a performance-based building code, and privatisation of enforcement (CIE, 2012; CSIRO, 1999). The first two occurred in the early 1990s and the mid-1990s respectively (CIE, 2012), while the privatisation of the building approval system shift occurred across different states from 1994 (CSIRO, 1999). The benefits for each of these reforms have been reported by a variety of sources, including economic analysis and quantified effects on productivity, for example by the nationwide CIE report (2012) commissioned by the ABCB and within the State of Victoria, CSIRO report (1999). While cost-benefit analysis has been published in the CIE (2012) report, it focussed on the construction industry as a whole and has not looked at the particular benefits or challenges for specific sectors dealing with existing buildings, for example in projects involving retrofitting, refurbishment or change of use adaption. The CSIRO (1999) report also did not make any distinction between new construction and modifications to existing buildings. More recently, there have been calls to reform building regulation in Australia from the Australian Institute of Building Surveyors (AIBS) who have published key policy objectives which seek to "provide greater efficiencies and limit what is generally seen as unnecessary 'red tape' (AIBS, 2018a:2). In their report, titled *AIBS Policy – Building Regulatory Reform in Australia*, the AIBS also specifically recognises the importance of regulating works to existing buildings, and this is reflected in its recommendations, including: “a comprehensive record of all proposals to construct or alter buildings, including the use of existing buildings” (p.17); consistency in “mandatory maintenance requirements for existing buildings” (p.6); and consistency in “auditing of existing buildings” across all states and territories in Australia (p.8). Further significant changes in building regulation are likely due to the AIBS’ calls for reform and the ongoing parliamentary inquiry in New South Wales (NSW), titled *Regulation of building standards, building quality and building disputes* (GovNSW, 2019).

Van der Heijden & de Jong (2009:1038) explicitly claim “building regulation appears to be a neglected subject in the field of regulation”. One critical explanation of this gap is provided by Jones (2009), who suggests “the romantic myth of the asocial, creative architect” has been used to cover up the hard political and economic relations of which regulations is one part (Jones, 2009:2524). This interpretation is a sharp criticism of why regulation is underexamined in architectural research. Imrie & Street (2009b:2557) make the claim that regulation and rule-based activities in architecture are significant and under-researched.

Van der Heijden & de Jong (2009) suggest that there are four central debates in understanding building regulation, which are: “quality of law; enforcement strategies, enforcement styles and enforcement actors” (van der Heijden & de Jong, 2009:1039). Lord *et al.* (2016), suggest enforcement can be disaggregated into: “who is responsible; motivations; enforcement method; and the power of regulators to apply penalties” (p.636). In their report to the Report to Australian Federal Government, Allen (2009b), report that building regulation governance, funding and administration need to be considered separately from technical standards (p.4).

The limited focus of building regulation in the literature available also tends to restrict discussion to site redevelopment and new construction (van der Heijden, 2013a). The gap in the literature regarding the control of adaptive works to an existing building is scarce. Research on existing buildings is also often limited in its reference to building codes. For example, a recent CSIRO report titled, *Barriers to the Adoption of Energy Efficiency Measure for Existing Commercial Buildings* (Marquez et al., 2012) did not include any reference to building control regulation. The author of this report was contacted regarding this omission, who responded explaining: there is no current plan to extend the research further and building code fell outside of the scope of this report[1]. Häkkinen & Belloni (2011:242) elaborate on this view, claiming research does not address building regulation as barriers to sustainable building, of which adaptive reuse if often seen as an example of sustainable architecture. It is important to unpack the area known as building regulation policy to address the research gap.

2.3.2 Regulation as a socio-technical process

Building regulation is an example of an enforcement system to ensure a set of social rules will be upheld (Davis, 1999:201). The introduction of regulatory policies and subsequent changes are often spurred on public outcry following man-made or natural events involving human loss of life. The birth of the first comprehensive set of modern building regulations is widely attributed to a single event: the man-made disaster of The Great Fire of London (1666). The Australian building regulation system, therefore, shares common regulatory ancestry common to other westernised countries, such as Canada, Europe and the U.S (Zillante, 2007; Davis, 1999; Knowles & Pitt, 1972). Early drivers of regulation included protection against loss of life, prevention of injury and reducing the spread of infectious diseases due to building design, thus improving public health and the quality of amenities (van der Heijden & de Jong, 2009).

Davis (1999) argues that over time, regulatory systems have comprised of: uncodified/implicit local social understandings; case-by-case common-laws, derived from custom and judicial precedents in law; or explicit codes are applied universally. Davis (1999) argues that the 'weighting' or social values, ascribed to these codes changes and the current emphasis differs from past formulations. Imrie & Street (2011:19) suggest that building codes have become increasingly connected with other legal requirements – both from governmental or privately regulated sources systems. For

[1] Personal communications by the author to Leorey O. Marquez via email, 16th & 17th April, 2015

instance, health and safety regulation and insurance company requirements. The remit of building regulation has been significantly widened beyond public safety to include other societal expectations such as comfort, security and disabled access (Mumford, 2010:20).

The remit also includes environmental considerations regulated through energy consumption and performance; contamination and hazardous materials; and water conservation (Visscher et al., 2016:1; Meacham et al., 2014; Imrie & Street, 2011:4; Almeida, 2010; Imrie & Street, 2009a; Fischer & Guy, 2009). Further to this, the evolution of regulation enforcement mechanisms can be seen to be driven by political agendas such as the need for construction innovation and flexibility in regulation as well as economic arguments of efficiency and efficacy of regulation systems (van der Heijden, 2010; Visscher et al., 2016). Moore & Wilson (2009) highlight a new social agenda emerging or social justice and categorise it as “reconstituted environmentalism” (p.2620). Literature to date has made connections between adaptive reuse and social sustainability: between the potential for adaptive reuse strategies to actively contribute to meeting the needs of the contemporary social sustainability agendas, such as heritage preservation (Bullen & Love, 2011c; Wilkinson & Remøy, 2018).

In response to the larger body of legislative codes, Imrie & Street (2011) provide useful clarification. Their perspective has origins drawing upon Black (2002), highlight regulation, codes, and customs can also stem from 'decentred' or non-state institutions and organisations. Imrie & Street (2011) suggest governmental regulations are “only part of the broad-cloth of rules and regulations that shape urban design” (p.5). Jones (2009) adopts a similar view, stressing the broader context of regulation, particularly how professional practices also act as a form of regulation (p.2531).

One useful distinction to make here is between planning and building regulation policies. They are related but not synonymous. Building renewal is often discussed in policy and research. But typically, this is only in the context of planning policy. In a recent literature review of 81 published papers by Zheng et al. (2014) on sustainable urban renewal, for example, there was no mention of the role of building regulations or their enforcers. While they discuss the various stakeholders' in urban regeneration literature, such as planners, developers and end-user/community groups, there is no mention of building code regulators as interested drivers. Discussions on governance were limited to planning agencies: governmental and private. It is unclear as to why building regulation is overlooked in research discussion: it is not seen as an interactive in the process; building regulation policymakers and enforcers are not seen to be stakeholders in urban regeneration.

A key contribution of Imrie & Street (2011) is that the authors re-frame regulation in architecture as a process rather than a set of documents ordering compliance. This innovative perception allows research to explore the relationship between stakeholders involved in adaptive reuse and the regulation process. Here the term 'stakeholder' also refers to the particular professional practices and activities different stakeholders undertake as part of the adaptive reuse process. The central argument, of regulation as a process (Imrie & Street, 2011), is a development of Huge (2004), and which rests upon understanding the “specificity of authorship (i.e. who wrote the rules), context (i.e. their interpretation and where, and under what conditions, they are applied), and implementation (i.e. how they are applied) are paramount to an understanding of the interrelationships between architects’ practices, regulation, and design” (Imrie & Street, 2011:16).

A special issue of Urban Studies Journal (2009), focussed upon social aspects of building regulation (Imrie & Street, 2009a & 2009b; Jones, 2009; Faulconbridge, 2009; Dovey et al., 2009; Moore & Wilson, 2009). At a conceptual level, Imrie & Street (2011:18) describe regulation as a socio-institutional context in which architectural design sits. They also claim that building regulation code is as much social as it is technical. They go on to say, “the shape of the rules and their shaping of the practices of architecture is part of a relational mixture of discursive practices and social and political processes” (Imrie & Street, 2011:7).

Moore & Wilson (2009) identify categories of building code present within mandatory building regulation and voluntary accreditation schemes. These categories are tacit, representational, economic, civil, procedural, codes of conduct and sumptuary codes (p.2621). Moore & Wilson (2009) further subdivide financial codes into three separate categories: Prescriptive economic codes, incentive-based economic codes and performance-based economic codes (p.2625). They state that the four lenses are significant as they assist our understanding of “the social values that order code-making as well as the objects and spaces regulated” (p.2621). However, despite this attempt to create order, the authors add that building codes “have rather porous boundaries” (p.2621). This adds a layer of complexity to understanding and interpreting building codes in practice.

In an article from a US perspective, Meacham et al. (2014) suggest that building regulation is often seen as an entangled and fragmented system and makes several criticisms of building regulation policy and stakeholders’ engagement. He suggests that the policy environment is over-complex, adding, “stakeholders in the construction and building regulatory markets are fragmented and not working effectively together” (p.2). This highlights the importance of considering the social aspects of building regulation compliance and enforcement.

Imrie & Street (2011) claim that the regulation process (both in its making and enactment) is dynamic due to legal requirements, human actors and the specificities of each unique project. From this, they draw: “regulation is a socio-political and institutional process, in which its composition, and its effects, cannot easily be known in advance of its making” (p.102). This view of regulation as a dynamic process is important in identifying regulatory barriers to adaptive reuse and also analysing to what extent they present impediments to adaptive reuse uptake.

2.3.3 Perceptions of regulation

Understanding stakeholder perceptions of regulation is essential to achieve a more in-depth and critical evaluation of building regulation as a barrier to adaptive reuse. However, there are few sources which include this deeper consideration. Imrie & Street (2011) explore the notion of “the expansion of the regulatory society into the broadcloth of state-centred forms of control” (p.28). They go on to suggest, “it became synonymous with what Black (2002:2) characterises as "poorly targeted rules, rigidity, ossification, under or over enforcement, and unintended consequences” (Imrie & Street, 2011:28). Imrie & Street (2011:70) suggest that objections from lobby groups towards environmental standards are widespread, highlighting costs as being prohibitive to new development. Imrie & Street (2011:71) highlight two discourses or perceptions of regulation of buildings:

1. Regulation is necessary
2. "...belief in the freedom to build, unfettered by rules and bureaucratic processes and procedures" (Imrie & Street, 2011:71). The negativity of discourse can be seen in the language used by stakeholders (Imrie & Street, 2011:73).

The first discourse connects with the underpinning principles of governance and regulation. Historically, building regulation emerged from a need to safeguard public safety. This view can be in legislation enacting NCC compliance in Australia, for example, South Australia's Development Act 1993, which highlights the critical role of building regulation in ensuring public safety "…to enhance the amenity of buildings and provide for the safety and health of people who use buildings" (GovSA, 2014:01).

The second discourse, according to Imrie & Street (2011:71) has persistently been seeking to challenge regulation of society, and promotion of the idea that there is a "perceived crisis relating to systems of government and rule" (p.71). This idea has brought about the emergence of a "Better Regulation movement....in most developed countries" (Imrie & Street, 2011:71).

Literature offers some evidence that stakeholders' perception of regulation may play a role in shaping how building regulation policy is formed, interpreted, applied and enforced (Andrews et al., 2016; Elliot et al., 2015; Imrie & Street, 2011). This appears to affect not just regulation applicants but also enforcers, for example, Imrie & Street (2011:97) examine patterns of positive views of building code enforcers. Imrie & Street (2011:77) also suggest that there is a relative quiet from construction professionals who regard building regulation as positive for ensuring public interests are considered, for example, reduction in loss of life & injury, and improvements to public health.

Imrie & Street (2011:77-101) evaluate and challenge the primary perceptions of building regulation. They highlight a widespread negative narrative to "seek to discredit the arguments for regulating design" (p.77). Imrie & Street (2011) suggest negative arguments can "reduce understanding of complex phenomena to a singular reference".

This reductive frame of understanding often lies blame with regulations or enforcers without analysis of any other factors which lie outside of performance-standards and enforcement practice. Often, the picture is much more complex, and building regulations may play only a little part. An example of this offered by Imrie & Street (2011:77) lays the blame for UK housing shortages on regulation. The UK housing shortage is a complex phenomenon, yet it is used in anti-regulation lobbying to lay blame on building control. They explain criticism often focusses on “industrial output, economic efficiency and international competitiveness” (p.77). Davis (1999:216) highlight a possible imbalance in regulation formation due to lobbying from groups and organisations with invested interests, such as material manufacturers.

Imrie & Street (2011:71) highlight the changes occurring in a UK/global context for regulatory control systems are the result of a 'crisis' discourse about building regulation. They describe simultaneous moves in building regulation of decentralisation and a centralising of enforcement in an attempt to introduce “new socio-institutional mechanisms” in response to the discourse of 'perceived crisis'. Two examples of decentralising movement, given by Imrie & Street (2011), are part-privatisation of building control, and self-certification in the UK (p.71). A further change is from prescriptive codes to performance-based standards. Central to Imrie & Street’s research is the notion that regulation is perceived as obstructive & stifling to design, that it inflates costs, is inflexible and reduces the scope for ingenuity in the design and construction of buildings, and allows for imbalanced in how building code is interpreted by enforcers (pp.77-78). Imrie & Street (2011) suggest that “while having some basis in experience, [building codes] are largely based on anecdotal or incomplete evidence and that they caricature the interrelationships between regulation and the design and development process” (p.72). Within the two most polemic discourses on regulation surrounding this perceived crisis, both sides cite 'public good' as being their motivation for supporting or challenging current regulation policy and enforcement (Imrie & Street, 2011:79). Although this literature details perceptions based on research in the UK, the regulatory changes depicted have also occurred in Australia, making it relevant to this thesis.

Williamson (2011) highlight the complexity when understanding from where each code originates, and the purpose they serve. A senior officer from the ABCB has told the author the regulatory provisions were "more politics than science" (Williamson, 2011:1656). This comment is important to this thesis, as it suggests that particular regulation aims may not be the sole motivations behind some performance standards. If regulations do present barriers for adaptive reuse projects, this thesis must explore any undocumented and indirect agendas, in the context of adaptive reuse projects. Perceptions of building regulation are likely to be influenced by these undocumented agendas.

2.3.4 Regulation effectiveness and failure.

While writing this thesis, several notable regulatory failures have been alleged to have occurred both within Australia and internationally. These failures are still being played out in the courts, industry and the media, which makes this review more controversial and timelier than it would have hitherto have been. A landmark report released by Shergold and Wier (2018) responded with 24 recommendations designed to mitigate severe shortcomings in the implementation of enforcement of performance standards within NCC in New South Wales. This report has put the role of private building certifier in the enforcement process under scrutiny (AIBS, 2018b) and prompted the response which questions assumptions about the role of building certifiers, 'Is it due to a lack of diligence of building surveyors or is it a function of the legislative systems in place that effectively inhibits the ability of a building surveyor to be influential in achieving a compliant outcome?' (p.7). Other events considered to involve regulation failure include fires in the Lacrosse apartment building, Melbourne (November 2014); Neo200 building, Melbourne (February 2016); Spencer Street Apartments (February 2019); and the infamous Grenfell Tower fire, in London (June 2017) which involved a large loss of life and prompted an ongoing public inquiry in the UK. At the time of writing, these events involve the use of non-compliant cladding materials. In addition, there have been other regulatory concerns about the structural integrity of several recently constructed apartment buildings in Sydney, resulting in a NSW Parliamentary Inquiry titled

"Regulation of building standards, building quality and building disputes" (GovNSW, 2019).

Cobin (2013) summarises ten different ideas to explain why safety regulation may fail. The ideas are loosely categorised as either 'governmental failure' or 'market failure' (Cobin, 2013:1). Corbin (2013) also suggests that ineffective regulation is often blamed upon non-governmental agencies and users. Through analysis of Turin (between 1835 – 2010) and incidences of fire safety in buildings, Corbin discounts or at least questions 'market failure' as a critical cause of fire safety issues. This strengthens further the need to scrutinise the regulations and policies themselves and how they are enforced. From the ten theories detailed, he suggests that ideas stemming from 'governmental failure' can better explain the reduced effectiveness of building regulation when it comes to improvements in public safety.

With specific reference to adaptive reuse, Corbin (2013) makes an important argument regarding the lack of a holistic approach to building regulation. One 'government failure' which may account for some ineffective regulation in the pursuit of improving public safety is highlighted, "political compromise of special interest groups, solutions (building codes) end up being conglomerations of bits and pieces from different solutions" (Corbin, 2013:12). As the National Construction Code is primarily written for new constructions, it can be argued that the NCC is already problematic for adaptive reuse projects. Regulatory policies and code that consist of a collection of piecemeal codes due to political compromise will impact upon adaptive reuse to a greater extent. As mentioned elsewhere in this literature review, according to Meacham et al. (2014), adaptive reuse needs a more holistic approach to building regulation consideration.

According to Baldwin & Black (2008), one test that used to judge the effectiveness of any regulatory regime is whether the system employed assists its enactors to meet the challenges that arise during its application to industry. They further suggest what these challenges may be during the enforcement of regulation. Although this research has been applied to a different sector (sea fishing industry), it is still relevant to building code compliance in construction. The challenges they highlight include: lack of resources for enforcement agents; disingenuous behaviour to avoid regulatory compliance within an industry can be difficult to detect; conflicting institutional pressures; and regulatory objectives can be unclear or conflicting. While there are some apparent differences between the two sectors (fisheries and construction), namely the extent to which enforcers are expected to seek out regulatory breaches, this paper highlights a need for this study to examine building regulation enforcement systems in the context of adaptive reuse of buildings. Baldwin and Black (2008) propose 'really responsive' regulation may better help regulation enactors address the challenges faced during enforcement. They suggest 'really responsive' regulation can more effectively assist enactors when compared with other theories of regulation: responsive, target analytical approach, risk-based and 'smart' strategies to regulation. The enforcement and compliance of building code for adaptive reuse projects may generate their own unique set of challenges when compared with new building construction projects.

Principles of good governance have been connected by literature with effective regulation (Imrie & Street, 2009b). A clear definition of 'good governance' is as of yet undefined. However, a report, *Risk and Regulatory Policy: Improving the Governance of Risk* by the Organisation for Economic Co-operation and Development (OECD), describes 'good governance' as being: effective regulation; regulation that identifies and addresses risk at the right level; promotes successful design and implementation of regulation; and addresses the causes of regulatory failure. It is interesting to note though that while OECD (2010:17) state that good governance should address regulatory failure, it does not include a need to identify regulatory failure, highlighted as important by Cobin (2013).

According to OECD (2010:18), there are two types of regulatory errors (type I and type II). Type I involves a failure to regulate: allowing practices or products that are dangerous for us if left unregulated. In a construction context, this could involve mechanisms which result in a lack of enforcement of NCC code compliance. Type II is where a product or practice is banned or effectively restricted that would otherwise have an overall social benefit. This thesis aims to focus upon examining the evidence for both type I and II regulatory failures in the context of adaptively reusing existing buildings. Adaptive reuse of existing buildings has been highlighted, in Chapter 1 Introduction, as having social, environmental and economic benefits.

2.3.5 Criticisms of regulation: in an adaptive reuse context

Published research is often critical of current policies and regulations in Australia and internationally. Van der Heijden (2013a:352) suggests that Australian legislation does not place sufficient emphasis on existing building structures. This comment suggests there is a potential bias within regulation towards new construction, and against the reuse or adaption of existing buildings. Meacham et al. (2014) indicate the need for an agreed framework which is holistic and which assesses building performance “across all societal objectives” (p.2). One potentially helpful shift that has already occurred in building regulation is the move from prescriptive building codes to performance-based standards as this has particular implications for adaptive reuse building projects. All European member countries report a similar move to a performance-based system (Visscher & Meijer, 2011). Australia first made this shift towards performance-based codes in 1996 (Greenwood, 2012). A performance-based system is said to be driven by several benefits, which are: introducing greater flexibility in building design to meet the NCC requirements; improving the clarity of code requirements; reduction in complexity; generating more clarity of intent and also consistency; and enabling industries to respond faster to innovation within the market (ABCB, 2017a). The impact of moving towards the performance-based system is yet to be reported by research in terms of its application to real building adaption projects. However, it is currently reported as an enabler of compliance for existing building adaption as it permits a higher degree of flexibility (ABCB, 2017b; Allen Consulting Group, 2009:9).

However, Fischer & Guy (2009:2585) allude to potential limitations of performance-based regulation and offers some untested insights about enforcement weaknesses relevant to this thesis, relating to the practices of enforcement practices. Fischer & Guy claim enforcement in performance-based systems is more complicated than prescriptive codes, suggesting this is due to weak and under-resourced enforcement, concurring with the findings of Andrews *et al.,* (2016) in their study of the enforcement practice within adaptive reuse.

As previously identified, research suggests, current National Code of Construction (NCC) in Australia, International Construction Code (ICC) in United States of America, National Building Code of Canada (NBCC) and some codes employed across Europe (Meijer & Visscher, 2008), are written from the perspective of new building projects (Meacham et al., 2014:4, van der Heijden, 2013a). There is some suggestion that this bias in regulation is an additional hurdle to the adaption of existing buildings when compared to new developments (Galvan, 2006; Yung & Chan, 2012).

Meacham et al. (2014) state that current regulations need to address existing buildings to a greater extent with regards to sustainability issues (p.3). Meacham et al. (2014) acknowledge that changes to building codes for existing buildings have occurred over the last few decades when life-loss events have identified a weakness in building regulation. However, there is a growing acknowledgement of the necessity to reusing existing buildings to meet environmental sustainability objectives (Wilkinson & Remøy, 2018). As definitions for 'sustainability' are wide and varied, for existing buildings, this broader call for building regulations to advance sustainability to a greater extent may have interesting applications for adaptive reuse.

In Australia, where there is a change of use application or even a major refurbishment of an existing building, the new design must comply with the same building code performance standards as a new building. This has implications for the uptake of adapting and refurbishing existing buildings as feasible alternatives to demolition of existing buildings and replacement with new development. Here lies one 'competing objective' alluded to by Meacham et al. (2014). Environmental agendas of building regulatory legislation strive to reduce construction waste and reduce energy consumption by the construction industry, yet it can be said they create barriers to recycling of existing building stock, for example, retrospective application of new higher energy performance standard may be unfeasible, potentially resulting in demolition (Andrews *et al.,* 2016; Bruce *et al*., 2015).

2.4 Building regulation as a barrier

The review disclosed that 10 papers directly referenced building regulation as a problem in prominent locations within the paper, for instance: abstract or results or findings. These papers are: Aigwi et.al. (2018); Olivedese et. al. (2017); Andrews et al. (2016); Conejos et al. (2016); Dyson et. al. (2016); Udawatta et al. (2016); Bruce et al. (2015); Remøy & van der Voordt (2014); Yung & Chan (2012); and Bullen & Love (2011a). The prominence of regulation as a problem in the paper indicates the importance ascribed by the authors to the issue. An additional 6 papers reference building regulation as problematic to adaptive reuse or adaption in the article's main body. These papers are Heurkens et al. (2018); Gosden (2017); Misirlisoy & Gunce (2016); Thomsen *et al.,* (2015); Tan et al. (2014); and Langston et al. (2008). While these papers explicitly state that building regulation is a barrier to adaptive reuse, often they contain limited or no reference to primary research studies as supporting evidence. A further paper by Giuliani *et al.* (2018) list building regulation as one constraint to adaptive reuse. This suggests that stakeholders' perceptions of building regulation have been uncritically accepted in these recent articles. This is an important gap in research and is discussed again at the end of this chapter.

Together these 16 papers represented research undertaken in several different countries, suggesting that building regulation is a problem internationally. The locations of the studies are as follows: Australia (5); Europe: Netherlands and Italy, and including the UK (6); Hong Kong (3); New Zealand (1); and the US (1). This geographical spread highlights the clusters of research examining adaptive reuse or adaption, and which also consider building regulation as a factor. Australia was by far the largest cluster, suggesting the prominence of this issue for Australian policy and practice.

2.4.1 Building codes

The review revealed that technical codes are specifically considered to be an important barrier to adaptive reuse by stakeholders in Australia affecting:

- non-heritage adaptive reuse and adaption (Bruce *et.al.*, 2015:150; Udawatta *et.al*., 2016:1; and Bullen & Love, 2011a:41)

- heritage building adaptive reuse and adaption (Dyson *et al.*, 2016:44; Conejos *et al.*, 2016:9; and Bullen & Love, 2011c:41)

Building regulation is also considered to be a primary, major or significant barrier to adaption and adaptive reuse for non-heritage and heritage buildings beyond Australia (Aigwi *et al.*, 2018:397; Remøy & van der Voordt, 2014:389). The authors identify problems stemming from acoustics, fire, lifts shafts, floor to ceiling heights, mechanical ventilation and services in the Building Code of New Zealand. While Yung & Chan (2012) do not go as far as stating building regulation is a primary, major or significant barrier to adaptive reuse, the authors make numerous references to the challenge presented by building codes and their enforcement (pp.358-359).

The following issues, covered by NCC performance standards, are perceived to present significant barriers to adaptive reuse or adaption:

- Fire safety, included in NCC Volume One Section C Fire Resistance, Section D1 Provision for Escape & D2 Construction of Exits, within Access & Egress, & Section E Services and Equipment (Conejos *et al.*, 2016; Udawatta *et al*., 2016; Bruce *et al.*, 2015; Bullen & Love, 2011a)
- Disability access, included in NCC Volume One Section D3 Access for People with a Disability within Access & Egress (Conejos *et al.*, 2016; Bruce *et al.*, 2015; Bullen & Love, 2011a)
- Seismic requirements, included in NCC Volume One Section B Structure (Conejos *et al.*, 2016; Udawatta *et al*., 2016)
- Hazardous substance provision, included in many sections within the NCC Volume One (Udawatta *et al*., 2016)
- Energy provision, included in NCC Volume One Section J Energy Efficiency (Udawatta *et al*., 2016)
- Acoustics, included in NCC Volume One Section F Health & Amenity (Conejos *et al.*, 2016)

One further paper, by Dyson *et al.* (2016) referred to NCC codes as a barrier without specifying which section or issues were problematic. Two further articles do not present any primary research on barriers to adaptive reuse but rely on findings from the literature, reporting barriers to adaptive reuse, to inform their conceptual model for adaptive reuse decision making. (Tan *et.al.*, 2014:68 & Langston *et al.*, 2008:1711).

The review has found that although building regulation is an often-cited barrier to adaptive reuse by the research authors and stakeholders alike, there is little or no further evaluation of these claims. One paper by Aigwi *et al.,* (2018) using the Friedman test to look for statistical differences in how stakeholders perceived the efficacy of adaptive reuse, as an urban regeneration strategy for towns in New Zealand. This paper, however, stopped short of applying quantitative analysis of stakeholders' perceptions of barriers to adaptive reuse. It is almost as though there is a bias towards building regulation from the outset. However, it could be that the emerging research field examining adaptive reuse has not matured and that there is a gap in existing knowledge surrounding critical examination of building regulation as a barrier to adaptive reuse.

In contrast, to the above papers, which explicitly claim building regulation is a key barrier to adaptive reuse, a further 5 papers did not characterise building codes as a problem for adaptive reuse or adaption when building regulation was discussed. These papers are: Živković et al. (2016); Elliott et al. (2015); Leadbeter (2013); Häkkinen & Belloni (2011); and Wilkinson & Reed (2011). These papers are from research which is based in the UK (1 paper) (Elliott et al., 2015); the US (1 paper) (Živković et al., 2016); Finland (1 paper) (Häkkinen & Belloni, 2011) and Australia (2 papers) (Leadbeter, 2013; Wilkinson & Reed, 2011). These 5 papers project a neutral or positive framing of building regulation when discussing obsolescence mitigation strategies such as adaptive reuse or adaption. For instance, Häkkinen & Belloni (2011) provide balance to the debate surrounding building regulation and barriers to adaption. The authors also suggest that the framing of barriers to adaption is important to consider as "barrier may sometimes appear as a driver when it is used in another way" (p.241). Häkkinen & Belloni (2011) promote a positive view of building codes as a normative regulatory instrument and state that building regulation can be a beneficial mechanism to achieve results including sustainable building adaption. They report that there may be some problems with building regulation enforcement practice for sustainable adaption in Finland, but not report any barriers from the code itself. Živković et al. (2016) do not frame regulation as a barrier but as one of many factors to consider when evaluating a building's suitability for using adaptive reuse as a strategy to avoid obsolescence. Elliott et al. (2015) depict the introduction of more stringent building regulation codes as beneficial and a necessity to improve building quality and to meet sustainability targets in England and Wales. They highlight that stakeholders may complain about new higher requirements in building regulation, such as more stringent energy efficiency codes, but the authors are dismissive of this. Elliott et al. (2015) highlight stakeholder complaints peak at new code introduction, then "calmed itself down", suggesting there is a recognisable behavioural pattern in stakeholder discussions of building regulation (p.673). By highlighting building owner/investor behaviours seen in previous regulatory changes such as disability access and contamination, Elliott et al. (2015) take a critical perspective in their qualitative data analysis of stakeholder interviews and stakeholder's perceptions of building regulation.

Leadbeter (2013) is the only paper found by this review that outlines legislation which attempts to provide a level of reasonable flexibility in building code requirements for adaptive reuse of heritage buildings. They highlight a tension between societal benefits of code compliance and adaptive reuse as a tool to conserve built assets, stating "relaxing the strict requirements of the Code to the extent that a dangerous situation is permitted is clearly not in the best interests of anyone" (p.505). Leadbeter (2013) further discusses the success of adaptive reuse of heritage buildings using a flexible approach to compliance on a case-by-case basis. They conclude that "the existing system of regulation and policy in this area works reasonably well with a sufficient degree of flexibility to ensure adaptive reuse projects proceed without unduly compromising the heritage value of significant heritage places. This is not an unreasonable conclusion to draw given the number of successful adaptive reuse project" (p.507). The author notes, in 2013, that there needs to be clarification for building owners and decision-makers alike to provide "transparency and certainty to the overall process" (p.507), suggesting it is the socio-aspects of building regulation that needs to be clarified rather than changes to the NCC code itself. However, while this article provides an authoritative and useful review of Australian legislation surrounding building regulation and heritage protection, it offers no qualitative or quantitative data to back up these claims.

An insightful point by Häkkinen & Belloni (2011) suggests that building regulation is a natural talking point for stakeholder groups within sustainable building adaption and may be due to the fragmentation of the different stakeholder groups within the industry. Normative building regulation, as described by Häkkinen & Belloni (2011:241), relies on a consensus being reached between stakeholders. The authors note that achieving an agreement at this societal level is a time-consuming process. This suggests any changes to building codes can evoke frequent, lengthy debates. In addition, the authors suggest that "the fragmentized nature of the sector and the high number of actors involved… may lead to a situation where regulations are considered as the only possible way to proceed" (p.241). Häkkinen & Belloni (2011) raise the idea that when no solution is obvious, stakeholders may tend to focus on normative regulation such as building codes as a default discussion point. This is a valuable insight considering the public attention devoted to building regulation in public discourse in Adelaide and which is detailed in Chapter 04 of this thesis.

2.4.2 Regulatory barriers other than technical codes

In the literature captured by this review, few papers, mention non-code factors connected to building regulation. Mostly the articles uncovered focussed on building codes as a key barrier to adaptive reuse. This absence of discussion beyond technical codes is a potential and important gap in research relevant to this thesis. The focus on technical aspects of the regulation fits with criticism discussed earlier in this review by Imrie & Street (2009b), and who call building control to be understood as a socio-political system in which non-codified (or social) aspects of prevailing professional practices form a critical part of regulation (Imrie & Street, 2011). The enforcement of regulatory codes is enacted by state government legislation in Australia, together with the professional practices of local government and private certifiers. This complexity in regulation is essential to recognise in the evaluation of barriers to adaptive reuse uptake, mainly as technical codes or performance standards are only one part of building control.

The articles, captured by this review, offered little discussion of non-code regulatory challenges for adaptive reuse projects. As a result of this brevity, the analysis found it challenging to group this review's findings into specific themes, useful to the research questions of this thesis. For example, there is a lack of specificity beyond the technical codes by Bruce *et al.,* (2015), though they generally highlight: "uncertainties on services changes, behavioural changes, government policies and regulations" (p.155). Developing a range of specific thematic codes to synthesise the published research would require this review to make numerous assumptions about many of the points raised. However, three tentative themes emerged from Australian-based literature which reports primary data: uncertainty, a lack of information or expertise, and cost of compliance.

The review found several articles discussing a general sense of uncertainty surrounding building regulation in stakeholders. Conejos *et al.* (2016) suggest "adaptive reuse is difficult since codes change" (p.9). This implies that updates to the NCC which introduce new requirements create the perception of uncertainty in stakeholders. Unforeseen latent defects affecting compliance add to this uncertainty perceived by stakeholders (Dyson *et al.,* 2016; Bullen & Love, 2011a). Leadbeter (2013) notes that there needs to be clarification in building regulation to "transparency and certainty to the overall process" (p.507). Importantly, this review finds that published literature in the field lacks clarity over which elements of building regulation lack transparency and cause uncertainty often adopting generalised and broad criticism of regulation.

Bullen & Love (2011a) disclose that office building owners perceive there to be a lack of flexibility by building certifiers when evaluating compliance (p.40). The authors further highlight that office building owners in Perth, Western Australia (WA) disclose "exemptions from the code were not required, but flexibility in the way they were interpreted and implemented without compromising safety" (p.41). This presents a rather interesting view of stakeholder's perceptions of regulation, and one which may disclose a lack of understanding by the building owners of alternative routes to NCC compliance using performance standards or an unwillingness to consider alternative solutions by NCC certifiers.

International literature presents an interesting practice by building regulation certifiers. Beyond Australia, similar themes of flexibility in compliance appear in the literature.

While Andrews et al. (2016) begin with the premise that “property owners often forgo alterations that would trigger costly investments” (p.115), their findings report that in reality, some codes are not being enforced (Andrews et al., 2016:113). The article discloses “street-level bureaucrats [certifiers] who take advantage of their autonomy and discretionary powers to develop ways to cope with ambiguous codes and in a difficult work context with inadequate time, skills and staffing” (Andrews et al., 2016:123). In this US study examining barriers to sustainable building adaption, this insight seems to suggest that dispensations are used to mitigate socio-factors and economic constraints rather than technical difficulties in achieving compliance. It raises an interesting point about the possibility that enforcement practice can be shaped by financial profitability of building regulation compliance for certifiers.

A lack of information on the existing building’s structure, fabric and services are disclosed as problematic to adaptive reuse (Bullen & Love, 201a1). Conejos *et al.* (2016) also reveal this, highlighting that stakeholders considered a lack of “accurate and good documentation” for the existing building and its proposed design creates uncertainty in how to achieve compliance (p.10). Moving beyond the issue of drawings and documentation, Bullen & Love (2011a) also highlight a lack of existing techniques to measure sustainable design performance. This implies that the availability of methods to achieve compliance via alternative solution routes, and expertise in using these methods by certifiers or designers may be problematic when it comes to achieving energy performance code compliance. From a lack of methods and documentation, Conejos *et al.* (2016) examines barriers from a contractor’s viewpoint and identify that stakeholders claim the “availability of materials and lack of skilled tradesmen” to achieve compliance is a barrier (p.11).

2.4.3 Relationships between building regulation and obsolescence

An intriguing but short conference paper by Thomsen *et al.* (2015) raises the issue of cause and effect in the context of existing building obsolescence, as highlighted in figure 2.6. Thomsen *et al.* (2015) make the point that in literature, “obsolescence is treated as a dependent variable, and the factors are presented as independent, potentially causal variables. This is true, but the argument that we want to make here is that they do not adequately reveal the underlying cause-effect mechanisms" (p.6). Understanding the relationships between office building obsolescence and building regulation compliance for adaptive reuse development is essential when evaluating to what extent is building regulation a barrier to adaptive reuse. The question can be posed: what does literature disclose about the relationships between building regulation and obsolescence?

An explicit investigation into cause and effect relationship between existing building obsolescence and building regulation lies beyond the scope of the papers included in this review. However, the next few paragraphs examine what can be deduced from the literature.

The studies, captured by this review, are also predominantly reliant upon qualitative interviews with stakeholders for views of building regulation and obsolescence. Literature which discusses causes of obsolescence and building regulation include Häkkinen et al. (2018); Heurkens et al. (2018); Gosden (2017); (Conejos *et al.* (2016); Uddawatta et al. (2016); Bruce et al. (2015); Elliott et al. (2015); Remøy & van der Voordt (2014); Bullen & Love (2011a); and Langston *et al.*, (2008).

Langston *et al.*, (2008) present the research premise that regulation is a cause of obsolescence in existing buildings, claiming that changes in regulation can lead to obsolescence, "Legal obsolescence: revised safety regulations, building ordinances or environmental controls may lead to legal obsolescence" (p.1711). This suggests regulation is a potential cause of vacancy, underuse or premature demolition, but Langston *et al.* (2008) are unclear about exactly why regulation is a cause of

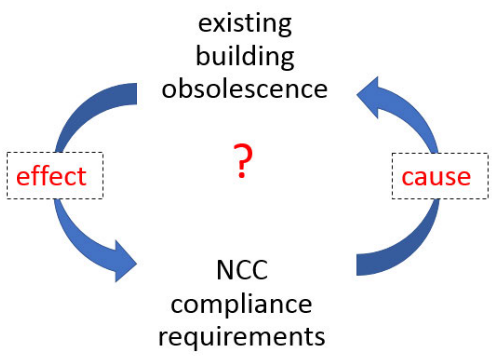


Figure 2.6 Questioning the 'cause – effect' relationship surrounding obsolescence

obsolescence. A later paper which Langston co-authors, explicitly connects building regulation as a major barrier to adaptive reuse in Hong Kong (Conejos *et al.*, 2016). Together, this body of research suggests that building regulation compliance requirement is both a cause (Langston *et al.*, 2008) and effect (Conejos *et al.*, 2016) of obsolescence in buildings, although there is a lack of detail in these conceptual papers.

Bullen & Love (2011a) make a case for intervention through adaptive reuse and highlight that obsolescence is inevitable in buildings due to changing market demands and natural depreciation of a building's fabric and services. This influential article identifies regulation as one of three underlying factors which influence stakeholder decisions surrounding adaptive reuse feasibility (p.37). Although they identify economics is the primary consideration, regulation is a key secondary concern in decisions to adaptive reuse: "the physical condition of the asset juxtaposed with regulations" (p.32). This suggests that regulation is not considered by Bullen & Love (2011a) as a primary cause of obsolescence. They go on to highlight that building owners warn that the introduction of an adaptive reuse directive by governments would be counterproductive, suggesting measures to force building owners to adopt adaptive reuse as obsolescence mitigation will deter owners and developers from retaining older buildings (p.41). It also highlights that the relationship between building regulation and obsolescence may be dependant on each building's physical condition and age.

The relationship between obsolescence and regulation may be complicated due to the high number of variables which feature in discussions on barriers to adaptive reuse in Australian studies (Bruce *et al.,* 2015; Bullen & Love, 2011a). Bruce *et al.* (2015) highlight, "Interviewees suggested there is a large number of factors that impede the retrofitting of existing multi-storey buildings. These barriers range from financial, technical to market conditions" (Bruce *et al.,* 2015:159). The authors, whose study was based in Adelaide, go further and add that stakeholders in Adelaide believe "it is clear that some structures that have been vacant for some time now present far too many barriers and that no reasonable government based incentive scheme will result in these buildings being re-used" (Bruce *et al.*, 2015:158). In a UK context, Elliott et al. (2015) contribute that the "issue of tightening legislation causing accelerated obsolescence was raised in interviews, but obsolescence is seen as a broader issue" (p.678). This insight by Elliot *et* *al.* (2015) raises the question as to what aspects of building regulation are viewed as problematic by stakeholders: the codes themselves or stakeholders' perceptions of building regulation in adaptive reuse development.

While this review cannot conclusively determine the cause and effect relationship between initial obsolescence and building regulation, one critical conclusion that can be drawn from Bullen & Love (2011a) and Langston *et al.*, (2008) is the need for further research to unpack the complex range of factors at play in the process of obsolescence in existing buildings, including building regulation codes and enforcement practices. Understanding the relationship between initial obsolescence and building regulation, typically referred to as legal obsolescence, is an important gap in knowledge when assessing to what extent is building a barrier to adaptive reuse, when vacancy is used as an indicator of obsolescence. While research has created different categories of obsolescence which imply regulation as a root cause of existing building obsolescence, such as 'technical' and 'legal' obsolescence, there is little critical evaluation or evidence presented to support the existence of these conceptual categories. This review, therefore, suggests that research authors and adaptive reuse stakeholders perceive building codes as a cause of *continued* obsolescence, rather than as a primary cause of obsolescence. This suggestion is highlighted in Fig.2.8, which attempts to respond to the gap in the field highlighted by this review.

2.4.4 Summary

The review finds that regulation is connected to a wide range of variables presented as barriers to adaptive reuse when potential restrictions, other than technical codes, are considered. This is not surprising given the variety of professions included in data collection and the range of factors within a complex adaptive reuse process which can trigger uncertainty. It could be suggested that this wide range of stakeholders and the sheer range of variables found by this review is the main reason why current research tends to make generalised and broad criticisms of building regulation. This literature review found no research which provided a clear hierarchy within the variables described by studies as barriers to adaptive reuse, outlining a gap in knowledge. This gap is returned to at the end of this chapter in the summary.

Many of existing studies use an economic lens to frame adaptive reuse. This economic framing is done in several ways. Firstly, articles suggest there can be financial benefits to adaptive reuse at a city-wide level (Heurkens *et al.,* 2018; Olivedese *et al.,* 2017; Aigwi *et al*., 2018; Dyson *et al.,* 2016; Misirlisoy & Gunce, 2016; Bruce *et al.,* 2015; Remøy & van der Voordt, 2014; Langston *et al.,* 2008). The economic benefits of adaptive reuse at an urban scale include urban revitalisation and an increase in economic activity from the businesses and people housed in these once underutilised or empty buildings. The studies also argue that adaptive reuse has economic benefits for individuals eg: existing building owners/developers, as it can be a cheaper option than demolition and new development (Aigwi *et al*., 2018; Olivedese *et al.,* 2017; Gosden, 2017; Conejos *et al.*, 2016; Dyson *et al.,* 2016; Uddawatta *et al.*, 2016; Bruce *et al.,* 2015; Yung & Chan, 2012; Bullen & Love, 2011a; Häkkinen & Belloni, 2011; Langston *et al.,* 2008)

Secondly, existing studies suggest that adaptive reuse development needs to be economically viable both from a building owner/developer perspective and from an end-user viewpoint (Olivedese *et al.,* 2017; Gosden, 2017; Andrews *et al.,*2016; Bruce *et al.*,2015; Yung & Chan, 2012; and Bullen & Love, 2011a). Bruce *et al.* (2015) highlight that rental rates and capital value, building running costs and marketability are all factors that inform economic decisions around existing building adaptions (p.155). They also suggest that building owners' economic rationales include considering the size of the financial commitment, investment risk, and illiquidity of a property market (p.154). Remøy & van der Voordt (2014) highlight that in cities with high vacancy rates, the benefits of interventions such as adaptive reuse may be preferable to lower-cost upgrades as the market may not guarantee a return due to low demand (p.381). They also detail that building costs are dictated by the final rental or sale price of an adaptive reuse development (p.382). This is an essential economic factor in determining adaptive reuse viability, particularly in cities with low demand to propose future uses for underutilised office buildings. Misirlisoy & Gunce (2016) refer to this as the 'economic sustainability' as the new intended use must be considered in economic terms (p.94).

Thirdly, an economic framing is also used to claim the cost of building code compliance is problematic, suggesting that building codes make adaptive reuse development economically unviable (Heurkens *et al.,* 2018; Olivedese *et al.,* 2017; Andrews *et al.,* 2016; Conejos *et al.,* 2016; Dyson *et al.,* 2016; Uddawatta *et al.*, 2016; Bruce *et al.*,2015; Remøy & van der Voordt, 2014; Yung & Chan, 2012; Bullen & Love, 2011a; Langston *et al.,* 2008). Langston *et al.* (2008) summarise typical views projected in literature: "the cost of converting a building is generally less than new construction because many of the building elements already exist. Given there are no expensive problems to overcome…the reuse of structural elements is a significant saving. Older buildings, however, may not comply with present regulations…It is essential that any building, being considered for a major refurbishment, has had a thorough survey undertaken to confirm its structural and constructional quality, and its compliance with building ordinances" (p.1711). A prevalent view in the literature reviewed is that building code compliance requirements can cancel out cost benefits or reusing existing buildings.

Yung & Chan (2012) clearly explain that the economic viability of adaptive reuse is only achievable if the tangible and intangible benefits of the project outweigh its development and construction costs. However, the authors further add that the "intangible values are difficult to assess and measure" (Yung & Chan, 2012:355). Elliott *et al.* (2015) suggest that these intangible values can manifest in a variety of ways for building owners and businesses alike, such as corporate social responsibility (CSR) benefits (p.669). Connecting to this, Aigwi *et al.* (2018) conclude that there is "too much concentration on only economic aspects [of adaptive reuse] by potential investors and developers" (p.402). Tan *et al.* (2014) add a further dimension to this in their study which focuses on the reuse of industrial buildings in Hong Kong by suggesting that "There may be social and environmental arguments for why an economic focus may be inappropriate" (p.74). Going further, Elliott *et al.* (2015) explain that it is a reliance on a "classical financial cost/benefit model, which has been identified as the primary barrier within the property industry" (p.668).

In addition to practical and technical impediments to code compliance, the financial cost of code compliance is considered to be a barrier to adaptive reuse by many studies surveyed in this review (Heurkens *et al.,* 2018; Olivedese *et al.,* 2017; Andrews *et al.,* 2016; Conejos *et al.,* 2016; Dyson *et al.,* 2016; Uddawatta *et al.*, 2016; Bruce *et al.*,2015; Remøy & van der Voordt, 2014; Yung & Chan, 2012; Bullen & Love, 2011a; Langston *et al.,* 2008). It is useful here to consider wider literature than that captured in this review.

Imrie & Street (2011:82) cite Schill (2005:7) in highlighting building regulations "serve "an important public purpose", in which increased costs to builders ought to be regarded as a necessary by-product of positive government action". However, in practice, the 'burden of cost' has been acknowledged as a problem for construction and developers: in the UK, the call to reduce the economic 'burden' of regulation saw the formation of The Better Regulation Executive (BRE) (Imrie & Street, 2011:72). There is a recent report commissioned by the AIBS to examine possible building regulation reform to "provide greater efficiencies and limit what is generally seen as unnecessary 'red tape.'" (AIBS, 2018a:2) In the USA, there is a Council for Excellence in Government (CEG). According to Shipley et al. (2006), from a Canadian perspective, unforeseen costs resulting from building code are a common issue connected with reuse of heritage. Wilkinson & Remøy (2015:4) summarise that the majority of barriers for adaptation feasibility relate to the estimated financial cost of resolving technical issues.

Imrie & Street (2011:83) suggest that the cost argument, used in negative perceptions of building regulations, is problematic as they only examine a short timeframe within a building's lifecycle. Cost arguments focus mainly upon the initial capital costs and do not include operational costs. The implications of this for adaptive reuse projects are different however than for new constructions. Imrie & Street (2011:82) further emphasis that economic costings to evaluating building code impact upon design are problematic. Focussing predominantly on cost fails to acknowledge the broader impact some codes may have in developing the quality of the built environment.

An over-reliance in the field on a single research method was noted in the review. It was found that most research studies used similar methods to reach similar conclusions regarding barriers to adaptive reuse, typically reporting stakeholder views collected by interviews, focus groups and questionnaires. Qualitative data samples, in the literature captured by this review, ranged from a small sample (n=6) (Bruce *et al.,* 2015), through to more substantial study samples (n=158) (Häkkinen & Belloni, 2011). The data sets were gathered using a variety of sampling techniques ranging from snowball sampling, where stakeholders included in the research study are themselves used to recruit additional interviewees via their professional their acquaintances (Bruce *et al.,* 2015); stratified random sampling from publicly available databases (Bullen & Love, 2011a);

mail-shot invitations to a particular profession (Andrews *et al.,* 2016); and invitation for professionals to participate base on involvement with particular buildings (Conejos *et al.,* 2016). The sampling technique used can provide relevant context when considering the findings in research.

Yung & Chan (2012) examines barriers in Hong Kong and is a typical example of this over-reliance on qualitative interviews in this field of research. The authors do, however, take a more holistic, critical and measured approached when discussing their findings regarding stakeholders' perceptions of barriers to adaptive reuse. A total of 12 articles, included in this review and which discuss building regulation as problematic, relied on qualitative analysis of primary data gathered via interviews, focus groups and surveys. These papers are: Aigwi et.al. (2018); Gosden (2017); Olivedese et al. (2017); Dyson et al. (2016); Andrews et al. (2016); Conejos et al. (2016); Misirlisoy & Gunce (2016); Uddawatta et al. (2016); Bruce et al. (2015); Remøy & van der Voordt (2014); Yung & Chan (2012); Bullen & Love (2011a). Heurkens et al. (2018) relied on their previous research excluded from this review as it has not been published in English. A further 4 papers that identified building regulation as a barrier relied on or were published literature reviews: Hsu et al. (2017); Tan et al. (2014); and Langston et al. (2008). These 3 papers cited research reliant upon qualitative analysis of stakeholder perceptions and often cited the same texts which claim building regulation is a significant barrier. An additional conceptual paper made the assumption that regulation is a barrier to adaptive reuse (Thomsen *et al.,* 2015). This overreliance in the field of qualitative analysis of stakeholder interviews without supported with evidence or quantifiable data could be problematic and presents a gap in knowledge.

2.5 Conclusion drawn from literature

This chapter has identified numerous research gaps concerning obsolescence, vacancy, adaptive reuse, and building regulation. To conclude this chapter with a meaningful focus, this section of the literature review summarises the gaps identified which this study specifically addresses, framing the contributions which this thesis can make to developing knowledge about barriers to adaptive reuse. While the literature review is sectioned to aid its organisation and aid understanding for the reader, may of the gaps identified cut across several sections of this review. This literature review concludes by responding to two of the gaps highlighted as having particular importance to this study. The relationship between obsolescence and regulation in section 2.5.2.1, and adaptive reuse typology in section 2.5.2.2.

2.5.1 Gaps in knowledge

Gaps identified are matched below against each method and its corresponding chapter in this study: Chapter 04 Content analysis of public debate, Chapter 05 Survey, Chapter 06 Stakeholder interviews, and Chapter 07 Quantifying vacancy. This review concludes:

- Claims of regulatory barriers present little or no supportive evidence beyond stakeholder anecdotes, yet have been widely and uncritically accepted in literature. This weakness in the field is particularly problematic as it potentially reinforces bias against building regulation. The prevalence of this view of building regulation in public discourse is examined in Chapter 04 and Chapter 05.
- This predominantly uncritical acceptance by literature suggests an overdue call for research to use other methods in addition to surveys, interviews and focus groups. Methods used in Chapter 04 and Chapter 07 provide a more critical exploration of public debate and an examination of a building population, to examine building regulation in the context of adaptive reuse as a strategy to mitigate vacancy and obsolescence.
- Cross-sectional studies which examine adaptive reuse through synthesising more than one case study are urgently needed. This gap in knowledge has been recently highlighted by Foster & Kreinin (2020).
- There is a gap in knowledge which inhibits a deeper understanding of the role of building regulation in the obsolescence process. Research has not identified regulation in cause-and-effect mechanisms around existing building obsolescence. Chapter 06 explores what evidence exists to support the notion that building regulation is a barrier to adaptive reuse within Adelaide.
- A lack of in-depth knowledge about types of adaptive reuse was identified as a gap in research. Chapter 07 further addresses this by analysing the distribution of vacancy, calling on the model, in figure 2.8, adapted from Wilkinson (2011).

In conclusion, this review suggests claims of regulatory barriers remain unevidenced beyond stakeholder anecdotes. The perception of regulation as a barrier to adaptive reuse has been widely accepted and has been incorporated into articles beyond those reporting stakeholder perceptions, including conceptual papers developing a model for adaptive reuse and literature reviews. This gap in the literature is particularly problematic as it potentially reinforces bias against building regulation.

In response to the gaps in literature highlighted in this review, a mixed methods research design is used in this thesis, comprising of content analysis of public debate (chapter 04); an electronic survey (chapter 05), semi-structured interviews (chapter 06) and cross-sectional analysis of vacancy distribution in an office building population (chapter 07). The mixed-method design is developed to offer a more critical, balanced understanding of the relationships between office building vacancy, obsolescence, building regulation, and adaptive reuse.

2.5.2 Responding to gaps

This final section informs the research design, which will be presented in chapter 03, to investigate building regulation as a key barrier and contributes to understanding adaptive reuse typologies to address office building vacancy.

2.5.2.1 Relationship between building regulation and obsolescence

The gaps in the literature highlight the need for adaptive reuse feasibility assessment tools to be re-visited. While it is widely perceived in the literature that building regulation is a key barrier to adaptive reuse, and obsolescence is argued to be a key driver of adaptive reuse the researcher has identified the range of variables as possible causes for initial obsolescence and possible reasons for continued obsolescence . The relationship is presented in Figure 2.7, and is based on Häkkinen et al. (2018); Heurkens et al. (2018); Gosden (2017); Uddawatta et al. (2016); Bruce et al. (2015); Remøy & van der Voordt (2014); and Bullen & Love (2011a), as well as adopts Imrie & Street (2011) socio-framing of building regulation.

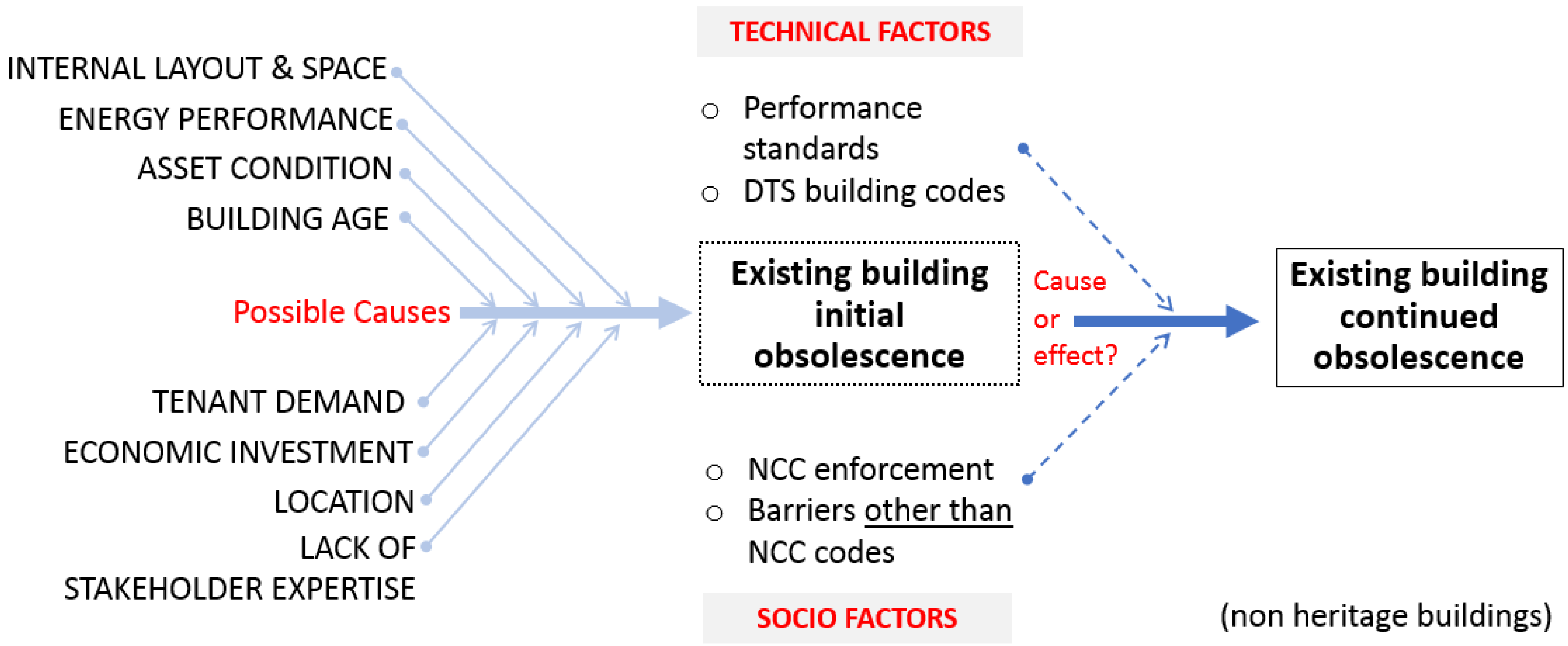


Figure 2.7 Relationship between continued obsolescence and regulation

2.5.2.2 *Adaptive reuse options and typology*

The review of the literature found few sources to examine the adoption of adaptive reuse on a scale less than adaptive reuse of the whole building. To address this gap, the researcher extends Wilkinson's (2018) model, titled 'options for adaptation'. This extension is represented in Figure 2.8 below and is called 'adaptive reuse options and typology' to differentiate it from the original by Wilkinson. Figure 2.8 includes a range of adaptive reuse types in addition to whole building reuse. In 'adaptive reuse options and typology' vacancy types and different scales or permutations of adaptive reuse are represented. The model presented in Figure 2.8 introduces the following original categories of adaptive reuse:

- whole building adaptive reuse (WBAR)
- creation of development described as Mixed-Use across Multiple Level Adaptive Reuse (MUMLAR)
- in pockets as single floor or partial floor plates (PAR)
- on a temporary basis (TAR) (O'Callaghan & Lawton, 2016), and
- top-up (Holden, 2018) if a broader definition of adaptive reuse is adopted.

These adaptive reuse categories informed the analysis of vacancy which is detailed in Chapter 7. The gaps identified in this chapter also directly influenced the data gathering methods chosen and overall research design, which Chapter 3 presents next.

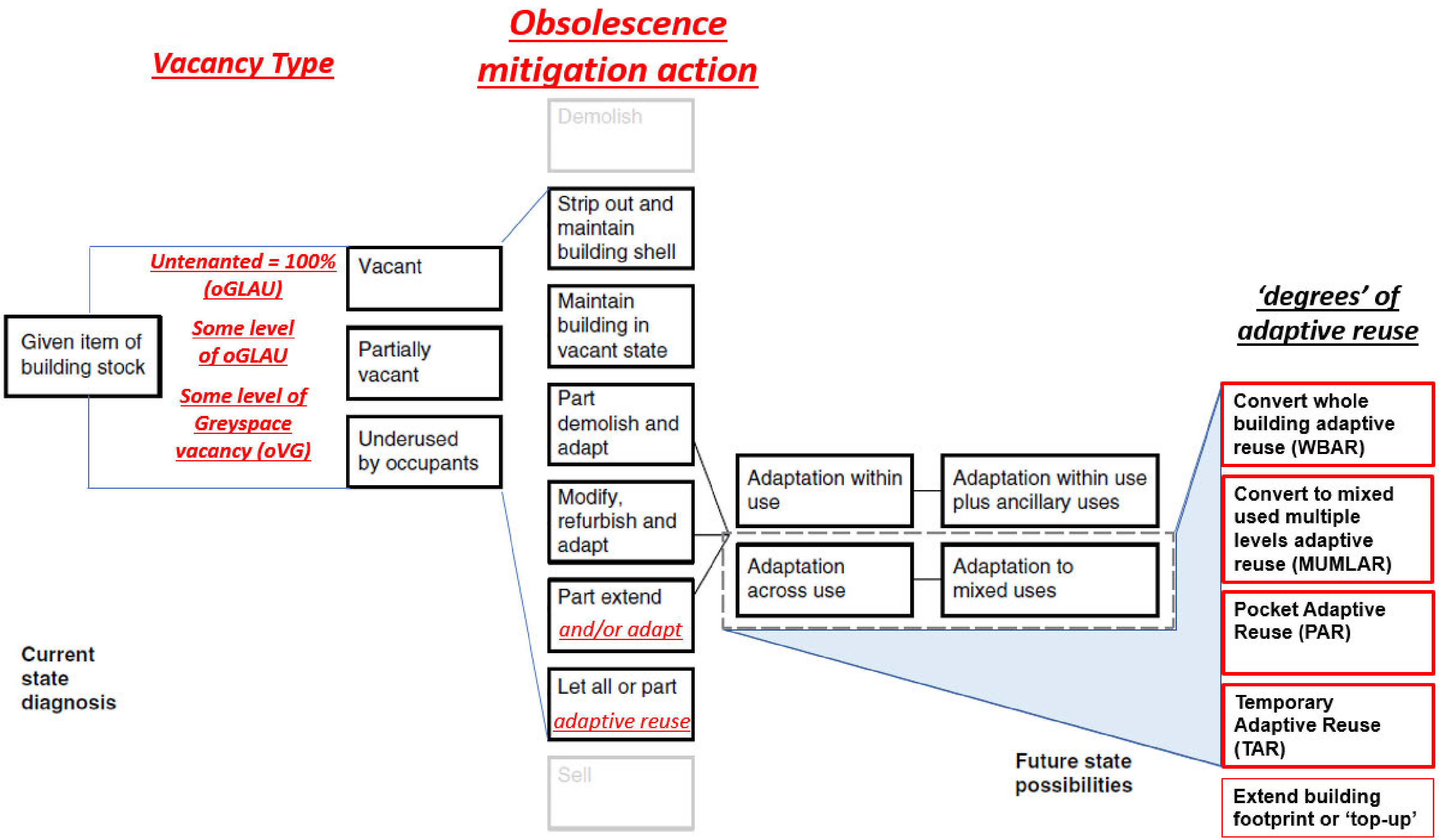


Figure 2.8 Adaptive reuse options and typology

Diagram adapted from Wilkinson (2018:8)

Chapter 3: Research methodology

> "Engaging this complexity requires not a privileging of just one way of knowing and valuing, but a marshalling of all of our ways of understanding in a framework that honours diversity and respects difference" (Greene *et al.,* 2001:15).

3.1 Organisation of chapter

This chapter discusses the theoretical framework adopted for the research and outlines the reasons for choosing specific methods to interrogate particular research questions (RQs) in this thesis. Mixed methods have been chosen as an overall methodological home for research because literature reviewed in Chapter 2 indicates that the research questions can only be adequately explored by adopting a range of methods. The limitations of single method qualitative studies, typically reporting the views of stakeholders about building regulation in relation to adaptive reuse, were highlighted at the end of Chapter 2 and are important gaps in the field of research – a gap which this thesis intends to address.

The section titled Research Design in this Chapter explains the connections between methods used in this thesis and conveys a sense of the research story, including why specific research methods connect within the overall mixed-method design. A key design consideration highlighted here was the need to advance insights gained from qualitative methods by use of a quantitative method, raising the quality of research through triangulation (Archibald, 2016) and permitting a more in-depth interrogation of the research questions.

As highlighted in Chapter 02 Literature Review, high vacancy has been understood by some as a critical factor triggering obsolescence mitigation strategies, including adaptive reuse (Muldoon-Smith, 2016; Remøy, 2010). Investigating vacancy is, therefore, a productive potential route into a more informed understanding of the context of adaptive reuse, explicitly investigating the research questions. The method developed in this thesis and summarised in this chapter is, therefore, novel but made an essential contribution to the overall research design and quality of findings in this thesis. This chapter also discusses the ethical issues affecting research at the end of this chapter in section 3.5 Ethics.

This chapter makes concise reference to data-gathering methods used in this thesis, summarising how each method fits within the overall mixed methods design of this study, whereas further details of the methods to address each research question will be presented in Chapters 04, 05, 06 and 07 alongside findings reached after using each method to interrogate the research questions. This structure was adopted for pragmatic reasons and so that findings gained from each method are also located close to research design rationale to make it clearer how the findings in each chapter connect to the decisions on the research method.

3.2 Research design

Choosing the most appropriate methodology to address the research questions is recommended by methodological literature on the basis that it increases the likelihood that a study will produce reliable conclusions within a clear epistemological framework (Creswell and Creswell 2017; Chilisa & Kawulich, 2012). Articles included in the literature review also suggested that while there is no dominant research paradigm in the field, wholly qualitative studies tended to predominate within the specific search parameters used and relevant to this study. Table 3-1 below, highlights the research design, sets out the order of research methods used in this thesis and includes a description broadly classifying each method.

Table 3-1 Research Design

Chapter	Method	Methodology
Ch04	Content Analysis of news articles	Qualitative
Ch05	Survey	Quantitative and Qualitative
Ch06	Interviews	Qualitative
Ch07	Building population study	Quantitative
Ch08	Synthesis of findings in concluding discussion	Mixed-method - synthesis of findings from chapters 02, 04, 05, 06, and 07 is undertaken to produce new overall findings

It is acknowledged that the labels 'quantitative' and 'qualitative' are necessarily imperfect and subject to debate in methodological literature about their utility (Piano Clark & Ivankova, 2015; Maggetti et al., 2013). The thesis structure, shown in table 3-2, sets out how each method maps to the specific research questions of this study. The research questions, as set out in Chapter 01:

1. *What is the perception of industry stakeholders about building regulation in relation to adaptive reuse of office buildings across Australia?*
2. *Focussing on Adelaide, what evidence is there to support stakeholder views of building regulation and adaptive reuse?*
3. *Does building regulation need to be reformed to encourage adaptive reuse in office buildings?*

Research objectives A and B were developed in response to the research question RQ1:

A. To systematically examine the perceptions of stakeholders both industry professionals in practice and as mentioned in published literature about NCC as a barrier to adaptive reuse in Australia.
B. To evaluate whether stakeholders, within the Adelaide CBD office building market, hold the view that NCC regulation is a barrier to office building adaptive reuse.

Objectives C and D were developed to answer research questions RQ2 and RQ3:

C. To seek and evaluate the evidence to support stakeholders' views of NCC regulation as a barrier to adaptive reuse, and detail which NCC provisions are problematic.
D. Identify which aspects of building regulation, if any, prevent greater uptake of adaptive reuse to help inform policy initiatives which seek to address barriers to adaptive reuse in practice

The mapping in table 3-2 clarifies how the range of methods used in this study addresses the research questions and associated objectives set out in sections 1.3 and 1.4 of Chapter 01. Explicitly highlighting which methods adopted respond to specific research questions is recommended as good practice in a mixed methods research design by methodological literature (Archibald 2016; Flick, 2017 and Heyvaert *et al.,* 2013).

Table 3-2 Thesis structure mapped to research questions

Chapter	Title	Methodology	RQ1	RQ2	RQ3
Chapter 02	Literature Review	Lit Review	X	X	
Chapter 04	Content Analysis of public discourse	Qualitative	X	X	
Chapter 05	Survey	Quantitative and Qualitative	X	X	
Chapter 06	Semi-structured Interviews	Qualitative		X	X
Chapter 07	Building Population study	Quantitative		X	X
Chapter 08	Concluding Discussion	Synthesis of findings from Ch2, Ch4, Ch5, Ch6, and Ch7 in Discussion to produce new overall findings	X	X	X

The literature review, in Chapter 02, has been included in table 3-2 because while not a data-gathering chapter, results from this section are integral to the research design and specific methods adopted in this thesis. The gaps in literature and limitations of studies in the research field specified at the end of Chapter 02 are drivers for the methods chosen and their sequencing in the research design of this thesis.

The research objectives A-D above were devised to answer the research questions. However, early in the research process, it became clear that an inductive approach was required. Inductive research is broadly defined as are those approaches through which researchers attempt to generate theory from data (Eisenhardt *et al.*, 2016). Initial research identified that vacancy was regarded as a critical factor in the public debate to encourage adaptive reuse to mitigate office building vacancy. It also became apparent that little is known or understood about causes of vacancy in office buildings. The research implications for the research from the gap in knowledge about office building vacancy, and the emphasis on vacancy in public debate, are explained in Chapter 1, section 1.6 Development of research design. The difficulties uncovered during the research design development necessitated a critical re-evaluation of how to answer the research questions. The focus on vacancy which will be presented later in Chapter 07 was generated by the inductive approach adopted by this study and added objective D to answer research questions RQ2 and RQ3.

The inductive process and resulting research design, represented in figure 3.1 below, further explains the connections between methods used in this thesis and can also be used to convey a sense of the research story. Methodological literature in the field of mixed-methods research support this approach, highlighting the particular need for coherence in the research process when adopting this methodology because of the heightened danger that studies will present a confusing menu of apparently unconnected different data-gathering types (Heyvaert *et al.* 2013; Bergman, 2011). The sections titled 3.2.1 Quanlitative Methods and 3.2.2 Quantative Methods below, explain why particular methods were chosen and the inductive, but logical, reasons underpinning their order of implementation in the research process. Figure 3.1 supports this explanation and used to read in conjunction with sections 3.2.1 and 3.2.2.

From the initial reconnaissance of literature by the researcher, it appeared that building regulation was a likely barrier to adaptive reuse of non-heritage office buildings in Adelaide (Chapter 01) and this assumption underpins the formulation of the research questions. The literature review in Chapter 02 indicated that building regulation was represented in much, although not all, literature surveyed as a barrier to adaptive re-use. Limitations in the methods used however and, in some cases, a lack of accompanying critical analysis introduced an element of doubt about this representation. In addition, a minority of studies surveyed contradicted this view, projecting a neutral or positive framing of building regulation when discussing obsolescence mitigation strategies such as adaptive reuse or adaption (Živković et al. 2016; Elliott et al. 2015; Leadbetter 2013; Häkkinen & Belloni (2011); and Wilkinson & Reed (2011).

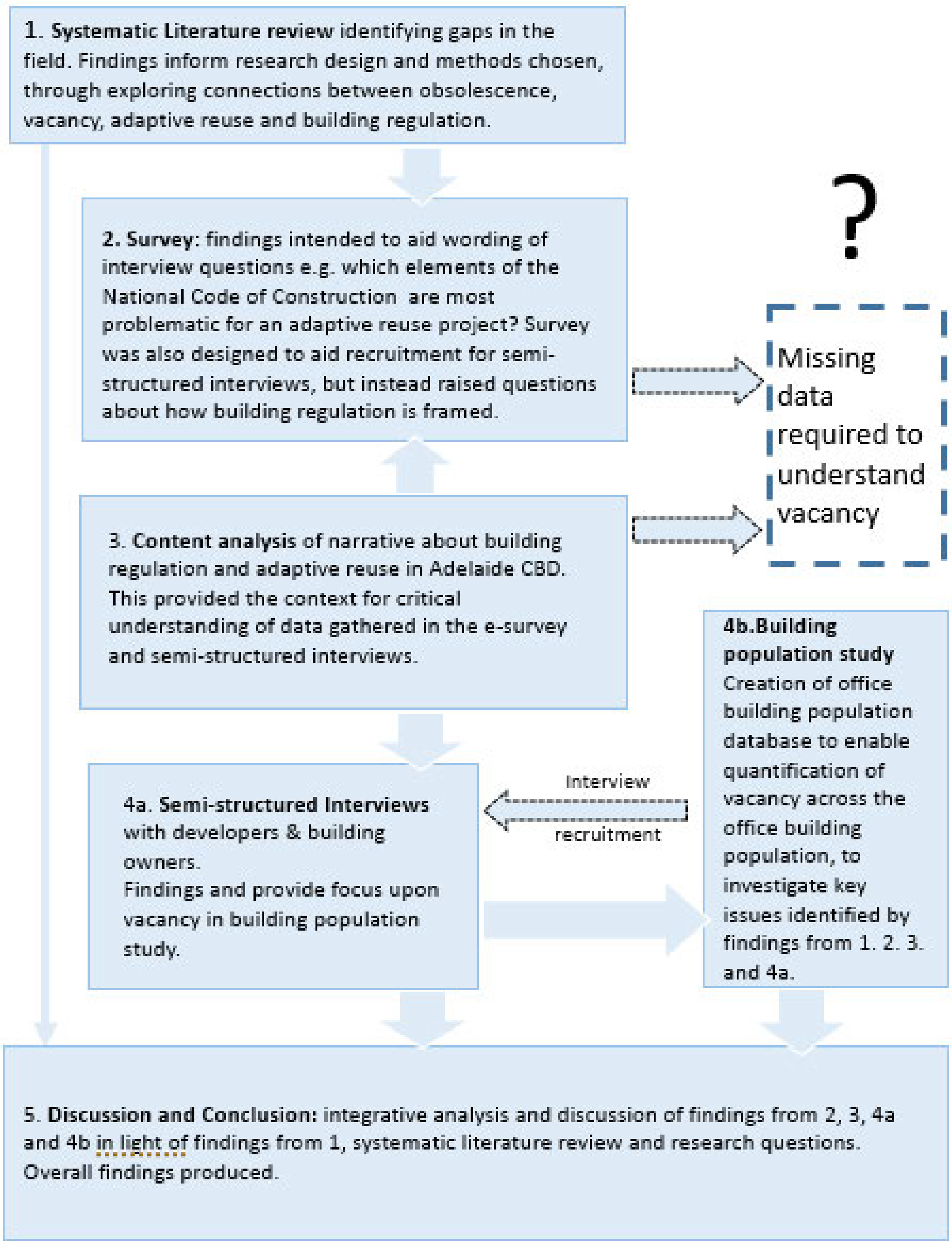


Figure 3.1 The inductive process and resulting research design

Methods adopted in the research design inductively investigated the research questions in light of this growing critical awareness that building regulation might not be a barrier to adaptive reuse. This important feature of the research design is described in figure 3.1 as 'missing data' and was a driver for the building population study detailed in chapter 07. In terms of sampling, research, therefore, adopted "theoretical sampling… moulded by the ongoing process of data collection and theory in evolution." (Leung, 2015, p. 326). The progress and sequence of this inquiry are important to describe because it explains the inductive decision process used to progress the research, including the choice and sequencing of individual methods used in the study. The need to address the missing vacancy data fits with Leung's (2015) characterisation of how new insights emerge from theoretical sampling in the inductive research process.

The researcher was determined to move the research beyond replication of methods used in previous studies which exclusively report stakeholder opinion. Alongside the quantitative vacancy analysis, other types of qualitative data were included in the research design, for instance, analysis of the public debate in news articles. The research design intentionally facilitates the gathering of different kinds of data, qualitative and quantitative, to examine how the adaptive reuse predicament is framed critically and the evidence to support the framing.

3.2.1 Qualitative methods employed

Content analysis of public discourse, a survey, and semi-structured interviews constituted the qualitative methods used in this study and will be presented, respectively, in Chapter 04, Chapter 05 and Chapter 06. To answer the research questions, appropriate methods were implemented. A combination of these methods was found necessary because each method complimented the other methods to provide a full understanding of the issues impacting adaptive reuse uptake to address vacancy and the role of building regulation in decision making. Further detail of how each method and corresponding chapter contributes to the research design of this study is provided next.

Chapter 04 presents the content analysis of the public discourse surrounding adaptive reuse of Adelaide CBD office buildings, particularly focusing on building regulation as a barrier. Findings from this method provide a beneficial social and cultural context for interpreting data gathered from the survey (Chapter 05) and the interviews (Chapter 06).

In Chapter 05, reports on a survey, which is a productive, although not problem-free, method for data-gathering across an expansive geographic area such as Australia. Survey Monkey software (http://www.surveymonkey.com) offers a convenient and accessible platform for designing questions, and the e-format ensures convenience for participants – a positive of this method sub-type noted by literature (McPeake, Bateson, & O'Neill, 2014). Survey design is, however, a highly skilled task and limitation in the question design limited the opportunity to use inferential statistics (see Limitations in Chapter 05).

Chapter 06 details analysis of data gathered from semi-structured interviews which are chosen as the best method to explore the perspectives of building owners and developers about building regulation as a potential barrier to adaptive reuse. A strength of interviews is that they offer an effective way to produce in-depth knowledge about social practices through “understanding the world from the subject’s point of view” (Brinkmann & Kvale, 2015:3). The majority of these studies, captured in the literature review, specifically adopted a semi-structured interview format (Gosden, 2017; Olivedese *et al.*, 2017; Dyson et al., 2016; Misirlisoy & Gunce, 2016; Bruce *et al.,* 2015; and Elliott et al., 2015; Bullen & Love, 2011; and Häkkinen & Belloni, 2011). The prevalence of the interview format in literature exploring building regulation in the context of adaptive reuse suggests that this method is highly appropriate for this study.

3.2.2 Quantitative method employed

A quantitative method was used in this study to examine office building vacancy in connection to office building obsolescence and adaptive reuse potential. In light of available research literature, Chapter 07 details a method developed in this thesis to examine office building vacancy and is highly original if not unique. Indeed the method, referred to as the Vacancy Visual Analytic Method (VVAM), enables visual representations of vacancy data to evaluate adaptive reuse as a strategy to address vacancy. VVAM uniquely quantifies greyspace, a specific form of vacancy, which has not previously been achieved (Muldoon-Smith, 2016). This new, differentiated, understanding of office building vacancy and specifically of greyspace, extends current knowledge in this field of research, an outcome commonly regarded as an indicator of originality and contribution in a research study (Clarke & Lunt, 2014, p.810). VVAM constructs and analyses a building population, providing unique 'extra knowledge' which sheds critical light on qualitative data gathered in Chapter 04, Chapter 05 and Chapter 06. The analysis procedure is detailed in the method section located in Chapter 07. The analyses of chapter 07 are represented in appendix 7C and 7D.

3.2.3 Triangulation in this study

One advantage of a mixed methods research design adopted in this study was that it enabled the opportunity to critically interrogate qualitative data. Triangulation can be concisely described as "Observation of a research issue from a minimum of two points" (Archibald, 2016, p.230). Literature discussing triangulation points to a frequent association with mixed methods research design and its use as a technique used to enhance the quality of research findings, increasing confidence that findings reached are unlikely to be the product of bias (Archibald, 2016; Maxwell, 2016).

Constructing a research design which was sufficiently robust to answer RQs in this thesis was a major challenge, precisely how this study should avoid gathering data which uncritically confirmed stakeholder perceptions that building regulation was a barrier to adaptive reuse such as those reported in literature (Aigwi et al. 2018; Gosden, 2017; Olivedese *et al.*; 2017; Dyson et al. 2016; Misirlisoy & Gunce 2016; Bruce *et al.* 2015; and Elliott et al. 2015; Bullen & Love 2011 and; Häkkinen & Belloni 2011).

Methodological literature recommends using a menu of methods that enable triangulation as a strategy to help avoid problems due to small sample size in qualitative research and to enhance the overall quality of studies, reducing potential bias in findings (Bergman, 2010). Indeed enabling greater triangulation in research was an early driver for the development of mixed-methods as a distinct methodology (Maxwell, 2016; Campbell and Fiske, 1959). In a useful discussion of triangulation for small-*n* social science research, Leuffen *et al.* (2012) highlight the benefit of using different qualitative and quantitative data sources commenting: "Measures derived from triangulating different sources are usually expected to have a lower risk of both unsystematic and systematic measurement error, because potentially incorrectly measured or biased information receives relatively less weight in the final evaluation." (p.42). Triangulation is, however, a concept which means different things within different methodological traditions, with emphasis on its use for confirmation in quantitative research and, alternatively to address a desire for completeness and cohesiveness in qualitative research (Archibald, 2016, Bergman, 2010). Both of these goals aim, in a general sense, to improve the quality of research findings produced but they do so from different, although not necessarily, mutually exclusive perspectives.

In light of these recommendations triangulating qualitative data-gathering chapters through the development of a quantitative method was therefore adopted as a conscious strategy by the researcher early in the research process of this study and became more critical as the potential limitations of qualitative methods became more apparent.

Practically, the research design adopted by this study and which involves gathering qualitative and also quantitative data, also raises the important question of "what strategy should researchers follow when they triangulate data from different sources and different data types" (Lueffen *et al.,* 2013). In analysing this challenge Leuffen *et al.* (2013) highlight that in general, collecting more information and using all of this information, weighted by the quality of the source typically leads to better measurement results" but add, "However this only holds under the assumption that the sources are not systematically biased" (p. 49). The research design of this thesis is mindful of these observations and responds by gathering a range of data (qualitative and quantitative) from a range of sources to minimise the risk of systematic bias. The Limitations section 8.5, acknowledges that it is still possible, but unlikely, that systematic bias occurred.

In the research design of this thesis, different methods are used to achieve triangulation and use "complementary information or synthesising divergent views to overcome strengths, weaknesses, and associated biases of a particular approach" (Archibald, 2016, p. 230). The use of a range of research methods also intends to offer an understanding of the RQ which is more comprehensive and complete that currently available in the literature. Flick (2017) is critical of the use of triangulation in many mixed methods research studies and suggests that triangulation should be used “as a source of extra knowledge about the issue in question and not just for confirming what is already known from the first approach (convergence of findings)” (p. 53). The research design of this thesis acknowledges Flick’s (2017) criticism and is intended to contribute new knowledge to the gaps in research identified at the end of Chapter 02 Literature Review, in addition to combining methods for triangulation purposes. The quantitative method in Chapter 07 intends explicitly to provide this ‘extra knowledge’ which sheds critical light on qualitative data gathered in Chapter 04, Chapter 05 and Chapter 06. Findings from Chapter 07 are also designed to interrogate the research questions at a deeper level through this quantitative investigation of office building vacancy and its relation to adaptive reuse, including potential barriers arising from building regulation. The building population study described in Chapter 07 emerged from this desire to ensure quality in the research study as a whole. The addition of a quantitative element to research design and in order to interrogate qualitative data means that this study has a research design which is clearly mixed methods, as opposed to being to a multi-method qualitative study: a distinction suggested as important to recognise for conceptual clarity by methodological literature (Maxwell, 2016).

While triangulation is used to corroborate conclusions drawn from the range of methods adopted, as discussed above, establishing the validity of mixed method designs is recognised as problematic (Newman *et al.,* 2013). Research to establish a consensus of ‘validity’ across qualitative and quantitative methods is still in its infancy (Brown *et al.,* 2017; Onwuegbuzie & Johnson, 2006). For clarity, this mixed-methods study adopts the term ‘legitimisation’ rather than ‘validity’ to avoid confusion in mixed-method research between how different research methodologies tend to treat and describe issues of validity (Onwuegbuzie *et al.,* 2011).

The research design considers two types of legitimisation and views them as continuous, iterative, interactive, and dynamic process rather than a specific stage of the research process (Onwuegbuzie *et al.*, 2011:1253). One type of legitimisation considered can be described as “Weakness minimisation legitimation” (Onwuegbuzie *et al.,* 2006:58) whereby potential bias in stakeholders' responses are minimised by combining content analysis of news articles to understand how the adaptive reuse predicament is framed in public debate. Potential limitations in the sample size for analysis of data gathered by semi-structured interviews were minimised by an exploration of existing buildings at a city-wide scale. The second type of legitimisation is 'conversion' (Onwuegbuzie *et al.*, 2011:1262). This is best described as exercising caution when inferences emerge from the data so as not to 'over-weigh' or 'under-weigh' the themes or findings deduced.

3.3 Ethics Approval

Research in this study was approved by the Human Research Ethics Committee (HREC) of Adelaide University (project: H-2016-257) on 30th November 2016. Documents submitted to the Human Research Ethics Committee (HREC), at the University of Adelaide, are included in Appendix 3-A Ethical approval which contains the ethics approval notification. Appendix 3-B contains the media package to aid third party recruitment for the survey, including: a press release produced by the information sheet for recruitment for the survey; and a Letter of Invitation sent out by Adelaide City Council to recruit participants for semi-structured interviews. Collectively designed to ensure the informed consent of participants and minimising the risks of participation in research.

It is worth noting that Adelaide City Council (ACC) provided the secondary dataset used to develop the building population method detailed in Chapter 07. Unexpectedly this contained some data which identified occupants by their trading names or in some cases personal family names. Work was undertaken by the researcher to anonymise this data when constructing the new database used to analyse data for the building population study, removing any personal data. There are ethical considerations in repurposing data collected by others (NHMRC, 2018; Smith & Smith, 2008). The researcher entered into a Confidentiality Agreement with ACC, specifying that the researcher would not share personal data contained within the original dataset with any other party, in writing or verbally. This agreement also stipulates all names and identifying locations must be removed prior to publication. In addition, Adelaide City Council acted as third-party recruiter for semi-structured interviews. A copy of the recruitment letter is contained in appendix 3-B.

Third-party professional organisations were used to recruit participants for the survey and included, for instance, Royal Institution of Charted Surveyors (RICS) and the (AIA) Architects Institute of Australia, facilitated recruitment for the survey to encourage participation by those involved in the adaptive re-use process. The use of third-party recruitment is recommended by literature to decrease the risk of ethical problems including potential coercion (Gyure, *et al.* 2014). To assist third party professional organisations a media package was produced consisting of an electronic link to a short video description of the research and the electronic questionnaire weblink to the consent page of the survey. This digital package was produced by the researcher in conjunction with the University of Adelaide's Media and Communications Department. The digital format was intended to ensure that potential participants could easily access information necessary for informed consent and less likely to be lost in the process of recruitment by third parties.

Chapter 4: Analysis of public debate

> "Mr Gannon said '…we need to solve our adaptive reuse predicament. That means we need to start bulldozing development and building code barriers preventing the transition from ageing commercial buildings to prime multi-residential stock' " (Evans, 2015 Aug. 18).

4.1 Organisation of chapter

This chapter analyses electronic (online) news articles published between 2008-2010 and 2014-2018 which refer to office buildings and adaptive reuse. Content analysis is used by Philo (2017) to examine the public debate contained in news articles during periods of high and low office vacancy. Figures for aggregated office building vacancy rates which appear in the news articles are charted against arguments presented in news articles in a timeline. The title of this thesis, *The Adaptive Reuse Predicament*, arises from data presented in this chapter, which charts the circumstances which give rise to the proposal that adaptive reuse is a solution to the perception of high office vacancy as problematic, with building regulation framed as a barrier to this solution. Background to the public debate and an explanation of the method used is given in section 4.3, before presenting analysis. The findings of this chapter details how the adaptive reuse predicament is framed in public debate.

4.2 Background to the public debate

The idea that adaptive reuse is an important strategy to mitigate office building vacancy in Adelaide CBD and trigger urban regeneration has become an established notion in local and state government in South Australia. For instance, State Planning Policy 3 (SPP3) introduced in 2018, is devoted to adaptive reuse (GovSA, July 2018). The SPP3 highlights adaptive reuse as an important strategy for providing "renewed vitality to any buildings that may be underused, abandoned, vacant, dilapidated, or functionally obsolete" and adds that, "Empty offices, warehouses and former institutions, can contribute to and reinvigorate local economies and promote innovation in design" (p.26). In making this suggestion, SPP3 calls on widely publicised models of urban revitalisation present in Australia, Canada and the UK.

In the 1990s Melbourne developed an influential, successful policy, titled Postcode 3000, which was designed to reuse obsolete existing office buildings for urban regeneration and residential accommodation (Baird, 1994; Wilkinson, 2018). A lack of vitality in Melbourne CBD outside of core office hours was identified as a problem (McNeill, 2011). Attracting dwellers back into the city through adaptive reuse of underutilised office buildings was developed into a key urban policy by the city council governing Melbourne's core business district (Wilkinson, 2018). Internationally other cities, such as Manchester (UK) and Toronto (Canada), were revitalising urban areas using adaptive reuse to generate new residential development at around the same time (Remøy & van der Voordt, 2014; Madgin, 2010). The idea of a shrinking city stems from US urban regeneration policy in the period 1930-1960s, where the presence of obsolescence due to de-industrialisation was accompanied by a decline in tax revenues (Audirac, 2018). The origins of creating city living, however, can be traced back as a reaction to the excesses single-zoned culturally sterile business districts, particularly those produced in the 1980s during major redevelopments of post-industrial brownfield sites seen internationally along waterfronts (Saniga, 2012:255-265).

Public debate about vacancy in Adelaide CBD has suggested that empty office buildings can readily convert into residential accommodation (Washington and Siebert, 2016, March 17). "Families are moving into the CBD" a newspaper article, published in 2012 was the first that linked adaptive reuse to office buildings and conversion to residential for Adelaide CBD building stocks, drawing inspiration from international examples of residential conversions in cities such as Manchester and Toronto. (Thistleton, 2012 Nov. 02). Public debate in Adelaide about high levels of office building vacancy has connected adaptive reuse and building regulation (Evans, 18 Aug. 2015). Commentary has proposed adaptive reuse as solution to high rates of office building vacancy; however, narratives position building regulation as a critical obstacle to this solution (Gannon, 2017, April 07).

4.3 Methods

Content analysis was chosen to analyse news articles published online between 2008-2010 and 2014-2018, and which refer to office buildings and adaptive reuse. Content analysis is used to 'describe the content of a document by examining who says what to whom and with what effect' (Vaismoradi *et al* 2013:401). A distinctive hallmark of content analysis is its consideration of the power-related social and authoritative content of written documents, and the potential power or effect of written documents on the intended audience, such as the institutional positions of the writer or source. This hallmark distinguishes it from and other analytical methods described as qualitatitive (Vaismoradi *et al* 2013). For this reason content analysis has an affinity with analysis of newspaper texts and other media texts available in the public domain, seeking to drawn out how they use the persuasive features of language to position readers into particular views about social or economic issues in the public domain (Philo, 2017). One distinctive strength of content alalysis is its capability to report results in terms of chronology and story (Elo and Kyngäs, 2008:110). Given that research aimed to examine how news articles mentioning high commercial building vacancy in Adelaide CBD over time this capability of content analysis made it highly appropriate. A product of this story-making capacity of this method is given later in this chapter in Figure 4.1 which features a timeline of public debate, policy action and vacancy rates.

4.3.1 Sampling method

A preliminary examination by the researcher potential news articles mentioning high commercial building vacancy in Adelaide CBD established that these stories first appeared in 2008. It was, therefore, logical to examine news articles available from 2008 onwards. Initial analysis of data confirmed that critical developments in the public narrative about high vacancy in Adelaide, adaptive reuse and building regulation occurred over the period 2008-2018. A news article by Thistleton (2012), for instance, was the first to highlight adaptive reuse of obsolescent office buildings and their conversion to residential use in Adelaide CBD (Thistleton, 2012 Nov. 02). Sampling ended in 2018 for purely pragmatic reasons and to enable this Chapter to be composed. Figure 4.1 timeline, which is given shortly in this Chapter, details critical developments in the public narrative about how office building vacancy, adaptive reuse and building regulation are details critical developments in the public narratives about vacancy in Adelaide, adaptive reuse, and building regulation.

The *Factiva* media database was used to search for news articles discussing office building vacancy in Adelaide for the periods January 2008 to September 2018. *Factiva* is described by its associated branded search engine ProQuest, as "one of the largest, most global digital business aggregators and archives in the world" (https://www.proquest.com/products-services/factiva.html) and has an established international reputation for coverage of media stories appearing in Newspapers, Magazines, Trade Journals, Blogs, Podcasts, and Websites (Brynko, 2012).

Keywords used in the *Factiva* search included: office building; vacancy; Adelaide; and CBD. The search of media articles was restricted to enable focus on the research questions. The following Australian publications were included: *The Advertiser* (South Australia); *The Australian* (Australia); and *The Australian Financial Review* (Australia). In addition to searches using *Factiva*, a keyword search was also performed using *Google News* for web-based newspapers not included in the *Factiva* database: SA online newspaper *InDaily* (South Australia, est. 2010 - present); ABC News (Australia); and *The Advertiser Online* (South Australia), whose content is available through paid subscription only. A manual check was done of all search results to exclude any irrelevant articles, such as those relating to CBDs beyond SA but which contained the keywords used in the search (Adelaide Street office developments in Perth CBD, Western Australia). These additional searches are recommended as a prudent quality check by Driedger and Weimer (2015) in their comparative study of the retrieval reliability of *Factiva* compared with other similar media databases for research purposes. Keyword settings in *Factiva* and additional searches were undertaken with the assistance of a specialist academic librarian to help ensure they were optimal.

Despite these efforts to focus the search via keywords and to restrict search results, it quickly became apparent, due to the high number of results, that further restrictions were pragmatically required. An unmanageable volume of data is acknowledged by methodological literature as a limitation of qualitative research (Silverman, 2019; Lune & Berg, 2016). In response to this problem, Silverman (2019) recommends an emphasis on the analysis of data and pragmatic restriction of the amount of qualitative data gathered by research studies. As explained below this strategy was used by the researcher and by the vacancy rate was used to help limit the search period, thus reducing the sheer number of news articles captured.

To help limit the sheer amount of news articles requiring analysis, the researcher examined the PCA vacancy rate 2008-2018 to ascertain whether any possible peaks and troughs in office building vacancy rates could be used to:

1. Limit the search period required: gather data only during time-defined high and low periods of office building vacancy – which also enables samples to be compared and contrasted to identify trends and patterns in data;
2. Provide a context for the timing of news stories and enable an analysis of the timing and content of these stories in light of PCA office building vacancy rates, e.g. did news articles promoting adaptive reuse coincide with periods of high office building vacancy?

Following Silverman (2019) recommendations to carefully manage the volume of qualitative data available, two sample periods were determined from the vacancy rate data published by the PCA in their annual office market reports (PCA, July 2018). These two samples are referred to as 'A' and 'B' in this chapter. Sample A covers news articles published during the time period 2008-2010, and sample B is for the period 2014-2018. These periods were selected after a scrutiny of PCA reports covering 2008-2018, and which detail the 'peaks' and 'troughs' in the office building vacancy markets.

The time period for Sample A (2008-2010) was selected on the basis that during this time, the vacancy rate was deemed by the PCA to be historically low, the lowest vacancy rate since the PCA started collecting data in 1993 (PCA, July 2018). January 2009, for instance, had the lowest office building vacancy rate in Adelaide CBD since the 1990s and was under 4% (PCA, July 2018:29). This period of low office building vacancy lasted until 2010.

The time period for Sample B (2014-2018), in contrast, was selected on the basis of office building vacancy. This period was described as historically high by the PCA and since vacancy data collection started in 1993 (PCA, July 2018). In January 2017, Adelaide CBD was reported by the PCA to have historically high levels of office building vacancy at 16.4% (PCA, Jan 2017). A historical average for office building vacancy is at 12.5% (PCA, July 2018:29). This period is therefore essential to understanding the public discourse surrounding the office building vacancy in Adelaide.

In light of this reconnaissance, the researcher decided to restrict data gathering to periods A and B. It is acknowledged that excluding systematic capture of news articles published January 2010- December 2013 is a potential limitation of research presented in this chapter and discussed further in the Limitations section later in this chapter. Table 4.1 below details the 114 news articles captured for analysis by the resulting search of A and B:

Table 4-1 Sample of new articles included for analysis

Period	Search	No of articles	Total
A Jan. 2008 – Jan. 2010	Factiva	29	39
	Google News	10	
B Jan. 2014 – Sept. 2018	Factiva	53	76
	Google News	23	
			Total: 115

News stories from A are detailed in appendix 4-A, and news stories from B are specified in appendix 4-B.

4.3.2 Data analysis and coding process

Content analysis was undertaken of electronic news articles published in the periods 2008-2010 and 2014- 2018, all of which are available online: henceforth these are known simply as news articles. It is important to recognise that the data sources analysed in this chapter are texts, and to acknowledge that documentary analysis, using any method, is an established field of scholarship and research concerning texts (Brennen, 2017; Atkinson and Coffey, 2004). Qualitative studies using publicly available documents as data and which refer to regulation, have disclosed that omission of discussion about specific issues, can be important for framing perceived policy problems (Riley *et al.* 2018).

The following coding procedure is recommended by Philo (2017) for applying content analysis to news stories and was adopted by research:

1. A detailed analysis examines news content: how (where and when) do key themes appear and how are these used to structure stories.
2. The news text is broken down into separate references (phrases or sentences) which relate to the range of themes covered in the story (and found in step 1).
3. A numerical account of these is also given (how often specific phrases or units of language appear), which allows some judgements to be made about the dominance of specific themes.
4. A hierarchy of themes is produced from step 3.
5. Other methods (e.g. interviews) are used to identify patterns of understanding and belief.
6. Techniques used in the media are used to examine how stories work to compel audience attention, to entertain and create lasting images as well as to how they might produce more negative responses from viewers (e.g. the symbolic features).

Steps 1-4 were applied to data; steps 5 and 6 are not applicable to the news articles in this chapter. Chapter 06 addresses step 5 by the overall design of research, and which provides what Philo (2017) refers to as other methods – for instance, Chapter 06 semi-structured interviews with stakeholder. Step 06 whilst interesting, was not applied because this exploring the detail of media practices in not mentioned in the research questions and is therefore out of scope of this study. It could also be argued that Step 6, is appropriate for a thesis in the discipline of Media Studies but not for this thesis.

Once data was captured, steps 1-4 as recommended by Philo (2017) were applied to news stories. Steps 1-3 involved the researcher reading, re-reading each text, categorising and coding key themes present in each news story followed by the marshalling and review of sentences or parts of sentences supporting themes. As recommended by methodological literature the process in steps 1-4 continued until theoretical saturation was reached - the point where no new concepts emerge from successive reviewing and coding. (Saunders *et al.,* 2018; Braun & Clarke, 2006).

Vacancy rates cited in the articles are included in the analysis. The source of vacancy rates in public debate tended to come from *The Office Market Report*, which is published online bi-annually online (January and July) by the PCA. The reports includes aggregated office building vacancy data across office-grade categories and property market sectors (PCA, July 2018; Jan 2018; July 2017; Jan 2017). Aggregated vacancy rates for Adelaide CBD along with other state capitals are published in this report and, from initial reconnaissance by the researcher, suggested that news stories about the office building market appear to rely exclusively on vacancy data provided in Office Market Report. (Evans, 2016, Aug. 16; Economou, 2014, June 24; Emmerson, 2008, Feb. 07). Logically, therefore, this chapter refers to PCA data released in *Office Market Reports* on the PCS website. The Timeline discussed below in Findings was the aggregative product of this data analysis process together with the findings given in the rest of this chapter.

