UTS UNIVERSITY OF TECHNOLOGY SYDNEY

Investigating the Design and Delivery of Aboriginal Housing in North-Western New South Wales, Australia

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Thesis submitted in fulfilment of the requirements for the degree of

Master of Architecture (Research)

under the supervision of Dr Campbell Drake &
Prof John Evans

University of Technology Sydney
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CERTIFICATE OF ORIGINAL AUTHORSHIP

I, Ella Holmgren, declare that this thesis, is submitted in fulfilment of the requirements for the award of Master of Architecture (Research), in the Faculty of Design, Architecture & Building at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This thesis includes Indigenous Cultural and Intellectual Property (ICIP) belonging to the Traditional Owners of Countries: the Dharawal and Yuin people of Wreck Bay; and the Gamilaraay people whose land upon which this research took place.Where I have used ICIP, I have followed the relevant protocols and consulted with appropriate Indigenous people/communities about its inclusion in my thesis. ICIP rights are Indigenous heritage and will always remain with these groups. To use, adapt or reference the ICIP contained in this work, you will need to consult with the relevant Indigenous groups and follow cultural protocols.

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Figure 01. *Photograph of architectural model for the Aboriginal housing in Boggabilla, New South Wales.* Adapted from photograph by Hamish McIntosh, 2021.

INVESTIGATING THE DESIGN AND DELIVERY OF ABORIGINAL HOUSING IN NORTH-WESTERN NEW SOUTH WALES, AUSTRALIA

Centred on a collaborative project between The University of Technology Sydney and the New South Wales Government Aboriginal Housing Office (NSW Aboriginal Housing Office), this research investigates the design, procurement and construction processes of Aboriginal housing in north-western New South Wales.

This research critically reviews literature and architectural documentation. It also analyses interview responses from members of the NSW Aboriginal Housing Office, builders, architects and Aboriginal Community Housing Providers to explore the varying perspectives within the design and delivery of Aboriginal housing.

Through action and reflection-based practice, this research demonstrates how culturally responsive design principles can be developed and implemented within the design and delivery of Aboriginal housing.

This research evaluates iterative architectural documentation to analyse an Aboriginal housing project in Boggabilla, New South Wales, from the initial concepts, development approval, construction and the tenants moving in. It examines the challenges of delivering Aboriginal housing in regional north-western New South Wales and the pressures that have precipitated the growing impetus for government agencies to 'rationalise' designs to focus on cost, maintenance, and timely delivery. Mindful of the legacy of substandard existing Aboriginal housing stock, this research investigates the challenges that impact delivering culturally responsive design outcomes.

Key Words

Aboriginal housing; Culturally responsive design; Design and delivery systems; NSW Aboriginal Housing Office

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CHAPTER 1: INTRODUCTION

Flowing through the Barwon River System, the Macintyre River weaves between the New South Wales and Queensland border on Gamilaraay Country. Along this river sits the small town of Boggabilla, where a newly constructed Aboriginal housing project lies, with two dwellings for single parents or aged residents. This thesis is centred on this collaborative project between the New South Wales Government Aboriginal Housing Office (NSW Aboriginal Housing Office) and the University of Technology Sydney from 2020 to 2023.

Through a reflective practice (Schön, 1983), this research evaluates the Aboriginal housing project in Boggabilla from the initial architectural design proposals to the completion of construction, comparing what was intended to what was built.

This research investigates how culturally responsive design principles are developed and applied within an Aboriginal housing project to meet the needs of Aboriginal tenants. Through this evaluation, this research seeks to provide insights into the challenges of designing, procuring and constructing Aboriginal housing in regional and remote New South Wales and how these may impact the delivery of culturally responsive outcomes.

This research emphasises the significance of addressing Aboriginal tenants' culturally specific needs and outlines a deficit in examples of culturally responsive housing. Between 2018 and 2019, 1 in 5 Aboriginal and Torres Strait Islander households lived in houses that did not meet an acceptable standard of having *"4 working facilities for washing people, clothes/bedding, storing/preparing food and sewerage and not more than 2 major structural problems"* (Australian Institute of Health and Welfare & National Indigenous Australians Agency, 2020).