No studies captured by the literature review in Chapter 02 used content analysis to analyse documents which present building regulation as a barrier to adaptive reuse – see Table 2.2 for a breakdown of methods employed. Indeed, none of the studies captured by the review gathered and analysed publicly available documents which refer to this notion. Concerning this absence, Atkinson and Coffey (2004) suggest that qualitative research studies tend to favour the gathering of primary data via for example interviews, and often incorrectly regard written texts as a less important form of data (p. 80). This observation supports the use of the research method detailed above. In contrast, written documents can be challenging for the researcher to interpret due to ambiguous language or the presence of complex social or political agendas and as is acknowledged by Philo (2017). The Limitations section at the end of this chapter discusses these potential problems with content analysis of news stories.

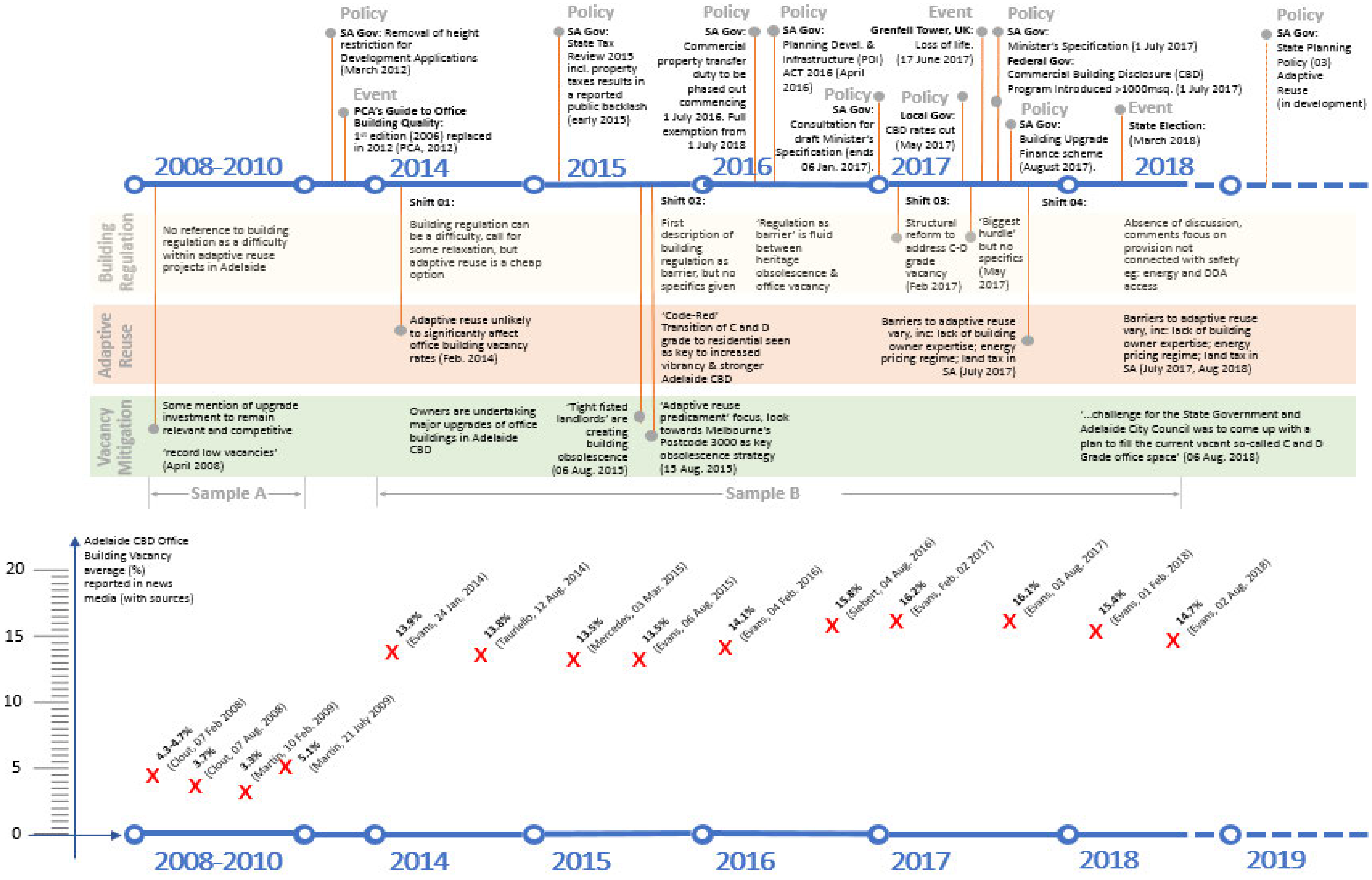


Figure 4.1 Timeline of public debate, policy action and vacancy rates

4.4 Results

Analysis of news stories contained in A and B enabled the production of a timeline and which details pivotal news stories, key events and external factors shaping the public debate narrative about high-office building vacancy in Adelaide CBD, adaptive reuse and building regulation. This timeline is given above in figure 4.1 and details critical developments in the public narrative 2008 to 2010 and 2014-2018 which pertain to low and high office building vacancy rates in Adelaide, adaptive reuse and building regulation.

4.4.1 Narratives over time: the problem of secondary office buildings

Analysis of A and B confirmed that news stories about the office building market in Adelaide CBD appear to rely exclusively on aggregated vacancy data provided in *Office Market Report* and which originates in the commercial vacancy database kept and maintained by PCA.

At first sight there appear to be multiple published sources of commercial property data available, for Australian CBDs and which detail market trends including office building vacancies, office building supply and removal of properties from the market. These reports and commercial industry briefings are produced and published online by various commercial stakeholders, real estate service providers and property investor consultants such as Savills, Knight Frank, Jones Lang LaSalle (JLL), and Colliers (Knight Frank, March 2018; Colliers, 2018; Savills, 2018; JLL, 2018). A closer inspection reveals that these reports, however, all reference data and analysis published by the PCA on their website when discussing the Adelaide CBD office market.

Finding ch4-1: Aggregated vacancy figures published in Office Market Reports for Adelaide CBD reports are a key influence on industry stakeholder briefings, government pronouncements and the broader public discourse surrounding office market vacancies in Adelaide.

When issues of transparency and potential bias are considered, more profound questions arise from finding ch4-1 above for this research and other similar studies in the field which relies upon vacancy data published by industry groups such as PCA office building vacancy data.

Investigations by the researcher concluded that Savills, Knight Frank, Jones Lang LaSalle, and Colliers do not independently gather data about vacancy in the office building market in Adelaide or other state capitals in Australia, which explains their reliance upon PCA data. Further investigations by the researcher in 2016-17 revealed that Adelaide City Council and the SA State Government (DPTI) also do not possess an independent database relating to office building vacancies in Adelaide CBD. Indeed, this surprising absence led to the researcher developing the office building population database, discussed in Chapter 07. The database which underpins PCA data is not available on their website, and as is highlighted in Chapter 07, this data was not supplied to the researcher, despite assurances that the data would be shared by the PCA with the researcher. Without access to this database, and with no accessible alternatives, it is impossible to interrogate the underpinning data to verify it independently – this issue is discussed further in Chapter 07.

Preparation of the data sample for this chapter, therefore, discloses the following finding and which relates to future, non-commercial, research on office building vacancy:

Finding ch4-2: Office building vacancy data collected for non-commercial purposes and independent of the PCA would be beneficial for research in this field and use in policy development.

Findings in this chapter directly arise from what the timeline *per se* discloses about the timing and content of news stories concerning public discussion of office vacancy, adaptive reuse and building regulation. These findings emerged during the construction of the timeline, particularly the difference in how secondary grade office buildings are discussed.

Finding ch4-3: Key shifts in news articles can be identified across A and B and which evolve the public presentation of office building vacancy. With direct relevance to RQ1,

building regulation was not framed as a barrier to adaptive reuse of vacant buildings, of any kind, by news stories before 2015.

Building regulation was first mentioned as a 'barrier' to adaptive reuse in an Adelaide context in newspaper articles during 2015 (Evans, 2015 August 18). Before this, news articles around adaptive reuse acknowledged building regulation could be challenging but did not deem building regulation as a barrier. For instance, a news article in early 2014 noted about building regulation that "It was not always easy to gain approval for a change of use, but conversions were cheaper than building from scratch" (Williams, 27 Feb. 2014). As noted in the literature review given in Chapter 02, several research studies published before 2015 and based in Australia reported the perception amongst stakeholders that building regulation was a barrier to adaptive reuse (Bruce *et al.,* 2015:150; Udawatta *et al.,* 2016:1; and Bullen & Love, 2011:41).

PCA vacancy rates published in the media are plotted on the timeline to understand office building vacancy rates and their possible relationship with the content of news articles (see Fig. 4 Timeline). This plotting disclosed the following:

Finding ch4-4: News articles published in the period from August 2015-June 2017 increasingly problematize the issue of high office building vacancy in Adelaide CBD. The language used in news article titles, for instance, reflects this trend. For example, 'Code red' (Evans, 2015, Aug. 18) and 'SA needs greater demand, not more taxes' (Gannon, D. 2017, April 07). This trend in B also corresponds to a period of historically high vacancy in Adelaide CBD.

One important feature of news articles contained in B and A is that those articles which negatively mention office building vacancy also tended to refer to offices by building grade: an association which warrants further explanation. As explained in Chapter 02 in Australia, the PCA provide a framework for assessing building quality in their publication, *A Guide to Office Building Quality* (PCA, 2012). This guidance categorises office buildings into five quality-related grades, which ranks office buildings as Premium, A, B, C, and D grades. Primary grade offices refer to Premium, A and B collectively; whereas secondary grade offices refer to C and D grades collectively (PCA, 2012). For simplicity, the remainder of this chapter the terms secondary grade and primary grade are preferred.

As their guide explains the PCA do not publicly classify office buildings and no public register of office buildings classified by quality grade exists (PCA, 2012:7). Policy documents present adaptive reuse as a potential solution for any buildings that may be underused, abandoned, vacant, dilapidated, or functionally obsolete' (GovSA, 2018 July:26). Considering reference made to building grade in news stories included in A and B was however fruitful in understanding how office building vacancy and adaptive reuse were connected.

Research discloses that in news articles included in A differ from news articles captured in B when considering the framing of building grades:

Finding ch4-5: When building vacancy rates are low for Adelaide CBD, using quotes of PCA vacancy figures, there is little or no reporting of secondary grade vacancy as a problem. The converse of this applies: when articles report high building vacancy, the discussion highlights secondary grade buildings as problematic in news stories.

Only 1 article (Emmerson, 2008 February 07) captured in A, explicitly mentions secondary grade, specifically D grade, office buildings. Finding ch4-5 can be interpreted in two different ways when it is understood that low vacancy implies high demand for office space and vice versa. Firstly, the finding could indicate that secondary grade buildings are not considered to have a vacancy problem when office space demand is high; or secondly, the finding could reveal that high secondary grade building vacancy rates may not be considered important enough to be the focus of news reporting during this period. A closer examination of content in news articles is discussed next to evaluate which interpretation is most plausible.

Table 4.2, given at the end of this section, presents the results of this examination and highlights news stories published over the period captured by in A are either neutral or positive about the overall office building market. This positivity is remarkable, given that the global financial crash (2007-2008) emerged during this period and had profound adverse economic effects on Australian commercial office markets. Discussion about problems within secondary building stock is noticeably absent in news articles published at this time (Emmerson, 07 Feb. 2008). Those few articles that did separate office buildings by grade in A, report secondary grade offices in a positive light and present vacant office buildings as an opportunity for landlords to gather increased rents by upgrading their properties to take advantage of a buoyant market (Emmerson, 2008 July 22; Clout, 2008 July 17). Asset repositioning of secondary office buildings, via their conversion of offices to education uses, is also reported in one news story captured by A (Emmerson, 2008 October 21). These insights offer support for the interpretation that secondary grade office buildings are not considered to have a vacancy problem when office space demand is high, and there is low vacancy. News stories appear to be merely reactive to market conditions at the time of publication.

In contrast, Table 4.3 given below at the end of this section, represents analysis of the content of news articles in B, and shows a noticeable shift in the tone employed in news stories and reveals a focus upon a high vacancy in secondary grade buildings, framing high vacancy as a problem for Adelaide's commercial propriety market and the wider economic vitality of the CBD. Henceforth in this thesis, this negative framing, and its logic, are described by the shorthand term 'office building vacancy problem' — Table 4.3 below compares content in news articles referring to primary and to secondary office building grades.

The language used in news articles discussing secondary grade buildings, is mainly negative, as also shown in Table 4.3. Negative terms used include: 'decrepit', 'rat house' and 'dilapidated' are used to describe secondary grade buildings. Office buildings are explicitly referenced in articles authored by Evans (2015 Aug. 11), Siebert (2017 May 31; 2017 Feb. 02), Gannon (2017 April 07), Hanife (2017 Aug. 03), and Evans (2018 Feb. 02; 2018 Feb 01). One article (Evans, 01 Feb. 2018) quantifies vacancy across Adelaide CBD, using the scale of Adelaide Oval playing field to explain vacancy but the article then goes on to discuss only secondary grades, with no explicit reference to primary grades at all. This analysis discloses the following insight:

Finding ch4-6: Secondary office building stock was framed as an urgent problem by news stories contained in B: 'Ageing and decrepit building stock (is) problematic for owners, tenants, all levels of government and the broader community.' (Evans, 02 Aug. 2018).

There is only one article in B that uses positive language for Adelaide's older office building stocks (Gannon, 07 April 2017). The timing and context of this article are critical and disclose an essential revelation. The article frames itself as responding to calls for SA state government to introduce a vacant property tax and argues that older buildings "spell opportunity" (Gannon, 07 April 2017). This article suddenly reconstructs the otherwise negative secondary vacancy narrative as a positive message in the face of calls to increase taxation. Aside from this revealing exception, the language used to describe office building vacancy in B is negatively weighted against secondary grade office buildings: this negativity is despite vacancy rates being reported as high for all office building grades (PCA, 2017, PCA, 2016). As highlighted by the Timeline given earlier adaptive reuse is highlighted in news articles as one possible obsolescence mitigation strategy which can be used to sole office building vacancy problem. Analysis of the frequency and type of obsolescence mitigation strategies, appearing in news articles, is revealing and is discussed next.

Table 4-2 Framing of secondary buildings when vacancy is reported as 'low'

News Article	Content discussing secondary grade office buildings
Emmerson (2008 Feb.07)	"When vacancy rates across different office building grades varied from the reported low average vacancy rate (2.6% to 3.9%), vacancy for D grade office buildings (7.9%) was reported as lower than Premium grade vacancy (12.9%)"
Clout (2008 April 08)	"Adelaide was in a solid position although commercial rents paused last year. Rents in December were between $153 sq m and $270 sq m for A-grade buildings and $120 sq m to $196 sq m for secondary stock" (p.63).
Emmerson (2008 July 22)	"About 5.5 per cent of Adelaide's secondary stock is vacant, compared with 3.5 per cent of prime stock. This is expected to place further pressure on owners of secondary stock to refurbish their assets to take advantage of rental growth" (p.42).
Emmerson (2008 Sept. 17)	"…demand from the resources, defence and education sectors was highlighting a lack of building stock, although the State Government remained `a major contender for space'"; "It is balancing the supply coming on line with the low vacancy, which is already putting upward pressure on (Adelaide's) primary and secondary stoc"' (p.23).
Emmerson (2008 Oct. 21)	"Much of the secondary stock is being taken up by the education sector" (p.40).

Table 4-3 Framing of secondary buildings when vacancy is reported as 'high'

News Article	Reference to vacancy in secondary buildings	Reference to vacancy in primary buildings
(Evans, 2018 Feb. 02)	"Ageing and decrepit building stock; problematic for owners, tenants, all levels of government and the broader community."	"green shoots across the prime grade stock; ticked all the boxes expected by tenants"
(Sutton, 2018 July 27	"Refurbishment of older buildings had been constricted unrealistically by red tape and building code impediments. This includes an untenanted, multi-storey building around the corner on Gawler Place that he considers to be the "biggest rat house in the city".	
(Evans, 2018 Feb. 01)	"This represents more than 10 Adelaide Oval playing surfaces; do not be misled by headline figures revealing a 0.7 per cent decrease (from 16.1 per cent) in the CBD vacancy rate, he said. Of the total vacant space, 35 per cent sits across C and D-grade office stock, though sublease vacancies — a good indicator of market health — show a healthy vacancy drop, meaning fewer tenants are leasing out part of their tenancies."	
(Hanifie, 2017 Aug. 03)	"40% per cent of office space currently vacant was in older buildings, of lesser standard than businesses wanted; toften compliance issues with older buildings, due to their energy use or lack of disabled access."	
(Evans & Gailberger, 2017 June 27)	"The biggest impact of [the Commercial Building Disclosure Program] will be on lower grade buildings tenanted by people with no focus on the quality of the building."	
(Siebert, 2017 May 31)	"…or those adapted from run-down former office space."	
(Gannon, 2017 April 07)	"47 per cent of buildings in the Adelaide CBD are more than 30 years old, with a combined 38 per cent vacancy in lower grade office buildings – that spells opportunity, not [vacant property] tax."	
(Siebert, 2017 Feb. 02)	"Increasing supply at the lower end of the market contributed to the vacancy problem."	"Increasing supply at the high end is a good thing"
(Evans, 2016 Aug. 27)	"Buildings are old stock in the CBD, many were built in the 1980s. The market is ready for a refurbishment."	
(Siebert, 2016 Aug. 04)	"There's a percentage of that C and D-grade stock that is…obsolete. C and D-grade [buildings are] just sitting there empty."	"B-grade city office buildings have emptied the fastest."
(Evans, 2016 July 19)	"…refurbishment activity as many owners attempt to reposition assets up the quality scale and away from the highly competitive secondary market."	
(Wills, 2016 March 18)	"sitting empty, dilapidated and under-utilised, we want to see these buildings come alive again."	
(Evans, 2015 Aug. 11)	"Adelaide has the highest percentage of C and D-grade space compared to other capital CBD office markets, which shows much higher vacancy than prime grade space; most [other] office markets see this stock removed, converted or demolished and new office/residential developments built."	
(Williams, 2014 Feb. 27)	"It [adaptive reuse] will get rid of some of that secondary stock, which is a good thing. "	

4.4.2 In the news: obsolescence mitigation strategies

As is discussed in Chapter 02 Literature Review, several mitigation options are available to building owners to address office building obsolescence. These strategies include change of use, conversion and within-class upgrades, such as upgrades for energy efficiency or end-of-trip facilities (Muldoon-Smith, 2016). A range of obsolescence mitigation strategies for office buildings do feature in articles in both samples, A and B, including adaptive reuse. In A when commercial building vacancy rates were reported as "record low" (PCA, 2012), eight articles discuss the need for existing building owners to take refurbishment action to avoid building obsolescence. In sample B the need for building owners to refurbish and upgrade office buildings was disclosed by 14 articles.

Other mitigation strategies suggested by articles include policy intervention to attract new commercial companies to Adelaide CBD and help increase the economic vibrancy. These policy-related suggestions include: reducing taxation and property stamp duty (Castello, 2018 Aug. 06; Gannon, 2017 April 07); upgrading infrastructure for commercial business, such as internet services (Evans, 2018 July 10; Siebert, 2017 Dec. 06); and asking state government to take up head tenancies to reduce vacancy levels (Richardson, 2018 Aug. 24; Siebert, 2017 Aug. 04). Alternative strategies to address office building vacancy mentioned are: increasing taxation of vacant property (Womersley, 2017 Mar. 31); reduce building regulation requirements (Evans, 2017b Feb 02; Evans 2015 Aug. 18); and reduce heritage and planning restrictions (Jervis-Bardy, 22 Feb. 2018a; Evans, 2017 July 04).

The focus on different strategies (refurbishment or adaptive reuse) to deal with building obsolescence varies between A and B. When the overall commercial building vacancy rate is considered this variance is revealing and suggests what the mention of adaptive reuse signifies in news articles.

In A, not a single article suggests using adaptive reuse as an obsolescence mitigation strategy to address vacancy in buildings located in the CBD. 8 articles discuss the need for existing building owners to undertake refurbishment or upgrade. As highlighted earlier, these news articles appeared during a time of historically low vacancy in commercial property in Adelaide (PCA, 2012).

In B, 25 articles suggest the use of adaptive reuse as an obsolescence mitigation strategy to address vacancy in buildings located in the CBD. Fourteen articles also recommended that building owners refurbish, and upgrade office and other buildings located in Adelaide CBD. News articles captured in B were published during a time of historically high vacancy in Adelaide CBD (PCA, 2012). This analysis of data points to an interesting finding:

Finding ch-4-7: Framing adaptive reuse as the solution to high-vacancy rates in commercial buildings is a stress symptom: mention of adaptive reuse in news articles surveyed market signifies that the commercial property market is under economic stress, a situation also accompanied in B by high vacancy in the building population and low demand for space.

Content in one article authored by Property Council of Australia's SA Executive Director, Daniel Gannon, develops this finding. In this text, Gannon (2017 April 07) argues "property owners need the right tax and policy environment to upgrade their stock and they require demand from growing businesses to fill their floor space" adding, "It's an economic equation, but one that has been overlooked" (Gannon, 2017 April 07). While "tax and policy environment" could include building regulation requirements, this article also highlights the critical role played by the market demand in addressing office building vacancy. Further to this, it could be suggested that building regulation does not provide technical barriers to investment in adaptive reuse but that stakeholders regard regulation as economically unfeasible given the low demand for office space referred to by Gannon (2017 April 07). Several other articles in B support this explanation emphasising low demand for office space in Adelaide per se and due to economic conditions. Condon (2015 Aug. 06), for instance, describes a two-speed economy as operating in Australian CBDs with sluggish growth and low demand outside of Melbourne and Sydney (Condon, 2015 Aug. 06). When considering RQ1 and RQ2, this emphasis on low demand produces the following:

Finding ch4-8: The content of articles in B discloses the explanation that building regulation does not provide technical barriers to investment in adaptive reuse but is simply regraded as economically unfeasible by building owners given the low demand for office space and high vacancy during the period covered by B.

Finding ch4-8 warrants further discussion in terms of the overall impression it provides for readers about adaptive reuse itself. While 25 news articles in B persistently urge that adaptive reuse is used to address the office building vacancy problem, there is no critical discussion in any of these articles about its suitability for Adelaide CBDs building stock. Articles present the reader with a simplistic, unproblematic, solution to the office building vacancy problem. As was highlighted in Chapter 02 studies into adaptive reuse have suggested that it is a high-intervention strategy when compared with, for instance, asset-repositioning (Greenhalgh & Muldoon-Smith, 2017). Interestingly, the call to reduce requirements for building regulation is only discussed in these 25 articles, within an adaptive reuse context not in discussions regarding existing building refurbishments and upgrades. This absence in content is factually important as both mitigation strategies (adaptive reuse and refurbishment) have the potential to trigger a requirement for compliance with building regulation requirements in line with the current performance standards of the NCC. Readers are, however, left unaware of this fact.

One article in A (Emmerson, 2008 Oct. 21) indicates that adaptive reuse of secondary office buildings is occurring as offices in the CBD are converted to education and training purposes. This article contradicts the idea that adaptive reuse of secondary grade office buildings, is not occurring in Adelaide. Any change-of-use would trigger a requirement to achieve NCC building regulation compliance. Emmerson (2008 Oct. 21) highlights that perhaps not all adaptive reuse experiences difficulties in achieving NCC compliance. Chapter 07 investigates and confirms this suggestion by scrutiny of public data about building upgrades in the CBD.

Three articles in A highlight the benefits for landlords to invest and upgrade their office buildings, emphasising that there are economic incentives within the market to do this (Lenaghan, 2009 May 14; Emmerson, 2008 July 22; Emmerson, 2008 Jan. 19). For instance, Emmerson (2008 July 22) comment: “Many are well-located, so it makes sense to upgrade them because tenants like the location” (Emmerson, 2008 July 22), adding “With the strong market, building owners are fighting for tenants and that would encourage owners to upgrade to make sure they remain competitive”. Narratives encouraging landlords to upgrade building stock could be viewed as evidence of a lack of investment in properties by building owners, especially given that articles contained in A occurred during a period of historically low vacancy and high demand. A moralistic article by Evans (2015, Aug. 06) describing “tight-fisted landlords” promotes this view and is a symptom of the increasing politicisation of the office building problem occurring in articles contained in A. This process, which relates to RQ1 and RQ2 is now explored.

4.4.3 Building regulation as a barrier in news articles

The narrative that building regulation is a barrier to adaptive reuse emerged in news articles from 2015 onwards (see Timeline in figure 4.1). It was only during this period that building regulation was framed as a problem. News articles in sample A contain no reference to building regulation. As was noted earlier in Finding 5, no reference is made to adaptive reuse either. Taking a broader perspective, five articles in sample A, referred to building upgrades, which can involve building regulation. No explicit reference was, however, made in these news articles to building regulation in discussions about upgrades and these articles can, therefore, be discounted in this discussion. Comparing A with B therefore discloses:

Finding Ch-4-9: Reference to building regulation as a problem occurs in news articles in B and during a period of high vacancy and low market demand for office space.

To develop this finding analysis of news articles, contained in B helps, reveals how building regulation came to be constructed as a barrier to adaptive reuse to solve the office building vacancy problem. The sequence in which this negative framing emerges is essential to addressing RQ 1 and 2 and in understanding findings contained in chapters 05, 06 and 07 in this thesis.

4.4.3.1 The Blame Game: from building owners to regulation

As highlighted by the timeline, the period 2015-2018 (B) contains a cluster of policy initiatives in South Australia and events which relate to taxation and also, importantly, building regulation. A State Tax Review was conducted in early 2015 by SA state government (SACROSS, 2017 May 01). Land tax concessions were considered to stimulate the Adelaide CBD commercial property market, revealing that commercial building markets were already a target for policy intervention. CBD office building vacancies in August 2015 (13.5%) had shown a slight reduction from vacancy rates published in July 2014 (13.8%) (PCA, 2015 Spring). Despite a lack of change in office building vacancy rates, between Jan and August 2015 (PCA, 2015 Spring), there is a change in narrative in August 2015 and which ascribes blame to office building owners for vacancy rates. The article, titled *Tight-fisted Landlords,* discloses that "…for those landlords not willing to spend up, stock obsolescence was becoming a major concern…The ageing office stock issue was also being monitored by the South Australian government. Planning Minister John Rau said this year that he would introduce "carrot and stick" measures [building regulation review] to encourage building owners to spend up" (Evans, 2015 Aug. 06).

The timing and motivation behind the sentiment blaming landlords for office building vacancy rates could be explained by media coverage of the state government's land tax reform proposal and a public backlash reported by Adelaide's newspaper, *The Advertiser* (SACROSS, 2017 May 01). This connection between policy by SA state government and between news articles can be expressed thus:

Finding ch4-10: News articles contained in B and policy initiatives which relate to building obsolescence and vacancy have a relationship: news articles respond to policy events but also, in several articles, seek to influence policy which addresses building obsolescence and vacancy.

4.4.3.2 The adaptive reuse predicament

An important article title, *Code red over city office space, published in 2015,* robustly connects adaptive reuse of non-heritage office buildings with barriers stemming from building regulation.

> "The South Australian executive director of the PCA, Daniel Gannon, said the Adelaide office market story was one of adaptive reuse. "The takeout message from this data is around adaptive reuse and removing barriers to reusing ageing

> commercial building stock," Mr Gannon said. "…we need to solve our adaptive reuse predicament". "That means we need to start bulldozing development and building code barriers preventing the transition from ageing commercial buildings to prime multi-residential stock. More residential options in the CBD also mean increased vibrancy and a stronger city population". "That means accelerating commercial stamp duty abolition, lowering land tax, reducing onerous red tape, particularly around adaptive reuse barriers when you take into account climbing B, C and D-grade vacancies" (Evans, 2015 Aug 18).

This article represents an pivotal shift in the framing of the office building vacancy problem by reporting regulation ("onerous red tape") as a barrier to the use of adaptive reuse as a solution to high vacancy and is followed by other news articles which promote this narrative (Wills, 2016 March 18; Novak, 2016 Dec. 29; Evans, 2017 Feb. 02; and Gannon, 2017 April 07). Mr Gannon's characterisation of this situation as the adaptive reuse predicament, the title of this thesis, is also reported.

Code red over city office space (Evans, 2015 Aug. 18), moves the news agenda in the time-period covered by B from cautious reporting of adaptive reuse as one limited but helpful strategy to mitigate office building vacancy, to reporting a narrative that positions adaptive reuse as a force to increase CBD 'vibrancy' and a produce "a stronger city population", if that is, onerous red tape is reduced via policy action by state government. The language here is rhetorical and emotive, e.g.: 'bulldozing', 'barriers preventing' and 'onerous red tape'. Choice of language is an influential factor in compelling the readers' attention and creating lasting and emotive imagery for the reader (Philo, 2017). *Code red over city office space* could be viewed as creating an emotive and morally charged focus for public debate, redirecting blame for high vacancy from 'tight-fisted' building owners and toward a new target: building regulation.

Finding ch04-11: Construction of building regulation as a problem in a period (B) reveals there is a trend for news articles to use increasingly emotive language about high-vacancy and low demand in the office building market. This further suggests that its mention should be understood as part of the wider stress response by the media and a reaction to economic stress during the period covered by B.

It is important to note that addressing the adaptive reuse predicament, via public policy and taxation changes is framed, by article *Code red over city office space,* as envisaging urban revitalisation such as that enabled by Postcode 3000 policy in Melbourne (Dovey *et al.* 2018). This persuasive positive 'hook' is provided for readers by Evans (2015, Aug. 18) alongside the adaptive reuse predicament in the same article. Building regulation is only, however, one small component in the presented transformation of economic demand and population growth associated with Melbourne and Postcode 3000.

In 2017 The focus on adaptive reuse as a critical strategy to resolve reported high vacancy rates in office buildings became a central issue within 2018 SA state government election. During the period between August 2015 and March 2016 the 'adaptive reuse predicament' was a focus of attention by the two main political parties in SA and public discussion of policy action. For instance, the opposition Liberal party committed themselves to draft new legislation to override national building codes (NCC), and this intention was reported in news articles in March 2016:

> "Adelaide has a large amount of office space around the CBD that is vacant, particularly in lower grade stock, He [state government opposition leader Steven Marshall] said. "Rather than just sitting empty, dilapidated and under-utilised, we want to see these buildings come alive again – whether that be for hospitality, residential or offices,…We have some great examples of adaptive reuse in the city, including Electra House and 2 King William St – and we want to see more." Mr Marshall said the Liberals would swiftly draft legislation [if elected] to give the planning minister the ability to override the Building Code of Australia's restrictions on adaptive re-use of old buildings….This would greatly reduce the red-tape burden associated with repurposing an existing office building,…It would make redevelopment quicker and cheaper by removing barriers to development." Mr Marshall said D-Grade building stock had a vacancy rate of almost 21 per cent and C-Grade building stock had a vacancy rate of almost 18 per cent" (Wills, 2016 March 18).

Public statements, like the above and which commit to legislation to reduce 'red-tape burden' arguably validate the narrative that building regulation is to blame for lack of adaptive reuse and suggest the following findings:

Finding ch4-12: Key public stakeholders accepted the adaptive reuse predicament as a given and as logic for policy action to reduce building regulation and thereby stimulate adaptive reuse in response to high office building vacancy. It is not possible to definitively say from data that the construction of the adaptive reuse predicament in news stories caused policy action, but comments by Liberal and Labor leaders indicate it had considerable influence over the formulation of policy at state and local level.

No public figure in B is reported to challenge the narrative that building regulation is a cause of a lack of adaptive reuse in Adelaide. Articles in B never present alternative perspectives to this argument. With the possible exception of Hanifie (2017 Aug. 03) (see discussion immediately below by Hanife, 2017 Aug. 03) there is also no discussion in news articles of which specific aspects of building regulation need addressing in order to overcome the adaptive reuse predicament. This omission is important given the lack of other evidence presented to back up reporting of onerous red tape as a barrier to adaptive reuse.

Although the focus of this thesis is on non-heritage office building vacancy, public discourse includes discussion of vacant heritage buildings. Wills (2016, March 18) also demonstrates how generalisation is used in constructing the narrative. The focus on a prestigious heritage project (Electra House), suggests that adaptive reuse success can be generalised across secondary grade office building stock. One persistent issue in news articles in B is the lack of explicit separation of heritage building stocks from other building stocks such as, such as secondary grade office accommodation built during the mid-1990s. These comparisons across very different sectors of Adelaide CBD building types are unhelpful for informed public debate when calling for building regulation reform to address secondary grade office building stock. This confusion could be considered as potentially misleading for readers and is epitomised by comments such as "Heritage status and strict Australian building code requirements also stifle investment" (Novak, 2016 Dec. 29). The following finding therefore discloses:

Finding ch4-13: Building regulation is typically presented as a barrier to adaptive reuse of office buildings in a generalised and unsubstantiated manner by news stories in B: there is a lack of convincing detail.

In articles contained B, there appears to be a building of narratives to call for the relaxation of building regulation, across more than one building population, when discussing adaptive reuse. This adds strength to the overall narrative that building regulation requirements are problematic more generally. In a further development of the narrative, PCA executive calls for:

> "Structural reform to building code and population growth is called for to address Adelaide's total vacancy of 230,859sqm, he said" (Evans, 2017b Feb. 02).

The adaptive reuse predicament continued to be promoted in news articles until May 2017. Up until this time, building code is positioned as a major inhibitor of local economic growth and linked to commercial market demand, "growth needed to be pursued along with reforms to building codes to help the local economy recover and to ensure higher levels of demand from tenants" (Evans, 2017a Feb 02) and also highlighted by the comment: "The biggest hurdle is around onerous building codes and a lack of tenant demand" (Evans, 2017 May 23).

4.4.3.3 A quieting in discourse: decrease in appetite for 'red-tape reduction.'

After May 2017, news articles rarely report narratives implicating building regulation as a barrier, and there is a lack of reference to this issue by stakeholders previously vocal on building regulation as a barrier to adapting secondary grade office buildings. Six articles discuss vacancy rates and the need for a solution, but building regulation is no longer gets a mention in these articles (Evans, 2017 June 01; Evans, 2017a Aug. 03; Evans, 2017b Aug. 03; Evans, 2018a Feb. 01; Evans, 2018 Aug. 02; Castello, 2018 Aug. 06). Articles now attribute non-building regulation issues for lack of willingness to convert office buildings. For example:

> "Property Council (SA) executive director Daniel Gannon said the challenge for the State Government and Adelaide City Council was to come up with a plan to fill the current vacant so-called C and D Grade office space, which account for 33

> per cent of total vacancies across the CBD. He cited as a potential solution, the so-called Postcode 3000 strategy of former Victorian premier Jeff Kennett, which aimed to convert unused office buildings into residential and student accommodation to bolster Melbourne CBD's population. 'One of our problems is land tax and the composition of building ownership, buildings are typically owned by a small or medium-sized private owners rather than the institutional owners,' he said" (Castello, 06 Aug. 2018).

The debate shifted to back to emphasising the deficiencies of building owners, and also broader financial burdens such as land tax and energy pricing:

> "The big rate is C and D stock where vacancy is growing as groups of people — who have bought property as a form of investment, such as mum and dads — don't have the ability or experience to know how to convert the properties...The planning regime has made it very difficult...power prices were catastrophic….If you have a C or D building it becomes almost uneconomical to continue to operate the building due to energy pricing regime…Landlords have said they are actually better off having a vacant building. Shutting it down and having it not operating…Then there are taxes, more here than anywhere...the land tax levied on SA is exorbitant" (Evans, 2017 July 04).

This silence on building regulation is unusual as there is no corresponding change in the reported vacancy rates across secondary grade. Only three articles mention building regulation as challenging, two of which are published on the same day by the same reporter. These three articles are unusual in the sample in that they provide specific detail of which parts of the NCC are regarded as challenging for adaptive reuse projects. It is important to note that the more generalised narrative blaming the whole of building regulation has gone. Comments are much more measured and specifically limited to the non-safety related NCC performance standards:

> "there were often compliance issues with [in meeting tenants' expectations in] older buildings, due to their energy use or shortfalls on disability access" (Hanifie, 2017 Aug. 03).

After May 2017, comments regarding building regulation compliance issues were only mentioned in a heritage context, and there was silence in news articles included in B around adaptive reuse of office buildings. Concerns about building rules were now presented as prohibitively costly:

> "The grand old properties are the strip's biggest asset, but building rules make them expensive to renovate and economically unattractive to redevelop" (Jervis-Bardy, 2018 Feb. 22).

Economic arguments, around the cost of compliance and investment returns, is different from earlier calls for structural reform of building regulation. Questions about the stakeholders' motivations driving the blame narrative need asking, particularly as it reached a peak in early 2017. The conclusion to this chapter discusses this further.

Grenfell Tower fire is a critical international event that may have shaped public debate, in South Australia, about relaxation of building regulation for existing building upgrades, including adaptive reuse. The Grenfell Tower fire was a significant loss of life event which occurred in London on 14th June 2017. Reporting of the event was global (Erlanger, 2017 June 28; Monbiot, 2017 June 27). Its potential impact on building regulation discourse in Australia and SA could be significant but is challenging to quantify. Red tape reduction and building regulation enforcement were quickly implicated in the debate in the UK and which critically discussed the fire:

> "For years, successive governments have built what they call "a bonfire of regulations". They have argued that "red tape" impedes our freedom and damages productivity. Britain, they have assured us, would be a better place with fewer forms to fill, fewer inspections and less enforcement. But what they call "red tape" often consists of essential public protections, that defend our lives, our futures and the rest of the living world" (Monbiot, 2017 June 27).

Reporting of the Grenfell Tower fire in SA and across Australia makes it an unfavourable environment for stakeholders to call for relaxation and reform of building regulation. An article in *The Advertiser* newspaper shortly after the fire highlights the risk of deviating from NCC requirements: "Building industry insiders say fire safety requirements in

Australia's building code are superior to those in the United Kingdom. But the rules are only effective if they are followed" (Jean, 2017 June 15). Further to this, there is often historically a pattern of increased stringency in building regulation after a loss of life event, such as the Grenfell Tower fire (Davis, 1999). This acknowledges building regulation as playing a critical role in reducing risk in disasters (GFDRR, 2010).

Finding ch4-14: The Grenfell Tower Fire in London, may have had a significant dampening effect on public calls in SA to reduce building regulation 'red-tape'.

This dampening effect appears to have also been applied to reporting on the introduction of a critical policy, *The Minister's Specification SA Upgrading health and safety in existing buildings [Minster's Specification]* (Gov SA, 2017): a policy which was specifically designed to address CBD vacancy through greater adaptive reuse of existing buildings. A lack of comment in news articles published during this period, however, makes it unwise to draw any other further conclusion.

4.4.4 Regulatory policy in the media

In Adelaide, local government policy initiatives were developed which looked towards the mechanisms contained within Postcode 3000 to address the problem of obsolete office buildings in Adelaide CBD (Tassone, 2010, Oct. 18), and include: *City of Adelaide Building Conversion Report (*1994), *Residential Conversion Study for Adelaide 21* (1996), *Commercial Conversion Study* (2006), *Shop Top Housing paper* (2010). By 2018, a range of state government policy initiatives to increase adaptive reuse uptake had been drafted and adopted through extensive public consultation, including draft *State Planning Policy 03 (SPP03) Adaptive Reuse* (Gov SA, 2018) and Ministers Specification in SA for Upgrading Health and Safety in existing buildings (Gov SA, 2017), to address perceived barriers to adaptive reuse stemming from Australia's building regulation compliance.

During the period covered by B, *The Minister's Specification* was explicitly developed by state government in SA to address vacancy in Adelaide CBD through adaptive reuse of existing buildings. The *Minister's Specification* was introduced by August 2017, after a public consultation event and period of development in December 2016-January 2017.

Its release also coincided with several other policies developed to improve existing building quality in SA and which are detailed on the Timeline given earlier in this chapter. Comments by MP John Rau, detailed in news article captured in B frame the *Minister's Specification* as a policy mechanism specifically developed to address the adaptive reuse predicament affecting secondary office buildings (Siebert and Washington, 2016). Lord Mayor of Adelaide, Martin Haese highlights this proactive response in 2016 by policy-makers in state government to the adaptive reuse predicament promoted by news articles, commenting: "We need to make it easier – and not harder – to transition our office buildings into residential apartments, and it's positive news that policy-makers are listening." (Washington & Siebert, 2016 March 17). News articles which promote the adaptive reuse predicament are a background to the development of this policy, and it is conceivable that they had some influence upon public comments received in the consultation of the *Minister's Specification*. This policy initiative, therefore, warrants further attention.

4.4.4.1 The Minister's Specification launch & impact

The *Minister's Specification* has two stated purposes:

1. To assist relevant authorities (public and private building regulation certifiers) when interpreting State Government legislation to determine reasonable compliance during existing building upgrades, including change of use conversion.
2. To provide property owners, tenants, developers and building practitioners with a broader understanding of the safety and health objectives of the legislation. (State Planning Commission, 2018 Aug. 23)

State government public information given on the SA Planning Portal website, frames the Minister's Specification "as part of the revitalisation of Adelaide and creating a more vibrant city, owners and investors can now access a range of measures to help unlock investment opportunities in the Adelaide CBD" (State Planning Commission, 2018 Aug. 23). This framing aligns with arguments about the purpose of adaptive reuse of vacant office buildings in Adelaide CBD and presented in news articles such as *Code Red Over*

City Office Space (Evans, 18 Aug. 2015). Despite this alignment, however, articles contained in B do not directly discuss the *Minister's Specification,* and which is unexpected:

Finding ch4-15: News articles in B do not refer directly to the Minister's Specification, which was developed in response to their promotion of the adaptive reuse predicament. Absence of discussion is unexpected given the extent and urgency of calls in the media to reform building regulation by key stakeholders, including prominent politicians and to address barriers to adaptive reuse involving secondary grade offices in Adelaide CBD.

Only one article in B, indirectly refers to The Minister's Specification, describing it obliquely as "chauffeured passage" and discussing this policy in a heritage building context, rather than in a context of secondary grade offices (Jervis-Bardy, 22 Feb. 2018). The single article suggests, indirectly, that *The Minister's Specification* has had little impact on reactivating obsolete heritage buildings:

> "Mr Rau says he has relaxed building rules for heritage-listed properties, convened meetings with property owners and even offered them a 'chauffeured passage' through the development application process in an effort to stimulate investment. However, little, if any, progress has been made. 'I won't beat around the bush,' Mr Rau tells The City. 'I'm very disappointed.' Mr Rau says the reasons behind the lack of action are varied, and not all within the State Government's control. He points to federal laws around disability access and requirements as one barrier" (Jervis-Bardy, 2018a Feb. 22).

This article suggests that there are multiple reasons why building owners are failing to reposition their assets within the market. Reported comments by Mr Rau also deflect blame from state government to federal government legislation by implicating federal laws (NCC building code) as a barrier to greater adaptive reuse in Adelaide CBD (Jervis-Bardy, 2018b Feb. 22). Mr Rau's comments are also vague about what is preventing adaptive reuse, although attitudes by building owners are clearly implicated by Mr Rau in a lack of action. This framing is, arguably, a subtle version of arguments presented in *Code Red Over City Office Space* (Evans, 2015 Aug. 18).

Finding ch4-16: News articles contained in B, including reported comments by prominent public figures in the PCA, State Government and politicians, do not advance a clear, constructive understanding of what factors might underpin high office building vacancy or suitable obsolescence mitigation strategies to respond to vacancy.

4.5 Limitations of method

As outlined in the Methods section 4.3.1 of this chapter, data gathered was restricted to news articles published in the periods 2008-2010 and 2014- 2018, all of which are available online. Articles published outside of this period were not gathered and therefore not analysed, which is a potential limitation in research. Furthermore, the researcher acknowledges that blogs, posts in social media and numerous other public forums available 2008-2010 and 2014- 2018 will most probably discuss office building vacancy and adaptive reuse in Adelaide CBD. Restricting the sample to news articles published and available online in the periods 2008-2010 and 2014- 2018 inevitably reduces how representative data is. Restricting the period of sampling and only gathering published news articles available online offered important benefits, however. Gathering news articles gathered during defined periods of historically high and historically low building vacancy in Adelaide's commercial market, however, enabled comparative analysis to elucidate trends and patterns in news stories potentially related to vacancy rate and market conditions. Restricting the format of data gathered to published news stories available online through the media database Factiva and supplemented with a search via Google News, is intended to facilitate transparency of method and rigour, qualities which research guidance literature regards as necessary (ARC, 2018).

4.6 Summary of findings

Content analysis of public debate in news articles proved to be a fruitful method for collecting data and table 4.4 provides an overview of the findings of this chapter.

The story of how adaptive reuse rose to prominence in policy by the SA government as a critical obsolescence mitigation strategy is also a narrative about how adaptive reuse became increasingly politicised and connected to an anti-regulation agenda. From a planning perspective, research into lobbying of state government by developers in Adelaide has been described as ‘aggressive’ (Bunker 2015b). The PCA has been identified as a powerful influence in public policy designed to aid urban regeneration in state capital cities (Bunker *et al*. 2017).

Lobbying present in news articles contained in B, including calls for red-tape reduction and epitomised by the adaptive reuse predicament, does not convincingly support the suggestion that NCC standards act as a barrier to adaptive reuse of vacant office buildings in Adelaide CBD. Data analysed in this chapter and presented in the Timeline does however point to the pervasive influence of market conditions on the timing and content of news articles about this issue in SA. Finding ch4-8 suggests the strong possibility that building owners are, in a period of low demand for office space, deciding not to invest in adaptive reuse due to economically motivated investment-return calculations rather than concerns about barriers arising from building regulation. Several studies captured by the literature review in Chapter 02 emphasised the priority of economic decision involving investment-return calculations by property owners and at the expense of adaptive reuse due to its perceived risk of weak profitability. Remøy & van der Voordt (2014) suggest that in cities with high vacancy rates, lower-cost, upgrades may be preferable to high-cost interventions such as adaptive reuse because building owners may perceive that the market may not guarantee a return due to low demand (p.381). This analysis may apply to Adelaide. Aigwi *et al.* (2018) are critical of what they characterise as an over-reliance on the economic dimensions of adaptive reuse by building owners (p. 402). Elliott *et al.* (2015) extend this explanation and contend that conservative reliance on a “classical financial cost/benefit model” is a major barrier to greater investment across the property industry (p.668).

Table 4-4 Summary of findings of Chapter 04 Analysis of public debate

Finding Ch4-01:	*Aggregated vacancy figures published in Office Market Reports for Adelaide CBD reports are a key influence on industry stakeholder briefings, government pronouncements and the broader public discourse surrounding office market vacancies in Adelaide.*
Finding Ch4-02:	*Office building vacancy data collected by for non-commercial purposes and independent of the PCA would be beneficial for research in this field and use in policy development.*
Finding Ch4-03:	*Key shifts in news articles can be identified across A and B and which evolve the public presentation of office building vacancy. With direct relevance to RQ1, building regulation was not framed as a barrier to adaptive reuse of vacant buildings, of any kind, by news stories before 2015.*
Finding Ch4-04:	*News articles published in the period from August 2015-June 2017 increasingly problematize the issue of high office building vacancy in Adelaide CBD. The language used in news article titles, for instance, reflects this trend. For example, "Code red" (Evans, 2015, Aug. 18) and "SA needs greater demand, not more taxes" (Gannon, D. 2017, April 07). This trend in B also corresponds to a period of historically high vacancy in Adelaide CBD.*
Finding Ch4-05:	*When building vacancy rates are low for Adelaide CBD, using quotes of PCA vacancy figures, there is little or no reporting of secondary grade vacancy as a problem. The converse of this applies: when articles report high building vacancy, the discussion highlights secondary grade buildings as problematic in news stories.*
Finding Ch4-06:	*Secondary office building stock was framed as an urgent problem by news stories contained in B: "Ageing and decrepit building stock (is) problematic for owners, tenants, all levels of government and the broader community." (Evans, 02 Aug. 2018a).*
Finding Ch4-07:	*Framing adaptive reuse as the solution to high-vacancy rates in commercial buildings is a stress symptom: mention of adaptive reuse in news articles surveyed market signifies that the commercial property*

	market is under economic stress, a situation also accompanied in B by high vacancy in the building population and low demand for space.
Finding Ch4-08:	*The content of articles in B discloses the explanation that building regulation does not provide technical barriers to investment in adaptive reuse but is simply regraded as economically unfeasible by building owners given the low demand for office space and high vacancy during the period covered by B.*
Finding Ch4-09:	*Reference to building regulation as a problem occurs in news articles in B and during a period of high vacancy and low market demand for office space.*
Finding Ch4-10:	*News articles contained in B and policy initiatives which relate to building obsolescence and vacancy have a relationship: news articles respond to policy events but also, in several articles, seek to influence policy which addresses building obsolescence and vacancy.*
Finding Ch4-11:	*Construction of building regulation as a problem in a period (B) reveals there is a trend for news articles to use increasingly emotive language about high-vacancy and low demand in the office building market. This further suggests that its mention should be understood as part of the wider stress response by the media and a reaction to economic stress during the period covered by B.*
Finding Ch4-12:	*Key public stakeholders accepted the adaptive reuse predicament as a given and as logic for policy action to reduce building regulation and thereby stimulate adaptive reuse in response to high office building vacancy. It is not possible to definitively say from data that the construction of the adaptive reuse predicament in news stories caused policy action, but comments by Liberal and Labor leaders indicate it had considerable influence over the formulation of policy at state and local level.*
Finding Ch4-13:	*Building regulation is typically presented as a barrier to adaptive reuse of office buildings in a generalised and unsubstantiated manner by news stories in B: there is a lack of convincing detail.*

Finding Ch4-14:	*The Grenfell Tower Fire in London, may have had a significant dampening effect on public calls in SA to reduce building regulation 'red-tape'.*
Finding Ch4-15:	*News articles in B do not refer directly to the Minister's Specification, which was developed in response to their promotion of the adaptive reuse predicament. Absence of discussion is unexpected given the extent and urgency of calls in the media to reform building regulation by key stakeholders, including prominent politicians and to address barriers to adaptive reuse involving secondary grade offices in Adelaide CBD.*
Finding Ch4-16:	*News articles contained in B, including reported comments by prominent public figures in the PCA, State Government and politicians, do not advance a clear, constructive understanding of what factors might underpin high office building vacancy or suitable obsolescence mitigation strategies to respond to vacancy.*

Voices critical of the politicisation of adaptive reuse in SA are beginning to emerge, albeit with a heritage context. Tony Giannone, has for instance, called for "an independent, non-political heritage commissioner" (Giannone, 2019 June 03). In making this comment Giannone calls on his extensive experience on adaptive reuse in Adelaide. At the time of writing, Mr. Giannone is the SA President of the Australian Institute of Architects in and is a Director of Tectvs, an architectural practice known for adaptive reuse in SA (ODASA, 2014). Giannone (2019 June 03) also critically observes, "Readapting buildings to building-code standard always raises the economic feasibility argument" (p.18). The President's careful frames building regulation as an economic barrier rather than a technical or compliance barrier prohibiting greater adaptive reuse uptake.

Negative public commentary about building regulation has directly prompted policy actions to reduce perceived barriers resulting in the Ministers Specification (SA Gov, 2017). Investigating the public framing of this topic is therefore not only a matter of contextualising data disclosing perceptions by stakeholders about building regulation concerning adaptive reuse but also concerns understanding the triggers for policy action by State Government in SA on adaptive reuse in relation to building regulation. This chapter raises critical questions regarding the origins of the idea that building regulation is a crucial barrier to adaptive reuse, within a discourse that adaptive reuse is the preferred solution to Adelaide's CBD office building vacancy problem.

Findings in this chapter collectively, underline the need for research into the adaptive reuse predicament but on critical, methodologically robust, terms rather than accepting its logic.

Chapter 5: Electronic survey

> "Such regulations and codes are not necessarily enshrined in law but are systematic sets of rules characterised and differentiated by authorship, context and implementation. In all instances, rules and regulations pervade and influence, or codify, the practices of architecture, yet little is known about their impacts on, and implications for, the design and production of the built environment" (Imrie & Street, 2009a:2507)

5.1 Organisation of chapter

This chapter presents insights from an electronic survey ('survey') which investigated stakeholder perceptions of building regulation and adaptive reuse. The survey was designed and implemented to test the claim by some studies that stakeholders in the adaptive reuse process often regard building regulation as a barrier to adaptive reuse of existing office buildings as captured in the literature review presented in Chapter 02 (Udawatta *et al.,* 2016; Bruce *et al.,* 2015; Bullen & Love, 2011). This chapter has two distinct but related sections reporting the results of the survey. The first shorter section (5.3.1) reports on descriptive statistical findings from closed survey questions. The second, more extended, section (5.3.2) features the analysis of qualitative comments given by participants in open-ended survey responses.

5.2 Method

The pragmatic requirement for conveniently gathering data from stakeholders residing interstate influenced the use of an electronic survey in research and hereafter referred to only as 'survey'. The rationale for the purpose of the survey, details about the method employed, its limitations and findings produced, are detailed below. The term 'respondents' is used interchangeably with 'participants' in this chapter and to avoid repetition for the reader.

5.2.1 Rationale for survey

An online survey method was chosen because it pragmatically enabled the collection of data interstate beyond Adelaide without additional costs and time spent by the research travelling. Furthermore, surveys permit the collection of data from a large sample, although low response rates are also a potential downside (Nardi, 2018). Surveys are an established method for data gathering due to several advantages (Nardi, 2018). A US-based study by Andrews *et al*. (2016), captured by the literature reviews in this study, gauges "interest in and awareness of energy efficiency issues" amongst municipal officials responsible for implementing state building codes in the state Pennsylvania (p. 120). Although Andrews *et al.* (2016) are not explicit, it can be inferred that the size of Pennsylvania, when combined with the desire to capture a representative sample across the state led them to choose a survey for data gathering. Andrews *et al.* (2016), for instance, emphasise the scale of Pennsylvania as a "five-county region" (p. 20). The capacity to gather data at a distance and from geographically dispersed respondents are key advantages of using surveys (Flick, 2015). Despite the stated benefits of a survey as a method, the literature review undertaken in Chapter 02 disclosed that only Andrews *et a*l. (2016), out of 23 studies captured, used a survey to gather data. It can, therefore, be inferred that Surveys are infrequently used by studies which examine barriers to adaptive reuse.

After careful consideration, an electronic format using Survey Monkey (http://www.surveymonkey.com) was chosen for the survey. Survey Monkey software offers a convenient platform for designing questions accessible online, and enabled data to be exported for statistical analysis. Survey Monkey also enables the generation of descriptive statistics such as, for example, the percentage of participants who responded to specific questions. Several studies have evaluated the advantages and disadvantages of using Survey Monkey (Gill *et al.* 2013; Barrios et al. 2011). In their research Barrios, *et al.* (2011) for instance compared the use of several web-based surveys, including Survey Monkey, with paper surveys (n = 572) and found that the response rate with web-based surveys was higher than paper surveys. They also report that the quality of data gathered in web surveys was higher than in paper versions, with "fewer overall errors, fewer missing items, and longer responses in open-ended questions" (Barrios et al. 2011:2017).

Low response rate and attrition (drop out) are problems which often affect surveys and presents a disadvantage of the method (Olsen, 2018). Methodological literature recommends that a convenient web-based format can help promote response rate in surveys and in reducing the risk of attrition (McPeake *et al.* 2014) although other comparative studies have qualified this suggestion, indicating that that paper surveys (with a prepaid return) rather than web-based surveys formats can generate the highest response rate (Guo *et al.* 2016). Cost considerations influenced the final decision to adopt an electronic format and discounted the use of paper surveys with a prepaid return. It was decided, in light of this discussion, to use Survey Monkey.

5.2.2 Survey design

The survey contained 55 questions designed to gather data about barriers to adaptive reuse. The survey was designed to test the hypothesis posed at an earlier stage of research, before the research re-design. The original intention was to examine which aspects of building regulation was problematic:

> "Current building control policy and its enforcement are significant inhibitors of adaptive reuse projects involving unlisted existing buildings occupying central urban locations within Adelaide, South Australia."

Two questions were used to obtain ethical consent (Q1) and define the scope of the survey for participants (Q2) at the beginning of the survey. One question at the end of the survey was designed to recruit possible participants for follow-up research (Q54) and ask participants if they wished to be sent an executive summary at the end of the research study (Q55). Therefore 51 questions were designed to test the above hypothesis. At the survey design stage, the researcher added an open-ended response options to 37 questions in the survey and where respondents could add supplementary information when answering the survey questions: see appendix 5-A for details.

In the survey, 37 questions contained an open-ended response options through which respondents could add supplementary information in answering the question: see appendix 5A for details. Open-ended responses were added to these survey questions to enhance the user experience and offer a space for additional comments by participants to add qualifying information about their closed responses. This practice is recommended by methodological literature on the basis that it can help respondents answer potentially difficult or complex questions (Couper & Zhang, 2016). In practice, the open-ended response option proved to be a popular choice for respondents in which participants explained, detailed and qualified their thoughts about building regulation. Lengthy, detailed responses were given in some cases. Open-ended, qualitative, data is, therefore, an important dimension to survey responses and warrants further attention and analysis of the data collected.

A summary of the main questions, which produced reportable findings from the survey, are shown in table 5.1 below. The remainder of the survey questions, however, were found not to be suitable for a variety of reasons discussed later in this chapter in the limitations section 5.4. Therefore, the questions included below in table 5.1, are the main focus of data analysis relied upon in this thesis.

Table 5-1 Main survey questions included in the analysis of the Survey

RQ ref.	Question included in chapter findings
Q3	Which of the following best describes your current profession in which you undertake adaptive reuse projects?
Q4	Do you perceive there to be barriers to 'change of use' conversion projects stemming from building regulations and enforcement practices?
Q5	In your opinion, for 'change of use' conversions, which aspect(s) of building regulation presents a significant barrier?
Q6	In your experience, how often does building regulation present barriers for 'change of use' conversion which affect the development's feasibility?
Q7	In your experience, can most building regulation challenges for existing buildings be overcome?
Q12	Do you have examples of change of use conversion projects that have been deemed unfeasible (by you or others) due to building regulation compliance issues?

5.2.3 Recruitment

Adaptive reuse of existing buildings is typically a complicated process as it involves a range of actors, including architects, engineers, planners and building certifiers as well as building owners (Wilkinson, 2018). Studies captured by the literature review in Chapter 02 reflect this diversity in adaptive reuse practice and several studies gathered data from a wide range of stakeholders involved in the process (Andrews *et al*. 2016; Dyson *et al*. 2016). Collecting data from a wide range of actors routinely engaged in the social practice or issue under investigation is recommended by methodological literature because it improves the validity of findings reached by qualitative studies through reflecting the diversity of perspectives about a topic under investigation (Silverman, 2017). This implies the benefits of this research in gathering data from a wide range of stakeholders involved in the adaptive reuse process. The need to collect a wide range of stakeholder views became apparent when the critical evaluation was undertaken of how news articles frame adaptive reuse and building regulation.

From the outset, the researcher was aware that sufficient recruitment for the survey was likely to be a challenge. A study by Bruce *et al.* (2016) captured by the literature review, indicated that recruiting stakeholders involved in the adaptive reuse process had been difficult. Additional efforts were, therefore undertaken by the researcher to recruit participants. These efforts consisted of the production of a media package in electronic format suitable for release in the media and third-party recruitment via professional organisations with substantial memberships (1000 +).

The media package was available via a convenient weblink and included: a 4-minute digital format video in which the researcher described the purpose of research and orally invited the viewer to participate; a formal written introduction and overview of the study; and a link to survey hosted online via the Survey Monkey platform. The media office at the researcher's university assisted with the dissemination of this digital package to the media including, South Australian newspapers, national news outlets, local and national radio channels and industry magazines. The researcher was interviewed by two South Australian radio stations about their study and also by the *InDaily* publication, based in Adelaide who included the weblink to the explanatory media package described above. To enhance recruitment, the researcher shared the media package with their respective professional networks, presenting about research to state and local government and at several industry events attended by potential participants.

The researcher approached several professional organisations which represent occupational groups involved in adaptive reuse, asked to share a link to the media package with their members. The following organisations assisted recruitment for the survey, and include the Royal Institution of Chartered Surveyors (RICS), the Australian Institute of Building Surveyors (AIBS), the Architectural Institute of Australia (AIA), the Chartered Institute of Architectural Technologists (CIAT), Australian Building Codes Board (ABCB), and Adelaide's Sustainable Building Network (ASBN). This support by third party professional organisations was helpful because RICS, AIBS and AIA have numerically large memberships and their support disseminating research offered access to a large population pool for recruitment. A further advantage of using established third-party professional organisations for recruitment was that their involvement could help in gaining the trust of potential participants (King & Horrocks, 2010:31). Using third-party recruitment in this way also has an ethical advantage. No direct contact was made to potential participants, thereby avoiding the ethical risk of coercion and ensuring that professional stakeholders did not feel pressured in any way to participate in the research study (NHMRC, 2007:17).

The survey opened, and recruitment via third party organisations took place from April 2017 to May 2017. The survey was accessible for four months before it was closed in September 2017 and data was downloaded. Human research ethical approval had been obtained from the University of Adelaide on 30th November 2016, prior to the start of data collection (ethics approval number: H-2016-257). This is detailed further in Chapter 03. The media package and examples of third-party recruitment notices can be found in appendix 3-B.

5.2.4 Sample Size and demographic

The number of respondents who started the survey was 181. As highlighted in Chapter 03, sample sizes in existing research range from n = 6 (Dyson *et al.* 2016) through to n =

81 (Bullen and Love, 2011). To put this in perspective, if the categories of qualitative and quantitative are disregarded, the sample size in the survey was 181 which is greater than the largest sample (n = 81) in existing (qualitative) studies captured by the literature review. The population sampled are (given in italics to clarify): *stakeholders involved in the adaptive reuse process in Australia.* There are, however, no numerical estimates in the existing literature of how many architects, surveyors, certifiers, engineers, designers and other stakeholders are involved in this process. Thus there is no quantifiable population against which to establish whether the sample size is sufficient. For this reason, the survey is best categorised as exploratory in term of its sampling and as is common in exploratory surveys, has a convenience sample (Jann and Hinz, 2016: 105).

5.2.5 Quantitative analysis of data from closed questions

Quantitative analysis was restricted to descriptive statistics in tabulated did not warrant inferential statistics due to limitations discussed in section 5.4. Only 3 questions were selected for quantitative analysis (Q3, Q4 and Q7), and are closed ended responses which occurred early on in the survey so least affected by the limitations impacting the survey data.

MS Excel was used to quantify categorical data from the closed ended questions and presented in descriptive statistics placed in tabular format to aid analysis. The questions analysed are:

> Q3. Which of the following best describes your current profession in which you undertake adaptive reuse projects? (closed responses with the option to add own profession description)
>
> Q4. Do you perceive there to be barriers to 'change of use' conversion projects stemming from building regulations and enforcement practices? (Yes / No)
>
> Q7. In your experience, can most building regulation challenges for existing buildings be overcome? (Yes / No, with an option to add further comments)

As highlighted, data gathered by closed questions did not warrant further quantative investigation. However, responses gathered from the open ended questions produced data which could provide further insights from the survey method if analysed using qualitative methods.

5.2.6 Qualitative analysis of data from open-ended questions

Qualitative data analysis was undertaken using NVivo-12. (Sage Publications Limited). Survey data, from open-ended responses, was imported into NVivo 12, which is one widely used software tool in qualitative research (Bazeley & Jackson, 2013). NVivo 12 was used to manage the open-ended responses in the survey data, code the data and develop themes, query the data and visualise the relationships between themes and sub-themes. The queries allowed further interrogation so that this process became part of the ongoing enquiry process (Hilal & Alabri, 2013).

Open responses to Q5, Q6, Q7, and Q12 were examined thematically. The survey questions which were included in this analysis are repeated below for the reader's convenience:

> Q5. In your opinion, for 'change of use' conversions, which aspect(s) of building regulation present a significant barrier? (open-ended responses)
>
> Q6. In your experience, how often does building regulation present barriers for 'change of use' conversion which affect the development's feasibility? (open-ended responses)
>
> Q7. In your experience, can most building regulation challenges for existing buildings be overcome? (Responses: Yes / No, with an option to add further comments)
>
> Q12. Do you have examples of change of use conversion projects that have been deemed unfeasible (by you or others) due to building regulation compliance issues? (open-ended responses)

The de-selection of other survey questions from this analysis is discussed later in this chapter in the limitations section 5.4.

Thematic analysis was undertaken by the researcher, using NVivo 12. The steps taken to make sense of the data involved:

1) exporting qualitative comments from Survey Monkey into MS Excel before uploading excel file into NVivo-12
2) provisional themes were identified from looking across data for common patterns and issues mentioned by participants
3) a word frequency query in NVivo-12 explored the data and confirmed the selection the central theme emerging from the data
4) using the auto-code function within NVIVO-12 to establish categorical coding nodes before the nodes were grouped manually under the main theme and sub-themes
5) visualised the data for the main theme to interrogate the relationships between main theme of 'cost' and its sub-themes: 'cost of the upgrade work' and 'cost of compliance process'.

Initially the researcher intended to use the auto-code function in NVivo-12 to efficiently code the data. However, the auto-code function did not align with the provisional themes identified manually. A word frequency query within NVivo-12 confirmed however that the tentative themes identified manually were indeed essential to consider. For instance, across questions 5, 6, 7 and 12, NVivo auto-coding only returned five references associated with the 'cost' theme. Manual coding, however, disclosed 37 references to 'cost' in the open-ended responses to questions 5, 6, 7 and 12m and 'cost' emerged as the predominant theme from manually reviewing the data. The auto coding function within NVivo-12 was, however, useful in that it grouped together data at specific coding nodes such as 'disability access' and 'fire safety'. The auto-code function was therefore considered to be unhelpful in identifying the main themes and sub-themes but was found to be useful in determining the child-codes. This influenced the steps 1-5, listed in the above paragraph, taken to code the data within NVivo.

Using NVivo allowed exploration of the data using parent-child diagrams to visualise the data. Visualisation of the data in NVivo is recognised in research as a valuable benefit of using the software, particularly the relationships between the sub-themes in data (Hilal & Alabri, 2013).

5.3 Results

The design of survey questions lends itself to two types of analyses: (1) numerical data from closed-type survey questions, and (2) qualitative data contained in survey open-ended responses. Respondents were able to provide supplementary information in 37 questions via open-ended responses for qualitative analysis. The selection of survey questions for inclusion in the analysis is discussed in this chapter in section 5.4 limitations. Logically, therefore, this results section adopts a structure of quantitative analysis of closed responses and qualitative analysis of open responses and presents both types of analyses separately in what follows.

5.3.1 Closed questions

The demographics of the sample, as disclosed by respondents, suggests a good fit with the population involved in adaptive reuse. Table 5-2 represents the professional status of respondents.

Table 5-2 Response to survey Q3

Q3. Which of the following best describes your current profession in which you undertake adaptive reuse projects?		
Respondents' profession(s)	**Number of respondents**	**Total respondents in sample (%)**
Asset Group: building owner, real-estate manager, financial advisors	4	5.3%
Building surveyors, including building regulation certifiers	32	42.7%
Building designers: Architects, Interiors, Landscape, designers	16	21.3%
Consultant engineers: structural, M&E, fire, disability, sustainability	8	10.7%
Planning Officers	5	6.7%
Policy Professionals	5	6.7%
Multi-professional	5	6.7%

The sample recruited in this study are similar to those recruited by similar research in the field (Bullen & Love, 2011). This suggests the following:

Finding ch5-1: demographics of those who participated in the survey closely matches the demographics of individuals participating in other studies in the field. The participants captured in the survey sample are representative of stakeholders involved in adaptive reuse in Australia.

In Q4 of the survey, participants were invited to answer yes or no as to whether they perceived building regulation, and its enforcement, as presenting barriers to change-of-use conversion projects. This question was an important one for the survey as a whole and to the research questions. Responses to survey question Q4 are represented in Table 5.3 below and show that a majority of respondents perceived building regulation to be a barrier to adaptive reuse.

Table 5-3 Responses to survey Q4

Q4. Do you perceive there to be barriers to 'change of use' conversion projects stemming from building regulations and enforcement practices?		
Q4 responses	**Number of respondents**	**Percentage total respondents for Q4**
Yes	55	73.3%
No	20	26.7%
Total responses	75	100%

Finding ch5-2: The majority of respondents (73.3%) perceived building regulation and its enforcement to present barriers to change-of-use conversion projects.

Finding ch5-2 is in keeping with stakeholder views reported in several published research studies captured by the literature review examining non-heritage adaptive reuse and adaption (Bruce *et al*., 2015:150; Udawatta *et al*., 2016:1; and Bullen & Love, 2011:41) and also two studies focussing on heritage building adaptive reuse and adaption (Dyson et al., 2016:44; Conejos *et al.,* 2016:9). In these studies, the majority (70 % or above) of stakeholders participating in research perceived building regulation and its enforcement to present barriers to change-of-use conversion projects, although as highlighted in Chapter 02 Udawatta *et al*., (2016) is a literature review reporting this finding from other studies. Demographic data about the professional experience of survey respondents gathered in Q24 supports finding ch5-1, disclosing that 78% of respondents in the survey had more than five years of experience in a role involving change-of-use conversions. The largest single sub-group of participants had over 20 years' experience (22.7%).

Q7 asked respondents to indicate whether building regulation barriers could, in their experience, be overcome. Table 5.4 below presents responses to Q7 by respondents. Q7 generated 18 open-ended responses in which participants explained the complexities of this issue. As is indicated by table 5.4, several participants chose 'Other' category rather than 'yes' or 'no' and offered revealing qualitative data in open-ended responses about their reasoning for this response.

Table 5-4 Response to survey Q7

Q7. In your experience, can most building regulation challenges for existing buildings be overcome?		
Q7 responses	**Number of respondents**	**Percentage total respondents for Q4**
Yes	33	60.0%
Other	18	32.7%
No	3	5.5%
Did not respond	1	1.8%
Total responses	55	100%

Finding ch5-3: The majority of respondents (60%) indicated that building regulation barriers could, in their experience, be overcome in adaptive reuse projects.

Following on from analysis of Q3, Q4, and Q7, responses to open-ended survey questions (Q5, Q6, Q12) became unexpectedly crucial for this study as a whole, and follow next in section 5.3.2. Qualitative data from these questions prompted the researcher to rethink the premise upon which the survey was built and sparked reflection by the researcher on whether the initial hypothesis began with the problematic assumption that building regulation was an inhibitor of adaptive reuse of office buildings.

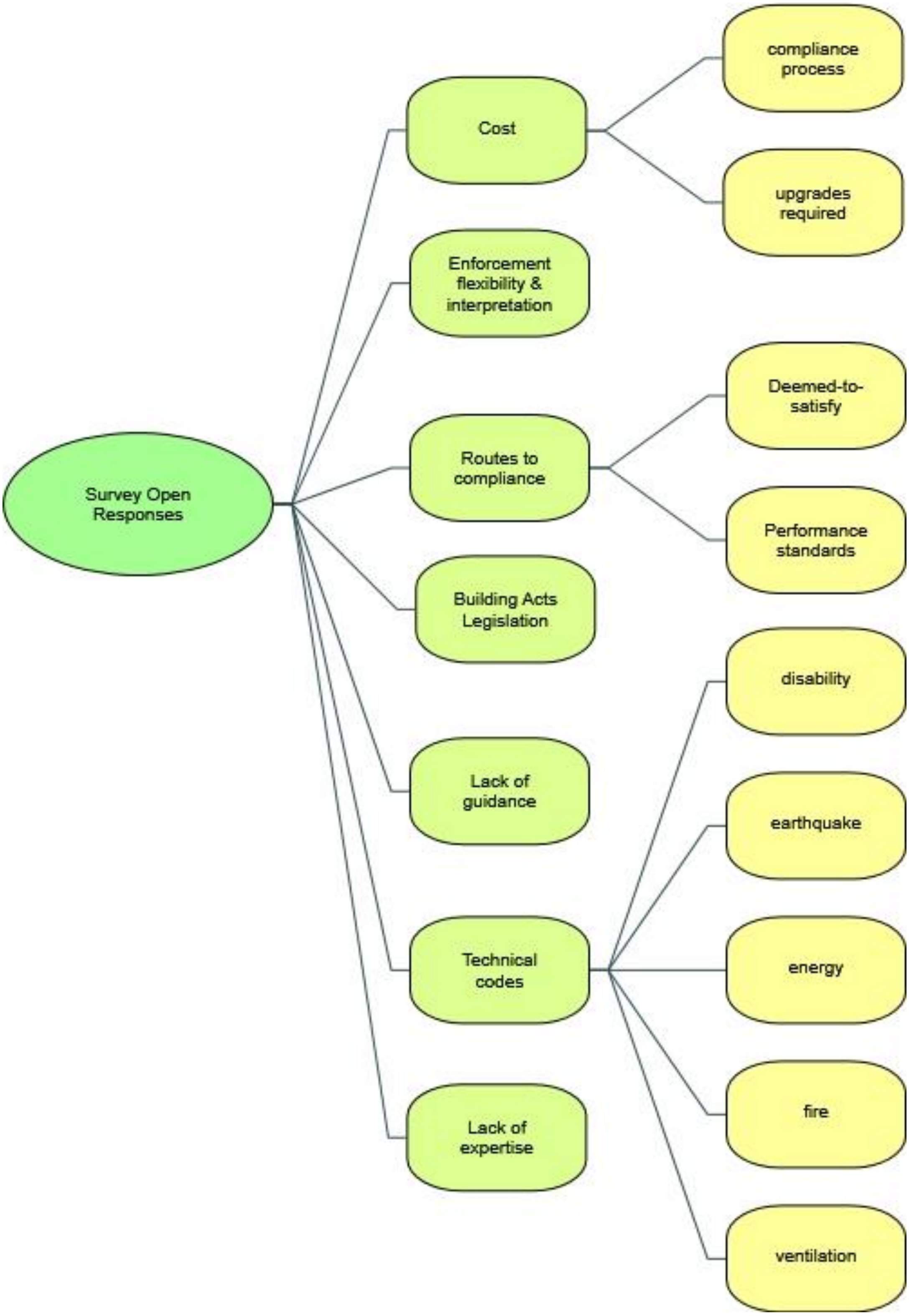


Figure 5.1 Parent child diagram for themes in open-ended survey responses.

5.3.2 Open-ended questions

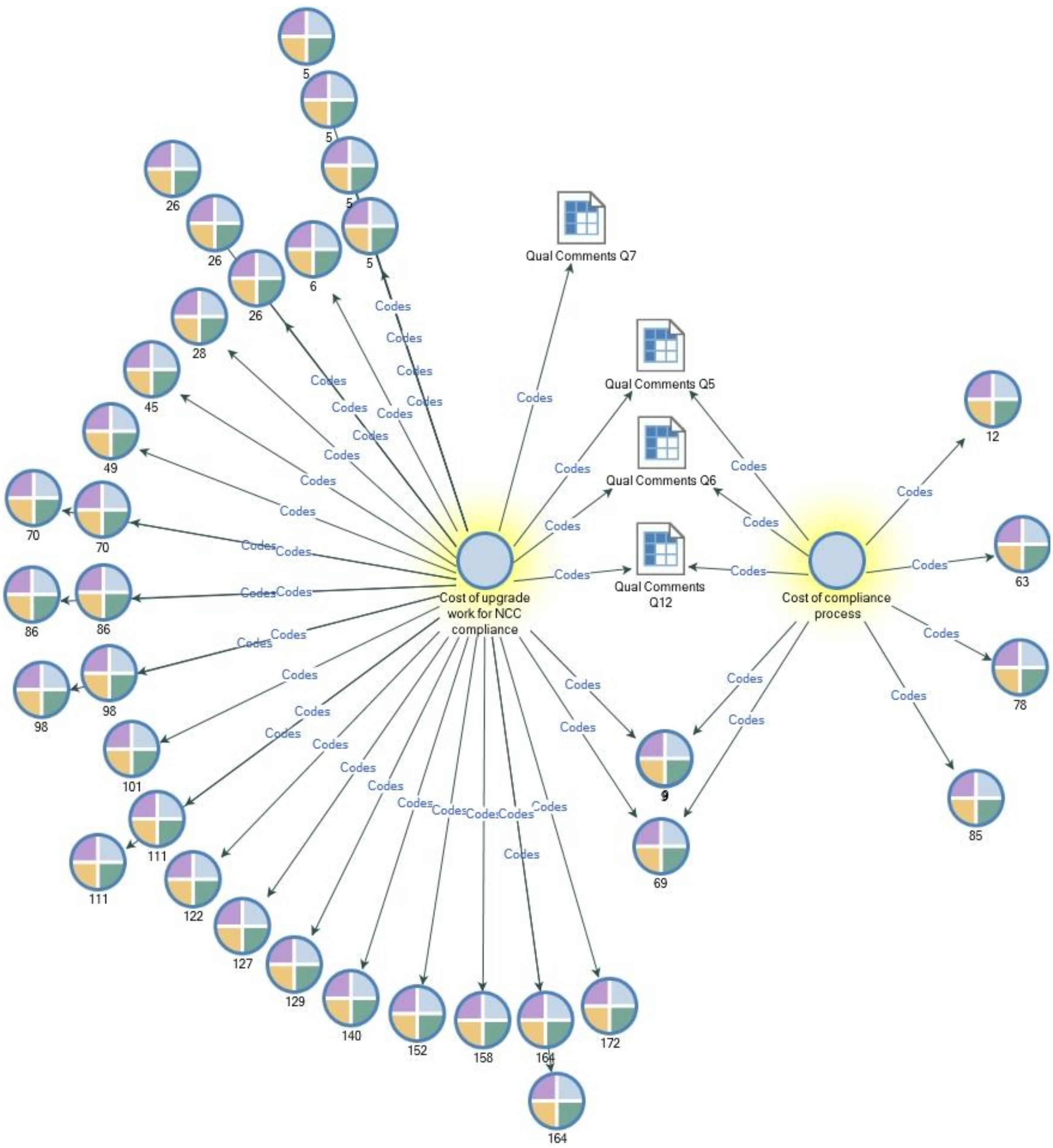
Seven themes were identified in open-ended responses as shown in figure 5.1 above. In order of popularity, the seven themes that emerged in qualitative survey data are cost; enforcement flexibility and interpretation; routes to compliance; buildings acts legislation; lack of guidance; technical codes; and lack of expertise. A breakdown of responses by theme is given in table 5.5 below. The parent themes are shaded in grey, in table 5.5, with their child sub-themes indented in the left column. The 'references' column on the far right of table 5.5 refers to the number of references made to a parent theme or a child sub-theme.

Table 5-5 Breakdown of respondents by theme

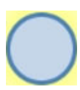
Theme	No. of survey questions in each theme	Number of references to content coded for theme
Cost	4	37
cost of upgrade work for NCC compliance	4	31
cost of compliance process	3	6
Technical Codes	2	15
Disability	2	10
Earthquake	1	1
Energy	1	2
Fire	2	7
Ventilation	1	1
Enforcement - flexibility & interpretation	3	8
Routes to Compliance	3	7
deemed to satisfy route	2	2
performance solution or alternative solution routes	3	5
Building Acts Legislation	3	4
Expertise – lack of	2	2
Guidance - lack of	2	3

The researcher expected ‘technical codes’ and ‘enforcement practice’ to emerge as the primary themes in qualitative comments when designing the survey, in light of the focus in literature (Chapter 02) and public debate in Adelaide (Chapter 04). Surprisingly, these two themes were not the primary focus in the qualitative responses. The survey was premised on the hypothesis that building regulation is a technical barrier to adaptive reuse. Although technical codes and enforcement did emerge as themes from open-ended qualitative responses, the prevalence of cost outweighed comments relating to technical and enforcement, even when these two themes were combined. As table 5.5 indicates, NCC provisions for disability access and amenities, followed by fire provisions are the most problematic for adaptive reuse developments. This emphasis on aspects of NCC standards fits with findings from published literature in this field of research (Chapter 02); specifically, building codes for fire safety (Conejos et al. 2016; Udawatta *et al.,* 2016; Bruce et al., 2015; Bullen & Love, 2011) and disability access (Conejos et al., 2016; Bruce et al., 2015; Bullen & Love, 2011). The parent theme ‘Technical Codes’ is referred to 15 times by respondents: ‘Disability’ is a child sub-theme of ‘Technical Codes’ and is referred to by 10 out of the total of 15 times. Disability is, therefore, the single most mentioned child sub-theme under the parent-theme of ‘technical codes’.

Cost emerged as the most important parent theme in the analysis of open-ended responses to the four questions included in this analysis (Q5, Q6, Q7 and Q12), with the highest number of references by respondents (37). This is shown in table 5.5. Comments referring to the ‘cost of the upgrade work’ emanate from 21 participants, with 6 participants discussing the ‘cost of compliance process’. Indeed ‘Cost of upgrade work for NCC compliance’ has the largest total number of references (31), suggesting high importance is attributed by survey respondents to the construction costs associated with achieving NCC compliance. This analysis revealed that cost is an essential factor when NCC is discussed as a barrier to adaptive reuse. Although survey questions themselves did not make any reference to cost or economics, participants referred to cost in all four survey questions, highlighting how cost is a pervasive factor featured in respondents’ discussion about building regulation and adaptive reuse. Further examination of cost is undertaken next, and the coding of responses for the parent-theme cost is visualised in figure 5.2 below, using software NVivo 12.



Key:



Response coded by respondent

child code for parent theme of 'Cost'

Survey Q number eg: Q5, Q6

Figure 5.2 Coding for cost theme visualised by NVivo
Representation of coding of open ended responses to Q5, Q6, Q7, and Q12 for child codes 1) 'cost of upgrade work for NCC compliance' and 2) 'cost of compliance process', offered by respondents in open ended responses.

Comments in open-ended responses which refer to cost are represented as multicoloured circular icons in visualisations produced using NVivo 12. Each comment in the data, which relates to cost, is represented by a circle in NVivo 12 and is the symbol for a case - the accompanying number represents the designated ID number of each survey participant. The survey questions included in this analysis are Q5, Q6, Q7, and Q12, and are shown as the rectangular icons in figure 5.2. Two child sub-themes codes for the parent-theme of cost emerged from the data. The child sub-theme, ‘cost of upgrade work for NCC compliance’, is shown on the left of figure 5.2, and these responses relate to construction costs to achieve compliance. The sub-theme ‘cost of compliance process’ is located on the right-hand side of figure 5.2, and these responses relate to professional fees and reference time-related factors to develop NCC compliant design. A total of 31 responses are included in the cost theme analysis across both child sub-themes by 25 survey participants. Several participants gave more than one answer, which was coded under the cost theme. For example, participants identified with numbers 5 and 26.

Tables 5.6, 5.7 and 5.8 are given to further illustrate the emphasis on cost by respondents in open-ended questions Q5, Q6, Q7, and Q12. As can be seen from the comments, respondents reached the same conclusions, indicating that building regulation barriers can be overcome if sufficient finance is available, although each respondent had a slightly different emphasis across all four survey questions. This economic framing of building regulation produces the following finding:

Finding ch5-4: Cost emerged as an essential theme in responses to open-ended survey questions. This finding contextualises finding ch5-2 and ch5-3, suggesting that NCC compliance is an economic barrier to adaptive reuse.

Table 5-6 Q5 - Q7 responses for theme: 'cost of upgrade work for NCC compliance'

Q5. In your opinion, for 'change of use' conversions, which aspect(s) of building regulation present a significant barrier? (3 responses)
Cost of upgrades are too high given the quality of existing office buildings
Think it's less about regulation and more about financial
Generally it comes down to the cost associated with complying with the building regulations as against building or utilising a complying building
Q6. In your experience, how often does building regulation present barriers for 'change of use' conversion which affect the development's feasibility? (4 responses)
Most cases, on costs grounds
The financial costs of achieving this sometimes far outweighs benefit of reasonable returns
In most cases barriers are entirely financial & Planning. Cost of work (design, permits/ approvals) associated with change of use Vs financial benefit derived from change of use
Therefore cost to upgrade is the issue that stops change of use.
Q7. In your experience, can most building regulation challenges for existing buildings be overcome? (13 responses)
yes, if the building owners can borrow enough money
Provided proposal remain financially viable all obstacles can be overcome with enough money
Yes but at sometimes unreasonable (for the building owner) prospects of financial returns
Yes, but at a too great cost (not financially feasible).
Financial consideration related to structural alteration and loss of floor space must also be taken into account, but most challenges can be addressed.
Yes, but usually expensive and can affect feasibility
In most instances we consider that fire safety of can be reasonably easily improved to a satisfactory level, but the building may require extensive and more costly upgrades in other areas such as occupant amenity that compound the costs.
Yes but at often significant cost
Money can fix anything - usually
yes, but it is often how deep is the pockets of the developer
Suspect most can - at a price
Mostly but subject to economic cost
Older existing built forms require huge cash injections to comply with today's accepted codes even small commercial sites

Table 5-7 Q12 responses for theme: 'cost of upgrade work for NCC compliance'

Q12. Do you have examples of change of use conversion projects that have been deemed unfeasible (by you or others) due to building regulation compliance issues? (11 responses)
No - it is mainly the cost of the full upgrades, rather than technical compliance
Cost involved in upgrading the building performance to comply with current code
Building Owners perceived lack of adequate financial returns
Lifts in buildings is most often a deal breaker, others have been the requirement to install sprinkler and/or upgrade fire resistance levels to current requirements. in educational, public and residential projects I have had the cost of replacing the cost of glass to Type A safety glass become an impediment.
Disabled access & facilities often creates a barrier due to cost and loss of lettable space
The owner claimed that the cost of the upgrades was not viable
The building spaces were fine but it almost crippled the project half way through in terms of envelope costs
upgrade requirements are often issues that result in a project being financially unfeasible
projects whereby the cost of replacing all windows and balustrades to comply with new requirements for environmental and sound are not suitable
The cost was too high so the project did not proceed
Additional toilet facilities - Costly and sometimes impossible due to structural constraints 2)Class 9b (educational) from Class5 (office) - Increased outside air requirements-Sometimes costly & difficult to install

Table 5-8 Survey responses codes for theme: 'cost of compliance process'

Q5. (3 responses)
But this does present another barrier, which in 4 is the fees associated with QFES consideration of a Performance Solution.
Cost of identifying upgrades
The unknown factors and cost involved in searching for a solution scares them. In particular the fee of fire 8s
Q6. (1 response)
In most cases the barriers are entirely financial and Planning. The cost of the work (design, permits/approvals, building) associated with a change of use Vs the financial benefit derived from the change of use.
Q12. (2 responses)
Cancelled the project without considering performance options as the cost of this consultancy work was likely in excess of the margin for the project
Design however costs can be a barrier for some building owners or proponents.

Finding ch5-4 further contextualises stakeholders' perceptions that building regulation is a barrier to adaptive reuse, expressed in finding ch5-2. Economic implications of NCC compliance explain finding ch5-3 in that barriers can be overcome if there are sufficient financial resources to achieve compliance. The survey was premised, in light of the literature, on the hypothesis that building regulation is a barrier to adaptive reuse. The prevalence of cost, in qualitative data, came as a surprise to the researcher based on the review of the literature discussing barriers to adaptive reuse, and the public debate. The pervasiveness of cost in open-ended responses suggest that the cost of upgrade work associated with building regulation is a crucial barrier to adaptive reuse; it also suggests that costs associated with NCC compliance make adaptive reuse economically infeasible.

This analysis proposes that building regulation primarily presents economic barriers to adaptive reuse development. Analysis of survey responses questions the hypothesis that technical obstacles arise from NCC building codes in adaptive reuse developments, and conveys a different picture to the one portrayed in some previously published studies. While 73.3% of respondents regard building regulation as a critical barrier, 60% of respondents also believe that this barrier can be overcome. Furthermore, cost rather than technical challenges for example, emerges in respondents' comments as the critical issue when considering the role played by building regulation concerning adaptive reuse. One respondent's comments exemplify this emphasis on the economics of adaptive reuse commenting "Money can fix anything – usually."

Participants responses disclose that costs associated with building regulation can be broken down into two components: the cost of upgrade works necessary to meet NCC compliance, and additional professional fees associated with NCC compliance. The idea that building codes make adaptive reuse development economically problematic chimes with a range of studies in this field of research which report the view from stakeholders that building codes make adaptive reuse development economically unviable (Heurkens *et al.,* 2018; Olivedese *et al.,* 2017; Conejos *et al.,* 2016; Dyson *et al.,* 2016; Uddawatta *et al.*, 2016; Bruce *et al.*,2015; Remøy & van der Voordt, 2014; Yung & Chan, 2012; Bullen & Love, 2011; Langston *et al.,* 2008). Other studies have, however, been highly critical of this economic argument about adaptive reuse (Andrews *et al.,* 2016; Imrie & Street 2011). In light of the literature critical of economic framing and finding ch5-4, it could be suggested that NCC compliance costs, such as those incurred to achieve fire safety and disabled access compliance, are wholly reasonable costs incurred in adaptive reuse to ensure public safety and social equity.

In summary, finding ch5-2 revealed that the majority of survey participants regarded NCC requirements as problematic for adaptive reuse development. However, findings ch5-3 qualified this perception indicating that the majority of stakeholders believed building regulation barriers could be overcome. Qualitative analysis of open-ended survey responses shed further light on how NCC compliance issues could be overcome, suggesting the existence of a dominant economic framing of building regulation, even in the face of core regulatory functions such as public safety and social equity (finding ch5-4). This analysis critically highlights the connection stakeholders make between technical compliance, enforcement decisions, and stakeholders' framing of NCC compliance as an economic problem.

5.3.3 Attrition patterns in the survey

The survey was affected by attrition and where respondents progressively dropped out of the survey. High levels of attrition in the survey was an unexpected feature of data. Although attrition is a problem for the strength of claims which can be made about the findings, the attrition is also interesting in itself and warrants further discussion. Hochheimer *et al.* (2016) who recommend that where possible, research should go beyond a simplistic reporting of attrition, and include analysis of where and why attrition occurs, which can shed light on the research questions.

In this survey, possible reasons why participants dropped out of this survey include:

- self-exclusion by participants located outside of Australia
- a belief that their profession/role was not of relevance to this research
- a loss of interest in participating in the survey due to a range of factors including a dislike of the survey format or wording
- an unwillingness to disclose their professional information

It is also useful to note that some studies have suggested that web-based surveys tend to have an increased risk of survey attrition (Hochheimer *et al.,* 2016). Three types of attrition occurred in this survey: dropout, skipping of questions and submission of non-useful data, for example, typing '123' in open-ended questions.

Table 5-9 Attrition Points resulting in participant dropout

Attrition Point (AP)	Location	Participation Decrease	Survey question	Answer Choices
AP-01	After Q1 (before Q2)	-13	Q2.Confirmation of non-heritage focus of research	Compulsory* Y/N response
AP-02	After Q2 (before Q3*)	-30	Q3.State your current profession	Compulsory* select from multiple choice list or option to type own response
AP-03	After Q3 (before Q4*)	-61	Q4.Perception of barrier	Compulsory* (Y/N)
AP-04	After Q16 to end	Disclosed as 'did not respond' (DNR) in reporting of findings	Progressive drop-out	Various

Table 5.9 shows the critical attrition points in the survey, resulting in participant dropout. The most substantial attrition points (AP-01, AP-02 and AP-03) were located at the start of the survey (Q2, Q3, Q4,). There was a further attrition pattern (AP-04) situated towards the middle of the survey (from Q17). Attrition points 01-03, all involved compulsory questions (denoted with *) and respondents were unable to avoid answering them without exiting the survey.

The attrition patterns highlighted in table 5.9 above had implications for data analysis. Progressive drop-out made it challenging to ensure the reliability of analysis where data was incomplete (Egleston & Meropol, 2011).

It was possible to identify dropouts at AP-01 included respondents from overseas, and who reported that they were based in Wisconsin, USA and Osaka, Japan. Adaptive reuse is also often connected to architectural heritage conservation (ICOMOS, 2013; ODASA, 2014; Conejos *et al.*, 2016). Therefore, several adaptive reuse stakeholders, who perhaps were solely focussed on heritage change-of-use conversion, may have realised it was not appropriate of them to participate further. Analysis of survey dropouts at AP-02 revealed that participants were mostly located in Adelaide at the time of survey activity. The AP-03 point in the survey with the highest attrition is between Q3 and Q4. Here respondents were asked to state whether they perceived, whether or not, building regulation is a barrier to change-of-use conversion. Question 4 was compulsory, and therefore attrition at Q4 resulted in survey 'dropout'.

AP-03 recorded a high number of respondents (61 respondents) exited the survey before answering this fundamental question at the centre of research. The pattern of withdrawal from the survey appeared to be important. Although these responses could be classified as outliers, the unusual pattern in attrition could include valuable data relevant to the RQ1. Attrition examination revealed there was a reluctance to engage with the research question RQ1 which is posed by survey Q4, which appeared early on in survey: is there a barrier to AR from building regulation. A breakdown of profession roles disclosed in Q3 can be seen in table 5.2. Overwhelmingly, the two stakeholder groups who exited the survey at this question (Q4) were building owners and policy advisors according to responses given in Q3. This insight was a further factor influencing the researcher's decision to focus on these two groups of stakeholders in the semi-structured interviews post-survey and discussed next in Chapter 06.

The final attrition pattern (AP-04), showed progressive dropout. An interesting pattern of AP-04 attrition is that progressive drop-out was more pronounced in the respondents who declared building regulation was a barrier (55 respondents) in Q4 than those respondents who believed NCC regulation was not a fundamental barrier (20 respondents). This pattern of attrition suggests that there were different levels of commitment to the survey completion by participants between the two groups. There are several potential explanations for this pattern detected, including that the attrition pattern could be purely coincidental. One other interesting interpretation is that respondent drop-out could be a product of a growing and uncomfortable awareness by participants that their professional experience on adaptive reuse projects did not support their earlier views of building regulation as an inhibitor. Cognitive dissonance describes a negative psychological state which can lead to avoidance behaviours (Festinger & Carlsmith, 1959). Recent efforts in research have been underway to re-examine the concept of cognitive dissonance in web-based surveys, particularly as a core motivational force for individuals as they face complex and psychologically demanding situations (Keusch, 2015; Hart, 2014; Gawronski, 2012). Cognitive dissonance could explain drop-out behaviours in the group of respondents who confirmed they believed building regulation is a key barrier. Their response could arguably be classified as avoidance when asked to unpack their views and provide evidence from their own professional experience. It is, however, impossible to verify this from the data contained in the survey.

5.4 Limitations of survey

The survey contained several problems which limit the number of findings which can be reached. As as the validity of the responses is questionable, and may contain bias in the results, further research methods were developed and only partial results from this survey can be used for further analysis. The decision to use partial results stem from these limitations, which for transparency are further discussed in brief below.

The survey design meant that only categorical data was collected, which could not be ranked and therefore limit the statistical analysis which could be done. The survey did not successfully answer the original hypothesis proposed at the start of the research process, and which highlighted the need for other methods to be employed to ‘test’ the stakeholder anecdotes which cite building regulation as a barrier to adaptive reuse. This also led to an inductive research design overall and generated new research questions as part of the inductive process.

5.5 Summary of Findings

Table 5.10 below provides an overview of the findings of this chapter. Cost implications of implementing building regulation are the main issues raised by stakeholders in open-ended comments in the survey.

The survey question Q4 revealed that a majority of respondents (73.3%) regard building regulation as a critical barrier to adaptive reuse development. Responses to open-ended survey questions, however, contradict this key finding indicating a far more nuanced picture than this finding suggests at face value. Cost of works and professional fees

Table 5-10 Summary of findings of Chapter 05 Survey

Finding Ch5-01:	***Finding ch5-01: demographics of those who participated in the survey closely matches the demographics of individuals participating in other studies in the field. The participants captured in the survey sample are representative of stakeholders involved in adaptive reuse in Australia.***
Finding Ch5-02:	***The majority of participants (73.3%) in the survey perceived building regulation and its enforcement to present barriers to change-of-use conversion projects in non-heritage buildings. This finding replicates several Australia-based studies involving stakeholders involved in the adaptive reuse process (Bruce et al., 2015; Bullen & Love, 2011).***
Finding Ch5-03:	***A large group of respondents (60%) indicated that building regulation barriers could, in their experience, be overcome in adaptive reuse projects. This finding contradicts Finding ch5-02.***
Finding Ch5-04:	***A large group of respondents (60%) indicated that building regulation barriers could, in their experience, be overcome in adaptive reuse projects. This finding contradicts Finding ch5-02 and qualifies Finding ch05-03. Cost emerged as an important theme in responses to open ended survey questions, suggesting that NCC compliance is an economic barrier to adaptive reuse.***

necessary to ensure NCC compliance, rather than technical challenges inherent in the NCC, emerged as a critical theme across open-ended responses. Furthermore, when asked in the survey about barriers arising from building regulation could, in their experience, be overcome in adaptive reuse projects, the largest group of respondents (60%) indicated yes.

Difficulties in survey design and resulting limitations were ultimately highly productive for this study, driving the development of new, more critical, research questions and the development of a mixed methods research design which: including interviews (Chapter 06) and; a novel method, developed by this thesis, to quantify and visualise office building vacancy in connection to office building obsolescence and adaptive reuse potential (Chapter 07). The survey could, therefore, be, metaphorically, regarded as a failed ‘experiment’ but one which stimulated efforts by the researcher for better ‘experiments’ to critically explore relationships between adaptive reuse, vacancy and building regulation. The development of research design, in Chapter 01 section 1.7, discusses these unexpected events in the research process and decisions by the researcher.

Finally, one further productive outcome of the survey, in light of the research questions of this study, concerns the stage at which surveyors, architects and other professionals who responded to the survey, are engaged in adaptive reuse projects. Many potential adaptive reuse projects may be deemed unfeasible by building owners and property developers before engaging surveyors or architects to progress projects. Building owners were under-represented in the demographic makeup of those who responded, making up just 5.3% of respondents. Attrition also affected buildings owners’ participation. This gap in the survey suggests the need to gather data from building owners about whether building regulation was a barrier to adaptive reuse from their perspective. This reasoning was a driver for Chapter 06 next and which features semi-structured interviews with building owners.

Chapter 6: Semi-structured interviews

An extract from semi-structured interview data:

Participant 06: At the end of the day if you are in a building, you are going to profit from the capital of that building. If you want to just sit there and spend no money on it and expect the world to come from to you, you're a bit self-entitled. It's a business decision like any other. Property doesn't make it any more sacrosanct. Right? You have responsibilities as a landlord to invest in your building. Make sure it still useful and relevant. You own it.

Personal communication, Armstrong (2018 April 06)

6.1 Organisation of chapter

This chapter examines qualitative data obtained from semi-structured interviews with stakeholders who make choices in obsolescence mitigation decisions. This chapter begins by detailing the method for this chapter, explaining why semi-structured interviews were chosen in the overall inductive mixed methods research design of this thesis. It discusses thematic analysis procedures and coding themes developed from the data using NVivo software before presenting the analysis from data and how findings fit with existing published literature in the field.

6.2 Method

The semi-structured interviews were undertaken to provide data to answer research questions RQ2 and RQ3. The interviews were undertaken in the first half of 2018 and involved nine office building owners in Adelaide CBD and two senior policymakers from state government departments who had responsibility for adaptive reuse policy in SA. Building owners were chosen as the sample population for interviews because they typically make final decision on adaptive reuse feasibility (Wilkinson, 2018). Earlier studies used interviews with building owners for this reason (Bruce *et al.* 2015; Bullen & Love 2011).

Semi-structured interviews conducted as part of this research play an essential role in the overall story of research and the research design of this study. Methodologically, the small sample size encouraged the researcher to develop further the quantitative building population study, which will be described later in Chapter 07. The small response from extensive recruitment to participate in interviews was a driver for efforts to triangulate and critically explore vacancy to understand participants' views given in interviews.

Themes generated from the content of participants' responses to interview questions suggested some revealing insights about Adelaide's office building problems, especially in light of Chapter 04 Analysis of public debate. This chapter reveals participants' views and experiences of building regulation and adaptive reuse, and ultimately highlights the need for a more critical appraisal of adaptive re-use as a go-to strategy for regenerating vacant buildings within Adelaide CBD. This insight is a crucial overall finding of this study with implications for policy development and regulation practice.

While chapter 05 examined stakeholders' broad perceptions of adaptive reuse and building regulation across Australia (RQ1), this chapter focusses on stakeholders within Adelaide (RQ2). In particular, it searches for the evidence, local to Adelaide, to support the wider perception of building regulation as a critical barrier to adaptive reuse.

6.2.1 Selection of semi-structured interviews as a method

In terms of complexity, adaptive reuse is a process that is complex with a high number of variables involved in the process (Wilkinson, 2018). Adaptive reuse is also a commercial activity. Consequently, any discussion with building owners about his topic can potentially reference financially sensitive data from their perspective, and also might cause discomfort for them. Indeed as noted in Chapter 02, previous studies investigating stakeholder views about potential barriers to reuse have captured economic viability as a key issue highlighted in data (Olivedese *et al.,* 2017; Gosden, 2017; Andrews *et al.,*2016; Yung & Chan, 2012; Bullen & Love, 2011). This literature highlights the commercial sensitivity affecting research participants which need to be considered and accommodated in the recruitment strategy and semi-structured interview question guide, including the welfare of participants. Ethical consideration was given in attention during the planning of the interview recruitment strategy, design of the semi-structured interview questions, and implementation of this data collection method (see appendix 6-A, and section 3.4 Ethics appendices 3-A and 3-B).

Interviews have been widely used for qualitative data gathering by previous studies in this field investigated by this study and, specifically, in the context of investigating challenges to adaptive reuse in Australia (Bruce *et al.,* 2015; Bullen & Love, 2011b; Conejos et al., 2013) as well as internationally (Yung & Chan, 2012; Remøy & van der Voordt, 2007; Shipley et al., 2006). As reported in Chapter 02, three Australian studies captured by the literature review identified building regulation is a primary, major or significant barrier nationally for non-heritage adaptive reuse and adaption (Bruce *et al.*, 2015:150; Udawatta *et al*., 2016:1; and Bullen & Love, 2011:41). Two out of these three articles used semi-structured interviews as the primary data gathering method (Bruce *et al.*,2015; Bullen & Love, 2011). Furthermore, findings from the e-survey echoed stakeholder views about building regulation reported in these two earlier studies and which adopted semi-structured interviews as a method (Bruce et al., 2015; Bullen & Love, 2011). For instance, fire safety and disability access elements of the NCC code were referenced by several respondents to the e-survey and also highlighted as barriers by participants interviewed by Bruce *et al.,* (2015) and by Bullen & Love, (2011).

Semi-structured interviews, as opposed to structured or unstructured interviews, was chosen in this study because it provided several advantages in terms of a good fit with the research questions of this thesis, specifically RQ1 and RQ2. In their article about research methodology, Merriam & Tisdell (2016), detail a continuum of interviews and semi-structured identified as a particularly versatile and flexible format, occupying a middle ground within the continuum (p.110). Versatility and flexibility are beneficial attributes in terms of this research study and where research questions address complex processes or sensitive issues (Kallio *et a*l., 2016; Rowley, 2012).

One other advantage of the semi-structured format in light of the building owner population profile and research questions was that it encourages dialogue between the interviewer and participant which enables "the interviewer to improvise follow-up questions based on participant´s responses" (Kallio et al., 2016:2945). This flexibility was essential for clarifying details within responses by building owners given the complexity and sensitivities around real-life construction projects.

Face-to-face delivery of semi-structured interviews was chosen in order to ensure that respondents felt as far as was possible, comfortable discussing details of their practice and decision-making around adaptive reuse. Telephone interviews were considered as an option in the research design process. It was, however, decided to follow the advice of Brinkmann (2013), when he suggests that face-to-face interviews provide higher quality, more detailed data when compared with telephone interviews in discussing topics or issues which could be sensitive for participants (p.53). This decision is also supported by Ryan *et al.*, (2009) who indicate that face-to-face interviews are the optimum format for developing trust between interview and interviewer and which they suggest is needed to achieve for the quality and quantity of data as well as optimal recruitment. Furthermore, observations from Bruce *et al.* (2015) in their study of factors influencing the retrofitting of existing office buildings in Adelaide, suggest that office building owners could be a hard-to-reach group for participation in research: this insight emphasises the importance of face-to-face delivery as the format most likely to appeal to this population and encourage recruitment.

6.2.2 Designing the interview guide

A semi-structured interview guide was developed and followed recommendations made by Kallio *et al.* (2016) for best practice in design. In developing an interview guide Kallio *et al.* (2016) recommend five 'inter-related phases' of development which are: (1) identifying the prerequisites for using semi-structured interviews; (2) retrieving and using previous knowledge; (3) formulating the preliminary semi-structured interview guide; (4) pilot testing the interview guide; and (5) presenting the complete semi-structured interview guide (p 2961). Kallio *et al.* (2016) add that "Developing a semi-structured interview guide contributes to the trustworthiness of the semi-structured interview as a qualitative research method" (p. 2961).

Pilot testing of the semi-structured interview guide was undertaken to scrutinise and develop the guide further. In a deviation from this 5-stage process due to the expected difficulties in participant recruitment, piloting the guide was done through a review with the researcher's supervisors and testing interview questions during an informal discussion with a supportive adaptive reuse stakeholder not included in the final sample. The resulting semi-structured interview guide is given in Appendix 6-A. Specific interview questions used in interviews were mapped to RQ1 and RQ2, see table 6.1 below.

Table 6-1 Interview questions mapped to interview questions

Research Question	**Interview Question (s)**
RQ2. Focussing on Adelaide, what evidence is there to support stakeholder views of building regulation and adaptive reuse?	**Q1:** Have you considered change-of-use (CoU) conversion for any of the buildings you own? **Q3**: What are your thoughts surrounding reusing existing buildings? **Q5**: In your opinion, what factors prevent a change of use conversion of lower quality (C & D grade) office buildings?
RQ3. Does building regulation need to be reformed to encourage adaptive reuse?	**Q2:** What are your thoughts on the current office building vacancy rates in SA? **Q4**: Do you think the lower-grade office buildings in the CBD are a problem in SA? **Q6**: Is there anything that the local council or state government should support building owners, especially to promote a change-of-use conversion?

Interview questions were carefully designed to be non-leading and followed the advice on question design given by Kvale and Brinkmann (2015) in their detailed study of the interview method. Kvale and Brinkmann (2015) highlight the importance of time spent by the researcher on the meticulous wording of questions to minimise the potential of interviewee bias. Kallio *et al.* (2016) echo this recommendation in their article on interview design. The semi-structured interview guide developed also allowed participants to 'tell their story' while ensuring topics, important to the research objectives, were discussed: enabling participants to have a sense of agency when conveying their thoughts about the research topic is suggested to be an important basis for establishing mutual trust in interviews (Kvale and Brinkmann, 2015).

An important principle of question design was the need to avoid introducing bias in the focus and wording of questions. For this reason, interview question did not directly refer to *building regulation as a barrier to adaptive reuse*. This strategy is informed by insights gained from qualitative analysis of survey data, and inaddition to recommendations about using non-leading questions, or indirect questions in interview methods (Brinkmann & Kvale, 2015). The interviewer only referred to building regulation as a barrier to adaptive reuse as a last reort to check that the participant had not inadvertently forgotten to mention building regulation in their responses. Any direct discussion of building regulation as a barrier was postponed to the final moments of the interview "after subjects have given their own spontaneous decriptions and had indictated which aspects of the phemona are central to them' (Brinkmann & Kvale, 2015:161).

At the same time the content of interview questions also, pragmatically, recognised that participants would be aware of the controversy surrounding adaptive reuse as a response to high office building vacancy and which was the subject of lively public debate when interviews were conducted. Question 4 (Do you think the lower-grade office buildings in the CBD are a problem in SA?) acknowledges this broader political and cultural context for this research study and prompts a response by participants.

6.2.3 Recruitment of participants

The researcher partnered with Adelaide City Council (ACC) to undertake recruitment for interviews. ACC Planning Department generously, acted as a third-party agent, contacting building owners who owned buildings in Adelaide CBD. The researcher spent considerable care and time in facilitating effective recruitment of owners of office buildings in Adelaide CBD. Detailed preparatory work was undertaken before contacting potential participants. This preparatory work included building relationships with suitable third party organisations who are in a position to ethically contact the groups of people needed for interview and ensure the demographics of the potential sample matched with the research focus of this study, on multi-storey, post-war, non-heritage, office buildings located within Adelaide CBD (see Chapter 1 Introduction).

The invitation to participate in a semi-structured interview was sent by post and email (refer to Appendix 3-B). A total of 393 individual building owners were invited. Addresses of office buildings were supplied to the ACC Planning Department, after the construction of the office building population database (detailed in chapter 07). The office building population database enabled the identification of office buildings from the secondary data supplied to the research by ACC Valuer Finance and Business Department. Further details of this secondary data can be found in the method section of chapter 07.

After the targeted invitation to participate via Adelaide City Council (see appendix 3-B), two individuals, who held senior policy roles within building reactivation and planning departments of the DPTI, independently contacted the researcher and expressed an interest in being interviewed. Both individuals could potentially provide revealing insights about the enforcement of policy pertinent to adaptive reuse but were not strictly building owners. It was therefore decided to include both individuals in the overall semi-structured interview sample group as it was reasoned that data gathered from both policymaker participants would be especially useful to help contextualise analysis of data gathered from building owners. This decision is supported by Beitin (2012) who is a discussion of interviews and sampling, comments that so long as they are pertinent to the research question (s) samples do not necessarily need to be homogenous in constitution adding that "Variations in social roles [of those interviewed] do offer the opportunity for a diverse range of meaning" (p.249).

6.2.4 Interview practice

In keeping with the semi-structured format, participants were provided with opportunities during interviews to spontaneously discuss building regulation in relation to adaptive reuse. The interviewer remained silent when the participants signalled a desire to 'think aloud' about the issues under investigation. Adopting this strategy by the researcher is recommended by literature as a useful non-verbal probing technique for researchers (Whiting, 2008). The researcher delivered questions in a manner sensitive to participants' welfare during the interview process. Care was taken during questioning, for example, to ensure that participants did not feel pressurised to make statements made about technical compliance or disclose financial issues. The researcher delivered interview questions in a way which avoided suggesting that the interviewer was attempting to test them about their technical knowledge of NCC regulation codes. Nonetheless, careful verbal probing by the researcher was used to extract the most relevant data from interviews in terms of the RQs. For instance, where participants indicated the view that building regulation was a barrier to adaptive reuse, the researcher invited them to discuss specific cases using investigative questioning and to explore which aspects of NCC code, might have adversely affected an adaptive reuse project. In the context of a discussion about individuals who might be classified as from an elite or expert demographic, Kvale and Brinkmann (2015), recommend that interviewers make specific efforts to unpick 'talking tracks' which some participants may have as automatic responses but which are lack detail (p. 173). Arguably, participants recruited for this study are from an elite social group, as commercial property owners, and this technique is, therefore, relevant to employ.

6.2.5 Sample Size

A total of 9 semi-structured interviews with building owners and two interviews with senior policymakers transpired. Methodological literature has moved away from specifying sample sizes for interviews over the last decade (Beitin, 2012) but a brief comparative discussion of this sample in light of literature is illuminating. Research studies directly pertinent to the RQs of this thesis were captured as a group by the literature review. Caution, however, needs to be exercised in this comparison, given the potential limitations of some of the studies detailed below, and which includes exploratory conference papers. Studies, found in the literature review, which use interviews of any type, are represented in table 6.2 below. The sample size is detailed in table 6.2 in ascending order to aid the reader in identifying where the sample size for the semi-structured interviews ranks alongside other research in the field.

As is evident, from table. 6.2 below, the interview sample size of this study is small (n=11) but comparable with other research in the field. The conclusion also supported by Beitin (2012) and who, in a review of literature about sample sizes in qualitative studies, suggests that interview samples anywhere within a range of 2-25 participants (p.244) are acceptable.

Table 6-2 Interview sample sizes

Author	Study title	Methods	Sample
Giuliani *et al.* (2018)	Reusing grain silos from the 1930s in Italy. Multi-Criteria decision analysis for the case of Arezzo	Case study; interviews, representative statistics.	**n=2** interviews
Bruce *et al*. (2015)	Factors influencing the retrofitting of existing office buildings using Adelaide, SA as a case study	Qualitative; semi-structured interviews, snowball sampling; Australia: Adelaide, SA	**n=6,** Industry practitioners: real estate managers, developers, and an architect
Elliott *et al.* (2015)	A new lease of life? Investigating UK property investor attitudes to low carbon investment decisions in commercial buildings	Qualitative; face-to-face semi-structured interviews; literature review; UK	**n=10**, senior property investors
Armstrong (2020)	*This PhD study.*		**n = 11**
Dyson *et al.* (2016)	Critical success factors of adapting heritage buildings	Qualitative; semi-structured interviews, Western Australia	**n=15** interviews (7 architects, 3 clients/ owners, 3 site managers, 1 building surveyor, and 1 town planner)
Aigwi *et al.* (2018)	Efficacy of adaptive reuse for the redevelopment of underutilised historical buildings	Focus group, questionnaires	**n=22**, stakeholders comprised of: design professionals, valuers, building owners, legal & heritage representatives, & local gov. council representatives
Bullen & Love (2011)	A new future for the past: a model for adaptive reuse decision-making	Qualitative; semi-structured interviews; Australia: Perth metropolitan area	**n=81**, architects, developers, planners, building managers/ building owners and property consultants

6.2.6 Transcription of data

All interviews were audio-recorded and the transcription took place immediately after each recording to capture the data as comprehensively as possible. Interviews were transcribed verbatim. Transcriptions were checked for accuracy against the original recording before being changed to protect participants' anonymity: each participant was allocated a number; all personal names and building addresses they mentioned from which they could be identified were removed and replaced with 'XXXX'. Participants are identified with a number from 01-11 in extracts from interview transcripts.

6.2.7 Thematic analysis and coding

Thematic analysis (TA) was undertaken by the researcher, using NVivo-12, to explore the parent-child themes set out in figures 6.2 to 6.5. TA was chosen as an appropriate method of qualitative analysis of the semi-structured interviews as it offers a useful approach to developing a coding framework for inductive research (Braun & Clark, 2012). TA is a method of data analysis which is structured but flexible, enabling the researcher to use different ways to focus on the data most useful to the research questions (Braun & Clark, 2012:58). This study adopts recommendations and guidance from Braun & Clarke (2012) to develop a semi-structured interview coding framework. TA, as noted by Braun & Clark (2012), is also useful because two equally valid coding types are identified: descriptive (or semantic) codes and interpretative (or latent) codes (p.61-62). TA permits the combining of these two code types within a single framework. This plasticity is useful for addressing different perspectives identified in multiple research questions central to this thesis.

Data was coded initially by hand and then using NVivo software, following the six-step thematic analysis process identified by Braun & Clarke (2012) as 1) Familiarisation with the data; 2) Coding; 3) Searching for themes; 4) Reviewing themes; 5) Defining and naming themes; and 6) Writing up (p.61). In a further article about the process underpinning TA, Braun & Clarke (2013) add that "This should not be viewed as a linear model, where one cannot proceed to the next phase without completing the prior phase (correctly); rather analysis is a recursive process" (p. 120).

Themes and codes were developed using the 6-step process by Braun & Clarke (2013), and the final codes are represented in figures 6.2 to 6.5, located at the end of this method section and immediately before section 6.3 Findings. Figure 6.1 illustrates the coding structure adopted by this study for thematic analysis of the semi-structured interviews, with a larger theme followed by parent and its child codes.

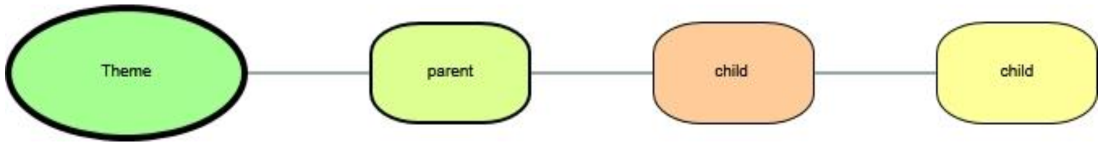


Figure 6.1 Key for coding theme diagrams figures 6.2 to 6.5

Further examination of semi-structured interview responses revealed which sections of the NCC standards were perceived as challenging in adaptive reuse developments. When discussing regulation, participants mainly referred to barriers by issue, rather than refer to the specific performance standards within the NCC. The researcher's own professional experience and knowledge of NCC were used to classify participants' comments in terms of current NCC provisions, and to make sense of the data. Specific reference was rarely made to the NCC documents themselves, except for one participant (05). For example, participants would talk about fire safety and egress in a more general sense, instead of DP4 Exits or NCC Volume One Part D1 Provisions for Escape.

As discussed above, one benefit of TA is that it can combine both descriptive (or semantic) codes and interpretative (or latent) codes (Braun & Clark, 2012:61-62). Latent coding was restricted to stakeholders' attitudes about Adelaide and adaptive reuse to maintain the focus of the research questions of this thesis. The latent theme of 'attitudes' was done to provide a background for subsequent analysis using descriptive coding.

A general weakness of interview as a method of data collection is that respondents can exaggerate or skew their responses to glorify their "foresight, rationality, or creative entrepreneurialism" (Peck & Theodore, 2012:26). This tendency can lead to a potential problem with the honest and accuracy of responses in data. In dealing with this potential limitation, the analysis, of semi-structured interview data, accounted for potential inaccuracies by critically evaluating responses against more than one question and against examples they cite. It was also decided that triangulation of qualitative data collected via interview would be triangulated with quantitative data examining office buildings, vacancy distribution, and instances of office building adaption that had recently triggered the requirement to achieve NCC compliance.

A limitation of semi-structured interviews is that bias can emerge in the identification and selection of themes that arise during qualitative data analysis, particularly studies in which qualitative data is gathered and analysed by a sole researcher (Campbell *et al.,* 2013:294). To address this potential limitation intercoder agreement, between the researcher and supervisors, was therefore established during stages 5-6 of the six-step thematic analysis process identified by Braun & Clarke (2012). This thematic analysis process is discussed above in section 6.2.7. Initial codes of two randomly selected semi-structured interview transcripts (interviews with participants 03 & 07) were generated independently by three researchers: the PhD candidate, the principle and co-supervisor of this thesis. Both PhD supervisors were chosen to establish intercoder agreement because they had strong knowledge about the purpose and research questions of this thesis. All coders took a sample of a randomly selected semi-structured interview transcript as a representative sample of the data. Independent coding was reviewed together by all three coders and agreement was reached about the codes generated.

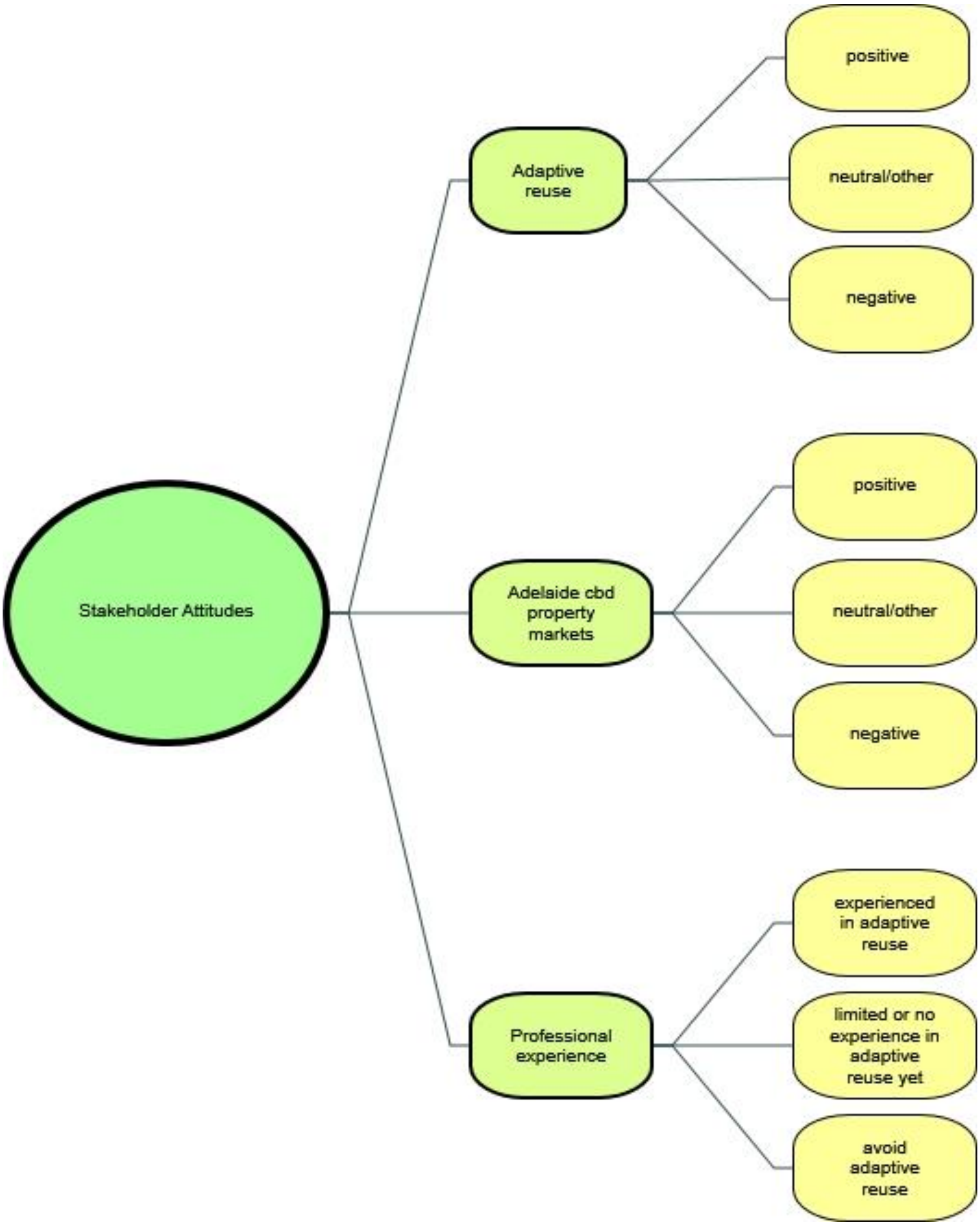


Figure 6.2 Theme: Stakeholder Attitudes

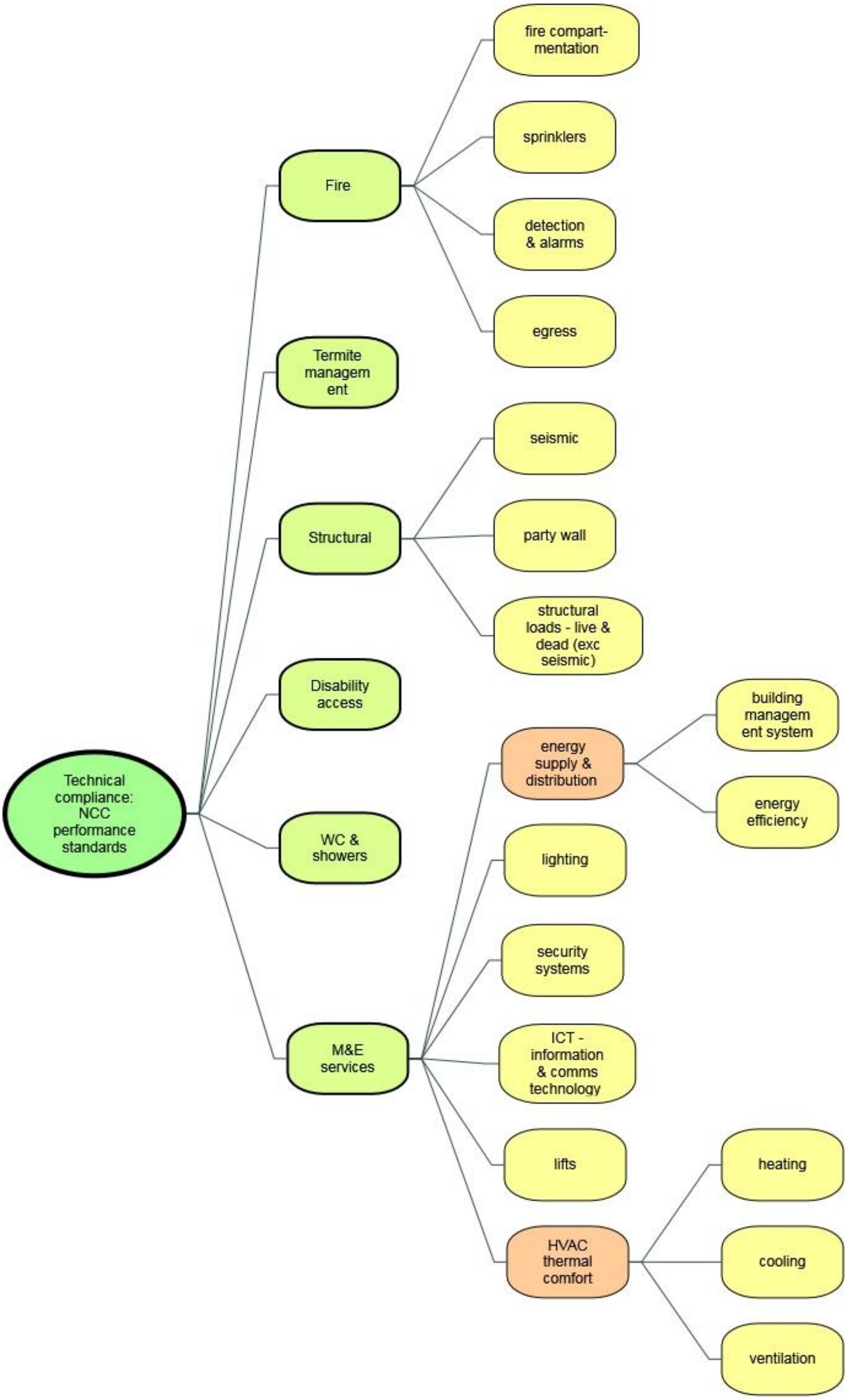


Figure 6.3 Theme: Technical compliance NCC

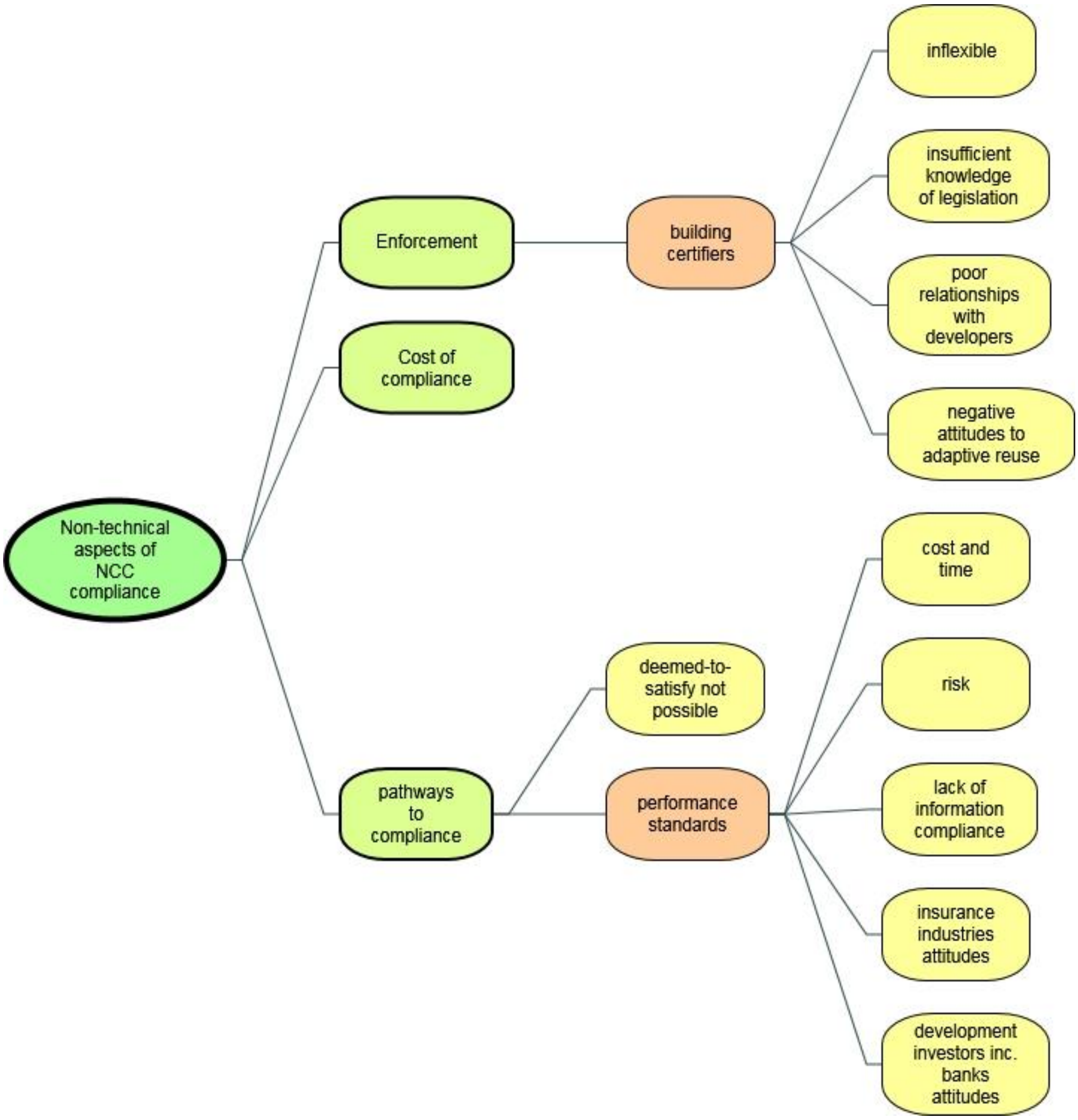


Figure 6.4 Theme: Non-technical aspects of NCC compliance

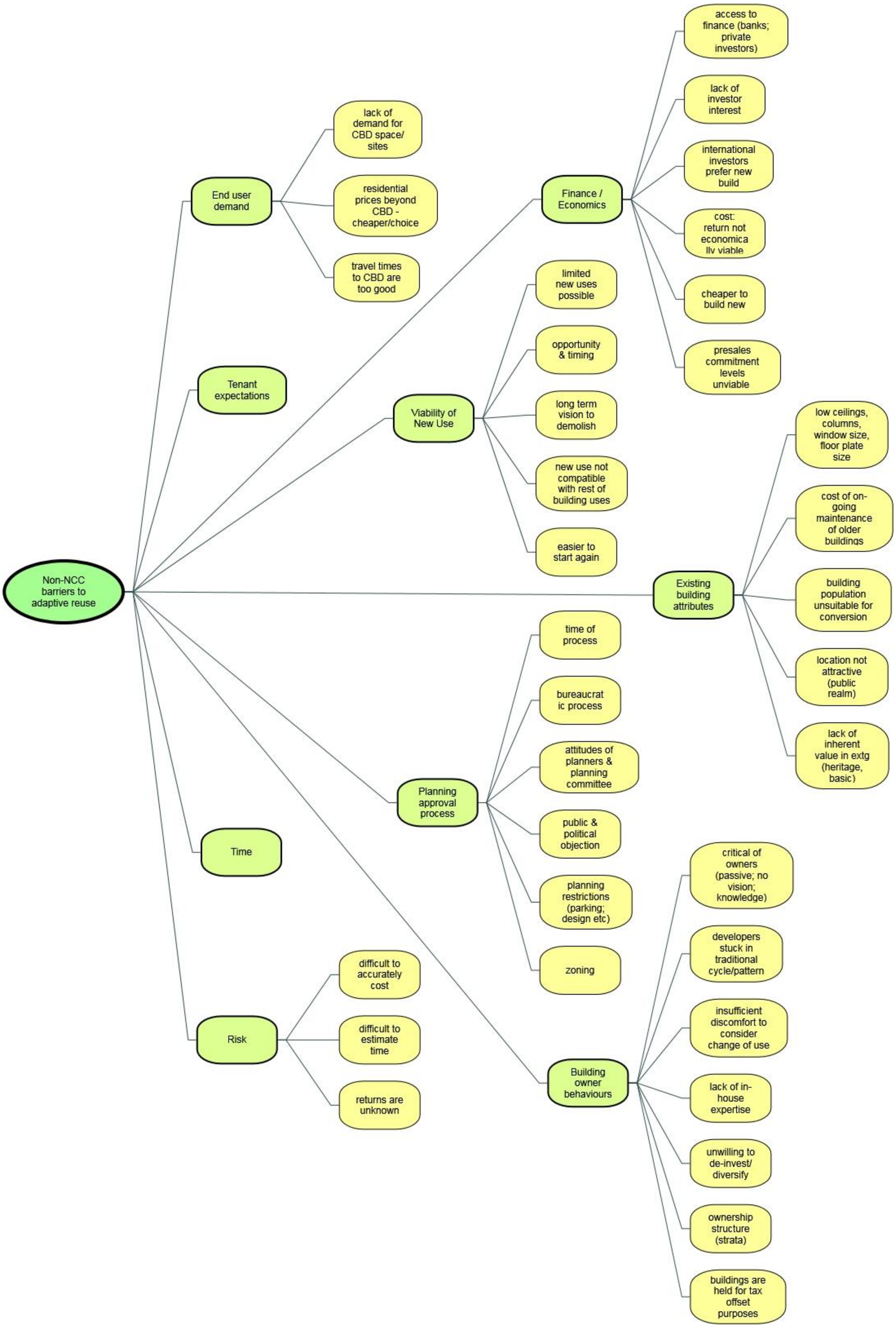


Figure 6.5 Theme: Non-NCC factors to consider for adaptive reuse developments

6.3 Results

Four themes were identified across the semi-structured interview data. These themes consist of stakeholder attitudes, technical compliance with NCC performance standards, non-technical aspects of NCC compliance, and finally non-NCC barriers to adaptive reuse. The analysis of these themes is given in what follows, with section titles reflecting the findings disclosed.

6.3.1 Interviewees' experience and attitudes towards adaptive reuse

Attitudes to adaptive reuse as a strategy by developers and building owners are contextualised by participants thoughts about Adelaide CBD property market and also their own professional experience of undertaking adaptive reuse. See figure 6.2 for how participants' attitudes were coded into three parent codes before connections across these codes were drawn.

Data disclosed that participants held a range of attitudes to adaptive reuse of existing buildings but that the majority viewed it positively. Specifically, participants suggested that adaptive reuse was a desirable strategy to address premature obsolescence (see table 6.3). This favourable view was held by the majority of the sample, and this fits with findings by several existing studies who interviewed stakeholders in the adaptive reuse process. Comments in favour of adaptive reuse include:

[02]: "I believe very strongly in it"
[07]: "Well that's basically what we do"

Finding ch6-01: the majority of participants reported a positive view of adaptive reuse and regarded it as a constructive response to building obsolescence.

This finding correlates with existing literature. Aigwi *et al.* (2018), for instance, report highly positive views about adaptive reuse as a potential tool for urban regeneration in their New Zealand-based study involving 22 stakeholders and which had a focus upon the adaptive reuse of underutilised historical buildings.

One participant, who was positive about adaptive reuse in principle, reported that it is "probably quite difficult" [04]. In contrast, two participants, who held wholly negative views about adaptive reuse, stressed that adaptive reuse was not an appropriate response to building obsolescence [01, 03]. For example, a participant expressed reservations about the achievability of adaptive reuse in practice and expressed the view that "its just not economically viable to convert" [01]. Furthermore, two participants' views could not be categorised as positive or negative about adaptive reuse [05, 06]. Interestingly, one participant avoided discussing adaptive reuse at all, even when explicitly prompted and referred, instead, to upgrade or demolition [05].

Participants attitudes towards adaptive reuse can be mapped against other perceptions relevant to the office building market in Adelaide (see table 6.4). Analysis of transcripts by respondents who expressed negative views of adaptive reuse [01, 03] suggests that they also held negative views of Adelaide or believed that the broader public in Adelaide did not support adaptive reuse. Respondents holding unfavourable views of adaptive reuse, also tended to disclose a lack of experience in adaptive reuse, explaining that while they were experienced building owners and developers, they had never undertaken adaptive reuse. For instance, participant 01 commented that he "had not considered" adaptive reuse as an action for buildings he owned and was adamant that it was "much too costly to convert" buildings. This view resonates with an important qualitative study in the field by Bullen and Love (2011) and which also interviewed building owners amongst others (n=81) involved in adaptive reuse decision. Bullen and Love (2011) summarise stakeholders' views that "Unless a built asset has some redeeming aesthetic features or is heritage listed its reuse may not be an economically and sustainably viable option." (p. 39). Post-war office buildings focussed on by this study do not fit the valued heritage profile and the views expressed by participant 01 are in keeping with this observation by Bullen and Love (2011).

Table 6-3 Semi-structured Interviews: participants views of adaptive reuse

ID	Views of adaptive reuse
	Positive
2	I have made it my lifetime occupation. I very strongly believe in it and I have made it from an artform to a profession to a money-making business.
4	It [adaptive reuse] definitely needs to be researched and promoted more heavily than it has been; Make more efficient use of the buildings in the CBD that way; I think we need to take the blinkers off a bit to consider things that might not look like a traditional apartment.
7	Well that's basically what we do [adaptive reuse]. So were quite happy to be involved in that area.
8	The incontrovertible aspiration....is for spaces within cities to be efficiently & effectively used; But I think there is a space for it absolutely.
9	So reusing buildings is something that should happen but I don't think it happens enough.
10	Adaptive reuse of buildings is really important.
11	Adapting existing buildings to new uses provide for exciting design and experiences for people that are not necessarily available through newbuild. This still needs to be, from the point of view, considerations of health and safety.
	Negative
1	As for Change-of-use, look a building arrives at a point in it's lifetime that nothing can be done to save it in particular commercial or even residential, it is just not economically viable to convert or do otherwise. Demolish or rezone the land for alternative use.
3	But these aren't the mainstream, these are the odd examples. Well its [adaptive reuse] very problematic.
	Other (neutral or avoidance)
5	It's very specific to the building itself. Note: Avoidance of talking about adaptive reuse, reverted back to existing building vacancies and demolition.
6	I don't really have a choice. We have finite resources. We have to make best use of [existing buildings]; What's our end game here? What's a purpose for these buildings? Are they going to be here for the next 20 to 30 years? Because we are re-fitting them? Or do they need to exist at all?

Table 6-4 Semi-structured Interviews: participants views of Adelaide

Positive (+ve) negative (-ve) and neutral (?) views of adaptive reuse summarised from table 6.3

ID	Professional experience and views of Adelaide	+ve	-ve	?
1	Strata building owner, non-heritage, multi-storey office buildings in Adelaide CBD; avoids adaptive reuse		✓	
	Negative view of Adelaide through economic lens: *I have been witness to the failure of 1970's, ...Of recent times failure Port Adelaide Quays*			
2	Experienced building owner and developer specialising in adaptive reuse	✓		
	Positive view of Adelaide through individual lens: *You can see I am passionate about Adelaide. I want to help my community. If I can get my city to grow, it helps me. I care. Because I've kids here*			
3	Building owner and multi-storey residential developer in SA; Construction professional; not yet experienced in adaptive reuse process		✓	
	Limited view of Adelaide through residential market lens: *Not in cities like Adelaide; So purely from residential point of view, fundamental no.1 question is, would I, if I want to develop something, would I live here? No. Not the hardcore city, busy CBD locations. Now, if you live in Melbourne, New York Paris & London, you do, you accept that.*			
4	Building owner and office building property portfolio manager in Adelaide CBD; not yet experienced in adaptive reuse process but wants to explore	✓		
	Neutral views; professional distance noted: *So they're aren't the same pressures on Adelaide CBD that you have inside London or Sydney where people are commuting in for an hour and a half and it's really hard work and then if they can live in CBD they would. Here there's a bit more choice.*			
5	Commercial Property Manager for office building owners in Adelaide CBD; experienced in adaptive reuse feasibility process			✓
	Neutral views; professional distance noted: *There is a lot of buildings that are either dead empty the number of tenancies are not paying their overheads. They are still in the hope of getting it filled up*			
6	Strata building owner, landlord, building upgrade, not adaptive reuse			✓
	Positive view of Adelaide through individual lens: *I'm Adelaide centric, been here all my life, and we do have a better living here. We can attract the best and brightest. And they're the kind of people were trying to attract*			
7	Building owner, landlord & occupier; expert in adaptive reuse & heritage r	✓		
	Did not express a view of Adelaide			
8	Government policy maker; experience in existing building re-activation	✓		
	Did not express a view of Adelaide, but discussed other cities negatively: *You'll find that the city centre of Perth, it's similar, just lacks a lot of soul. It really hasn't got much of a heartbeat. It has between nine and five but after that it just dies.*			
9	Building owner & construction professional & sustainability advisor; experienced in adaptive reuse	✓		
	Sympathetic view of Adelaide: Poor old little Adelaide. If you're in Sydney or Melbourne the demand would be there. Look I think Adelaide, its got its benefits in some ways, Adelaide has definitely lead the way in many things, especially in sustainability over the years.			
10	Building owner; expert in adaptive reuse; construction professional	✓		
	Did not express a view of Adelaide			
11	Government; Built Environment Policy; experienced in existing building re-activation; construction professional	✓		
	Did not express a view of Adelaide			

6.3.2 Perceptions: NCC performance standards are a key barrier

Participants' perceptions of problematic NCC performance standards are mapped by parent-child coding diagram figure 6.3, located at the end of the method section above. Performance standards within the National Construction Code (building regulation) was reported as a barrier to change of use conversion of office buildings in Adelaide CBD by 45% of the semi-structured interview sample. This group of participants mirror stakeholder views captured in the review outlined in Chapter 02 of this thesis and, also in literature reviews undertaken by Hsu *et al.* (2017); Tan *et al.* (2014); and by Langston *et al*. (2008).

Five participants explicitly stated that they perceived NCC performance standards act as barriers to change of use conversion in South Australia [02, 04, 05, 07 & 09]. Comments included:

[04]: "And certainly fire regulation gets a mention every time we talk about this subject."
[05]: "another big problem is…you need to upgrade it to a 9B category 09 but often these days to bring stuff up to code… can be cost-prohibitive".

Finding ch6-02: several participants expressed the view that NCC standards (building regulation) are a key barrier to adaptive reuse of office buildings.

Fire safety and disability access were identified the highest number of times by participants. Table 6.5 represents a breakdown of which issues were mentioned by participants, that had relevance to NCC Volume One provisions. This feature of semi-structured interview data fits with several Australian-based studies, highlighted by Chapter 02 Literature Review, and which explicitly refer to provisions covered by NCC Volume One[2]: fire safety (Conejos *et al*., 2016; Udawatta *et al*., 2016; Bruce *et al.,* 2015; Bullen & Love, 2011); and disability access (Conejos *et al*., 2016; Bruce *et al*., 2015; Bullen & Love, 2011).

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[2] For detail, fire safety is included in NCC Volume One under Sections C Fire Resistance; Section D1 Provision for Escape & D2 Construction of Exits; within Access & Egress; & Section E Services and Equipment. Disability access is included in NCC Volume One under Section D3 Access for People with a Disability within Access & Egress.

Table 6-5 Participants' reference to NCC Codes

Participant ID	NCC code issues mentioned when discussing barriers to adaptive reuse of office buildings										
	Fire, egress, access, window to boundary distance; stairwells; compartmentation	**Disability access & WCs**	**Seismic; earthquake**	**Structural - non seismic**	**Energy efficiency**	**air con**	**Lifts**	**other M&E services**	**party wall**	**Termite Management**	**WCs, showers**
01											
02	✓	✓✓		✓		✓✓	✓	✓	✓	✓	✓
03	✓										
04	✓✓					✓	✓				
05						✓					
06		✓									
07	✓	✓✓	✓								
08	✓	✓✓									
09	✓		✓✓	✓	✓						
10											
11	✓✓✓	✓✓✓			✓						

Structural compliance, including provision for seismic events, also attracted attention [02, 07, 09]. Air conditioning was also highlighted along with energy efficiency and other electrical services but to a lesser extent [03, 04, 05, 09]. Participant 10 avoided making any reference to specific building codes in the NCC. Instead, they referred to building codes within voluntary rating systems such as Greenstar.

One participant disclosed that they avoided owning older office buildings due to building regulation compliance requirements but disclosed had no personal experience of barriers arising from these requirements [01]. One participant actively avoided communicating their views about NCC standards when explicitly asked, during the semi-structured interview [10] and should, therefore, be regarded as neutral.

Finding ch6-03: In keeping with several other pertinent Australian studies, fire safety and disability access were mentioned, respectively, with the highest number of times by participants who considered NCC standards as a key barrier to adaptive reuse.

6.3.3 Perceptions: no barrier from NCC performance standards

In contrast, to finding ch06-03, four participants did not perceive NCC standards as a key barrier to change of use conversion [03, 06, 08 & 11]. Instead, they pointed to the reality of successful adaptive reuse they undertook or had already occurred in Adelaide CBD:

[06]: "oh totally, this building here. I totally gutted it, this is a really interesting experiment, this one. I did not want to own it myself. I just wanted to lease it [at first]."

In response to a specific question, about examples of incidents where NCC provisions prevented adaptive reuse, participant 08 emphasised the number of successful examples of office building adaptive reuse in Adelaide CBD.

[08]: "There are some great buildings that have been converted to new uses, fantastic new uses, but the building stock themselves the buildings are beautiful anyway. And some of them like the Torrens building in Victoria Square have been converted to a new use by Carnegie & Mellon, converted to an education-use and a couple of other international private institutions. We've got another one down there where Torrens University is down at 68 Grote Street, which is a former office building, showroom, that

has been changed into a university campus, student hub type building. Which is fantastic. Really inventive fit-out. But you have a tenant in both of those situations, a building that is in a prominent part of the city, with a large amount of floor space, with the tenant that has the capacity, the product to re-utilise it."

Several participants were, in fact, highly critical of the perception that NCC building codes were problematic, including the associated notion that some relaxation in NCC performance standards is a helpful idea. For instance, participant 03 commented that any relaxation in NCC Fire standards was an unwise and was a public safety issues.

[03]: "Because you are not going to relax fire safety. Look at the situation with the external panels in London and Melbourne."

This response could be seen as counter to the anti-building regulation discourse highlighted by Imrie and Street (2011) summarised as a "...belief in the freedom to build, unfettered by rules and bureaucratic processes and procedures" (Imrie & Street, 2011:71). In addition to these four participants who were positive about NCC provisions [03, 06, 08 & 11], participant 10 can only be categorised as neutral in their view of NCC compliance on adaptive reuse developments, as explained earlier. Participant 01 did not express a clear view of whether building regulation is a key barrier to adaptive reuse during the interview. Participant 10 could not name any NCC regulations that had been problematic in their adaptive reuse of office buildings and highlighted congenial, professional relationships with certifiers to enable successful adaptive reuse.

[10]: "Have good relationships with our certifiers and relationships with DPTI… that make the process relatively straightforward."

Four participants detailed successful approaches for achieving compliance were deemed-to-satisfy solutions were not feasible [02, 07, 10, 11].

Finding ch6-04: Participants, explicitly expressed the view that NCC standards (building regulation) did not constitute a pivotal barrier to adaptive reuse of office buildings, contrary to existing Australian research studies, which report stakeholders' perceptions about building regulation and adaptive reuse. Other participants avoided expressing the view that building regulation is a barrier to adaptive reuse.

This divergence of views about NCC standards by participants in the sample is revealing because it suggests a more differentiated and nuanced response by building owners to building regulation as a primary barrier to adaptive reuse than might be otherwise be gleaned from some existing literature about this topic. As highlighted in Chapter 02 several two studies based in Australia (Bruce *et al.,* 2015:150; Bullen & Love, 2011:41) and one literature review (Udawatta *et al*., 2016:1) leaves the reader with the impression that decision-makers with in the adaptive reuse process are homogenous in their view that NCC is the primary barrier.

Data from interviews in this study suggests, however, more nuanced and divergent views about building regulation as a possible barrier to adaptive reuse. Participants in the sample (03, 06, 08 & 11) who did not perceive NCC standards as a barrier to adaptive reuse of existing buildings expressed opinions in alignment with the five papers identified in the review outlined in Chapter 02 and which convey a neutral or positive framing of building regulation when discussing obsolescence mitigation strategies such as adaptive reuse or adaption (Živković et al. 2016; Elliott et al. 2015; Leadbetter 2013; Häkkinen & Belloni (2011); and Wilkinson & Reed (2011). This finding is an important and unexpected conclusion reached from data.

Finding ch6-05: participants expressed divergent views about whether NCC standards (building regulation) was a key barrier to adaptive reuse of office buildings.

6.3.4 Perceptions of barriers other than NCC performance standards

Barriers to adaptive reuse emerged from the data which did stem from NCC performance standards. These were coded as two separate themes:

- non-technical aspects of NCC compliance encompassing enforcement, pathways to compliance and costs of compliance
- barriers which were wholly external to NCC building regulation, for example planning approval, economics and end-user demand

The coding for these two themes is shown in figures 6.4 and 6.5, earlier in section 6.2

6.3.4.1 NCC enforcement practice as a barrier

The enforcement of NCC compliance can be considered as a separate aspect of building regulation and is in addition to technical compliance with the NCC performance standards (Armstrong, 2016). Interview data discloses that participants held perceptions that there were several important regulation challenges to existing building adaptation arising from enforcement practices, beyond NCC standards per se (see table 6.6).

Participants [02, 10, 11] reported problems around the practices of building certifiers, specifically: certifiers attempting to reducing their liability & risk in compliance decision were deemed-to-satisfy' designs were not possible; problems around certifiers attitudes towards adaptive reuse and alternative solutions [02]; trust between building owners and certifiers [02 & 10]; two participants even suggested that building regulation certifiers had a lack of knowledge of building regulation legislation [10 & 11].

Participants, also reported other regulation challenges, such as a perception that insurance industry & financial investors held adverse views of alternative solutions/non-compliance issues [03]; a general lack of proof that compliance can be achieved in reality [04]; dispute resolution is too challenging as ERD Court dispute resolution difficulties involve delay & are costly [11]; and compliant designs published as deemed-to-satisfy solutions are not acceptable to retail industry/public, e.g., disability ramps in front of retail window displays [08].

Table 6-6 Participants' perceptions of NCC enforcement as a barrier

Participant ID	Issues with NCC certifiers perceived			
	Certifiers take 'easy way out', reduce liability by rejecting design other than deemed-to-satisfy (DTS) routes	Trust between certifier and building owner	Certifier lack of vision for adaptive reuse	Legislation lack of knowledge/ misinterpretation by certifiers
Int 01				
Int 02	✓	✓	✓	
Int 03				
Int 04				
Int 05				
Int 06				
Int 07				
Int 08				
Int 09				
Int 10	✓	✓		✓
Int 11	✓			✓

6.3.4.2 The cost of NCC compliance as a financial barrier

All participants in the sample reported that the cost of works to achieve NCC compliance was a potential problem for building owners. An economic emphasis could be seen in all interviews when discussing building regulation.

Finding ch6-06: all participants in the sample reported that the cost of works to achieve NCC compliance was a barrier to adaptive reuse.

The review of literature in chapter 02, highlights this economic lens which is used to frame building regulation as a financial barrier to adaptive reuse. The financial cost of code compliance in Australia is highlighted by literature in the field including Conejos *et al*. (2016); Uddawatta *et al.* (2016); Bruce *et al.* (2015); Bullen & Love (2011). However, Elliott et al. (2015:668) report this crude economic framing as the primary barrier within the property industry, rather than technical requirements themselves. Aigwi *et al.* (2018) also support this view and are critical of the narrow economic focus by building owners when considering adaptive reuse and the wider regeneration benefits to local economies.

6.3.4.3 Factors other than building regulation affecting adaptive reuse feasibility

Participants highlighted a range of factors affecting adaptive reuse feasibility which they considered to be important and which were not directly stemming from NCC building regulation. To elaborate on the non-NCC regulation challenges perceived by participants, the following thematic categories, given in italics for clarity, emerged from systematic coding of data and were used to group responses relating to non-NCC regulation challenges to adaptive reuse: *finance/economics/user demand; tenant expectations; viability of new uses; building owner behaviours; planning approval process; existing building attributes;* and *risk*. Table 6.7 below highlights the range of issues and complexity in adaptive reuse feasibility decisions. All participants disclosed a variety of factors, including financial considerations, tenant expectations, planning processes, and building owner behaviours as potential inhibitors of adaptive reuse projects. Given this sheer number of factors identified by participants, a tentative finding emerges and which questions the generalised and simplistic claims that reforms to building regulaton will enable adaptive reuse to address office building vacancy.

Table 6-7 Participants perception of barriers other than NCC regulation

	Participant ID (Interviewee 01 to Interviewee 11)										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Finance/Economics											
Access to finance (banks; private investors)	✓	✓					✓				
Lack of investor interest			✓	✓							
International investors prefer new build				✓							
Cost: Return Not Economically Viable	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Cheaper to build new			✓	✓	✓			✓			
Presales commitment levels unviable								✓	✓		
User Demand											
Lack of demand for CBD space/sites		✓	✓	✓	✓	✓		✓	✓	✓	
Competition of rents beyond CBD				✓							
Travel times to CBD are too good			✓	✓							
Tenant Expectations											
Converted buildings are not wanted			✓	✓	✓	✓		✓	✓		✓
Viability of New Use											
Limited new uses possible		✓	✓					✓		✓	
Opportunity & timing								✓		✓	
Long term vision to demolish					✓			✓		✓	
New use not compatible with other uses							✓				
Easier to start again				✓							
Building owner behaviours											
Critical of owners (passive; no vision)		✓			✓		✓				
Developers stuck in traditional cycles				✓							
Insufficient discomfort to consider CoU				✓				✓			
Lack of in-house expertise				✓							
Unwilling to de-invest/diversify					✓		✓				
Ownership structure (strata)								✓			
Buildings are held for tax offset purposes											✓
Risk											
Difficult to accurately cost				✓							
Difficult to estimate time				✓							
Returns are unknown			✓	✓							
Time											
Time adaptive reuse takes									✓		

Table 6-8 Continued.

	Participant ID (Interviewee 01 to Interviewee 11)										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Planning approval process											
Time of process		✓					✓				
Bureaucratic process		✓									
Attitudes of planners & committees		✓			✓		✓				
Public & Political Objection		✓									
Planning restrictions (parking; design etc)		✓		✓	✓						✓
Zoning					✓					✓	✓
Existing Building Attributes											
Low ceilings, columns, windows, floor m^2			✓		✓			✓			
Cost of on-going maintenance								✓			
Buildings unsuitable for conversion			✓		✓				✓		
Location not attractive (public realm)			✓		✓						
Lack of inherent value in extg building			✓		✓			✓	✓		

Discussion of non-NCC regulatory factors dominated participants' discussion in semi-structured interviews and occupied a far greater portion of attention than building regulation difficulties. This feature of interview transcripts is important to report as a finding to contextualise the scale of building regulation as a barrier to adaptive reuse from the viewpoint of participants. To expand on the Table 6-7:

- *Finance/economics.* Two connected economic factors, most commonly mentioned as inhibitors of adaptive reuse viability were capital cost of adaptive reuse and economic returns from low end-user demand for buildings in Adelaide. Example, participant 03: 'everything is driven by economic fundamentals'.
- *Viability of new uses and tenant expectations*. The viability of new uses and building owner behaviour were highlighted as problematic. Interviewees had a perception that converted buildings would not meet end-user expectations. Issues around the long-term viability of new uses was also a concern. These two factors are linked to the perception of low demand for converted buildings. Example, participant 09 'Again if the demand is not there it won't get taken up'.

- *Planning approval process.* Planning approval regulation was highlighted as an issue as a key barrier to adaptive reuse. Example, participant 07, 'I think that planning could be dramatically improved'.
- *Existing building attributes*. Challenges from existing building attributes were mentioned to some extent by the interview participants. Example, participant 05, 'A restriction in these older buildings is where the columns are'.
- *Risk*. The unknown financial return on adaptive reuse projects was a sub-discussion point concerning the financial viability of adaptive reuse projects. Interviewer 08, 'You can get them (adaptive reuse projects) bloody wrong. There is no doubt of that.'

Economic return was the most mentioned challenge, rather than technical barriers or enforcement problems. The likelihood of building regulation as the primary inhibitor to adaptive reuse of office buildings is low. Each factor, or combination of factors, could potentially prevent adaptive reuse and act as a barrier on a case-by-case basis.

Finding ch6-07: Interviewees revealed many difficulties affecting adaptive reuse feasibility, suggesting NCC compliance is one potential factor amongst many non-regulation considerations which can affect adaptive reuse feasibility.

The extent of discussion devoted to non-NCC barriers in interviews is indicative of the importance of which participants placed upon broader factors affecting adaptive reuse of office buildings in Adelaide. NCC regulations were featured as challenging but not as the most frequent challenge. Participants gave much greater attention and detail in discussions to low market demand and economic risks involved in undertaking office building adaptive reuse. In light of RQ2, the following finding is therefore also reached:

Finding ch6-08: interview data suggests market economics and market demand for space are perceived as the most concerning barrier to adaptive reuse in Adelaide CBD.

Several existing research studies exploring barriers to adaptive reuse echo the emphasis placed upon economics and market demand by participants in this research. Bullen and Love (2011), for example, report a focus on economics by the sector stakeholders they interviewed. Indeed, as chapter two detailed, literature in this area has been critical in this respect, suggesting that the focus by investors and developers on short-term financial viability has crowded out other, social and environmental benefits of adaptive reuse (Aigwi *et al.* 2018. p.402; Tan *et al.* 2014 p.74). In an insightful study, Elliott *et al.* (2015) suggest that simplistic cost/benefit model in the property industry could be the root cause of this preconceived opinion by investors and developers (p.668). Several participants in this sample were self-reflexive about the dominance of financial and economic considerations when considering adaptive reuse and which the majority of respondents considered as a positive and effective strategy to address obsolescence in office buildings. Participant 09 concisely summarised this situation: “There is definitely an appetite for reuse of buildings in the CBD. The challenge is money.”

The semi-structured interviews indicate that while NCC compliance is seen as a challenging factor to consider, it is not regarded by those interviewed as a *primary* barrier in the adaptive reuse process. Indeed this emphasis on economics and market forces, specifically, market demand, advances understanding of building regulation suggesting that it is constituted by human agents involved in often complex social relations but also shaped by “hard political and economic relations” highlighted in the literature (Jones, 2009:2524).

In evaluating all of the finding presented in this chapter, it is important to highlight, firstly, that there was a level of detailed discussion missing in interviews about difficulties stemming from NCC compliance in adaptive reuse projects. Secondly, several participants also highlighted a shortage of experience in the successful completion of adaptive reuse projects. Both features in data are worthy of further discussion because they shed light on the contribution which semi-structured interviews can make in answering RQ1 and RQ2 in this thesis.

6.3.5 Beyond anecdotes: evidence missing

Parent-child diagrams figure 6.3 and 6.4, highlight the determination by the research to uncover which aspects of building regulation presented barriers to adaptive reuse. This section details the evidence uncovered, by semi-structured interviews, of building owner’s professional experience of building regulation as a barrier to adaptive reuse.

While all 11 participants reported probable difficulties for adaptive reuse due to building regulation performance standards or regulation enforcement practice, only one respondent (05) offered an example of adaptive reuse project that had been deemed unfeasible due to upgrades stemming from performance standards requirements. Indeed, when specific cases were discussed, six participants [02, 05, 06, 07, 09, 10] indicated that difficulties associated with NCC compliance had been overcome in projects. The following examples from transcripts illustrate this feature in data.

[02]:

> Interviewer: Have you got any building that you own where you have had problems with planning policy or building regulation?
> Participant 02: *Yes. Every building here, I've had a problem with.*
> Interviewer: So, have you got any buildings where you just haven't been able to convert them, or have you gone through that battle with them until you've got them through?
> Participant 02: *Oh no, I always convert and preserve.*

[05]:

> Participant 05: *We did a study on changing use, more so in my other building, to serviced offices. And also we had also, we had our partners look at it also. XXXX did the study on it and it wasn't economical to do that building. To do service offices, we are in competition with all the serviced offices. We'd have to settle a different kind of business with people who can run the business. Again the floor plate wasn't really ideal to be able to split it into small components or small offices. A restriction on these older buildings is where the columns are also. You haven't got the floor plates problem on the newer buildings now, generally speaking. We did the study over 12 months, and we got consultants to look at it, we got financial consultants to look at it, and it didn't stack up as something that might work.*
> Interviewer: So that was for a couple of different options of feasibility study?
> Participant 05: *That's right yes. We did a feasibility study on serviced offices, running them through a different company and I can't remember who it was. Yes, for the return it was a bit wishy-washy and not enough certainty in it.*

[06]:

> Interviewer: For these buildings, to convert or upgrade, did you have any issues to do with regulation?
> Participant 06: *No, so far no, it's pretty good.*

[07]:

> Interviewer: Have you done any feasibility studies of your buildings where you wanted to upgrade and change of use where it's become unfeasible?
> Participant 07: *Not really, no.*
> Interviewer: Do you have examples of regulations as a problem for upgrading and developing your buildings?
> Participant 07*: Well, we generally, we found that in most of our buildings, that's not an issue. Because the old-style buildings were used to are actually built pretty well. So, with very little effort you can upgrade them to that standard.*

[09]:

> Interview: I've seen quite a few buildings in the CBD that have been given zero stars. Have you come across any building projects that haven't got off the ground for adaptive reuse? I wondered if you could talk about the feasibility reasons for that?
> Participant 09: *Adaptive reuse, ones that haven't got across the line? Err, no. No, we haven't had any.*

[10]:

> Participant 10: *…And we are doing one down at the XXXX site. It [Building regulation] proved to be easier than we actually anticipated.*
> Interviewer: you mentioned that it was quite surprising that the buildings weren't as difficult as expected to convert, the ones that have triggered compliance through major upgrade or change of use. What do you think about the perceptions around about building regulations being difficult or not being as hard as expected?
> Participant 10: *I think that, …pause…, look its building dependent. Isn't it, too? I think some buildings probably are easy, some harder, we were surprised once we actually got into the building and started the process.*

The extract below details the single example given, across all semi-structured interview data, of an instance of NCC non-compliance. In the example offered, the class 5 building (an office used for professional or commercial purposes) was to undergo a change of use to a class 9B building (an assembly building, primary or secondary school, education training facility). Under NCC performance standards, air conditioning requirements do not differ between class 5 and class 9B buildings, as both classes are required to comply with NCC Volume One, Part F 4.5 and the embedded Australian Standards 1668.2 and AS/NZS 3666.1. However, as the class 5 building was constructed in the 1970s, there is likely to be a performance gap between the existing building's air-conditioning services and those expected in the 2016 NCC performance standards.

[05]

> Interviewer: So I wonder if you have ever come across a building that, you know, it's empty and you can't let it out as offices, would consider those other options?
> Participant 05: Well again, for XXXX Street, when it was vacant, we were looking at a vertical school and what who we looking at it with? I can't remember to be honest. Again it wasn't ideal because we would've had to inject too much money. One of the big problems here is that these buildings were built in the 70s. So they've got one air conditioning system and one or two fans. Which means you can't turn off sections if the classrooms [proposed new use] are not being used. You can't manipulate the airflow and the temperature as well as you can in new buildings. Another big problem is, if you've got any form of training, you need to upgrade it to 9B category. Which we could have done with XXXX Street. But the air-conditioner requirements means we've got a strip everything and start again, with individual air-conditioners in every room. And the cost was prohibitive. The trouble is you might get a slight increase of rent, but very small and it certainly wouldn't pay itself off. And it was very uncertain of whether you would get a tenant to pay extra for what is still a C grade building.

The participant disclosed the cost of upgrading the air conditioning in this instance, was not deemed feasible for the investment return. The participant also added that the converted building may not meet end-tenant market expectations and therefore, not attract a suitable tenant. While the participant highlighted building regulation compliance as a key barrier, they also disclosed, the regulation issue was bound to other considerations: cost (of meeting Part F4.5 NCC requirements for ventilation using air-conditioning); end-tenant demands and expectations; and financial returns on their investment. This response begs the question as to whether the barrier lies with a gap between an existing building's performance and the current NCC requirements or end-tenant demands for class 9B buildings (market demand) and rental returns (economics) in Adelaide.

Analysis of the data discloses that there is a gap between participants' perceptions and the evidence to support claims that building regulation is a primary barrier to adaptive reuse in Adelaide. In practice, participants had scant evidence to support a view that building regulation or enforcement was a key inhibitor of adaptive reuse, in contradiction with their stated perception that building regulation presented them with difficulties. When examples were NCC compliance difficulties were given, barriers were not due to NCC standards or enforcement practice, with one exception.

Finding ch6-9: interview data suggests that while building regulation is perceived as challenging or difficult by some building owners, it is not the main barrier in practice.

Caution must be exercised with this finding. It could be that participants unwilling to disclose examples of unviable adaptive reuse projects due to commercial sensitivity. Methodological research about interviews suggests that participants can self-censor to avoid revealing situations which they fear will be perceived as failures or which might reveal financially sensitive data (Roulston and Choi, 2018, Rowley, 2012). This possibility is one potential limitation of data gathered via semi-structured interviews.

Several participants were positive toward adaptive reuse but highlighted that they did not yet have any direct experience of it (04, 06, 09), despite clear wording in the participant recruitment invitation letter, sent out by Adelaide City Council. The letter explicitly invited building owners who had direct experience of adaptive reuse to participate in research. All participants, however, did have experience of existing building adaption which would trigger NCC code compliance and therefore, remained in the sample. This gap in knowledge and understanding around adaptive reuse was discussed via a philosophical lens by participant 06:

[06]:

> I guess, the over-arching, seam in over all of this, is the question of 'what's our end game here?' What's a purpose for these buildings? Are they going to be here for the next 20 to 30 years? Because we are re-fitting them? Or do they need to exist at all? I could probably ask the why question a lot. You know, not just what is the problem and why is it a problem. Are we asking the right questions when we talk about the sorts of issues.

In contrast, participant 04 emphasised the pragmatic need for best practice examples of adaptive reuse in Adelaide CBD and to encourage higher uptake by building owners, developers and investors:

[04]:

> It [adaptive reuse] definitely needs to be researched and promoted more heavily than it has been because we're stuck in a bit of a cycle here where we're struggling to actually break out of the pattern and really reuse old office buildings that probably should be reused and I know that people have put up issues in terms of fire regulations and all the things that make it hard I don't pretend to understand the technicalities and the ins and outs of that. It's something that we need to work hard at and actually get some examples done so we can actually have some sort of case studies and shows that it's not impossible.

Comments by participant 06 above are also critical of the motivations behind claims of barriers to adaptive reuse within the terms of the office vacancy problem in public debate investigated by Chapter 04 of this study. Calls for the publication of adaptive reuse case studies for Adelaide support Finding ch6-01, emphasising the interest in adaptive reuse as an obsolescence mitigation strategy for office buildings in the future, even from those who have not yet undertaken adaptive reuse in Adelaide.

6.4 Limitations of semi-structured interviews

Sufficient recruitment of participants can often be a challenge for any research study. Extensive efforts were, however, made to recruit stakeholders for semi-structured interviews. Despite these efforts, included a targeted approach by Adelaide City Council, recruiting sufficient participants for semi-structured interviews proved to be problematic. Bruce *et al.* (2015) also report problems with recruitment of participants, in their study of the retrofitting of existing office buildings in Adelaide CBD. The small sample size is, therefore, a limitation of research detailed in this chapter.

Despite ethical safeguards applied to guard participants' anonymity and assure participants of confidentiality in research, commercial sensitivities may have reduced openness by participants when discussing building investment plans for existing buildings, particularly in a competitive office building marketplace reportedly suffering high vacancy. It is possible that the participants were unwilling to disclose examples of unviable adaptive reuse projects due to commercial sensitivity. In practice the research was confident that participants were not unduly reticent and typically offered open responses, revealing their thoughts and plans of their visions for existing buildings in their business portfolios. All of the participants wanted to see a positive change in Adelaide CBD and participate in research to inform and shape urban regeneration addressing office building vacancy in Adelaide CBD.

6.5 Summary of findings

Semi-structured interviews proved to be a fruitful method for collecting data for this study. Table 6-8 below provides an overview of the findings of this chapter.

To summarise findings in this chapter, participants expressed divergent views about whether NCC standards (building regulation) was a primary barrier to adaptive reuse of office buildings. Of those who regarded NCC standards as a key barrier, fire safety and disability access elements of the NCC code were highlighted as the most problematic by several respondents for adaptive reuse of office buildings, in common with other Australian-based studies on this topic (Bruce *et al.,* 2015, Bullen & Love, (2011). Inconsistent or risk-averse enforcement of regulation by certifiers and planning restrictions were highlighted as specific problems, although planning approval, it should be emphasised, is separate to NCC compliance, indicating some confusion amongst respondents. Most importantly, data from semi-structured interviews challenges the veracity of the view that NCC requirements are the primary barrier to adaptive reuse and as highlighted by participants 02, 04, 05, 07 & 09. With one exception, no evidence was provided to substantiate this view; indeed, as discussed earlier, examples were offered of projects which had actually overcome NCC requirements. Conservatively, therefore, the conclusion can be reached from interviews that NCC requirements are, at most, a potential cause of extra cost in the adaptive reuse of office buildings but as several participants highlighted these costs such as those associated with fire safety, should not be regarded as unnecessary.

A key insight gained from interviews was that market economics, and market demand for space is perceived as the most significant barriers to adaptive reuse in Adelaide CBD. Capital required to meet NCC requirements is positioned by those interviewed as a potential complication in the unlikely circumstances that barriers stemming from market economics and market demand are overcome, and adaptive reuse is chosen as an obsolescence mitigation strategy. This conclusion from interview data addresses research question RQ3 because it discloses that reforming building regulation is unlikely to address low end-user demand in Adelaide CBD for office space conversion such as residential.

Table 6-8 Summary of findings of chapter 06 semi-structured interviews

Finding Ch6-01:	*The majority of participants reported a positive view of adaptive reuse and regarded it as a constructive response to building obsolescence.*
Finding Ch6-02:	*Several participants expressed the view that NCC standards (building regulation) are a key barrier to adaptive reuse of office buildings.*
Finding Ch6-03:	*In keeping with several other pertinent Australian studies, fire safety and disability access were mentioned, respectively, with the highest number of times by participants who considered NCC standards as a key barrier to adaptive reuse.*
Finding Ch6-04:	*Participants, explicitly expressed the view that NCC standards (building regulation) did not constitute a pivotal barrier to adaptive reuse of office buildings, contrary to existing Australian research studies, which report stakeholders' perceptions about building regulation and adaptive reuse. Other participants avoided expressing the view that building regulation is a barrier to adaptive reuse.*
Finding Ch6-05:	*Participants expressed divergent views about whether NCC standards (building regulation) was a key barrier to adaptive reuse of office buildings.*
Finding Ch6-06:	*All participants in the sample reported that the cost of works to achieve NCC compliance was a barrier to adaptive reuse.*
Finding Ch6-07:	*Finding ch6-06: Difficulties associated with NCC compliance is one factor amongst many non-regulation factors which can affect adaptive reuse feasibility.*
Finding Ch6-08:	*Interview data suggests market economics and market demand for space, rather than building regulation, are perceived as the most significant barriers to adaptive reuse in Adelaide CBD.*
Finding Ch6-09:	*Interview data suggests that while building regulation is perceived as challenging or difficult by some building owners, it is not be a key inhibitor in practice.*

Chapter 7: Quantifying vacancy using VVAM

> "Planning must consider the larger picture of what vacancy provides as fodder for its own future development. While most of this would be completed incrementally, a larger agenda must be established to address vacancy at scale" (Burkholder, 2012:1166).

7.1 Organisation of chapter

This chapter examines vacancy in the office building population using an innovative method developed during this study. The method is called the Vacancy Visual Analytics Method (VVAM). The objective of VVAM is to circumnavigate an absence of publicly available data in Adelaide to quantify, analyse and describe vacancy in office buildings. VVAM relies on secondary data, collected for taxation purposes by the Adelaide City Council (ACC), and offers a cross-sectional view of office building vacancy in the Adelaide CBD. The method is exploratory and quantitative.

This chapter contains three phases, each contributing to different but related understandings of vacancy within a context of adaptive reuse and vacancy as an indicator of existing building obsolescence. These three phases relate to empirical investigations both across a building population and at the individual building scale. The structure of this chapter is as follows:

A. Vacancy quantified across the office building population sample
B. Spatial analysis of vacancy sub-types
C. Contextual factors examined

Across the office building population, Phase A quantifies each building's occupancy and, by default, the inverse of occupancy: vacancy, which local council property valuers consider when commercial building rates are set annually. Valuation-factored vacancy, calculated in VVAM, is the space that is factored into the local council's valuations for taxation purposes, and includes all vacancy types. The fine-grained analysis of vacancy in Phase A discloses new insights that are undetectable if research only considers the aggregated vacancy trends published for the office building market by industry leaders such as real-estate groups, commercial property developers and investors.

Phase B examines the distribution of different vacancy sub-types (Untenanted and Greyspace vacancy) on a building-by-building basis. Phase C examines the likelihood of building regulation as a primary barrier to adaptive reuse on a case-by-case basis, by exploring the contextual factors that may influence building owners' decisions to employ adaptive reuse as a strategy to mitigate office building obsolescence. Phases B and C of this chapter provide more in-depth insights to understand the suitability of adaptive reuse as an urban regeneration strategy to address office building vacancy.

Together, the findings of Phases A, B, and C offer insights into the likelihood of building regulation as a critical barrier of whole building adaptive reuse to address vacancy, and of the necessity to reform building regulation to address vacancy through greater uptake of adaptive reuse.

7.2 Rationale for developing VVAM

In Chapter 02 (Literature review), it was found that researchers have argued that vacancy is an indicator of the need for adaptive reuse. An examination of vacancy distribution and type is, therefore, an important consideration when evaluating the drivers of and barriers to adaptive reuse. The literature review found, however, that while it is essential to consider building stocks, an understanding of vacancy and its dynamics is generally not well established (Kohler & Yang, 2007; Muldoon-Smith, 2016). Published research has yet to understand vacancy fully or to examine office building vacancy. One notable exception to this is a UK study by Muldoon-Smith (2016). This chapter follows the recommendation by Muldoon-Smith (2016) that vacancy be investigated in greater detail, particularly when considering strategies to manage the amelioration of office building vacancy and obsolescence. As suggested by Muldoon-Smith (2016), the relationship between office building obsolescence and adaptive reuse potential needs first to be contextualised by considering the reality of office building vacancy (p.24).

This chapter also represents one of the first studies of its kind to quantify vacancy within an adaptive reuse context. Methodologically, the analysis detailed in this chapter and referred to as VVAM is intended to triangulate qualitative data, described in Chapters 04, 05 and 06. The analysis of public debate detailed in Chapter 04 revealed that the presence of high vacancy is the argument used by stakeholders calling for reform of building regulation. Chapters 05 and 06 disclosed that many stakeholders perceive building regulation to be problematic for adaptive reuse development to address vacancy. Before the quantification of vacancy by this study, vacancy rates for each building were not known, and there was reliance in public discourse on media statements of simplistic average vacancy rates disclosed in the PCA's Office Market Reports (OMR) for Adelaide. No database of vacancy rates existed, even for stakeholders such as local and state governments. This absence of data resulted in an inability on the part of policymakers to independently quantify vacancy to inform policy decisions. This lack of available vacancy data has been problematic, given the persistence of public pressure from stakeholder groups demanding action by local and state governments to address vacancy in CBD buildings, as outlined in Chapter 04. Recognising the limited number of vacancy data sources is important for understanding how vacancy is framed in the public debate to shape stakeholders' perceptions, particularly of barriers to urban reactivation through adaptive reuse.

This chapter examines secondary data, obtained from ACC, that was originally collected for local council taxation and has been repurposed in this study to quantify vacancy in office buildings located within the Adelaide CBD. While the ACC data does not directly disclose occupancy and vacancy, the methods described in this chapter allow each building's vacancy to be quantified. The secondary data was collected from building owners and tenants for the first half of 2017. Public discourse during this time perceived office building vacancy as problematic for the Adelaide CBD (see Chapter 04). The quantification of vacancy, and the subsequent analysis of its distribution in office buildings, also played a pivotal role in the overall story of this research, addressing the problem of 'missing vacancy data', as represented in Figure 7.1 below. This central problem of the 'missing data' is first discussed in this thesis in Chapter 01, and referenced again in Chapter 03.

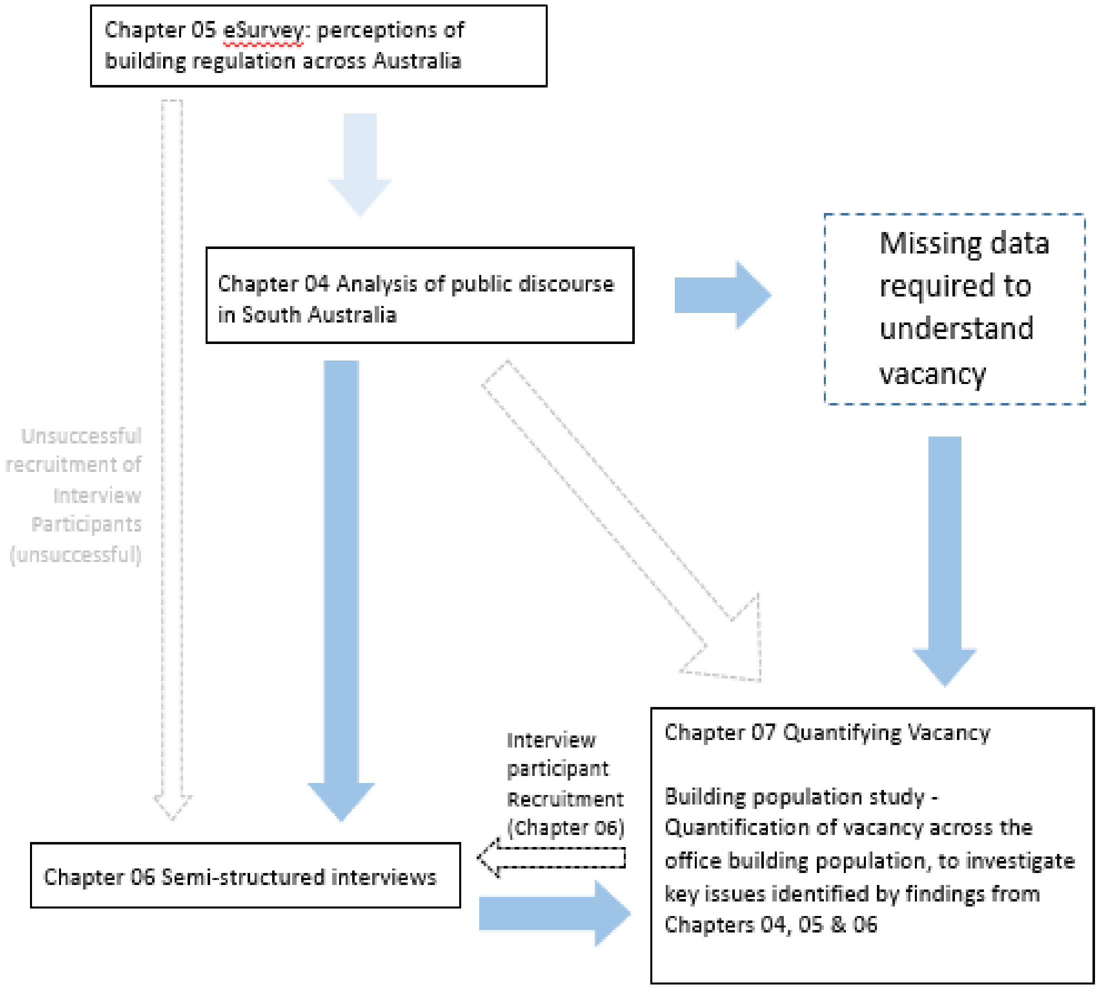


Figure 7.1 Rationale for Chapter 7

The researcher undertook lengthy investigations to seek and obtain data from several sources prior to agreement with ACC to share datasets for research purposes. To address the missing data highlighted by Figure 7.1 above, Figure 7.2 below details a timeline of actions taken by the researcher to seek and source appropriate data, in order to examine office building vacancy. These actions include building relationships with key stakeholders identified in public discourse, such as state and local government representatives and the PCA, authors of the Office Market Report for Adelaide CBD.

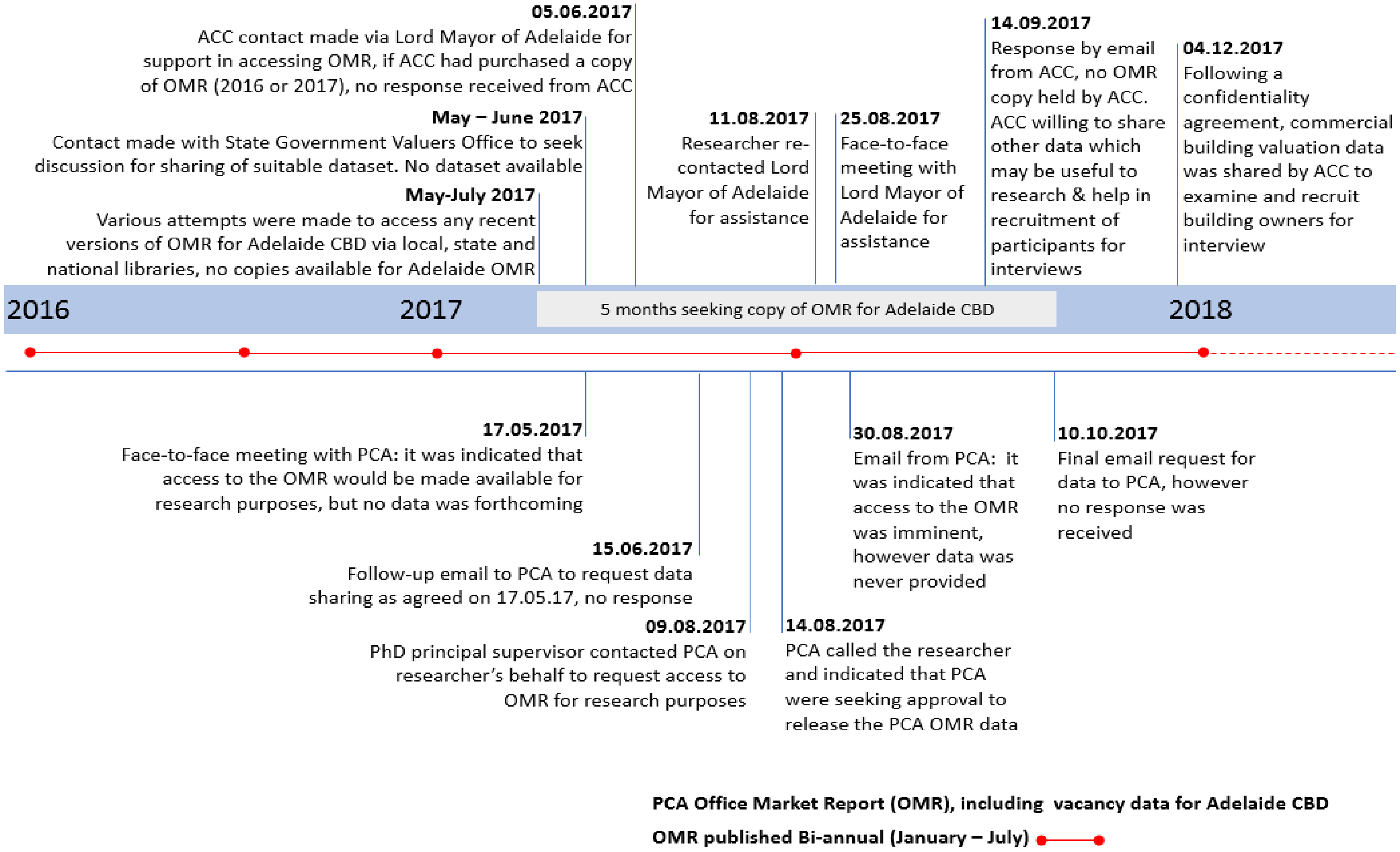


Figure 7.2 Timeline: Identifying the dataset used to quantify vacancy

This timeline charts the actions and efforts taken to locate and gain access to a secondary data source suitable for investigating Adelaide CBD office building vacancy.

Aggregated vacancy rates for office buildings within Adelaide CBD are published publically bi-annually by the PCA. This data is the primary source of vacancy statistics informing public discourse. These aggregated vacancy rates, however, do not enable deeper critical insights into the distribution of vacancy across the office building population. For instance, average rates do not permit calculation of the number of office buildings with 0% or 100% vacancy, or show how the vacancy is distributed across the population. Despite assurances, access to the PCA's commercially produced vacancy data did not transpire, and the researcher could not probe the published simplified aggregated rates further. A decision was taken to seek a suitable secondary data source as an alternative that would enable fine-grained analysis of vacancy. After a search of around 7–8 months, a suitable dataset was found (see Figure 7.2).

7.3 Underpinning constructs of VVAM

Size and building grade are two contextual factors that are important to understand and consider when examining vacancy rates as an indicator of obsolescence and in light of calls for greater adaptive reuse. Although slightly different from size and grade, a building's ownership structure is another factor to consider when evaluating vacancy as an indicator of obsolescence and strategies to mitigate vacancy.

7.3.1 Occupant configuration in buildings: SOA

The ACC database shows commercial building information according to Single Ownership Areas (SOA) occupied by tenants or owner-occupiers. The distinction between each building's address and SOA boundaries is essential to note, as the office building population database is built from SOA data, and this distinction is important in understanding how vacancy is quantified using taxation data. The SOA is the smallest defined area examinable using data from the ACC database. It is similar to the unit of occupation defined within NCC regulation, referred to as a Sole Occupancy Unit (SOU), which is defined in the NCC as 'a part of a building for occupation by an owner/s, lessee, or tenant, to the exclusion of any other owner/s, lessee, or tenant. Put simply, it is a space with an exclusive use in a building' (ABCB, 2017c:1). Office buildings are subdivided into smaller units of occupation, and this study references these smaller units of SOA throughout this chapter. For the office building population in Adelaide CBD, the number of SOAs within a single office building ranges between 1 and 193 SOAs.

7.3.2 Office building quality grades

In Australia, the office building population comprises two broad categories of office building quality: primary grade buildings (Premium, A and B grades) and secondary grade buildings (C and D grades), as discussed in the literature review in Chapter 02. An evaluation of an office building's amenities establishes the grade of each office building. The grading, however, is based on subjective guidance contained within *The Guide to Office Building Quality* (PCA, 2012). One problem with the subjective nature of using fine-grained grade distinctions is that they are open to a degree of interpretation. A second problem in applying specific grades to each building is the range of building information required to judge each building, as there are 60 criteria included in the PCA's grading matrixes (PCA, 2012). This thesis classifies office buildings as either primary (Premium, A, and B office buildings) or secondary (C and D office buildings) grade, rather than using the more specific stratifications suggested in the guide as Premium, A, B, C and D grades. (PCA, 2012).

7.3.3 Size of office buildings

Building size is essential to evaluate when considering adaptive reuse candidates that could potentially address Adelaide's vacancy problem and contribute to a broader urban reactivation of the Adelaide CBD. In quantifying vacancy rates, office-use Gross Lettable Area (oGLA, m^2) is used as a unit of measurement to define a building's overall scale. The Phase B spatial analysis described in section 7.6 uses values of $GLA_{BUILDING}$ to scale each building, as $GLA_{BUILDING}$ is the sum of office-use Gross Lettable Area (oGLA) and non-office-use Gross Lettable Area (nGLA). Within the spatial analysis, larger-scale buildings are those with $GLA_{BUILDING} \geq 3000$ m^2, and modest scale are buildings with $GLA_{BUILDING} < 3000$ m^2.

7.3.4 Certificate of Title and ownership structure of buildings

Building obsolescence mitigation strategies, including adaptive reuse, require a consensus between building owners to enable the strategy, and the associated financial investment, to be put in place. Ownership complexity is, therefore, an important factor to consider when evaluating adaptive reuse uptake as a solution to vacancy and obsolescence. There are several ownership structures relevant to this thesis:

1. A building owned by a single owner
2. A building owned jointly by more than one person, or group of people
3. A building owned by a group of people with varying degrees stakes of ownership
4. Different people or groups can own separate parts of a subdivided building or site. Usually, for access purposes, this form of ownership also often includes a common or shared portion of the building or space. A subdivision agreement sets out the common parts and access rights.

A Certificate of Title details the ownership structure of a building. In South Australia, there are four types of property division, or Titles (GovSA, 2016b):

A. Torrens Title
B. Community Title
C. Community Strata Title
D. Strata Title (historical, not used for new construction)

Ownership structures 1–3 can have only Torrens Titles (A). Ownership structure 4, however, can have Titles of Certificate of types B–D. The legal differences amongst buildings with Community Titles, Community Strata Titles and historical Strata Titles are not important to this study *per se*. The complexity involved in ownership types, however, is a factor worth considering, as structures 2–4 all require mutual consent between two or more building owners before works, including adaptive reuse, can be carried out. In addition, if a building is under multiple ownership, such as a Community or Strata Title, then any works affecting the common parts of the building must have permission from all parties in the ownership plan. Common parts can include space such as ground floor access and vertical circulation, or the building's structure and infrastructure.

Online records held by the South Australian Integrated Land Information System (SAILIS) identify office buildings under Strata Titles and Community Plans (GovSA, 2020). Public access is permitted to search SAILIS's online database using a property's address. The researcher checked each address to obtain details of each property's plan and ownership, using a property search to obtain the Certificate of Title (CoT). The CoT search disclosed whether the building address was under a Torrens, Community or Strata Title. From this disclosure, it was possible to ascertain if a property was either:

- subdivided and had individual owners, with each having rights over a communal area(s), or
- collectively owned by a single person/group but had no legal subdivision of spaces within it.

Shared ownership is an important potential factor in adaptive reuse decisions, as the more owners a property has, the harder it is to gain a consensus for consent to existing building adaption.

7.4 Adaptive reuse categories for office buildings

Four categories of adaptive reuse have been proposed by this study, responding to a gap identified in the review of literature described in Chapter 02 (see section 2.5.2.2). These categories have relevance to this chapter, as the distribution and scale of vacancy lend themselves to different categories of adaptive reuse; Table 7.1 sets them out below.

Table 7-1 Adaptive Reuse Categories

Adaptive reuse category		Characteristics of category
1	Whole Building Adaptive Reuse WBAR)	All space converted to new use, with or without demolition and additions, excluding development where only the façade is retained
2	Mixed-Use Multi-level Adaptive Reuse (MUMLAR)	Within the whole building, some office space use is retained, and the conversion of multiple levels is undertaken to make a mixed-use building
3	Pocket Adaptive Reuse (PAR)	Isolated floors or partial floor plates converted; new use to complement existing office uses with the building. Often part of the curation of space used to strengthen the economic viability of existing tenancies
4	Temporary Adaptive Reuse (TAR)	Partial to whole floor plates, based on new use being 'a good fit' with physical attributes of existing building/space, resulting in little or no economic commitment to enable the conversion. Often used in prime locations (ground floor) with high visibility and footfall traffic. New use is often curated with surrounding uses

7.5 Vacancy types explored in VVAM

The international literature defines different types of vacancy; for instance, structural, natural and strategic vacancy (Muldoon-Smith & Greenhalgh, 2017; Keeris & Koppels, 2006). These vacancy types, however, can only be detected through longitudinal data gathering and analysis of several years of vacancy data (Muldoon-Smith, 2016). In Australia, the PCA undertakes a longitudinal gathering of vacancy data, by calculating aggregated vacancy rates based on office space advertised for lease by real-estate listings and confirmed by industry professionals (PCA, n.d.). Data supplied by ACC was limited to 2017 and was, therefore, a 'snapshot in time'. A cross-sectional research design is, therefore, most appropriate for analysing vacancy in the data available to this study, which quantifies and examines three types of vacancy using cross-sectional analysis of taxation data:

- Valuation-factored office-use vacancy, expressed as either a vacancy rate, oVR (%), or as a floor area, oVA (m^2)
- Untenanted vacancy, expressed as floor area per space-use category: office-use space (oGLAU, m^2) and non-office-use space (nGLAU, m^2), and
- Greyspace vacancy in office-use space, expressed as a floor area, oVG (m^2).

Valuation-factored office vacancy is the sum of Untenanted and Greyspace vacancies, and is a product of ACC's preferred method of setting local council rates for each commercial building in their jurisdiction. The ACC refers to this method as 'Annual Value', which is discussed in further detail in section 7.6 (Method).

Untenanted vacancy is the vacancy type used by industry groups such as the Peahen calculating aggregated office building vacancy rates, such as those detailed in bi-annual Office Market Reports (PCA, n.d., About the OMR). Therefore, one strength of this study in its examination of Untenanted vacancy (oGLAU and nGLAU) is that it mirrors the industry-standard measure of vacancy, enabling independent critical evaluation of this vacancy type, and alongside Greyspace vacancy. When considering office building adaptive reuse, Untenanted vacancy is space that is potentially ready to convert as there are fewer legal barriers and processes to restrict the commencement of adaptive reuse development. For example, one barrier is the economic cost of relocating existing tenants. When examining vacancy as a measure of adaptive reuse potential, Untenanted vacancy is, however, not the whole picture. Greyspace vacancy is an essential factor to consider, as Greyspace can affect a considerable floor area within office buildings and mask the true extent of obsolescence (Muldoon-Smith, 2016:115; Hammond, 2013).

Greyspace vacancy is described as 'hidden vacancy' as it is leased space, but space that is surplus to tenants' requirements. This type of vacancy is often challenging to locate and therefore quantify (Muldoon-Smith & Greenhalgh, 2017). Vacancy rates published by the PCA rely on information information supplied by real-estate agents, who supply data for space advertised for lease. For lease data does not include Greyspace, as this is not available to let, and one of the challenges in the detection of Greyspace highlighted by Muldoon-Smith & Greenhalgh (2017). Real-estate agents may be aware of its presence from oral discussions with individual building owners and managers, for whom it exists as tacit knowledge. Unless Greyspace becomes part of a formal and advertised sublease, its presence cannot easily be converted to collectable data. Methods that currently rely on real-estate data to set vacancy rates cannot quantify Greyspace, as it is not formally advertised as vacant space. Greyspace is, however, an integral part of understanding office building vacancy, and is considered to be a precursor to obsolescence, as it can indicate that a building is surplus to market requirements (Muldoon-Smith, 2016:115). As Greyspace is not a category of vacancy that is time-dependent, it is wholly suitable for a cross-sectional research design. One additional advantage of cross-sectional studies is that they can be 'generally quick, easy, and cheap to perform' (Sedgwick, 2014:2). This speed and economic efficiency are both benefits of cross-sectional analysis because results can be quickly produced to aid policy development and further research. This study, which quantifies Greyspace vacancy using the cross-sectional data available and an original method, is the first of its kind to measure Greyspace in buildings.

7.6 Method

The method described in this chapter, referred to as VVAM, comprises 3 phases of analysis (A, B, and C). As mentioned in section 7.1, these three phases provide the structure for this chapter, and are:

A. Valuation-factored vacancy quantified across the office building population sample
B. Spatial analysis of vacancy sub-types (Untenanted and Greyspace vacancy), building-by-building
C. Contextual factors examined, building-by-building.