The New South Wales Closing the Gap Implementation Plan for 2022-2024 (Aboriginal Affairs NSW & NSW Coalition of Aboriginal Peak Organisations, 2022) recognises this shortfall. Through an in-depth analysis of the design and delivery of Aboriginal housing in north-western New South Wales, this research seeks to align with *"improving understanding of suitable housing for Aboriginal people… from a culturally safe perspective"* (Aboriginal Affairs NSW & NSW Coalition of Aboriginal Peak Organisations, 2022, p.85).

To provide some background on my orientation as a researcher, I am a non-Indigenous Interior Architecture graduate from the University of Technology Sydney, a Research Associate and a sessional academic. I am also a member of The Indigenous Infrastructure and Sustainable Housing Alliance (TIISHA)[1], a group of industry professionals, designers, architects and researchers focusing on addressing disadvantages within Indigenous communities. These roles have allowed me to undertake this practice-based research project on Aboriginal housing in Boggabilla.

Before undertaking this Master's, I was involved in a research project at the University of Technology Sydney to evaluate the NSW Aboriginal Housing Office's 'AHO Innovation Program'. This program focused on delivering durable and affordable housing in Moree and providing training and employment opportunities for

1 https://www.tiisha.com.au/

local Aboriginal residents. It involved the testing of alternative construction methods for three new homes in Moree, including Structurally Insulated Panels (SIP), Podular 'straight and knuckle' design developed through a partnership between the NSW Aboriginal Housing Office, the University of Technology Sydney (UTS) and Corrective Services Industries (CSI); and Gluelam, a cross-laminated timber structured modular design. The opportunity to contribute to this evaluation allowed me to learn about the various modes of delivering Aboriginal housing, sparking my interest to explore this further. Emerging from the evaluation of the AHO Innovation Program was a commission awarded to the team to design two two-bedroom homes at a site owned by the NSW Aboriginal Housing Office, forming the basis of this thesis.

Figure 03. *Photograph of SIP (left), GlueLam (middle), and Podular (right) construction for AHO Innovation Program in Moree.* From *Photographs* by Campbell Drake, 2020