Each phase of VVAM enables vacancy to be examined from different perspectives to address the research questions of this thesis. The three phases are mapped against the research questions of this thesis and shown in Table 7.2 below.

Table 7-2 VVAM mapped against the research questions of this thesis

Research Question	**Methods in each section of Chapter 07**		
	A. Valuation-factored vacancy	B. Spatial analysis of vacancy sub-types (Untenanted and Greyspace)	C. Contextual factors examined
RQ 1. What is the perception of industry stakeholders about building regulation in relation to adaptive reuse of office buildings across Australia?	n/a	n/a	n/a
RQ 2. Focusing on Adelaide, what evidence is there to support stakeholder views of building regulation and adaptive reuse?	✓	✓	✓
RQ 3. Does building regulation need to be reformed to encourage adaptive reuse?		✓	✓

Phase A: Office building vacancy quantified, across both primary and secondary office building grades, by developing an office building population database. The database enabled the quantification of occupancy and its inverse, which this study refers to as valuation-factored vacancy. At this stage, vacancy is not broken up into sub-types, but is an aggregated total of both Untenanted and Greyspace vacancy for each building. This phase enables:

- an examination of the broader patterns of vacancy across the office building population
- analysis of vacancy, in both primary and secondary office building grades, to better understand vacancy as an indicator of obsolescence and as a potential driver of adaptive reuse uptake to address high vacancy in a building population, and
- identification of a sample of secondary office buildings suffering high vacancy, for further examination in Phase B's spatial analysis of vacancy distribution.

Phase B: Spatial analysis of vacancy across all sizes (m^2) of secondary grade office buildings considered to have a high vacancy rate, in order to:

- visualise the location and distribution of each vacancy sub-type (Untenanted and Greyspace vacancy) for each secondary building, and
- identify large-scale secondary buildings for further examination in Phase C.

Phase C: Contextual factors examined for large-scale ($GLA_{BUILDING} \geq 3000\ m^2$) secondary grade office buildings considered to have a high vacancy rate in order to:

- uncover evidence of existing building upgrades to support or question the premise that building regulation is a primary barrier to adaptive reuse, and
- ascertain the suitability of WBAR to mitigate high vacancy.

Phases B and C focus on secondary grade buildings because this grade is the primary focus of concern in the adaptive reuse predicament. Also, the literature reviewed in Chapter 02 often promotes adaptive reuse as the 'go-to' strategy to address premature obsolescence. Phase C includes the broader range of obsolescence strategies to address vacancy, of which adaptive reuse is only one possible option. Large-scale secondary buildings are chosen for Phase C analysis, as their scale offers the most capacity for addressing vacant space (m^2) across the office building population, and it is this building grade that is most believed to be inhibited by building regulation barriers. The relationships between Phases A, B, and C are shown in Figure 7.2 overleaf.

7.6.1 Variables used to quantify vacancy in VVAM from ACC dataset

Microsoft Excel (Microsoft Corporation) was used to construct the office building population database from the ACC dataset. Excel enables easy calculation of occupancy rates for each building in the sample.

	A	B	C	D	E	F	G	H	I	J	K
1	Council ID	Trading Name	Locality	Full Address	Street Number	Street Name	Number of Levels	Gross Lettable Area	Component Type	Component GLA	Component Level
2											
3											

Figure 7.3 ACC dataset variables used to quantify vacancy

The ACC dataset included over eighty columns of variables, of which many related to ACC's administrative systems and had no relevance to this study. To ensure the office building database was as lean and user-friendly as possible, variables that were not relevant to this study were removed from the MS Excel spreadsheet by deleting the relevant column of data. This process left ten variables (shown in Figure 7.3 in columns A–J), carefully retained as they had a practical use in navigating the dataset or could be used to calculate and contextualise vacancy. The variables are shown in Figure 7.3 and listed below:

A. Council ID – a reference number given by ACC to identify individual SOAs within each building
B. Trading Name – the name of the business or occupants trading from each SOA
C. Locality – location of each building by suburb, e.g. Adelaide CBD or North Adelaide, and within the boundaries liable for payment of commercial rates to the local council for the City of Adelaide
D. Full Address – the location address given to each SOA

E. Street Number – location of each building by its number on the street or road
F. Street Name – the road name on which the building's main entrance is located
G. Number of Levels – the number of storeys contained within each building
H. Gross Lettable Area – the floor area of each SOA, submitted to ACC via TIS (see Appendix 7-A)
I. Component Type – classification of space use for each SOA, including 30 types of space, such as office, shop, bar, restaurant, laboratory, hospital, etc.
J. Component GLA – an area of space declared as occupied and used by building owners or tenants, referred to as CGLA throughout this chapter.
K. Component Level – the location of each SOA by storey level, e.g., ground, first, second floor

One important aspect of using the ACC dataset is that the data was identifiable by the addresses and trading names of occupants, as Figure 7.3 above shows. At times, personal names were used as trading names. Literature examining the use of secondary data has highlighted that there are often ethical considerations where personal data is disclosed in secondary datasets collected by others (Smith, 2008). One condition in the Confidentiality Agreement entered into by the researcher with ACC was that the researcher would not share personal data contained within the original dataset with any other party, in writing or verbally. This agreement also stipulated that all names and identifying locations must be removed before publication.

7.6.2 Constructing the office building population database

The office building population database organises building data and enables the vacancy to be quantified and disaggregated. Preparation of the office building database followed a systematic framework for secondary data, as recommended by Johnston (2017):

- Stage 01: developing the research questions
- Stage 02: identifying the dataset
- Stage 03: evaluating the dataset

Stage one is dealt with in section 3.3 Research Design of Chapter 03. Stage 02 and 03 are the subjects of the method described in this chapter. A visual representation of these three stages (highlighted in orange) in the overall VVAM research method is given below in Figure 7.4. For this study, the 'dataset' referred to by Johnston (2017) is the secondary data originally gathered by ACC for setting local council taxation rates, and repurposed in this study.

7.6.2.1

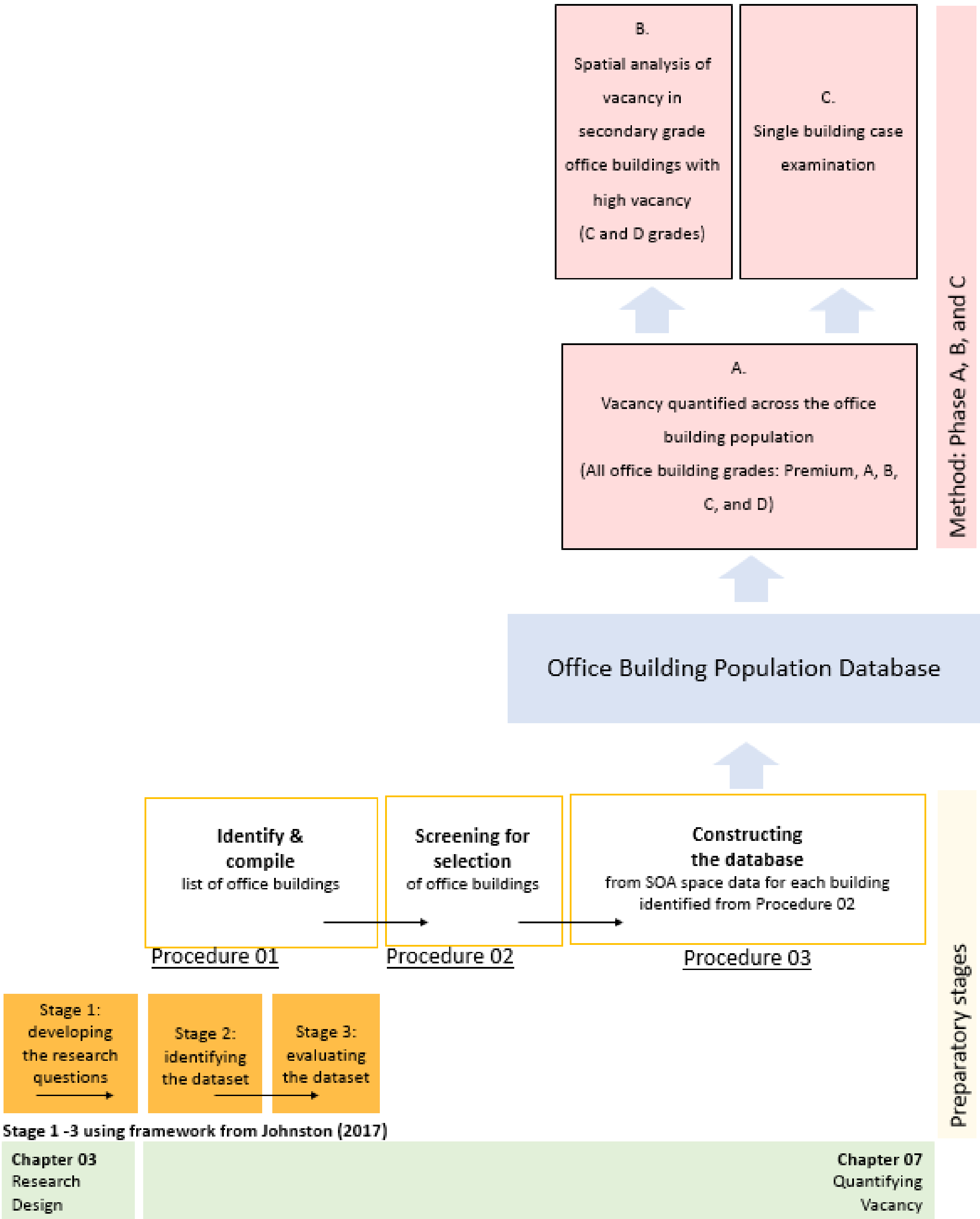


Figure 7.4 Relationships between components of VVAM

Identifying the dataset

Investigations at the early stages of this research revealed that Adelaide's local and state governments did not have a dedicated dataset that provides an independent source of vacancy rates for commercial buildings. After an extensive search, ACC revealed the existence of a potentially suitable dataset collected by ACC to set local council rates. Senior policymakers were supportive of this study, and were willing to facilitate access to the dataset.

A confidentiality agreement was entered into by the researcher with ACC and the dataset shared with the researcher in by ACC in December 2017, by the now dissolved Department of Valuer Finance and Business. This dataset had the greatest potential for enabling the researcher to quantify vacancy, although this dataset would require the researcher to develop a method to calculate vacancy. The remainder of section 7.6 details the preparatory procedures developed to quantify vacancy, and the methods used for analysis in Phases A, B and C of VVAM. The office building population database was already in Microsoft Excel format, and the method described in this chapter permitted the calculation of occupancy rates with ease, once the database and final sample had been established.

7.6.2.2 Evaluating the secondary dataset

ACC uses the dataset to establish the rateable value for every commercial building space whose ownership lies within the Council's boundary. The Council's literature explains to taxpayers that a building's rateable value is linked to 'occupancy across the city', and that 'property valuations for the purpose of calculating rates payable are prepared on the basis of Annual Value, which is ACC's "preferred valuation method"' (ACC, 2017:2). According to ACC's literature, the annual value method is considered to be an efficient way of calculating rates and is equitable, incorporating an owner's ability to pay (ACC, 2017:2). This principle of taxation on the basis of a building owner's ability to pay underpins reasons why the dataset captures occupancy, and alerted the researcher to its potential as an alternative source of vacancy data.

Familiarisation with the data confirmed that it would be possible to determine occupancy in each building from the ACC dataset. Such a determination of occupancy would involve a lengthy process to accurately assemble and calculate vacancy rates from the ACC dataset on a building-by-building basis. However, a detailed understanding of vacancy rates for each building in the office building population sample was considered essential to answering the research questions of this thesis. A detailed understanding of vacancy on a building-by-building basis would provide critical insights into adaptive reuse and potential barriers preventing greater adaptive reuse uptake. The accuracy of vacancy data would also be important, and so steps taken to evaluate the dataset in order to ensure its accuracy are described later in this section.

The purpose of the ACC data is assist setting of commercial building rates for local council taxation of commercial properties located within the Adelaide CBD. According to ACC's website, 'Each year Council's valuers request information from ratepayers to assist in two key functions; the preparation of the annual valuation for the next financial year, and the maintenance of an accurate Voters Roll. ACC request this information under Section 168 of the *Local Government Act 1999*' (ACC, 2018). The data collected includes Gross Lettable Areas for commercial-grade spaces within the Adelaide CBD.

The ACC's former Department of Valuer Finance and Business were responsible for collecting the raw data from property owners and tenants who are liable for payment of non-residential rates to Adelaide City Council. One disadvantage of using data collected by others is that the researcher has no control over the accuracy of its collection or its aggregation (Smith, 2008). This potential issue is discussed at the end of the chapter in section 7.9 Limitations.

The data was collected in the first half of 2017 to inform local council rates for the Australian financial year from 1 July 2017 to 30 June 2018. The precise year of data that was collected is important to stress against a broader background of vacancy rates. According to vacancy rates published by the PCA, 2017 was the period considered to have the highest vacancy rates across the population in the last ten years. Choosing a year when the average office building vacancy rate is at its highest is important when examining vacancy as an indicator of the presence of barriers to adaptive reuse. Data gathered during 2017 represents the 'worst-case vacancy rate', and as such offers the largest sample for analysis of buildings suffering vacancy.

The secondary data was collected via a survey sent annually to building 'owners', using a mixture of electronic and paper formats via email and by post, respectively. This survey is known as the Tenancy Information Schedule (TIS) form (see Appendix 7A). The TIS gathers area data (m^2) for each commercial use space within a 'building'.

The two terms 'building' and 'owner' deserve a further explanation in terms of their definition within the data collection. The term 'building', however, may relate to the whole or part of a building, depending upon the ownership boundaries. Many CBD buildings are made up of a multitude of different owners for different parts of a building, often under a strata or community plan arrangement. Adelaide City Council calculates rateable values based on ownership, which is explained as any piece or section of land subject to separate ownership or occupation.

Each owner or occupier is referred to as 'the occupier' under the *Local Government Act 1999* (South Australia), Section 148. This legislation recognises that an 'occupier' means a person who is either jointly or alone in possession of land (to the substantial exclusion of others). The ACC database is therefore made up of 'parcels of ownership'. The ACC database shows commercial building information according to single ownership tenancies or owner-occupied areas. For brevity, these are referred to as Single Ownership Areas (SOA) in this thesis. The SOA is the smallest defined area that can be examined using data from the ACC database, and is used throughout this chapter.

Understanding how floor areas are measured is helpful in evaluating the dataset provided by ACC and its use in developing VVAM. The dataset discloses Gross Lettable Areas (GLA) which this thesis relies upon to calculate vacancy rates. There are, however, different methods of calculating GLAs, and these differences are important to highlight, as differences in the methods used to calculate the data constitute one potential limitation of the research. It is assumed to be likely that building tenants and owners would have used property valuation and tenancy leases when declaring areas in their non-residential TIS. However, there are several published methods in Australia for measuring office buildings. One such method is the Australian Property Institute's Method of Measurement (API, 2017) and is based upon guidance set out by the International Property Measurement Standards Coalition (IPMS Coalition). A key objective in establishing API's Method of Measurement, in agreement with the IPMS Coalition, is to produce a "shared standard of property measurement" (API, 2017:5). The Method of Measurement technical paper outlines how transactional areas are calculated. Transactional areas are defined as "the use of measurement of a building for the sale or lease or other dealing (includes valuation purposes)" (API, 2017:9). This method is widely adopted by property valuers and surveyors in drawing up office space lease contracts and property valuations (API, 2017).

The Property Council of Australia publishes its preferred method of measuring office building space, titled the *Method of Measurement for Lettable Area* (PCA, 2008). The PCA method classifies office buildings according to Nett Lettable Area (NLA). The difference between API's Method of Measurement the API guidance recommends that valuers should "reconcile NLA to IPMS 3 – Offices" (API, 2017:21).

The variations between the two published guides (API, 2017 and PCA, 2008) are important, as they may help explain differences between vacancy rates published by the PCA and those offered in this thesis, which rely upon ACC data. Further attempts to clarify which method (API or PCA) was adopted by ACC received no response. In the absence of a clear answer, two observations were made and drawn upon:

1. the IPMS 3 – Office Method of Measurement is a widely accepted method based on the International Property Measurement Standards Coalition (API, 2017)
2. the ACC dataset refers to GLA only and does not contain PCA terminologies such as NLA data.

This study therefore assumes that data collected by ACC has followed the transactional method of area calculation prescribed in IPMS 3 – Office Method of Measurement (API, 2017:17). Table 7.3 below details the inclusions and exclusions assumed to have been applied to calculate floor areas within the ACC dataset.

The ACC dataset does not declare any separate areas for external balconies, patios, cooling equipment and refuse areas, and these areas were not requested on the non-residential Tenancy Information Schedule (TIS, see Appendix 7A). While the number of car parking spaces was requested in the TIS, there was no collection of parking areas

(m^2). It is therefore assumed that all car parking spaces are not included in the office GLAs as they are often located externally, uncovered or unallocated, and are therefore exempt from GLA calculations under the IPMS 3 method. It is also important to note that there are a few differences between THE IPMS 3 method of calculating areas and the method known as 'Nett Lettable Areas' (NLA) used historically for valuation purposes (API, 2017:21). The NLA method for valuation purposes has several further exclusions such as floor area with headroom lower than 1.5 m. For the purposes of this research, it was assumed that all ACC area data had adopted the IPMS 3 method of calculation, rather than another method or a mixture of methods, and it was assumed that the inclusion or exclusion of areas, such as car parking, patios, and cooling equipment areas, was consistent throughout all TIS information returned to ACC.

Table 7-3 Extract from the IPMS 3 – Office Method of Measurement

IPMS 3 Principles	**Description of terms, extracted from API (2017a)**
GLA	"The floor area available on an exclusive basis to an occupier but *excluding* Common Facilities and shared circulation areas. It is calculated on an occupier-by-occupier basis or on a floor-by-floor basis for each Building" (API, 2017:17).
Inclusions	All internal walls and columns within an occupant's exclusive area are included within IPMS 3 – Office. The floor area is taken to the Internal Dominant Face and, where there is a common wall with an adjacent occupancy area, to the centre-line of the common wall. Where a wall is to a Common Facility the measurement is to be taken to the Finished Surface. (API, 2017:17).
Exclusions	Common Facilities: those parts of a Building providing shared facilities that typically do not change over time, including, for example, circulation areas, stairs, escalators, lifts/elevators, and motor rooms, toilets, cleaners' cupboards, plant rooms, fire refuge areas, maintenance rooms, and unallocated parking spaces. Common Facilities may vary from floor to floor and will also vary according to how the building is occupied. In the case of a building in single occupation, it has to be assumed, hypothetically, that the building is in multiple occupation, floor by floor. If a floor has two or more occupiers, each is to be measured separately and any shared circulation areas are also excluded. Open light wells or the upper-level voids of an atrium; Patios and decks at ground level, external car parking, equipment yards, cooling equipment areas and refuse areas and other ground-level areas that are not fully enclosed (API, 2017:17-18).

7.6.2.3 Management of primary data

Data was received in December 2017 and had been used by ACC to calculate rateable values for the financial year from 1 July 2017 to 30 June 2018. When received, the dataset was already organised as a searchable database in Microsoft Excel format. However, the dataset was collected for a different purpose and was organised using smaller units of data based on leased spaces rather than whole buildings. To use the ACC dataset for the purposes of establishing a vacancy database suitable to answer the research questions, a lengthy period of developmental work was undertaken to identify a population of office buildings and then to use this database to quantify vacancy. These steps are described in detail next in section 7.6.2.4.

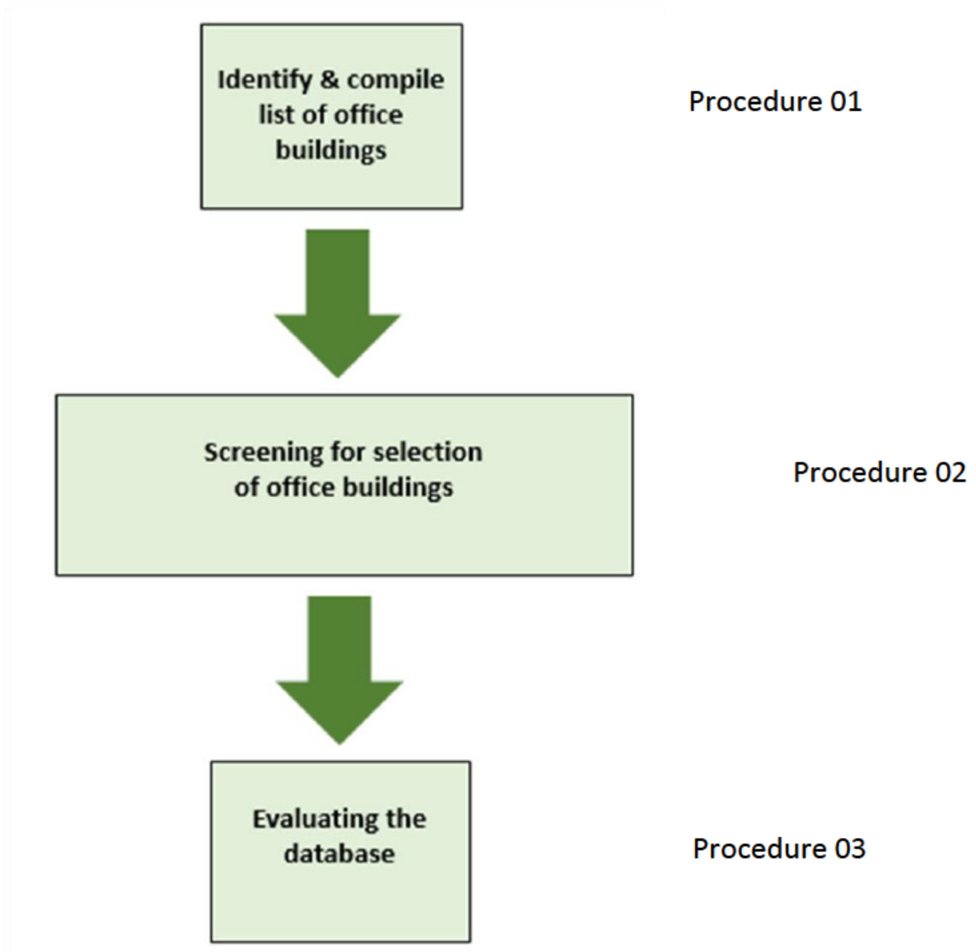


Figure 7.5 Preparing the office building population database

7.6.2.4 Preparation of data

This section details the procedures necessary to enable the construction of the office building population database. Figure 7.5, presented above, highlights the steps taken to construct the office building population database, before quantification of vacancy and subsequent analysis.

There was no single source that could offer a reliable and comprehensive list of office buildings located within the Adelaide CBD. The ACC dataset was organised and coded for each SOA (see section 7.3.1), rather than ordered by building address, and contained many other types of commercial space in addition to office use space. It was therefore unhelpful, in the first instance, for identifying a list of buildings for the office building population database. It was thus necessary to construct a database of office buildings, located within the Adelaide CBD, that was current as of 2017–2018. Therefore, a list was compiled from several secondary data sources.

Figure 7.6 below details the secondary sources used by this study and discloses that Cityscope Adelaide (RP Data, 2012) is a key source of secondary information that enabled Procedure 01. Cityscope maintains a current and comprehensive list of office buildings for Australian state capital cities , which is updated annually by Core Logic RP Data. It is noted that a more current version of Cityscope Adelaide is available through an online subscription. However, while access to Cityscope online is available for other Australian state capital cities via each state's library, South Australia's State Library did not have an active subscription, nor did the local/state governments that oversee the governance of the Adelaide CBD. The researcher did not have access to a budget to acquire an annual subscription to access current Cityscope data. The most recent paper version, from 2012, was however available via the Australian National Library in Canberra, and is therefore relied upon in this thesis.

- **ACC 2017 dataset**
  for non-residential local council rates valuations
- **Cityscope Adelaide 2012** (RP Data, 2012)
- **Electronic site map**
  Adelaide CBD (AutoCAD drawing format)
- **Websites** such as Streetview function of Google Maps via https://www.google.com.au
- **State Heritage Register**
  Listed buildings database

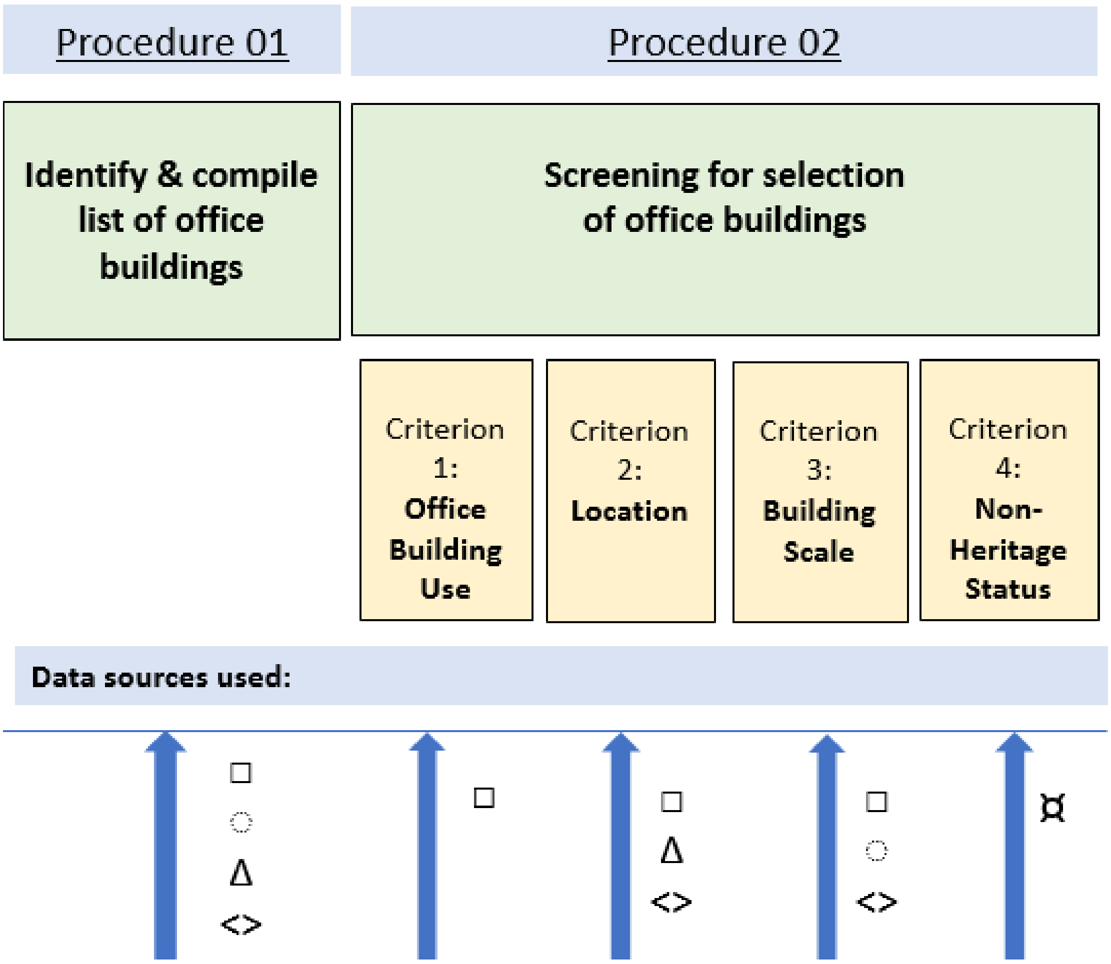


Figure 7.6 Data sources used to construct the office building population database

Site visits were also undertaken, between January and March 2018, to ensure office buildings constructed recently were included as potential office buildings for inclusion. Likewise, the data was scanned for buildings recently demolished so that they could be excluded from the sample. These visits ensured the office building population was both accurate for 2017 and inclusive of all office buildings within Adelaide CBD. This detailed preparatory work was undertaken to compile an accurate and comprehensive list of the largest possible sample of office buildings for screening using criteria 1 to 4 in Table 7-4 below.

Table 7-4 Criteria for inclusion in the office building population database

Criterion	**Description**
1 Office building use	*Considered to be an office building by ACC property valuers*
2 Location	*Located within the Adelaide CBD area defined as: buildings aligning both sides of North Terrace, and the inner edges of The Adelaide Parklands that align South, East and West Terraces*
3 Building scale	*Four storeys and above (above ground)*
4 Heritage status	*Non-heritage listed buildings*

Familiarisation with the data was developed by the researcher through a process of identifying each building's locations, site boundary and building footprint area on the electronic site map, paper maps and building descriptions contained within Cityscope Adelaide, and aerial records published in Google Maps. Each office building was located using a 2017 electronic site map of the Adelaide CBD, supplied by Department of Environment, Water and Natural Resources to the researcher.

7.6.2.5 Criteria for inclusion in the office building population database

Adaptive reuse is an all-encompassing term to describe a process of renewing an existing building for a new purpose, and thus can be applied to any building typology, function, location, building scale, and age. In order to answer the research questions, a set of criteria was developed and used to select buildings to be included in the office building population. The criteria developed are based upon:

- the research questions of this thesis

- gaps in the literature and in research knowledge identified in Chapter 02
- findings from Chapter 04 (Analysis of public debate), and
- provisions within the NCC, particularly those addressing safety (fire & seismic codes).

Sustainability was also a key factor considered by the researcher. On this basis, the scope of this study focuses upon obsolescence mitigation of the building typology most familiar to many urban centres globally – the ubiquitous multi-storey, post-war office buildings that are not, as yet, considered to hold any heritage value. The office building population consisted of buildings that met criteria on the following basis: location, the scale of the building (number of building storeys), heritage status, construction age, and each building's functional use in 2017 at the time of ACC data collection. Table 7-4 and Figure 7.6 summarise the criteria, and further consideration of each criterion is detailed next.

'Office building' is a somewhat ill-defined term, often used to describe a structure that contains spaces for commercial business activities. Although the focus on office buildings by this study is clear, this criterion requires further explaining. The all-encompassing nature of what commercial business activities may be renders the term 'office building' as needing further explanation. It is perhaps easier to categorise buildings as 'non-residential' than to define them as 'office buildings'. Commercial space includes a much wider range of buildings than office buildings, as commercial space includes other space uses such as retail, restaurants, healthcare services, and religious spaces. This study, therefore, adopts ACC space-use classifications, one of the variables in the ACC dataset. As shown in Figures 7.7 and 7.8, which follow shortly, the ACC dataset variable for space use is known as 'component type', and it enabled space use to be identified according to classifications given by ACC's property valuers. A component type of 'office use' was used to identify office buildings according to use.

The location of Adelaide's CBD is at the centre of one of four Australian state capital cities perceived as having recent and prolonged periods of high office building vacancy. As highlighted in Chapter 04, there has been a long-standing focus on Adelaide CBD buildings in public discourse. A study was already under way, commissioned by the City of Perth Economic Development Unit in Western Australia, to examine the possibility of adaptive reuse to address vacancy in Perth's CBD office building population (City of Perth, 2017). The Government of South Australia is also developing policies to address vacancy through adaptive reuse and stimulate economic regeneration of the urban core of the South Australian state capital.

Vacancy across the cluster of buildings in the Adelaide CBD is negatively framed by stakeholders with a widespread perception that building regulation is a key barrier preventing greater adaptive reuse uptake. Other locations, including urban fringe and smaller cities within SA, were also considered; however, there is a lack of data available for lesser-known and more remote non-CBD locations. The location of office buildings within Adelaide's CBD is, therefore, a key criterion for office building population selection.

The inclusion of building scale as a criterion is based upon provisions within the NCC and existing research literature. This study uses the definition of 'storey' provided in NCC Volume One:

> 'Storey means a space within a building which is situated between one floor level and the floor level next above, or if there is no floor above, the ceiling or roof above, but not—(a) a space that contains only—(i) a lift shaft, stairway or meter room; or (ii) a bathroom, shower room, laundry, water closet, or other sanitary compartment; or (iii) accommodation intended for not more than 3 vehicles; or (iv) a combination of the above; or (b) a mezzanine' (ABCB, 2019:32).

NCC Volume One also provides a number of exemptions that are applicable when calculating a building's total number of storey levels (ABCB, 2019) and are explained in sections C1.2 (b), (c), and (d). An example of storey level exemptions is provided below:

> 'C1.2 (b) A storey is not counted if— (i) it is situated at the top of the building and contains only heating, ventilating or lift equipment, water tanks, or similar service units or equipment; or (ii) it is situated partly below the finished ground and the underside of the ceiling is not more than 1 m above the average finished level of the ground at the external wall, or if the external wall is more than 12 m

> long, the average for the 12 m part where the ground is lowest. (c) In a Class 7 or 8 building, a storey that has an average internal height of more than 6 m is counted as—(i) one storey if it is the only storey above the ground; or (ii) 2 storeys in any other case' (ABCB, 2019:91).

This extract highlights that there are a number of conditions that exempt storey levels when establishing a building's total number of storeys for NCC compliance purposes. The exemptions are somewhat problematic, as it is not possible to visit all office buildings in the population to verify whether or not some floors are exempt for NCC compliance purposes. Buildings that appeared to have only 3 storeys from external site visits may be considered as two storeys for NCC purposes when space-use exemptions allowed under the NCC are applied. This suggests that a focus on buildings of 4 storeys and above would be a more reliable threshold for office buildings that would be required to comply with the more stringent fire and seismic NCC code requirements identified as problematic in the literature. As highlighted in Chapter 02 (Literature review), among the NCC regulations considered to be most problematic by stakeholders of adaptive reuse are:

- fire safety (Conejos *et al.*, 2016; Udawatta *et al*., 2016; Bruce *et al.*, 2015; Bullen & Love, 2011a), and
- seismic requirements (Conejos *et al.*, 2016; Udawatta *et al*., 2016).

A review, for this study, of NCC Volume One found that the number of storeys in a building becomes an important factor of NCC provisions at around 3–4 storeys, not including floors considered to be exempt under NCC guidance. Important NCC safety provisions, which apply to buildings above 3–4 storeys, arguably involve higher construction costs, and compliance is potentially more problematic for adaptive reuse developments of 4 storeys and above. A review of NCC provisions shows that 3–4 storeys is an often-used threshold across NCC provisions including Section C Fire Resistance, Section D Access and Egress, Section E Services and Equipment, and Section F Health and Amenity. Provisions for earthquakes are applied across all buildings. The review of provisions is detailed in Appendix 7-F, and shows which provisions are applied to developments on the basis of 3 or more storeys. As shown in Figure 7.5, three information sources were used to determine whether each building was above or below the 4-storey threshold for inclusion in the office building population (criterion 3).

In addition to NCC provisions, Chapter 02 (Literature review) highlighted that there is also increasing recognition of an environmental need to retain taller buildings for longer to maximise embodied energy already spent in our built environment. Coupled with this, it is acknowledged that all buildings need to continuously evolve in order to stay relevant and adapt to their marketplace in order to avoid obsolescence and premature demolition (Davies & Trabucco, 2018). Andrews *et al.* (2016) suggest that resources should be targeted toward larger projects that 'promise a bigger bang for the enforcement buck' to maximise the impact of energy-efficient reuse of commercial office buildings (p.119). This insight supports the researcher's decision to focus on the larger-scale office buildings of 4 storeys and above.

There are several reasons why this study focuses on non-heritage buildings. Firstly, the focus on non-heritage office buildings is to minimise the number of potentially problematic variables involved in adaptive reuse development. Alongside NCC compliance, change-of-use adaption can trigger more than one type of regulation approval, such as mandatory planning approval. For listed buildings, the impact upon heritage value is also a potent inhibitor of adaptive reuse, as perceived by stakeholders (see Chapter 02). While all change-of use developments must achieve planning approval alongside NCC compliance, only buildings with state-listed status require heritage consideration. This study, therefore, examines non-heritage office buildings to reduce the number of potentially problematic variables stemming from mandatory regulation.

Secondly, non-heritage buildings make up the vast majority of buildings in cities, and as a population, they shape each city's unique sense of place and identity alongside those listed on local and state heritage registers (Hofmann *et al.*, 2002; Loli & Bertolin, 2018). Finally, the review of literature revealed that adaptive reuse research tends to focus upon heritage building case studies. Adaptive reuse of buildings not yet considered to have heritage value is under-researched in the field. This study aims to contribute to the research on non-heritage adaptive reuse.

Registers for both local and state heritage property listings were consulted to screen for buildings whose heritage value had been recognised and therefore had an additional layer of planning regulation complicating their potential relationship to answering the research questions. The listing status of each address was also established using public local, state and national heritage listing records. To enable the largest sample possible for the office building population database, consideration was given to heritage-listed buildings if the listings were limited to façade retention. Office buildings were included where heritage listings involved only façade retention, with the remainder of the development being unlisted and constructed relatively recently. Where this occurred, the heritage status of the office building was discounted, and the building was included in the sample if all other criteria were met.

Office buildings were screened according to their space-use classification by ACC property valuers (criterion 1). The classification of each building (office buildings) was undertaken on the basis of its SOA component uses. Buildings were excluded from the sample when they contained no office-use space and were predominantly used for religious activities; community uses; short-term residential use, including hotel accommodation; and as education facilities. Each building was evaluated using the categories of space-use given for each component SOA. Office buildings in the sample often contained both office-use and non-office-use space. This complexity can be contextualised by methodological literature that engages in secondary data analysis. The complexity of using secondary data often involves ambiguous or incomplete data in the source dataset (Sprague *et al*. 2017). The need for time-consuming development work by researchers when using secondary datasets is not uncommon, due to the fact that 'the data are typically created for other purposes and do not always capture desired constructs' (Stewart *et al.* 2016:529). The office building population represents the largest sample of office buildings possible, rather than a representative sample across the office building population. It was possible to deal with these complexities by making pragmatic decisions on whether a building could be classified as an office building.

The ACC dataset was provided in Microsoft Excel format and organised in Excel rows according to Single Ownership Areas (SOAs) rather than per building envelope. Figure 7.7 below highlights this organisation of the ACC dataset according to individual SOAs.

	SOA - Council ID	Trading Name	Inspected Date	Rateable	Address	reet Number	Locality	Street Name
2	3	The Occupier	######	Yes	XXXX STREET ADELAIDE, 5000	387	ADELAIDE	XXXX
3	4	XXXX	######	Yes	XXXX STREET ADELAIDE, 5000	142	ADELAIDE	XXXX
4	5	The Occupier	######	Yes	XXXX STREET ADELAIDE, 5000	23	ADELAIDE	XXXX
5	6	The Occupier	######	Yes	XXXX STREET ADELAIDE, 5000	15	ADELAIDE	XXXX
6	7	The Occupier	######	Yes	XXXX STREET ADELAIDE, 5000	6	ADELAIDE	XXXX
7	10	XXXX		Yes	XXXX STREET ADELAIDE, 5000	12	ADELAIDE	XXXX
8	11	XXXX		Yes	XXXX STREET ADELAIDE, 5000	12	ADELAIDE	XXXX
9	14	The Occupier		Yes	XXXX STREET ADELAIDE, 5000	12	ADELAIDE	XXXX

Figure 7.7 Example of SOA data for each office building from ACC dataset

While some SOAs represented whole buildings, many buildings are made up of varying multiples of SOAs, each of which differed in size ranging from small-scale areas (around 20 m^2) up to multiple floor plates (over 3000 m^2). Data for every single building address, within the preliminary list of office buildings, had to be constructed by aggregating rows of data for individual SOAs, as shown in Figure 7.8.

	Building Ref		Total No. of SOAs	Trading Name of Occupiers	Council ID	Full Address	Street Number	Locality	Street Name	Component Type
2	#001		12			XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	
3		SOA	1	XXXX	2290	XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
4		SOA	1	The Occupier	2820	XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Shop
5		SOA	1	XXXX	3287	XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Shop
6		SOA	1	The Occupier	26272	XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
7		SOA	1	The Occupier	26273	XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
8		SOA	1	The Occupier	26274	XXXX Street, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
9		SOA	1	XXXX	31499	XXXX Place, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
10		SOA	1	The Occupier	31500	XXXX Place, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
11		SOA	1	XXXX	31501	XXXX Place, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
12		SOA	1	XXXX	31502	XXXX Place, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
13		SOA	1	XXXX	31503	XXXX Place, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office
14		SOA	1	XXXX	31790	XXXX Place, ADELAIDE, 5000	XX	ADELAIDE	XXXX	Office

Figure 7.8 SOA data collated by building address

Although SOAs were contained within a single building envelope, the street number assigned in the ACC dataset often differed from the commonly known building number displayed on the main building façade and visible from the public street. The reason for the differences between the various information sources relied upon by this research was not clear. Three possible reasons are: recent and historic changes to ownership structures, such as strata subdivision; buildings occupying corner locations on sites where two streets intersect; and historic anomalies where street numbers are not consecutive. Site maps within Cityscope Adelaide (RP Data, 2012) were useful in determining the range of business addresses by which each building could be referred to in different data sources, including the ACC dataset. This was also particularly useful for buildings occupying corner sites and having multiple entrances located on more than one street.

SOAs were compiled for each building using the addresses listed within the ACC dataset, Cityscope, and anomalies noted during site visits. The filters function within Excel was employed for this part of the database construction. The ACC dataset contained a small number of SOAs that were without a street address and could not be identified. These SOAs were not included in the sample. Each building was then screened again, for inclusion in the office building database, against criterion 1. The number of buildings that met all 4 criteria for inclusion in the office building population database at the end of procedure 3 (see Figure 7.5) was 126. This provisional number represents the sample prior to the initial analysis and removal of outliers. Office buildings included in the office building population database at this stage of the research process were given a numeric reference starting from #1 to #126. This was so the data could eventually be anonymised but reidentified if needed by the researcher.

It was decided that SOAs containing non-office space, located within buildings classified as office buildings, should be included to enable a deeper understanding of office building space use and vacancy. SOA data for spaces other than office-use ones was included but classified as non-office-use space. This included space described as reception, store, consulting rooms, and education. These spaces were retained in the database, as it was found that these functional uses were often associated with office buildings within the ACC dataset.

7.6.2.6 Finalising the sample

This section explains the procedures undertaken to establish this final sample of office buildings. The final sample of 118 buildings is the largest possible office building population that this study could robustly analyse (*n* = 118). The sample includes office buildings across both primary and secondary grades that met all the criteria for selection described earlier in section 7.6.2.

An evaluation of the office building population database was conducted before undertaking calculations to establish vacancy sub-types and analysis. This evaluation compares total gross lettable areas set from ACC data ($GLA_{BUILDING}$, m^2) with other public data sources that disclosed floor areas (m^2) for buildings in the sample.

There were three benefits of comparing areas disclosed by the office building population database with floor areas published by other data sources. These were:

1) It established greater confidence in the novel method developed in this study to quantify vacancy.
2) The process of comparing floor areas helped the researcher to locate instances of inadvertent SOA omissions and errors made in compiling the database from the ACC dataset.
3) It enabled the researcher to identify outliers and exclude them from the sample.

This evaluation uses data published in Building Energy Efficiency Certificates (BEECs) required by the Commercial Building Disclosure Program (CBD Program) to review $GLA_{BUILDING}$ totals for buildings included in the Office Building Population database. While there are other data sources that disclose building area values (m^2), the data from the BEECs was selected for the evaluation because:

- nearly half of the buildings in the office population were included in the CBD Program register, which discloses total Nett Lettable Areas, enabling a check of a large proportion of buildings in the sample, and
- the CBD Program has inbuilt quality management audits and is a mandatory, government-led national initiative, and it can therefore be assumed that BEEC data was reasonably reliable.

Under the federal *Building Energy Efficiency Disclosure Act 2010* (BEED Act), the CBD Program was introduced on 1 July 2015, and amendments were made in July 2017 that require most building owners to hold and register a BEEC when their buildings are advertised for sale, lease or sublease and are over 1000 m^2 in area (DISER, 2020). Within the office building population (n = 118) identified in this chapter, 67 buildings had undergone a BEEC assessment.

For further detail about the reliability of the BEEC data, it should be noted that BEECs are prepared by independent professionals who have been accredited by the Secretary of the Department of the Environment and Energy as accredited CBD Assessors (DISER, *n.d.*). The BEED Act sets out provisions for CBD Program assessors undertaking a BEEC assessment. Quality assurance checks of BEEC submitted by assessors are carried out through a CBD Auditing Program by the Australian Government Department of the Environment (DISER, 2020). This study assumes that the data produced and submitted by independent assessors is therefore reliable and accurate.

There are two parts to the BEEC assessment: 1) the building's National Australian Built Environment Rating System (NABERS) Energy for offices star rating, and 2) a tenancy lighting assessment of the relevant area of the building (Department of the Environment and Energy, 2019a). It is the NABERS rating system component that discloses a 'Nett Lettable Area of the building' for each commercial building and is, therefore, most useful to this study. Nett Lettable Area (NLA) values are published in the CBD Downloadable Dataset as part of the CBD Program, and are used to compare GLA values calculated by VVAM, using taxation data supplied by ACC. Within the office building population database, 67 had a BEEC assessment available, disclosing an NLA for the building. These values are referred to as the CBD Program NLAs (NLA_{CBD}) from this point onwards.

The NLA_{CBD} data is published in the *CBD Downloadable Data Set* (Australian Government, n.d.), and covers assessments made between 2011 and 2018. The evaluation uses publicly available NLA data from BEECs covering the period April–July 2017, or data from available BEECs closest in time to this period. April–July is the period of data collection for the ACC dataset used by this study. The 'Current from' valid date stamped on each BEEC was the deciding factor in this decision.

Total $oGLA_{BUILDING}$ values, from VVAM, were selected as the variable for this comparison with that NLA_{CBD} data. Values of $oGLA_{BUILDING}$ are the total Gross Lettable Area of all office-use in each office building, calculated through VVAM using values in the ACC dataset. The comparing of data was also a useful check to find and correct any errors caused by inaccuracies during the data input stage, and 2 data input errors were corrected through this process.

The comparison found that NLA_{CBD} and $oGLA_{BUILDING}$ values closely matched each other, which suggests that $oGLA_{BUILDING}$ values can be relied upon as much as the NLA_{CBD} values disclosed in the CBD Program (see Figure 7.9 below).

The above finding also implies that similar methods of area measurement had been used in calculating floor areas disclosed by the ACC dataset. As space use and vacancy in this population are under constant flux, the review did not seek to establish accuracy to absolute levels, but rather acted as a quality check to aid confidence in the GLA data, disclosed by the method in this chapter, before undertaking the time-consuming quantitative work needed to calculate vacancy levels. On this basis, the researcher was satisfied that the office building population database was sufficiently reliable.

In addition to the comparison above, 8 buildings disclosed unexpectedly low $oGLA_{BUILDING}$ (m^2) when compared with other databases, and with knowledge gained through site visits and electronic site plan measurements. These buildings and the data sources reviewed were shown earlier in Table 7.4. The buildings detailed in Table 7.5, which is immediately after figure 7.9 below, were considered outliers and thus excluded from further analysis due to the discrepancies found.

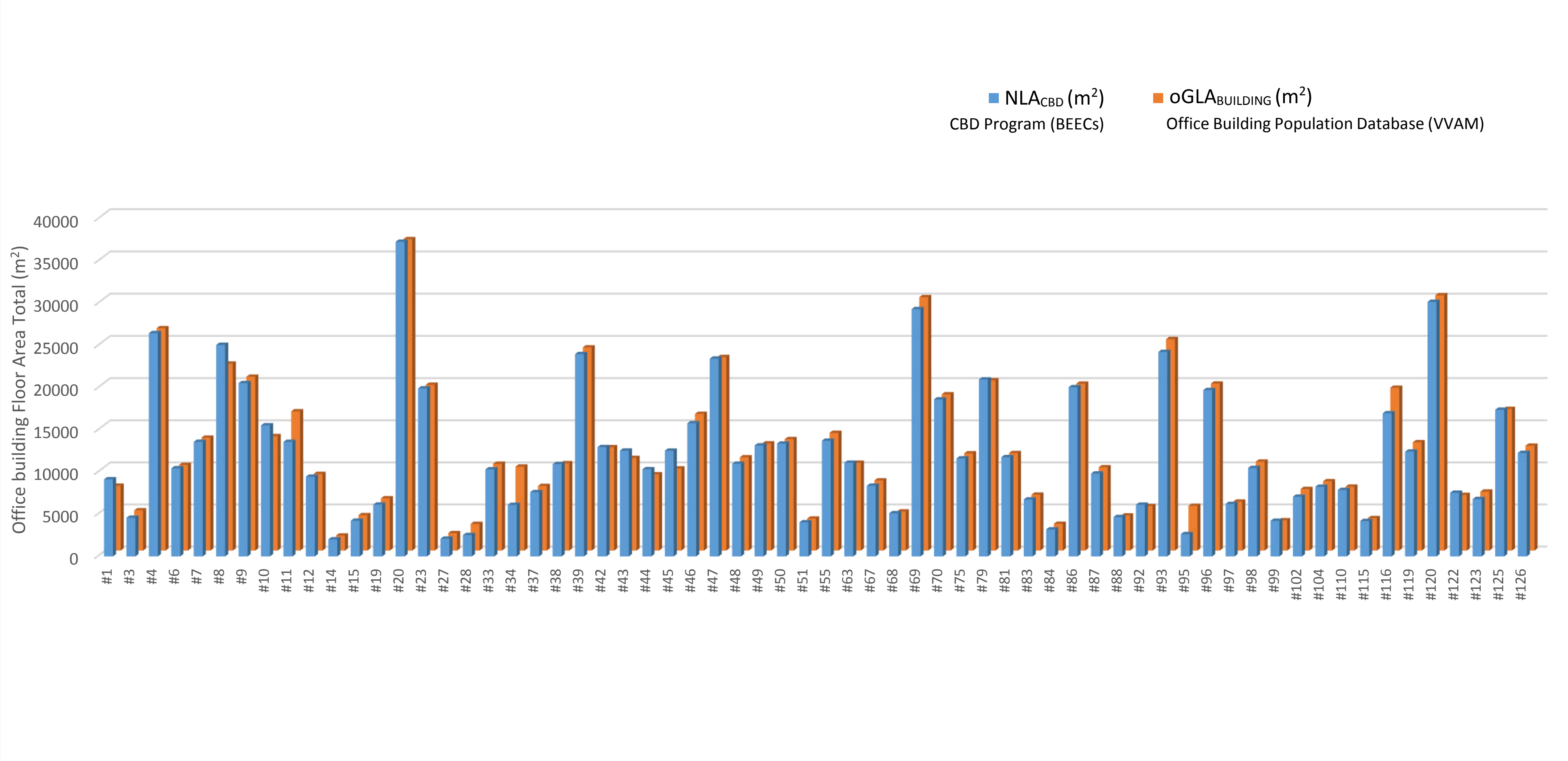


Figure 7.9 Comparison of Floor Areas: oGLA$_{BUILDING}$ (m^2) and NLA$_{CBD}$ (m^2)

Table 7-5 Buildings removed from the sample as considered to be outliers

Comparison of $GLA_{BUILDING}$ (m^2) values with other data sources eg: [1] NLA_{CBB} (BEEC CBD Program), [2] NLA from Cityscope Adelaide (RP Data, 2012), [3] Building footprint areas from electronic site plans.

Building ref	Building grade	Description of building	Tot. $GLA_{BUILDING}$	Comparable data sources	Comment
#13	Primary	6 storeys	1726 m^2	[2] 17138 m^2	High vacancy rate reported: >50%. However, total $GLA_{BUILDING}$ is suspected to be too low given the scale of building. Only 1 public sector-occupied SOA disclosed. Possible discrepancy due to exemption of local council rates.
#30	Secondary	8 storeys plus basement	5511 m^2	[2] 7678 m^2	Low vacancy rate reported: <30% Total $GLA_{BUILDING}$ is suspected to be too low. Subdivided under Community Plan. 129 SOAs disclosed. Average SOA area is only 43 m^2.
#35	Secondary	8 storeys	1302 m^2	[3] 484 m^2 building footprint	Low vacancy rate reported: 0% Total $GLA_{BUILDING}$ is suspected to be too low. Subdivided under Community Plan. 7 SOAs disclosed of equal m^2 (186 m^2).
#80	Secondary	11 storeys	5333 m^2	[3] 868 m^2 building footprint	Low vacancy rate reported: <30% Total $GLA_{BUILDING}$ is suspected to be too low. Missing data for levels 9–11.
#90	Secondary	11 storeys	926 m^2	[1] 22979 m^2	Low vacancy rate reported: 0% Total $GLA_{BUILDING}$ is suspected to be too low. Only 4 SOAs disclosed. All occupants public sector. Possible discrepancy due to exemption of local council rates.
#94	Secondary	11 storeys	7546 m^2	[3] 1258 m^2 building footprint	High vacancy rate reported: ≥50%. However, total $GLA_{BUILDING}$ is suspected to be too low given the scale of building. Only 1 SOA disclosed by ACC dataset. Occupants are public sector–local/state government organisations. Possible explanation – discrepancy due to exemption of local council rates.
#109	Primary	7 storeys	10,661 m^2	[1] 15140 m^2	Low vacancy rate reported: <30%. Total $GLA_{BUILDING}$ is suspected to be too low. 10 SOAs disclosed by ACC database. Missing data for level 3 & partially missing for level 0.
#118	Primary	10 storeys	22,120 m^2	[1] 35350 m^2	High vacancy rate reported: ≥50%. However, total $GLA_{BUILDING}$ is suspected to be too low given the scale of building. 3 SOAs disclosed by ACC database. The two SOAs occupying 95% of the $GLA_{BUILDING}$ area are public sector–local/state government organisations.

7.6.3 Phase A: Quantifying valuation-factored vacancy

Phase A of VVAM enabled the quantification of valuation-factored vacancy through the inversion of occupancy data. Valuation-factored vacancy is the floor area (m^2) that is factored into the local council's valuations for taxation purposes, and includes space that is not occupied. All vacancy types within office-use space are included in valuation-factored vacancy.

The method detailed next enables a quantification of the unoccupied space that is exempt from local government commercial building taxation under the method 'Annual Value'. This method of calculating non-residential local council rates is used by Adelaide City Council to enable equitable calculation of local taxation, and incorporates an owner's ability to pay (ACC, 2017). An occupancy rate for each building is the percentage of floor area, within each SOA, used by tenants and owner-occupiers at the time of data collection. A Single Ownership Areas (SOA) is described in section 7.3, and is the smallest defined area that can be examined using data from the ACC database. Occupancy rates can be calculated using Gross Lettable Areas (GLA) & Components of Gross Lettable Areas (CGLA) disclosed by each SOA in the Office Building Population Database. However, space use (office and non-office use) was one complicating factor in deciding how to calculate occupancy and vacancy rates.

Buildings in the population were often found to contain a variety of uses in addition to office space. The space use classification, for each SOA, was included in the original dataset collected by ACC, and had already been used to identify office buildings within the ACC dataset (see Procedure 02, Criterion 1 earlier in this chapter). Most office buildings identified contained mostly SOAs that are classed as 'office' use. However, a small number of SOAs were classed as uses other than office, and included retail, shop, store, consulting rooms, and education facility. To deal with this complicating factor, it was decided to calculate each building's vacancy rate using area values (m^2) for space categorised as 'office' only. Therefore, the vacancy rate used to quantify under-use within this thesis is the 'office'-only space vacancy rate, oVR (%). It is important to note here, however, that non-office use data was retained within the office building population database. Data for spaces categorised as non-office use was not discarded, as it can offer important insights into each building and the demand for all space within office buildings. Such spaces are part of each building's occupancy and are useful when undertaking the spatial analysis discussed later in this chapter.

As highlighted at the start of section 7.4, occupancy taxation data was inverted to quantify the overall office-use space considered surplus to local office market demands, and is referred to as valuation-factored vacancy. The overall vacancy rate used in Phase A analysis includes both vacancy sub-types, namely Greyspace and Untenanted vacancy, which are the two sub-types examined later by the visualisations in Phase B. This section details the process used for calculating valuation-factored vacancy for office-use space within each building across the whole office building population sampled.

Two categories of space use ('non-office-use' and 'office-use') were employed to disaggregate each building's non-office-use space from valuation-factored office-use vacancy, oVR (%). To do this, area values (GLA and CGLA) are given prefixes 'o' for office-use space (oGLA and oCGLA), and 'n' for non-office-use space (nGLA and nCGLA). In summary, key terms used in Phase A calculations are:

oGLA = the total Gross Lettable Area for <u>office</u> space within a building

nGLA = the total Gross Lettable Area for <u>non-office</u> space within a building

oCGLA = the component of floor area occupied for <u>office</u> space

nCGLA = the component of floor area occupied for <u>non-office</u> space

SOA = the smallest unit of space examinable in the ACC dataset, whereby Total GLA values are the sum of all SOA values for each building address.

To calculate the valuation-factored office-use Vacant Area (oVA) (m^2):

$$\mathbf{oVA = Total\ oGLA - Total\ oCGLA} \qquad (\mathbf{m^2})$$

where **Total oGLA** is calculated using office-use SOA values for each building:

$$\mathbf{Total\ oGLA = \sum oGLA_{SOA1} + oGLA_{SOA2} + \ldots + oGLA_{SOA193}} \qquad (\mathbf{m^2})$$

and **Total oCGLA** is calculated using SOA values for each building, where **Total oCGLA** is the total office-use component considered to be occupied:

$$\mathbf{Total\ oCGLA = \sum oCGLA_{SOA1} + oCGLA_{SOA2} + \ldots + oCGLA_{SOA193}} \qquad (\mathbf{m^2})$$

Although the formula to calculate non-office-space vacancy (nVA) is shown next, the reader should note that nVA is not used in Phase A but as a foundation for enabling the visualisation of vacancy distribution in Phase B. It is, however, presented here as the nVA formula mirrors that for oVA. The formula's purple border is indicative of the colours used in Phase B visualisations.

To quantify valuation-factored non-office Vacant Area (nVA) (m^2):

$$\mathbf{nVA = Total\ nGLA - Total\ nCGLA} \qquad (\mathbf{m^2})$$

where **Total nGLA** is calculated using non-office-use SOA values for each building:

$$\mathbf{Total\ nGLA = \sum nGLA_{SOA1} + nGLA_{SOA2} + \ldots + nGLA_{SOA193}} \qquad (\mathbf{m^2})$$

and **Total nCGLA** is calculated using SOA values for each building, where **Total nCGLA** is the total non-office-use component considered to be occupied:

$$\mathbf{Total\ nCGLA = \sum nCGLA_{SOA1} + nCGLA_{SOA2} + \ldots + nCGLA_{SOA193}} \qquad (\mathbf{m^2})$$

Valuation-factored office-use Vacant Area (oVA) is expressed as the vacancy rate (oVR) (%):

$$\textbf{oVR} = \textbf{100\%} - \textbf{oOR} \qquad \textbf{(\%)}$$

where **oOR** is the office-use Occupancy Rate given by:

$$\textbf{oOR} = (\textbf{Total oCGLA / Total oGLA}) \times \textbf{100} \qquad \textbf{(\%)}$$

Total oCGLA is calculated using SOA values for each building, where

Total oCGLA is the total office-use component considered to be occupied:

$$\textbf{Total oCGLA} = \sum \textbf{oCGLA}_{\textbf{SOA1}} + \textbf{oCGLA}_{\textbf{SOA2}} + \ldots + \textbf{oCGLA}_{\textbf{SOA193}} \qquad (\textbf{m}^2)$$

and **Total oGLA** is calculated using office-use SOA values for each building:

$$\textbf{Total oGLA} = \sum \textbf{oGLA}_{\textbf{SOA1}} + \textbf{oGLA}_{\textbf{SOA2}} + \ldots + \textbf{oGLA}_{\textbf{SOA193}} \qquad (\textbf{m}^2)$$

In Phase A, valuation-factored vacancy was calculated for both office-use and non-office-use space. The inclusion of non-office-use space in Phase A, however, was important to ensure that data for office buildings was as complete and as comprehensive as possible to aid confidence in the novel method of VVAM. This study, however, is focused on office-use vacancy in office buildings. Therefore, while occupied floor area, and its inverse, valuation-factored vacancy (m^2), were calculated in Phase A for non-office-use space, it was not deemed necessary to quantify vacancy sub-types (Untenanted and Greyspace vacancy) for non-office-use space in this study, although this calculation is entirely possible from the data. Untenanted and Greyspace vacancy is quantified for office-use space in Phase B, which follows.

7.6.4 Phase B: Spatial Analysis of vacancy sub-types

Without fine-grained data to critically understand vacancy, it is difficult to evaluate the accuracy of claims that high vacancy is the product of problematic NCC performance standards for adaptive reuse development. Findings in Chapter 04 underline the need for research into the adaptive reuse predicament using a critical and robust interrogation of office buildings considered to have high vacancy (oVR ≥ 50%), rather than accept the logic presented to explain the predicament in public debate. The spatial analysis technique investigates vacancy in secondary grade office buildings, considered to have high vacancy (oVR ≥ 50%) for four reasons:

1. As a pragmatic strategy to visualise vacancy, when the data did not lend itself readily to a written description or tabular representation. In this situation, difficulties describing vacancy would hinder analysis of vacancy in the context of a building's suitability for adaptive reuse.
2. To provide a fine-grained detailed description of the shape and distribution of office space, non-office space, and vacancy. Undertaking this analysis would also enable a more critical understanding of the connection between vacancy shape and adaptive reuse potential at a city-wide scale and also on a building-by-building scale.
3. To ascertain whether patterns in vacancy and occupancy exist and can inform whether adaptive reuse is a solution to obsolescence in the face of reportedly high vacancy across any given building population.
4. To help evaluate the current focus in research and public debate, which suggests adaptive reuse is the preferred obsolescence mitigation strategy for secondary grade office buildings suffering high levels of vacancy (oVR ≥ 50%).

In practice, applying the Phase B technique raises questions about the suitability of adaptive reuse to address vacancy in the Adelaide office building population. In turn, this application casts a critical light on claims that regulatory barriers are preventing adaptive reuse.

Phase B visualises the distribution of vacancy through the disaggregation of unoccupied space into two sub-types of vacancy for office-use space:

- Untenanted vacancy, expressed as floor areas for the SOAs categorised as office-use space, $oGLAU_{SOA}$ (m^2)
- Greyspace vacancy in office-use space, expressed as a floor area, oVG (m^2)

Untenanted vacancy and Greyspace vacancy are calculated for individual SOAs for office-use space contained within each office building. The sum of each SOA vacancy sub-type can then provide an Untenanted and Greyspace total per office building.

Further discussion of these two vacancy sub-types was presented earlier in section 7.5 The method for Phase B is broken down into 5 steps, as shown in Figure 7.10, which is followed by an explanation of each step.

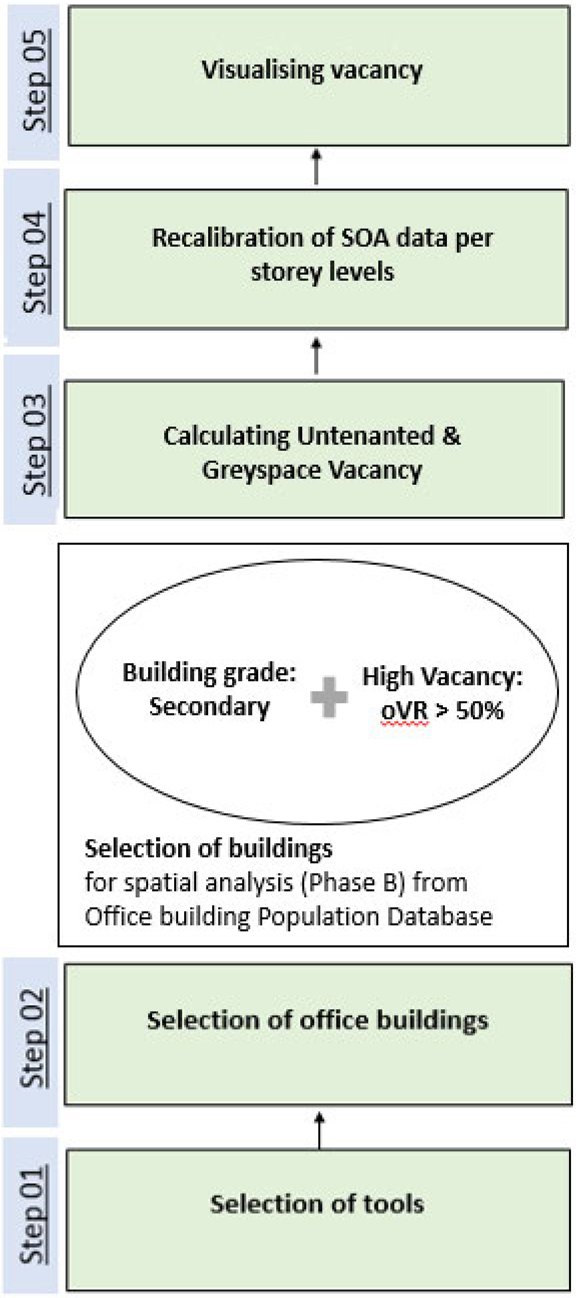


Figure 7.10 Overview of steps in Phase B

7.6.4.1 Step 01: Selection of tools

As visualisations involved sectional representations of buildings, the use of GIS platforms to conduct spatial analysis was not appropriate. GIS platforms map data in the form of aerial plans. While GIS is capable of analysis at a single point or single building, the spatial analysis in VVAM stacks multiple datasets using five variables:

1. Untenanted vacancy in office-use space
2. Greyspace vacancy in office-use space
3. Valuation-factored non-office-use vacancy
4. Occupied office-use space
5. Occupied non-office-use space.

These five variables generate multiple sets of data from every SOA contained in each office building, and are organised by building storey level. It was, therefore, appropriate to select a spatial analysis technique based on its ability to visualise the data as a vertical section. Representing each building by its number of storeys also offered communication of each building's scale, especially when read in conjunction with its site plan showing the building footprint on electronic site plans viewed in CAD software, such as AutoCAD.

Stacked bar charts are generated within Microsoft Excel to represent vacant and occupied space within each building. This representation of the data was selected because it was similar to architectural section drawings. Sectional drawings differ from horizontal plans in that they are used to communicate vertical dimensional information, such as floor-to-ceiling height and level information. Microsoft Excel was also convenient from a time resource point of view, as the original ACC dataset and the Office Building Population Database had already been produced and stored in Excel.

7.6.4.2 Step 02: Selection of office buildings

The focus in Phase B is on office buildings, considered as 1) secondary grade, and 2) having a high vacancy rate in 2017. The analysis of the public debate (Chapter 04) and published literature (Chapter 02) identifies these two variables as being important in the debate on barriers to adaptive reuse. Chapter 04 revealed that stakeholders wished for adaptive reuse of secondary grade office buildings to mitigate high vacancy rates in the market. Stakeholders identified secondary buildings as most likely to be vacant and therefore obsolete, framing secondary buildings as the apparent target for adaptive reuse. Chapter 04 also found that stakeholders within South Australia perceived building regulation to be most problematic for secondary grade buildings. The review of the literature found that existing studies conceptualised vacancy as a 'lump' that made its way through the office building market over time, transitioning from primary grades into lower grades before finally becoming 'indigestible' in secondary grade office building assets, as they depreciated. The term 'sinking stack theory' is used to describe this idea (Langston *et al.*, 2008; Ness & Atkinson, 2001; Atkinson, 1998). The public debate also presents high vacancy as evidence of barriers arising from NCC performance standards. Phase B uses the following criteria to select buildings in the office building population:

- secondary grade office building
- oVR (%) > 50%

A total of 32 buildings met the above selection criteria. The buildings selected for spatial analysis are shaded green in Appendix 7-B.

7.6.4.3 Step 03: Quantifying vacancy sub-types

This section of the method presents the formula for calculating Untenanted vacancy and Greyspace vacancy. To aid clarity, and to highlight the connection between the steps in this method, the coloured boxes around the formulas for oGLAU and oVG represent the colours used in Phase B spatial analysis figures in step 05 below.

Untenanted vacancy for each SOA ($oGLAU_{SOA}$):

$$\mathbf{oGLAU_{SOA} = 0\ (m^2)} \qquad \textit{if } oCGLA_{SOA} \neq 0\ (m^2)$$

$$\mathbf{oGLAU_{SOA} = oGLA_{SOA}\ (m^2)} \qquad \textit{if } oCGLA_{SOA} = 0\ (m^2)$$

Building total (Total oGLAU):

$$\textbf{Total oGLAU} = \sum \mathbf{oGLAU_{SOA1} + oGLAU_{SOA2} + \ldots + oGLAU_{SOA193}} \qquad \mathbf{(m^2)}$$

Greyspace vacancy for each SOA (oVG_{SOA}):

$$\mathbf{oVG_{SOA} = 0\ (m^2)} \qquad \textit{if } oCGLA_{SOA} = 0\ (m^2)$$

$$\mathbf{oVG_{SOA} = oGLA_{SOA} - oCGLA_{SOA})\ (m^2)} \qquad \textit{if } oCGLA_{SOA} > 0\ (m^2)$$

Building total (Total oVG):

$$\mathbf{Total\ oVG = \sum oVG_{SOA1} + oVG_{SOA2} + \ldots + oVG_{SOA193} \qquad (m^2)}$$

Valuation-factored vacancy, quantified in Phase A for each secondary grade building, can be disaggregated into two vacancy sub-types: Untenanted vacancy and Greyspace vacancy. Untenanted vacancy quantified in Phase A is the space that is not occupied at the time of data collection. Greyspace vacancy is known to be hard to detect, and VVAM is the first known attempt to quantify Greyspace in office buildings in Australia.

7.6.4.4 Step 04: Recalibration of SOA storey levels

The spatial distribution of vacancy within each building, storey by storey, can offer a profound insight into the suitability of adaptive reuse for Adelaide's office building population. For example, the scale and clustering of vacancy both have a bearing on the type of adaptive reuse that can be employed to address vacancy in each building, from the conversion of single floor plates (PAR) to whole building adaptive reuse (WBAR). Adaptive reuse types are discussed further in section 7.4.

Visualising the distribution of vacancy requires recalibration of vacant and occupied floor space for SOAs, particularly where an SOA occupies more than one floor plate. This recalibration is necessary due to the ACC dataset only records one storey level for each SOA, as shown in Figure 7.11 below, using building #2 as the example. Each SOA disclosed a variable that permits identification of SOAs by building storey level. In the ACC dataset, this variable is the 'component level' and is shown in column 'J' of Figure 7.11 below.

	A	B	C	D	E	F	G	H	I	J	K	L
1		**Study ID No.**	**Trading Name of Owners/Occupiers**	**ACC Council ID**	**Simplified Address**	**Street Number**	**Locality**	**Street Name**	**ComponentType**	**Component Level**	**Total $GLA_{BUILDING}$ (m^2)**	**Total $CGLA_{BUILDING}$ (m^2)**
2	**SUMMARY:**	**2.00**			**XX**	**XX**	**ADELAIDE**	**XXX**		**10 storeys**	**2783**	**1263**
3		SOA 01	XXXX	----			ADELAIDE	XXX	Office	Mezzanine	141	0
4		SOA 02	XXXX	----			ADELAIDE	XXX	Office	Ninth	350	140
5		SOA 03	XXXX	----			ADELAIDE	XXX	School	Basement	85	11
6		SOA 04	XXXX	----			ADELAIDE	XXX	Office	Seventh	66	0
7		SOA 05	XXXX	----			ADELAIDE	XXX	Office	Seventh	66	66
8		SOA 06	XXXX	----			ADELAIDE	XXX	Office	Seventh	114	114
9		SOA 07	XXXX	----			ADELAIDE	XXX	Office	Fifth	160	160
10		SOA 08	XXXX	----			ADELAIDE	XXX	Office	Fifth	86	86
11		SOA 09	XXXX	----			ADELAIDE	XXX	Office	First with L	30	0
12		SOA 10	XXXX	----			ADELAIDE	XXX	Office	Sixth	240	0
13		SOA 11	XXXX	----			ADELAIDE	XXX	Office	Second wit	243	156
14		SOA 12	XXXX	----			ADELAIDE	XXX	Office	Fourth	531	284
15		SOA 13	XXXX	----			ADELAIDE	XXX	Shop	Ground	233	233
16		SOA 14	XXXX	----			ADELAIDE	XXX	Office	First with L	181	0
17		SOA 15	XXXX	----			ADELAIDE	XXX	Office	Eighth	55	0
18		SOA 16	XXXX	----			ADELAIDE	XXX	Office	Eighth	190	0
19		SOA 17	XXXX	----			ADELAIDE	XXX	Shop	Ground	12	12

Figure 7.11 Example: SOA area data per storey level extracted from ACC dataset

Typically, the storey level disclosed by the ACC dataset is the location of the main reception area for the suites of office space included in an SOA. The need to recalibrate the data is a limitation of VVAM and is returned to in section 7.9 Limitations. After discussions with senior staff in the planning and valuations departments within ACC, it was determined that this feature of the data was most probably due to a simplification by ACC of the data collected via the TIS proforma. Appendix 7-A details the TIS proforma.

The recalibration redistributed occupied and vacant floor area to storey levels that appeared to have no SOAs assigned to them. The total occupied and vacant floor areas per building were not changed, simply redistributed. The recalibration consisted of adjustments in the location of occupied and vacant floor areas from each SOA that was occupied, and vacant floor areas exceeded the Average Floor Plate (AFP) area. These are described as 'underspill' when the floor area is less than the AFP area, and 'overspill' when the floor area exceeds the AFP area for each storey level in each building. The following formula calculates the AFP areas for each building:

Estimated Average Floor Plate (AFP) area:
AFP area = $GLA_{BUILDING}$ / total number of storeys (m²)

The estimated AFP area for each building is calculated using total $GLA_{BUILDING}$ for each building from the ACC dataset. The number of storeys in each building must be deduced from a range of information sources, as there is no single information source to ascertain floor levels for each building in the sample. These sources consist of:

- the ACC dataset (column 'G' in Figure 7.11)
- commercial buildings databases, such as Cityscope Adelaide
- websites, such as www.Emporis.com, and
- site visits, to confirm storey level totals where variations exist between the ACC dataset and Cityscope.

The redistribution of occupied and vacant floor area ensured that each vacant and occupied floor area equated to the AFP area on every storey level in each building.

The recalibration consisted of the following steps :

i. Estimated Average Floor Plate (AFP) areas were used to identify which storey levels needed to be recalibrated. Data was marked for adjustment when the sum of $*oGLA_{LEVEL}$ (office) and $*nGLA_{LEVEL}$ values differed considerably from estimated AFP values. The asterisk is used to denote area values prior to recalibration.
ii. If the sum of $*oGLA_{LEVEL}$ and $*nGLA_{LEVEL}$ values was greater than a building's estimated AFP value, it was classed as having 'overspill' and required recalibration.

iii. If the sum of $^*oGLA_{LEVEL}$ and $^*nGLA_{LEVEL}$ was less than a building's estimated AFP area, the floor level was classed as having 'underspill'.

> To calculate overspill or underspill:
>
> $$\textbf{AFP area} - {}^*\textbf{oGLA}_{\textbf{LEVEL}} = \textbf{area to be redistributed (m}^2\textbf{)}$$
>
> Values were either –ve (overspill) or +ve (underspill).

iv. Overspill data was redistributed to storey levels that appeared to have 'underspill', while maintaining their space-use categories (office use or non-office use) so that the mix of office-use and non-office-use space was not affected by the redistribution of data.

The underspill/overspill created a new set of adjusted lettable area values for each level; these are referred to as $oGLA_{LEVEL}$ and $nGLA_{LEVEL}$.

It was found that overspills equated to underspills surprisingly well, and it was possible to reassign overspill data to underspill storey levels, using the estimated AFP area values. It was also found that $^*oCGLA_{LEVEL}$ values were less than, or equated to, the estimated AFP area and so no recalibration was necessary for the occupied component (oCGLA).

The redistribution was informed by the API method of measuring Gross Lettable Areas. Communal lobby areas are excluded from each SOA's GLA under the API method. From site visits, it was noted that most office buildings had a large communal lobby located at ground floor. It was therefore decided that overspill and underspill redistribution would not be carried out for ground-floor levels. It was also decided that no redistribution would be undertaken for levels below ground either. The Adelaide CBD has a very flat natural topography, and it is assumed that little or no office accommodation would be located below ground level, as this attribute of the topography does not lend itself to design strategies that allow natural light into basement levels.

When making adjustments to accommodate for an underspill, a decision was made by the researcher to ignore underspills of values lower than 200 m^2. As discussed above, it was considered reasonable by the researcher to assume that small amounts of floor area may not be counted as lettable, for instance, space taken up by the plant and mandatory service equipment, such as fire-fighting boosters and electrical transformers, required by many commercial buildings in South Australia. However, in some cases, exclusions may be greater in area than 200 m^2. For example, communal space in commercial buildings may include large areas given over to ground-floor lobby receptions and vertical circulation, or include large blocks of end-of-trip facilities such as bike storage.

There was a small number of SOAs that did not have an associated storey level. It was found that all storey-level information disclosed matched with each SOA's postal address. Therefore, missing storey levels could be reliably determined from postal addresses. Each SOA is categorised as either office-use or non-office-use space, using ACC valuation classifications. This variable within the ACC database is referred to as 'component type' and is represented in column 'I' shown in Figure 7.11 above.

Efforts were made to ensure accuracy as far as possible. However, it is noted that floor plate areas (m^2) can vary due to a building's design and form, even in an office building with a consistent floor plate area (m^2) over multiple storeys. This variation is due to exemptions in how GLA is calculated, as explained in the IPMS method (API, 2017). Therefore, some imprecision is present, and this is a limitation of Phase B in VVAM. An example of the SOA area redistributed for building #2 area can be seen in Figure 7.12 below, with the original data, pre-redistribution shown in Figure 7.11 above.

TABLE: SPATIAL ANALYSIS DATA		OFFICE SPACE TENANTED	OFFICE GREY SPACE	OFFICE VACANT LEASES	NON-OFFICE OCCUPIED	NON-OFFICE VACANT
		$oCGLA_{LEVEL}$	oVG_{LEVEL}	$oGLAU_{LEVEL}$ (untenanted SOAs)	$^*nCGLA_{LEVEL}$	nV_{LEVEL}
		msq.	msq.	msq.	msq.	msq.
		$= oCGLA_{LEVEL}$	$= {}^*oGLAT_{LEVEL}$ (adjusted) - $oCGLA_{LEVEL}$ (tenanted)	$= \sum oGLA_{SOA}$, by level where corresponding $oCGLA_{SOA} \neq 0$	$= \sum nCGLA_{SOA}$ per level	$= nGLA_{LEVEL} - nCGLA_{LEVEL}$
-1	basement	0	0	0	23	75
0	ground floor	0	0	0	245	0
1a	mezzanine	0	0	141	0	0
1b	first	0	59	210	0	0
2	second	156	87	0	0	
3	third	0	269	0	0	
4	fourth	284	0	0	0	
5	fifth	247	0	0	0	
6	sixth	0	0	240	0	
7	seventh	180	0	66	0	
8	eighth	0	0	245	0	
9	ninth	140	129	0	0	

Figure 7.12 Example of data redistributed for building #2

7.6.4.5 Step 05: Visualising vacancy

Visualisations were produced using the 'Stacked Bar' chart function in Microsoft Excel, to enable analysis of office buildings identified in public debate (Chapter 04) as problematic. There are 32 buildings in the office building population database (*n* = 118) identified as problematic: secondary grade office buildings, suffering high vacancy (oVR ≥ 50%). Phase A identified these 32 buildings during the quantification of valuation-factored vacancy.

Figure 7.13 below uses building #2 as an example to show how vacancy and occupancy can be visualised within Phase B. The full set of visualisations is located in Appendices 7-C and 7-D. In the space categorised as office-use, the visualisations identify occupied space (coloured dark blue), and vacant space as either Untenanted (coloured light blue) or Greyspace vacancy (coloured grey). In the space categorised as non-office-use, the visualisations show occupied space (coloured dark purple) and valuation-factored vacancy (coloured light purple). Each bar represents one storey level in a building, and shows the floor plate areas per storey level.

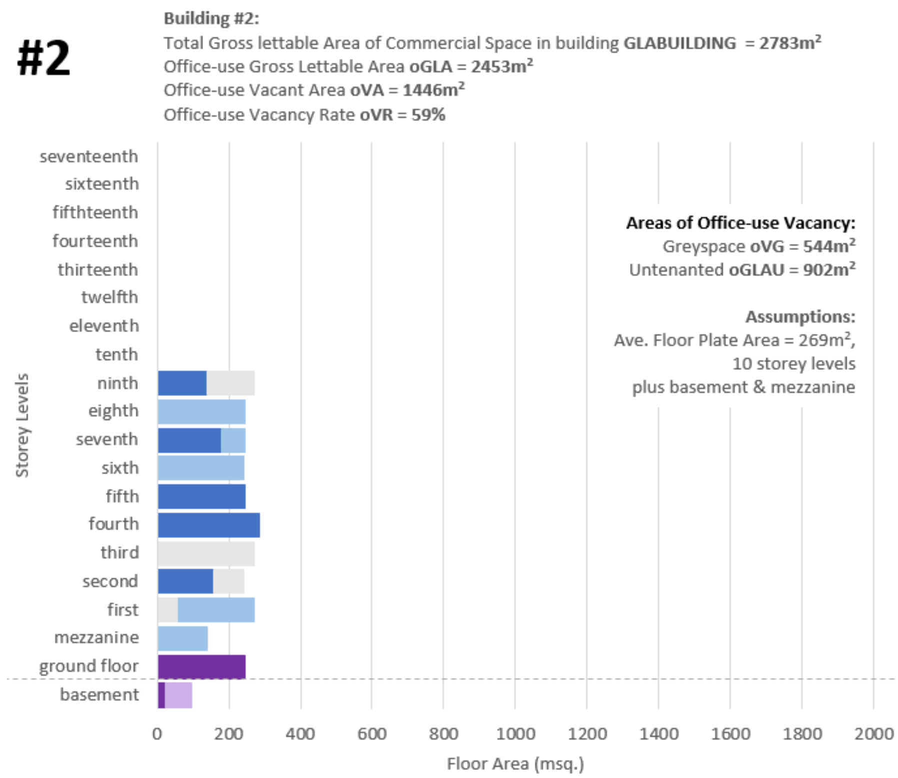


Figure 7.13 Visualision of vacancy using stacked bar charts, showing building #2

7.6.5 Phase C: Contextual factors examined

Each building in the spatial analysis sample involving 32 secondary grade buildings was analysed for its suitability for adaptive reuse, and for the likelihood that building regulation was acting as a barrier to adaptive reuse. The following factors were considered:

1) evidence of other obsolescence mitigation investment (see below for a further breakdown of evidence sources):
    a) photographic evidence, from Google Streetview, of building upgrades since 2007
    b) real estate for-sale and for-lease listing descriptions
    c) the GBCA Green Star rating register, and
    d) BEEC data, namely the NABERS rating under the CBD Program Register.
2) other data disclosed to the researcher in the semi-structured interviews detailed in Chapter 05 Discussions with building owners
3) building age, from construction completion dates
4) ownership structure (Strata/Community Plan)
5) number of separate leases within the building (SOAs), as disclosed by the office building population database
6) occupation by public- or private-sector organisations
7) vacancy type (oVG or oGLAU) and category of adaptive reuse most suitable, and
8) Development Assessment Approvals applications for Change of Use (CoU) applications between 2007 and August 2017, from a database of CoU applications that was shared with the researcher by Adelaide City Council Planning Department in September 2017.

The complex range of variables involved in a building owner's decision to avoid obsolescence necessitated the wide range of data sources used to undertake this evaluation. If vacancy is presumed to be a key driver of adaptive reuse, it is also important to consider the shape and location of vacancy types on a case-by-case basis. Also, the variability of the office buildings in the sample also demanded a look at a wide variety of evidence in order to question whether it was likely that building regulation is a key barrier to adaptive reuse.

7.7 Results

The development of VVAM is one important overall outcome of the inductive research process in this study. VVAM is an exploratory, yet reproducible, method to quantify vacancy and evaluate adaptive reuse as a strategy to mitigate vacancy at a city-level scale. Figure 7.14 represents this important result of the inductive process.

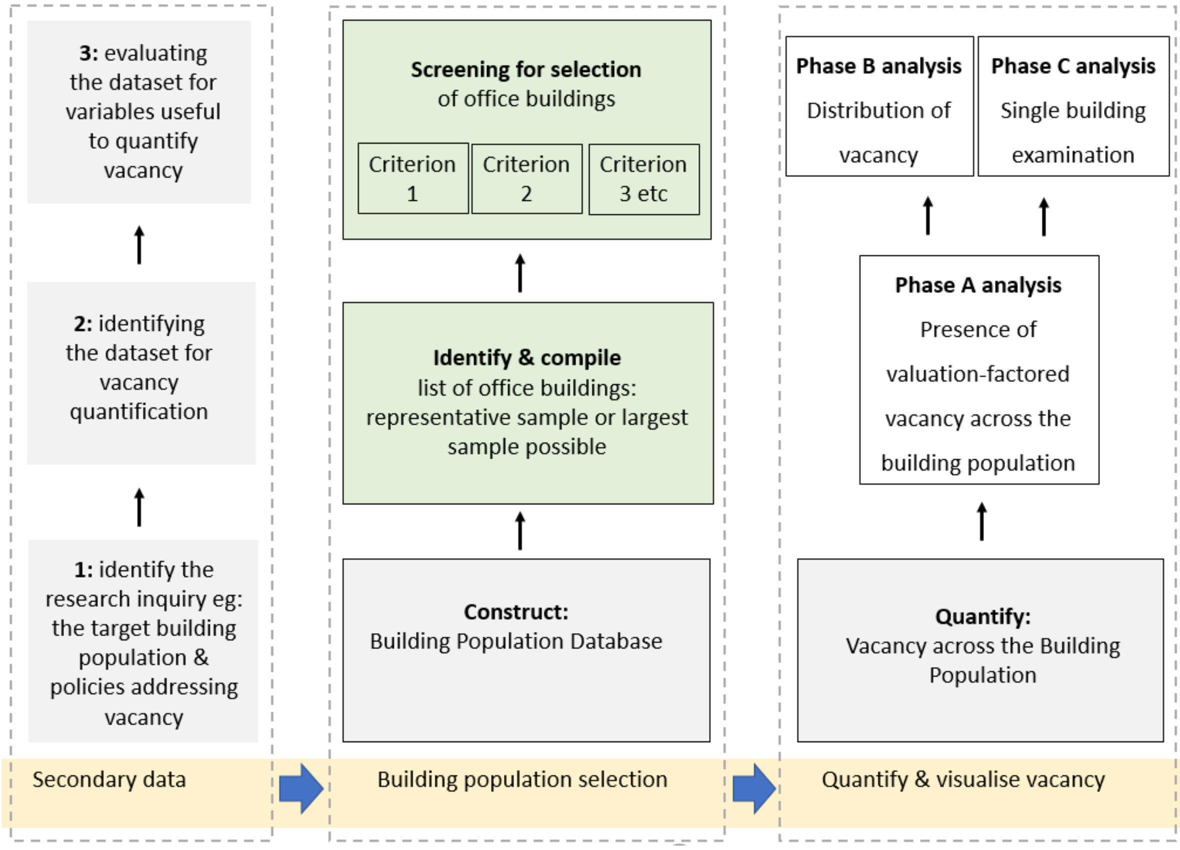


Figure 7.14 Overview of VVAM, using vacancy to evaluate adaptive reuse policy

VVAM has been developed to assist in answering the research questions of this study, and provides a method for evaluating adaptive reuse as an urban planning policy to address vacancy, in the face of scant evidence to support the view that NCC building regulation is a barrier to adaptive reuse. Together, the phases of VVAM provide insightful results that question the framing of the adaptive reuse predicament in Adelaide. What follows details findings from the application of VVAM to the non-heritage, multi-storey office building population in the Adelaide CBD.

In Phase A, all 118 office buildings were considered in the analysis of valuation-factored vacancy, and the findings from Phase A are detailed in sections 7.7.1 to 7.7.5 below. For Phase B, secondary grade office buildings have been the focus of debates about office building vacancy in public discourse in Adelaide (see Chapter 04). This group of buildings was framed as the problematic sector of the building population, and the group most favoured for adaptive reuse to address vacancy. For this reason, the subset of 32 secondary grade office buildings, with high vacancy (oVR ≥ 50%) was included in the Phase B analysis, the findings from which are detailed in section 7.7.6 below.

The findings from Phase C analysis present a fine-grained analysis of secondary grade buildings in the office building population that are affected by high vacancy (oGLAU + oVG > 50%). These buildings were selected because high vacancy increases the risk of obsolescence (see Chapter 02 Literature Review). As noted earlier in this chapter, adaptive reuse is considered to be one solution to building obsolescence, amongst several others. If building regulation is a barrier to adaptive reuse, then it is likely that regulatory barriers would prevent other obsolescence mitigation strategies from occurring, which might also trigger NCC compliance. For example, within-class use upgrades involving the installation of new lifts, air-conditioning, and disability access. To explore this possibility, large-scale secondary grade buildings in the building population were examined in detail, looking for evidence of recent within-class major refurbishments. This final phase of analysis included 21 large-scale secondary grade office buildings that had high vacancy (oVG + oGLAU = oVR > 50%). There were a further 10 secondary grade buildings with high vacancy, but these were smaller in scale ($GLA_{BUILDING}$ < 3000 m^2) and for practical reasons this exercise was confined to the 21 large-scale buildings. The identities of the buildings selected for Phase C analysis can be seen in Table 7-12, which is located in section 7.7.7 of this chapter. This research systematically used several public sources to establish whether building owners had recently (within the last 10 years) invested in within-class major refurbishments that would trigger NCC compliance. The findings from Phase C analysis are located in section 7.7.7 of this chapter.

7.7.1 Valuation-factored vacancy disaggregated by building quality grade

To identify vacancy in office-use space within the office building population (n = 118), oGLA values were used. Primary grade office buildings make up 61.3% of the total office space area, which is contained in 46 individual buildings. Secondary grade office buildings, therefore, make up 38.7% of the population's GLA total, contained in the remaining 72 buildings.

Table 7-6 Area vacant by building grade (n = 118)

Building by grade	No. of buildings	Total oGLA (m^2)	Total oVA (m^2)	Mean oVR (%)
All grades	118	972,528	552,794	48.9
Primary grade only	46	596,084	349,228	51.6
Secondary grade only	72	376,444	203,566	48.2

Finding ch7-1: Mean vacancy rates (oVR) for office buildings in the Adelaide CBD were high in 2017, and valuation-factored vacancy (oVA, m^2) was a problem across both primary and secondary building grades in the Adelaide CBD.

Using the Vacant Area values for office-use space (oVA) in Table 7-6, secondary grade buildings contribute 36.8% of the overall vacant space in the office building population, with the remaining 63.2% of vacancy residing in primary grade buildings. Vacancy was present across primary and secondary building grades in office buildings in the Adelaide CBD in 2017.

7.7.2 Vacancy and floor area

An investigation of the relationships between office building size and vacancy rates, when office-use space is considered, provides further insight into adaptive reuse as a strategy for addressing obsolescence in the building population. Figure 7.15 below highlights the relationship between variables for office use vacancy rates (oVR) and building size measured by floor area (oGLA) for each building (n = 118). The analysis revealed that the size of a building was a factor in the presence of vacancy: (p = 0.000): the larger a building's total Gross Lettable Area, the higher the tendency of a proportion of space within the building was vacant even though this can only be explained by around 11% of the office population ($R^2 = 0.112$).

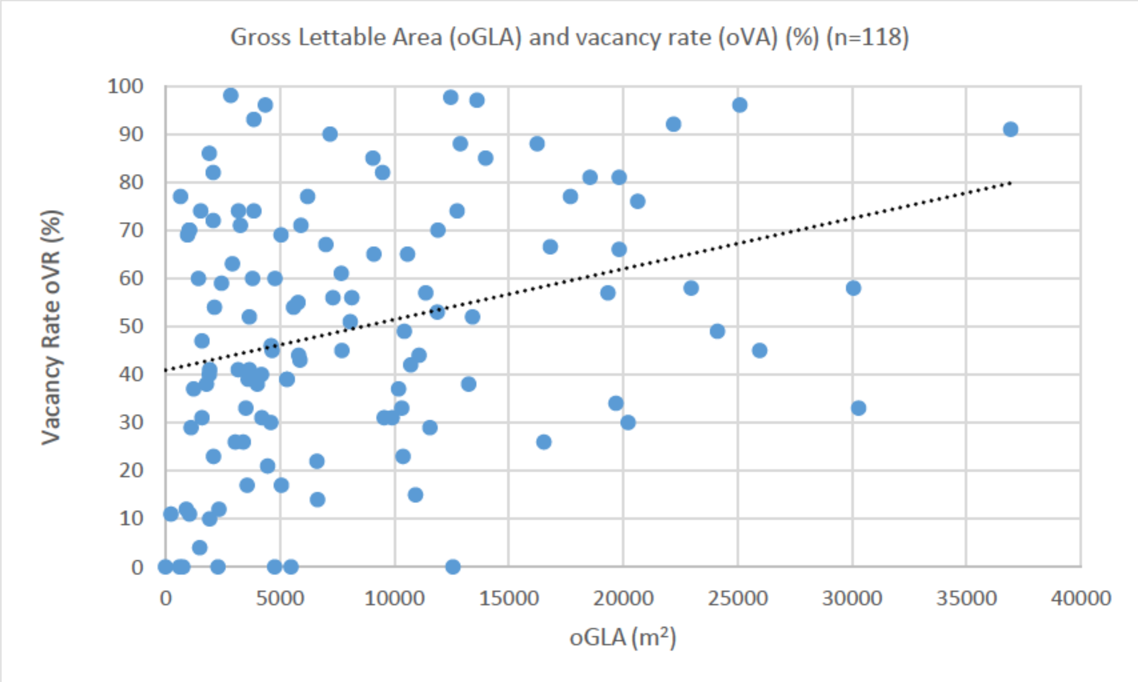


Figure 7.15 The relationship betwenn GLA and valuation-factored vacancy rate (%)

Finding ch7-2: The size of a building was found to be a factor in the presence of vacancy, disclosing that buildings with larger office-use floor areas tended to have higher vacancy rates (oVR).

7.7.3 Ownership structure and vacancy

The variable of ownership structure is examined in order to investigate whether it has a relationship with the presence of vacancy across the population. The ownership structure has a potential bearing on achieving a consensus between building owners to enable adaptive reuse on a scale of PAR or MUMLAR. Logically, it is assumed that buildings with high numbers of owners might be a complication in achieving the agreement necessary for adaptive reuse development to progress to completion, particularly agreement to enable NCC compliance for common areas shared by different ownership groups. Common areas include ground-floor lobby areas and vertical circulation including lifts, shared WC facilities, and mechanical and engineering services such as shared air-conditioning plant.

Using information from the SAILIS register, the ownership structures of the office buildings within the sample (*n* = 118) were as follows:

- 21 buildings were found to be under Strata or Community Plan ownership
- the ownership for 1 building could not be found on the SAILIS records when a search for Certificate of Title was undertaken, and
- 96 buildings, therefore, are assumed to be owned by either a single owner or a group. Where a group of people is involved in a non-Strata/Community Plan arrangement, investors' shares are not tied or limited to specific spaces within the building, as it has not legally been subdivided.

As shown in Figure 7.16 below, the ownership structure is a factor affecting vacancy rate ($VR_{BUILDING}$) in 2017. Office buildings under a Strata or Community Plan had a lower mean valuation-factored vacancy rate (oVR = 31.9%), across the office building population, when compared with the mean rate for the group of office buildings that are not under

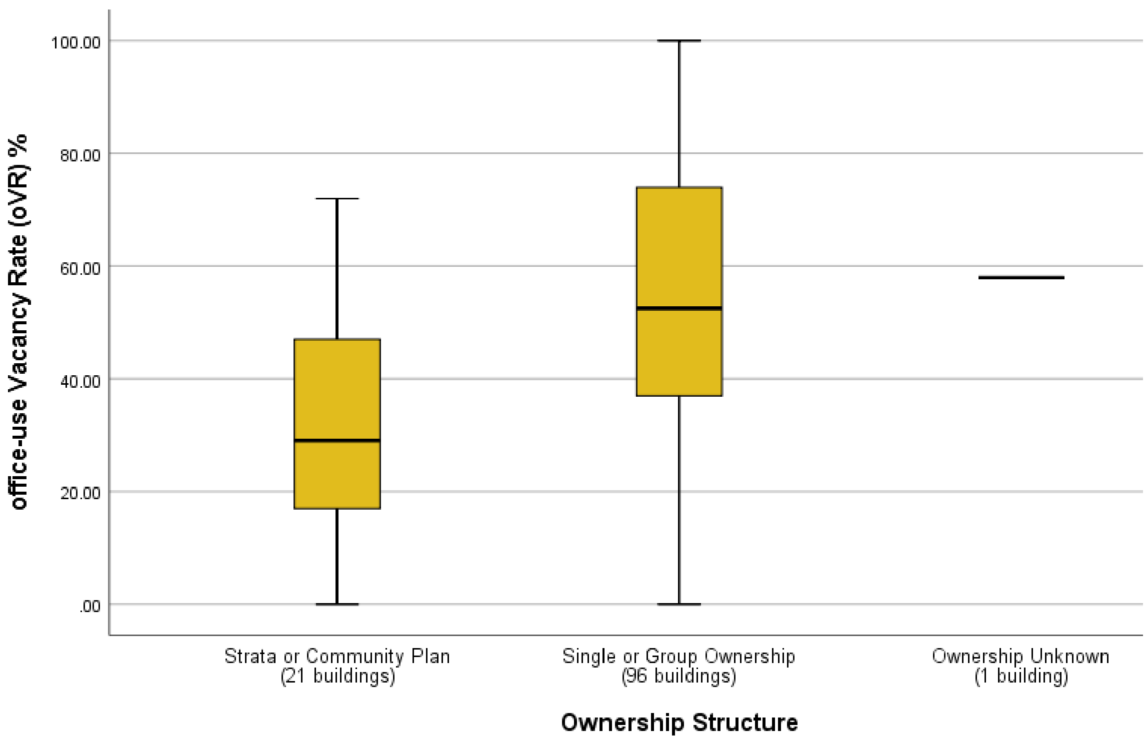


Figure 7.16 Ownership structure and vacancy rates oVR (%)

a Strata or Community Plan ownership structure (oVR = 52.5%). Means were compared using an independent sample T-test, using SPSS, to determine the significance. The test returned a significance value of $p = 0.000$. Furthermore, the group of office buildings ($n = 96$) that are not under Strata or Community Plan ownership structures disclose a mean valuation-factored vacancy rate (oVR) above 50%.

Finding ch7-03: The type of ownership structure (Strata/Community Plan versus single/group ownership) did affect vacancy rates across the building population, and the mean valuation-factored vacancy rate was lower in office buildings under Strata or Community Plan ownership structures.

This finding indicates that vacancy is less of a problem for buildings under Strata or Community Plans. This contradicts the literature, which has previously disclosed a perception that Strata and Community Plan ownership are often problematic when a consensus between building owners is needed to enable development and adaption (Easthope & Randolph, 2018). If this perception about ownership structure was accurate for office buildings, the researcher would expect to find a higher vacancy rate in buildings under Strata and Community Plan ownership structures, as agreement to mitigate vacancy would be harder to reach. Finding ch7-3 has implications for understanding the barriers and enablers of adaptive reuse when considering vacancy as an indicator of the need to adopt obsolescence mitigation. Buildings that are under Strata-type arrangements, however, may simply require less intervention to remain occupied. Cautiously, it can be suggested that either Strata and Community Plan office buildings do not suffer vacancy in the first instance, or it could be claimed that Strata and Community Plan office buildings more readily undergo works to mitigate vacancy. In addition, the lower vacancy could be due to Strata-type buildings being occupied by a higher proportion of owner-occupiers than tenant occupiers, when compared with occupants in buildings owned by single/group investors. Owner-occupiers may have less incentive to disclose under-occupancy in their TIS returns than tenant occupiers, as owner-occupiers would be liable for local council building rates regardless of whether the space is used or not.

7.7.4 Building standing empty – 100% vacancy

High average vacancy rates across a population do not necessarily mean that there are some buildings standing wholly empty. No empty buildings were found in the sample when office-use space was analysed across the sample of *n* = 118 buildings. Mean vacancy rates are reported above in Table 7.5, disclosing a mean vacancy rate (oVR) of 48.9% across the population.

Finding ch7-04: Although vacancy rates were considered to be high across the population, no wholly empty buildings were identified in the population n=118.

This is an important finding because the public debate in Adelaide about vacancy implied that a significant number of buildings stood empty in the CBD. This insight challenges the idea that a high average vacancy rate is derived from a mixture of wholly empty buildings that are obsolete and, in contrast, a separate group of primarily occupied buildings sought after by tenants. This simplistic, polarised view of vacancy in office buildings is problematic when evaluating adaptive reuse likelihood, and barriers to its uptake. The reality appears much more nuanced, with shades of vacancy existing across most buildings.

All properties had some level of occupancy, with vacancy rates ranging from 98% in building #126, to 0% vacancy in 7 buildings (#17, #24, #57, #72, #107, #114, #117). Across the sample, 7 buildings had a vacancy rate of over 90% (oVR > 90%). These were: #8, #10, #19, #52, #93, and #126. Although this is a small sub-group within the sample, the majority of these buildings (5) are classified as primary grade office buildings. This is important to note, given that the focus in public discourse around Adelaide's empty office buildings is on secondary grade buildings.

The insight from Finding ch7-4 corroborates with previous research undertaken in 2017 by the PCA, supplied to the researcher by the State Government Department of Planning, Transport and Infrastructure (DPTI). This unpublished research is simply a spreadsheet titled 'v1-Property_Council_-_Adelaide_CBD_vacancy_rates_and_locations', purchased by DPTI (PCA, 2017 unpublished). The v1 spreadsheet identified the locations of C and D grade office buildings with vacancy above 50%, and found that there were only 5 commercial buildings standing empty within the Adelaide CBD and city fringe. Further investigations revealed that all 5 were small-scale buildings, the largest of which was a 2–3 storey building of lettable area 1,650 m^2. Interestingly, one of these properties was also vacant due to a refurbishment involving major construction works, and therefore occupation was not possible. This refurbishment also involved 1 level of adaptive reuse, the result of which is a contemporary office space in a heritage-listed building, with retail at the ground floor.

One building in the office building population (n = 118) was being used wholly as storage, however, which suggests that while it had been used as an office, it was no longer serving this function and was classed as an associated function of office storage (#24). A search of CoU Development Approval (DA) applications for the last 10 years was undertaken for this building, using Adelaide City Council DA records. Although no application or approval was found, the ACC dataset recorded this building's use as storage, and it could be considered to have undergone a change of use already. As data is not collected for NCC building regulation approvals, it is impossible to ascertain whether this building had achieved compliance for this change of use. It is also possible that this building's use had been changed from office to storage as it had been withdrawn from the market as office space, which is referred to as mothballing or brand repositioning (Greenhalgh & Muldoon-Smith, 2017). It is important to mention building #24 because mothballing and brand repositioning are two low-intervention obsolescence mitigation strategies that can be adopted by building owners, as opposed to high-intervention strategies such as adaptive reuse (Greenhalgh & Muldoon-Smith, 2017). However, this was the only case identified in the building population of 118.

7.7.5 Buildings with high vacancy (oVR > 50%) across the population

Buildings with a high vacancy rate (oVR > 50%) make a logical grouping to focus upon when considering obsolescence mitigation strategies such as adaptive reuse. The office building population database provided the following breakdown of vacancy by grade in buildings with high vacancy. Table 7-7, below, discloses that while the valuation-factored vacancy, oVR (%), is similar across both office grades, the total area of valuation-factored vacancy (m^2) is greater in the primary grade buildings than in the secondary grade buildings across the population.

Table 7-7 Number of buildings per grade with oVR > 50%

Buildings with oVR ≥ 50% per grade	**No. of buildings**	**Total oGLA (m^2)**	**Total oVA (m^2)**	**Mean oVR (%)**
All grades	56	571,562	423,841	72%
Primary grade only	24	366,385	276,644	73%
Secondary grade only	32	205,177	147,197	71%

Further to Table 7-7, across primary and secondary grade buildings considered to have high vacancy (oVR ≥ 50%), 65.3% of valuation-factored vacancy (oVA) resides in primary grade office buildings. This insight further substantiates Finding ch7-1, indicating that vacancy is a problem across both primary and secondary building grades in the Adelaide CBD, and leads to Finding ch7-5, which examines vacancy across only office buildings with oVR ≥ 50%.

Finding ch7-5: Mean oVR (%) is similar across both office building grades (primary and secondary) when buildings with high vacancy are examined.

Findings ch7-1 and ch7-5 highlight that there was a higher mean valuation-factored vacancy rate and a greater area of vacancy across primary grade office buildings in 2017 when compared with the mean valuation-factored vacancy rate and total vacant area across secondary grade office buildings. The primary grade buildings also make up a greater proportion of office building accommodation. This finding casts a critical light upon public debate in Adelaide about high office building vacancy, which tended to focus on secondary grade buildings (see Chapter 04).

The 'indigestible lump' or sinking stack theory described in the literature (Langston *et al*., 2008; Ness, 2002; Ness & Atkinson, 2001; Atkinson, 1988) may explain the focus on the need to address vacancy in secondary grade buildings through adaptive reuse. Analysis of this particular group of office buildings is undertaken next to critically understand vacancy distribution in the group of buildings described as problematic in public debate.

7.7.6 Visualisation of Greyspace (oVG) and Untenanted (oGLAU) vacancy

The presence of vacancy in secondary grade office buildings was depicted in public discourse as suggesting that building regulation required reform because NCC regulation acted as a barrier to adaptive reuse. The need to disaggregate and quantify vacancy by sub-type means that disaggregation is an important part of understanding vacancy when considering the suitability of adaptive reuse as an obsolescence mitigation strategy. Secondary grade buildings with a high vacancy (oVR ≥ 50%) (n = 32) were therefore chosen as a logical group to investigate, using the visualisation method developed in VVAM for understanding the spatial distribution of vacancy and its possible implications for adaptive reuse. The sample of buildings analysed using the Phase B VVAM visualisations are shaded green in Appendix 7-B. The spatial analysis visualisations representing oGLAU and oVG can be found in Appendices 7-C and 7-D, respectively.

Secondary buildings with oVR ≥ 50% typically had a mix of untenanted vacancy (oGLAU) and Greyspace (oVG), challenging the bifurcation of space as either vacant or occupied (see Tables 7-8 and 7-9 below). This complex mix of vacancy has implications for adaptive reuse viability in the short term because space cannot be adaptively reused if it is leased, even if it is under-used. Analysis of the 32 secondary buildings with a high vacancy (oVR ≥ 50%) disclosed that:

- all 32 buildings in the sample have Greyspace oVG > 0 m^2, and
- 19 buildings have Untenanted space oGLAU > 0 m^2.

The majority of buildings contain a mixture of vacancy types:

- 1 building has an office-use vacancy as Untenanted space only, oGLAU > 0 m^2
- 13 buildings have office use vacancy as only Greyspace, oVG > 0 m^2, and
- 18 buildings have a mixture of Greyspace and Untenanted space, oGLAU > 0 m^2 and oVG > 0 m^2.

Table 7-8 Greyspace and Untenanted vacancy in secondary buildings (oVR ≥ 50%)

Secondary buildings with oVR ≥ 50% **#Bldg Ref**	**oVG (m^2)** Greyspace vacancy	**oGLAU (m^2)** Untenanted vacancy	**oVR (%)** Valuation-factored vacancy rate	**Large-scale** $GLA_{BUILDING} \geq$ 3000 m^2	**Modest-scale** $GLA_{BUILDING} <$ 3000 m^2
#2	544	902	58.9		✓
#3	899	1953	59.6	✓	
#5	60	1083	74.0		✓
#7	6914	0	51.5	✓	
#8	20,374	0	91.8	✓	
#22	622	1282	52.0	✓	
#27	1694	0	81.6		✓
#40	580	504	69.9		✓
#41	1150	0	53.6		✓
#51	2282	0	60.0	✓	
#52	4206	184	96.4	✓	
#53	1748	569	70.9	✓	
#55	11,868	0	84.8	✓	
#60	1893	11,644	76.5	✓	
#62	6754	1035	82.2	✓	
#64	291	376	69.1		✓
#65	355	151	77.0		✓
#67	2115	2422	55.7	✓	
#71	0	3264	54.7	✓	
#84	162	2204	74.3	✓	
#85	1640	0	85.7		✓
#86	9273	3756	65.7	✓	
#91	724	0	69.6		✓
#100	130	740	60.2		✓
#101	299	1107	63.2	✓	
#105	3423	770	70.8	✓	
#106	2837	0	73.6	✓	
#111	214	0	90.5		✓
#113	1508	0	71.9	✓	
#117	6171	1014	57.2	✓	
#121	10,500	0	88.4	✓	
#125	11,201	0	66.6	✓	

Table 7-9 Vacancy sub-types in secondary buildings with oVR ≥ 50%

Vacancy Type: Building-by-building	**oGLAU vacancy only**	**oVG vacancy only**	**Mixture of vacancy oGLAU + oVG**
All secondary grade office buildings oVR ≥ 50% (Total = 32 buildings)	1 building: **#71**	13 buildings: **#7, #8, #27, #41, #51, #55, #85, #91, #106, #111, #113, #121, #125**	18 buildings: **#2, #3, #5, #22, #40, #52, #53, #60, #62, #64, #65, #67, #84, #86, #100, #101, #105, #117**
Large scale secondary buildings with oVR ≥ 50% ($GLA_{BUILDING}$ ≥ 3000 m^2) (Total = 21 buildings)	1 building: **#71**	8 buildings: **#7, #8, #51, #55, #106, #113, #121, #125**	12 buildings: **#3, #22, #52, #53, #60, #62, #67, #84, #86, #101, #105, #117**
Modest scale secondary buildings with oVR ≥ 50% ($GLA_{BUILDING}$ < 3000 m^2) (Total = 11 buildings)	0 buildings:	5 buildings: **#27, #41, #85, #91, #111,**	6 buildings: **#2, #5, #40, #64, #65, #100**

The breakdown of vacancy type (oGLAU and oVG) can be seen in Tables 7-8 and 7-9 above. Total values in Table 7-8 highlight that across the 32 buildings, the total Greyspace area outweighs the total Untenanted space considerably. Greyspace vacancy is by far the most common type of office-use space vacancy in the secondary grade buildings that have oVR ≥ 50%.

Finding ch7-6: When comparing the two types of vacancy, oGLAU and oVG, Greyspace considerably outweighs the Untenanted space.

This disaggregation of vacancy by sub-type, oGLAU and oVG, presents an unexpected insight. While the researcher expected to find some vacancy as Greyspace, it was surprising to find the quantity of Greyspace (m^2). However, literature examining vacancy in the UK suggests that Greyspace can have a substantial presence in office buildings (Hammond, 2013; Muldoon-Smith, 2016). Hammond (2013) predicts that Greyspace vacancy, '20 per cent of all property leased by the private sector, which has a total rental commitment of £382bn, is not in use or has been sublet to pare losses' (p.1). Muldoon-Smith (2016) suggests that Greyspace 'could equate to 50% of a building's floor space' (p.115). The Greyspace found in Adelaide's office buildings thus aligns with recent international literature. In addition, it could be suggested that the presence of such large areas of Greyspace could be explained by Adelaide's economic malaise in 2017. This explanation is corroborated by a PCA office market analysis highlighting low demand (API, 2017 April).

7.7.6.1 Distribution of Untenanted vacancy (oGLAU)

There were no buildings with oGLAU = 100% vacant in the secondary grade sample. As can be deduced from Table 7-9 above, the majority of secondary grade buildings (18) contain a mixture of oGLAU and oVG. There are 13 buildings, considered to be large-scale (oVA ≥ 3000 m^2), with some level of oGLAU, and a further 6 buildings, considered to be modest-scale (oVA < 3000 m^2). Untenanted vacancy within these 18 buildings, of large and modest scales, are ranked in order of greatest value of Untenanted (oGLAU) vacant area (m^2) in the visualisations contained in Appendix 7-C.

When oGLAU is viewed in isolation as an indicator of potential obsolescence, there are 13 large-scale buildings ($GLA_{BUILDING}$ ≥ 3000 m^2), but only 7 of these 13 have at least 1 whole floor plate of Untenanted space. These 7 stand out as potential candidates for adaptive reuse to address vacancy. A further 6 modest-scale buildings are also possible candidates for adaptive reuse. Untenanted vacant space within these 6 modest-scale buildings (oGLAU) ranges from just over 150 to 1000 m^2. This analysis has implications for whole building adaptive reuse (WBAR) of office buildings.

Finding ch7-7: Adaptive reuse is unlikely for these 13 large-scale secondary office buildings due to the lack of Untenanted space on: a) the whole-building scale, or b) multiple levels of abutting floor plates with oGLAU.

However, while there were no, or very few, suitable candidates for WBAR, adaptive reuse of smaller pockets within a building is still possible, converting office buildings into an adaptive building classed as mixed-use multi-level adaptive reuse (MUMLAR) or pocket adaptive reuse (PAR). See Table 7-1, located at the start of this chapter, for a breakdown of adaptive reuse categories.

Large-scale buildings are the focus of the remainder of this section, as this group contains the greatest area of vacancy. It could also be suggested that addressing vacancy in the larger buildings would have the greatest impact on urban reactivation in the Adelaide CBD. The group of 32 secondary buildings was scaled in terms of their overall $GLA_{BUILDING}$ areas and grouped into 2 categories: large-scale ($GLA_{BUILDING} \geq 3000$ m^2) and modest-scale ($GLA_{BUILDING} < 3000$ m^2).

Table 7-10 below pairs the distribution of oGLAU in large-scale buildings ($GLA_{BUILDING} \geq$ 3000 m^2), as shown in Phase B visualisations, with categories of adaptive reuse applied. Adaptive reuse categories are applied on the basis that no further space-use consolidation, e.g. tenant relocation, was to be undertaken to enable adaptive reuse on a larger scale. The analysis in Table 7-10 uses the categories of adaptive reuse set out in Table 7-1, and applies the highest adaptive reuse category possible without any tenant relocation when applied to the spatial analysis visualisations contained in Appendix 7-C.

The most optimistic outcome for this group of buildings is MUMLAR; however, this is only optimal for two buildings: #60 and #84. This finding is to be read in conjunction with the population database disclosing that there were no buildings wholly empty at the time of ACC data collection (May 2017), and therefore unsuitable for immediate WBAR.

Finding ch7-8: Untenanted vacancy is overwhelmingly distributed in pockets of single floor plates or partial floor plates. Only 2 large-scale buildings with oVR > 50% contained areas of multiple floorplates with oGLAU stacked together.

The scale of a building matters, however, if adaptive reuse is argued to be a tool to address the vacancy problem and to contribute to a wider urban reactivation of the Adelaide CBD. While adaptive reuse of the 6 modest-scale buildings, or adaptive reuse of the large-scale building on a MUMLAR basis, may contribute to obsolescence mitigation at a single building scale, the total contribution made to Adelaide's vacancy problem can only be minuscule. In addition, small-scale adaptive reuse development would have little impact on the 349,228 m^2 of vacancy in primary grade office buildings.

Table 7-10 Adaptive reuse categories applied to Untenated vacancy (oVR ≥ 50%)

Building #Ref	**Untenanted vacancy oGLAU (m^2)**	**Total $GLA_{BUILDING}$ (m^2)**	**% of Untenanted vacancy (oGLAU) per building using $GLA_{BUILDING}$ values**	**Categories of adaptive reuse**
#60	11,644	20,983	55.5%	MUMLAR
#86	3756	19,819	19.0%	PAR
#71	3168	6157	51.5%	PAR
#67	3079	10,316	29.8%	PAR
#84	2203	3369	65.4%	MUMLAR
#3	1954	5641	34.6%	PAR
#22	1283	3660	35.1%	PAR / TAR
#101	1107	3186	34.7%	TAR
#62	1035	9938	10.4%	PAR
#117	1015	16,797	6.0%	PAR
#105	770	5924	13.0%	PAR
#53	569	3268	17.4%	PAR
#52	184	4363	4.2%	PAR

The spatial analysis visualisations contained in Appendix C, and Table 7-10 above, highlight that oGLAU vacancy is typically contained in pockets, often only as partial floor plates, and distributed on different storey levels, often separated by an occupied floor plate above and/or below. This observation has important implications when considering the suitability and scale of adaptive reuse as an obsolescence mitigation strategy. The distribution of these pockets highlights a lack of curation and space management as an obsolescence mitigation strategy.

Finding ch7-9: Spatial analysis discloses that partial adaptive reuse (PAR) is the most suitable category of adaptive reuse for buildings with oGLAU vacancy, in the immediate to short term. No buildings appeared to be suitable in the short term for whole building adaptive reuse (WBAR) when considering vacancy as an indicator of obsolescence. Few (2) buildings appeared suitable for mixed-use multi-level adaptive reuse (MUMLAR) at the time of data collection.

7.7.6.2 Distribution of Greyspace vacancy (oVG)

Greyspace is an important part of understanding vacancy. The earlier analysis presented in Finding ch7-6 disclosed that Greyspace vacancy (oVG) was greater in area than Untenanted vacancy (oGLAU) across secondary grade buildings with a high vacancy rate (oVR ≥ 50%). High levels of oVG area (m^2) can potentially be argued to be evidence of barriers to adaptive reuse. Therefore, understanding the distribution of Greyspace vacancy is important to answering the research questions of this thesis. The spatial analysis exposes the distribution of Greyspace vacancy with vacancy visualisations, which can be found in Appendix 7-D.

To contextualise Greyspace vacancy, oVG is examined across the secondary grade office buildings, which are portrayed in public discourse as having the most problematic vacancy (see Chapter 04). As mentioned previously in Finding ch7-6, Greyspace vacancy (oVG) is present in 32 of the secondary grade buildings with a high vacancy (oVR ≥ 50%). Of this group, 13 buildings have office-use vacancy as Greyspace only, and 18 buildings have a mixture of Greyspace and Untenanted space. Refer to Tables 7.8 and 7.9 above, for a list of those buildings that contain Greyspace vacancy.

Finding ch7-10: Greyspace vacancy (oVG) was present in all 32 secondary grade office buildings with high vacancy.

For Adelaide's office buildings, public debate frames the presence of high vacancy as evidence of regulatory barriers to adaptive reuse (see Chapter 04). The limited literature available on Greyspace vacancy, however, suggests that a range of factors could be involved in its generation. Muldoon-Smith (2016, p.115) comments that 'there is a potential preconception that vacant property is entirely a landlord issue'. He goes on to suggest that Greyspace could be a positive condition for building owners, as they are receiving full rent for the space, despite the space largely remaining unused (p.115). Muldoon-Smith suggests this situation for tenants could be due to a change in their business needs, shrinking numbers of staff and inflexible lease agreements. Semi-structured interviews in Chapter 06 shed further light on landlord attitudes to vacancy, including Greyspace. These insights are discussed in Chapter 08 Concluding discussion.

There are 20 large-scale buildings ($GLA_{BUILDING} \geq 3000\ m^2$) with oVG (see Table 7-9 above). These 20 buildings are ranked by the greatest area of oVG in Table 7-11 below. At face value, analysis of the Phase B visualisations for these 20 large-scale secondary buildings found that there are 4 large-scale buildings (#8, #52, #55, #121) that have the potential for whole building adaptive reuse (WBAR). However, it should be noted that these 4 buildings have no Untenanted vacancy whatsoever.

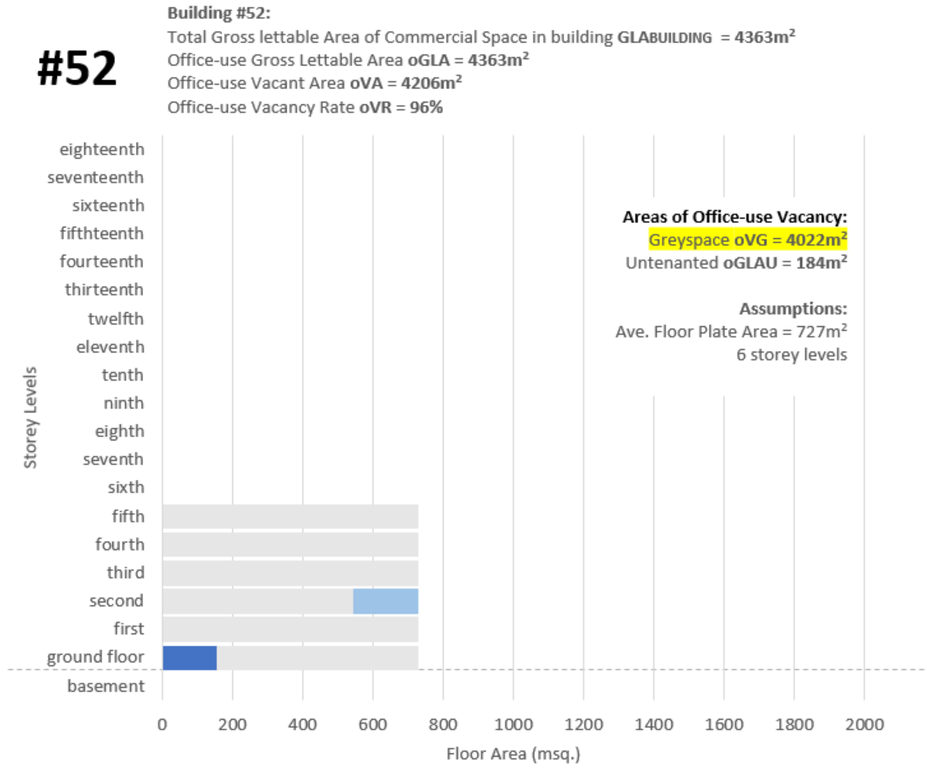
Table 7-11 Adaptive reuse categories applied to Greyspace vacancy (oVR ≥ 50%)

Building ref	Greyspace area oVG (m^2)	Categories of adaptive reuse applied to oVG shape and distribution
#8	20,374	WBAR
#55	11,867	WBAR
#125	11,201	MUMLAR
#121	10,501	WBAR
#86	9273	MUMLAR
#7	6914	MUMLAR
#62	6754	MUMLAR
#117	6172	MUMLAR
#52	4022	WBAR
#105	3424	MUMLAR
#106	2837	MUMLAR
#51	2203	MUMLAR
#60	1893	PAR
#53	1748	MUMLAR
#113	1508	MUMLAR
#67	1458	PAR
#3	900	PAR
#101	738	PAR
#22	621	PAR
#84	161	PAR

When each building was investigated, other contextual factors complicated the picture. These complications questioned the buildings' suitability for WBAR on the basis of vacant area (m^2). Buildings #8 and #55 are occupied solely by public-sector organisations with no private-sector tenants whatsoever. The oVG could be a product of departmental relocation, and simply not used by the single owner/occupant at the time of data collection by ACC. Alternatively, these two buildings could be occupied by public-sector organisations that are exempt from local council taxation, and therefore the persons responsible for returning data to the ACC, using the TIS proforma, may not have the need to accurately declare occupied space. Local council rates exemptions may be applied by ACC's own departments or state government departments.

Two buildings (#52 and #121) each have only 1 private-sector organisation occupying the whole building, and that organisation owns or leases the space that contains all the oVG in that building. These two buildings are shown as examples in Figure 7.17 below. Building #121 has been unoccupied above the ground floor for an extended period of time due to a business restructuring by the current building owner, a globally renowned corporation, as reported in national and international media. The building also has large undivided floorplates with frameless, double-skinned transparent façades, which may not be suitable for subdivision in future adaptive reuse. This investigation leaves question marks over the suitability for WBAR of these 4 large-scale secondary buildings (#8, #52, #55, #121) with high vacancy (oVR ≥ 50%).

Finding ch7-11: There were few (0–4) large-scale secondary grade office buildings suitable for WBAR adaptive reuse in 2017 when ACC collected data. All four buildings had high levels of oVG, distributed over multiple floorplates clustered together.



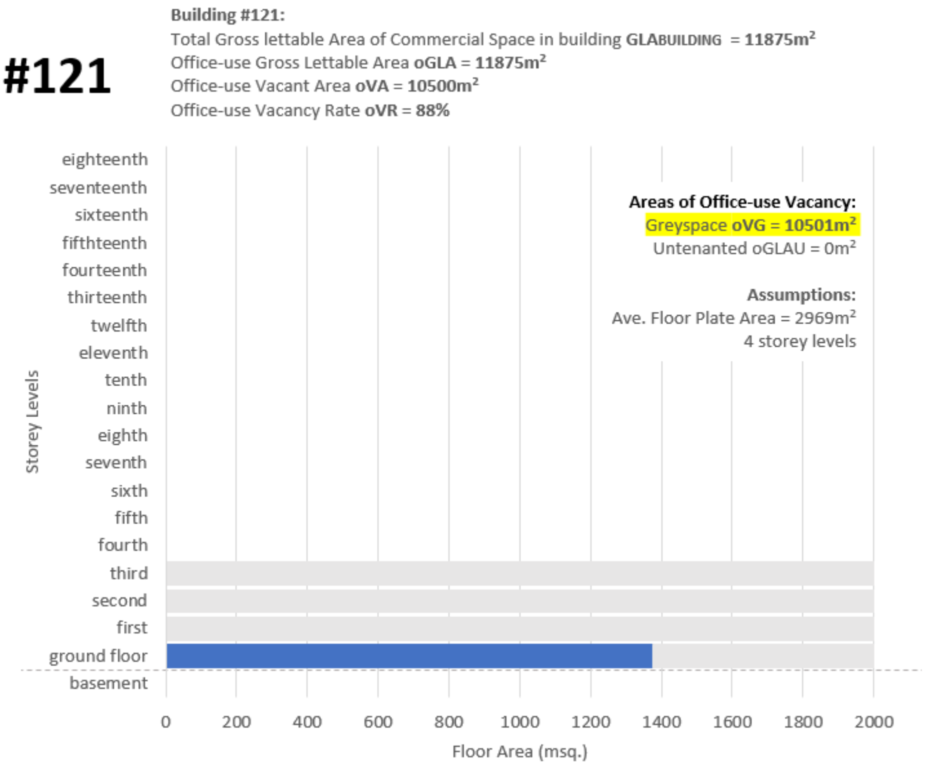
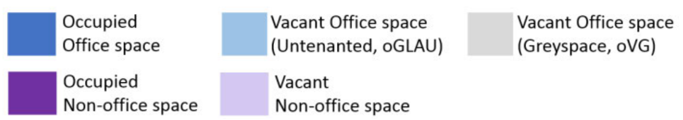


Figure 7.17 Greyspace in buildings #52 and #121



7.7.6.3 Greyspace and Untenanted vacancy combined (oVG and oGLAU)

Phase B spatial visualisations also permit the distribution of occupied space to be viewed. The distribution of occupancy appears to show that occupancy exists in small pockets peppered in amongst oGLAU and oVG. Examples of this pattern are shown in Figure 7.18 below. The distribution of occupancy in pockets points to a lack of active consolidation of vacant space by landlords and their agents, within large-scale secondary grade office buildings that have a high vacancy rate. This observation is important to understand when evaluating adaptive reuse as a strategy to address vacancy, because space-use consolidation is a low-intervention obsolescence strategy that could be used by building owners prior to mixed-use multi-level (MUMLAR) and whole building adaptive reuse (WBAR) (Greenhalgh & Muldoon, 2017).

Finding ch7-13: The distribution of occupancy suggests that there is a lack of space-use consolidation occurring in the large-scale ($GLA_{BUILDING}$ ≥ 3000 m^2) secondary grade office buildings with a high vacancy rate (oVR > 50%).

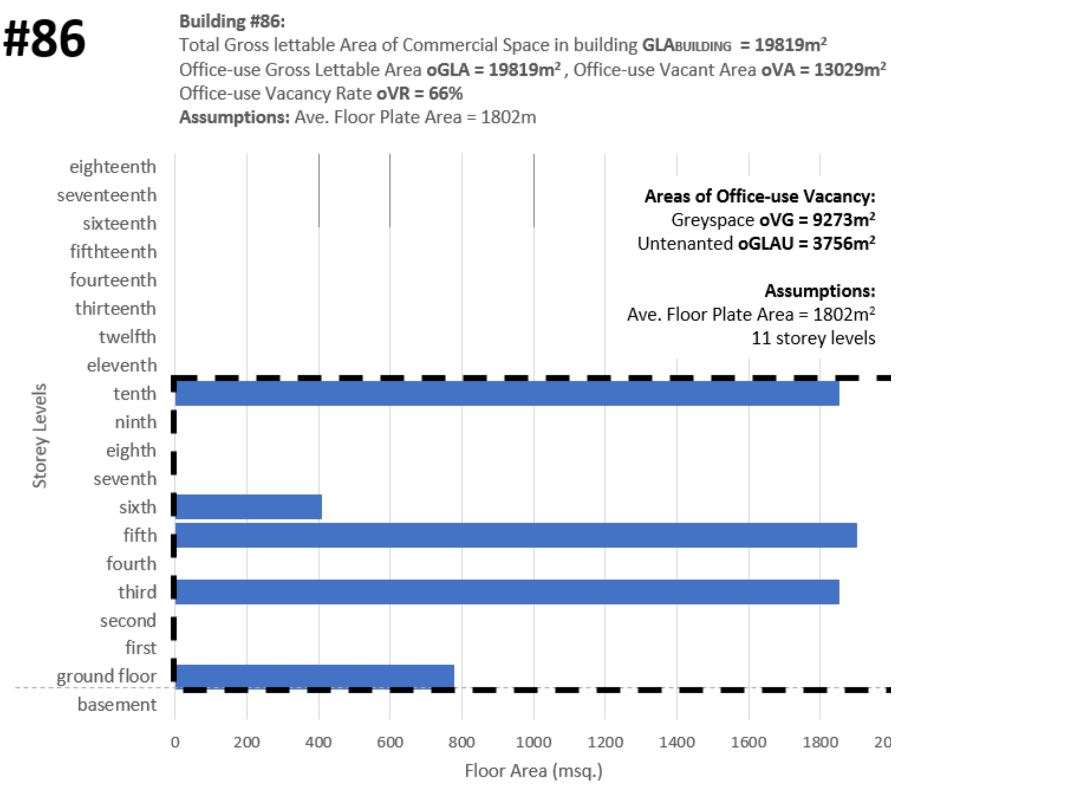


Figure 7.18 Lack of active consolidation of vacancy, showing occupancy 'pockets'

7.7.7 Contextual factors

As indicated by Table 7-12 below, 12 of the 21 large-scale secondary buildings ($GLA_{BUILDING} \geq 3000$ m^2) had undergone refurbishment works that were likely to trigger building regulation compliance with recent NCC performance standards. The table shows secondary grade large-scale office buildings ($GLA_{BUILDING} \geq 3000$ m^2) with high levels of vacancy (oVR ≥ 50%) when oGLAU and oVG vacancy (m^2) are combined. Buildings that have undergone major works are shown shaded. The following sources of information were used to identify works that would have triggered the need to comply with current NCC performance standards. Sources of information to verify construction events have been anonymised.

Table 7-12 Evidence of recent adaption and compliance with NCC regulation

#Ref	Building history
#3	*Underwent upgrade – office fit-out undertaken in 2014[1] Unclear if works would have triggered building regulation, but project photos on website show entire building scaffolded.* ***Regulation compliance to codes current in 2014 likely.***
#7	*Underwent upgrade – office fit-out undertaken in 2013[2] as major government organisation vacated. Real-estate listings disclose 'full building refurbishment' in 2013 Office building sold in 2006 and 2016[3]. Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#8	*No evidence found to support any major upgrades within the 5 years 2014–18.*
#22	*A major upgrade in 2014 incl. air-conditioning and fit-outs[4]. Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#51	*Construction completed in 2007–08, and likely to have a high level of compliance with current codes.*
#52	*Constructed 1987, considered to be high-quality. No evidence found to support any major upgrades within the 12 years 2007–18.*
#53	*Constructed 1987, considered to be high-quality. No evidence found to support any major upgrades within the 12 years 2007–18.*
#55	*Constructed 1988, considered to be high-quality. No evidence found to support any major upgrades within the 12 years 2007–18.*
#60	*Underwent major refurbishment in 2013–14[5]. Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#62	*Extensive refurbishment[6] incl. air-conditioning, lighting, lift-car and other building services. Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#67	*No evidence found to support any major upgrades within the 12 years 2007–18.*
#71	*Whole building internal re-imaging of spaces (internal space refurbishment) in 2006 and upgrades[2] incl. undergone a refurbishment with renovated foyer, male and female bathroom upgrades, building services and lift upgrades, telecommunications infrastructure upgrade to 'smart city' initiatives. Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#84	*Underwent major refurbishment in 2009[5]. Building regulation compliance would have been triggered. Upgrade repositioned office building as a GBCA-rated sustainable accommodation, achieving 4* Green Star rating.* ***Therefore, barrier from building regulation unlikely.***
#86	*Construction completed in 1999 and likely to have a high level of compliance with current NCC.*
#101	*Evidence of external 'facelift'[5] and internal space decoration, brand repositioned (2016–17)*
#105	*Major upgrade[7] in 2014 (lifts, air-conditioning, lobby areas, etc.). Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#106	*Major upgrade[2] in 2014 (all services, WCs, lobby areas, etc.). Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#113	*No evidence found to support any major upgrades within the 12 years 2007–18.*
#117	*Major upgrade in 2007[2] (incl. environmental performance upgrade of both services and external walls). Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***
#121	*Construction completed in 2005 and likely to have a high level of compliance with current NCC.*
#125	*Major upgrades in 2016[1] (services, end-of-trip facilities, and internal fit-out). Building regulation compliance would have been triggered.* ***Therefore, barrier from building regulation unlikely.***

[1]Construction company website; [2]https://www.commercialrealestate.com.au/property/XXX;
[3]https://www.domain.com.au/property-profile/XXX; [4]Local newspaper report;
[5]Photographic records on Google Streetview; [6]https://www.realcommercial.com.au/property/XXX;
[7]https://www.savills.com.au/offices/XXXX

It is possible that further buildings in this list have undergone major refurbishments, but public data is simply not available, as no register of building regulation applications exists in Australia. This analysis can, however, conclude that obsolescence mitigation strategies have been undertaken in the last 10 years by building owners for 12 of the 21 buildings examined. Building regulation does not appear to be an impediment to building upgrades that trigger NCC compliance. The relatively recent construction dates for 11 of the 21 buildings also question whether any further upgrades, including adaptive reuse, would be undertaken by building owners as a strategy to mitigate vacancy. The prevalence of recent construction dates, in this sample of 21 buildings, further reduces the likelihood that building regulation prevented the uptake of adaptions that trigger compliance with NCC performance standards, as their recent construction would mean the buildings already have a high level of compliance with current NCC performance requirements. It is far more plausible to simply suggest that building owners are indeed choosing to upgrade their secondary office buildings, rather than transitioning them out of the office building market through adaptive reuse into other markets such as residential.

Finding ch7-14: Evidence was found that adaption was occurring within the secondary grade office buildings with a high vacancy rate (oVR > 50%), triggering requirements to comply with NCC performance standards within the last 14 years.

This finding disputes or challenges claims made that building regulation is a barrier to adaption in the wider sense. It also casts doubt on whether building regulation is a barrier for other obsolescence mitigation strategies, specifically adaptive reuse of office buildings for other space uses.

Finding ch7-14 needs to be interpreted cautiously, as office buildings can potentially be converted to a wide range of new uses. Different uses may trigger compliance with different parts of the NCC. However, this finding demonstrates that some stakeholders' perceptions are unsound, particularly in suggestions that certifiers in South Australia interpret the Building Act and legislation enacting building regulation. The relevant legislation includes the *Development Act 1993 (*GovSA, 2014) and *Development Regulations 2008* (GovSA, 2016a). Specifically, Finding ch7-14 challenges the perception, commonly held by stakeholders, that the whole building needs to be brought up to current NCC performance standards when major upgrades, including adaptive reuse, are undertaken. The building data captured in Table 7-12 disputes generalised claims that any upgrade triggers the requirement for the entire building to achieve compliance with the latest NCC performance standards. This is a misunderstanding of SA legislation, and underpins faulty perceptions of cost-prohibitive compliance requirements. This incorrect interpretation about the extent to which compliance is required for adaptive reuse projects is being used to arrive at a faulty economic conclusion about the prohibitive expense of building regulation compliance (see Chapter 04). Finding ch7-14 also indicates that adaptive reuse is not the preferred option by many secondary grade building owners. Within-class upgrades are occurring and compliance with building regulation is being achieved.

7.8 Concluding discussion

The findings from this chapter have the potential to shift the current debate away from a simplistic understanding of vacancy, which, up until now, has been limited by a reliance on PCA's mean values for Untenanted office building vacancy. The findings from Phases B and C enable an examination of the likelihood of building regulation being a key barrier to adaptive reuse of office buildings. Therefore, the office building population database and its subsequent analysis make a unique contribution to a critical understanding of vacancy as an indicator of obsolescence, and the suitability of adaptive reuse to address vacancy.

Untenanted and Greyspace vacancy are important vacancy sub-types and enable critical understanding in evaluating existing building obsolescence and obsolescence mitigation strategies, such as adaptive reuse. The need for further research into office building vacancy has been identified in recent international literature (Muldoon-Smith, 2017; Remøy, 2010). Two sub-types of vacancy were quantified in this chapter, and this proved useful when evaluating adaptive reuse suitability, and the likelihood of NCC building regulation as a key inhibitor preventing greater adaptive reuse of office building. These two types of vacancy were Untenanted space (GLAU) and Greyspace (VG).

7.8.1 Usefulness of VVAM

This chapter details an original and innovative method for locating and quantifying two sub-types of vacancy, using a cross-sectional research design. Cross-sectional studies are described as ‘generally quick, easy, and cheap to perform’ (Sedgwick, 2014:2). The shorter timeframes needed to undertake cross-sectional studies and their economic efficiency offer two key benefits that make this chapter’s method particularly appropriate when developing urban planning policy to address vacancy in existing building populations. The quantitative method can be replicated as a stand-alone method to quantify vacancy in existing buildings when vacancy data is not publicly available to researchers and policymakers.

The method developed in this thesis can also be used in future research studies to triangulate qualitative data. For research into adaptive reuse, triangulation is important because it limits potential bias stemming from qualitative data such as interviews with stakeholders. A range of state and local policy levers can offer financial gain for stakeholders, particularly building owners and developers. These policy levers include regulation dispensations, tax concessions, planning approval exemptions, and grants or loans to upgrade existing buildings. Triangulation of qualitative data can limit the bias from stakeholders who seek to financially benefit from encouraging policy action around reducing the cost of building regulation and improving the financial viability of undertaking adaptive reuse.

Findings ch7-01 and ch7-5 indicate that the focus on vacancy in the secondary grade buildings in public debate is misplaced, as vacancy is a problem across all building grades. This finding also contradicts predictions made in the ‘indigestible lump’ concept discussed by Ness (2002). The cross-sectional data analysis presented in this chapter detected no discernible ‘lump’, as vacancy is distributed across both primary and secondary office building grades. Further to the ‘indigestible lump’ concept, the ‘sinking stack theory’ predicts that vacancy would be concentrated in the secondary grade office buildings (Langston *et al*., 2008; Ness & Atkinson, 2001; Atkinson, 1998). Data did not bear out this prediction, although it is possible that a longitudinal study may detect the operation of the sinking stack process.

7.8.2 First study of Greyspace vacancy

This chapter has detailed a method that is the first of its kind to measure Greyspace in existing buildings. As described at the start of this chapter, research studies announced Greyspace vacancy as a 'hidden' form of vacancy and one that is difficult to identify or quantify through research studies (Muldoon-Smith & Greenhalgh, 2017). It is considered to be a precursor to obsolescence, as it can indicate that a building is surplus to market requirements (Muldoon-Smith, 2016:115). Greyspace vacancy is not formally advertised as vacant space, and current methods to quantify vacancy in Australia rely on real-estate listings of untenanted space available. Greyspace vacancy is therefore not included in vacancy rates published by industry bodies such as the PCA.

Multi-storey, non-heritage office buildings located within the Adelaide CBD were used to test the VVAM method. This study has been replicated with a different building population (heritage-listed buildings), which demonstrates it's potential for a wider contribution to research in the field. The method detailed in this chapter was replicated for the SA State Government, as part of an evaluative investigation into adaptive reuse of the SHR building in Adelaide CBD. A report was commissioned by the Heritage Office of the SA State Government Department of Environment and Water ,and undertaken by the researcher in 2018–19 (see Appendix 7F: 'The Shape of Vacancy' report). Successful replication of the method is important because it shows that it can be generalised beyond the current study and could be used by other researchers in the future.

7.9 Limitations of VVAM

VVAM is a novel method developed by this study and would benefit from further testing on building populations beyond the building populations of multi-storey office buildings Adelaide CBD. Encouragingly, replication of the method has been already carried out for the SA State Government, on a heritage building population. Phase A quantification of vacancy from secondary data collected for local council taxation was found to be an effective way to identify the distribution of vacancy across heritage buildings.

The secondary data used (ACC dataset) was not designed to investigate vacancy and the repurposing of data is an imperfect solution to mitigate a lack of a vacancy data for local and state governments. Thus one limitation of this research is the assumption that the data, relied upon in this study, and collected by ACC, is accurate at the time of collection. This assumption of accuracy is made after investigating the purpose and collection method of the ACC dataset. The data is part of a well-established annual collection process, undertaken by qualified property valuers for local government, and is relied on for taxation. This research assumes, therefore, that the dataset is accurate.

The small range of types of vacancy quantified from the secondary data constitute a limitation of the VVAM. For instance, VVAM could quantify valuation-factored vacancy, Greyspace and Untenanted vacancy. It could not quantify structural vacancy or other types of vacancy that are time-dependent and are discussed as key vacancy types in the literature (Muldoon-Smith & Greenhalgh, 2017; Remøy, 2010). Cross-sectional data is inherently limited because it is a snapshot in time, and findings gained from cross-sectional data may not apply beyond the period in which it was collected.

Limitations exist in the criteria used to select office buildings for inclusion in the sample. For instance, the researcher's decisions in grading office building quality as premium, A, B, C or D grade, using the guidance available (PCA, 2012) has an inherent limitation, as the guidance is highly subjective and not meant to provide a tick-list for categorising office buildings. To mitigate this problem, two broader grades have been used: primary and secondary. In addition, heritage buildings and offices under 3 storeys were excluded from the study. While helpful to focus this study on NCC regulation, these criteria are a potential limitation on how the findings can be generalised across different building scales and heritage statuses.

Assumptions were made during the recalibrating of data to visualise vacancy that generate potential limitations on conclusions reached about the suitability of adaptive reuse categories applied to each building. Underspills at ground level storeys were noted, and for ground floor underspills, it was assumed that the underspill was due to exclusion in how GLAs are calculated using the IPSM Method, as ground floor storeys in office buildings were most likely to contain larger communal areas, such as public lobby areas to main entrances, or some floor levels had changes in the number of spaces excluded from area calculations, eg: plant and service equipment. It was not possible to gain access and independently measure gross lettable floor area, noting spaces to be excluded on each level.

Therefore, one limitation of VVAM is that the redistribution relies upon estimations of GLA values for each storey level. Variations in building design can affect floor plate area (m^2), and this variation limits the accuracy of VVAM in quantifying vacancy. Detailed information on how these potential limitations are reduced is contained section 7.6.4.4, on specifying the recalibration of data for visualisations. This limitation only potentially affects Phase B of VVAM and the associated findings (ch7-7, ch7-8, ch7-9, ch7-11, ch7-12 and ch7-13). The technique and the resulting visualisations therefore cannot be considered to be accurate record. Rather, VVAM visualisations act as a tool to describe vacancy patterns within building populations.

7.10 Summary of chapter's main findings

Tables 7-13, 7-14, and 7-15 below provide an overview of the main findings of this chapter. The findings collectively indicate that whole building adaptive reuse (WBAR) is unlikely to be a suitable option to address office building vacancy in the Adelaide CBD.

Table 7-13 Summary of Chapter 07 key findings from Phase A

Quantifying vacancy (Phase A)	
Finding ch7-1	Mean vacancy rates (oVR) for office buildings in the Adelaide CBD were high in 2017 and valuation-factored vacancy (oVA, m2) was a problem across both primary and secondary building grades in Adelaide CBD.
Finding ch7-2	The size of a building was found to be a factor in the presence of vacancy, disclosing that buildings with larger office-use floor areas tended to have higher vacancy (oVR).
Finding ch7-3	The type of ownership structure (Strata/Community Plan versus single/group ownership) did affect vacancy rates across the building population, and the mean vacancy rate was lower in office buildings under Strata or Community Plan ownership structures.
Finding ch7-4	Although vacancy rates were considered to be high across the population, no wholly empty buildings were identified in the population (n = 118).
Finding ch7-5	Mean oVR (%) is similar across both office building grades (primary and secondary) when buildings with high vacancy are examined.

Table 7-14 Summary of Chapter 07 key findings from Phase B

Visualisations and spatial analysis (Phase B)	
Finding ch7-6	When comparing the two types of vacancy, oGLAU and oVG, Greyspace outweighs the Untenanted space considerably.
Finding ch7-7	Adaptive reuse is unlikely for these 13 large-scale secondary office buildings due to the lack of Untenanted space on: a) the whole-building scale or b) multiple levels of abutting floor plates with oGLAU.
Finding ch7-8	Finding ch7-8: Untenanted vacancy is overwhelmingly distributed in pockets of single floor plates or partial floor plates. Only 2 large-scale buildings with oVR > 50% contained areas of multiple floorplates with oGLAU stacked together.
Finding ch7-9	Spatial analysis discloses that partial adaptive reuse (PAR) is the most suitable category of reuse for buildings with oGLAU vacancy, in the immediate to short term. No buildings appeared to be suitable in the short term for whole building adaptive reuse (WBAR) when considering vacancy as an indicator of obsolescence. Few (2) buildings appeared suitable for mixed-use multi-level adaptive reuse (MUMLAR) at the time of data collection.
Finding ch7-10	Greyspace vacancy (oVG) was present in all 32 secondary grade buildings with high vacancy.
Finding ch7-11	There were few (0–2) large-scale secondary grade office buildings suitable for WBAR in 2017 when the ACC collected data. Both buildings had high levels of oVG, distributed over multiple floorplates clustered together.
Finding ch7-12	10 buildings had the capacity for either mixed-use multi-level adaptive reuse (MUMLAR) or partial adaptive reuse (PAR), with a further 6 buildings suitable for PAR only, unless space consolidation or tenant relocation were to occur.
Finding ch7-13	The distribution of occupancy suggested that there was a lack of space-use consolidation occurring in the large-scale ($GLA_{BUILDING} \geq 3000$ m^2) secondary grade office buildings with a high vacancy rate (oVR ≥ 50%).

Table 7-15 Summary of Chapter 07 key findings from Phase C

Contextual factors considered (Phase C)	
Finding ch7-14	Evidence was found that adaption was occurring within the secondary grade offices with a high vacancy rate (oVR > 50%), triggering requirements to comply with NCC performance standards within the last 14 years. This finding disputes or challenges claims made that building regulation is a barrier to adaption in the wider sense. This finding also casts doubt on whether building regulation is a barrier for other obsolescence mitigation strategies, specifically adaptive reuse of office buildings for other space uses.

Vacancy proved to be a highly useful lens through which to assess whether adaptive reuse is a 'good fit' for a building population. This chapter uncovered evidence of recent successful obsolescence mitigation strategies occurring in the Adelaide CBD. These adaptions, while they did not involve adaptive reuse, would have triggered a requirement to comply with recent NCC performance standards. This casts doubt over claims that adaptive reuse is not happening due to barriers arising from building regulation. It points to a wider reluctance by building owners to transition their buildings out of the office building market.

One enabler of adaptive reuse is space consolidation of existing tenants or vacant spaces. Few or no attempts to consolidated vacant space could be found in the spatial analysis. Space consolidation is a low-intervention obsolescence mitigation strategy, and is arguably an early-stage enabler of whole building adaptive reuse (Greenhalgh & Muldoon-Smith, 2017).

Key issues raised in this chapter are further explored in Chapter 08, which is the concluding chapter of this thesis. Chapter 08 synthesises empirical insights from this chapter with qualitative insights gained from Chapters 04, 05 and 06.

Chapter 8: Discussions and Conclusions

> "Adaptive reuse is the repurposing of a structurally sound building for a new use that reconciles the tensions between the environment, economic development, and equity" (Mohamed *et al., 2*017:150)

8.1 Organisation of chapter

This chapter synthesises the findings from chapters 02, 04, 05, 06 and 07 to report how building regulation is perceived and what evidence has been uncovered to support stakeholders' views. It then examines whether building regulation reform is necessary to increase adaptive reuse uptake. The synthesis of findings from all chapters is organised by each research objective A to D and reflects the order of RQ1, RQ2 and RQ3. Consideration of how the main findings relate to previous literature will discussed. Finally, this chapter concludes by considering how research can contribute to generating new knowledge to help shape policies that seeks to manage existing buildings sustainably and avoid premature obsolescence. Recommendations of this study intend to inform future research, setting out the need for a more nuanced and critical understanding of relationships between vacancy and obsolescence; adaptive reuse and obsolescence; and building regulation as a cause of obsolescence.

8.2 Synthesis of findings

This study investigated the evidence to support the prevailing view held by stakeholders that building regulation is a key barrier to adaptive reuse. Through the lens of Adelaide, South Australia, this study examined non-heritage, multi-storey office buildings located within a CBD and aimed to answer the three research questions and meet the four research objectives of this study.

Altogether, the study involved a synthesis of five methods in the research design: (1) literature review contained in chapter 02, section 2.3; (2) content analysis of public debate in chapter 04; (3) an electronic survey in chapter 05; and (4) semi-structured interviews in chapter 06; and (5) a quantitative study of vacancy in Adelaide's office building population in chapter 07.

Methods (1), (2), (3), and (4) address research objectives A and B, to answer the first research question 1: *what is the perception of industry stakeholders about building regulation in relation to adaptive reuse of office buildings across Australia?*

Methods (2), (3), (4) and (5) address research objective C and the second research question: *focusing on Adelaide, what evidence is there to support some stakeholders views of building regulation and adaptive reuse?*

Methods (4) and (5) address research objective D and the third research question: *does building regulation need to be reformed to encourage adaptive reuse?*

8.2.1 Research objective A

To systematically examine the perceptions of stakeholders both industry professionals in practice and as mentioned in published literature) about NCC as a barrier to adaptive reuse in Australia.

Many stakeholders regard building regulation to be a key barrier to adaptive reuse of office buildings in the research literature, public debate captured in online newspaper articles, and data gathered through the survey and semi-structured interviews for this study. Findings from Chapters 2, 4, 5, and 6 substantiate this conclusion. Taken together the findings of this study disclose the prevalence of the view that regulation as a barrier to adaptive reuse: the literature review (findings ch2-01, ch2-02, ch2-07, ch2-08, ch2-12); analysis of public debate for Adelaide (findings ch4-09, ch4-12); and electronic survey (finding ch5-02); and semi-structured interviews (finding ch6-02).

The methods adopted and subsequent findings confirm the view of building regulation as a barrier to adaptive reuse development is held by stakeholders internationally, across Australia and in Adelaide, for both heritage and non-heritage buildings. The review found that Australian based research studies made up the largest cluster of articles in literature captured by the review. Australian based research literature discloses that some stakeholders view several NCC performance standards as problematic for adaptive reuse development as detailed in finding ch2-08. The literature covered studies of adaption of both office and non-office buildings. Some stakeholders consider the problematic NCC provisions to be the fire safety and disability access sections. Open-ended survey responses, disclosed by industry professionals in Australia, mirrored the emphasis on technical provisions addressing fire and disability access found in the literature. Stakeholders also raised compliance with fire and disability standards as problematic for office building adaptive reuse development during semi-structured interviews. In summary, the prevalent view held by stakeholders is that performance standards for fire safety and disability access present the most prominent hurdle to the feasibility of office building adaptive reuse in Australia.

However, this study also captured divergent views challenging the idea that stakeholders often regard building regulation as a pivotal barrier to adaptive reuse. Divergent views are in the review of the literature (findings ch2-10 and ch2-11), open-ended responses gathered by the survey, and semi-structured interviews (finding 6-04). Not all stakeholders agreed with the perception that building regulation is a key barrier. Some participants in the survey and interviews actively challenged the dominant and negative perception of building regulation. Finding ch5-03 qualifies the dominant view of regulation as a barrier, suggesting that in most cases, it is possible to overcome difficulties with building regulation for adaptive reuse developments. The resolution of technical issues implies that regulation presents complexity and inconvenient challenges rather than insurmountable barriers.

8.2.2 Research objective B

To evaluate if stakeholders, within the Adelaide CBD office building market, hold the view that NCC regulation is a barrier to office building adaptive reuse.

Focusing upon Adelaide, chapter 04 provided detail about how newspaper articles present building regulation as a barrier to adaptive reuse of vacant office buildings. The construction of building regulation as a problem changes over time in public debate and reflects trends in perceived vacancy levels. Reference to building regulation as a problem only occurs when there is a period of perceived high vacancy and low market demand for space (findings ch4-03 and ch4-09). The framing of building regulation as a problem should be understood as part of the broader stress response by stakeholders reported in the media (findings ch4-07 and ch4-08).

The study shows there is a trend in news articles to use increasingly emotive language when new articles report high-vacancy in the population of office buildings (finding ch4-11). News articles captured gave the impression that all stakeholders believed that building regulation is problematic for adaptive reuse of office buildings, from industry group leaders such as the Property Council of Australia to state government leaders from opposing political parties (finding ch4-12). Key public stakeholders appear to have accepted the adaptive reuse predicament as a given and as logic for policy action to reduce building regulation and thereby stimulate adaptive reuse in response to high office building vacancy. It is not possible to definitively say from data that the construction of the adaptive reuse predicament in news stories caused policy action, but comments by the government leaders at the time indicate it had considerable influence, including during the period when policies for under-used Adelaide CBD were being formulated at state and local level. This acceptance in public debate, of the narrative that building regulation is a barrier to adaptive reuse of office buildings, potentially reinforces a broader negative perception of building regulation, which arguably, entrenches views that the narrative, of regulation as an inhibitor to adaptive reuse development, is generalisable.

To answer research question RQ1, the dominant view held by stakeholders is that building regulation is perceived as a barrier to adaptive reuse in research literature, by professional stakeholders across Australia, and within Adelaide, the state capital of South Australia. However, divergent views in published studies, and analysis of data gathered by this study, reveal that this view is too simplistic and over-generalised. Reporting of stakeholder opinion lacks critical investigation to progress knowledge in the field of barriers to adaptive reuse. This conclusion questions the prevailing view, held by stakeholders in Australia and internationally, of building regulation as a key barrier, and underlines the need to ask what evidence exists to support this view (research question RQ2).

8.2.3 Research objective C

To seek and evaluate the evidence to support stakeholders' views of NCC regulation as a barrier to adaptive reuse, and detail which NCC provisions are problematic.

The review of literature and analysis of public debate for Adelaide highlight a lack of evidence to support stakeholders' claims that technical requirements of NCC performance standards present critical hurdles to adaptive reuse of office buildings (findings ch2-09, ch4-13). To summarise again, research studies tended to descriptively report stakeholders' views of regulation without addressing potential bias and financial incentives of a reduction in regulation performance standards (findings ch2-09 and ch2-10). Analysis of the public debate about adaptive reuse and regulation for Adelaide captured similar instances of this uncritical reporting and also an imbalance in the range of stakeholders who influenced the public debate (finding ch4-12 and ch4-16). This study finds that research studies and news articles provided little or no evidence to support stakeholder claims of NCC performance standards as a key barrier to adaptive reuse. Finding ch7-4 did not support the perception that Adelaide had a high number of office buildings left standing empty.

8.2.3.1 Evaporating evidence: no examples of buildings with technical barriers

In the responses captured by the semi-structured interviews, building owners, developers and policymakers active in developments within Adelaide CBD could not cite a single example of a building for which adaptive reuse had been deemed infeasible due to NCC performance standards. The response by interviewee 02 illustrates the contradictory nature of discussions about building regulation:

[02]:

> Interviewer: Have you got any building that you own where you have had problems with planning policy or building regulation?
> Participant 02: *Yes. Every building here, I've had a problem with.*
> Interviewer: So, have you got any buildings where you just haven't been able to convert them, or have you gone through that battle with them until you've got them through?
> Participant 02: *Oh no, I always convert and preserve.*

Participants in research (survey and semi-structured interviews) only provide one example of a building that could not be converted and which works did not proceed due to requirements of NCC compliance. This office building example, located in Adelaide CBD, was given by participant 05 in semi-structured interviews and had been deemed unfeasible for adaptive reuse due to NCC performance standards requirements for ventilation and energy efficiency. Additional information in the interviewee's response, however, confirmed that it was a financial or behavioural barrier rather than a technical barrier, which prevented progress. Several stakeholders perceived the cost of upgrading a building economically unfeasible for the financial return (finding ch6-07).

Analysis of semi-structured interview data revealed that local economic and commercial market conditions determine the financial feasibility of adaptive reuse development, from the perspective of building owners and developers (finding ch6-07). Responses in the semi-structured interviews align with literature describing Adelaide's economic problems during the time of data collection in 2017 (ABS, 2018). Cities with poor economic performance, suffering high vacancy, may present financial barriers to adaptive reuse as poor economic performance has implications for adaptive reuse investors. Arguably, low demand for CBD space, including commercial and residential demand for inner-city living in cities such as Adelaide, would dictate that there may not be sufficient market interest in the adaptive reuse development after its completion. One other possible explanation for the negative framing of building regulation is that 'reasonable' NCC compliance is too cost-prohibitive and this economic problem frames building regulation as a 'barrier'.

This study concludes that while stakeholders often frame building regulation as a barrier, no robust evidence was uncovered to support this view. The study also affirms that while the terms 'barrier', 'problem' and 'difficulty' are often used to describe NCC compliance on adaptive reuse projects, the reality is more likely to be that building regulation is a financial feasibility issue rather than a technical barrier. Building regulation does not constitute a technical barrier to adaptive reuse as a general principle, rather NCC performance standards are 'inconvenient' or add 'complexity' in terms of construction costs, consultants' fees and the time required to develop and document compliant designs.

One common adaptive reuse project type is an office to residential conversion. Semi-structured interviews revealed that there is a perception by stakeholders in Adelaide of low demand for inner-city living. This perception concerning the residential market questions the suitability of adaptive reuse as a strategy to reduce high vacancy levels if market demand for other space, such as residential, is low. This notion poses the question: how desirable is low-cost adaptive reuse development which has been granted dispensation from meeting minimum NCC provisions, such as fire, energy efficiency, and disabled access?

8.3.2.2 False conclusions from aggregated vacancy rates

Chapter 4 found that the presence of vacancy in the secondary grade office building was framed as the evidence of the need to reform and reduce NCC building regulation requirements for adaptive reuse of existing buildings (findings ch4-01, ch4-04, and ch4-06) and that this narrative is accepted by many policymakers and stakeholders (findings ch4-12 and ch4-16). Findings from chapter 07, however, challenge this generalised view that building regulation is a critical barrier to reducing vacancy through adaptive reuse. Recent successful examples of secondary office building adaption are found during the examination of the office building population. These adaptions would have triggered NCC compliance requirements, including adaptive reuse and the upgrading of critical services such as lifts (finding ch7-14). This finding indicates that NCC performance standards do not present insurmountable challenges for all existing buildings.

The analysis of vacancy also found that there were few (up to two) large scale (GLA > 3000m^2) office buildings with above 85% in Adelaide CBD (finding ch7-08) if untenanted and greyspace vacancy is included. The lack of buildings standing empty, or nearly empty, suggests that whole building adaptive reuse is not appropriate for the office building population in Adelaide CBD as an urban regeneration strategy. The lack of office buildings standing vacant is also substantiated by additional data, provided by the PCA research department. This additional vacancy data details a list of secondary grade office buildings believed to have a vacancy rate of 50% or more, and was purchased by the SA state government in 2017. This secondary data was shared with the researcher by officials at DPTI. This data disclosed that there were only 2 secondary office buildings with GLA above 3000m^2 suffering high vacancy (above 50% vacancy) in Adelaide CBD in 2017 by the PCA's own admission. These two buildings are included in the office building population and are #3 and #63. The lack of vacant buildings was surprising given the focus upon secondary office building vacancy depicted as a problem in the public debate. The narrative of buildings standing empty was provided as evidence, in the public debate, that building regulation is the critical barrier preventing the empty buildings from being reused. The examination of vacancy distribution detailed in chapter 07 reveals, however, that this narrative was false as there were so few buildings standing empty despite the high average vacancy rate.

The study found that vacant floor space (both untenanted and greyspace vacancy) was spread across the office building population rather than concentrated in a smaller number of office buildings. One main conclusion of this study is that aggregated vacancy rates are unhelpful in evaluating vacancy as an indicator of building obsolescence in cities, as they do not describe the distribution of vacancy across the building population. Aggregated vacancy rates are also not useful in predicting the efficacy of office building adaptive reuse to address vacancy in cities, and this study concludes that future studies of the barriers and enablers of adaptive reuse should include analysis of reliable and detailed vacancy data for a deeper understanding of a buildings' risk of obsolescence and suitability for adaptive reuse.

Collectively, the conclusions reached by this study challenge the assumption that building regulation is a barrier for all or most secondary grade office buildings and reduces the likelihood that a generalised view of building regulation as a barrier to adaptive reuse is an over-reach of some stakeholder opinion. It could be that it is sometimes more challenging for designers and investors to convert some office buildings. Difficulties could stem from a building's age, current condition, site restrictions and suitability of the new use for the existing structure. However, this study finds no evidence to support the dominant perception, often held by some stakeholders, that NCC performance standards are a critical barrier to adaptive reuse.

8.2.4 Research objective D

Identify which aspects of building regulation, if any, prevent greater uptake of adaptive reuse to help inform policy initiatives which seek to address barriers to adaptive reuse in practice

In answering research question RQ2, conclusions emerge which guide responses to research question RQ3: *Does building regulation need to be reformed to encourage adaptive reuse?* This study finds that policy reform of building regulation to encourage adaptive reuse lacks evidence to support its need and holds risk. This study does not support the need to reform building regulation to enable higher adaptive reuse uptake. The argument that building regulation is a barrier to addressing vacancy through adaptive reuse, made in public debate to justify policy action, is fundamentally flawed on three grounds. Firstly, this study finds that the vacancy data to support the need for policy reform of building regulation is missing and that there is an over-reliance in public debate on opinion from industry groups advocating for the interests of property developers and building owners. Secondly, the societal cost of reduced building regulation is potentially high and poses an unacceptable risk. Thirdly, the argument rests on the assumption that adaptive reuse is an appropriate strategy to address office building vacancy in Adelaide CBD. These three insights from research are valuable because they highlight the need for a more critical understanding of adaptive reuse as a policy response to remedy high vacancy and premature obsolescence in existing buildings.

The presence of high vacancy in the office building market has been held up by the public debate in Adelaide, as evidence in the perceived need to reform building regulation to enable adaptive reuse in South Australia (findings ch4-03, ch4-04, ch4-07, and ch4-12). This narrative, coined by stakeholders in Adelaide as 'the adaptive reuse predicament', appears to have influenced policy development to address vacancy in buildings within Adelaide CBD (findings ch4-12, ch4-15, and ch4-16). The Minister's Specification for Upgrading Health and Safety in Existing Buildings (GovSA, 2017) was developed in response to the adaptive reuse predicament (finding ch4-15). For South Australia, the wording in clause 53A(1), 'extent reasonably necessary', appears to addressed by the Minister's Specification, a concern which underpins narratives about building regulation examined in chapter 04. Indeed, the Minister's Specification, developed at the same time as this research study, was developed to provide greater certainty for existing building development, including adaptive reuse. As stated in Section 101.3 in the Minister's Specification, "Without guidance on the extent of upgrading that may be required by an authority under these circumstances, interpretation of the legislation has been inconsistent, and buildings have sometimes been required to be upgraded to an extent either above or below that which is considered necessary or reasonable for an existing building" (GovSA, 2017:1).

In answering research question 3, local and state government policy in SA was shaped by the public debate. Building regulation was reformed to the extent that it provided clarification on what is "the extent reasonably necessary" to achieve building regulation compliance in existing building upgrades, as set out in Section 53A of the Development Act 1993 (Government of South Australia, 2014). At the local government level, taxation incentives were also introduced in 2017 to support office to residential adaptive reuse within Adelaide CBD. The policies introduced were reactive to the public debate and motivated by the assumption that the adaptive reuse predicament was correct, despite a lack of robust investigation by local and state government of the evidence to support the predicament and stakeholders' views. The lack of non-aggregated vacancy data to inform policy drives this study and underpins research question 3. Policy reform occurred, therefore without reliable non-aggregated vacancy data.

Chapter 04 highlighted a change in the public debate in 2017 following the Grenfell Tower disaster and which arguably exemplified the risk to life from non-compliance of existing building upgrades (finding ch4-14). There are inherent dangers and tensions involved in reducing the requirement to comply with NCC performance standards (finding ch2-11). Participants in the survey and semi-structured interviews also held the view that it was dangerous to reducing NCC compliance on grounds of public safety (fire safety and structural integrity), construction quality (service provision, thermal comfort and energy efficiency), and the risk that reduced compliance would compromise a building's ability to meet minimum market expectations (commercial occupiers' legal requirements to meet Disability Discrimination Act).

Finally, the vacancy distribution infers that whole building adaptive reuse is an unsuitable obsolescence mitigation strategy for the office building population in Adelaide CBD (findings ch7-01, ch7-07, ch7-08, ch7-09, ch7-11, and ch7-12). Interestingly mixed-use multi-level adaptive reuse (MUMLAR) and pocket adaptive reuse (PAR) have been undertaken recently in Adelaide's secondary office buildings, albeit on a low-level scale (finding ch7-14). The premise that high vacancy is evidence of the presence of regulatory barriers preventing building owners from undertaking adaptive reuse is therefore unsound. The unsuitability of adaptive reuse to address vacancy in office buildings in Adelaide CBD disputes the potential impact of any measures to reform building regulation. To address Adelaide's office building vacancy rates, this study finds that a range of low-intervention obsolescence mitigation strategies need to occur before policy attention is focussed on whole building adaptive reuse. Consolidation is one such low-intervention mitigation strategy which may be effective, as the distribution of vacancy indicates that consolidation of occupied is not happening in building with high vacancy (finding ch7-13). This would also enable MUMLAR adaptive reuse, which is the next scale of adaptive reuse down from whole building. This study concludes that the generalised perception of building regulation as a barrier is a dangerous myth, and rejects the need to reform building regulation in South Australia, to increase office building adaptive reuse uptake.

8.3 Relationship to previous literature

This section critically sets out how the findings in this study relate to existing literature which can explain the relationship between adaptive reuse, building regulation, and vacancy as an indicator of premature obsolescence in office buildings.

The findings question the widely expressed negative view that building regulation is a key barrier to adaptive reuse, reported in the following research studies: Aigwi et al. (2018), Heurkens et al. (2018), Gosden (2017), Olivedese et al. (2017), Andrews et al. (2016), Conejos et al. (2016), Dyson et al. (2016), Misirlisoy & Gunce (2016), Udawatta et al. (2016), Bruce et al. (2015), Thomsen *et al.,* (2015), Remøy & van der Voordt (2014), Tan et al. (2014), Yung & Chan (2012), Bullen & Love (2011a), and Langston et al. (2008).

This study affirms the need for a more critical and balanced reporting of stakeholder views about the role of building regulation in the feasibility of adaptive reuse development. The findings of this study align with a smaller body of research literature which does not frame building regulation as problematic for existing building adaption, including Živković et al. (2016); Elliott et al. (2015); Leadbetter (2013); Häkkinen &

Belloni (2011); and Wilkinson & Reed (2011). A study of office building vacancy and adaptive reuse options for secondary office buildings within Perth CBD, Western Australia (WA) was conducted by the Economic Development Unit within Perth City Council in 2014-16, a period of high office building vacancy in Perth (WA) (City of Perth, 2017). The report offers a balanced and constructive view of NCC compliance and avoids framing building regulation as a barrier, demonstrating to building owners that adaptive reuse is an opportunity for investment in the safety and environmental provisions of their assets. Findings from this thesis support this framing of regulation. Research by Muldoon-Smith & Greenhalgh (2019) highlights the wisdom of this approach to ensure assets in the real estate market are not stranded due to environmental changes created by climate change.

The findings from this study support the calls for greater attention to building regulation (van der Heijden & de Jong, 2009; Jones, 2009; Imrie & Street, 2009b). During background research for this study, it became apparent that there is a lack of literature to locate this study within research and which focus upon Australian building regulation, including technical compliance with NCC performance standards and enforcement practices. This gap in research is concerning given the recent adverse events potentially connected with weak enforcement of building regulation occurring beyond Adelaide in Australia (Shergold & Wier, 2018). For example, the use of flammable cladding, similar to materials implicated in the loss of life event at Grenfell Tower in London (UK), and structural issues appearing in multistorey residential construction in Sydney and Melbourne (see p.74 in this thesis for further detail). These events have highlighted the urgent need for a review and overhaul of regulation enforcement and its actors, including private building certifiers and building designers (AIBS, 2018c). At the time of writing there is a major parliamentary inquiry underway into building regulation in NSW, titled "Regulation of building standards, building quality and building disputes" (GovNSW, 2019).

'Relationships', 'knowledge', 'perceptions' and 'risk' figure in discussions about the technical compliance and enforcement of NCC performance standards, in semi-structured interview transcripts. Examples: *participant 10* "having a good relationship with our certifiers…makes the process straightforward" (relationships); *participant 04* "I don't pretend to understand the technicalities" (knowledge); *participant 05* in referring to a feasibility study *"Yes, for the return it was a bit wishy-washy and not enough certainty in it."* (risk); *participant 02* "it's all a bit hearsay" (perception). 'Relationships', 'knowledge', 'perceptions', and 'risk' are factors which can be categorised as social factors.

This analysis of semi-structured interviews emphasises the importance of considering social factors and connects with theoretical perspectives about building regulation offered by literature. The problem of how building regulation is negatively perceived in the sector accords with Meacham *et al.* (2014) who critically suggest the need for more agreement amongst stakeholders about the societal objectives in embedded within building regulation (p.2). This emphasis by Meacham *et a*l. (2014) on the social rather than technical aspect of building regulation is supported by semi-structured interview data in discussions about 'relationships', 'knowledge', 'perceptions' and 'risk'. Andrews *et al.* (2016) also shed critical light on the enforcement of building regulation in their US-based study and highlight problematic variance in practice, including the non-enforcement of particular elements of codes in regulation by public certifiers. Understood together, transcripts conveyed the importance of considering building regulation as a human decision-making practice involving a network of agents which include building owners, designers and system-enforcers including but not restricted to, public and private certifiers.

The findings in this study highlight the need for a more critical and nuanced understanding of adaptive reuse as only one possible premature obsolescence mitigation strategy available to building owners from a menu of possible solutions, identified by Greenhalgh & Muldoon-Smith (2017). This study is located as a further voice amongst an emerging literature which is critical of adaptive reuse and which advocates for a more critical understanding of of the social impact of adaptive reuse when used at a wider urban scale (Clifford et al., 2018; Mohamed et al., 2017; O'Callaghan & Lawton, 2016; Abramson, 2016; Yung et al., 2014).

Literature examining office and other commercial buildings types highlight the need for more attention in research to unpack concepts of vacancy and as an indicator of premature obsolescence and possible strategies to sustainably manage existing building stocks (Wilkinson & Remøy, 2018; Muldoon-Smith, 2016, 2017; Grodach et al., 2017; Burkholder, 2012). This study aligns with these calls for greater attention to vacancy rates to understand property markets and findings of this study extend knowledge about how building vacancy is useful in examining the suitability of adaptive reuse to mitigate premature obsolescence.

This thesis does not evaluate conceptual models developed to calculate adaptive reuse feasibility, such as the Conversion Meter by Geraedts, et al., (2018: 126-149), fuzzy adaptive reuse selection model by Tan et al., (2014); ARP model by Langston et al., (2013); and adaptSTAR by Conejos et al., (2013). Several of these tools, however, tend to imply that building regulation can cause legal and technical obsolescence, without critical discussion of the cause and effect relationship between building regulation and obsolescence. Conceptual models which cite building regulation as a cause of legal obsolescence are counter to this research. This study found no convincing evidence to support building regulation as a barrier to adaptive reuse and as one cause or factor of obsolescence.

Findings did, however, concur with literature which highlights the primacy of economics and financial factors, such as market demand, in decision making about adaptive reuse development by building owners and investors. This study aligns with literature which is critical of the concentration by stakeholders on only the economic aspects of building regulation (Aigwi *et al.*, 2018; Tan *et al.*, 2014). Elliott *et al.* (2015) explain that it is a reliance on a “classical financial cost/benefit model, which has been identified as the primary barrier within the property industry” (p.668).

8.4 Policy implications beyond Adelaide

An implication of this study is the need to challenge prevailing negative attitudes towards building regulation and in meeting mandatory minimum building regulation standards. This implication is born from the main theoretical contributions made by this study, and also the practical contributions useful for adaptive reuse policy development.

The theoretical contributions of this study include a more nuanced framing of adaptive reuse, and this study contributes to the understudied area of Australian building regulations and enforcement. It details a novel method (VVAM) to examine obsolescence through quantifying vacancy types using cross-sectional analysis of local government taxation data. New typologies of adaptive reuse are a further theoretical contribution of this study. The practical contributions include: VVAM provides a replicable method to evaluate the potential efficacy of policy development encouraging urban regeneration through adaptive reuse to address high vacancy. Finally, this study presents the case that building regulation is not a critical barrier to office building adaptive reuse in Adelaide. Findings deduced from this study provide an important reference for urban policy-making, practising professionals involved in converting existing buildings, and future research into adaptive reuse.

This study highlighted a reluctance for public debate and research to objectively engage and unpack the different facets of building regulation from state government legislation enacting NCC provisions, to enforcement practice of routes to compliance and the technical codes themselves. Häkkinen & Belloni (2011) make an argument which explains this implication when they suggest that stakeholders tend to be reductive during discussions to focus on the rules or codes within regulation, which offers a conservative and simplistic interpretation of the regulation in practice. This narrowing tendency limits debate to building codes as a default point of complaint or discussion. In support of this view, Imrie & Street (2011) also critically suggest unhelpful attitudes towards regulation play a role and that it "is commonly assumed that building regulation and control is a technical activity, and part of a bureaucratic machine external to the design process" (p.21). This study implies the need to foster more constructive engagement by stakeholders, avoiding simplistic view of regulation as just building code. In addition, policymakers and professionals alike need to obtain robust data to substantiate calls seeking to reduce building regulation. As outlined in section 8.4, there is a range of risks inherent in offering dispensations to adaptive reuse development, including public safety, social equity, environmental and economic. The findings of this study imply the need to apply a more critical understanding of 'red-tape' reduction agendas before any policy action to support adaptive reuse.

Simplistic reduction of building regulation to technical codes could be a convenient smokescreen for several stakeholder groups with economic interests. This interpretation arises from data captured by this thesis, and which points to a perception that alternative solutions are problematic for adaptive reuse on several grounds: additional costs, risk and liability incurred from developing alternative solutions. Stakeholder groups which potentially benefit from reduced regulation include building owners, architectural designers and regulation certifiers operating on a fixed fee. From the limited literature available in the field, these findings aligned with one study conducted by the BCC Access Quantification Working Group for the Australian Building Construction Board (ABCB, 2017b). This industry-led research highlighted that building designers located in Adelaide (SA), were reluctant to develop alternative solutions to achieve NCC compliance where deemed-to-satisfy solutions for existing buildings were not possible. Albeit this study was limited to NCC provisions for disability access, but the study reveals a further interesting finding highlighting a non-technical or enforcement barrier to adaptive reuse in South Australia. The ABCB study reveals that building designers and consultants may not have the expertise to achieve NCC compliance through developing alternative solutions. Alternatively, it could reveal that building designers are not being engaged in Adelaide to develop alternative solutions. Either way, the over-reliance on deemed-to-satisfy solutions to achieve NCC compliance, and a reluctance to develop alternative solutions cannot be framed a technical or enforcement barrier, but one of economic cost, or a lack of expertise by adaptive reuse professionals in Adelaide. The findings from ABCB (2017b) support this thesis: that technical compliance and enforcement of NCC provisions are not key barriers to office building adaptive reuse.

This study has implications for understanding public policy development addressing vacancy in cities. As highlighted in chapters 04 and 06, the adaptive reuse predicament was represented as a problem for state and local government policy, with building regulation presented as a critical barrier to office building adaptive reuse. Findings ch7-2 and ch7-3 indicates that policy to mitigate vacancy should be focused on larger scale buildings, and buildings which are not under strata or community plan ownership structures. Larger buildings tending to have greater rates of vacancy (finding ch7-2) and buildings under strata and community structures tended to have lower rates of vacancy (finding ch7-3).

An interesting paper by Bacchi (2012) provides a tool which can help make sense of the findings of this study as the tool intends to critically interrogate public policies through an examination of underpinning presumptions which frame the 'problem'. The tool is called 'What's the Problem Represented to be' (WPR) and consists of six questions to ask when critically interrogating an issue to be addressed by policy (Bacchi (2012:21). When applied to the adaptive reuse predicament, the WPR is illuminating and helpful to draw out the implications of this study. As highlighted in 'The research journey' in section 1.1.6, future research needs to draw-out and explore unexamined assumptions about the relationship between adaptive reuse and its perceived barriers, including the presumption that adaptive reuse is a panacea for mitigating obsolescence and high vacancy at a city-wide scale.

Following Bacchi (2012), this study uncovers unexamined assumptions central to how the adaptive reuse predicament is presented as a 'problem'. The adaptive reuse predicament is multi-faceted as it connects vacancy, building regulation, and the need for greater uptake of adaptive reuse to generate economic growth of Adelaide. Assumptions underpinning the representation of the 'problem' are listed below:

- Adaptive reuse is a straight-forward process and the 'go-to' option, suitable for mitigating office building vacancy
- The presence of vacancy is evidence of barriers to adaptive reuse
- Adaptive reuse is not occurring, and that uptake by buildings owners is too low
- Aggregated rates of high vacancy equate to buildings standing empty, ready for adaptive reuse
- Aggregated vacancy rates are a suitable indicator for the need to adaptively reuse office buildings

This study poses questions which disrupt these assumptions and the framing of building regulation as a barrier to the panacea of adaptive reuse to mitigate vacancy. Chapter 07 critically investigated the concept of vacancy in office buildings, including vacancy distribution, and what this implied for adaptive reuse suitability. An implication of examining vacancy to triangulate qualitative data from chapters 02, 04 – 06 is that office building vacancy is a relevant and under-studied field, useful for evaluating urban regeneration strategies such as adaptive reuse.

As discussed in section 8.4, there is a need for a more critical and nuanced understanding of adaptive reuse – adaptive reuse should be considered as only one possible premature obsolescence mitigation strategy available. This perspective implies that policy should adopt a more considered understanding of the limits of adaptive reuse. Local and state government initiatives to address vacancy need to be mindful of the range of obsolescence mitigation strategies available and policy should imagine alternatives to whole building adaptive reuse. These could include temporary reuse (Wilkinson & Remøy, 2018; O'Callaghan & Lawton, 2016); 'top-up' development Holden (2018); and space-use consolidation, corrective maintenance, demolition and deconstruction (Greenhalgh & Muldoon-Smith, 2017); or simply encouraging buildings owners to sell buildings which contain high levels of vacant space through taxation mechanisms similar to the Vacant Residential Property Tax (VRPT) (Womersley, 2017; VIC State Gov, 2017).

8.5 Contribution to knowledge

This study contributes to knowledge about two important issues: 1) building regulation and 2) vacancy within the context of adaptive reuse. In doing so, this study contributes to the need for a more sophisticated understanding of building regulation and vacancy as an indicator of obsolescence, together with a need for a more nuanced understanding of adaptive reuse.

The mixed-method research design produced results which challenge the literature framing building regulation as a barrier to adaptive reuse. Some research literature tended to uncritically describe negative views of building regulation and lacked interrogation of factors which may contextualise a negative framing. The research design of this thesis sought to overcome this limitation by adopting a range of methods for critical triangulation. Data gathered suggests that a negative view, of building regulation percieved a key barrier to adaptive reuse, is unevidenced. This study adds to literature which mentions building regulation in a neutral or positive view light. The findings raise questions about conclusions reached by previous studies which examine barriers to adaptive reuse but rely on mono-method research design, disclosing that a single research method is insufficient for critical interrogation of this complex field.

An original contribution of this study resides in how it brings together three different fields: urban planning and architecture (regeneration through adaptive reuse), building surveying and construction management (enforcement of performance standards of building regulation), and property decisions (to maintain and upgrade existing assets) to address a real-world-issue affecting policy and practice. This multi-disciplinary approach advances knowledge about the complex, multidimensional question of how building regulation relates to adaptive reuse. In taking this approach, the research shines new light upon the cause-and-effect relationship between existing building obsolescence and NCC compliance on technical grounds. Finally, this multi-disciplinary approach generated new knowledge to address the single issue of whether building regulation is a barrier to adaptive reuse.

The overall contribution confirms that building regulation is not a key barrier to adaptive reuse. This insight advances knowledge about the relationship between building regulation and adaptive reuse as a strategy to mitigate obsolescence. Conceptual models often overlook building regulation when seeking to evaluate adaptive reuse feasibility. This knowledge can aid future development of conceptual models which include a reference to building regulation. It is interesting to think how what appears to be a modest and unexciting issue often overlooked in architecture, emerged as one which is complex and challenging to investigate. The difficulties inherent in examining this seemingly simple issue could explain why regulation as a barrier to adaptive reuse has evaded greater critical scrutiny for so long and why it is held by a range of stakeholders from different professional groups. Interest in this research was shown by ABCB, Adelaide City Council, South Australian State Government, and Perth City Council. The interest and support given are indicators of the importance of understanding building regulation as a barrier to adaptive reuse. The contribution by this thesis is potentially magnified somewhat by the lack of available studies which examine building regulation compliance in Australia. The gap in the literature is highlighted by the absence of any single authoritative text which sets out NCC enforcement practice for building designers and certifiers alike.

The development of the VVAM is the first known examination of vacancy to include greyspace vacancy across a building population. Prior to this study, greyspace was considered challenging to detect but is a critical vacancy type to consider when evaluating property markets (Greenhalgh & Muldoon-Smith, 2017). The method contributes to the field of adaptive reuse as it provides the basis to evaluate adaptive reuse as an urban regeneration strategy to address vacancy at a city-wide scale. The research field examining adaptive reuse feasibility is limited somewhat to conceptual models of adaptive reuse feasibility for single building analysis. Two exceptions to this gap are the body of research led by Dr Hilde Remøy and also Dr Kevin Muldoon-Smith. Remøy's research highlighted the drivers of vacancy in office markets within the Netherlands and the possibilities for adaptive reuse (Remøy, 2010; Remøy & van der Voordt 2014). Muldoon-Smith's research examines vacancy in the UK's office building markets beyond London (Muldoon-Smith, 2016; Muldoon-Smith & Greenhalgh, 2019). This study contributes to research examining vacancy in Australian office buildings, with a specific focus adaptive reuse. In addition, Dr Sara Wilkinson's body of research should be acknowledged here, particularly her study on building regulation events and adaption in office buildings within Melbourne, Australia (Wilkinson, 2011).

A further contribution of this study is that in examining the distribution of vacancy using VVAM, different adaptive reuse typologies emerged. These smaller-scale adaptive reuse interventions could potentially address vacancy in office buildings as alternatives to the radical intervention of whole building adaptive reuse (WBAR) scale. The typologies invite researchers to discuss adaptive reuse potential with a more nuanced expectation, including pocket adaptive reuse (PAR), mixed-use multi-level adaptive reuse (MUMLAR) temporary adaptive reuse (TAR). These typologies of adaptive reuse extend the model of adaption provided by Wilkinson (2011) and reproduced in Wilkinson & Remøy (2018), and as a response to the conceptual model of strategies to mitigate office building obsolescence is provided by Greenhalgh & Muldoon-Smith (2017).

Finally, this study has contributed to policy development for heritage-listed buildings in South Australia. VVAM was used to identify a building population of heritage buildings in Adelaide CBD and quantify vacancy present in 2017 in this population. This work was commissioned in 2018-2019 by the Heritage Unit with the State Government

Department of Energy and Water (DEW) and has so far produced the draft report contained in Appendix 7-E. While the DEW study's report is not complete at the time of writing; preliminary findings indicate that the DEW study has not uncovered any examples of heritage buildings which cannot be converted due to technical compliance with NCC performance standards or enforcement practice[3]. The preliminary findings also report that heritage building owners interviewed do not consider vacancy and under-occupation as a priority or concern. These initial findings corroborate the conclusions reached by this study, adding the likelihood that building regulation is not a key barrier to adaptive reuse of heritage buildings. The DEW study highlights the potential of real-world application of VVAM to interrogate vacancy distribution and evaluate adaptive reuse as a strategy to mitigate vacancy and obsolescence. VVAM has proven to be a useful technique to interrogate aggregated vacancy rates which were paramount in developing the incorrect framing of building regulation as a key barrier in the adaptive reuse predicament.

The researcher would also like to highlight the risks involved in undertaking building regulation reform to improve the financial feasibility of existing building upgrades for existing building owners and financial investors, including those incurred in adaptive reuse developments. Reforms which reduce NCC compliance to below the current legislative requirements could lead to loss of life events, particularly from reductions in fire safety and structural provisions, as are the subject of ongoing parliamentary inquiries both in the UK and in NSW in Australia. The current legislative requirements are set out in Australia in each state governments' Building Acts. In South Australia, legislation details the level of NCC compliance for existing building upgrades to be "carried out to the extent reasonably necessary", as enacted in Section 53A of the Development Act 1993 (GovSA, 2014), and clarified in recent policy *Minister's Specification: Upgrading health and safety in existing buildings* (GovSA, 2017). The potential public safety risks posed by lower levels of compliance are also coupled with

[3] Personal communication between the author and representatives from State Heritage Unit - Michael Queale, Adaptive Reuse Project lead, via email, 6th August 2019; and Beverly Voigt State Heritage Unit Manager via email on 16th January 2020.

legal and societal risks in failing to meet the objectives of Australia's federal legal legislation to end disability discrimination under the Disability Discrimination Act 1992.

To conclude this thesis, the adaptive reuse predicament is a stress symptom arising from social and economic changes in cities. The predicament is also a signal calling for greater engagement with building regulation – the challenge of how to meet public safety, address climate change, and increase social equity while simultaneously satisfying local conditions in property investment markets.

8.6 Limitations

This study adopts an integrated mixed-method research design. The methodological limitations for each data-gathering method adopted in this mixed-method study are contained within each chapters' method section (chapters 04 – 07). Despite efforts to be explicit about which findings contribute to each conclusion reached, there are inherent limitations in using such a diverse range of research methods (Castro *et al*. 2010). Nevertheless, the range of methods employed adds strength to the validity of the findings made and conclusions drawn.

The issues investigated (adaptive reuse, office building vacancy, and building regulation reform) were far more politicised than the researcher expected. A considerable amount of time was spent in the recruitment of participants for semi-structured interviews, including the use of third-party recruitment (undertaken with Adelaide City Council) following insufficient numbers of survey participants willing to participate in follow-up interviews. The resulting sample size was relatively small for qualitative analysis of semi-structured interviews. Although the number of interviewees was comparable to sample sizes in other adaptive reuse studies (n=11), the small sample size is a noticeable limitation. This limitation is somewhat mitigated by mixed-method research design, which relied less on findings from one individual method. The triangulation somewhat reduces the limitations inherent in small sample sizes, which potentially limits findings reached from small number of semi-structured interviews.

The findings of this study do not imply that it is possible to achieve a reasonable extent of compliance for all adaptive reuse developments. Nor do the findings claim that adaptive reuse is always technically feasible and can satisfying legislation which sets out building regulation enforcement, such as the 'reasonable extent' requirement in South Australia as detailed in section 53A of the SA State Government Development Act 1993. Caution needs exercising before applying findings from this study to other building populations. Data from for these studies were gathered to examine the research questions using Adelaide as the site for investigation. While Adelaide is not a unique city, in the sense of it being a metropolitan conurbation serving a population of 1 million people, there most probably will be unique local conditions that limit the interpretation of results for application to policy development and practice beyond South Australia.

8.7 Recommendations

The following recommendations are made to conclude this thesis. As this study involves applied research, it has direct relevance to both future research studies in the field and policy action in practice. Of particular importance is the need for a more nuanced view of adaptive reuse, avoiding an over-estimation of the positive impact which adaptive reuse can make to mitigate obsolescence at a city-wide scale. This study indicates that ubiquitous advocacy for adaptive reuse has negated attention to the detail of adaptive reuse in practice. In addition, it highlights the need to be more cautious in accepting the use of adaptive reuse as part of calls to reduce regulation. Together, the findings of this study support greater emphasis, in research and practice, on the societal benefits of building regulation. This study suggests that a narrow framing of regulation, such as an economic representation, undermines the primary purpose of regulation are met: to ensure public safety, including climate change mitigation. Specific recommendations for future research and policy action are given below.

8.7.1 Adaptive reuse future research

Recommendations for future research pertinent to adaptive reuse are:

- Existing conceptual adaptive reuse models need to be re-examined, where they infer building regulation is a barrier to feasibility, including the premise that regulation is a cause of obsolescence.
- A need to examine different types of adaptive reuse and adaptive development, moving away from a focus on whole building towards more nuanced discussion including pocket adaptive reuse, temporary reuse and 'top-up' development.

- Research designs for future studies should incorporate a broader range of methods, including quantitative approaches and mixed methods with less reliance on stakeholder opinions about adaptive reuse, and single case-studies of successful adaptive reuse development.

This thesis emphasises the need for greater critical understanding, by policymakers, of adaptive reuse as a strategy to resolve urban issues such as vacancy, premature obsolescence, to facilitate economic regeneration of cities undergoing transition. Currently, the research field for adaptive reuse consists mainly of either small scale case studies of reusing unique structures in innovative ways or qualitative reporting of stakeholders' views. The number of variables involved in examining the process of adaptive reuse is considerable (financial, technical, social and legal) because the adaptive reuse process is flexible and applies to many different building typologies and scales of development. Cause and effect relationships, between the variables involved in adaptive reuse design decisions, need urgent investigation by research before conceptual models can be reliably applied. Building regulation, as a cause of obsolescence, is one relationship explored within this study, in the complex decision process affecting office building adaptive reuse development.

8.7.2 Developing research in building regulation in Australia

In terms of future research into building regulation, this thesis recommends:

- The development of an authoritative text capturing enforcement and practice of Australia's National Construction Code.
- Further studies to examine stakeholders' behaviours around the routes to NCC compliance and differences in enforcement practice across the individual states and territories to contribute a cohesive picture of adaptive reuse regulation across Australia.
- Further studies to examine the role of building regulation for future adaptability of new development, such as research undertaken by Conejos *et al.* (2014).

One challenge affecting research is the lack of an authoritative text discussing Australian building regulation practice and development. Other than guidance offered by key stakeholders, such as the ABCB and professional bodies including AIBS, there is an absence of independent research examining building regulation. There is little research evaluation of the quality of building regulation legal frameworks, enforcement strategies and styles, and design practices to develop alternative solutions to meet NCC performance standards. Information is also spread across different Australian jurisdictions operating at state and federal levels, and different sectors of local government building control departments and individual building regulation certifiers in private practice. Primary data to examine building regulation is absent. Collection and disclosure, by local and state governments, of building regulation enforcement data is a long-overdue and essential step to enable research. Data from development applications, which involve changes of use, is vital for research which seeks to inform adaptive reuse policy. The urgency of data collection for adaptive reuse regulation is particularly important when developing policy to mitigate environmental impacts of premature demolition, assessing economic impacts of existing building obsolescence, and in understanding the social impact of urban vacancy and decay.

This study also has recommendations for the preparation of professionals in tertiary education and their on-going professional learning once qualified. There is a need for building regulation to be given greater emphasis within the education curriculums delivered to individuals studying to be design consultants, building surveyors, construction and property managers, and planners. Curriculum content should include governance objectives, historical evolution, principles and strategies to developing alternative solutions, and current compliance and enforcement practice. The curriculum needs to be research-informed and avoid a reliance on tacit, anecdotal knowledge gleaned from practice. This study highlights the urgency of a review of attitudes toward building regulation. Professional bodies are well placed to conduct this review, which could examine how professionals engage with building regulation in practice, in education, and research.

8.7.3 Vacancy distribution and types

Finally, recommendations for future research pertinent to existing building vacancy are:

- An examination of vacancy of office buildings in other Australian CBDs perceived to have high aggregated vacancy rates and to evaluate adaptive reuse as a potential obsolescence mitigation strategy for under-used office buildings
- A longitudinal study to examine office building vacancy in Adelaide CBD
- Further testing and refinement of the Vacancy Visual Analytic Method (VVAM). One such study has replicated VVAM for heritage-listed buildings in Adelaide (Armstrong, 2019). The vacancy was quantified using the method outlined in VVAM, and this data is being used for State Government policy initiatives to protect heritage buildings in South Australia
- Extension of VVAM to explore perceived vacancy in other building populations at risk of demolition or gentrification, particularly buildings within zones identified for urban regeneration including buildings which house activities related to manufacturing and cultural production (Grodach *et al.,* 2017)
- Further attention to vacancy as a phenomenon in the context of evaluating adaptive reuse as a strategy to mitigate existing building obsolescence and premature demolition

In order to reliably examine adaptive reuse as a city-wide urban regeneration strategy, this thesis recommends greater independent collection and disclosure of space-use data to quantify different vacancy types in existing office buildings. Existing programs, such as Australia's Commercial Building Disclosure Program, which aim to provide information for sustainable management of built assets, could extend data collection to include robust and comprehensive vacancy datasets. This data would also integrate well with Smart City initiatives and disruptive technologies which seek to make better use of under-occupied space and existing infrastructure.

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Appendix 1-A: Legislation to enact NCC requirements in Australian States

Legislation Documents	Date of effect
NSW Legislation or Standards	
Environmental Planning and Assessment Act (EP & A Act) 1979 (GovNSW, 2017a)	Amended Jan 2017
Environmental Planning and Assessment Regulation 2000 (GovNSW, 2017b)	Amended Jan 2017
NSW Variations Vol 1 & 2	*In effect 2015*
National Code of Construction (ABCB, 2019) & *Australian Standards*	NCC adopted May 2019
Australian Standards	Various
QLD Legislation or Standards	
Building Act (1975) (GovQLD, 2015)	Amended Nov 2015
Building Regulations (2006) (GovQLD, 2017)	Amended Jan 2017
Queensland Developmental Code Mandatory Parts (GovQLD, n.d.)	Amended various dates
National Code of Construction (ABCB, 2019) & *Australian Standards*	NCC adopted May 2019
SA Legislation or Standards	
Development Act 1993 (GovSA, 2014)[4]	*Amended Sept 2014*
Development Regulations 2008 (GovSA, 2016)	*Amended Dec* 2016
Planning, Development and Infrastructure Act 2016 (GovSA, 2016)	*In effect 2016*
Minister's Specifications 2017 (GovSA, 2017)	*In effect August 2017*
National Code of Construction (ABCB, 2019) & *Australian Standards*	NCC adopted May 2019
Tasmania Legislation or Standards	
Building Act 2016 (GovTAS, 2016a)	In effect Jan 2017
Building Regulations 2016 (GovTAS, 2016b).	In effect Jan 2017
Determinations from Director of Building Control	Various
National Code of Construction (ABCB, 2019) & *Australian Standards*	NCC adopted May 2019
VIC Legislation or Standards	
Building Act 1993 (GovVIC, 2016)	Amended Sept 2016
Building Regulations 2006 (GovVIC, 2006)	In effect June 2006
Minister's Guidelines/Building Amendments	Various
National Code of Construction (ABCB, 2019) & *Australian Standards*	NCC adopted May 2019
WA Legislation or Standards	
Building Act 2011 (GovWA, 2011)	Amended Jan 2017
Building Regulations 2012 (GovWA, 2012)	Amended Jan 2017
Commission Standard, though no additional state standards are in force at present[5]	None in force currently
National Code of Construction (ABCB, 2019) & *Australian Standards*	NCC adopted May 2019

[4] This act will be repealed by Sch 6 cl 2 of *Planning, Development & Infrastructure Act 2016*. (SAGov, *n.d.*).