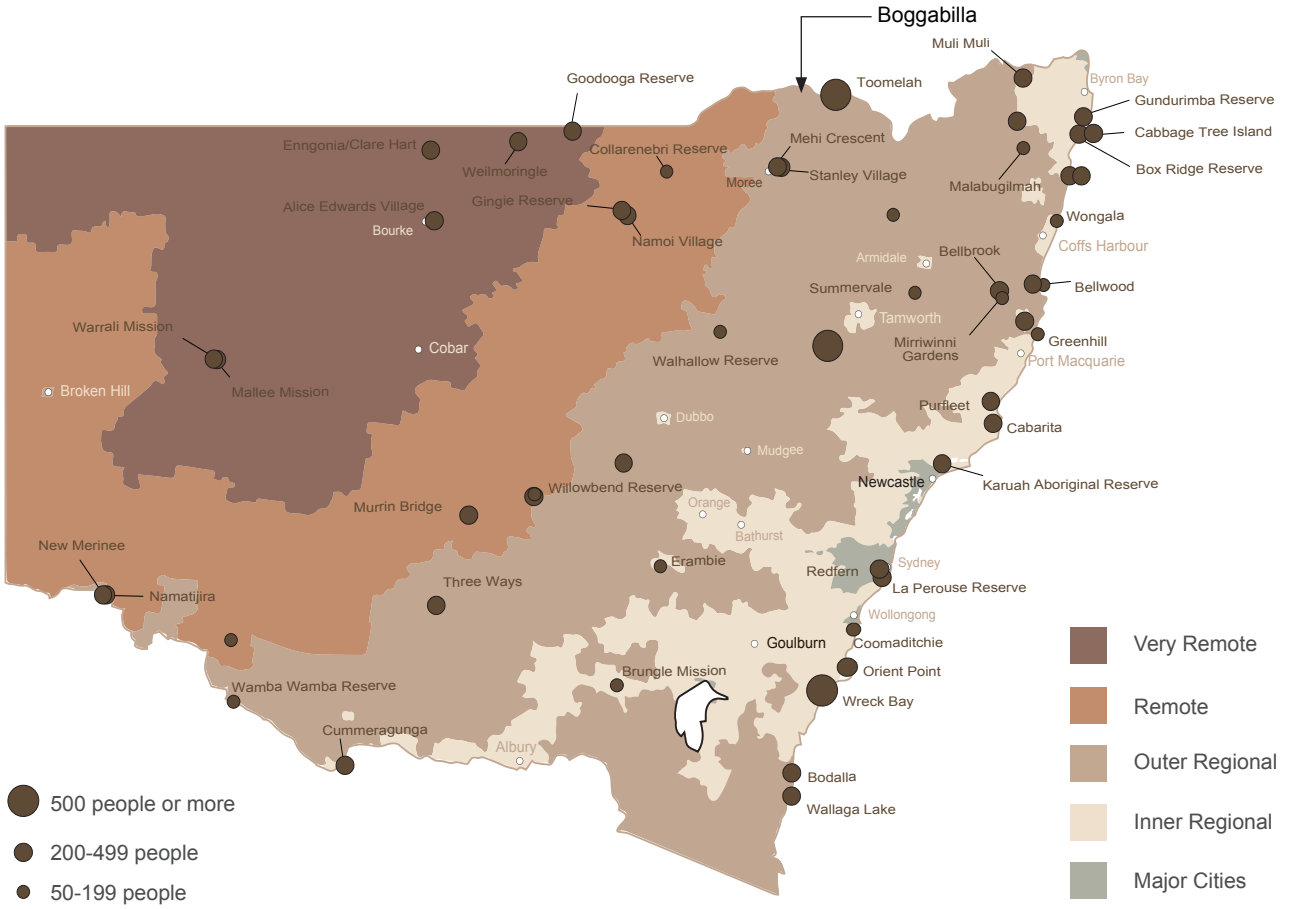
1.1 Context of Boggabilla

Boggabilla derives from the Gamilaraay word 'bagaaybila', which means 'full of creeks' (Appleton & Appleton, 1992), reflecting the region's landscape. Low-lying houses within the town have historically suffered from the flooding of the Macintyre River. The land surrounding Boggabilla has rich, fertile soil and is mainly utilised for primary industries and agriculture. Boggabilla is 35km from Goondiwindi, 115km south of Moree and 15km from Toomelah, one of the largest discrete Aboriginal communities[2] in New South Wales (as displayed in Figure 04).

Toomelah was an Aboriginal reserve between the 1930s and 1970s as part of the government assimilation policy (Human Rights and Equal Opportunity Commission, 1988, pp. 2-3). In 1988, The Human Rights and Equal Opportunity Commission conducted a report on the needs of Queensland, New South Wales border towns Goondiwindi, Toomelah and Boggabilla after racially fuelled violence broke out. The report highlighted racial discrimination against Aboriginal residents and poor living conditions often as a result, especially in Boggabilla and Toomelah, compared to Goondiwindi as a thriving regional centre due to agricultural business, with a predominantly non-Indigenous population (Human Rights and Equal Opportunity Commission, 1988).