[5] Personal communication 07.02.17, Senior Technical Officer at the Building Commission, Department of Commerce, WA. Whilst WA does not have any standards in addition to the BCA at present, there is provision for variations under Part 8 of the *Building Services (Complaint Resolution and Administration) Act 2011*. Under Part 8, the Building Commissioner is able to issue Commissioner Standards, detailing technical requirements for the construction or demolition of a building (section 96(1)(c) of the CRA).

Appendix 1-B: Office buildings included in this study

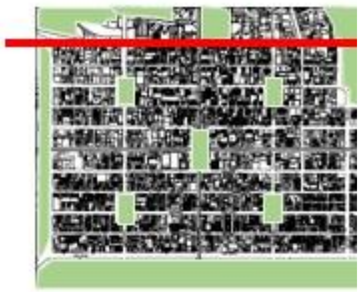
ADELAIDE CBD SA 5000 : 116 office buildings

136 North Terrace

144 North Terrace

195 North Terrace

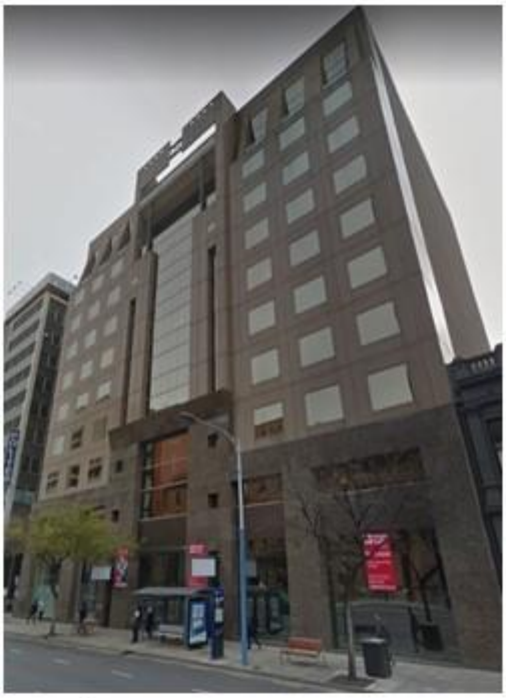
108 North Terrace



NORTH TERRACE : SA 5000

127 Rundle Mall

RUNDLE MALL : SA 5000



30 Currie Street

55 Currie Street

41 Currie Street

95 Currie Street

38 Currie Street

CURRIE ST : SA 5000

28 Grenfell Street

32 Grenfell Street

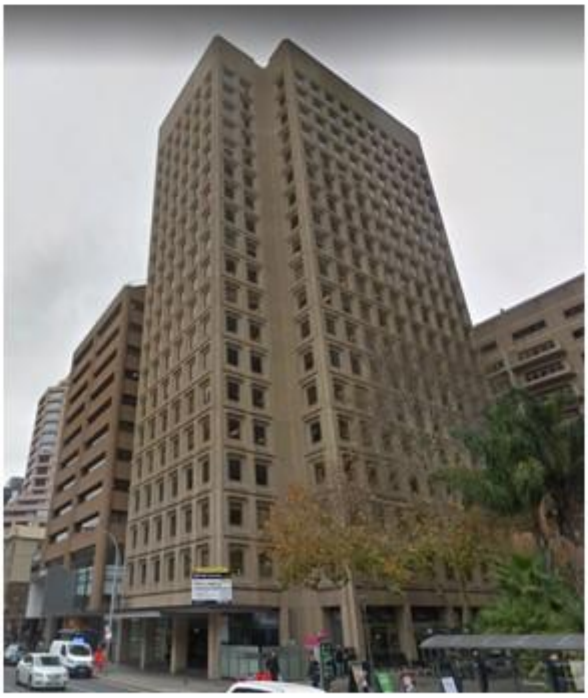
19 Grenfell Street

25 Grenfell Street

GRENFELL ST : SA 5000

50 Grenfell Street

68 Grenfell Street



45 Grenfell Street

55 Grenfell Street

GRENFELL ST : SA 5000

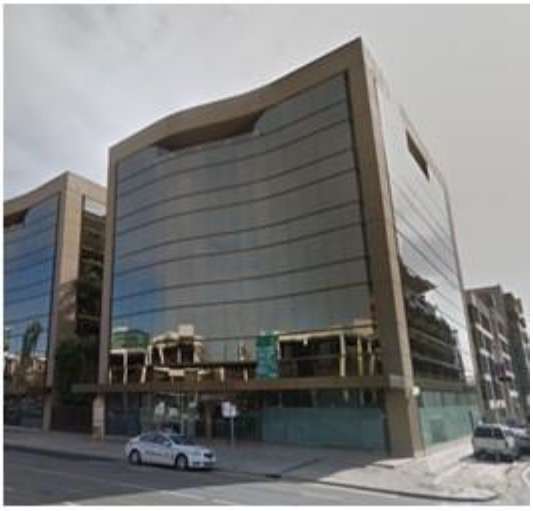
77 Grenfell Street

80 Grenfell Street

91 Grenfell Street

GRENFELL ST : SA 5000

150 Grenfell Street



162 Grenfell Street

101 Grenfell Street

115 Grenfell Street

GRENFELL ST : SA 5000

131 Grenfell Street

199 Grenfell Street

GRENFELL ST : SA 5000

11 Weymouth Street

31 Weymouth Street

76 Weymouth Street

44 Weymouth Street

WEYMOUTH ST : SA 5000

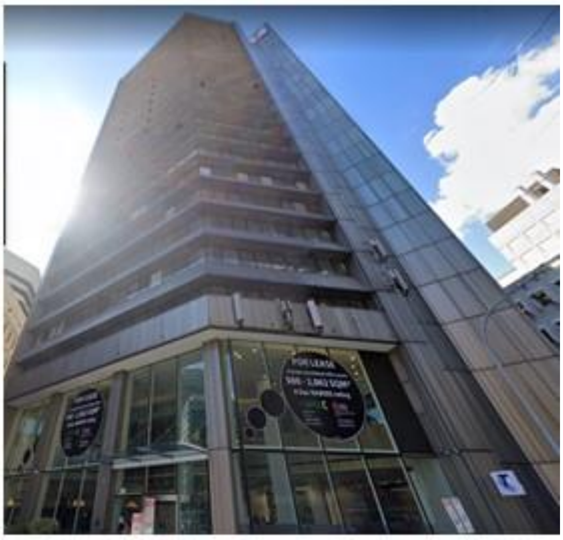
60 Weymouth Street

100 Weymouth Street

91 Weymouth Street

WEYMOUTH ST : SA 5000

12 Pirie Street



22 Pirie Street

44 Pirie Street

50 Pirie Street

PIRIE ST : SA 5000

70 Pirie Street

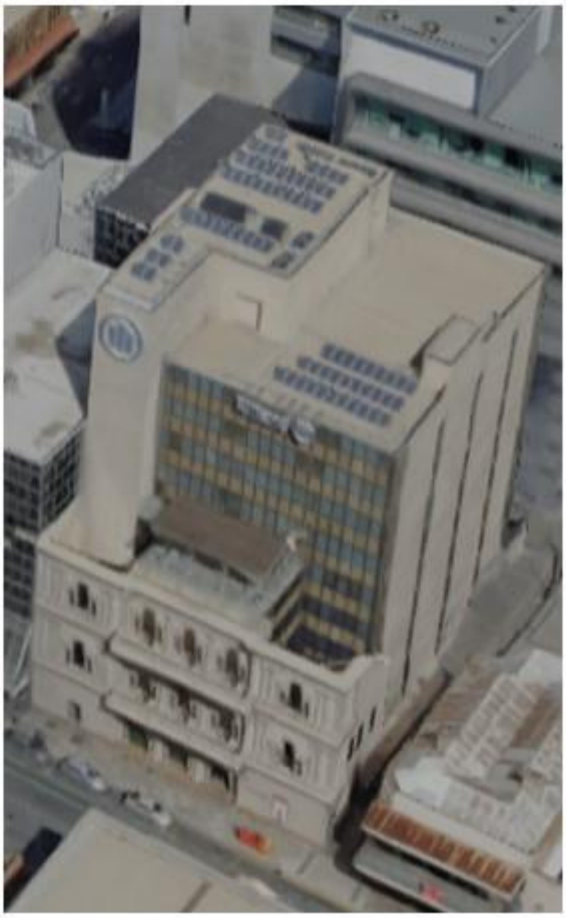
74 Pirie Street

45 Pirie Street

63 Pirie Street

PIRIE ST : SA 5000

86 Pirie Street



89 Pirie Street

97 Pirie Street

PIRIE ST : SA 5000

100 Pirie Street

101 Pirie Street

169 Pirie Street

PIRIE ST : SA 5000

147 Pirie Street

122 Pirie Street

135 Pirie Street

PIRIE ST : SA 5000

25 Franklin Street

26 Franklin Street

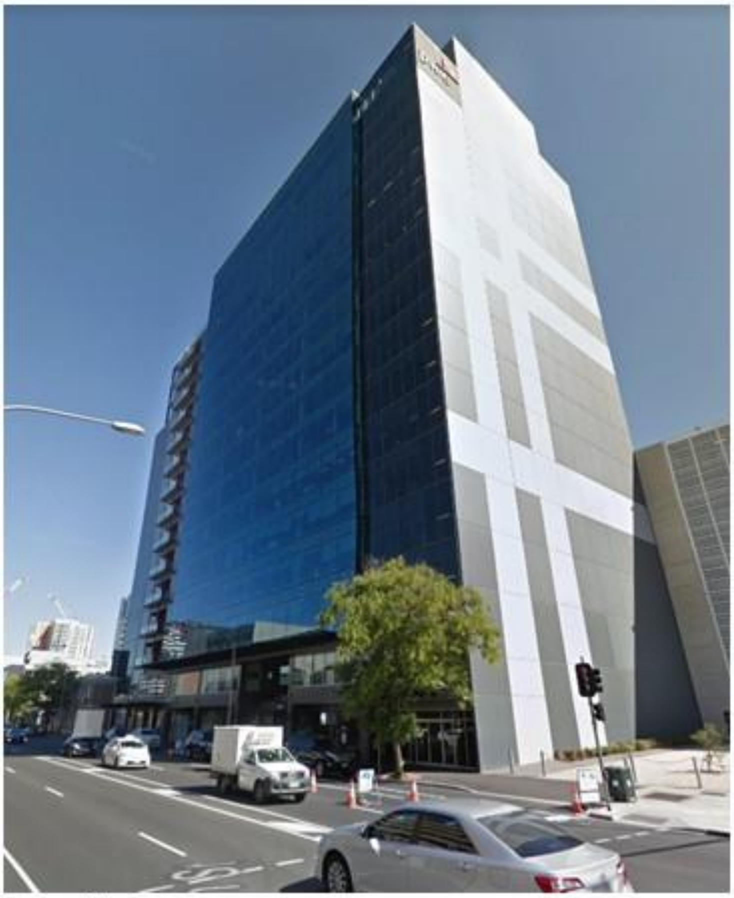
31 Franklin Street

33 Franklin Street

FRANKLIN ST : SA 5000

118 Franklin Street

132 Franklin Street



70 Franklin Street

FRANKLIN ST : SA 5000

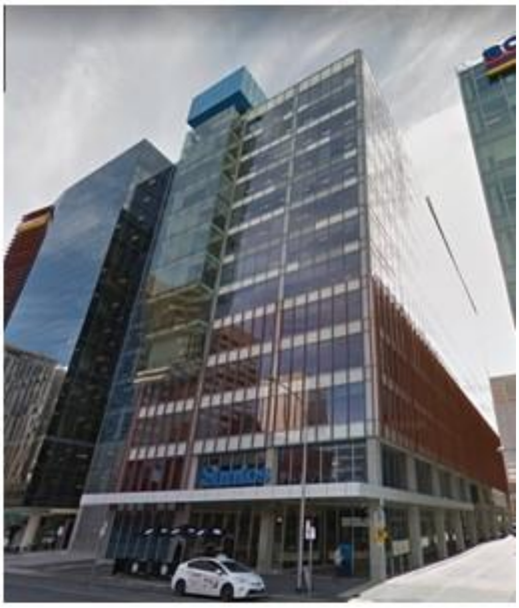
26 Flinders Street

30 Flinders Street

31 Flinders Street

FLINDERS ST : SA 5000

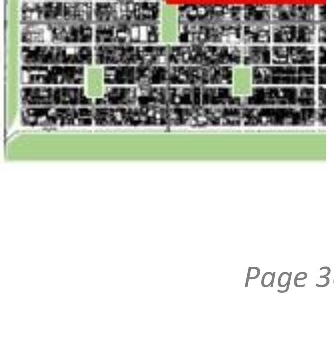
50 Flinders Street



60 Flinders Street

80 Flinders Street

81 Flinders Street



FLINDERS ST : SA 5000

149 Flinders Street

153 Flinders Street

190 Flinders Street 54

276 Flinders Street

300 Flinders Street

FLINDERS ST : SA 5000

141 Ifould Street

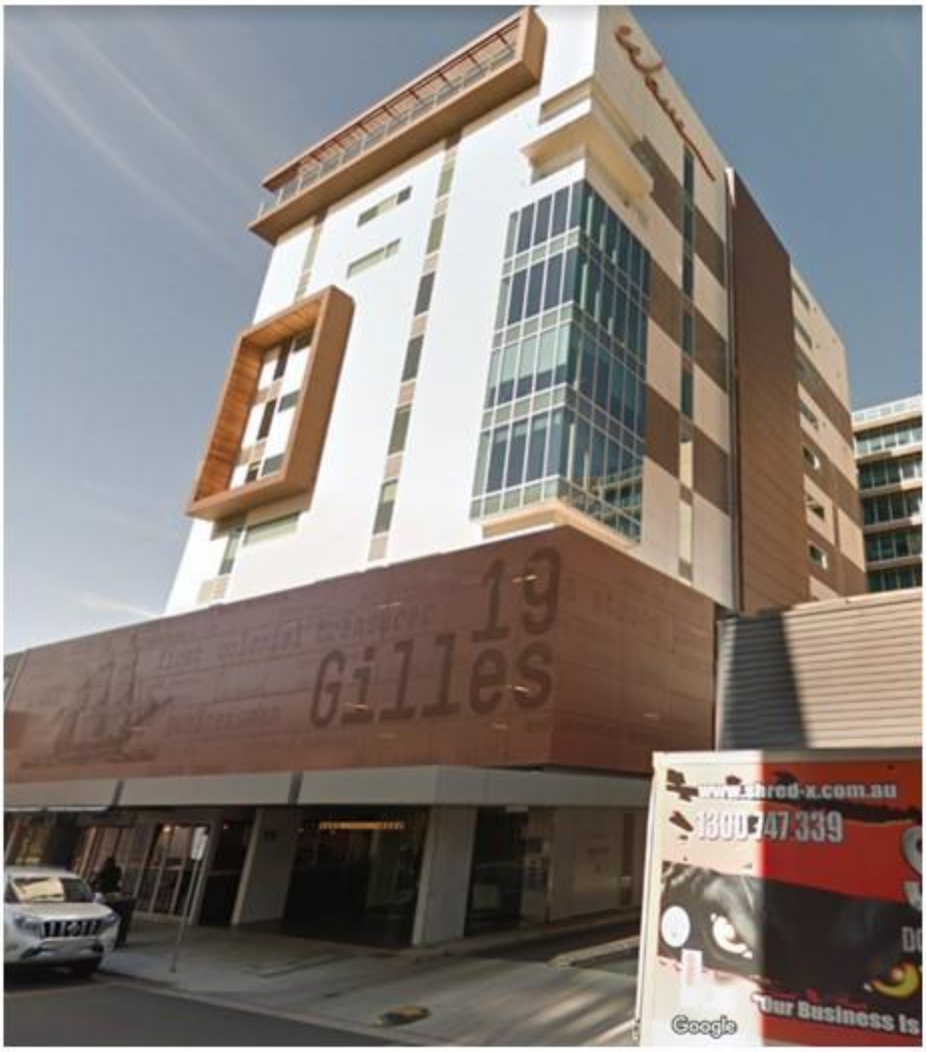
IFOULD ST : SA 5000

30 Wakefield Street

WAKEFIELD ST : SA 5000

17 Gouger Street

GOUGER ST : SA 5000



19 Gilles Place

GILLES ST : SA 5000

124 South Terrace

SOUTH TERRACE : SA 5000

124 South Terrace

SOUTH TERRACE : SA 5000

23 Leigh Street

LEIGH ST : SA 5000

18 King William Street

22 King William Street

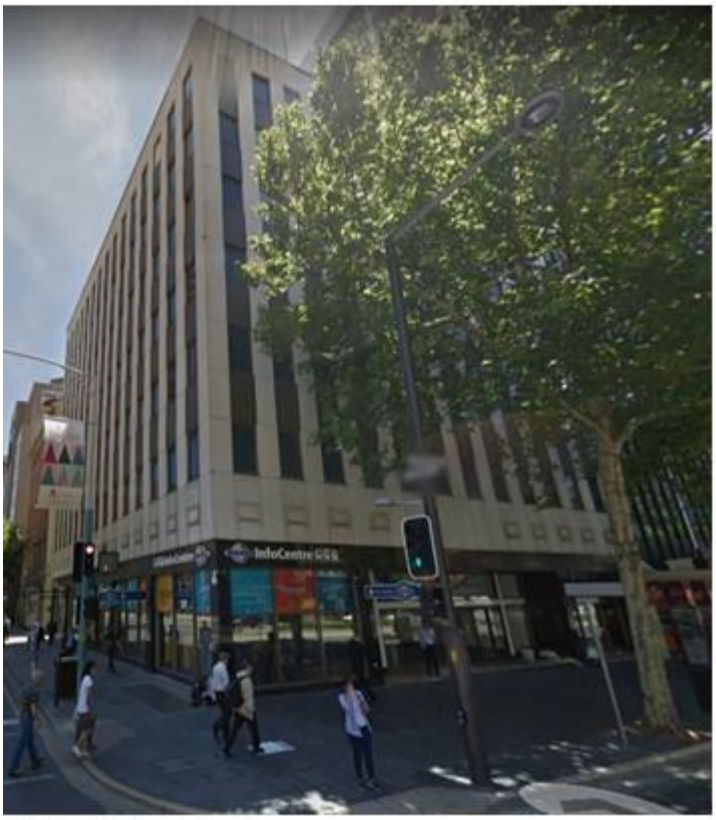
33 King William Street

1 King William Street

KING WILLIAM ST : SA 5000

48 King William Street

66 King William Street

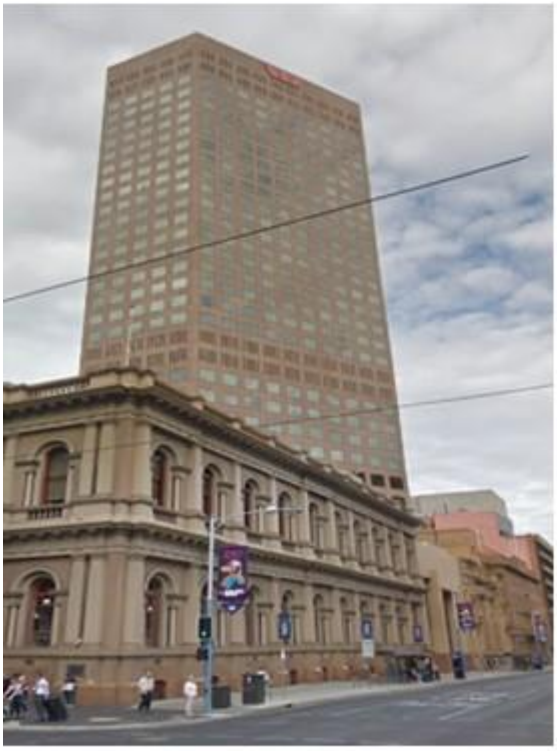


75 King William Street

KING WILLIAM ST : SA 5000

80 King William Street

90 King William Street



91 King William Street

100 King William Street

KING WILLIAM ST : SA 5000

115 King William Street

108 King William Street

118 King William Street

121 King William Street

117 King William Street

KING WILLIAM ST : SA 5000

366 King William Street

400 King William Street

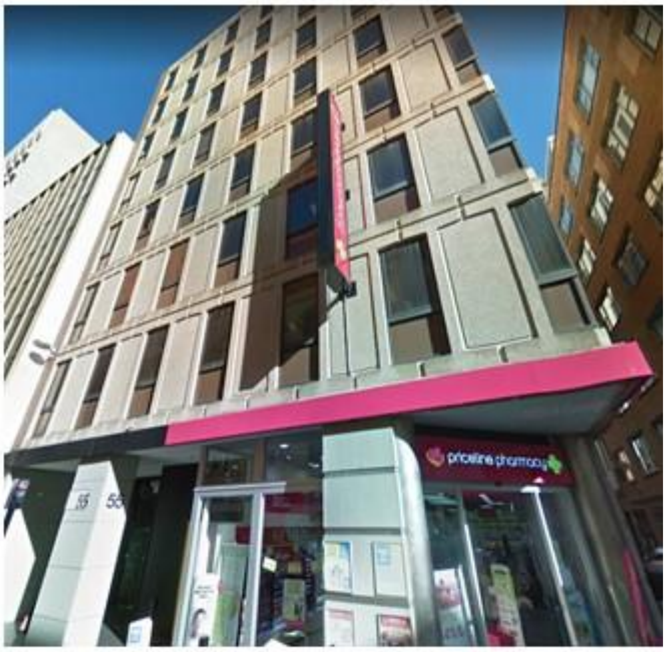
433 King William Street

345 King William Street

333 King William Street

KING WILLIAM ST : SA 5000


49 Gawler Place



55 Gawler Place


111 Gawler Place


99 Gawler Place

GAWLER PL : SA 5000

214 Pulteney Street

PULTENEY ST : SA 5000

60 Light Square

76 Light Square

70 Light Square

LIGHT SQ : SA 5000

104 Frome Street

122 Frome Street

148 Frome Street

139 Frome Street

FROME ST : SA 5000

11 Penny Place

PENNY PL : SA 5000

60 Light Square

76 Light Square

70 Light Square

LIGHT SQ : SA 5000

200 Victoria Square

211 Victoria Square

VICTORIA SQ : SA 5000

60 Hindmarsh Square

70 Hindmarsh Square

11 Hindmarsh Square

75 Hindmarsh Square

HINDMARSH SQ : SA 5000

Appendix 2-A: Articles in the literature review

Table 2-2 List of articles captured by sections 2.3 and 2.4 in the literature review

Author	Title	Details of Selection	
		Stated methodology; research method; location	***Sample size & stakeholders***
Aigwi et.al. (2018)	Efficacy of adaptive reuse for the redevelopment of underutilised historical buildings	Qualitative; interviews	n=22, stakeholders comprised of: structural engineers, quantity surveyors, architects, estate valuers, building owners/developers, legal representatives, heritage representatives and local government council representatives
Andrews et al. (2016)	Energy-Efficient Reuse of Existing Commercial Buildings	Mixed methods; multiple small-sample surveys; focus group & interviews; eSurveys of Pennsylvania code officials, analysis of data sets from US department of Energy eg: Commercial Buildings; Energy Consumption Survey (CBECS); US: Greater Philadelphia region, including Pennsylvania	n = undisclosed. Various stakeholders but predominantly building code officials and building professionals. Survey 01 Pennsylvania counties: n=49 responses from municipal officials, survey 02 code officials in Pennsylvania: n=43; 2013 focus groups in Philadelphia: regional building officials and building professionals
Bruce *et al.* (2015)	Factors influencing the retrofitting of existing office buildings using Adelaide, South Australia as a case study	Qualitative; semi-structured interviews, snowball sampling; Australia: Adelaide, SA	n=6, Industry practitioners: real estate managers, developers, and an architect
Bullen & Love (2011a)	A new future for the past: a model for adaptive reuse decision-making	Qualitative; semi-structured interviews; Australia: Perth metropolitan area	n=81, architects, developers, planners, building managers/ building owners and property consultants
Conejos *et al.* (2016)	Governance of heritage buildings: Australian regulatory barriers to adaptive reuse	Qualitative; multiple building case studies with semi-structured interviews of the key industry experts, supplemented with field observation and building plan appraisals; literature review; UK	n=14 professionals heading consultant-based teams in the 11 selected adaptive reuse building case study ie: architects, project managers, a quantity surveyor, structural

Author	Title	Details of Selection	
		Stated methodology; research method; location	***Sample size & stakeholders***
			engineer- managing owner
Dyson et al (2016)	Critical success factors of adapting heritage buildings	Qualitative; semi-structured interviews, Western Australia	n=15 interviews (7 architects, 3 clients/ owners, 3 site managers, 1 building surveyor, and 1 town planner)
Elliott *et al.* (2015)	A new lease of life? Investigating UK property investor attitudes to low carbon investment decisions in commercial buildings	Qualitative; face-to-face semi-structured interviews; literature review; UK	n=10, senior property investors
Gosden (2017)	Adaptive Re-Use in the London Market: The influence of technical constraints on project feasibility	Qualitative; workshop with stakeholders; semi-structured interviews; UK	Sample sizes not disclosed, engineers experienced in adaptive reuse.
Giuliani *et al.* (2018)	Reusing grain silos from the 1930s in Italy. A multi-criteria decision analysis for the case of Arezzo	Case study; interviews, representative statistics.	n-2 interviews
Häkkinen & Belloni (2011)	Barriers and drivers for sustainable building	Qualitative; literature review, a web-based inquiry, structured interviews, expert workshops, and case studies; Finland	n=158 for web-based questionnaire respondents made up of contractors, developers, big owners, facility managers, planners, designers, and product manufacturers; n=20 structured interviews of designers, product manufacturers, developers, contractors, owners and authorities
Heurkens *et. al.* (2018)	Planning Policy Instruments for Resilient Urban Redevelopment: The Case of Office Conversions in Rotterdam	Qualitative; case study; Rotterdam, Netherlands	Evaluation of policy in Rotterdam involving in-depth interviews with people involved with the Rotterdam reuse policy
Hsu et. al. (2017)	Further Opportunities to Reduce the Energy	Quantitative; literature review; comparison of energy benchmarking data	5 benchmarking data sets

Author	Title	Details of Selection	
		Stated methodology; research method; location	***Sample size & stakeholders***
	Use and Greenhouse Gas Emissions of Buildings		
Langston *et al.* (2008)	Strategic assessment of building adaptive reuse opportunities in Hong Kong	Mixed methods; literature review, case study testing of modeling framework; Hong Kong	Single building case study
Leadbeter (2013)	Adaptive reuse of heritage buildings – do current planning and heritage controls support the concept?	Qualitative; policy analysis; discussion paper; Australia: Adelaide	n/a
Misirlisoy & Gunce (2016)	Adaptive reuse strategies for heritage buildings: A holistic approach	Qualitative; content analysis of literature; interview with stakeholders of adaptive reuse; building case studies	Interviews n= not disclosed Building case study = 16 successfully complete adaptive reuse developments
Olivedese *et al.* (2017)	Reuse into housing: Italian and Dutch regulatory effects	Qualitative; building cases with site visits & analysis of architectural drawings; semi-structured interviews;	Interview sample size not disclosed - interviews with architects and designers; six buildings were selected for inclusion
Remøy & van der Voordt (2014)	Adaptive reuse of office buildings into housing: opportunities and risks	None-stated, but essentially qualitative analysis used; meta-study of multiple case studies: site visits; structured interviews, studies of drawings and documents; Netherlands	n=15 office building conversions; interviews with key stakeholders: architects, developers, and clients (n=undisclosed)
Tan *et al.* (2014)	A fuzzy approach for adaptive reuse selection of industrial buildings in Hong Kong	Conceptual research, based on a review of literature, applied to buildings in Hong Kong, using quantitative approach	n/a
Thomsen *et.al.* (2015)	Obsolescence – the underlying processes	An evaluative review of conceptual models	n/a
Udawatta *et al.* (2016)	Adaptive Reuse of Inner City Buildings: methods for minimising waste and stimulating the economy	Case study; literature review and quantitative costings; Australia: Adelaide	n/a
Yung & Chan (2012)	Implementation challenges to the adaptive reuse of	Quantitative; literature review, case studies of buildings and proposals, in-	n=16 interviews

Author	Title	Details of Selection	
		Stated methodology; research method; location	***Sample size & stakeholders***
	heritage buildings: Towards the goals of sustainable, low carbon cities	depth interviews with practitioners; Hong Kong	
Wilkinson & Reed (2011)	Examining and quantifying the drivers behind alterations and extensions to commercial buildings in a central business district	Quantitative; case study Australia Melbourne	n=5290 building adaption events
Živković *et al.* (2016)	Current Strategies Of Urban And Architectural Conversion As A Result Of Increased Housing Demands	Qualitative evaluation	n=12 building studies

Appendix 2-B: Method used in literature review

Scopus and Google Scholar were used for this review to examine what literature reports about barriers to adaptive reuse. Combinations of the following keywords were used to search the Scopus database, along with limiting the search results by subject area to reducing irrelevant sources.

- ((vacan* AND "existing buildings" OR "heritage")) **[82 results]**
- ((obsole* OR "empty building*") AND ("existing building*" OR heritage) AND adapt*) **[123 results]**
- (("adaptive reuse" OR conversion OR "change of use") AND ("existing buildings" OR heritage) AND ("building regulation*" OR "code")) **[280 results]**

Duplications of articles found using these three searches were identified before article titles, abstracts, and keywords were scanned to make the decision to either select or deselect papers. Google Scholar was then used to find a greater range of papers, including conference articles. Google Scholar has a function to discover recent sources which cite the papers found via the Scopus searches. Papers which cited articles found in Scopus were also included in the review is they met the criteria for selection listed below. The review also included a hand-search of the main journals publishing in the field of adaptive reuse and building regulation research disclosed to the researcher to date. These included journals: Structural Survey, Facilities, and Building Research & Information. Due to its ease of use, Google Scholar was also used to gather citation metrics for each paper.

The criteria used to select literature for inclusion in this review is as follows:

1. Articles published in academic books, peer-reviewed journals and conferences with proceedings published in English in the last 10 years
2. Sources which make references to barriers preventing greater uptake of adaptive reuse where there has been a change of use and adaption of existing buildings
3. Articles which predominantly focus upon considering non-domestic or commercial properties for adaptive reuse or adaption
4. Articles which mention building regulations or codes such as NCC

Articles which focussed on both adaptive reuse and adaption of existing buildings were included in the review as they both have the capacity to trigger compliance with building codes. In addition, as noted earlier in this chapter, several countries or regions share a similar policy environment to Australia's NCC. These include: Canada Europe, Hong Kong, New Zealand, the UK and the U.S. (Zillante, 2007; Davis, 1999; Knowles & Pitt, 1972). It was therefore decided to restrict the selection of sources to these countries and regions.

From these, a total of 23 articles fully met the criteria above. It was found that some authors had produced numerous articles using the same dataset. Where this issue occurred, a decision was made to select only one article from the group which relied on the same primary data. The papers included in sections 2.3 aqnd 2.4 of the review are detailed in Table 2.2 below. The review cannot be considered fully comprehensive as additional research sources may also be found in unpublished/non-research forms.

Further to this review, it is important to note that there are three older studies influential in establishing building regulation as a problem are cited often in the articles captured by this review. These earlier papers are Bullen (2007) in Australia; Burby *et.al.* (2006) in North America; and a Canadian paper by Shipley (2006)

Appendix 3-A: Ethical approval

Ethical approval notification (1 sheet of 2)

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY
THE UNIVERSITY OF ADELAIDE

LEVEL 4, RUNDLE MALL PLAZA
50 RUNDLE MALL
ADELAIDE SA 5000 AUSTRALIA

TELEPHONE +61 8 8313 5137
FACSIMILE +61 8 8313 3700
EMAIL hrec@adelaide.edu.au

CRICOS Provider Number 00123M

30 November 2016

Professor Zillante
School of Architecture and Built Environment

Dear Professor Zillante

ETHICS APPROVAL No: **H-2016-257**

PROJECT TITLE: **Barriers to adaptive reuse: a qualitative study exploring stakeholder perceptions of feasibility to rehabiliate obsolete, multi-storey commercial office buildings in prime urban locations, using Adelaide, South Australia as a case study**

The ethics application for the above project has been reviewed by the Low Risk Human Research Ethics Review Group (Faculty of Arts and Faculty of the Professions) and is deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* involving no more than low risk for research participants. You are authorised to commence your research on **30 Nov 2016**.

Ethics approval is granted for three years and is subject to satisfactory annual reporting. The form titled *Annual Report on Project Status* is to be used when reporting annual progress and project completion and can be downloaded at http://www.adelaide.edu.au/rb/oreci/human/reporting/. Prior to expiry, ethics approval may be extended for a further period.

Participants in the study are to be given a copy of the Information Sheet and the signed Consent Form to retain. It is also a condition of approval that you **immediately report** anything which might warrant review of ethical approval including:

- serious or unexpected adverse effects on participants,
- previously unforeseen events which might affect continued ethical acceptability of the project,
- proposed changes to the protocol; and
- the project is discontinued before the expected date of completion.

Please refer to the following ethics approval document for any additional conditions that may apply to this project.

Yours sincerely

DR JOHN TIBBY
Co-Convenor
Low Risk Human Research Ethics Review Group
(Faculty of Arts and Faculty of the Professions)

DR JOANNA HOWE
Co-Convenor
Low Risk Human Research Ethics Review Group
(Faculty of Arts and Faculty of the Professions)

(2 sheet of 2)

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY
THE UNIVERSITY OF ADELAIDE

LEVEL 4, RUNDLE MALL PLAZA
50 RUNDLE MALL
ADELAIDE SA 5000 AUSTRALIA

TELEPHONE +61 8 8313 5137
FACSIMILE +61 8 8313 3700
EMAIL hrec@adelaide.edu.au

CRICOS Provider Number 00123M

Applicant:	**Professor Zillante**
School:	**School of Architecture and Built Environment**
Project Title:	**Barriers to adaptive reuse: a qualitative study exploring stakeholder perceptions of feasibility to rehabiliate obsolete, multi-storey commercial office buildings in prime urban locations, using Adelaide, South Australia as a case study**

The University of Adelaide Human Research Ethics Committee
Low Risk Human Research Ethics Review Group (Faculty of Arts and Faculty of the Professions)

ETHICS APPROVAL No: **H-2016-257** **App. No.: 0000022093**

APPROVED for the period: **30 Nov 2016 to 30 Nov 2019**

It is noted that this project involves PhD candidate Gillian Armstrong.

DR JOHN TIBBY
Co-Convenor
Low Risk Human Research Ethics Review Group
(Faculty of Arts and Faculty of the Professions)

DR JOANNA HOWE
Co-Convenor
Low Risk Human Research Ethics Review Group
(Faculty of Arts and Faculty of the Professions)

Appendix 3-B: Recruitment of research participants

Participant recruitment documentation for survey and interviews

Appendix 3-B includes:

1. Media release by the University of Adelaide to aid third party recruitment for the survey
2. Participation Information Sheet for inclusion in survey invitations distributed by 3rd party organisations such as professional bodies (eg: RICS, AIBS, AIA, REIA SA, and news groups both local and national)
3. Examples of survey 3rd party recruitment
4. Letter of Invitation sent out by Adelaide City Council to recruit participants for semi-structured interviews.

1. Media Release

Media Release

www.adelaide.edu.au/news

THE UNIVERSITY *of* ADELAIDE

April 2017

Why can't we reuse Adelaide's empty buildings?

A new study at the University of Adelaide hopes to find ways to reduce the barriers currently preventing the city of Adelaide's empty buildings from being transformed into modern, usable spaces.

PhD student Gillian Armstrong, from the University's School of Architecture and Built Environment, has begun an independent research study aimed at better understanding what the real challenges are to reactivating older multi-storey buildings in CBDs. Her research is focused on non-heritage empty commercial and retail buildings, many of which have little or no occupancy above the ground floor.

Building developers and owners, members of the building industry and the architectural profession, as well as businesses who cannot find the right space to use are urged to participate in the survey.

"The city of Adelaide has one of the worst-performing occupancy in all states in Australia for CBD buildings," says Gill Armstrong, who is also a practicing architect with 15 years' experience, and a member of the Chartered Institute for Architectural Technologists.

"If change isn't feasible, older and obsolete buildings will stand empty for years, or face premature demolition. Unoccupied buildings have a tendency to degrade faster and can prove to be potential hazards. Early demolition can be wasteful and empty buildings can create a negative perception that the city is in decline.

"Reusing existing buildings not only help cities stay vibrant, but reuse makes environmental sense too. As we strive to make Adelaide a carbon neutral city, we need to reduce barriers and help empty buildings to become useful again.

"Typical examples within Adelaide are older, lower grade office spaces that are simply left to slowly decay, even though they occupy prime city locations. Some are used for storage, while others just sit empty and lifeless with broken downpipes and faded blinds.

"The lack of utilisation of commercial buildings in prime urban areas carries with it real economic, social and environmental consequences. Existing buildings offer real opportunities – they often have a good structural life left."

Gill Armstrong says that within the building industry itself, there is significant discussion about building regulation acting as barriers to change-of-use conversion.

"Beyond the rhetoric, there is a lack of hard evidence to back up these claims of regulatory barriers," she says, adding that there are some good examples of building conversions in Adelaide that have helped to bring about positive urban change.

"We've seen some significant conversions of redundant commercial buildings in Adelaide. The Air apartments on Greenhill Road and the Unihouse development on the corner of Rundle Mall and Pulteney Street are two examples of successful adaptive reuse. These repurposed buildings are fully used again, no longer empty shells. So we know it can be done."

A video about the research can be seen here: https://spark.adobe.com/video/nZQPqZhKnpelG

To take part in the survey, visit: https://www.surveymonkey.com/r/LDN2PK5

Media Contact:

Gillian Armstrong, PhD student, School of Architecture and Built Environment, The University of Adelaide
gillian.armstrong@adelaide.edu.au

Robyn Mills, Media and Communications Officer, The University of Adelaide
Phone: +61 (0)8 8313 6341, Mobile: +61 (0)410 689 084, robyn.mills@adelaide.edu.au

2. Participation Information Sheet (1 sheet of 3)

PARTICIPANT INFORMATION SHEET

PROJECT TITLE: Barriers to adaptive reuse of existing buildings.
HUMAN RESEARCH ETHICS COMMITTEE APPROVAL NUMBER: H-2016-257
PRINCIPAL INVESTIGATOR: Professor George Zillante
STUDENT RESEARCHER: Gillian Armstrong
STUDENT'S DEGREE: PhD

Dear Participant,

You are invited to participate in the research project described below.

What is the project about?
The aim of this research is to better understand potential barriers to adaptively reusing redundant buildings in urban centres. Adaptive reuse is a significant architectural tool for urban regeneration, heritage conservation and sustainable design. Research intends to beneficially inform built environment policy and practice. Insights from this project will be of particular benefit to conversion and preservation of un-listed post-war multi-storey structures, located in urban centres, and whose cultural value may be realised in the future.
A limitation of this project is that research interviews will be restricted to Australia.

Who is undertaking the project?
This project is being conducted by Gillian Armstrong.
This research will form the basis for the doctorate of philosophy (PhD) in Architecture at the University of Adelaide under the supervision of Professor George Zillante, Associate Professor Veronica Soebarto and Dr Jian Zuo.

Why am I being invited to participate?
Participants are invited on the following basis:

- Qualified professional, holding a position in a field related to adaptive reuse of existing buildings (for example: Enforcers of policy: public servants and private certifiers; policy advisors; chartered building surveyors; building designers specialising in adaptive reuse including registered architects, chartered architectural technologists and building designers registered with the National Association of Building Designers or equivalent bodies; private developers; building owners; and design/construction lecturers at higher educational institutions.

- Participants will have expertise to have a minimum of 5 years of professional experience relevant to adaptive reuse projects.

- Industry professionals, who participate, will have experience of projects located in Australia. Other participants, e.g. lecturers and policy advisors may practice within the national context.

(2 sheet of 3)

What will I be asked to do?
Participants will be asked to:

- Complete a short electronic questionnaire using SurveyMonkey software
- A sample of participants, who wish to and have expressed an interest in taking part in a further discussion will be invited to take part in a follow-up interview.
- Participants have the right to withdraw at any time without having to give a reason.
- Participants will be invited to receive a summary of research findings.

How much time will the project take?
The initial electronic questionnaire will take approximately 20-30 minutes
The follow-up interview will take approximately 60 minutes.

Are there any risks associated with participating in this project?
All data (professionals involved and organisations, any building names and addresses disclosed, sensitive financial data) will be anonymised immediately after collection to avoid the risk that any individual can be identified. However, it must be pointed out that it may be possible to identify individuals due to the small sample size and if the building case studies disclosed are unique. However, every effort will be made to ensure anonymity. For further information, please email Gillian.armstrong@adelaide.edu.au.

What are the benefits of the research project?
The research intends to contribute to a better understanding of barriers to adaptive reuse projects. This in turn may affect policy and inform professional practice in Australia.

Can I withdraw from the project?
Participation in this project is completely voluntary. If you agree to participate, you can withdraw from the study at any time up to one years after data collection, to enable the researcher to submit the thesis for examination. Should the participants wish to withdraw, it is the responsibility of participants to specify what sections of data they also wish to withdrawn (initial questionnaire, interview data, case-study data, or all of these).

What will happen to my information?

- All Data gathered will be confidential, stored securely in a password protected computer at University of Adelaide.
- Only Gillian Armstrong will have access to the data.
- Data will be stored for a maximum of 5 years after the research thesis has been submitted for examination.
- Beyond this PhD submission, anonymised data may be used and results reported and publicised e.g. publications, journal articles, report to funding body, or conference presentations. In any publication, only aggregated data
-

(3 sheet of 3)

be published and all data will be anonymised. Participants will be invited to receive a summary of research findings via electronic email communication.

Who do I contact if I have questions about the project?
For further information or should you have any questions regarding this study, please contact:

Ms Gillian Armstrong
School of Architecture and Built Environment
The University of Adelaide
Adelaide
SA 5005
Gillian.armstrong@adelaide.edu.au
Ph. +61 (08) 8313 3702
Fax 61 8 8313 4377
Web: http://www.architecture.adelaide.edu.au

What if I have a complaint or any concerns?
The study has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number H-2016-257). If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the Principal Investigator. If you wish to speak with an independent person regarding a concern or complaint, the University's policy on research involving human participants, or your rights as a participant, please contact the Human Research Ethics Committee's Secretariat on:

Phone: +61 8 8313 6028

Email: hrec@adelaide.edu.au

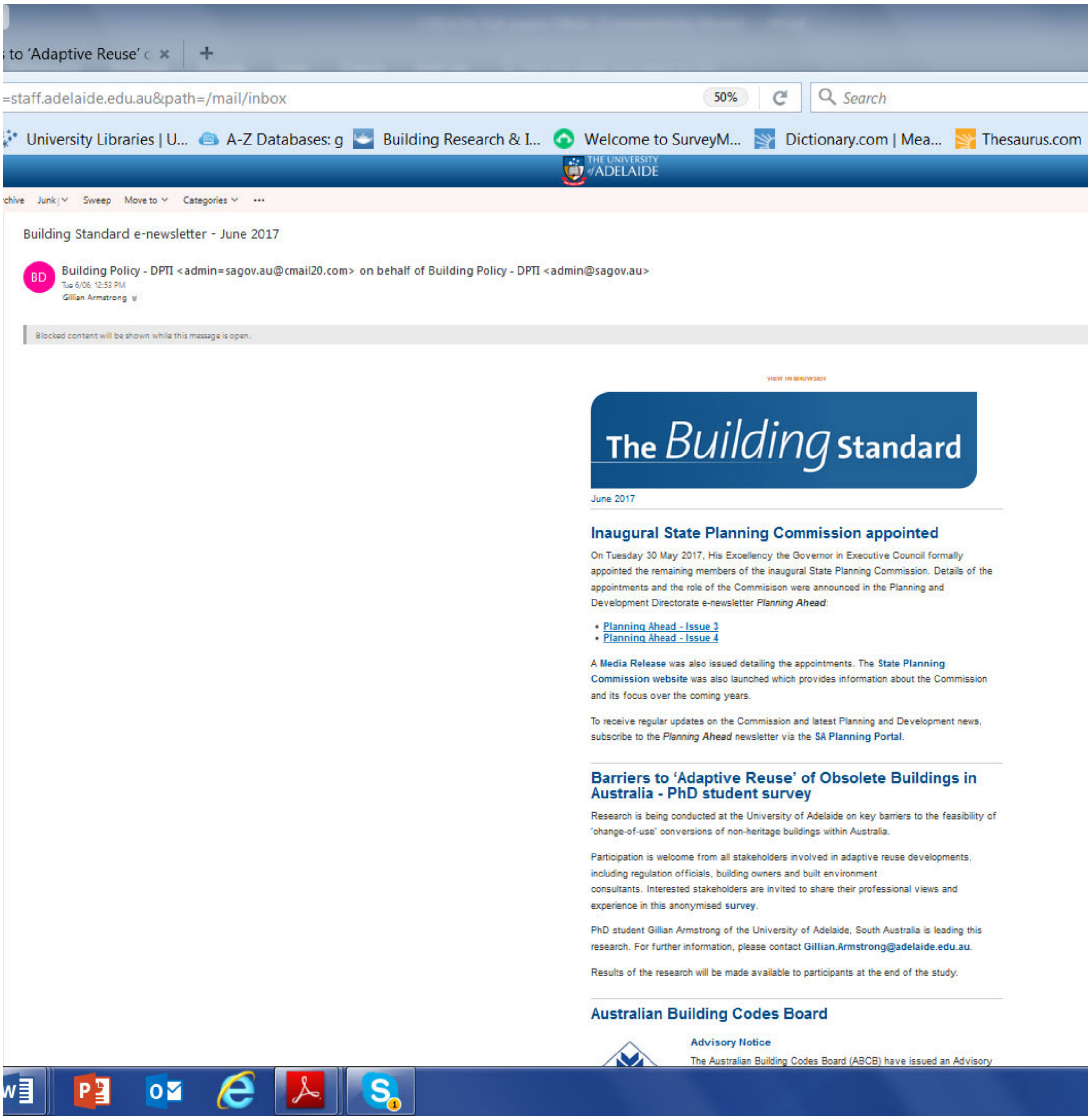
Post: Level 4, Rundle Mall Plaza, 50 Rundle Mall, ADELAIDE SA 5000

Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

If I want to participate, what do I do?
To participate, please reply to the interview invitation to Gillian Armstrong by email (*gillian.armstrong@adelaide.edu.au*) or by telephone: 0468400889

Yours sincerely,
Gillian Armstrong
PhD Candidate.
University of Adelaide

3. Examples of survey 3rd party recruitment (1 sheet of 2)



Screenshot of survey recruitment via SA State Government Department (DPT) to subscribers of DPTI newslatter: *The Building Standard June 2017* (Tuesday, 06.06.17). Personal communication, via email from a senior policy advisor (13.06.17) confirmed the The Building Standard newsletter is issued to just under 650 subscribers.

(2 sheet of 2)

From: AIBS Member Services [mailto:members4@aibs.com.au]
Sent: Monday, 1 May 2017 11:41 AM
To: Troy Olds <TOlds@teconaust.com.au>
Subject: Why can't we reuse empty CBD buildings

Australian Institute of Building Surveyors

AIBS image header

Why can't we reuse empty CBD buildings?

Dear Troy,

The AIBS is supportive of research that may lead to the development of better building regulation and we would ask members to contribute to this research if possible.

To contribute, please see the information below.

Why can't we reuse empty CBD buildings?

A new study at the University of Adelaide hopes to find ways to reduce the barriers currently preventing empty commercial buildings from being transformed into modern, usable spaces.

PhD student Gillian Armstrong, from the University's School of Architecture and Built Environment, has begun an independent research study aimed at better understanding what the real challenges are to reactivating older multi-storey buildings in CBDs. Her research is focused on non-heritage empty commercial and retail buildings, many of which have little or no occupancy above the ground floor. Within the building industry itself, there is significant discussion about building regulation acting as barriers to change-of-use conversion. Beyond the rhetoric, there is a lack of hard evidence to back up these claims of regulatory barriers.

Building developers and owners, members of the building industry and the architectural profession, as well as businesses who cannot find the right space to use are urged to participate in the survey. Of particular interest are the experiences of building surveyors, whose views are currently under-represented in published studies on this issue.

To take part in the survey, visit: https://www.surveymonkey.com/r/LDN2PK5

Call for participation to RICS members (01/05/17):

http://www.rics.org/au/news/news-insight/news/contribute-barriers-to-adaptive-reuse-of-obsolete-buildings-in-australia/

Expert Guide News (28.04.17)http://www.expertguide.com.au/news/article.aspx?ID=3026

Inclusion of the University of Adelaide main website (26.04.17)

http://www.adelaide.edu.au/news/news91703.html

School of Architecture and Built Environment website (02.05.17) http://blogs.adelaide.edu.au/architecture/2017/05/02/adaptive-reuse-research-call-for-participation-in-phd-study/

Invitation to talk part in discussions on FM101.5 Radio Adelaide Breakfast Show with Jennie Lenman and Ian Newton (05.05.17, 7.45am-8am). http://radioadelaide.org.au/2017/05/05/waste-of-adelaide-space/

4. <u>Letter of Invitation to participate in semi-structured interviews</u> (1 sheet of 2)

CITY OF
ADELAIDE

25 Pirie Street, Adelaide
GPO Box 2252 Adelaide
South Australia 5001

T (08) 8203 7203
F (08) 8203 7575
W cityofadelaide.com.au

ABN 20 903 762 572

Enquiries: Robyn Taylor
Reference: ACC2018/####

Date XX/XX/XX

First Name Last Name
Address line 1
SUBURB
STATE POSTCODE

Dear

As a building owner/developer with an interest in the City of Adelaide, Council is inviting you to share your views of the challenges and opportunities of converting existing buildings (change of use adaptive reuse) in Adelaide. To this end, Council is collaborating with PhD researcher Ms Gillian Armstrong.

Gillian is undertaking research into adaptive use of existing office buildings from a building owner's perspective. She is a PhD candidate at University of Adelaide in the School of Architecture and Built Environment. This research is being undertaken in collaboration with the City of Adelaide. With an interest in encouraging adaptive reuse, we are supporting this independent piece of research by inviting you to take part in the research project.

Gillian is seeking building owners/developers to have a 60-minute conversation about options, feasibility and challenges for upgrading and/or converting existing office buildings in Adelaide. Council would like to encourage building owners to discuss their experiences of office building conversion. All discussions will be held in strict confidence and will centre around key issues that inform the decisions in office building upgrades, and how these challenges and opportunities might shape existing building refurbishment decisions and professional practice in South Australia. International research has sketched out the benefits of building upgrades but lacks balanced views and detail of factors preventing change of use conversion.

(2 sheet of 2)

CITY OF ADELAIDE

The interviews will be conducted between March to end of April 2018. If you are interested in participating in the research, or would like more details, please contact Ms Gillian Armstrong before 30 March 2018.

Gillian can be contacted directly by email (gillian.armstrong@adelaide.edu.au) or by telephone: 0468 400 889. Please contact Ms Robyn Taylor from the City of Adelaide for further information about Council's involvement in the process by email (r.taylor@cityofadelaide.com.au) or by telephone on 8203 7792 (Tuesdays to Thursdays).

This research has Human Research Ethics Committee Approval from the University of Adelaide, approval number: H-2016-257.

Kind regards

Ms Shanti Ditter
Associate Director, Planning and Development

Appendix 4-A: News articles in sample A

News articles (January 2008 to January 2010)

Phillips, M. (2008, Jan. 12) A hot little property spot. *The Australian Financial Review,* p.24
Emmerson, R. (2008, Jan. 19) Makeover for city's tallest tower. *The Advertiser,* p.42
Clout, J. (2008, Feb. 07) Core still shows much promise. *The Australian Financial Review,* p.56
Emmerson, R. (2008, Feb. 07) Office vacancy rates lowest in 18 years. *The Advertiser,* p.35
Emmerson, R. (2008, Feb. 12) January property sales top $35m. *The Advertiser,* p46
Emmerson, R. (2008, Feb. 14) $174m in plans as city surge ahead. *The Advertiser,* p.14
Clout, J. (2008, April 03) PCA and Savills numbers at odds. *The Australian Financial Review,* p.59
Clout, J. (2008, April 08) There's no room at the top in Adelaide. *The Australian Financial Review,* p.63
Emmerson, R. (2008, May 06) Office boom powers on. *The Advertiser,* p.42
Allen, L. & Phillips, M. (2008 May 29) Nothing's going up until rates go way up. *The Australian Financial Review,* p62
Clout, J. (2008, June 12) Spaced out: demand holds for offices. *The Australian Financial Review,* p.59
Cranston, M. (2008, July 17) CBD office vacancies on the rise. *The Australian Financial Review,* p.52
Clout, J. (2008, July 17) Buyers aged to look past credit crisis 'blip'. *The Australian Financial Review,* p.61
Emmerson, R. (2008, July 22) City office vacancy rates fall to 20-year low. *The Advertiser,* p.42
Wilmot, B. (2008, July 22) GDI buys total $48m. *The Australian Financial Review,* p.52
Emmerson, R. (2008, Aug. 05) Olympic Dam still the driver. *The Advertiser,* p.42
Clout, J. (2008, Aug. 07) Woes bypass SA's capital. *The Australian Financial Review*, p.66
Harley, R. & Cranston, M. (2008, Aug. 07) Space needs reined in as pressure grow. *The Australian Financial Review,* p.62
Condon, T. (2008, Aug. 07) Office leasing dives in slowdown. *The Australian,* p.25
Emmerson, R. (2008, Aug. 26) Values down but acceptable. *The Advertiser,* p.48
Emmerson, R. (2008, Sept. 17) Adelaide's office rent set to soar. *The Advertiser,* p.51
Emmerson, R. (2008, Sept. 23) Landlords in box seat. *The Advertiser,* p.48
Emmerson, R. (2008, Oct. 21) Mining still drives demand. *The Advertiser,* p.40
Clout, J. (2008, Oct. 30) Testing times for corporate CBD leasing. *The Australian Financial Review,* p.2
Elliott, S. (2008, Oct. 30) Adelaide A-grade tier in record short supply. *The Australian Financial Review,* p.9

Martin, S. (2009, Feb. 10) Healthy start to 2009 as January sales pass $34m. *The Advertiser,* p.42
Elliott, S. & Wilmot, B. (2009, Mar.03) GDI sees gold in Adelaide office block. *The Australian Financial Review,* p.45
Martin, S. (2009, Mar. 24) Olympic Dam delays will mean empty city offices. *The Advertiser,* p.46
Gelber, F. (2009, April 09) Tough it out: times are bleak but this downturn has a limited horizon. *The Australian,* p.28
Wills, D. (2009, May 11) Gloomy forecast for major projects City at standstill as global crisis bites. *The Advertiser,* p.5
Lenaghan, N. (2009, May 14) Road, rail spend tipped to bring windfall. *The Australian Financial Review,* p.58
Martin, S. (2009, June 23) Going got tougher, but better than predicted. *The Advertiser,* p.46
Cranston, M. & Wilmot, B. (2009, Jul 09) Syndicator eyes $200m Canberra plum. *The Australian Financial Review*, p.48
Martin, S. (2009, July, 21) Vacancy rate on rise as companies downsize. *The Advertiser,* p.34
Condon, T. (2009, Aug. 06) Vacant office space soars by 40pc. *The Australian,* p.29
Martin, S. (2009, Sept. 15) Origin decision to stay put keeps construction activity tight. *The Advertiser,* p.48
Martin, S. (2009, Nov. 03) Fit-out key to fitting in. *The Advertiser,* p.20
Jenkin, C. (2009, Nov. 28) CBD hub of activity. *The Advertiser,* p.3
Martin, S. (2009, Dec. 08) Adelaide bucks rental downturn. *The Advertiser,* p.34

Appendix 4-B: News articles in sample B

News articles (January 2014 to September 2018)

Evans, R. (2014, Jan. 24) Empty blocks and vacant lots. *The Australian Financial Review,* p.37
Evans, S. (2014, Feb. 06) Office space sits empty. *The Australian Financial Review,* p.42
Tauriello, G. (2014, Feb. 11) Centennial buys student complex for $42.5m. *The Advertiser,* p.36
Williams, T. (2014, Feb 27) Adding new life to empty offices. *The Advertiser,* p.21
Tauriello, G. (2014, May 27) Flight to quality name of the property game. *The Advertiser,* p.34
Tauriello, G. (2014, June 03) Origin Energy makes switch to new offices. *The Advertiser,* p.34
Economou, A. (2014, June 24) City Commercial market strong. The Advertiser, p.51
Tauriello, G. (2014, Aug. 12) KPMG committed to the 'workplace of the future'. *The Advertiser,* p.30
Barrett, R. (2014, Sept. 11) Incentives cut rents almost by half amid high vacancy rate. The Australian, p.26
Mercedes, R. (2015, Mar. 03) Adelaide on ascendancy. *The Australian Financial Review,* p.36
Evans, R. (2015, Mar. 24) Two tier economy at work in city property market. *The Advertiser,* p.31
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Appendix 5-A: Survey questions

1. CONSENT: I have read and understood the above Participation Information Sheets and give my consent to participate.

- o Yes
- o No

2. To complete this survey, please only consider non-heritage listed 'change of use' conversion (adaptive reuse) projects within Australia. Please consider the following projects: 1. Conversions that have already been completed and built 2. Conversion projects that have been deemed 'unfeasible' and will most likely not go ahead or obsolete buildings that have already been demolished. Thank you.

- o Yes, I understand

3. Which of the following best describes your current profession in which you undertake adaptive reuse projects?

- o Building owner or developer
- o Building regulation certifier (Private)
- o Building regulation certifier (Public)
- o Building Surveyor
- o Architect or building designer
- o Landscape architect
- o Interior designer
- o Engineer
- o Real Estate / Property Manager
- o Interior Architect/designer
- o Policy Advisor
- o Educator

Other Role (please specify)

4. Do you perceive there to be barriers to 'change of use' conversion projects stemming from building regulations and enforcement practices?

- o Yes
- o No

5. In your opinion, for 'change of use' conversions, which aspect(s) of building regulation present a significant barrier?

- o the performance standards of the BCA
- o how the technical standards are administered or enforced
- o knowledge and expertise of the designers/consultants to achieve compliance

Other (please specify)

6. In your experience, how often does building regulation present barriers for 'change of use' conversion which affect the development's feasibility?

- Present in a small number of cases deemed unfeasible
- Present in a significant minority of cases deemed unfeasible
- Present in around half or more of cases deemed unfeasible

Other (please specify)

7. In your experience, can most building regulation challenges for existing buildings be overcome?

- Yes
- No

Other (please specify)

8.Under building regulation requirements, where 'deemed to satisfy' solutions are difficult to achieve, have you used other solutions?

- None - I've only use "deemed to satisfy" solutions.
- Yes - alternative "performance solution"
- These terms are unfamiliar to me.

Other (please specify)

9. Other than 'deemed to satisfy' provisions and 'alternative solutions', have you agreed other ways forward when BCA compliance for existing building conversion is difficult?

- Yes - agreement for dispensations/relaxation.
- No

Other (please specify)

10. What is the main barrier to you using alternative solutions more often?

- Time to research and develop
- Risk of increased liability
- Costs involved
- Expertise in the specific technical issue
- Complexity of process
- I don't need to develop alternative solutions, as there is rarely any requirement

Other (please specify)

11. When building regulations have been identified as a key barrier to adaptive reuse feasibility by other professionals, have agreed that the building regulation issues could not be resolved?

- I haven't come across this scenario
- Yes
- No

Other (please specify)

12. Do you have examples of change of use conversion projects that have been deemed unfeasible (by you or others) due to building regulation compliance issues?

- No
- Yes

Please specify

13. Which specific technical requirements of the BCA, have you experienced the most compliance difficulties with for 'change of use' conversions? Please remember to only consider non-heritage buildings.

Open-Ended Question

14. Which specific aspects of the BCA compliance process (administration and enforcement procedures ie: the non-technical aspects of compliance), have you found to cause significant difficulties for 'change of use' conversions, if any?

Open-Ended Question

15. Are there any other comments you wish to make about building regulation and 'change of use' conversion projects? If so, please comment here.

Open-Ended Question

16. In your experience, what other issues (not building regulations) can present significant barriers to 'change of use' conversion developments?

Open-Ended Question

17. In your experience, why do building owners decide to convert non-heritage buildings rather than demolish instead of demolishing and/or redeveloping the sites?

Open-Ended Question

18. What aspects of 'change of use' conversion projects do you enjoy undertaking the most?

Open-Ended Question

19. Why do you enjoy this aspect(s) most?

Open-Ended Question

20. When considering feasibility of 'change of use' conversions, which of the following statements applies to how you interact with building regulations (BCA)?

- BCA requirements are considered from the outset and are key considerations.
- BCA requirements influence feasibility but often there are other more significant factors to be considered.
- BCA requirements are always there in the background, but they not a significant concern.
- BCA requirements play little or no role in an adaptive reuse project's feasibility.

Other (please specify)

21. How do data (investigations/reports) impact on your professional role when considering building regulation compliance matters for existing buildings?

- At feasibility stages, there is often no firm data available. My judgements are only offered verbally.
- Typically, there is insufficient data/information and I have to rely upon on my professional experience.
- I prefer to rely upon my professional experience, rather than investigations/reports done by others.
- Compliance issues are dealt with by other professionals, not me.
- I prefer to withhold my opinion unless I have access to data/reports prepared by others.
- I produce my own data before I make my own judgements.
- I collect my own data and detail it in my professional activities (eg: drawings/meetings minutes/written statements).

Other (please specify)

22. Prior to your current stated profession, have you previously held other roles whilst working on 'change of use' conversions?

- No

Yes (Specify what)

23. Briefly describe your current role & the types of activities you undertake on 'change of use' conversion projects.

Open-Ended Question

24. How long have you been involved in 'change of use' conversion projects?

- 0 - 5 years
- between 5 -10 years
- between 10 - 15 years
- between 15 - 20 years
- over 20 years

25. Company size you currently work at whilst undertaking 'change of use' conversion work?

- sole practitioner or independent consultant
- small 1-10 employees
- medium 11-30 employees
- large 31-50 employees
- very large 51+

26. What State or Territory in Australia do you currently work in?

- ACT
- NT
- NSW
- QLD
- SA
- TAS
- VIC
- WA

27. How many adaptive reuse projects you have been involved in? (Please include completed & current projects, and projects that never progressed to completion)

- 1
- 1-5
- 6-10
- 11-15
- 16-20
- 21-30
- more than 30

28. Complete the following statement of your experience of adapting existing non-heritage buildings. (Tick all that apply)

- small-scale buildings, up to 3 storey.
- self-contained portions of larger buildings, eg: ground floor conversions, basements, partial conversions.
- larger-scale multi-storey buildings, over 3 storeys.
- large volume buildings, eg: cinemas, industrial scale warehouses.

non-buildings or other structures (please specify)

29. At what stage of the project do you get involved in change of use conversion?

- Very early - initial inception/assessment
- Post initial design concept development
- Development of planning approval information
- Post planning approval decision
- Production information stage for building regulation compliance
- Post-occupancy

Other (please specify)

30. I have converted commercial or professional office buildings (eg: BCA Building Class 5) to....

- no experience of converting this building class
- no experience of converting this building class
- residential uses
- new retail uses
- new storage or car parking uses
- new Industrial uses
- new public building or community uses

Other new use(s) - please specify which use(s)

31. I have converted residential-type buildings (eg: BCA Building Classes 1a, 1b, 2, 3 & 4) to....

- no experience of converting this building class
- new commercial/professional office uses
- new retail uses
- new storage or car parking uses
- new industrial uses
- new public building or community uses

Other, please specify new use(s)

32. I have converted retail buildings (eg: BCA Building Classes 6, inc. shops, cafes, showrooms) to....

- o no experience of converting this building class
- o new residential uses
- o new commercial/professional office uses
- o new storage or car parking uses
- o new Industrial uses
- o new public building or community uses

Other new use(s) - please specify which use(s)

33. I have converted storage and car parks (eg: BCA Building Class 7a & 7b) to....

- o no experience of converting this building class
- o new residential uses
- o new commercial/professional office uses
- o new retail uses
- o new Industrial uses
- o new public building or community uses

Other new use(s) - please specify which use(s)

34. I have converted industrial buildings (eg: BCA Building Class 8, inc. workshops, laboratories, production line activities) to....

- o no experience of converting this building class
- o new residential uses
- o new commercial/professional office uses
- o new retail uses
- o new storage or car parking uses
- o new public building or community uses

Other new use(s) - please specify which use(s)

35. I have converted public buildings (eg: BCA Building Class 9a, 9b & 9c, inc. schools, hospitals, community arts, churches, sports & recreation) to....

- o no experience of converting this building class
- o new residential uses
- o new commercial/professional office uses
- o new retail uses
- o new storage or car parking uses
- o new Industrial uses

Other new use(s) - please specify which use(s)

36. I have converted non-habitable structures (eg: BCA Building Classes 10a & 10b, inc. private sheds, private swimming pool, private bush-fire shelters) to....

- no experience of converting this building class
- new residential uses
- new commercial/professional office uses
- new retail uses
- new storage or car parking uses
- new Industrial uses
- new public building or community uses

Other new use(s) - please specify which use(s)

37. Other former use (please specify) converted to ... to other new use (please specify)

Open-Ended Question

38. What percentage of your change-of use conversion projects result in a completed conversion?

- None of the projects have been realised (0%)
- A minority are completed (up to 30%)
- A good portion are completed (between 30% to 60%)
- Majority are completed (between 60% and 90%)
- Most of them are realised (between 90-100%)

39. Indicate the age of the buildings to be converted (non-heritage adaptive reuse projects). Please tick all construction periods that apply.

- 1995 - present (post introduction of seismic building codes)
- mid-1980s to 1994 (post phasing out of blue/brown asbestos products)
- 1960s to mid-1980s
- post war to 1959
- pre-1945

40. In your experience, what are the contract values of adaptive reuse developments that have been successfuly completed. Please select all that apply.

- up to AUD$50k
- between AUD$50k - $250k
- between AUD$250k - $1m
- between AUD$1m -$10m
- above AUD$10million
- any additional comment

41. At what stage do most of the projects, that are NOT completed, typically stall or stop?

- o Early feasibility stage
- o After a design has been developed but just prior planning approval stage
- o After planning application has been approved/rejected
- o None, all of my adaptive reuse projects are built

Other (please specify)

42. In your experience, what are the contract values of adaptive reuse projects that are deemed unfeasible? Please select all that apply.

- o up to AUD$50k
- o between AUD$50k - $250k
- o between AUD$250k - $1m
- o between AUD$1m -$10m
- o above AUD$10million

Any additional comment?

43. In your experience, which projects are typically least likely to progress beyond feasibility stages? Please select all that apply.

- o small-scale buildings requiring little changes (upto $50k)
- o small-scale buildings, up to 3 storey.
- o self-contained portions of larger buildings, eg: ground floor conversions, basements, partial conversions.
- o larger-scale multi-storey buildings, over 3 storeys.
- o large volume buildings, eg: cinemas, industrial scale warehouses.

Other (please specify)

44. In your experience, which age banding of projects are typically least likely to progress beyond feasibility stages? Please select all that apply.

- o 1995 - present (post introduction of seismic building codes)
- o mid-1980s to 1994 (post phasing out of blue/brown asbestos products)
- o 1960s to mid-1980s
- o post war to 1959
- o pre-1945
- o I do not think age affects 'change of use' feasibility

Other (please specify)

45. Have you experience of working with buildings that were demolished due to high vacancy rates?

- No
- Yes. Please specify your reason(s) for demolition

46. Are you confident about laws and legislation relating to building regulation requirements to 'change of use' conversions?

- Yes
- No

Other (please specify)

47. What legislation exists in your State or Territory that details Building Code of Australia (BCA) compliance requirements for 'change of use' developments?

- I am unsure.
- I don't know about legislation requirements beyond the BCA.

The legislation in my State/Territory is (please list)

48. In addition to professional training qualifications, have you ever undertaken specialist adaptive reuse CPD, research or study?

- No
- Yes (please specify)

49. How confident are you on engaging with BCA and its compliance procedures on 'change of use' conversion projects? Which of the following statements is closest to your view?

- Very confident and experienced – I take the lead within my professional working environment for adaptive reuse projects.
- I am confident if offered support by colleagues.
- I am not confident but willing to take a lead if necessary.
- I prefer someone else to lead building code compliance on adaptive reuse projects

None of the above: please briefly detail your own view: Open-Ended Response

50. Do you feel that additional professional development in 'change of use' conversions of existing buildings and building regulation requirements would be of benefit?

- No
- Yes (please specify)

51. Do you usually prefer to use a private building regulation certifier on 'change of use' conversion projects?

- Yes
- No
- Sometimes
- I am the certifier

52. What is the main reason for your preference of certifiers expressed in the above question? Or, if you are a certifier, why do adaptive reuse clients engage your services?

- service is faster than others
- cheaper fees than others
- skills and knowledge in adaptive reuse process
- continuity - used on other non-adaptive reuse projects
- not my choice

Other (please specify)

53. Briefly note your perceptions or any 'rules of thumb' of which building regulations are required, in your State/Territory, when an existing building undergoes a change of use.

Please specify

54. Would you be interested in taking part in a follow-up interview as part of this research? The follow-up interviews will be conducted with individuals as a face-to-face interview of no more than 60mins, at a place and time convenient to you.

- No
- Yes (please leave a contact phone or email)

55. And finally, would you like to be sent a summary of the findings of this research?

- No
- Yes, I will request by email myself (gillian.armstrong@adelaide.edu.au)

Yes, (please add your email or postal address)

Appendix 6-A: Semi-structure interview question guide

The following six questions were used as a guide for semi-structured interviews.

Question 1:

Have you considered change-of-use (CoU) conversion for any of the buildings you own?

Question 2:

What are your thoughts on the current office building vacancy rates in SA?

Question 3:

What are your thoughts surrounding reusing existing buildings?

Question 4:

Do you think the lower grade office buildings in the CBD are a problem in SA?

Question 5:

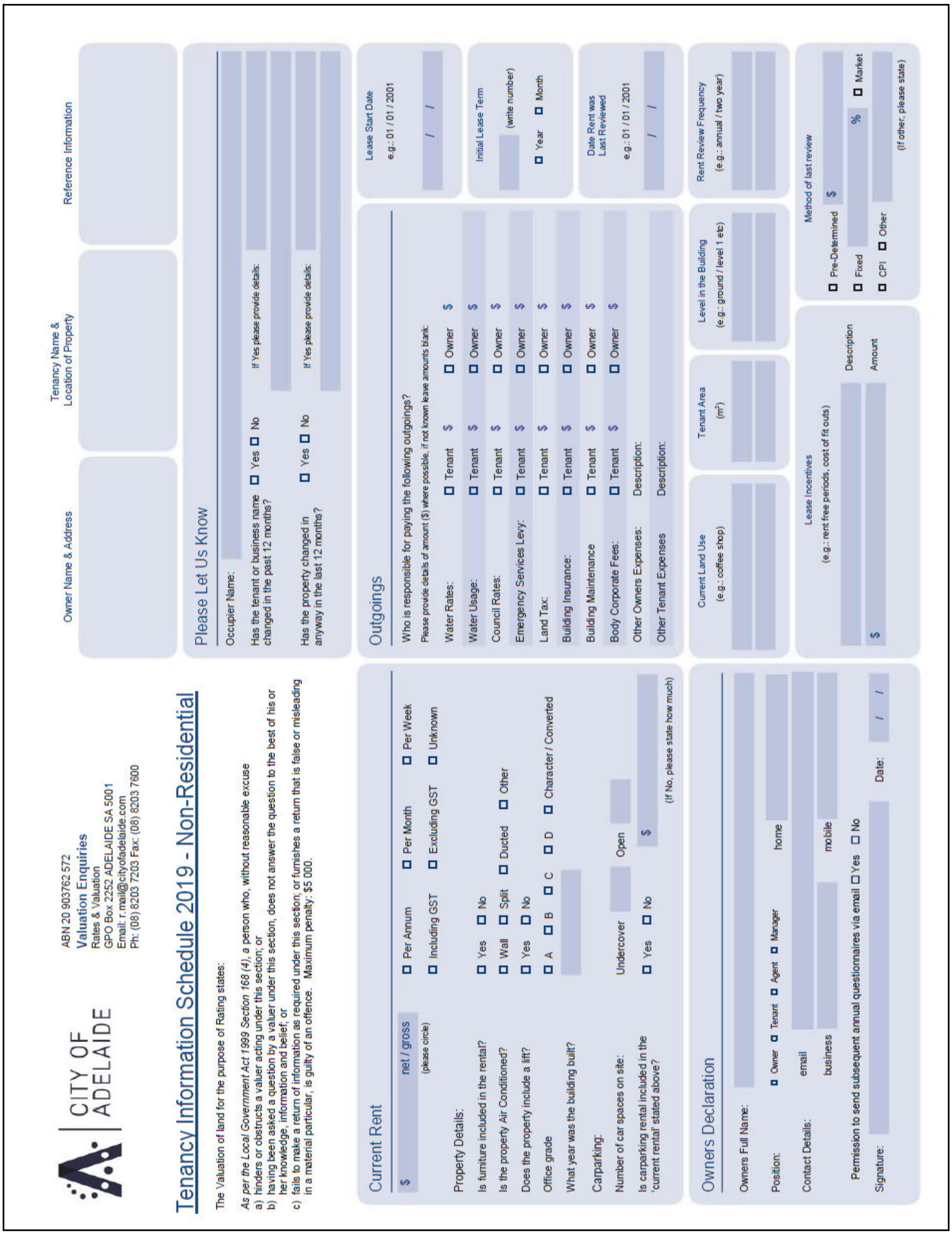
In your opinion, what factors prevent a change of use conversion of lower quality (C & D grade) office buildings?

Question 6:

Is there anything which local council or state government should support building owners, especially to promote change of use conversion?

Appendix 7-A: Tenancy Information Schedule Proforma

Tenancy Information Proforma (TIS) used by Adelaide City Council to collect property data for the purposes of setting local council rates taxation.


CITY OF ADELAIDE

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Owner Name & Address | Tenancy Name & Location of Property | Reference Information

Tenancy Information Schedule 2019 - Non-Residential

The Valuation of land for the purpose of Rating states:

As per the Local Government Act 1999 Section 168 (4), a person who, without reasonable excuse
a) hinders or obstructs a valuer acting under this section; or
b) having been asked a question by a valuer under this section, does not answer the question to the best of his or her knowledge, information and belief; or
c) fails to make a return of information as required under this section; or furnishes a return that is false or misleading in a material particular, is guilty of an offence. Maximum penalty: $5 000.

Please Let Us Know

Occupier Name:
Has the tenant or business name changed in the past 12 months? ☐ Yes ☐ No — If Yes please provide details:
Has the property changed in anyway in the last 12 months? ☐ Yes ☐ No — If Yes please provide details:

Current Rent

$ net / gross (please circle) ☐ Per Annum ☐ Per Month ☐ Per Week
☐ Including GST ☐ Excluding GST ☐ Unknown

Property Details:
Is furniture included in the rental? ☐ Yes ☐ No
Is the property Air Conditioned? ☐ Wall ☐ Split ☐ Ducted ☐ Other
Does the property include a lift? ☐ Yes ☐ No
Office grade ☐ A ☐ B ☐ C ☐ D ☐ Character / Converted
What year was the building built?
Carparking:
Number of car spaces on site: Undercover Open
Is carparking rental included in the 'current rental' stated above? ☐ Yes ☐ No $ (If No, please state how much)

Outgoings

Who is responsible for paying the following outgoings?
Please provide details of amount ($) where possible, if not known leave amounts blank:

Water Rates:	☐ Tenant $	☐ Owner $
Water Usage:	☐ Tenant $	☐ Owner $
Council Rates:	☐ Tenant $	☐ Owner $
Emergency Services Levy:	☐ Tenant $	☐ Owner $
Land Tax:	☐ Tenant $	☐ Owner $
Building Insurance:	☐ Tenant $	☐ Owner $
Building Maintenance	☐ Tenant $	☐ Owner $
Body Corporate Fees:	☐ Tenant $	☐ Owner $
Other Owners Expenses:	Description:	
Other Tenant Expenses	Description:	

Lease Start Date
e.g.: 01 / 01 / 2001
/ /

Initial Lease Term
(write number)
☐ Year ☐ Month

Date Rent was Last Reviewed
e.g.: 01 / 01 / 2001
/ /

Current Land Use (e.g.: coffee shop)
Tenant Area (m^2)
Level in the Building (e.g.: ground / level 1 etc)
Rent Review Frequency (e.g.: annual / two year)

Lease Incentives
(e.g.: rent free periods, cost of fit outs)
Description
$ Amount

Method of last review
☐ Pre-Determined $
☐ Fixed % ☐ Market
☐ CPI ☐ Other
(If other, please state)

Owners Declaration

Owners Full Name:
Position: ☐ Owner ☐ Tenant ☐ Agent ☐ Manager home
Contact Details: email
business mobile
Permission to send subsequent annual questionnaires via email ☐ Yes ☐ No
Signature: Date: / /

Appendix 7-B: Office Building Population (*n=118*) Vacancy Rates oVR (%)

#Bldg Ref No.	Primary Grade (Premium A & B)	Secondary Grade (C & D)	Total $GLA_{BUILDING}$ (m²) Gross Lettable Area of Building = ∑GLA for each Single Ownership Area (SOA) (office & non-office space)	Total $CGLA_{BUILDING}$ (m²) Component occupied Gross Lettable Area of Building =∑CGLAs for each Single Ownership Area (SOA) (office & non-office space)	Total $VA_{BUILDING}$ (m²) Vacant Area of Building =∑Tot.$GLA_{BUILDING}$ - Tot.$CGLA_{BUILDING}$	$OR_{BUILDING}$ (%) Occupancy Rate of Building ∑=$GLA_{BUILDING}$ / $CGLA_{BUILDING}$ x 100 (office & non-office space)	$VR_{BUILDING}$ (%) Vacancy Rate of Building ∑=100 - $OR_{BUILDING}$ (office & non-office space)	Total oGLA (m²) Gross Lettable Area = ∑oGLA for each Single Ownership Area (SOA) (office space only)	Total oGCLA (m²) Occupied component of Gross Lettable Area = ∑oGLA for each Single Ownership Area (SOA) (office space only)	Total oVG (m²) Vacant Greyspace (office space only)	Total oGLAU (m²) Vacant Untenanted (office space only)	Total oVA (m²) Vacant Area (Greyspace & Untenanted vacancy) (office space only) =∑oGLA - oCGLA	Total oOR (%) Occupancy Rate (office space only)	Total oVR (%) Vacancy Rate (office space only)
#1	1		9151	4575	4576	50.0	50.0	7713	4231	0	3481	3481	54.9	45.1
#2		1	2783	1263	1520	45.4	54.6	2453	1007	544	902	1445	41.1	58.9
#3		1	5641	2726	2915	48.3	51.7	4785	1933	899	1953	2852	40.4	59.6
#4	1		26708	14479	12229	54.2	45.8	25962	14157	9468	2337	11804	54.5	45.5
#5		1	1555	412	1143	26.5	73.5	1544	401	60	1083	1143	26.0	74.0
#6	1		10245	6472	3773	63.2	36.8	10183	6410	2769	1005	3773	62.9	37.1
#7		1	13420	6507	6914	48.5	51.5	13420	6507	6914	0	6914	48.5	51.5
#8		1	24452	4078	20374	16.7	83.3	22198	1825	20374	0	20374	8.2	91.8
#9	1		21962	5621	16340	25.6	74.4	20637	4915	12216	3506	15721	23.8	76.2
#10	1		13770	412	13358	3.0	97.0	13610	412	13198	160	13198	3.0	97.0
#11	1		17083	12768	4315	74.7	25.3	16538	12254	3212	1072	4284	74.1	25.9
#12	1		9549	3629	5919	38.0	62.0	9110	3191	4230	1690	5919	35.0	65.0
#14		1	1792	1118	674	62.4	37.6	1792	1118	0	674	674	62.4	37.6
#15	1		4208	2912	1296	69.2	30.8	4208	2912	1296	0	1296	69.2	30.8
#16		1	4612	2505	2107	54.3	45.7	4612	2505	576	1530	2107	54.3	45.7
#17		1	830	830	0	100.0	0.0	752	752	0	0	0	100.0	0.0
#18		1	1054	939	115	89.1	10.9	1054	939	115	0	115	89.1	10.9
#19	1		6655	1852	4803	27.8	72.2	6217	1414	2573	2230	4803	22.7	77.3
#20	1		36931	3145	33786	8.5	91.5	36931	3145	33518	268	33786	8.5	91.5
#21		1	1343	886	457	66.0	34.0	1236	779	48	409	457	63.0	37.0
#22		1	3660	1755	1905	48.0	52.0	3660	1755	622	1282	1905	48.0	52.0
#23	1		19976	13328	6647	66.7	33.3	19686	13068	0	6618	6618	66.4	33.6
#24		1	4653	455	4198	9.8	90.2	0	0	0	0	0	0.0	100.0
#25		1	2123	1923	200	90.6	9.4	1926	1726	200	0	200	89.6	10.4
#26		1	4484	3545	939	79.1	20.9	4460	3521	939	0	939	78.9	21.1
#27		1	2077	383	1694	18.4	81.6	2077	383	1694	0	1694	18.4	81.6
#28		1	3312	1993	1319	60.2	39.8	3172	1865	692	615	1307	58.8	41.2
#29		1	4607	3222	1386	69.9	30.1	4607	3222	1386	0	1386	69.9	30.1
#31		1	1895	1792	102	94.6	5.4	1491	1431	0	60	60	96.0	4.0
#32		1	4668	3522	1146	75.4	24.6	3054	2248	0	886	806	73.6	26.4
#33	1		11052	7467	3585	67.6	32.4	10320	6891	2088	1342	3429	66.8	33.2
#34	1		5637	2635	3003	46.7	53.3	5596	2594	1671	1331	3003	46.3	53.7
#36		1	2893	2619	274	90.5	9.5	2342	2068	0	274	274	88.3	11.7
#37	1		8293	3560	4733	42.9	57.1	7679	2972	4708	0	4708	38.7	61.3
#38	1		10785	8256	2529	76.5	23.5	10388	7959	317	2213	2428	76.6	23.4
#39	1		25337	13324	12013	52.6	47.4	24114	12248	10599	1268	11867	50.8	49.2
#Bldg Ref	Primary Grade	Secondary Grade	Total $GLA_{BUILDING}$ (m²)	Total $CGLA_{BUILDING}$ (m²)	Total $VA_{BUILDING}$ (m²)	$OR_{BUILDING}$ (%)	$VR_{BUILDING}$ (%)	Total oGLA (m²)	Total oGCLA (m²)	Total oVG (m2)	Total oGLAU (m²)	Total oVA (m²)	Total oOR (%)	Total oVR (%)

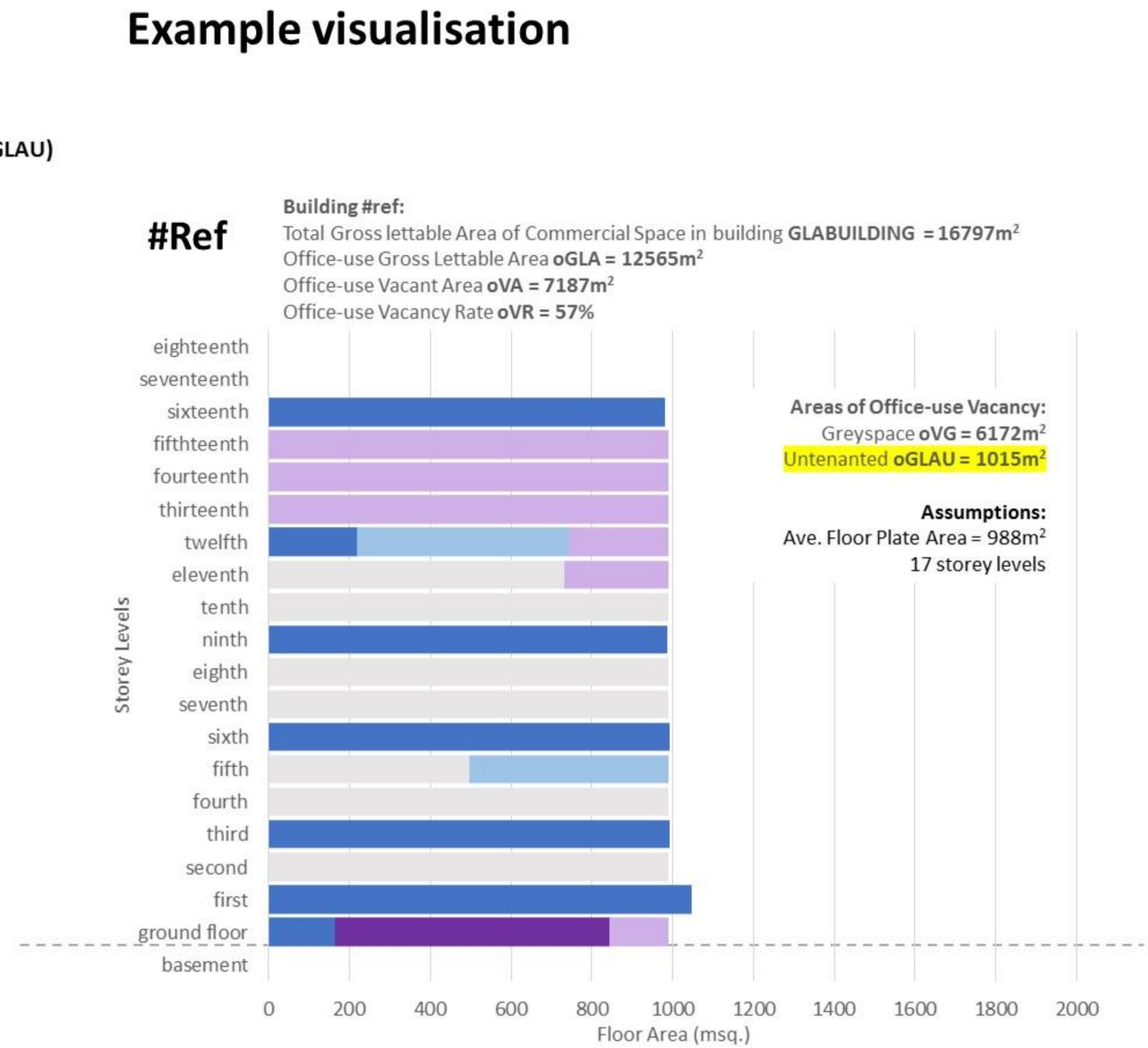
#40		1	2196	1015	1180	46.2	53.8	1044	314	580	504	730	30.1	69.9
#41		1	2418	1229	1189	50.8	49.2	2145	995	1150	0	1150	46.4	53.6
#42	1		12972	4404	8568	34.0	66.0	11909	3575	6189	2145	8334	30.0	70.0
#43		1	12721	7408	5313	58.2	41.8	10710	6171	122	4468	4539	57.6	42.4
#44	1		9813	1981	7832	20.2	79.8	9071	1325	7746	0	7746	14.6	85.4
#45		1	12166	8717	3449	71.7	28.3	9553	6616	194	2743	2937	69.3	30.7
#46	1		16537	2210	14327	13.4	86.6	16240	1913	14327	0	14327	11.8	88.2
#47	1		23325	9904	13421	42.5	57.5	22972	9551	11317	2104	13421	41.6	58.4
#48	1		11153	6309	4844	56.6	43.4	11086	6242	4844	0	4844	56.3	43.7
#49	1		12764	3336	9428	26.1	73.9	12744	3316	9312	116	9428	26.0	74.0
#50	1		13808	8336	5471	60.4	39.6	13246	8160	0	5185	5085	61.6	38.4
#51		1	4278	1996	2282	46.7	53.3	3803	1521	2282	0	2282	40.0	60.0
#52		1	4363	157	4206	3.6	96.4	4363	157	4206	184	4206	3.6	96.4
#53		1	3268	950	2317	29.1	70.9	3268	950	1748	569	2317	29.1	70.9
#54	1		5052	1395	3657	27.6	72.4	5052	1575	2667	990	3477	31.2	68.8
#55		1	13992	2125	11868	15.2	84.8	13992	2125	11868	0	11868	15.2	84.8
#56		1	3668	2178	1490	59.4	40.6	3668	2178	450	1040	1490	59.4	40.6
#57	1		4774	4774	0	100.0	0.0	4774	4774	0	0	0	100.0	0.0
#58		1	4679	3014	1665	64.4	35.6	4193	2528	827	838	1665	60.3	39.7
#59		1	1113	788	326	70.8	29.2	1113	788	326	0	326	70.8	29.2
#60		1	20983	7216	13768	34.4	65.6	17692	4155	1893	11644	13537	23.5	76.5
#61		1	2089	1190	900	56.9	43.1	1588	840	102	646	748	52.9	47.1
#62		1	9938	2118	7819	21.3	78.7	9478	1689	6754	1035	7789	17.8	82.2
#63		1	11309	5890	5419	52.1	47.9	10437	5326	1187	3924	5111	51.0	49.0
#64		1	1080	361	719	33.4	66.6	966	299	291	376	668	30.9	69.1
#65		1	1050	201	849	19.2	80.8	658	151	355	151	506	23.0	77.0
#66		1	6502	3982	2520	61.2	38.8	5872	3352	2357	163	2520	57.1	42.9
#67		1	10316	3987	6329	38.7	61.3	8149	3613	2115	2422	4536	44.3	55.7
#68		1	4990	2705	2285	54.2	45.8	4656	2578	504	1781	2078	55.4	44.6
#69	1		30696	13244	17452	43.1	56.9	30061	12737	14656	2668	17324	42.4	57.6
#70	1		18662	3674	14988	19.7	80.3	18553	3565	10771	4217	14988	19.2	80.8
#71		1	6157	2851	3306	46.3	53.7	5789	2621	0	3264	3168	45.3	54.7
#72	1		5504	5504	0	100.0	0.0	5477	5477	0	0	0	100.0	0.0
#73		1	3592	2982	610	83.0	17.0	3570	2961	275	335	610	82.9	17.1
#74		1	3236	1996	1240	61.7	38.3	1931	1142	502	286	788	59.2	40.8
#75	1		12606	8805	3801	69.8	30.2	11562	8194	2337	1032	3369	70.9	29.1
#76		1	1593	1107	487	69.5	30.5	1593	1107	124	363	487	69.5	30.5
#77		1	3575	2700	875	75.5	24.5	3405	2530	478	397	875	74.3	25.7
#78		1	1417	1060	357	74.8	25.2	907	795	0	112	112	87.6	12.4
#79		1	22880	16035	6845	70.1	29.9	20212	14134	6078	743	6078	69.9	30.1
#81	1		11807	9757	2049	82.6	17.4	10924	9300	401	1222	1624	85.1	14.9
#83	1		6704	5802	902	86.5	13.5	6650	5748	902	0	902	86.4	13.6
#84		1	3369	1003	2366	29.8	70.2	3184	818	162	2204	2366	25.7	74.3
#85		1	2080	440	1640	21.1	78.9	1914	274	1640	0	1640	14.3	85.7
#Bldg Ref	**Primary Grade**	**Secondary Grade**	**Total GLA$_{BUILDING}$ (m^2)**	**Total CGLA$_{BUILDING}$ (m^2)**	**Total VA$_{BUILDING}$ (m^2)**	**OR$_{BUILDING}$ (%)**	**VR$_{BUILDING}$ (%)**	**Total oGLA (m^2)**	**Total oGCLA (m^2)**	**Total oVG (m2)**	**Total oGLAU (m2)**	**Total oVA (m^2)**	**Total oOR (%)**	**Total oVR (%)**
#86		1	19819	6790	13029	34.3	65.7	19819	6790	9273	3756	13029	34.3	65.7

#88		1	5027	3062	1966	60.9	39.1	4020	2491	1203	327	1530	62.0	38.0
#89		1	4272	3046	1226	71.3	28.7	3508	2345	359	804	1163	66.9	33.1
#91		1	1040	316	724	30.4	69.6	1040	316	724	0	724	30.4	69.6
#92	1		5706	3631	2075	63.6	36.4	5297	3222	180	1896	2075	60.8	39.2
#93	1		25095	930	24165	3.7	96.3	25095	930	24165	0	24165	3.7	96.3
#95		1	5317	3220	2097	60.6	39.4	5317	3220	1070	1027	2097	60.6	39.4
#96	1		19877	3899	15978	19.6	80.4	19830	3853	14969	1009	15978	19.4	80.6
#97		1	6366	3607	2759	56.7	43.3	5826	3240	271	2315	2586	55.6	44.4
#98	1		10764	3735	7029	34.7	65.3	10578	3735	1087	5756	6843	35.3	64.7
#99	1		3935	2319	1616	58.9	41.1	3607	2201	0	1407	1407	61.0	39.0
#100		1	1658	690	968	41.6	58.4	1445	575	130	740	870	39.8	60.2
#101		1	3186	1285	1901	40.3	59.7	2917	1072	299	1107	1845	36.8	63.2
#102	1		7319	3242	4077	44.3	55.7	7319	3242	2292	1785	4077	44.3	55.7
#103		1	5353	4323	1030	80.8	19.2	5063	4221	100	742	842	83.4	16.6
#104	1		9413	5217	4196	55.4	44.6	8078	3996	1526	2557	4082	49.5	50.5
#105		1	5924	1730	4193	29.2	70.8	5924	1730	3423	770	4193	29.2	70.8
#106		1	3856	1019	2837	26.4	73.6	3856	1019	2837	0	2837	26.4	73.6
#107		1	1788	1118	670	62.5	37.5	614	614	0	0	0	100.0	0.0
#108		1	11839	6839	5000	57.8	42.2	11376	6506	239	4631	4871	57.2	42.8
#110		1	7668	6193	1475	80.8	19.2	7191	5736	0	1455	1455	79.8	20.2
#111		1	236	23	214	9.5	90.5	236	23	214	0	214	9.5	90.5
#112		1	12381	8241	4140	66.6	33.4	2085	1857	0	228	228	89.1	10.9
#113		1	3367	1210	2157	35.9	64.1	2098	589	1508	0	1508	28.1	71.9
#114		1	331169	1776	329393	0.5	99.5	2298	1776	50	473	523	77.3	22.7
#115	1		3896	3896	0	100.0	0.0	3861	3861	0	0	0	100.0	0.0
#116	1		19335	1315	18021	6.8	93.2	19335	1315	18021	0	18021	6.8	93.2
#117		1	16797	6058	10738	36.1	63.9	12565	5379	6171	1014	7186	42.8	57.2
#119	1		12879	12879	0	100.0	0.0	12879	12879	0	0	0	100.0	0.0
#120	1		30982	13541	17441	43.7	56.3	30285	12844	17441	0	17441	42.4	57.6
#121		1	11875	1375	10500	11.6	88.4	11875	1375	10500	0	10500	11.6	88.4
#122	1		6948	4423	2525	63.7	36.3	6614	4423	103	2088	2191	66.9	33.1
#123	1		7315	3631	3684	49.6	50.4	7013	3329	2455	1229	3684	47.5	52.5
#124		1	2997	2384	613	79.6	20.4	2848	2235	266	346	613	78.5	21.5
#125		1	16822	5621	11201	33.4	66.6	16822	5621	11201	0	11201	33.4	66.6
#126	1		12468	297	12172	2.4	97.6	12468	297	12008	164	12172	2.4	97.6

Buildings shaded dark green are included in the spatial analysis visualisations which can be seen in Append

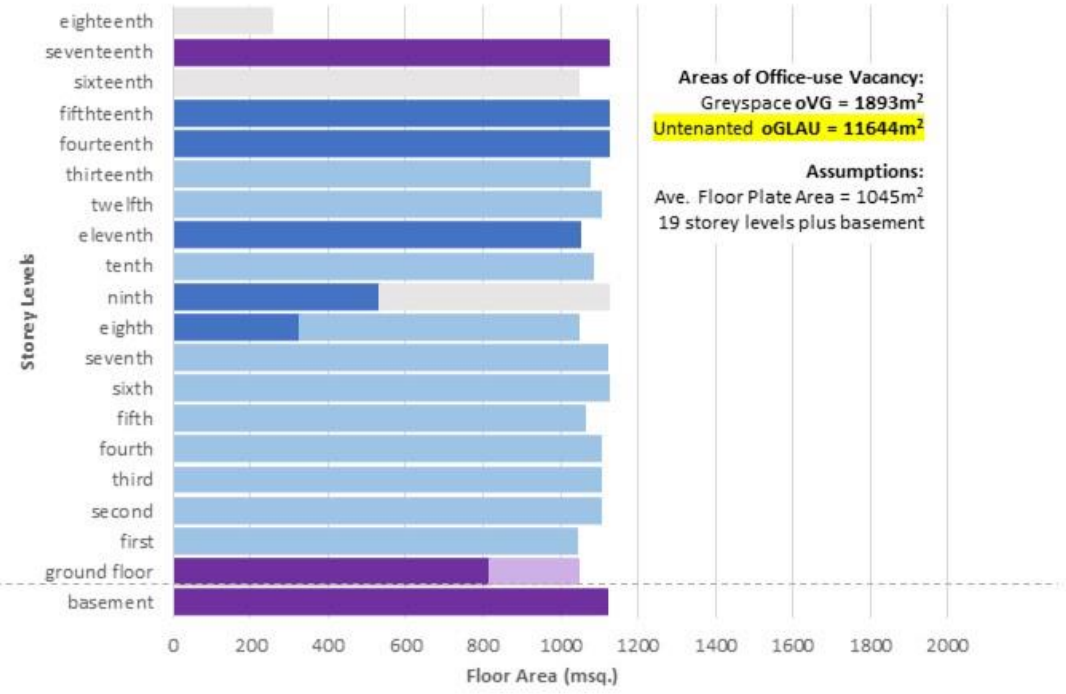
Appendix 7-C: Untenanted vacancy visualised