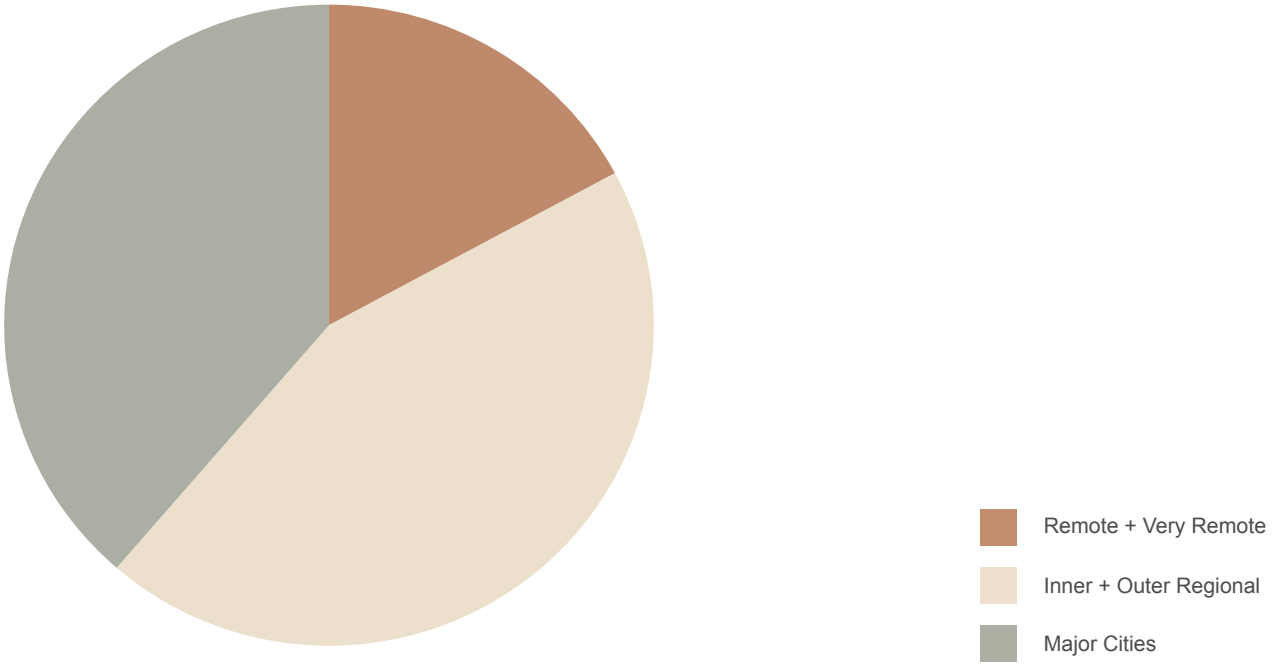
The Accessibility/Remoteness Index of Australia (ARIA) classifies Boggabilla as Zone OR - Outer Regional Australia with restricted access to goods, services, materials, labour and increased transportation costs. Remoteness can also be a qualitative concept, and despite limited access to these facilities, some Aboriginal people or communities may view their location as ideal, perhaps with proximity to family members and traditional lands (Aboriginal Housing Office, 2020).

2 As indicated in Figure 04, there are over fifty discrete communities in New South Wales (Australian Bureau Of Statistics, 2007). Comprising of predominantly Aboriginal or Torres Strait Islander peoples, these communities include former missions and reserves and other small settlements with housing managed on a community basis (Australian Institute of Health and Welfare, n.d). They often receive variable levels of government support and are responsible for the provision of *"basic services such as administration, education, health clinics, housing, local roads and drainage, communication and postal services, waste disposal and supply of water and electricity"* (Memmott & Moran, 2001, p.30). Figure 04 illustrates that most of the discrete communities in New South Wales are located in outer regional, remote, or very remote areas (Australian Institute of Health and Welfare, 2023)



Location of Discrete Communities in Relation to Accessibility/Remoteness in NSW

Figure 04. *Map indicating population and location of discrete communities in NSW.* Adapted from *Discrete Indigenous Communities* by Australian Bureau Of Statistics, 2006. & *Accessibility/remoteness in New South Wales.* Adapted from A*RIA remoteness in New South Wales* in the AHO Design Guidelines (p.20) by Aboriginal Housing Office, 2020.



Indigenous Population Distribution in Australia

Figure 05. (Right) *Pie chart of Indigenous population distribution in relation to remoteness*. Based on *Profile of First Nations people* by Australian Institute of Health and Welfare, 2023, Australian Institute of Health and Welfare (https://www.aihw.gov.au/reports/australias-welfare/profile-of-indigenous-australians), CC-BY 4.0

As shown in Figure 04, most of the population within discrete Indigenous communities live outside of metropolitan areas. This is the same case for Indigenous people in New South Wales, not just within discrete communities, as displayed in Figure 05[3].