Untenanted vacancy (oGLAU), in large and modest scales office buildings, ranked in order of greatest value of vacant area (m^2)



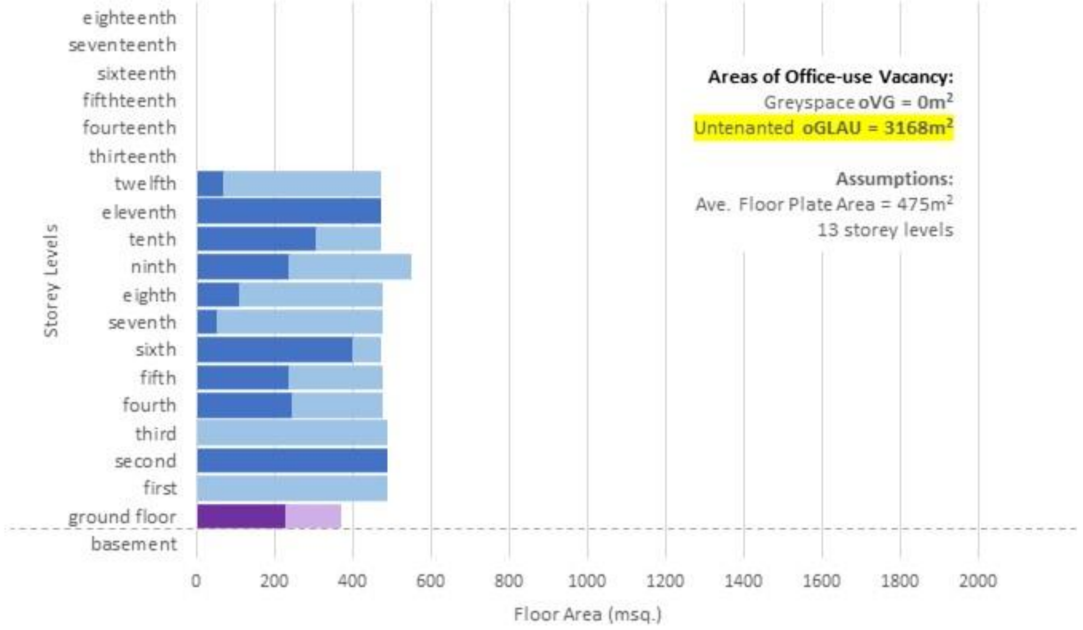
#60

Building #60:
Total Gross lettable Area of Commercial Space in building **$GLA_{BUILDING}$ = 20983m²**
Office-use Gross Lettable Area **oGLA = 17692m²**, Office-use Vacant Area **oVA = 13537m²**
Office-use Vacancy Rate **oVR = 77%**



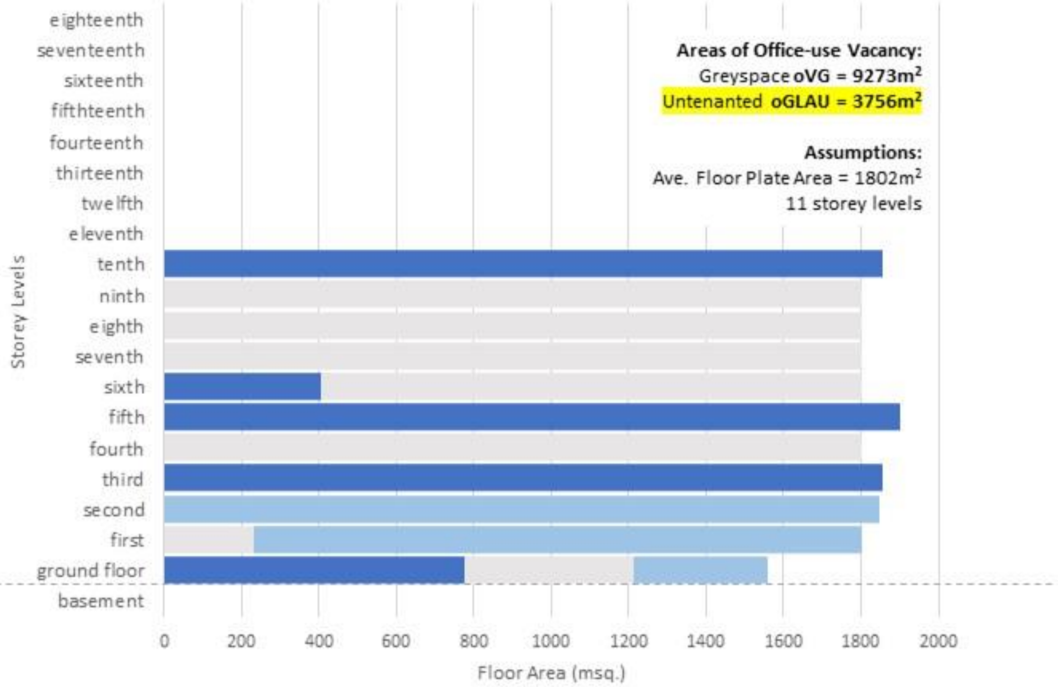
#71

Building #71:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 6157m²**
Office-use Gross Lettable Area **oGLA = 5789m²**
Office-use Vacant Area **oVA = 3168m²**
Office-use Vacancy Rate **oVR = 55%**



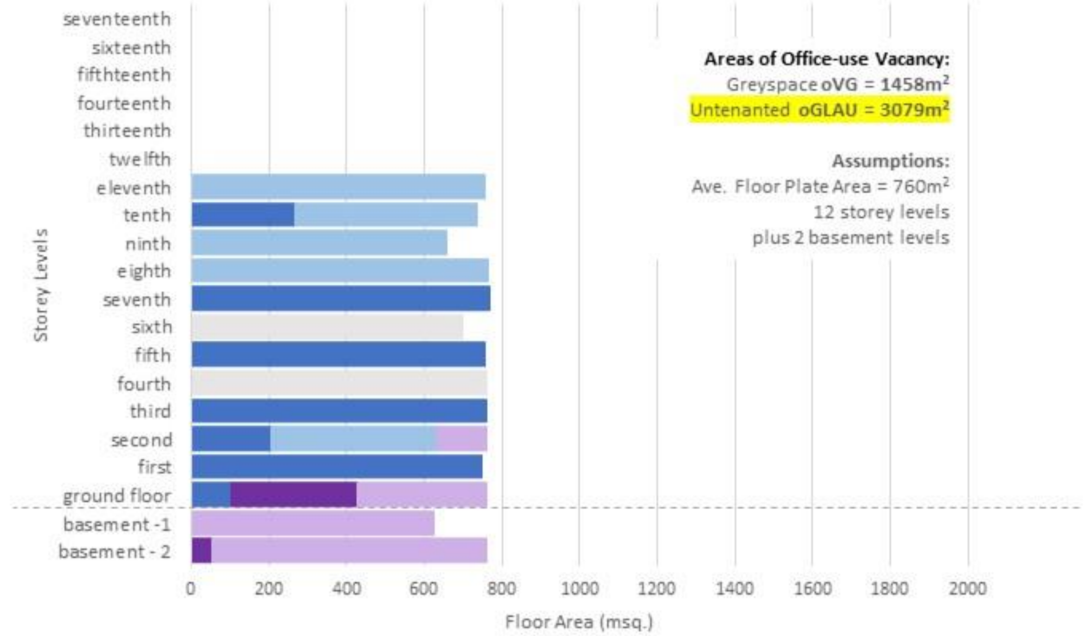
#86

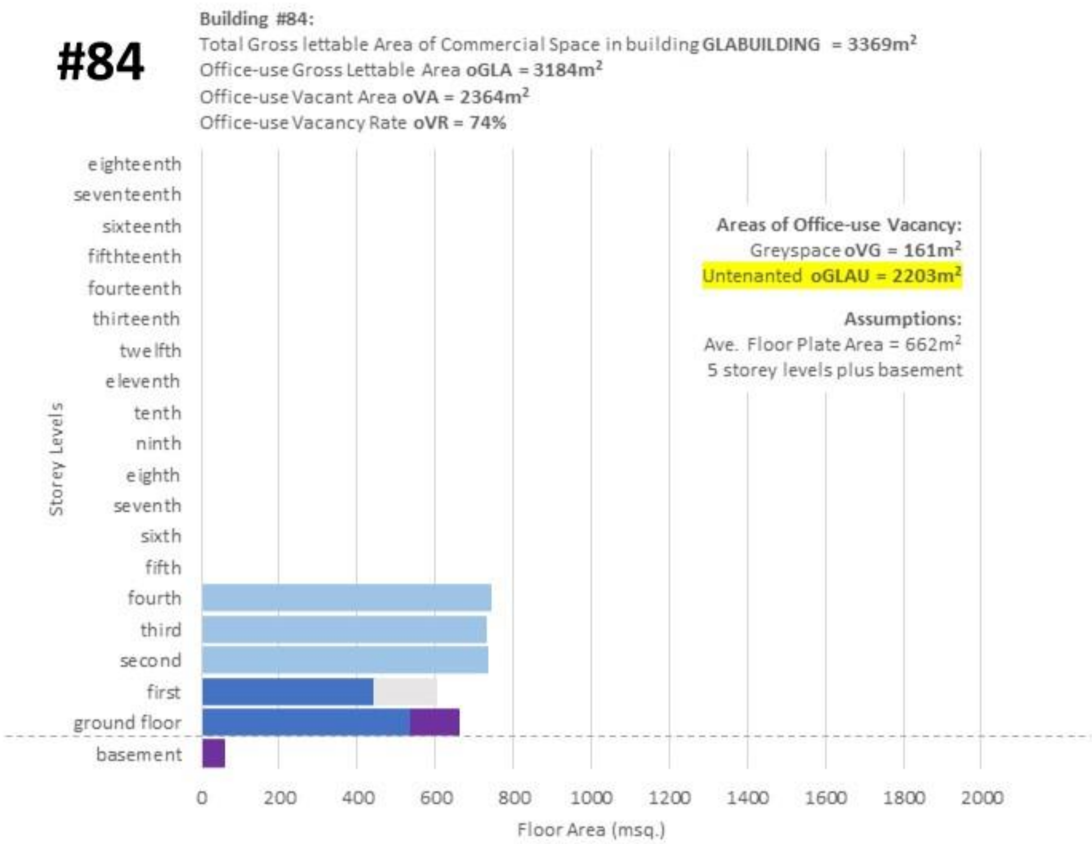
Building #86:
Total Gross lettable Area of Commercial Space in building **$GLA_{BUILDING}$ = 19819m²**
Office-use Gross Lettable Area **oGLA = 19819m²**, Office-use Vacant Area **oVA = 13029m²**
Office-use Vacancy Rate **oVR = 66%**
Assumptions: Ave. Floor Plate Area = 1802m

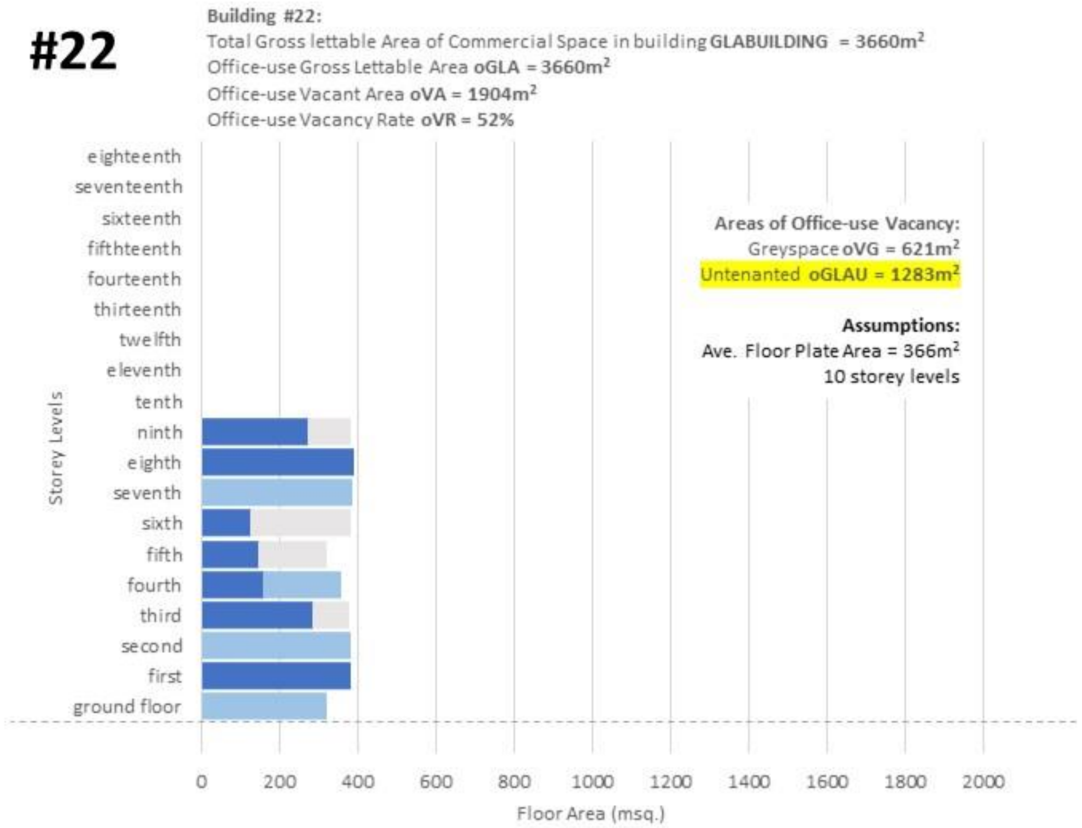


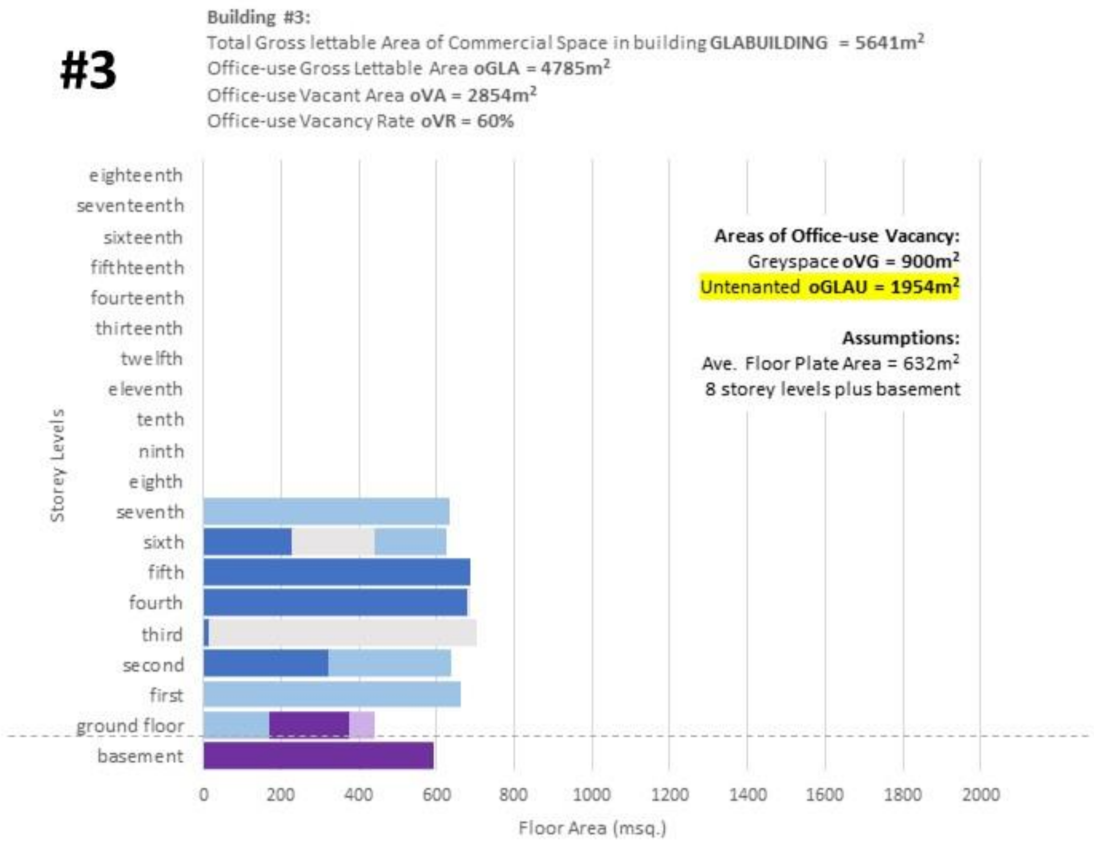
#67

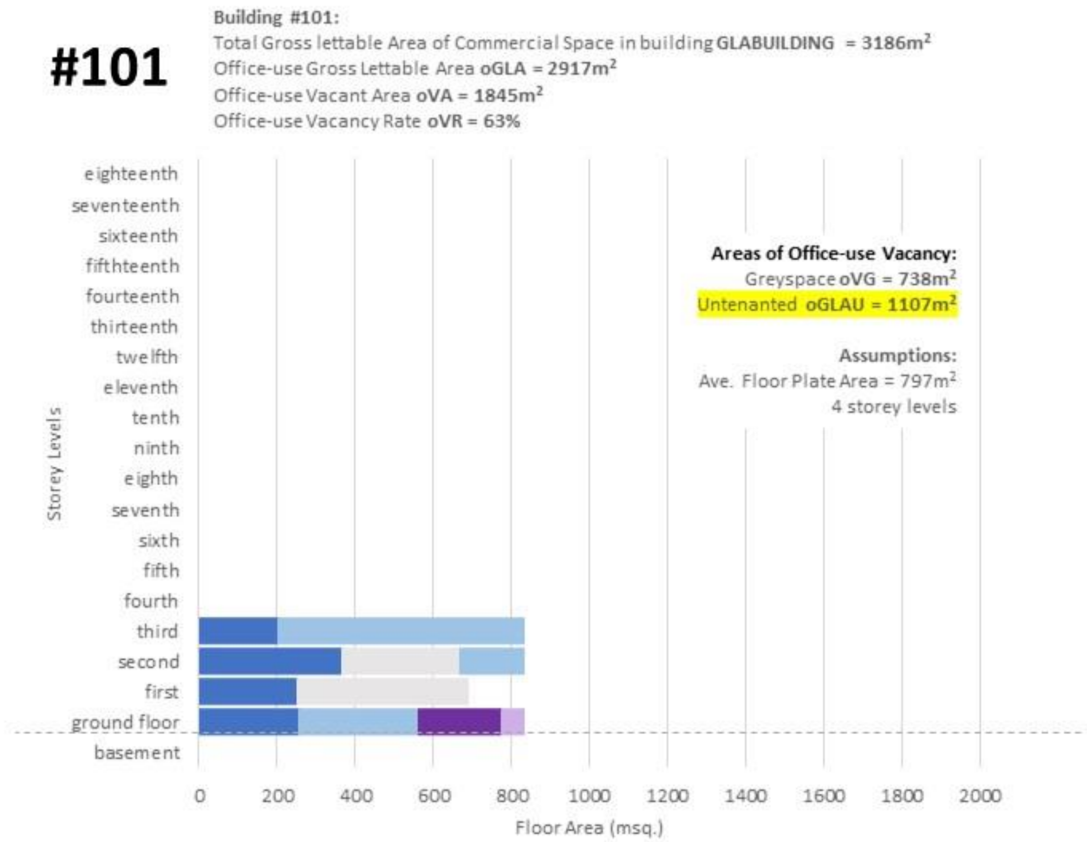
Building #67:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 10316m²**
Office-use Gross Lettable Area **oGLA = 8149m²**
Office-use Vacant Area **oVA = 4536m²**
Office-use Vacancy Rate **oVR = 56%**




#84
Building #84:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 3369m²
Office-use Gross Lettable Area oGLA = 3184m²
Office-use Vacant Area oVA = 2364m²
Office-use Vacancy Rate oVR = 74%
Areas of Office-use Vacancy:
Greyspace oVG = 161m²
Untenanted oGLAU = 2203m²
Assumptions:
Ave. Floor Plate Area = 662m²
5 storey levels plus basement
Storey Levels
Floor Area (msq.)

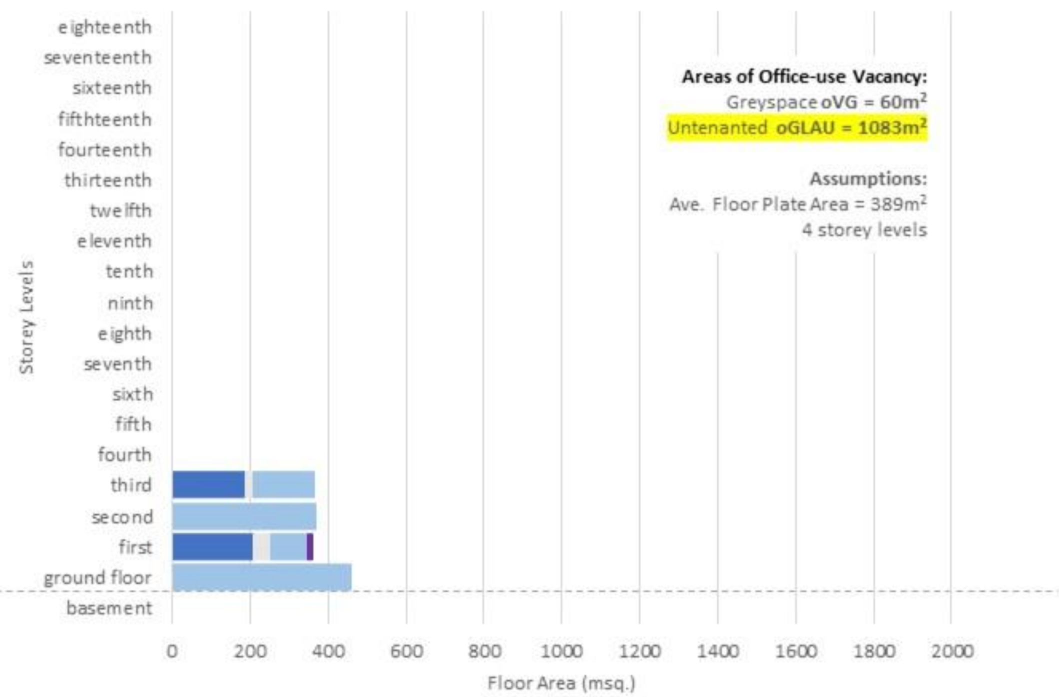

#22
Building #22:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 3660m²
Office-use Gross Lettable Area oGLA = 3660m²
Office-use Vacant Area oVA = 1904m²
Office-use Vacancy Rate oVR = 52%
Areas of Office-use Vacancy:
Greyspace oVG = 621m²
Untenanted oGLAU = 1283m²
Assumptions:
Ave. Floor Plate Area = 366m²
10 storey levels
Storey Levels
Floor Area (msq.)


#3
Building #3:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 5641m²
Office-use Gross Lettable Area oGLA = 4785m²
Office-use Vacant Area oVA = 2854m²
Office-use Vacancy Rate oVR = 60%
Areas of Office-use Vacancy:
Greyspace oVG = 900m²
Untenanted oGLAU = 1954m²
Assumptions:
Ave. Floor Plate Area = 632m²
8 storey levels plus basement
Storey Levels
Floor Area (msq.)


#101
Building #101:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 3186m²
Office-use Gross Lettable Area oGLA = 2917m²
Office-use Vacant Area oVA = 1845m²
Office-use Vacancy Rate oVR = 63%
Areas of Office-use Vacancy:
Greyspace oVG = 738m²
Untenanted oGLAU = 1107m²
Assumptions:
Ave. Floor Plate Area = 797m²
4 storey levels
Storey Levels
Floor Area (msq.)

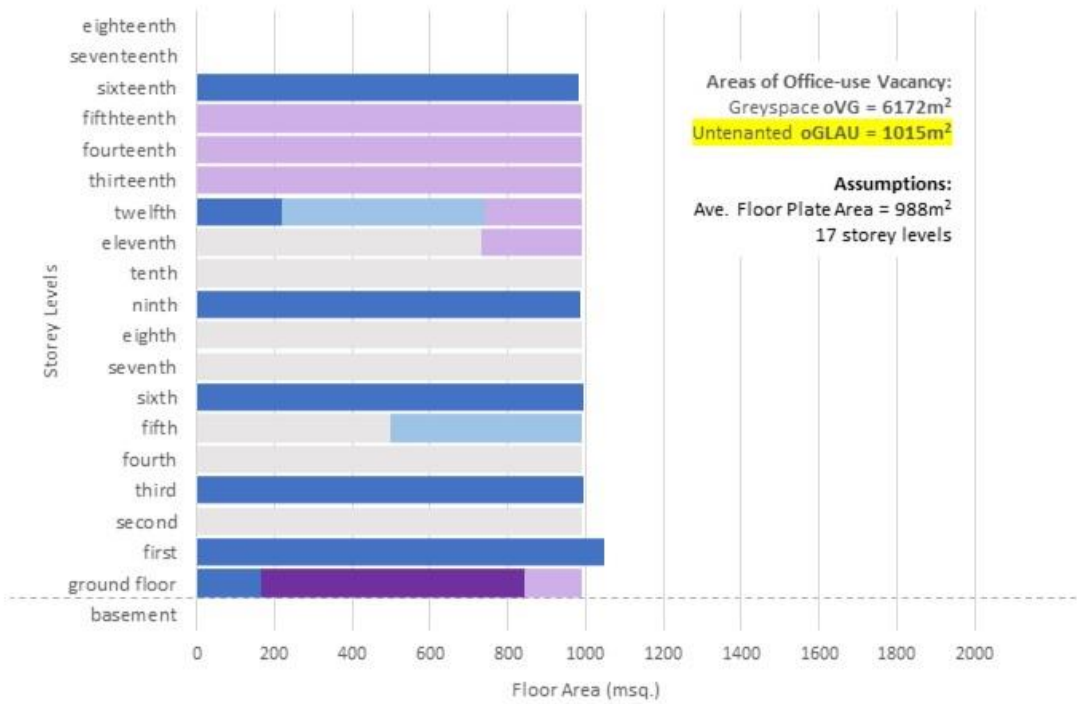
#5

Building #5:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 1555m^2**
Office-use Gross Lettable Area **oGLA = 1544m^2**
Office-use Vacant Area **oVA = 1143m^2**
Office-use Vacancy Rate **oVR = 74%**



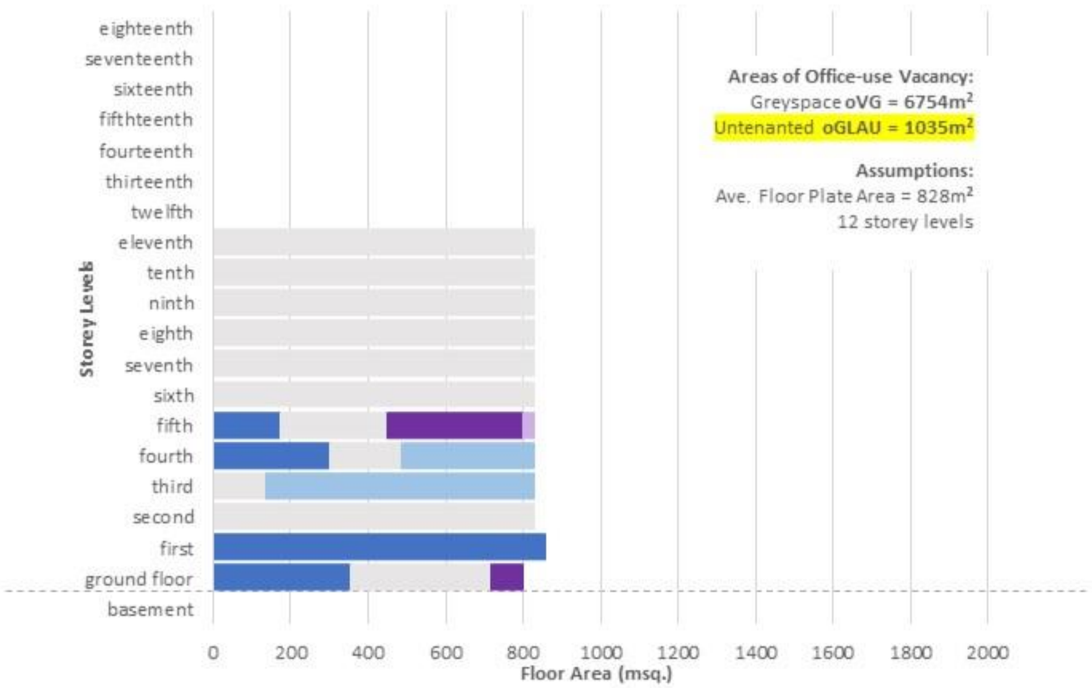
#117

Building #117:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 16797m^2**
Office-use Gross Lettable Area **oGLA = 12565m^2**
Office-use Vacant Area **oVA = 7187m^2**
Office-use Vacancy Rate **oVR = 57%**



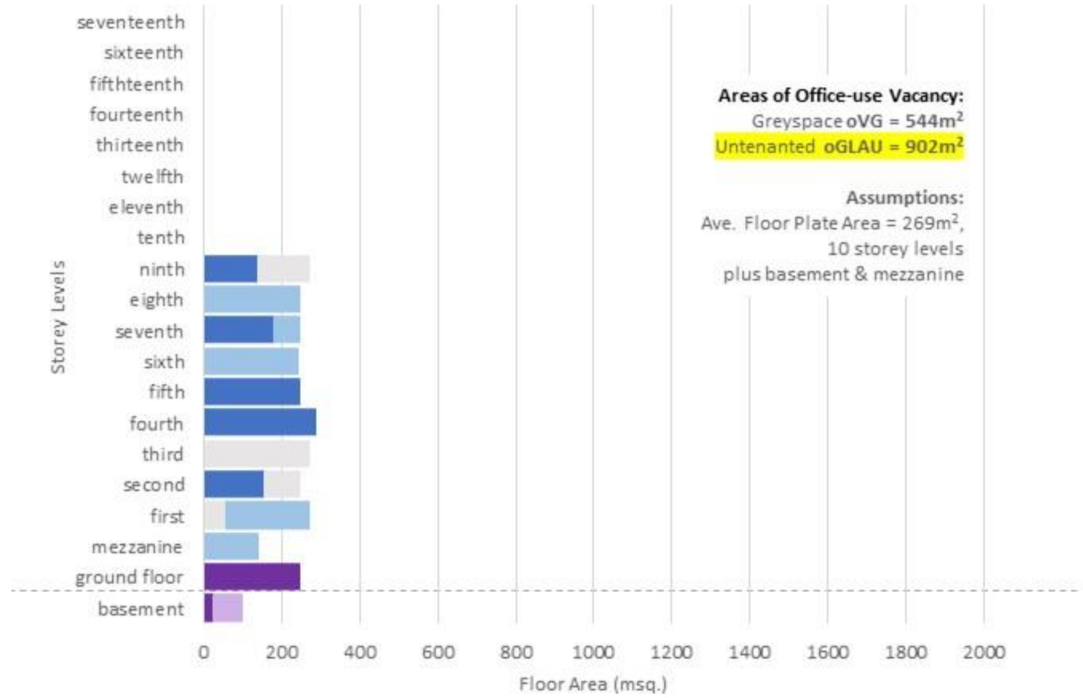
#62

Building #62:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 9938m^2**
Office-use Gross Lettable Area **oGLA = 9478m^2** Office-use Vacant Area **oVA = 7789m^2**
Office-use Vacancy Rate **oVR = 79%**



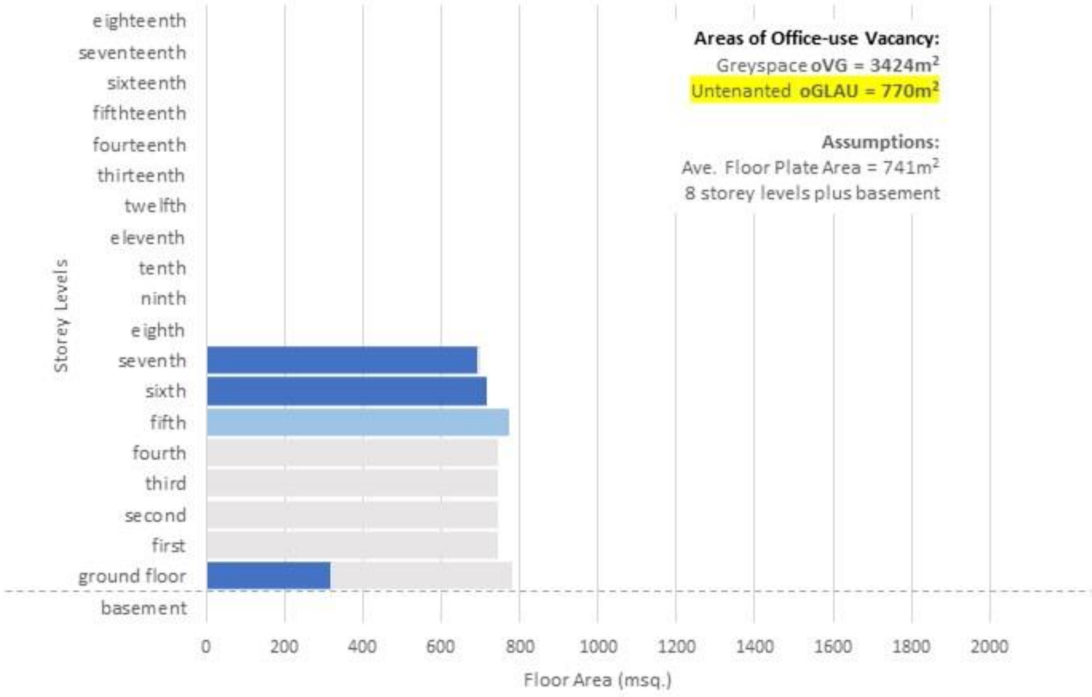
#2

Building #2:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 2783m^2**
Office-use Gross Lettable Area **oGLA = 2453m^2**
Office-use Vacant Area **oVA = 1446m^2**
Office-use Vacancy Rate **oVR = 59%**



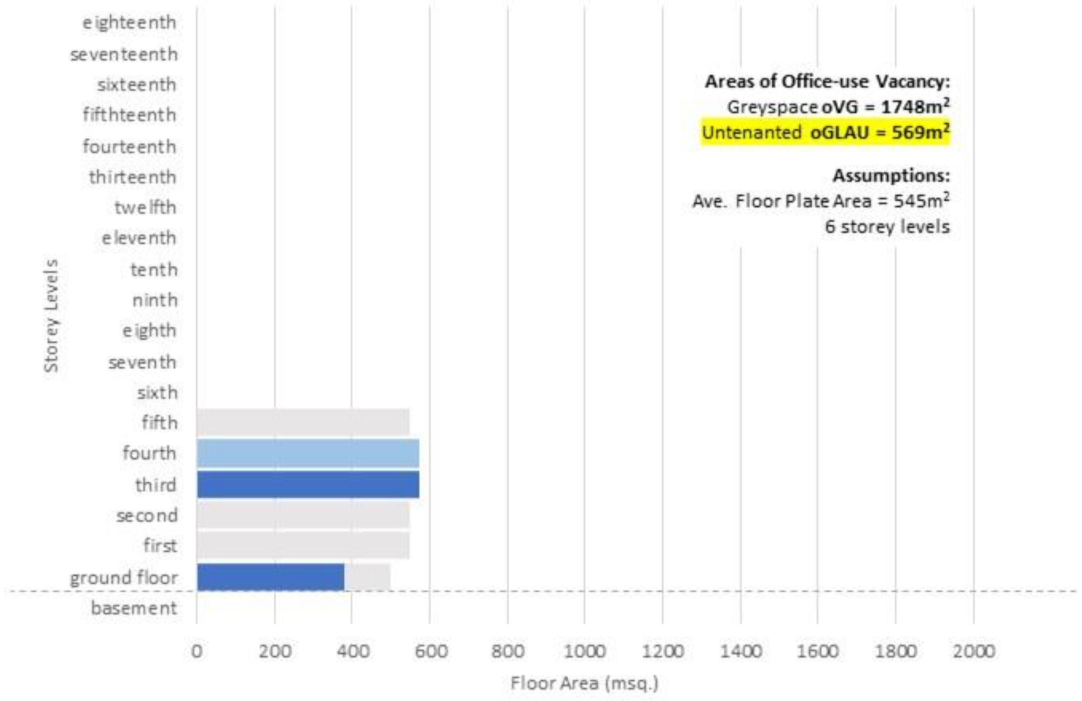
#105

Building #105:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 5924m²**
Office-use Gross Lettable Area **oGLA = 5924m²**
Office-use Vacant Area **oVA = 4193m²**
Office-use Vacancy Rate **oVR = 71%**



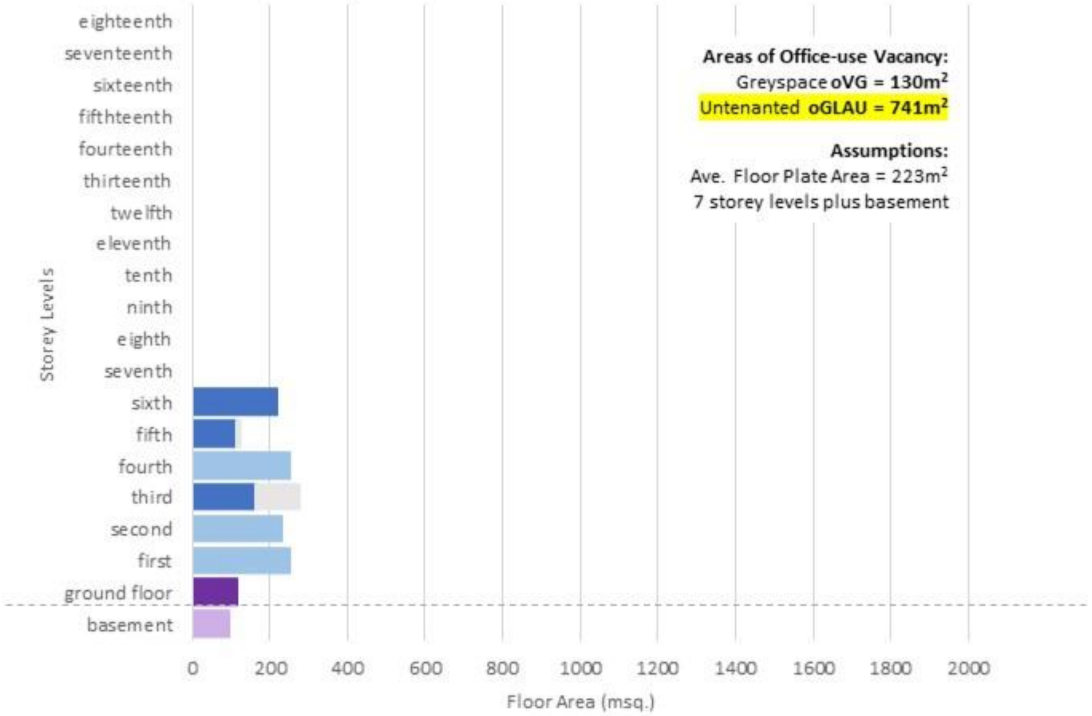
#53

Building #53:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 3268m²**
Office-use Gross Lettable Area **oGLA = 3268m²**
Office-use Vacant Area **oVA = 2317m²**
Office-use Vacancy Rate **oVR = 71%**



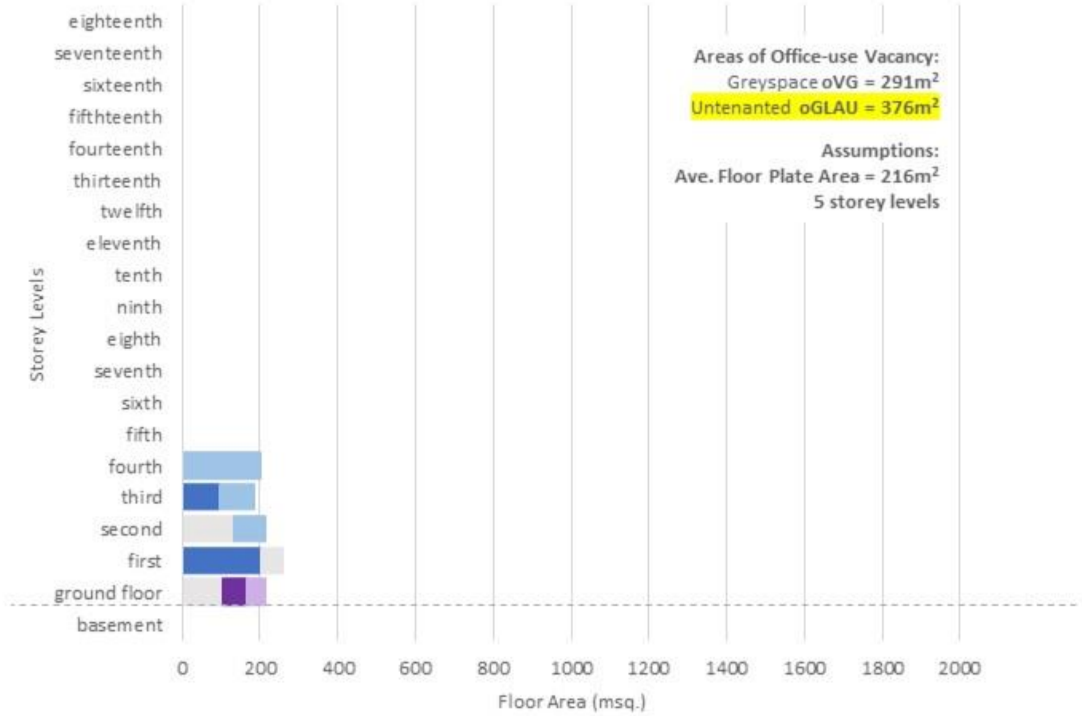
#100

Building #100:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 1658m²**
Office-use Gross Lettable Area **oGLA = 1445m²**
Office-use Vacant Area **oVA = 871m²**
Office-use Vacancy Rate **oVR = 60%**



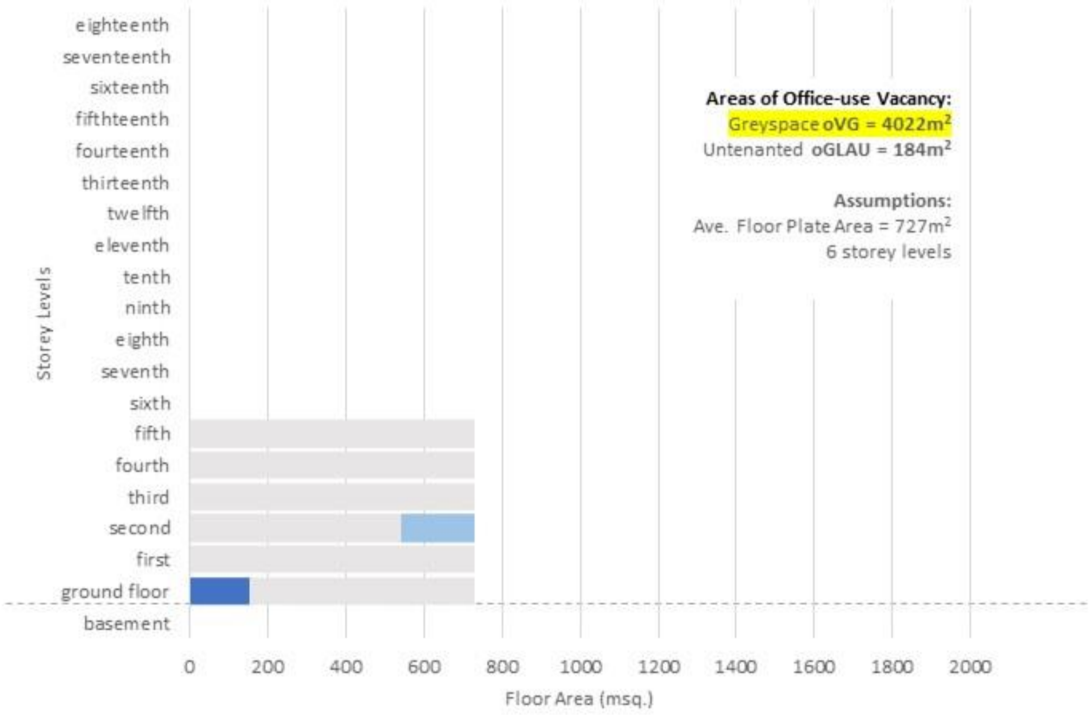
#64

Building #64:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 1080m²**
Office-use Gross Lettable Area **oGLA = 966m²**
Office-use Vacant Area **oVA = 667m²**
Office-use Vacancy Rate **oVR = 69%**



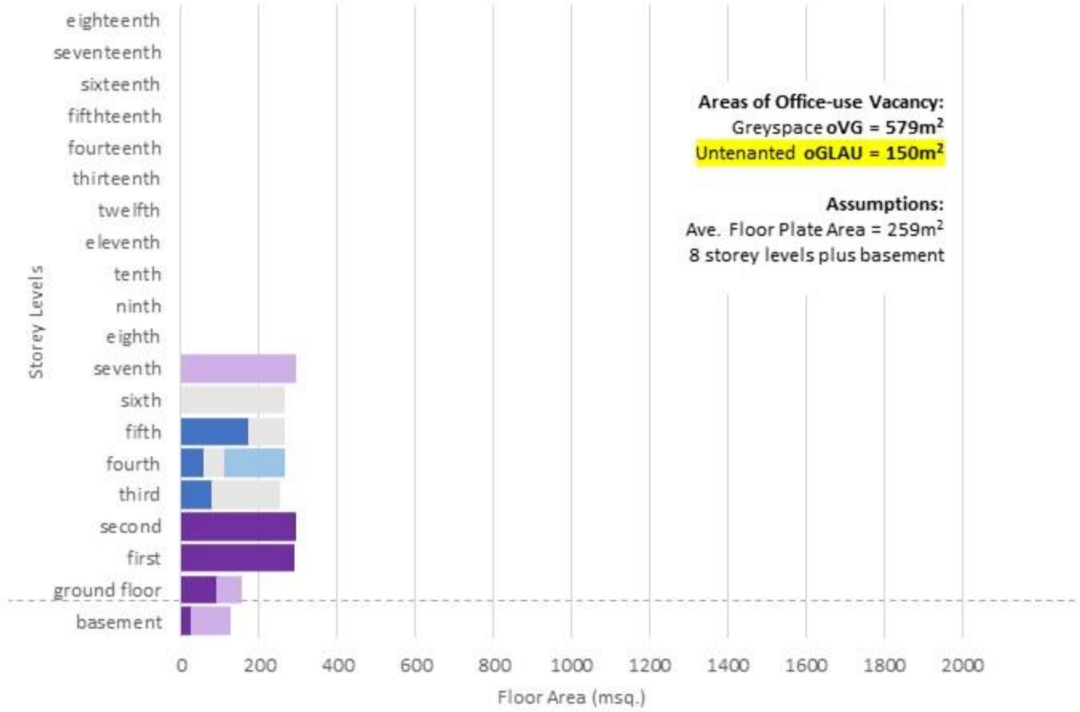
#52

Building #52:
Total Gross lettable Area of Commercial Space in building **GLABUILDING =4363m²**
Office-use Gross Lettable Area **oGLA = 4363m²**
Office-use Vacant Area **oVA = 4206m²**
Office-use Vacancy Rate **oVR = 96%**



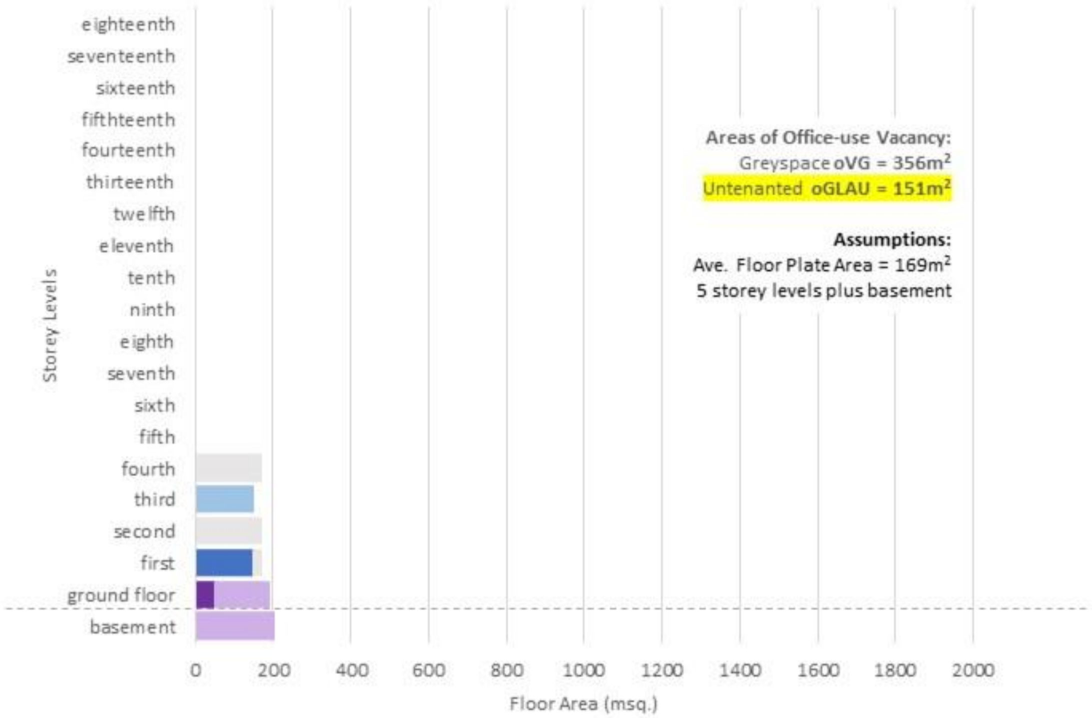
#40

Building #40:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 2196m²**
Office-use Gross Lettable Area **oGLA = 1044m²**
Office-use Vacant Area **oVA = 729m²**
Office-use Vacancy Rate **oVR = 70%**



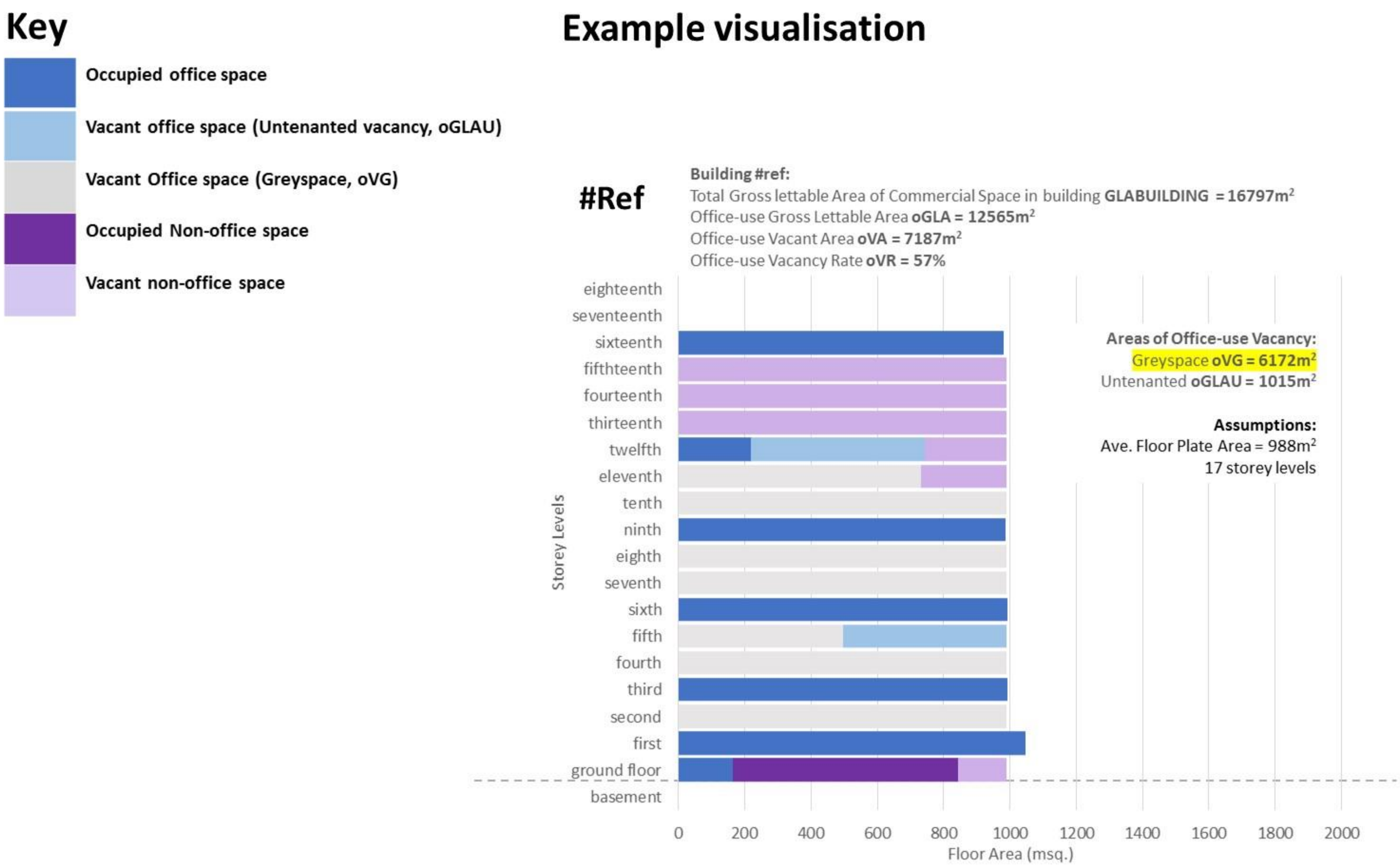
#65

Building #65:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 1050m²**
Office-use Gross Lettable Area **oGLA = 658m²**
Office-use Vacant Area **oVA = 507m²**
Office-use Vacancy Rate **oVR = 77%**



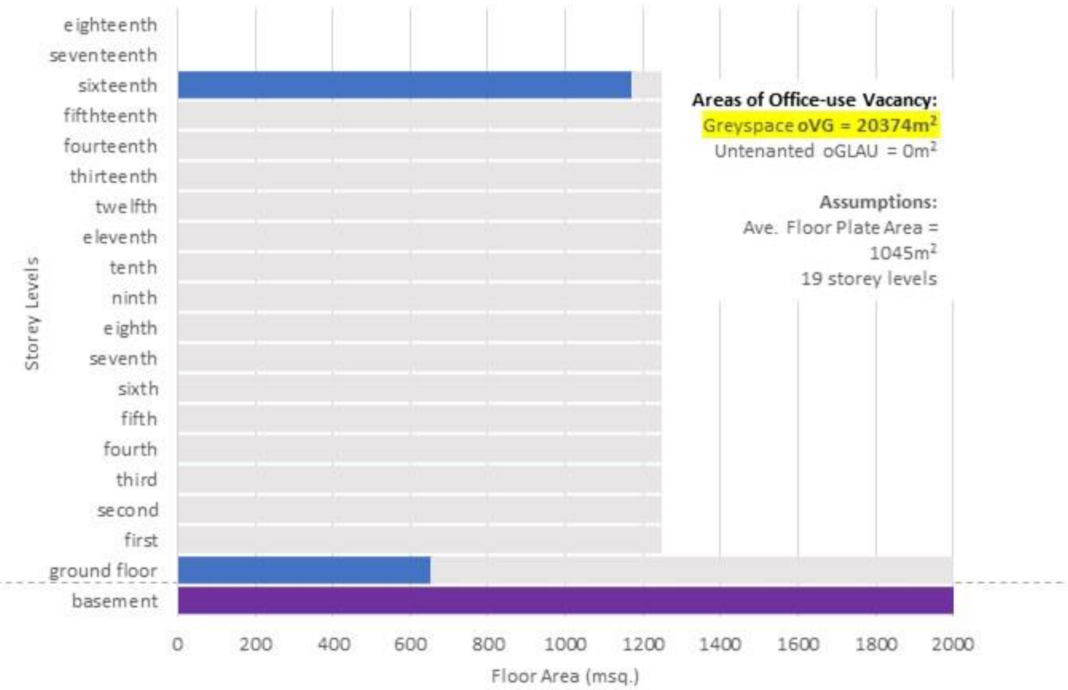
Appendix 7-D: Greyspace vacancy visualised

Greyspace vacancy (oVG), in large and modest scales office buildings, ranked in order of greatest value of Greyspace area (m2)



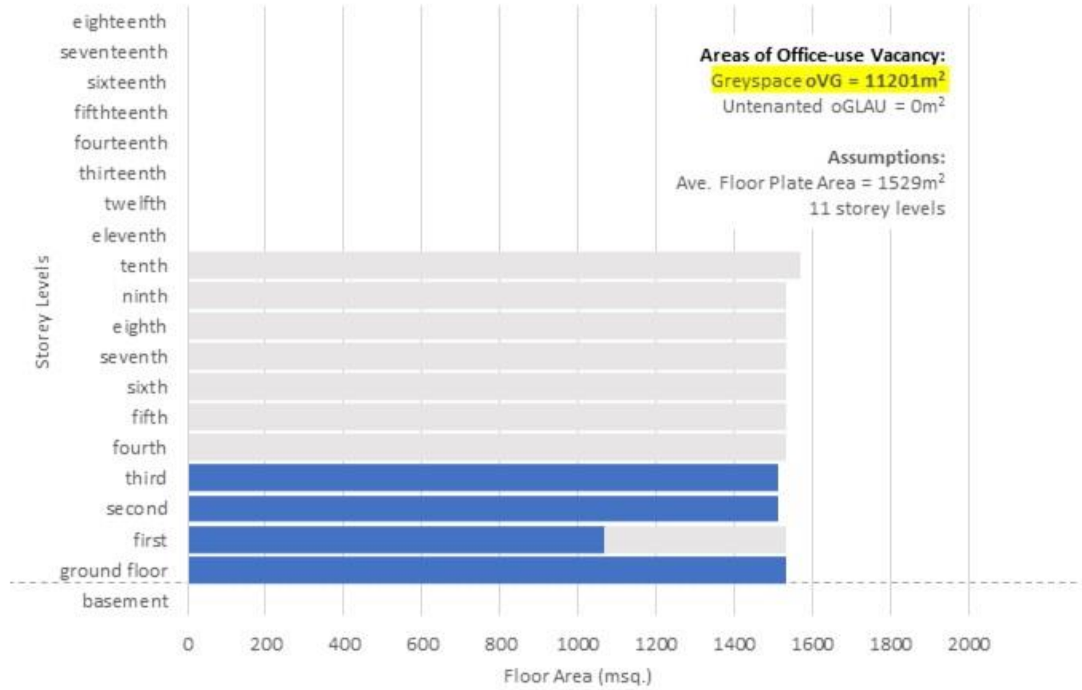
#8

Building #8:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 24453m²**
Office-use Gross Lettable Area **oGLA = 22199m²**
Office-use Vacant Area **oVA = 20374m²**
Office-use Vacancy Rate **oVR = 92%**



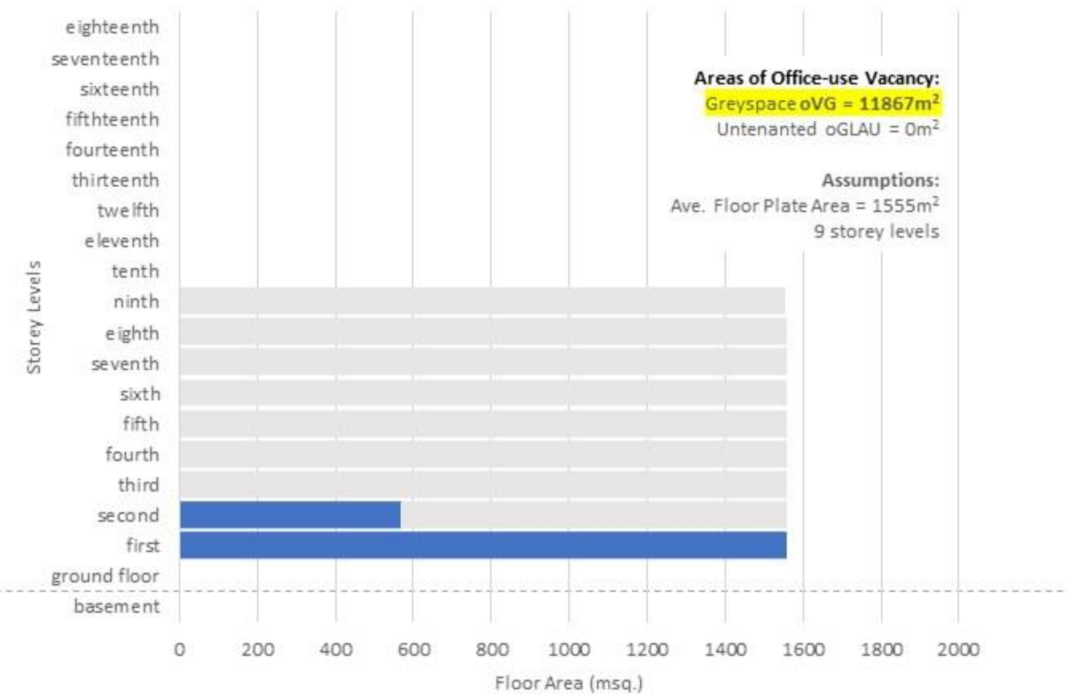
#125

Building #125:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 16822m²**
Office-use Gross Lettable Area **oGLA = 16882m²**
Office-use Vacant Area **oVA = 11201m²**
Office-use Vacancy Rate **oVR = 67%**



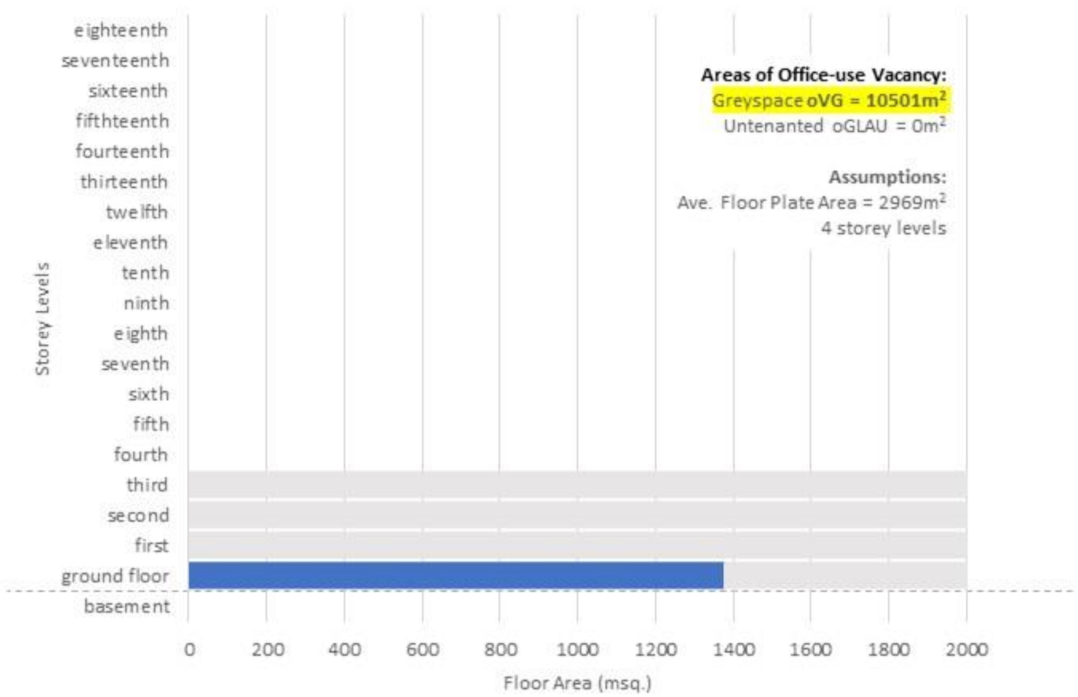
#55

Building #55:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 13992m²**
Office-use Gross Lettable Area **oGLA = 13992m²**
Office-use Vacant Area **oVA = 11867m²**
Office-use Vacancy Rate **oVR = 85%**



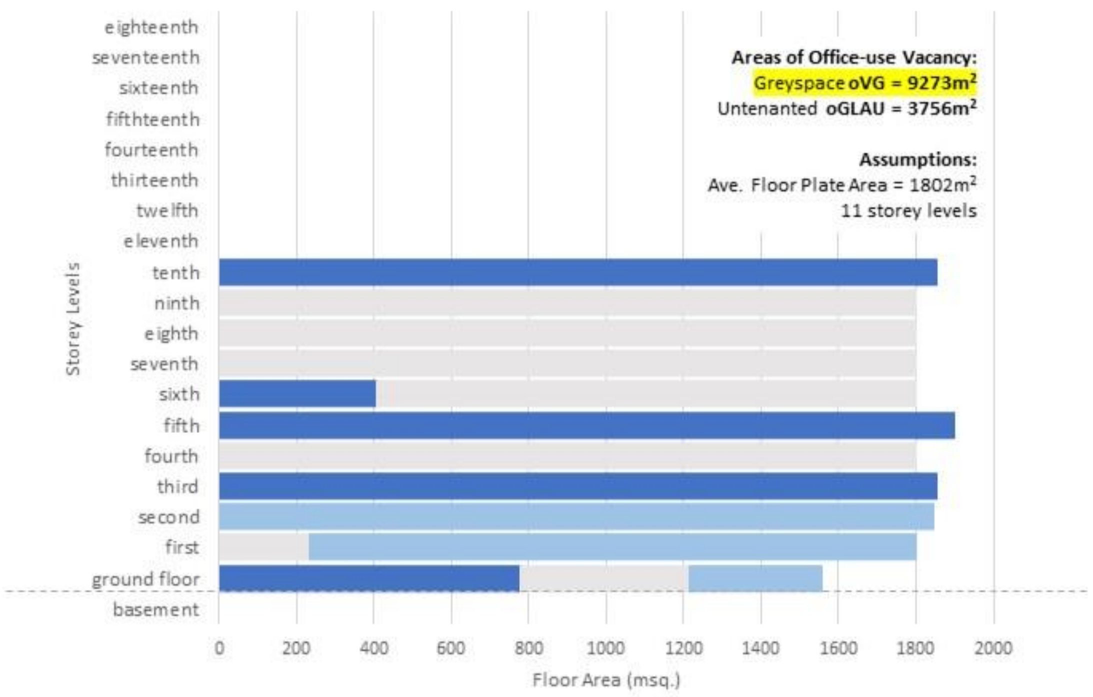
#121

Building #121:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 11875m²**
Office-use Gross Lettable Area **oGLA = 11875m²**
Office-use Vacant Area **oVA = 10500m²**
Office-use Vacancy Rate **oVR = 88%**



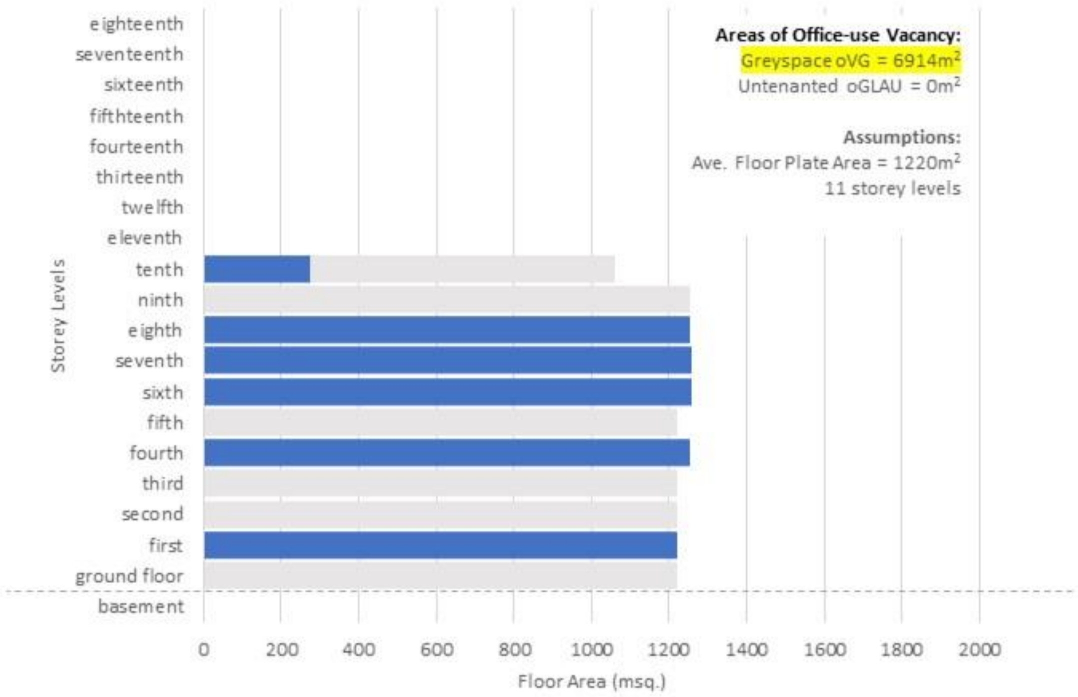
#86

Building #86:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 19819m²**
Office-use Gross Lettable Area **oGLA = 19819m²**, Office-use Vacant Area **oVA = 13029m²**
Office-use Vacancy Rate **oVR = 66%**
Assumptions: Ave. Floor Plate Area = 1802m



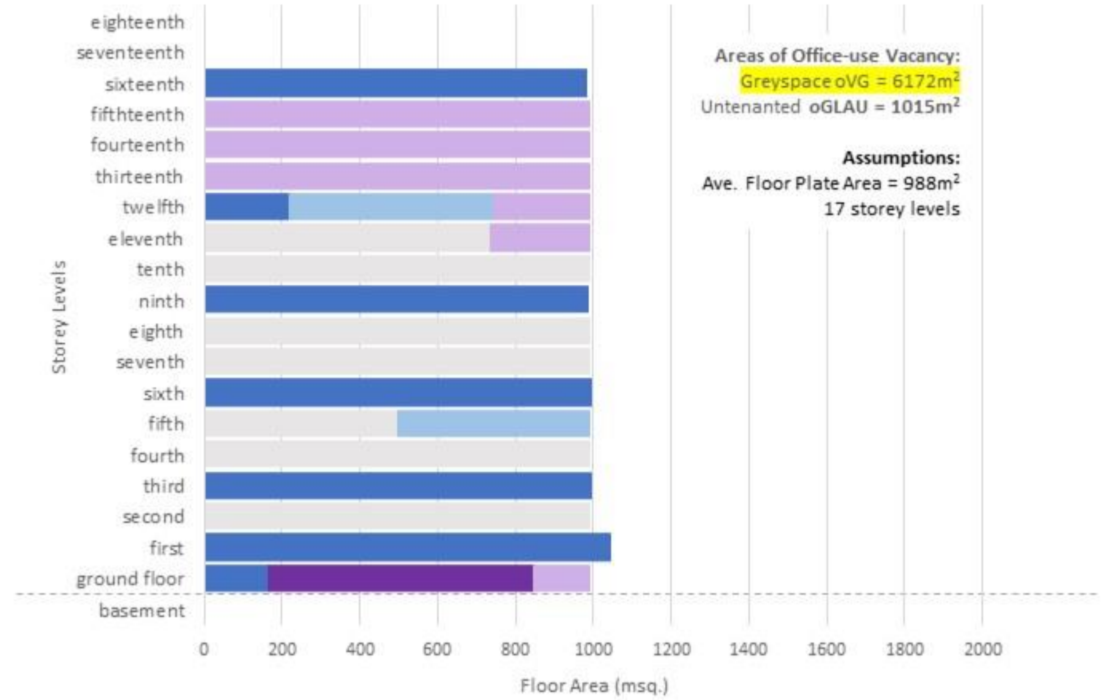
#7

Building #7:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 13420m²**
Office-use Gross Lettable Area **oGLA = 13420m²**
Office-use Vacant Area **oVA = 6914m²**
Office-use Vacancy Rate **oVR = 52%**



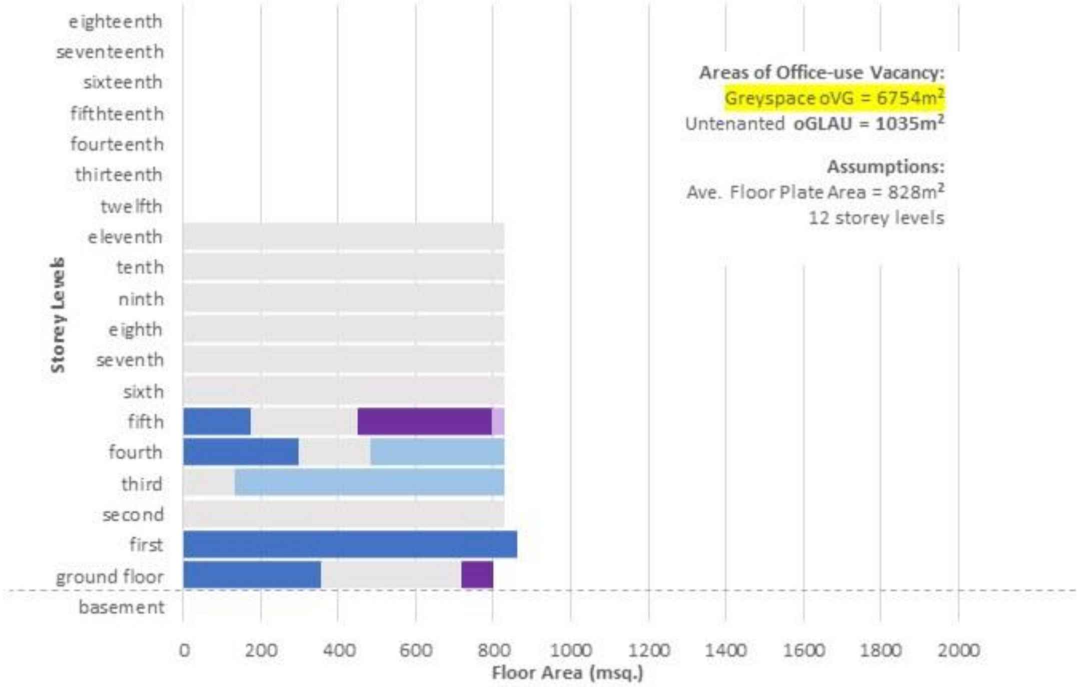
#117

Building #117:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 16797m²**
Office-use Gross Lettable Area **oGLA = 12565m²**
Office-use Vacant Area **oVA = 7187m²**
Office-use Vacancy Rate **oVR = 57%**



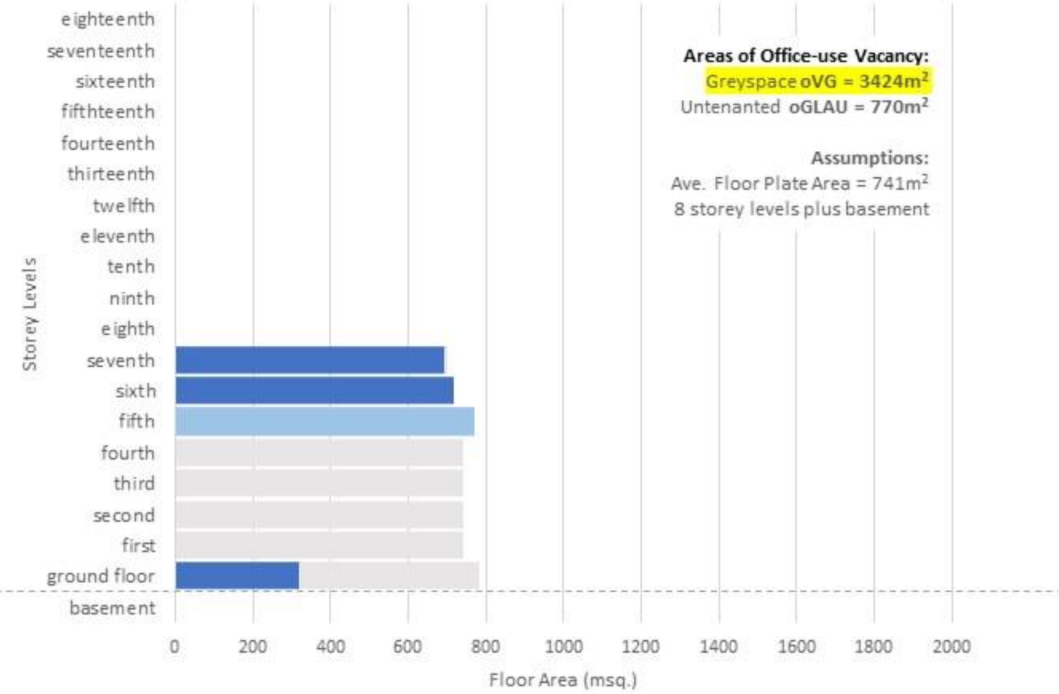
#62

Building #62:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 9938m²**
Office-use Gross Lettable Area **oGLA = 9478m²** Office-use Vacant Area **oVA = 7789m²**
Office-use Vacancy Rate **oVR = 79%**



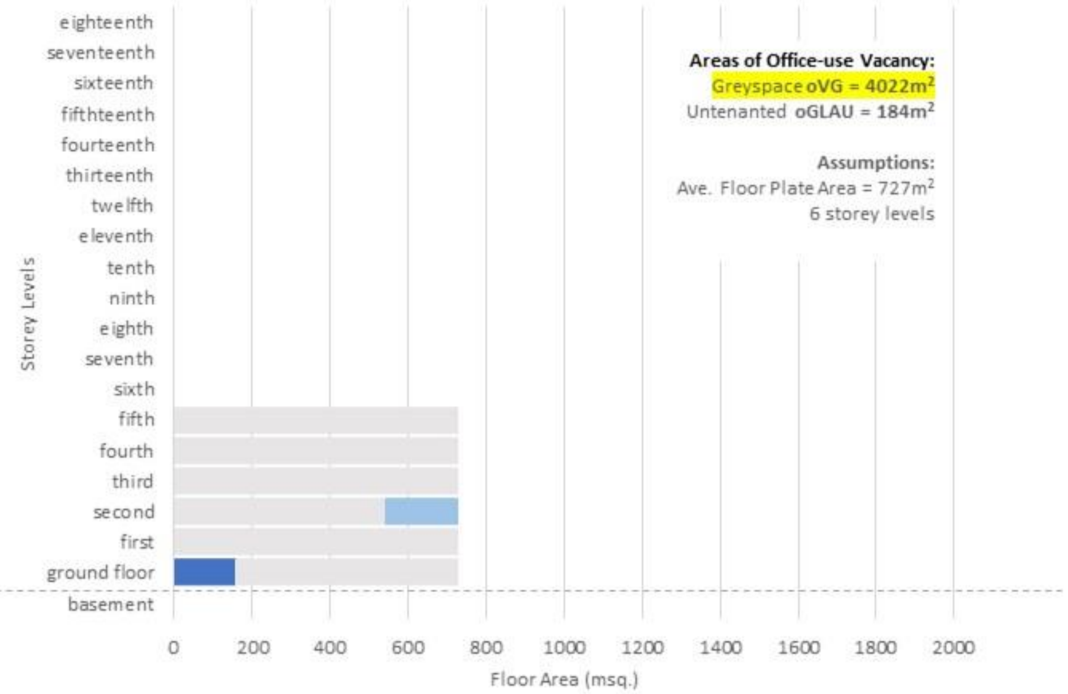
#105

Building #105:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 5924m²**
Office-use Gross Lettable Area **oGLA = 5924m²**
Office-use Vacant Area **oVA = 4193m²**
Office-use Vacancy Rate **oVR = 71%**



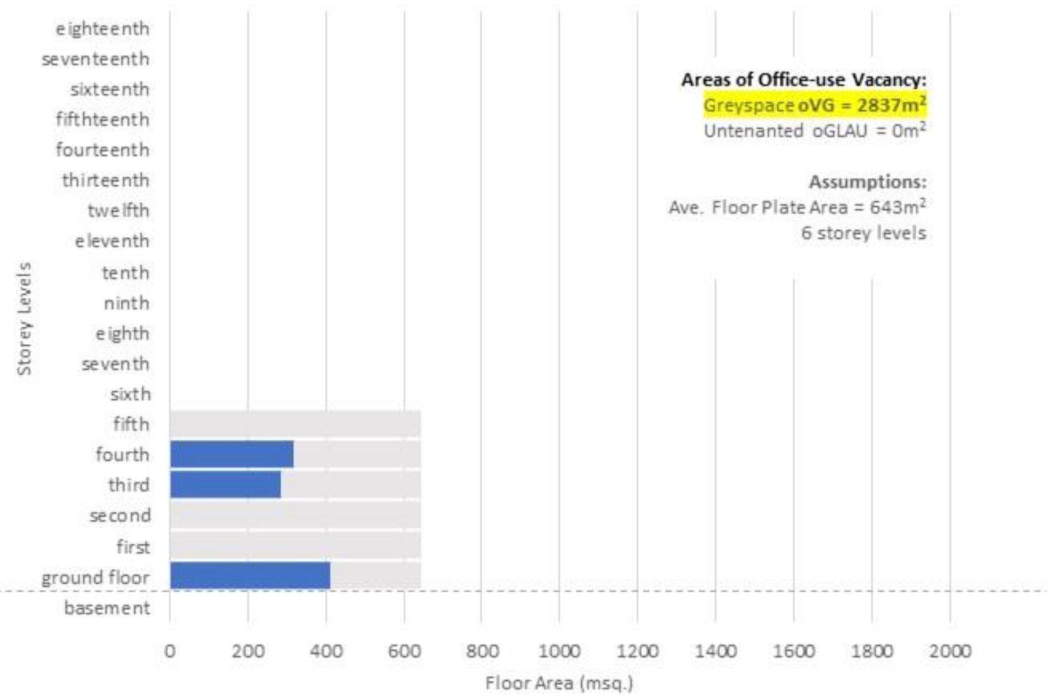
#52

Building #52:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 4363m²**
Office-use Gross Lettable Area **oGLA = 4363m²**
Office-use Vacant Area **oVA = 4206m²**
Office-use Vacancy Rate **oVR = 96%**



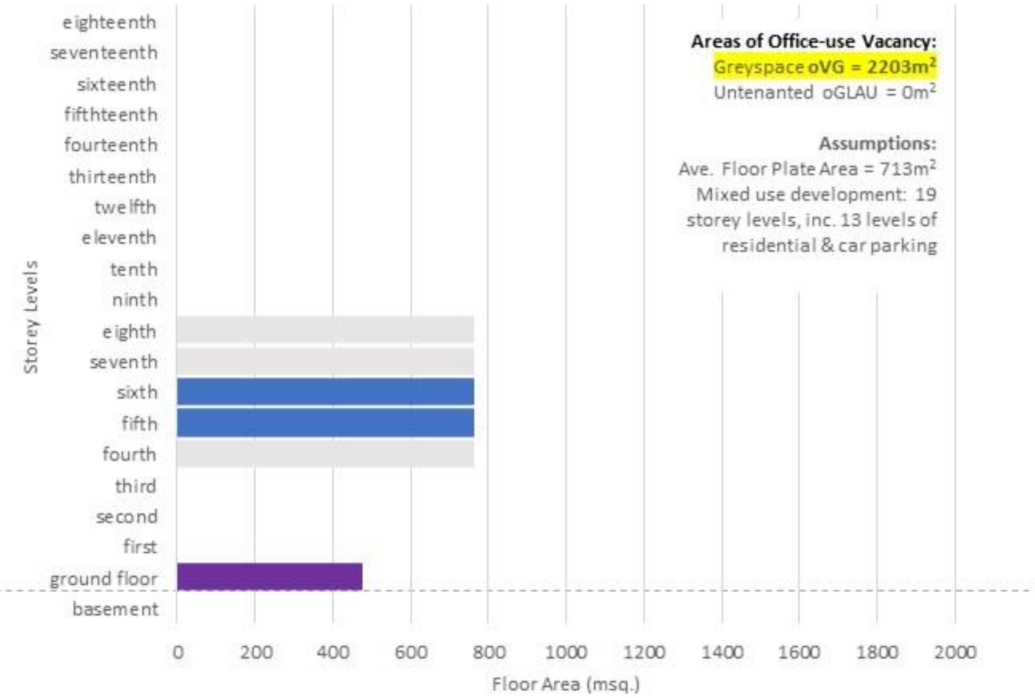
#106

Building #106:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 3856m²**
Office-use Gross Lettable Area **oGLA = 3856m²**
Office-use Vacant Area **oVA = 2837m²**
Office-use Vacancy Rate **oVR = 74%**



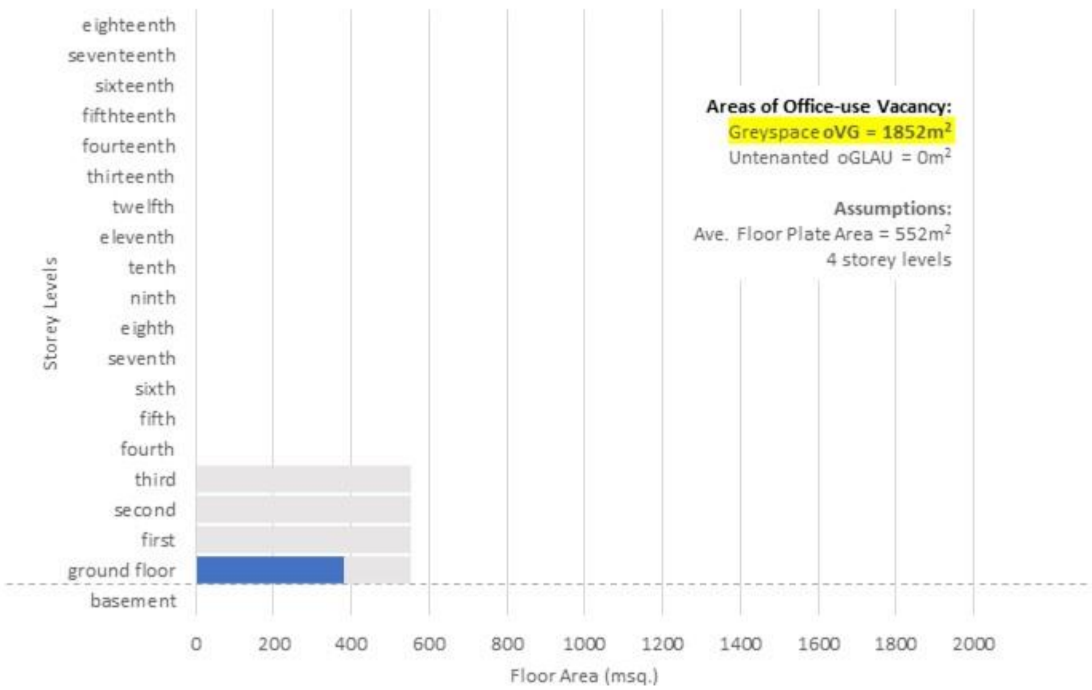
#51

Building #51:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 4278m²**
Office-use Gross Lettable Area **oGLA = 3803m²**
Office-use Vacant Area **oVA = 2283m²**
Office-use Vacancy Rate **oVR = 60%**



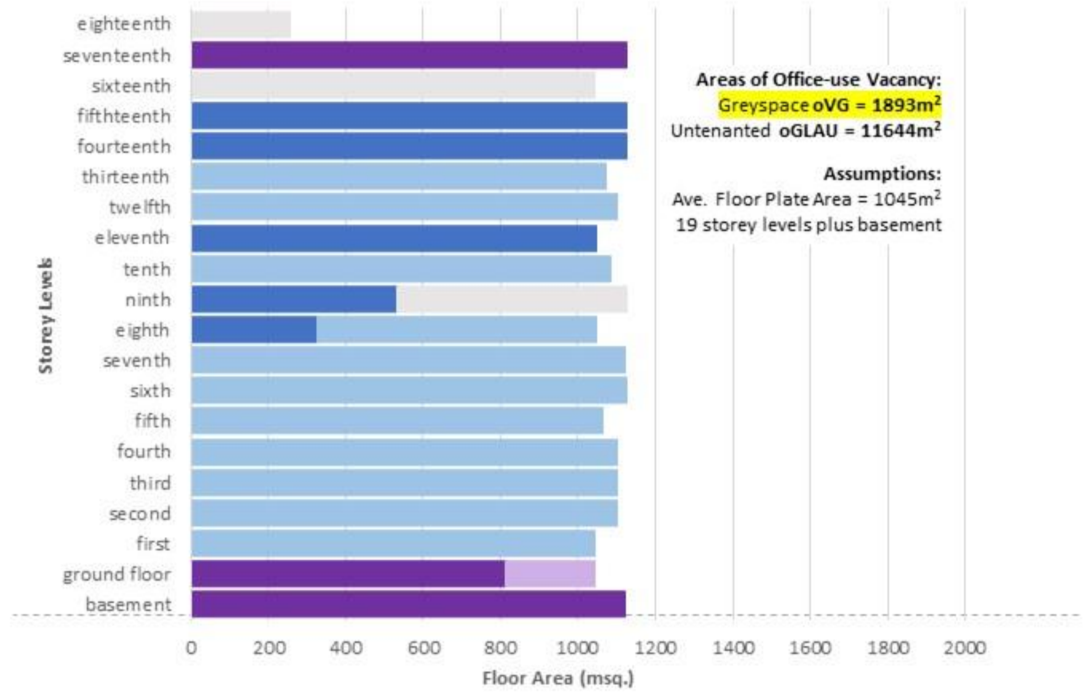
#27

Building #27:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 2077m²**
Office-use Gross Lettable Area **oGLA = 2077m²**
Office-use Vacant Area **oVA = 1825m²**
Office-use Vacancy Rate **oVR = 82%**



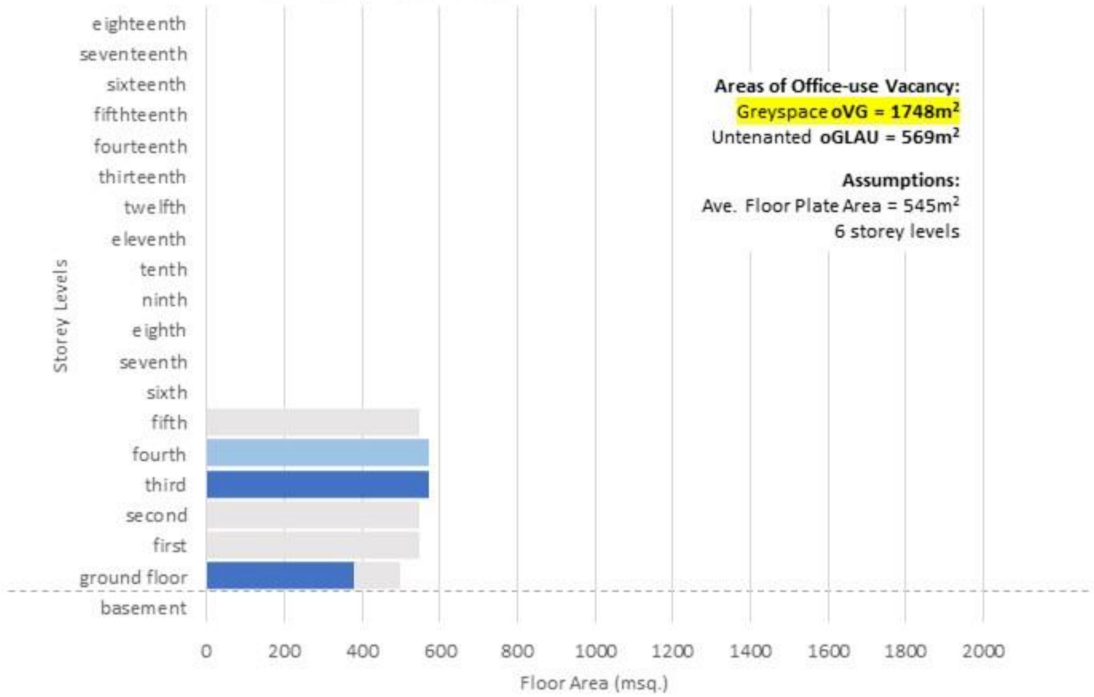
#60

Building #60:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 20983m²**
Office-use Gross Lettable Area **oGLA = 17692m²**, Office-use Vacant Area **oVA = 13537m²**
Office-use Vacancy Rate **oVR = 77%**



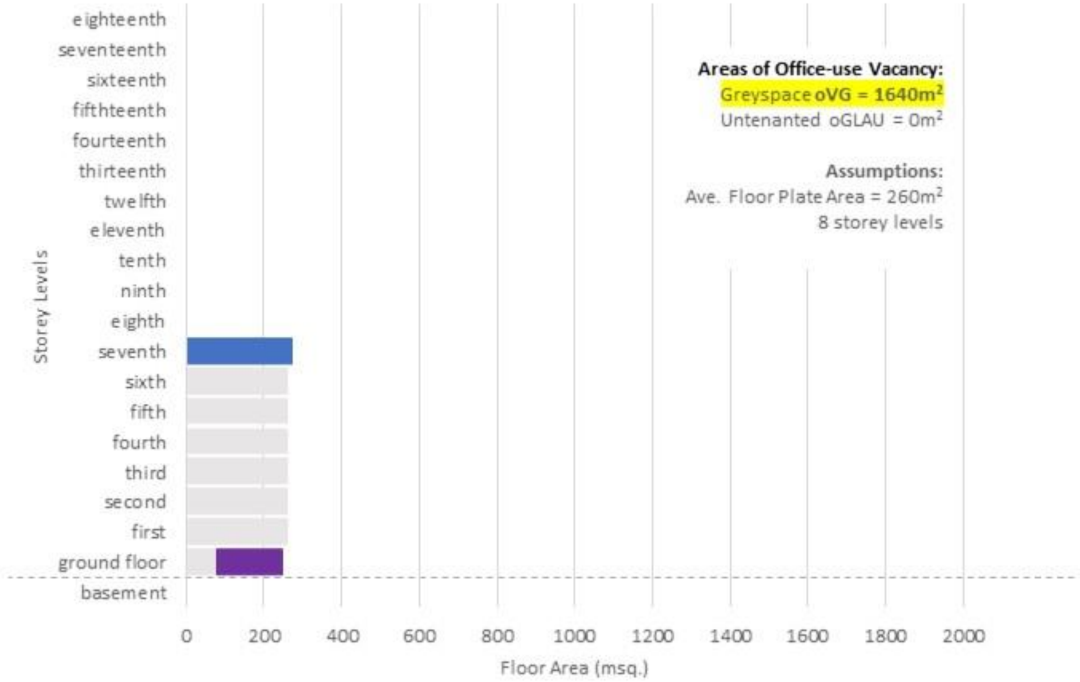
#53

Building #53:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 3268m²**
Office-use Gross Lettable Area **oGLA = 3268m²**
Office-use Vacant Area **oVA = 2317m²**
Office-use Vacancy Rate **oVR = 71%**

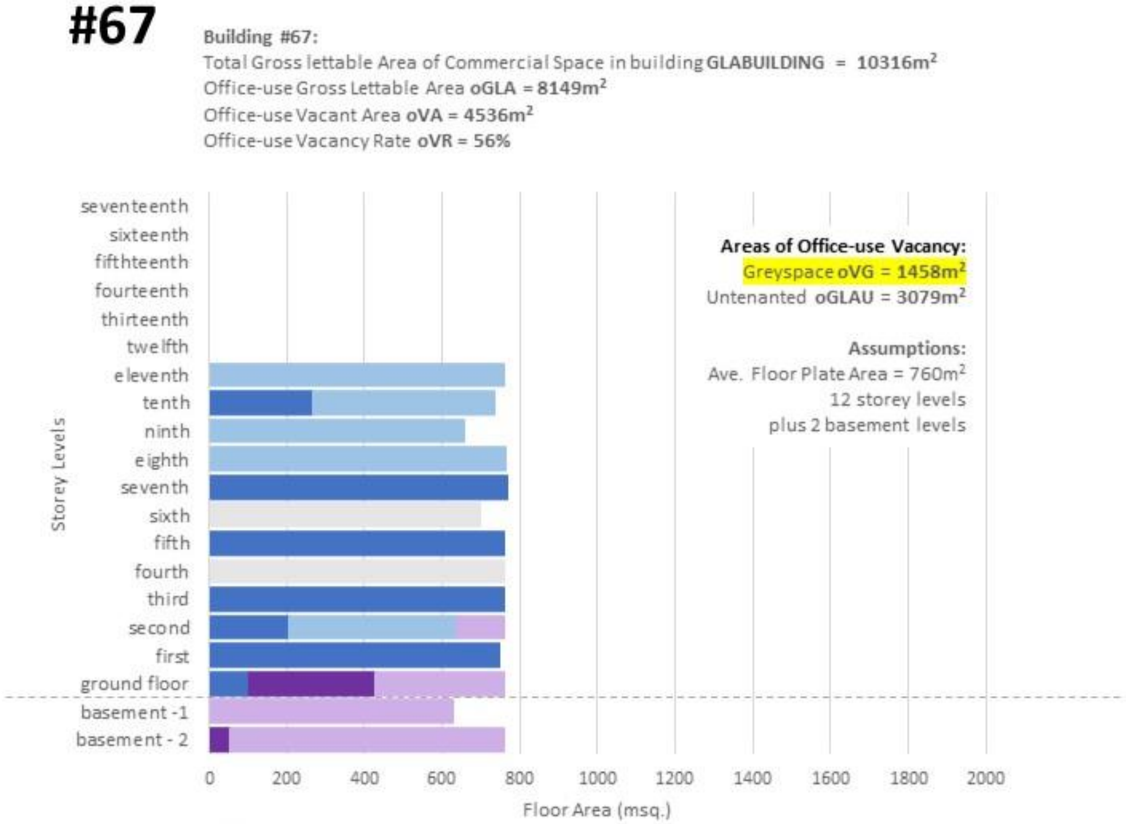


#85

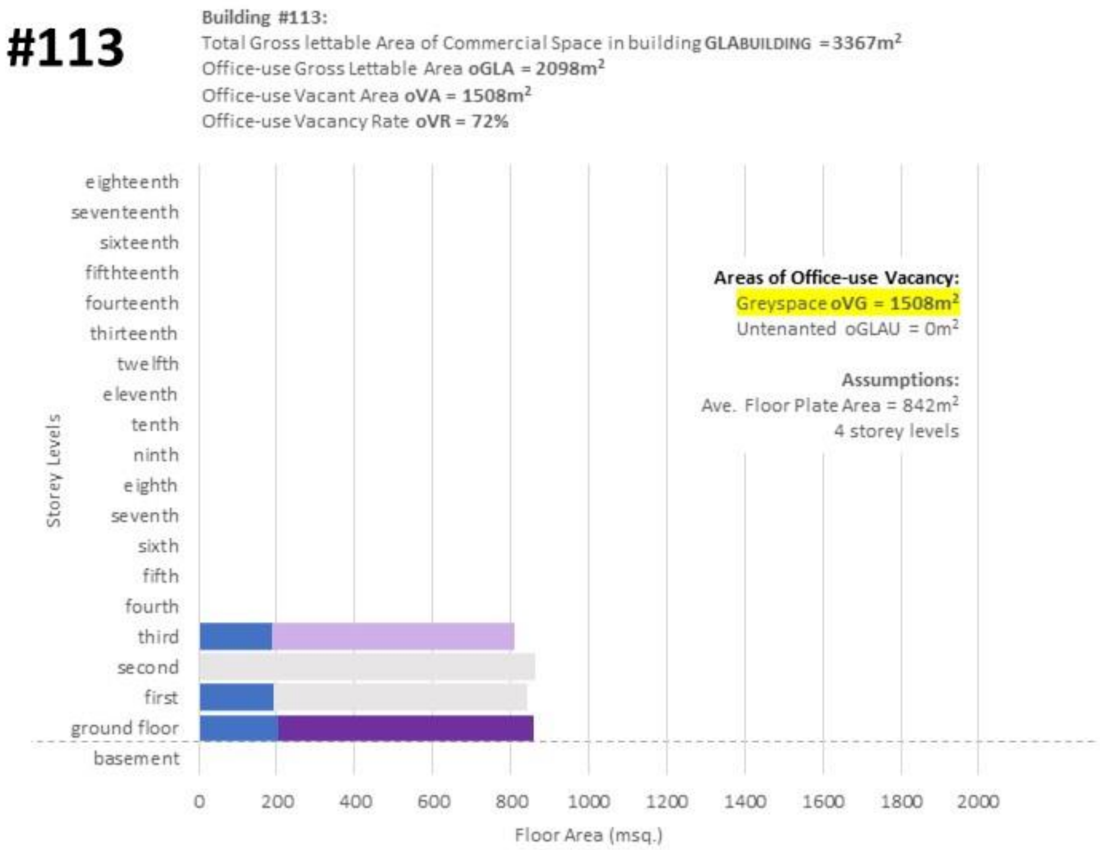
Building #85:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 2080m²**
Office-use Gross Lettable Area **oGLA = 1914m²**
Office-use Vacant Area **oVA = 1640m²**
Office-use Vacancy Rate **oVR = 86%**



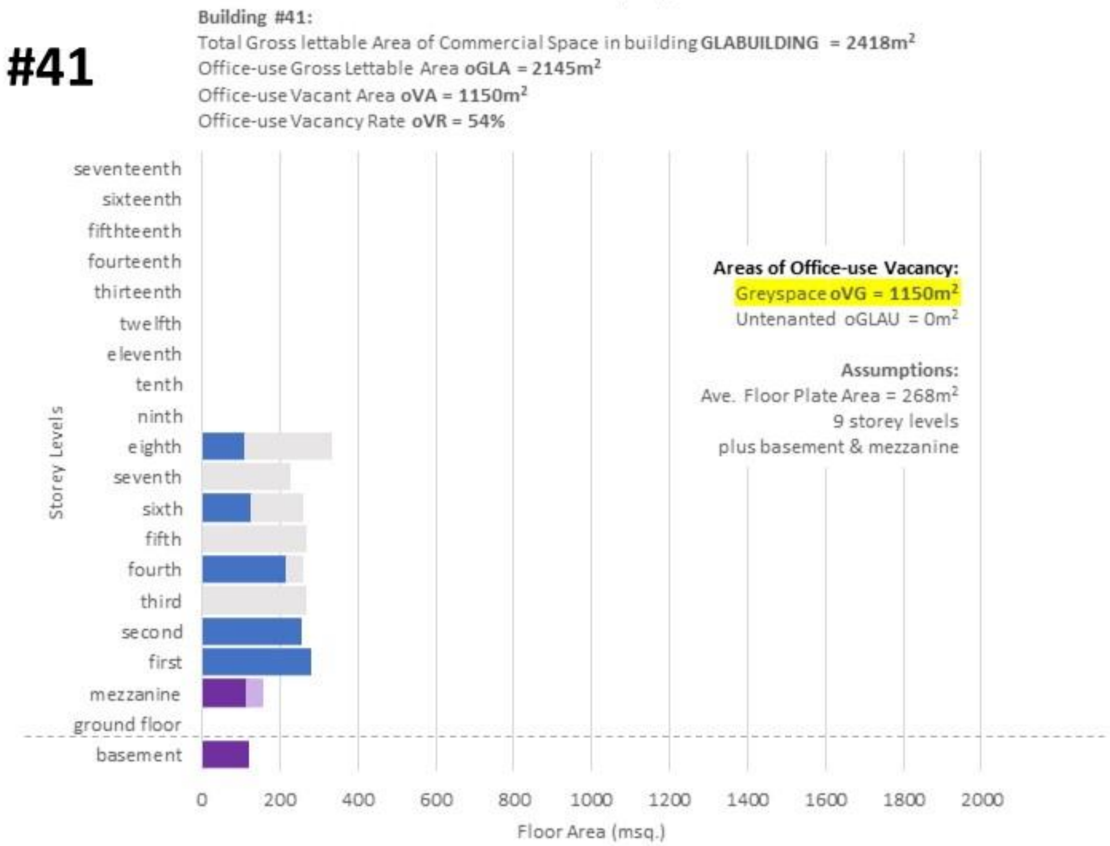
#67


Building #67:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 10316m²
Office-use Gross Lettable Area oGLA = 8149m²
Office-use Vacant Area oVA = 4536m²
Office-use Vacancy Rate oVR = 56%
Areas of Office-use Vacancy:
Greyspace oVG = 1458m²
Untenanted oGLAU = 3079m²
Assumptions:
Ave. Floor Plate Area = 760m²
12 storey levels
plus 2 basement levels
Storey Levels
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
ground floor
basement -1
basement - 2
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Floor Area (msq.)

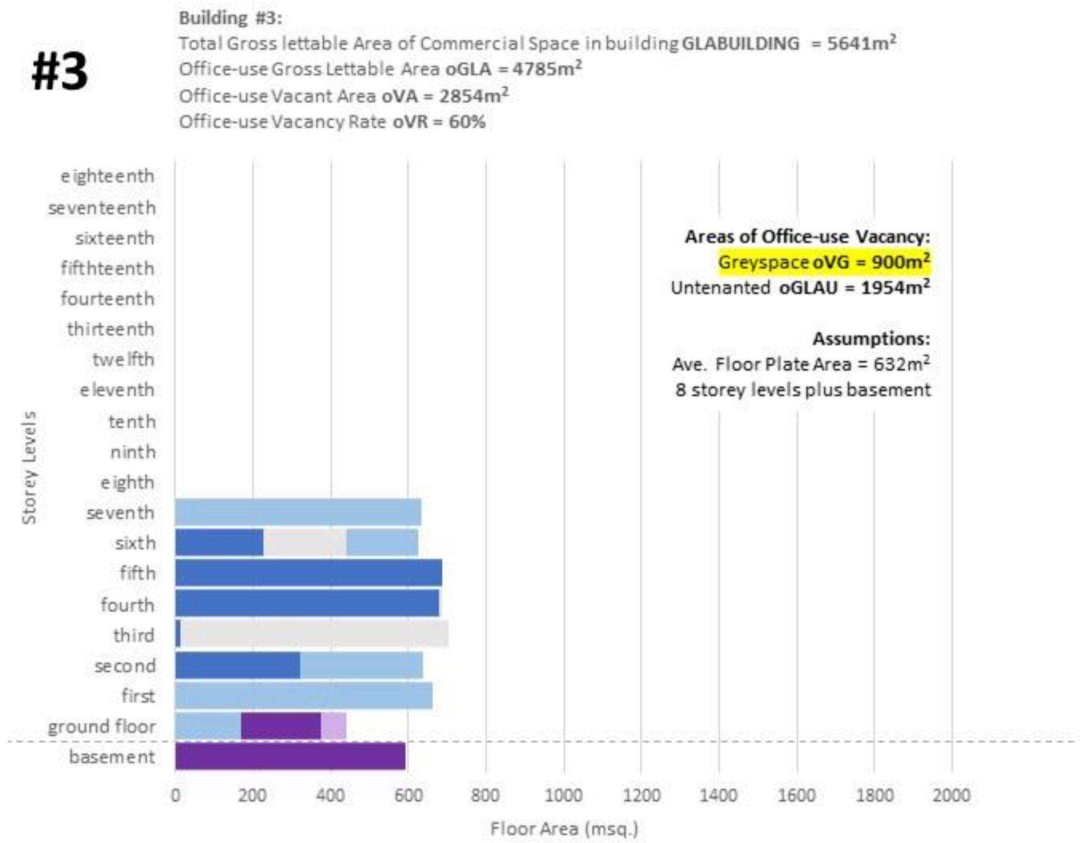
#113


Building #113:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 3367m²
Office-use Gross Lettable Area oGLA = 2098m²
Office-use Vacant Area oVA = 1508m²
Office-use Vacancy Rate oVR = 72%
Areas of Office-use Vacancy:
Greyspace oVG = 1508m²
Untenanted oGLAU = 0m²
Assumptions:
Ave. Floor Plate Area = 842m²
4 storey levels
Storey Levels
eighteenth
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
ground floor
basement
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Floor Area (msq.)

#41

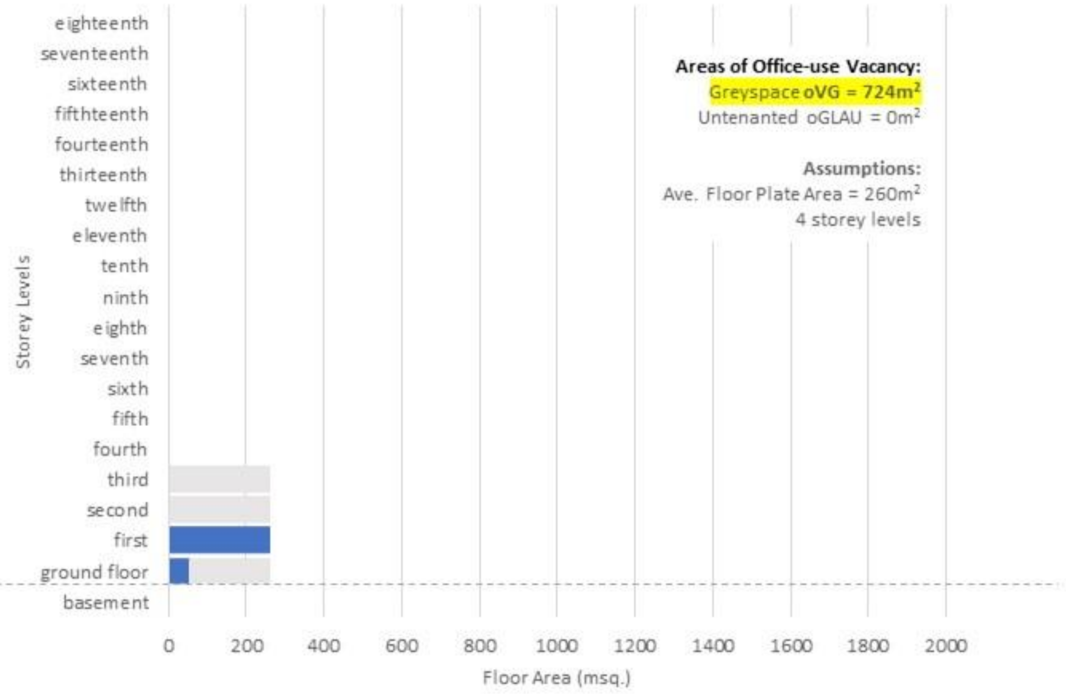

Building #41:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 2418m²
Office-use Gross Lettable Area oGLA = 2145m²
Office-use Vacant Area oVA = 1150m²
Office-use Vacancy Rate oVR = 54%
Areas of Office-use Vacancy:
Greyspace oVG = 1150m²
Untenanted oGLAU = 0m²
Assumptions:
Ave. Floor Plate Area = 268m²
9 storey levels
plus basement & mezzanine
Storey Levels
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
mezzanine
ground floor
basement
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Floor Area (msq.)

#3


Building #3:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 5641m²
Office-use Gross Lettable Area oGLA = 4785m²
Office-use Vacant Area oVA = 2854m²
Office-use Vacancy Rate oVR = 60%
Areas of Office-use Vacancy:
Greyspace oVG = 900m²
Untenanted oGLAU = 1954m²
Assumptions:
Ave. Floor Plate Area = 632m²
8 storey levels plus basement
Storey Levels
eighteenth
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
ground floor
basement
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Floor Area (msq.)

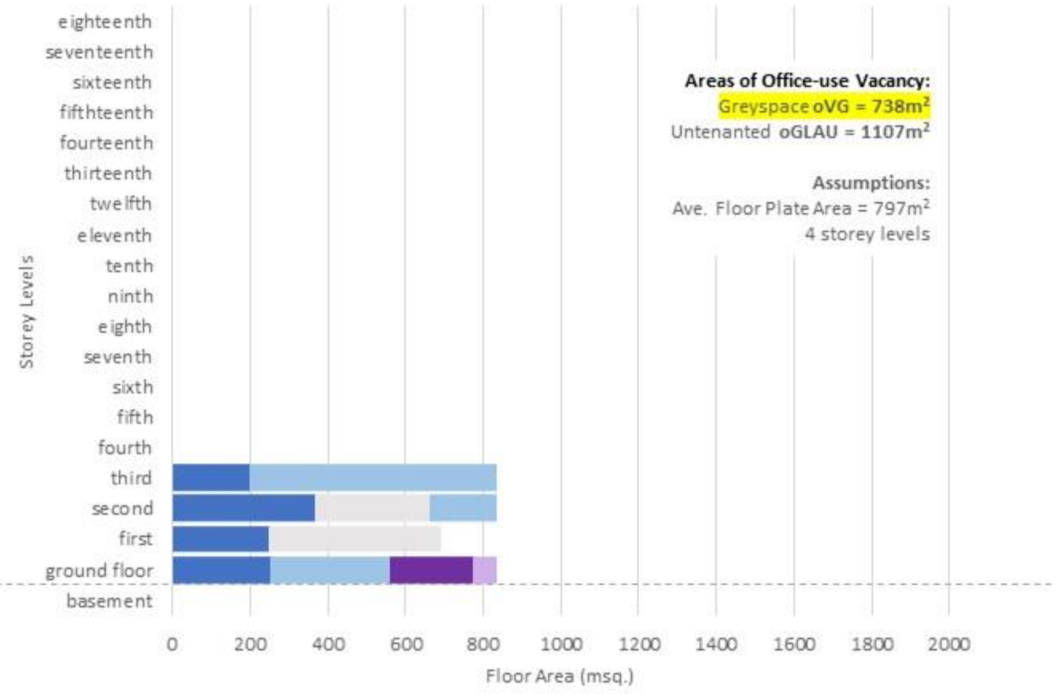
#91

Building #91:
Total Gross lettable Area of Commercial Space in building **GLABUILDING** = **1040m²**
Office-use Gross Lettable Area **oGLA** = **1040m²**
Office-use Vacant Area **oVA** = **724m²**
Office-use Vacancy Rate **oVR** = **70%**



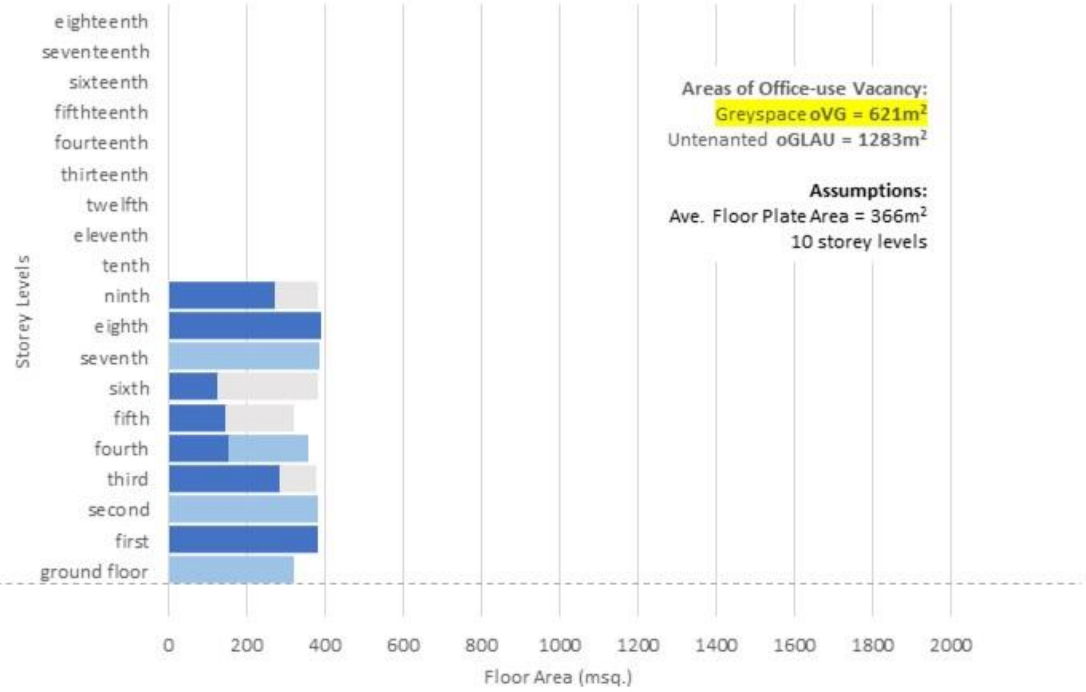
#101

Building #101:
Total Gross lettable Area of Commercial Space in building **GLABUILDING** = **3186m²**
Office-use Gross Lettable Area **oGLA** = **2917m²**
Office-use Vacant Area **oVA** = **1845m²**
Office-use Vacancy Rate **oVR** = **63%**



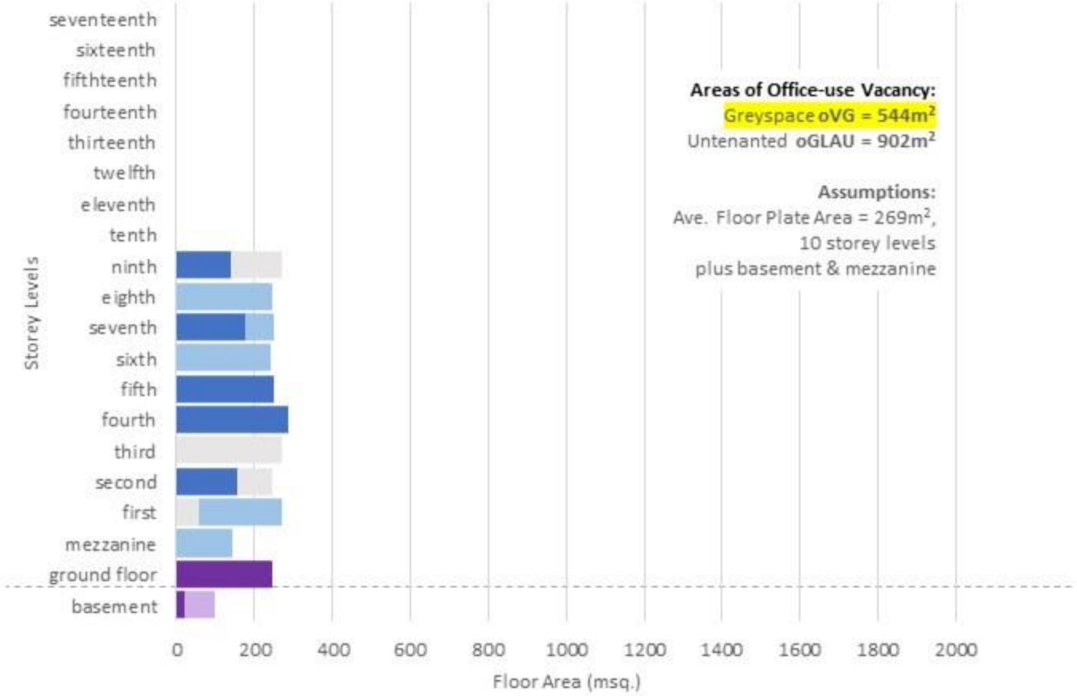
#22

Building #22:
Total Gross lettable Area of Commercial Space in building **GLABUILDING** = **3660m²**
Office-use Gross Lettable Area **oGLA** = **3660m²**
Office-use Vacant Area **oVA** = **1904m²**
Office-use Vacancy Rate **oVR** = **52%**



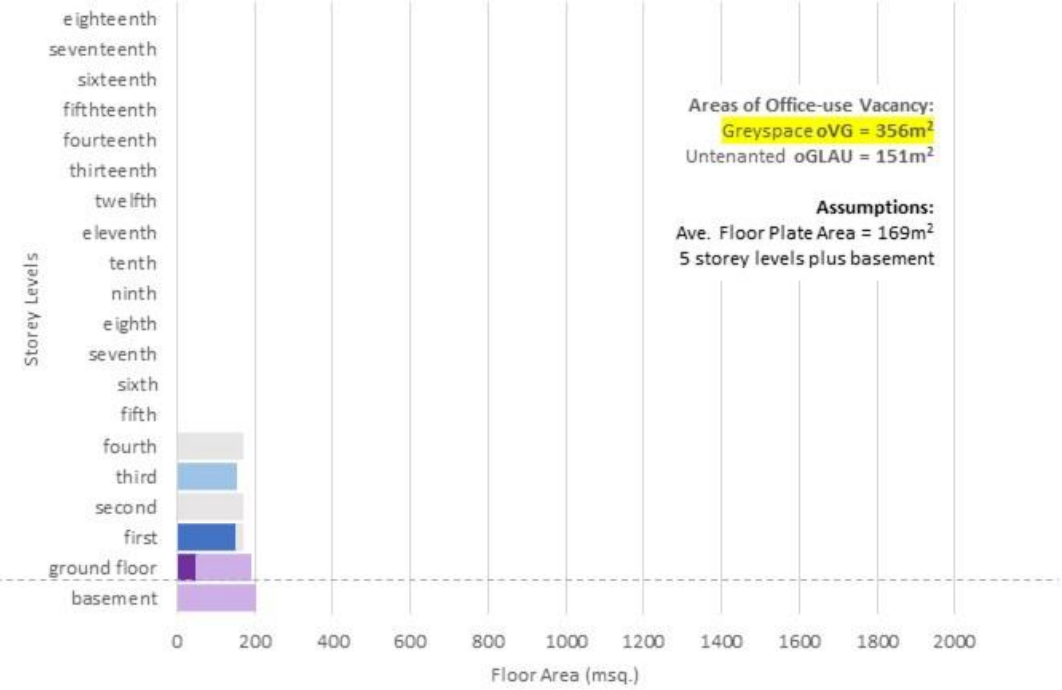
#2

Building #2:
Total Gross lettable Area of Commercial Space in building **GLABUILDING** = **2783m²**
Office-use Gross Lettable Area **oGLA** = **2453m²**
Office-use Vacant Area **oVA** = **1446m²**
Office-use Vacancy Rate **oVR** = **59%**



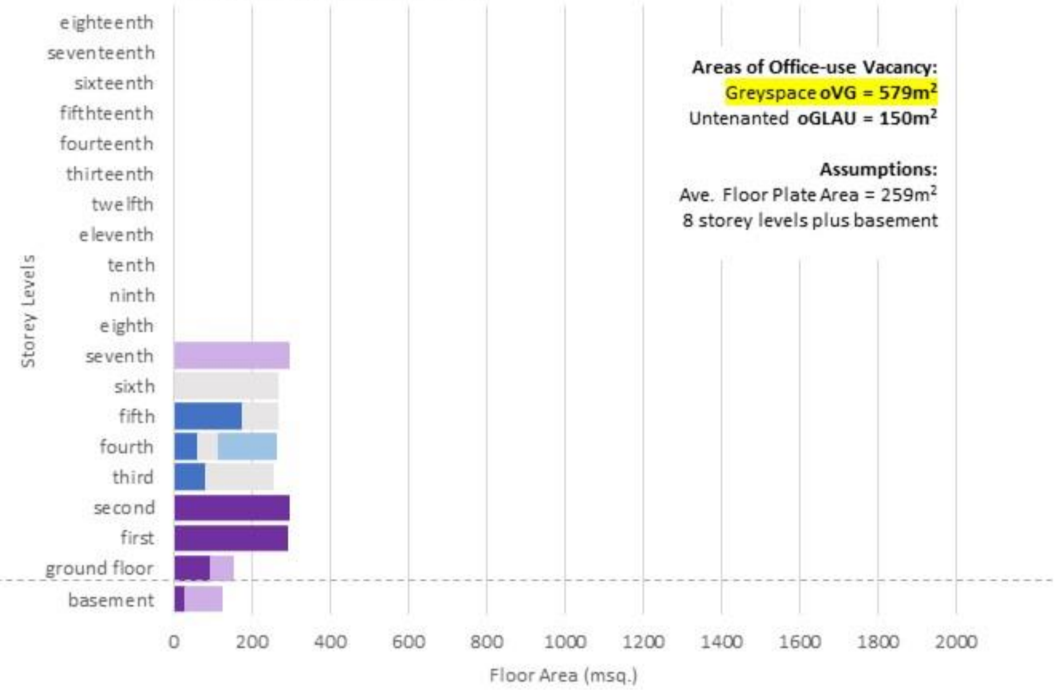
#65

Building #65:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 1050m²**
Office-use Gross Lettable Area **oGLA = 658m²**
Office-use Vacant Area **oVA = 507m²**
Office-use Vacancy Rate **oVR = 77%**



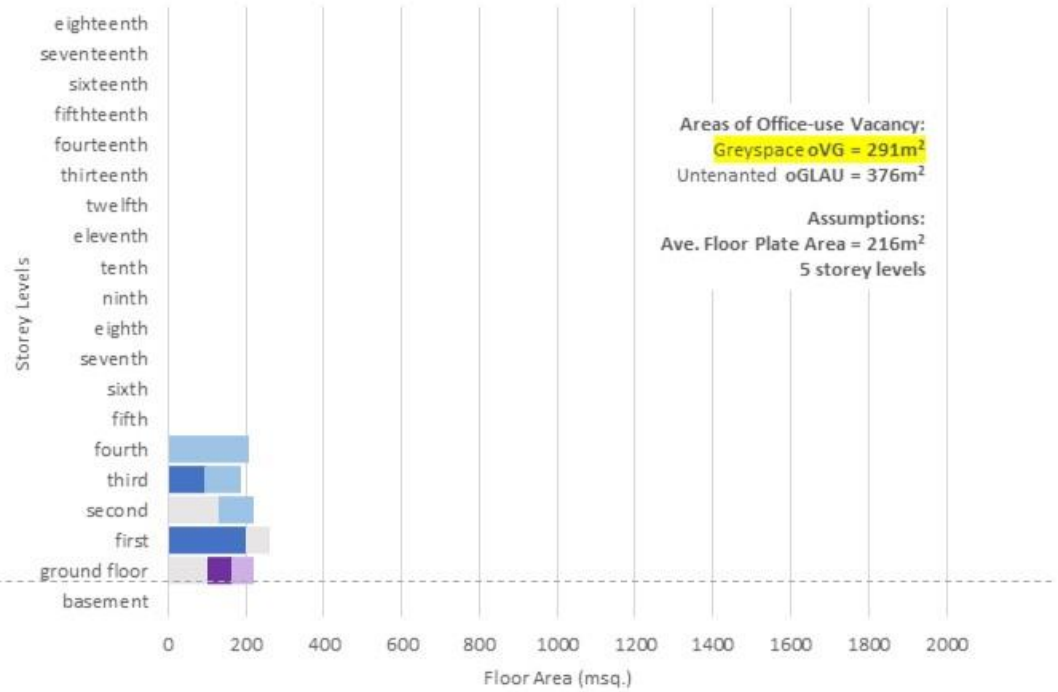
#40

Building #40:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 2196m²**
Office-use Gross Lettable Area **oGLA = 1044m²**
Office-use Vacant Area **oVA = 729m²**
Office-use Vacancy Rate **oVR = 70%**



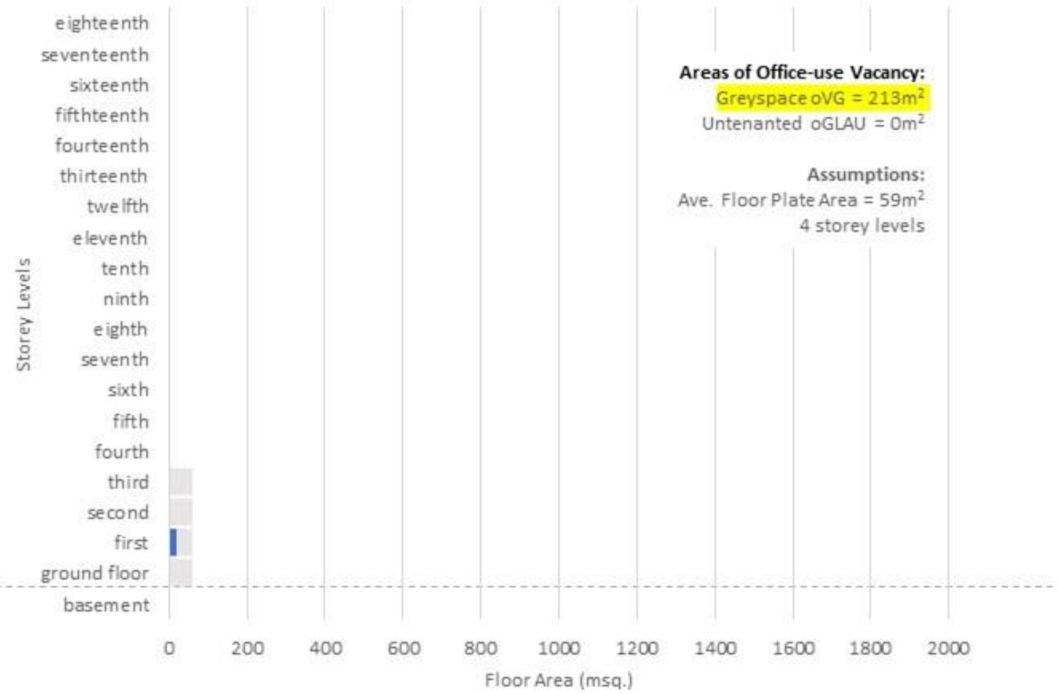
#64

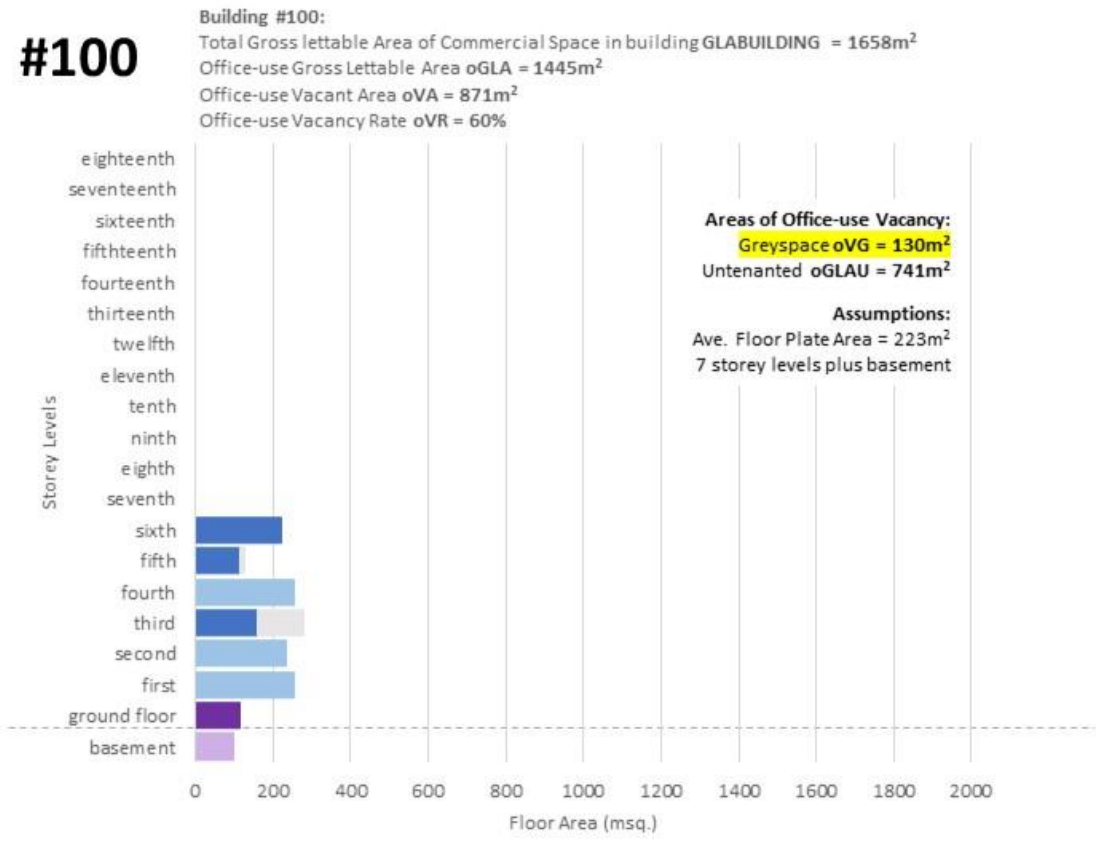
Building #64:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 1080m²**
Office-use Gross Lettable Area **oGLA = 966m²**
Office-use Vacant Area **oVA = 667m²**
Office-use Vacancy Rate **oVR = 69%**

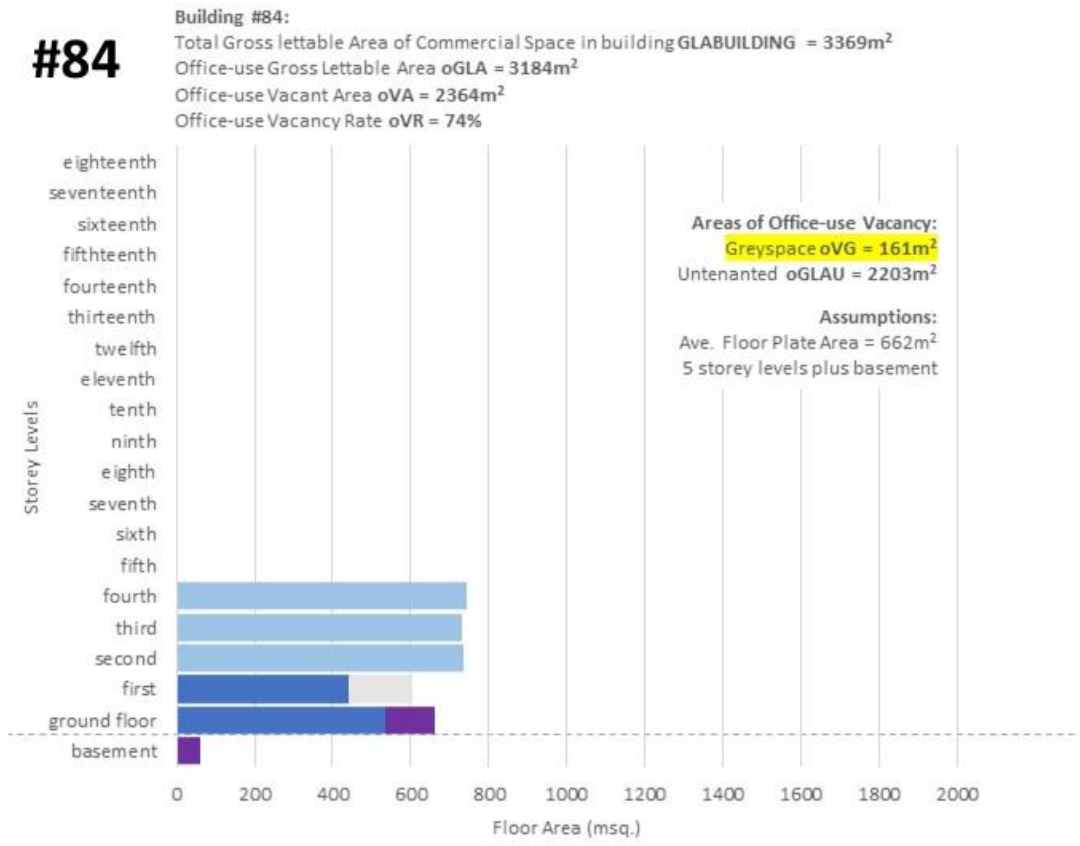


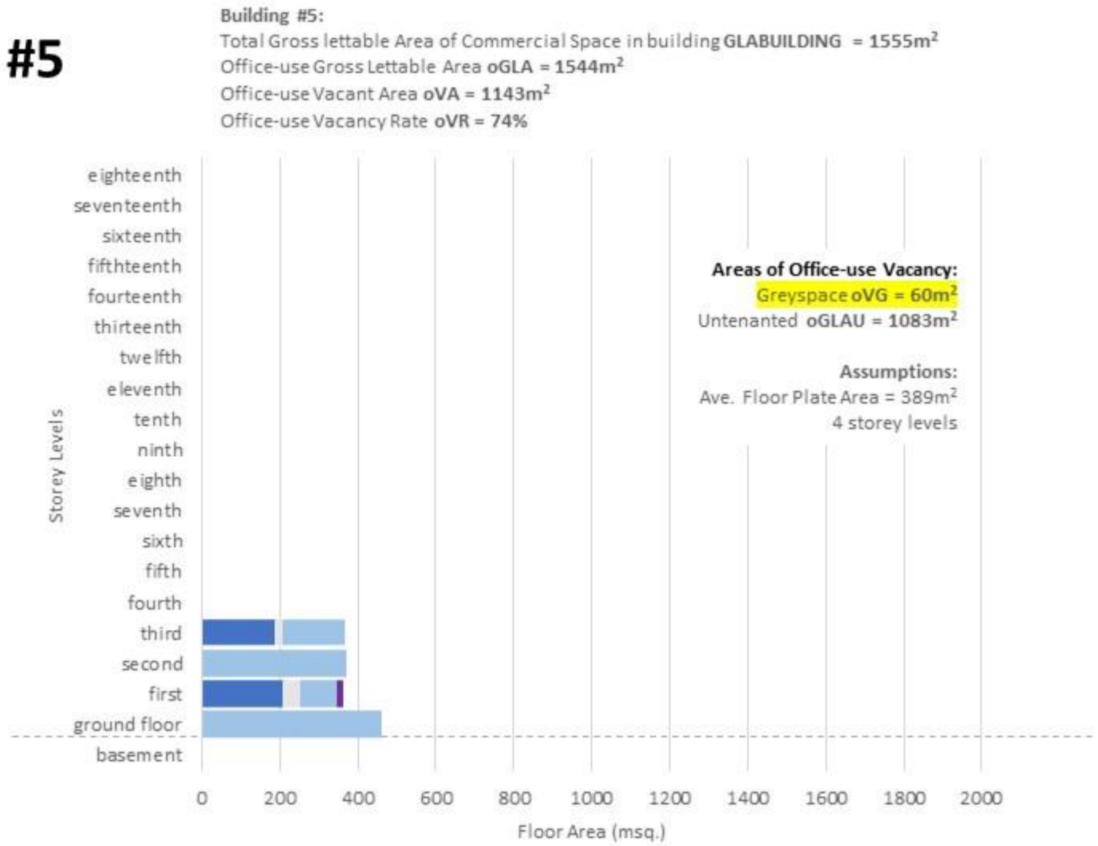
#111

Building #111:
Total Gross lettable Area of Commercial Space in building **GLABUILDING = 236m²**
Office-use Gross Lettable Area **oGLA = 236m²**
Office-use Vacant Area **oVA = 214m²**
Office-use Vacancy Rate **oVR = 90%**




#100
Building #100:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 1658m²
Office-use Gross Lettable Area oGLA = 1445m²
Office-use Vacant Area oVA = 871m²
Office-use Vacancy Rate oVR = 60%
Areas of Office-use Vacancy:
Greyspace oVG = 130m²
Untenanted oGLAU = 741m²
Assumptions:
Ave. Floor Plate Area = 223m²
7 storey levels plus basement
Storey Levels
eighteenth
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
ground floor
basement
0 200 400 600 800 1000 1200 1400 1600 1800 2000
Floor Area (msq.)


#84
Building #84:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 3369m²
Office-use Gross Lettable Area oGLA = 3184m²
Office-use Vacant Area oVA = 2364m²
Office-use Vacancy Rate oVR = 74%
Areas of Office-use Vacancy:
Greyspace oVG = 161m²
Untenanted oGLAU = 2203m²
Assumptions:
Ave. Floor Plate Area = 662m²
5 storey levels plus basement
Storey Levels
eighteenth
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
ground floor
basement
0 200 400 600 800 1000 1200 1400 1600 1800 2000
Floor Area (msq.)


#5
Building #5:
Total Gross lettable Area of Commercial Space in building GLABUILDING = 1555m²
Office-use Gross Lettable Area oGLA = 1544m²
Office-use Vacant Area oVA = 1143m²
Office-use Vacancy Rate oVR = 74%
Areas of Office-use Vacancy:
Greyspace oVG = 60m²
Untenanted oGLAU = 1083m²
Assumptions:
Ave. Floor Plate Area = 389m²
4 storey levels
Storey Levels
eighteenth
seventeenth
sixteenth
fifthteenth
fourteenth
thirteenth
twelfth
eleventh
tenth
ninth
eighth
seventh
sixth
fifth
fourth
third
second
first
ground floor
basement
0 200 400 600 800 1000 1200 1400 1600 1800 2000
Floor Area (msq.)

Appendix 7-E: 'The Shape of Vacancy' Report for SA Gov.

This report was produced for SA State Government, and reproduced here, highlighting the contribution to knowledge offered by VVAM.

THE SHAPE OF VACANCY

By Gillian Armstrong, in conjunction with the Heritage Office, Department of Environment and Water, South Australian State Government and Adelaide City Council.

Contents

Executive Summary

The most effective way to protect a building's future is to ensure it has an ongoing functional use. Buildings left empty often fall quickly into disrepair and dilapidate faster than buildings that are used. Decisions to avoid and mitigate obsolescence in buildings are best informed by evidence to discuss low levels of occupancy across the heritage building population, rather than reliance on anecdotes of examples of single buildings. This report outlines the method used to quantify occupancy levels in a building population of South Australian (SA) State Heritage Registered buildings (SHR), located within Adelaide CBD. The report is to be read in conjunction with the SHR Sample Database V5. The research was commissioned by the Department of Environment and Water (DEW), South Australian State Government in October 2018. The time period for which occupancy was establish was mid-2017. The occupancy levels were established for the purpose of identifying a sample of buildings suitable for further analysis within a context of obsolescence mitigation strategies. The method is reliant on data collected by Adelaide City Council. Using the method detailed, in this report, a total of 85 SHR buildings were suitable for occupancy analysis. The analysis was undertaken to identify buildings most at risk of obsolescence, using occupancy levels as an indicator of obsolescence.

Key findings include:

- From a sample of 85 SHR properties, 37 buildings were considered to have occupancy levels of below 50%.
- The majority of these 37 buildings are primarily small-scale properties of total lettable areas under 1500msq.
- Only 2 properties, considered to have an occupancy level below 50% were of a large scale (above 5000msq. total lettable area). These are considered to be privately owned buildings containing banks and are considered to be commercially active.
- This finding is contrary to widespread view that Adelaide has a severe problem with vacant heritage buildings.

Critical discussions are recommended on the scale of vacancy in Adelaide's heritage buildings and whether comparisons can be drawn with other heritage building populations within Australian and international cities.

It is recommended that this exercise needs to be repeated in the future, with the support from Adelaide City Council and SA State Government DEW, so that it can be determined if the vacancy disclosed by 2017 data is still present and can be considered long-term structural, rather than temporary natural vacancy.

Acknowledgements

I would like to express my thanks for support, local knowledge and heritage expertise offered in support of the research contained in this report. Many thanks to Michael Queale, Senior Heritage Architect, at the Heritage Office, SA State Government Department of Environment and Water. I would also like to thank the support of Adelaide City Council for sharing the secondary data relied upon in this report. I am also grateful to Robyn Taylor for her wisdom within the research process and for sharing her expertise about Adelaide's heritage population.

Introduction

This document outlines the findings from a research project conducted by Gillian Armstrong in October 2018 and April 2019 for the purposes of understanding vacancy in State Heritage Registered (SHR) buildings located in the Central Business District (CBD) of Adelaide, the capital city of the Australian State of South Australia. This report is to be read in conjunction with the SHR Building Sample Database V5, supplied in Microsoft Excel format.

This research report was commissioned by the Department of Environment and Water, South Australian State Government. The research was commissioned in October 2018 (see Appendix C). It has been produced under guidance and instruction by Beverly Voigt, Manager of Heritage Office, Economic and Sustainable Development South Australia and Michael Queale, Senior Heritage Architect at Heritage Office, Economic and Sustainable Development, South Australia. The information provided in this report relies upon secondary data collected and produced by Adelaide City Council (ACC). Permission for data use was sought and obtained from ACC (see Appendix B). The secondary data was used to determine occupancy levels, in a sample of SHR buildings in Adelaide CBD to provide insight into how best to encourage strategies to mitigate vacancy in Adelaide CBD.

The occupancy analysis was conducted for a recent period, at a time considered to be the peak of vacancy across both heritage and non-heritage commercial buildings in Adelaide CBD, (Wills, 2016; Evans, 2017a; Evans, 2017b; Preiss, 2017; Siebert, 2017; Jervis-Bardy, 2018). Concern about vacancy in Adelaide CBD was notable and was often the subject of public discourse, resulting in media attention and political debate (Washington & Sierbert, 2016; Weatherill, 2016). However, there is little research to understand vacancy and occupancy across SHR buildings in Adelaide CBD to critically evaluate perceived wisdom reported in public discourse. This report is the first known attempt to quantify vacancy by establishing occupancy levels as an indicator of the perceived vacancy 'problem'.

It has been suggested by policy initiatives, international research, and debates in public discourse local to Adelaide that adaptive reuse, or building re-activation through change of use, is a key strategy for re-activating heritage listed buildings. At a city-wide scale, adaptive reuse of SHR buildings is considered important from both economic and heritage conservation perspectives. However, there is a lack of understanding of vacancy within heritage buildings in Adelaide. This lack of knowledge is not limited to Adelaide however, nor to heritage building populations. Although, adaptive reuse of heritage buildings is an emerging field of research both internationally and within Australia, the quantification of vacancy in buildings across towns and cities has not had sufficient focus to fully understand how adaptive reuse can effectively be used as heritage conservation or urban regeneration tool at a citywide or local suburb level. This report aims to begin to address this to enable greater understanding in discussions surrounding the potential of adaptive reuse as a strategy to address under-use of SHR buildings in Adelaide CBD.

This report is broken into three stages. The first stage was to establish the largest Adelaide CBD SHR Building Sample possible. The second stage was to establish an occupancy level for each building in the sample, using ‘parcels’ of space within each building on a single ownership occupancy basis. The third stage involves an analysis of occupancy levels so that conclusions could be drawn about vacancy across the sample building population. In particular, identification of individual buildings with low occupancy levels that could be targeted for further research. The methods used in stages one & two also permit detailed insights into the vacancy ‘shape’ on a building-by-building basis. Looking at buildings identified with low occupancy is considered by be a rigorous method to develop a more useful and insightful understanding of heritage vacancy in Adelaide, whilst developing policy mechanisms to support reactivation of existing building stocks.

The methods for Stage one and Stage two are detailed below in the methodology section of this report. Stage three (analysis) is detailed in the Analysis and Discussion section of this report.

Methodology

The research question investigated is:

1. To investigate vacancy and occupancy in SA Heritage Registered buildings in Adelaide CBD, in lieu of a lack of available data to quantify vacancy in Adelaide CBD.

Procedure

The following steps have been taken to establish an occupancy level for a sample of SA Heritage Registered buildings in Adelaide CBD. The occupancy rates rely upon data collected by Adelaide City Council in 2017. The method for establishing occupancy levels is detailed below and is split into two stages. The first stage is the formation of the largest sample of SHR buildings possible, within the scope of this report and under guidance of advisors at SA State Government Department of Environment and Water. The second stage was to establish an occupancy level for each building in the sample, using 'parcels' of space within each building on a single ownership occupancy basis. The procedures adopted for these two stages are detailed in the remainder of this report section.

Stage One: electing the Adelaide CBD SHR Building Sample:

1. Selection of buildings within the sample was restricted to located within Adelaide CBD, bound by buildings aligning North, South, East and West Terrace.
2. Identify SHR structures suitable for occupancy analysis and omit structures which cannot be occupied, for example bridges, gates, war memorials, and statues.
3. SHR religious buildings with active worship and buildings containing schools were excluded from the sample as they are not typically regarded as commercial entities.
4. Identify and expand SHR addresses using records from Adelaide Cityscope (RP Data, 2012) and Google Maps and an electronic site map (AutoCAD drawing format) obtained from ACC, to ensure the maximum inclusion of data from ACC's Commercial Buildings Database. Some properties have multiple addresses, due to strata subdivision, corner locations on sites where two streets intersect, or historic anomalies where street numbers are not consecutive.

5. Identify which SHR buildings which can be cross-referenced to areas schedule data within ACC's database.
6. Evaluate each building where they house a mixture of different uses, including religious activities, residential dwellings, and commercial offices. ACC's database mainly covers commercial uses within building spaces. Where no records in the ACC Commercial Buildings Database could be found, or the required data for establishing an occupancy level was incomplete, the SHR building was omitted from the sample as no occupancy level could be obtained. This included a small number of larger scale multi-storey SHR buildings.
7. All SHR buildings were coded according to their suitability for inclusion in the sample. A detailed record of which buildings were excluded and the basis for this decision was kept and included in the SHR building sample database which accompanies this report. This is because, it may be useful to ascertain, at a later date, which buildings were excluded from the sample and the rationale for exclusion.

Stage Two: Establishing Occupancy Levels:

ACC Commercial Buildings Database (Aug 2017) includes total lettable area and component areas (msq.) of non-residential use under single ownership tenancies/occupation within buildings. This data can be used to establish occupancy levels, for a snapshot in time (2017), for commercial buildings in Adelaide CBD. The data is collected and stored by Adelaide City Council on an annual basis. The data is voluntarily supplied by property owners and tenants on non-residential Tenancy Information Schedule (TIS) form for the purposes of calculating non-residential council rates. According to Adelaide City Council's website, 'Each year Council's valuers request information from ratepayers to assist in two key functions; the preparation of the annual valuation for the next financial year, and the maintenance of an accurate Voters Roll. This information is requested in accordance with Section 168 of the Local Government Act 1999' and 'City of Adelaide relies on information provided by property owners and occupiers to maintain an accurate property database' (ACC, 2018). The method detailed below was used to estimate occupancy rates in SHR buildings included in the sample, as an indicator of vacancy.

To establish a reasonable level of confidence in the data, gross lettable areas, as recorded on the ACC database, were compared with building areas disclosed by other data sources. For example, GLA correlated well with area measurements taken of building footprints on an electronic site map of Adelaide (AutoCAD) and building areas as stated in Cityscope (RP Data, 2012). This is discussed in the later section of this report: 'Confidence in occupancy levels'.

1. Each SHR building's storey data was compared with collated data from ACC Commercial Buildings Database for each expanded address in the sample. The ACC data is listed according to storey levels as disclosed by the Tenancy Information Schedules (TIS) completed and returned by building owners and occupiers. By comparing the collated ACC data with storey height information and building area data from other commercial building databases and electronic site maps showing building footprints, a decision about the completeness of ACC's occupancy data could be made. Where there appeared to be incomplete occupancy data, the SHR building was removed from the sample.
2. Each building's occupancy was estimated, by calculating the Component Gross Lettable Area (CGLA) as a percentage of the total Gross Lettable Area (GLA). The CGLA is the occupied gross lettable floor area as disclosed by building owners and occupiers in the returned Tenancy Information Schedules. Where the building contained a mixture of commercial activities and residential space (ie: dwelling), a site investigation was undertaken. This enabled an estimation, on a storey-by-storey basis, of each building's occupancy for the commercial portion of the building. Residential space was excluded from the calculation.
3. An evaluation was made about the accuracy of ACC data available for each SHR buildings in the sample. The CGLA's disclosed were checked against building areas offered by other databases and information available. This evaluation included:

a) site visits to ascertain the number of storeys in each SHR building. The building storey heights were checked via site inspections, and where sites were difficult to access, google earth was also used to ascertain number of storeys above ground. Where there appeared to be discrepancies between floor areas declared by owners in their returned TIS and these other databases and check procedures.

b) comparison with lettable areas disclosed by other commercial building databases such as RP Professional, building data websites such as emporis.com.au, Adelaide CityScope (RP Data, 2012) and electric site plan of Adelaide CBD showing building footprints.

4. These additional data checks were used to triangulate the areas contained in the ACC database. Notes of caution were added to the database when ACC data did not tally well with investigations detailed in methods a) & b) above. These comparative checks were released to advisors at SA State Government Department of Environment and Water for comment. Comments were incorporated into the database and where there were discrepancies between data relied on for occupancy levels and other data sources, these buildings are identified for further investigative work.
5. Occupancy levels were calculated on a building-by-building basis using the following formula: the sum of all component areas expressed as a percentage of the total nett lettable area for the whole building.

Analysis and Discussion

After screening SHR buildings, the sample suitable for vacancy analysis consisted of 85 buildings. The screening took place through an analysis on a building by building basis, of both categories of occupancy (less than 50% and 50% or more) was undertaken. Further details of the screening procedure used are provided in the method section[6]. After careful screening, 37 buildings were considered to have an occupancy level of below 50%. It was found that data was potentially unreliable for 3 buildings of these 37

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[6] The screening method for the SHR sample differed slightly from the screening of office buildings for the sample within Gillian Armstrong's office building vacancy research, which adopts the method detailed in this report. This research is part of a PhD, being undertaken at University of Adelaide, under the supervision of Professor Veronica Soebarto and Associate Professor Jian Zuo. In contrast, the office building sample screening undertaken in the PhD, included identifying government occupied/owned buildings. This emerged after a pattern identified in the data concerning the reliability of areas disclosed in the office building data, which are then used to calculate vacancy rates. However, no such pattern emerged in the SHR buildings included in the SHR sample.

building and required more investigation to confirm occupancy levels in 2017 (building refs 189, 492 & 747). In addition to these further investigations, the sample which disclosed occupancy rates > 50%, the remaining 46 buildings, were investigated cross - referencing gross lettable area and building footprint area data from other data sources. This was to ensure that sample for vacancy analysis was as large as it could be and that sample of buildings disclosing higher occupancy rates>50% was reliable also. This analysis found a further 6 buildings in this category requiring more investigation to confirm occupancy levels in 2017 (building refs 190, 200, 395, 567, 571, 999). This screening resulted in a recommendation for DEW to undertake investigations for 9 buildings, where the data was not considered to be reliable enough to establish an occupancy level beyond ‘below 50%’ and 50%-100%. This was undertaken so that the research was rigorous and critical throughout. For further details of these properties and investigations undertaken, see table 1.1 and 1.2.

It was concluded that potentially inaccurate data from 9 buildings requiring further investigation, would not affect the overall findings of the SHR sample occupancy analysis. This is due to two reasons:

1. Out of the 9 buildings with occupancy levels of greater uncertainty, it could be established that 6 of these buildings were in the category of 50% or above occupancy and were therefore not considered to be of concern within the scope of this report.

2. The buildings with occupancy levels of greater uncertainty, and categorised as having occupancy levels below 50%, were of relatively small scale 2-storey properties, it is unlikely that potential inaccuracies in occupancy levels for these 2 buildings would affect the findings of this report.

Greater insights found during the screening analysis are detailed below in the report section titled ‘Confidence in occupancy levels’, which follows next.

Confidence in occupancy levels

The data used to evaluate occupancy in SHR buildings in the sample was collected by Adelaide City Council for non-residential rates purposes, rather than for examining occupancy per se. The implication of using the secondary data for evaluating occupancy levels means that the data is may not be completely accurate. A comparison of total areas disclosed in the ACC database was made with areas disclosed by other data sources, such as CityScope Adelaide (RP Data, 2012) and electronic site plans in CAD. This comparison confirmed that the gross lettable areas disclosed in the SHR database tallied with other area data sources for the majority of buildings in the sample which are considered to have 50% or above occupancy. However, discrepancies were found in a small number of buildings when the occupancy data was compared with local knowledge by senior heritage professionals within DEW, and other databases such as CityScope Adelaide (2012) and electronic site plans in CAD. Caution must, therefore, be exercised in drawing conclusions across buildings within SHR vacancy sample where there is a question mark over the reported occupancy levels for some buildings. In order to ensure findings were not skewed, the researcher examined the buildings which appear to have unreliable data on a case by case basis for both categories (occupancy below 50% and occupancy of 50% or above). This was to ascertain the scale of these buildings in terms of their total areas and their effect upon the sample overall.

Table 1.1 and Table 1.2 highlight the buildings which appear to have gross lettable area discrepancy when compared with other data sources, such as CityScope Adelaide (2012) and electronic site plans in CAD. Table 1.1 shows buildings with potentially unreliable area data and which report less than 50% occupancy when compared with other data sources. In summary, Table 1.1 shows buildings in this category are few in number (5 in total) and are large international hotel chains (3) or is very small bluestone cottage (1). Only 1 medium scale building still requires further investigation. Please note, this creates a total of 7 buildings in the sample recommended for further investigation (building ref 747).

Table 1.1 Buildings with potentially unreliable data, disclosing occupancy levels of below 50%: a case-by-case evaluation.

Building ref.	No storey	Analysis of building data	Reliability of occupancy level	Results of further investigations undertaken by DEW
189	2	Small scale heritage property 2 storey building, of approximate site area of 310msq. Only the bottom floor appears to be disclosed.	Occupancy data cannot be relied upon, but building scale is small. Further investigations required.	Originally 4 apartments (1920s) with roof top laundries. 2019: as café fully across ground floor, along with the foyer to the apartments behind (at least since 2010+). A recent (late 2018) nightclub /bar is located in 1/3 of upper floor, rest this level is 'office/ store' Suspect upper floor was vacant (or storage) in 2017. Occupancy was increased by 2018 to above 50% in 2018, and therefore excluded from sample of buildings with < 50% given the project scope.
492	4	Data potentially unreliable. Property is subdivided into approx 7 strata ownerships, no comparative data from other sources to verify	Further investigations are required. Occupancy data is potentially unreliable.	Site visit shows areas likely to be correct. Occupancy investigations reveal ½ ground floor has been empty since ArtsSA left pre 2017. Building comprises basement, ground and upper floor. 2/3 of ground and upper floor now set up as 'Youthinc' – secondary skills

		areas. Building is used for retail & offices.		training college. Retain in sample of buildings with < 50% occupancy.
567	15	The property is a 4* hotel chain and therefore the data returned does not reflect underoccupancy in a meaningful way.	See Table 1.2: Building occupancy no longer considered to have below 50%.	Confirmed whole building is used as hotel. Therefore excluded from sample of buildings with < 50% occupancy.
575	3	The property is a hotel and therefore the data returned does not reflect underoccupancy in a meaningful way.	Building occupancy no longer considered to have below 50%	Confirmed whole building is used as hotel. Therefore excluded from sample of buildings with < 50% occupancy.
747	2	Small-medium scale heritage property 2 storey plus basement building, of approximate site area of 636msq. Site is not fully developed. Only basement appears to be disclosed. Therefore data	Occupancy data cannot be relied upon, as building could be medium scale, further investigation is recommended.	Site visit shows areas likely to be incorrect. However, a DA was approved in 2018 for one half of the listing and site visit in 2019 shows works have been undertaken over two floors, resulting in one half of the listed property is occupied as consulting rooms. The remaining portion of the listing however remains unoccupied. Therefore, this

		considered unreliable.		building is retained in the sample of occupancy < 50%.
792	4	The building is complex - adjoins a larger retail complex. Low occupancy is found in the data relating to the hotel accommodation above. The hotel data returned does not reflect underoccupancy in a meaningful way.	Building occupancy no longer considered to have below 50%	Site visit investigation in 2019 revealed fully activated hotel/ apartments/ student accommodation. Therefore excluded from sample of buildings with < 50% occupancy.

In summary, it could be deduced from Table 1.1, that confidence in the reliability of occupancy levels for buildings with data showing less than 50% occupancy was high. There are 3 buildings requiring further investigation. Of these, 2 were small scale, 2-storey properties and therefore, it is unlikely that potential inaccuracies in occupancy levels for these two buildings would not skew the findings of the SHR sample for building disclosing occupancy levels of below 50%. One building however was a larger scale building of 4 storeys, with a larger building footprint. The remainder of the sample of buildings reporting low occupancy below 50% closely triangulated with site, building and lettable areas (msq.) disclosed by other data sources such as CityScope Adelaide (2012), electronic CAD plans and publicly available real estate listings published online. Therefore, the small number and scale of buildings in a sample of 85 is not enough to be considered to affect the reliability of the total lettable areas disclosed across the sample.

As shown in Table 1.2 below, there were 9 buildings which were considered to contained uncertainty about occupancy levels, in the category of 50% or above occupancy. Of these 9, 7 buildings were predominately used as private clubs, bars/nightclubs, public houses/hotels. On further investigation of this group of hotel buildings, whilst the occupancy levels calculated from ACC data may be potentially unreliable, 3 number of these properties (3) were likely to have occupancy above 50%. The remaining 4 hotel buildings in this group require further investigation by DEW, to establish occupancy levels and ensure levels are not below 50%. However, as these 4 buildings are 2 storey properties, it is less likely that inaccuracies in occupancy levels would skew and change the overall findings and conclusion of this investigation which has a sample of 85 buildings for a snapshot in time (2017).

In addition to the properties identified in Tables 1.1 and 1.2, the screening process found one additional building (ref 741) thought to have unreliable occupancy level data. This building was identified by both the researcher and a senior heritage architect within DEW who had gone through the draft SHR sample on a case by case building. The occupancy level was amended to suit the on-the-ground consensus of 0% occupancy. It was also noted that whilst the area for this SHR property appeared accurate, the property was listed as vacant land.

Table 1.2 Buildings with potentially unreliable data, disclosing occupancy levels of 50% or above: a case by case evaluation of occupancy level reliability and discussion of whether data inaccuracies are incorrectly indicating an occupancy level of 50% or more.

Building ref.	No storeys	Analysis of building data	Reliability of occupancy level of 50% or more
190	2	Data is potentially undersized - building footprint area is approx. 300msq. but only 36msq declared. Building is a public house and often busy at ground floor.	Whilst missing area data will not allow accurate evaluation of occupancy, investigations can conclude the building does have active uses at ground

			& upper floor, although intermittent occupation. Include in sample of buildings with occupancy <50%
200	2	Data potentially undersized - building footprint area approx 700msq. but only 450msq declared, all at ground floor. Building is a private club.	used as a club/ restaurant across the full ground floor and about 1/3 of upper floor (DA files, 2018 plan). Therefore not considered to have low occupancy. Exclude from sample of occupancy < 50%.
376	5 plus basement	Data was initially believed to undersized - building footprint area is approx 480msq. (CAD plan) but only 1183msq declared over 6 storeys. CityScope Adelaide (2012) declares the building as having a total lettable area of 1302msq. Property was subdivided under a Community Plan in 2007. Lower levels (251msq.) were advertised for lease in August 2016 but subsequently occupied. Level 02 had 118msq vacancy in 2018, and L3 had 77msq. vacancy in 2018.	Few DAs over time – unclear how 'occupied' it is. Assume likely that occupancy levels calculated from the data are a good indication of usage in 2017 as 50% or above. Include in sample of buildings with occupancy <50%

380	2	Data is potentially undersized - ACAD footprint of approx 523msq. Site visit by senior heritage architect at DEW confirmed building is now 100% vacant. Property is a public house/hotel.	Building occupancy has been re-evaluated as having 0% occupancy / 100% vacancy and should be included in the sample of buildings with occupancy <50%.
395	2	Data is potentially undersized. ACAD bldg footprint approx. 316msq but only 95msq disclosed. Property is a public house/hotel.	Building has been empty for several years now. Only used during Fringe annually (Hotel for rent) Building occupancy has been re-evaluated as having 0% occupancy and included in the sample of buildings with occupancy <50%.
567	4	Data is potentially unreliable. ACAD bldg footprint=617msq. Real estate listing in 2018 lists property as having lettable area 1184msq. And with vacant tenure. Still unsold as of April 2019. Building was recently used for community and gov funded immigrant support service	Fully occupied as hotel. Exclude from sample of occupancy < 50%. Exclude from sample of occupancy < 50%.
571	10 plus basement	Above ground floor, this property is a 4* hotel and therefore the data returned does not reflect	Fully occupied all levels by Hotel as rooms/apartments, with shops. Building occupancy

		underoccupancy in a meaningful way.	not considered to have below 50%.
934	2	Data is potentially unreliable. Further investigations by senior heritage architect confirmed that this small scale building over 2 storeys has 3 night clubs operating within it.	Building occupancy not considered to have below 50% as 3 night clubs in building – for an extended period of time. Exclude from sample of occupancy < 50%.
999	2	Data is potentially unreliable. Areas seem under-declared, ACAD site plan area approx 440msq - but data only declares 398msq over 2 storeys. Property is a public house/hotel.	Ground floor fully occupied by Hotel. Upper floor – detail unknown but expected to have some storage use. Therefore exclude from sample of occupancy < 50%.

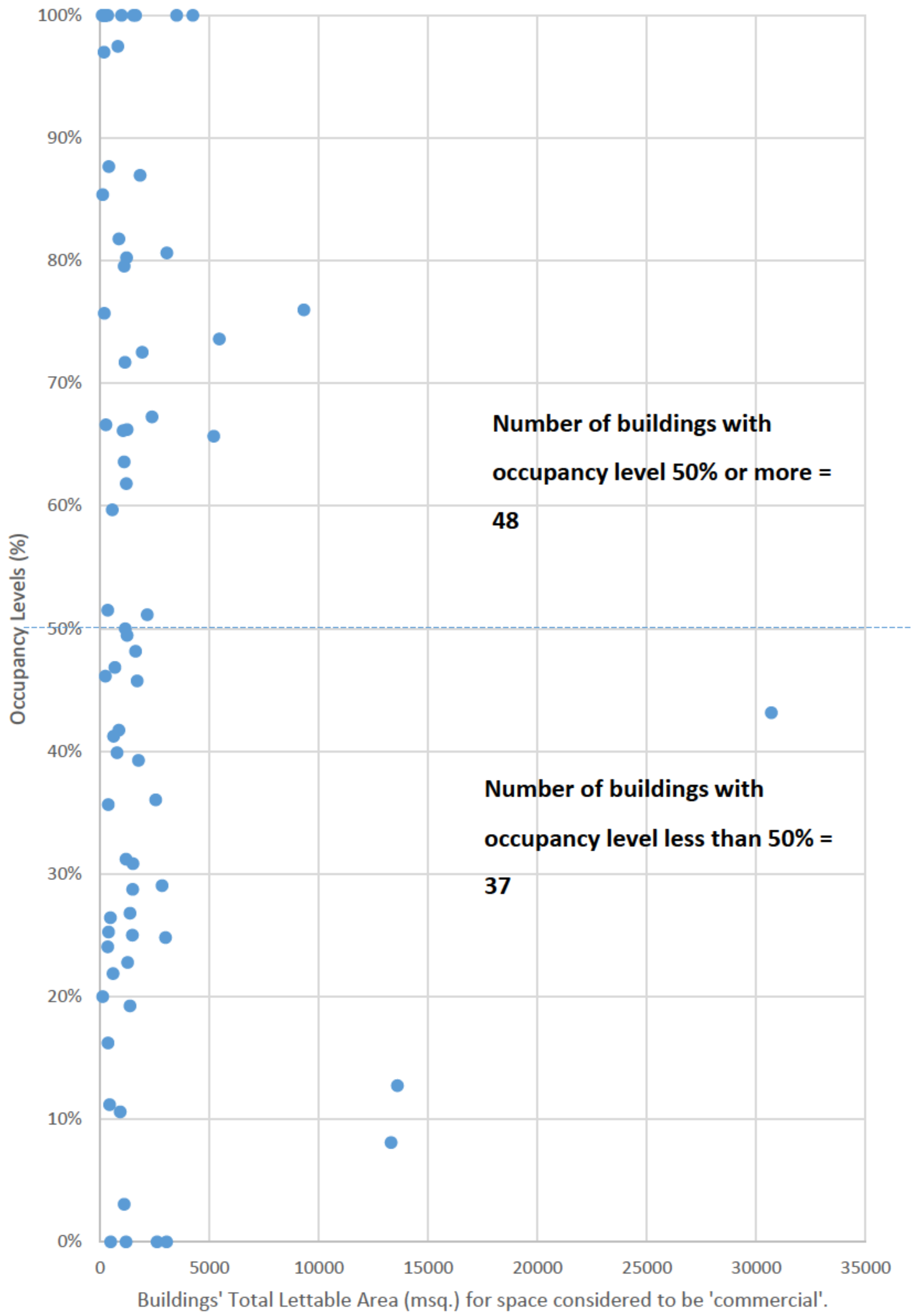
Examining occupancy across the sample

Through an examination of a building population, it is possible to establish occupancy patterns for a suburb or CBD. The method detailed in this report can be used to examine city-wide patterns on the basis of building scale using a building's total lettable area and scrutinise occupancy on a case-by-case basis. This is done in the following paragraphs and illustrated by Charts A and B.

It is useful to consider buildings in the sample according to their scale using total gross lettable area. For the purposes of this report, SHR buildings in the sample have been categorised as being either small scale (buildings of lettable area up to 1500msq.), medium scale (buildings between lettable areas of 1500msq. to 5,000msq.) and large scale (buildings of lettable area above 5,000msq.).

As illustrated by Chart A below, when looking at occupancy levels across the whole sample (85), the majority of SHR buildings in the sample are of small–medium scale. This

Chart A Shows relationship between estimated occupancy levels and total lettable area (msq.) for each building in the SHR sample of buildings.



is not surprising given that heritage buildings were predominantly constructed in older periods, prior to technological innovations in engineering and construction methods. However, Chart A shows that occupancy levels (high and low) are spread across all building scales in the sample (small, medium and large scale). There doesn't seem to be any correlation between building size (total lettable area) and occupancy level.

Chart B below shows that out of 37 buildings disclosing a low level of occupancy (less than 50%), the majority (18) have a total lettable building area under 1500msq. This finding discloses that whilst the number of individual buildings with low levels of occupancy may be concerning across the CBD, buildings considered to have low occupancy are primarily small-scale properties.

Chart B Shows relationship between estimated occupancy levels and total lettable area (msq.) per building in the SHR sample of buildings with occupancy lower than 50% (*n*=37)

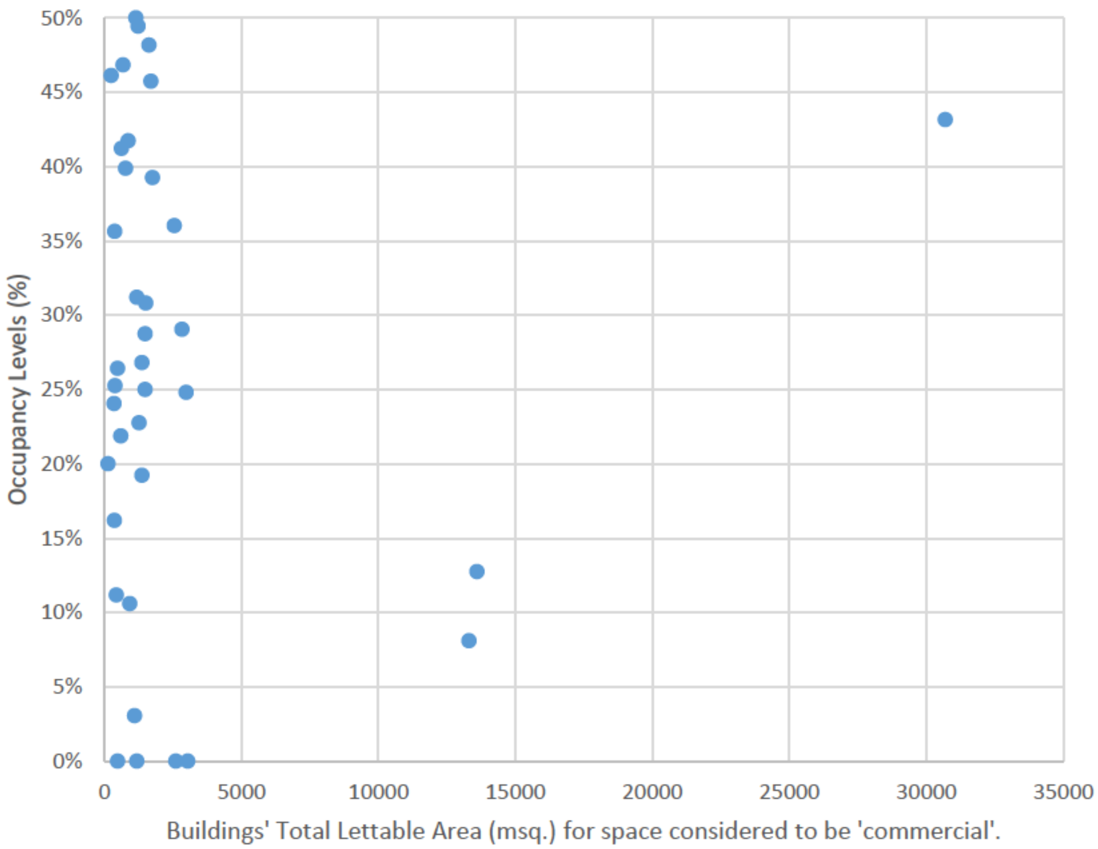


Chart A and B show that out of the sample of 85 buildings, only a small number of buildings (3) had an occupancy level of 0% in 2017, with a further building (1) having an occupancy level around 5%. Although caution needs to be taken when generalising any research findings, findings in this report point to the need to have more critical discussions on the scale of the 'vacancy problem' with SHR buildings. In particular, what policy measures are necessary to encourage greater adaptive reuse, and whether measures considered have any unintended consequences in relation to the wider existing building population, including commercial properties not currently considered to have State Heritage value. Discussions are also recommended to understand how commonly held perceptions, promoted in public discourse in 2014-2017, have impacted upon our understanding of the scale of the 'vacancy problem' in heritage buildings across Adelaide CBD (refer to Recommendations section in this report).

Analysis of the data in Chart B indicates that 6 buildings are of medium scale between 1500msq and 3040msq. Due to their total areas, this small number of buildings could be the target for further investigation and or policy action. Out of the sample of 85 buildings, there were a small number of buildings (11) with occupancy levels of 20% or under, including the large-scale privately owned outlier used as a bank.

The only building of significant size in the sample considered to have low occupancy is a privately owned 10 storey commercial property. The building is owned by a large corporation and is in currently in use as a bank with an operational ground floor serving the public. This poses the questions:

1. Whether it is meaningful to classifying privately owned large-scale property as having low occupancy if retention of a building's heritage value is not under threat.
2. Whilst under-occupancy of large SHR commercial buildings may have a wider economic impact, it must be questioned as to how the low occupancy can be mitigated through state/local government policy initiatives, including adaptive reuse, for a privately owned commercially active building.

It can also be seen, in Chart B, that there are 4 buildings wholly unoccupied. A further 7 buildings with occupancy levels under 20%, not including privately owned banking outlier. Potentially these buildings could be prioritised as the first candidates for adaptive reuse or other obsolescence mitigation strategies, such as brand repositioning.

Quantifying Occupancy: Key Findings

1. In the sample of 85 SHR properties, 37 buildings were considered to have occupancy levels of below 50%, including properties identified as needing further investigation. These 37 buildings equates to 45% of SHR buildings in the sample having an occupancy level below 50%. See table 1.3, in Appendix A.
2. Of the 37 buildings in the sample considered to have occupancy levels below 50%, the majority are primarily small-scale properties of total lettable areas under 1500msq.
3. Only 2 properties, considered to have an occupancy level below 50% was of a large scale (above 5000msq. total lettable area). These are considered to be privately owned buildings containing banks and considered commercially active. Questions need to be asked if occupancy for buildings such as this are meaningful within the scope of this report.
4. Out of the SHR sample of 85, only a small number of buildings had an occupancy level of 0% in 2017 (Chart A & B).
5. Out of the sample of 85 buildings, there were a small number of buildings (7) with occupancy levels of 20% or under, not including the large-scale privately-owned outlier used as a bank.
6. Wide-spread perceptions of the scale of vacancy as a problem may not have been accurately represented in public discourse between 2014-2017. Critical discussions are recommended on how much of a problem is vacancy in Adelaide CBD and whether comparisons can be drawn with other heritage building populations within Australian and international cities.

Limitations

Occupancy levels can only be used as a general guide or indicator of vacancy across Adelaide CBD as they are based upon data returned to Adelaide City Council in the first half of 2017 by building owners and tenants themselves. The following cautions and limitations need to be acknowledged:

- Adelaide City Council is reliant upon building owners and occupiers' accurately reporting upon their space usage. Due to this reliance on self-reporting caution needs, therefore, to be urged when relying on the findings in this report. Potential inaccuracies in interpreting the ACC data are key reason why the occupancy level data can only be used as an exploratory guide.
- A further limitation of the occupancy levels reported is that they rely on cross-sectional data that represents a short snapshot in time (occupancy as reported in the first half of 2017). Occupancy findings therefore may not be valid or accurate beyond August 2017.
- The sample does not contain every SHR building in Adelaide CBD, and therefore conclusions cannot be generalised and applied to the whole SHR building population.
- Whilst every effort has been made to eliminate errors and inaccuracies, the database may still contain a degree of human error, and therefore cannot be used to inform decisions.
- Some assumptions were made about the areas disclosed in ACC's database. For example, some records only disclosed ground floor areas despite being a 2-storey building. However, on further investigations, examining building data from other sources (autoCAD site plan of Adelaide CBD and Adelaide Cityscope) the total areas appeared to be double the expected GLA given the building footprint's area. It was therefore assumed that although the ACC database only contained 1 record for the ground floor, the GLA total was for both ground & first floors.
- It was not always possible to ascertain whether buildings had any basement accommodation. Unless there was a record explicitly stating basement, it was assumed the building had no space below ground.

Recommendations

1. There are 6 buildings that require further investigations to determine occupancy levels with a higher degree of certainty. These buildings are identified in Tables 1.1 and 1.2. Further investigations could include conversations with the building owners/occupants and examination of any building plans available.

2. Table 1.3, in Appendix A, highlights 37 buildings that are potentially suited to adaptive reuse or other obsolescence mitigation strategies based on the occupancy levels are considered. This would need further investigation on a case-by-case basis, taking into consideration a building owner's capacity to adapt or sell the buildings, and the architecture itself.
3. Caution needs to be taken when determining occupancy levels using the method detailed in this report when the building is used as either a private club, nightclub/bar, public house/hotel or hotel accommodation.
4. An evaluation should be undertaken into whether occupancy data for all non-residential buildings should be collected specifically for the purpose of understanding occupancy and vacancy rates in South Australia, including Adelaide CBD. Collection of occupancy/vacancy data would assist the development of future urban regeneration policy and strategy at local and state government levels. This evaluation would also enable a better understanding as the method detailed in this report could only lend itself to quantifying occupancy in 85 of the 205 SHR buildings in Adelaide CBD.
5. A further longitudinal study could be undertaken to ascertain occupancy levels overtime and inform suitable obsolescence mitigation strategies, particularly where a building is suffering from long-term structural vacancy.
6. Discussions are also recommended to understand how commonly held perceptions, promoted in public discourse in 2014-2017, have impacted upon our understanding of the scale of the 'vacancy problem' in heritage buildings across Adelaide CBD
7. Further discussions are necessary to ascertain what policy measures are useful to encourage greater adaptive reuse of SHR properties, and whether measures considered have any unintended consequences in relation to the wider existing building population, including commercial properties not currently considered to have State Heritage value.
8. It is recommended that this exercise needs to be repeated in 2020, with the support from Adelaide City Council and SA State Government DEW, so that it can be determined if the vacancy disclosed by 2017 data is still present and can be considered long-term structural, rather than temporary natural vacancy.

The Shape of Vacancy Report / Appendix A

The table 1.3 below details SHR Buildings, in the sample, which disclosed occupancy levels below 50% and is an extract from the SHR Building Sample Database which accompanies this report. These buildings are included in Chart B and the table below discloses the total lettable area (msq.) and the component of each building which is considered occupied (msq.). These two variables can be used to calculate occupancy level (%) on a case-by-case basis. The reference number provided for each building can be used to search with the accompanying SHR Building Sample Database.

Table 1.3: **Buildings in the SHR sample ranked in reverse order of occupancy (from 0% to 50% occupancy level)**

Sample Reference Number	Listing address	Building Description	Component considered occupied (msq.)	Building's Total lettable area (msq.)	Occupancy level (%)
741.00	188 North Terrace ADELAIDE	Gawler Chambers, Site area approx. 670msq, storey height of 5 storeys	0	3040	0.0%
1039.00	25-29 Young Street ADELAIDE	Young Street Chambers (former William Detmold Ltd, later Spicers Australia Warehouse), including Delivery Area	0	2606	0%

43.00	187-191 Angas Street ADELAIDE	Seven Stars Hotel, 2 storey height	0	777	0%
569.00	59 King William Street ADELAIDE	Edmund Wright House (former Bank of South Australia Head Office, later Union Bank, then ANZ Bank)	0	1184*	0.0%
380.00	233-235 Grenfell Street ADELAIDE	The Producers Hotel (former Old Exchange Hotel, former Producers Club Hotel)	275	480**	0.0%
852.00	74 Rundle Mall ADELAIDE	Shops (former Balfour's Shop and Cafe)	33.53	1096.02	3.1%
219.00	16-24 Flinders Street ADELAIDE	Multicultural SA Offices (former Stow Memorial Church Manse, Sanatorium, Attorney-General's Building)	97.55	920.18	10.6%
747.00	263-264 North Terrace ADELAIDE	Office (former dwelling), 2 storey plus basement	48	430	11.2%

573.00	97 King William Street ADELAIDE	BankSA (former Savings Bank of South Australia Head Office)	1733	13596	12.7%
522.00	60 Hutt Street ADELAIDE	Bray House	58.99	364.07	16.2%
869.00	17 Ruthven Avenue ADELAIDE	Office (former Dwelling)	25	125	20.0%
851.00	55 Rundle Mall ADELAIDE	Shop (former Young's Shoe Store)	130	595	21.9%
203c	12-22 Union Streets ADELAIDE	Former Adelaide Fruit and Produce Exchange Facades and Shops	85.22	354.18	24.1%
570.00	81 King William Street ADELAIDE	Goodlife Health Club (former Bank of Adelaide Head Office)	741	2987	24.8%

590.00	26-28 Leigh Street ADELAIDE	1 Records of South Australia Offices (former Megaw & Hogg Auction Rooms, former Warehouse)	371	1482	25.0%
229.00	82-86 Franklin Street ADELAIDE	Office (former Dwelling)	98	390	25.3%
203a	26-36, East Terrace	Former Adelaide Fruit and Produce Exchange Facades and Shops	126	475	26.4%
858.00	197-203 Rundle Street ADELAIDE	Shops adjoining the Austral Hotel, including Outhouses	367	1368	26.8%
743.00	203-207 & 201-202 North Terrace ADELAIDE	Office (former Consulting Rooms) and former G & R Wills Warehouse	428	1490	28.7%
736.00	165 North Terrace ADELAIDE	Adelaide Club Building	822	2831	29.0%

566.00	32-40 King William Street ADELAIDE	Beehive Corner Building	463	1504	30.8%
376.00	18 Grenfell Street ADELAIDE	Office (former Alliance Assurance Company Building)	369	1183	31.2%
223.00	84-86 Flinders Street ADELAIDE	Observatory House Office (former Instrument Manufacturer)	131	369	35.6%
998.00	47-49 Waymouth Street ADELAIDE	Woodards House, 5 storey plus basement	918	2549	36.0%
856.00	150-154 Rundle Mall ADELAIDE	Office & Shop	308	771	39.9%
203b	212-248 Grenfell Street ADELAIDE	Former Adelaide Fruit and Produce Exchange Facades and Shops	255	619	41.2%

568.00	42-46 King William Street ADELAIDE	Waterhouse Chambers Offices	359	861	41.7%
572.00	89-91 King William Street ADELAIDE	National Mutual Building (former Insurance Office)	13244	30696	43.1%
127.00	34 Carrington Street ADELAIDE	Bar Chambers (former Dwelling)	137	314	43.7%
855.00	135-139 Rundle Mall ADELAIDE	Commonwealth Bank of Australia, Rundle Mall, Adelaide Branch (former Shop)	773	1690	45.7%
731.00	57 North Terrace ADELAIDE	Office (former Dwelling)	111.84	242.47	46.1%
1038.00	54-60 Wyatt Street ADELAIDE	Former Adelaide Brewery	781.08	1621.78	48.2%
523.00	146-158 Hutt Street ADELAIDE	Shops (former 'Victoria Terrace' Dwellings)	319	680	46.8%
391.00	42-46 Grote Street ADELAIDE	Metropolitan Hotel	609.44	1232.38	49.5%

190.00	10-12 East Terrace ADELAIDE	PJ O'Brien's (former East End Market Hotel)	?	?	Occupancy considered < 50%
395.00	110 Grote Street ADELAIDE	Hampshire Hotel			Occupancy considered < 50%
492.00	104-120 Hindley Street ADELAIDE	Former West's Coffee Palace			Occupancy considered < 50%

The Shape of Vacancy Report / Appendix B

Permission from Adelaide City Council use ACC data for the research detailed in this report.

Reply all | Delete Junk | ...

RE: Use of CoA data in Built Heritage Election Commitment Project [DLM=For-Official-Use-Only]

RH Rick Hutchins <R.Hutchins@cityofadelaide.com.au>
Mon 24/09/2018, 1:14 PM
Voigt, Beverley (DEW) <Beverley.Voigt@sa.gov.au>; Gillian Armstrong; Queale, Michael (DEW) <Michael.Queale@sa.gov.au>; Shanti Ditter <S.Ditter@cityofadelaide.com.au>

Reply all

Inbox

You replied on 26/09/2018 1:37 PM.

Hello Beverley,

I confirm our approval for Gillian to use the data that she has available from the City of Adelaide for the Department's project on adaptive reuse of State Heritage Places in the CBD.

I would ask that we be kept informed of the scope of this project as it is further defined, so that can ensure pick up any overlaps, opportunities and share information.

Regards,
Rick

Rick Hutchins
Manager - Spatial Planning & Heritage
Spatial Planning and Heritage
4th Floor 25 Pirie Street
Adelaide, South Australia, 5000
TEL: +61882037241
M. +61419119021
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The Shape of Vacancy Report / Appendix C

The research in this report is based on the following scope and terms set out in Attachment 5 of the Standard Goods and Services Agreement between the researcher and SA State Government Department of Environment and Water. The scope and terms are part of a wider DEW project to understand adaptive reuse potential developing a Heritage Vacancy Database (Adelaide City Council).

Attachment 5 - Specifications

Desktop review:

Provide an improved understanding of heritage buildings within the boundary of Adelaide CBD

- An initial review of the data supplied by Adelaide City Council (ACC) and report back on what additional work needs to be done to enable quantification of State heritage vacancy.
- Supply 500 word summary of international research framing this project - growing interest in adaptive reuse, building obsolescence mitigation strategy, vacancy as a 'problem'.
- Assist in developing a robust rationale to limit the physical boundary of what to include in the sample, to reduce unnecessary work and keep the project focused.
- Liaise with ACC data analysts and heritage professionals to facilitate the database, including ownership implications
- Assist in quantifying individual heritage building population and their current/recent occupancy-vacancy. This will be done as a database and can be viewed at individual building scale and as a whole population, subject to what data is provided by ACC:
    - the database include searchable categories such as: building use, net/gross floorplate area
    - additional secondary data can be sourced and added to the database, where ACC data is inconclusive/insufficient eg: Cityscope (2012), RP Professional (subject to consent), and other CBD databases: DA approvals etc.
- Provide a cleaned, searchable and final heritage vacancy database (as a 'snapshot in time') to the Department for Environment and Water (DEW) - to be updated on an annual basis, if necessary.
- Provide a 500-1000 word executive summary of the database findings.

DEW will work the Supplier to select which of the above requirements are most helpful to the project, once a clearer picture has been established of what data is available and what additional work is required with confidence to quantify heritage vacancies. ACC may have already identified heritage buildings in their database and/or nett/gross areas.

The Shape of Vacancy Report / Glossary

ACC Adelaide City Council

CAD Computer Aided Design – used to classify maps and plans in electronic formats compatible with architectural drafting software including AutoCAD and Revit

CBD Central Business District

CGLA Component Gross Lettable Area as detailed in ACC data. It is assumed that Australian Property Method of Measurement (API, 2017) was used to calculate CGLAs.

GLA Gross Lettable Area

SHR State Heritage Register

SI Site investigation

Appendix 7-F: NCC (2016) for structures > 3-4 storeys

NCC performance standards, deemed-to-satisfy provisions, and embedded Australian Standards (AS) are must be adhered to when the building is considered to be above 3-4 storeys. The following Australian Standards are included:

AS 2118 Part 6 (2012): Automatic fire sprinkler systems General requirements Amendment t 1: Combined sprinkler and hydrant systems in multi-storey buildings

AS 1170 Part 4 'Structural design actions — Earthquake actions in Australia' has been referenced in A1.3 Table 1

AS 1670 Part 1 Smoke Detection, in multi-storey buildings

NCC provisions for structures above 3-4 storey are as follows:

NCC Section	Provisions determined on the basis of buildings of 3-4 storeys or above
Section C Fire Resistance CP1	A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to— (e) the height of the building
Section C Fire Resistance CP2	b) Avoidance of the spread of fire referred to in (a) must be appropriate to— (v) the number of storeys in the building
Section C Fire Resistance C1 Table C1.1 Type of Construction Required	Fire-resistance of construction is required to be the highest standard (classification A*) for buildings 4 storeys or more (ABCB, 2016:90) *Type A construction has implications for other NCC provisions, eg: C2.6 & C2.9
Section C Fire Resistance C2.3 Large isolated buildings	The size of a fire compartment in a building may exceed that specified in Table C2.2 where—(a) the building does not exceed 18 000 m2 in floor area nor exceed 108 000 m3 in volume, if— (i) the building is Class 7 or 8 and— (A) contains not more than 2 storeys; and (B) is provided with open space complying with C2.4(a) not less than 18 m wide around the building; or (ii) the building is Class 5, 6, 7, 8 or 9 and is— protected throughout with a sprinkler system complying with SpecificationE1.5; and (B) provided with a perimeter vehicular access complying with C2.4(b); or (b) the building is Class

	5, 6, 7, 8 or 9 and exceeds 18 000 m2 in floor area or 108 000 m3 in volume, if it is— (i) protected throughout with a sprinkler system complying with Specification E1.5; and (ii) provided with a perimeter vehicular access complying with C2.4(b) (ABCB, 2016:97)
Section C Fire Resistance C2.10 Separation of lift shafts	Any lift connecting more than 2 storeys, or more than 3 storeys if the building is sprinklered, (other than lifts which are wholly within an atrium) must be separated from the remainder of the building by enclosure in a shaft in which— (i) in a building required to be of Type A construction—the walls have the relevant FRL prescribed by Specification C1.1; and (ii) in a building required to be of Type B construction — the walls— (A) if loadbearing, have the relevant FRL prescribed by Table 4 of Specification C1.1; or (B) if non-loadbearing, be of non-combustible construction (ABCB, 2016:102)
Section C Fire Resistance Specification C1.1 2.5 General concessions	(a) Steel columns — A steel column, other than one in a fire wall or common wall, need not have an FRL in a building that contains— (ii) 2 storeys in some of its parts and 1 storey only in its remaining parts if the sum of the floor areas of the upper storeys of its 2 storey parts does not exceed the lesser of— (A) 1/8 of the sum of the floor areas of the 1 storey parts; or (B) in the case of a building to which one of the maximum floor areas specified in Table C2.2 is applicable — 1/10 of that area; or (C) in the case of a building to which two or more of the maximum floor areas specified in Table C2.2 is applicable — 1/10 of the lesser of those areas. (ABCB, 2016:115)
Section D Access and Egress	DP4 - Exits must be provided from a building to allow occupants to evacuate safely, with their number, location and dimensions being appropriate to— (a) the travel distance; and (b) the number, mobility and other characteristics of occupants; and (c) the function or use of the building; and (d) the height of the building; and (e) whether the exit is from above or below ground level. (ABCB, 2016:158) DP5 - To protect evacuating occupants from a fire in the building exits must be fire-isolated, to the degree necessary, appropriate to— (a) the number of storeys connected by the exits; and (b) the fire safety system installed in the building; and (c) the function or use of the building; and (d) the number of storeys passed through by the exits; and (e) fire brigade intervention. (ABCB, 2016:160) DP7

	Where a lift is intended to be used in addition to the required exits to assist occupants to evacuate a building safely, the type, number, location and fire-isolation must be appropriate to—(a) the travel distance to the lift; and (b) the number, mobility and other characteristics of occupants; and (c) the function or use of building; and (d) number of storeys connected by the lift; and (e) the fire safety system installed in the building; and (f) the waiting time, travel time and capacity of the lift; and (g) the reliability and availability of the lift; and (h) the emergency procedures for the building. (ABCB, 2016:160)
Section D Access and Egress Provision for escape D1.2 Number of exits required	(a) All buildings — Every building must have at least one exit from each storey. (b) Class 2 to 8 buildings — In addition to any horizontal exit, not less than 2 exits must be provided from the following: (i) Each storey if the building has an effective height of more than 25 m. (ABCB, 2016:164)
Section D Access and Egress Provision for escape D2.3 Non-fire-isolated stairways and ramps	In a building having a rise in storeys of more than 2, required stairs and ramps (including landings and any supporting building elements) which are not required to be within a fire-resisting shaft, must be constructed according to D2.2 (ABCB, 2016:178)
Section D Access and Egress Provision for escape D2.13 Goings and risers	(a) A stairway must have— (vi) treads of solid construction (not mesh or other perforated material) if the stairway is more than 10 m high or connects more than 3 storeys (ABCB, 2016:182)
Section D Access and Egress D3.3 Parts of buildings to be accessible	In a building required to be accessible— (f) a ramp complying with AS 1428.1 or a passenger lift need not be provided to serve a storey or level other than the entrance storey in a Class 5, 6, 7b or 8 building (i) containing not more than 3 storeys (ABCB, 2016:203)

<table>
<tr><td>Section E
Services and Equipment</td><td>Table E2.2a General Provisions contains various provisions for buildings of more than 2 storeys, including fire-fighting equip (ABCB, 2016:240-244)</td></tr>
<tr><td>Section E
E2.2a Smoke Detection and Alarm Systems</td><td>Various provisions for different building class uses eg: Class 3 building must be provided with a smoke detection system complying with Clause 4 if it— (A) has a Class 3 part located more than 2 storeys (ABCB, 2016:249)</td></tr>
<tr><td>Section E
E3.7 Fire service controls</td><td>Where lifts serve any storey above an effective height of 12m, the following must be provided: (a) A fire service recall control switch complying with E3.9 for— (i) a group of lifts; or (ii) a single lift not in a group that serves the storey. (b) A lift car fire service drive control switch complying with E3.10 for every lift. (ABCB, 2016:264)</td></tr>
<tr><td>Section F Health and Amenity</td><td>Table FV1.1 – RISK FACTORS AND SCORES
<table>
<tr><td rowspan="4">Number of storeys</td><td>One storey</td><td>Low</td><td>0</td></tr>
<tr><td>Two storeys in part</td><td>Medium</td><td>1</td></tr>
<tr><td>Two storeys</td><td>High</td><td>2</td></tr>
<tr><td>More than two storeys</td><td>Very high</td><td>4</td></tr>
</table>
(ABCB, 2016:281)</td></tr>
</table>