Boggabilla has approximately five hundred residents and a predominantly Indigenous population. As highlighted by Memmott & Moran, *"the presence of the Indigenous populations in these townships would be clearly evident and felt to the extent of challenging non-Indigenous socio-spatial characteristics of the town living environment"* (2001, p.30). Referring to Memmott's previous commentary (1991), the authors emphasised that either through their substantial numbers compared to non-Indigenous populations or through forces of discrimination, Indigenous people within these towns have often maintained social distance and distinct social character (Memmott & Moran, 2001). The separation between Aboriginal communities such as Boggabilla and large serviced towns and the contrast in available services and living conditions demonstrates the ongoing mechanisms of exclusions that have persisted ever since colonisation.

3 Unfortunately, census data has historically depicted the Indigenous Australian population inaccurately. However, it is important to still refer to the information to demonstrate trends. Figure 05 illustrates these trends without prescriptive statistics.

Figure 06. *Map of Boggabilla, indicating location of Aboriginal housing project site.* Adapted from *Google Earth*, 2023. Google Earth (https://earth.google.com/web/@-28.60521202,150.35712852,224.14568437a,7299.44782335d,35y,0h,0t,0r). In the Public Domain.

Figure 07. *Location of Boggabilla within New South Wales, Australia.*

Figure 08.[4] *Highlighted Indigenous communities I have worked within.* Adapted from *Aboriginal Languages and Nations in NSW & ACT* by Reconciliation NSW, 2023, State of New South Wales (Department of Education) (https://education.nsw.gov.au/about-us/strategies-and-reports/our-reconciliation-action-plan/resources), CC BY 4.0.

4 This map is based on existing resources and is only one representation of the rich diversity of languages and nations within Indigenous Australia. The intent is not for precise boundaries. It simply depicts the general location of larger groups of people, which may include smaller groups such as clans, dialects, or individual languages.

1.2 Research Aims

The primary aim of this research is:

- To investigate the challenges in designing, procuring, and constructing Aboriginal housing in regional New South Wales that impact the delivery of culturally responsive outcomes.

The secondary aims of this research are:

- To identify, explore and develop a set of transferable and relevant culturally responsive design principles for Aboriginal housing in New South Wales.
- To evaluate the spatial planning, procurement and construction processes within the context of Aboriginal housing in the north-western districts of New South Wales.

1.3 Research Questions

1. How can culturally responsive design principles be developed and implemented within the design and delivery of Aboriginal housing?
2. How do the challenges within the procurement and construction of Aboriginal housing in regional communities affect the delivery of culturally responsive outcomes?

1.4 Benefits

- Improve housing outcomes for Aboriginal tenants by building knowledge and competency in designing culturally responsive Aboriginal housing.
- Influence government agencies, Aboriginal Community Housing Providers, policy and housing delivery within the Aboriginal housing sector by evaluating the design, procurement and construction of an Aboriginal housing project.
- Benefit architects and designers working in Aboriginal housing by providing transferrable, culturally responsive design principles.

1.5 Thesis Structure

This thesis is structured in five chapters as follows, with chapters 2 to 5 reflecting the chronological progress of the subject housing project in Boggabilla;

Chapter 1 introduces the research, methodology and literature review that form the foundation of this thesis. Chapter 2 investigates the preliminary architectural design process in Boggabilla and the development of culturally responsive design principles. Chapter 3 examines the tender and procurement process and the transformation of architectural design within the project in Boggabilla. Chapter 4 is underpinned by interviews with members of the NSW Aboriginal Housing Office, builders, architects, and Aboriginal Community Housing Providers and investigates the challenges of procuring and constructing Aboriginal housing in Boggabilla and other remote or regional communities in New South Wales. Chapter 5 compares the team's pre-tender design, informed by culturally responsive design principles, with what was constructed in Boggabilla. The research reflects on the social, technical and political aspects of delivering Aboriginal housing in New South Wales.

1.6 Literature Review

Government agencies such as the NSW Aboriginal Housing Office and Aboriginal Community Housing Providers (ACHP) strive to deliver culturally responsive, accessible and affordable housing to Aboriginal people and families in remote, regional and metropolitan New South Wales (Aboriginal Housing Office, 2022; Community Housing Industry Association NSW, 2021). However, the following literature review demonstrates that there are limited examples of culturally responsive Aboriginal housing and emphasises the need for new and expanded research.

1.6.1 What is Culturally Responsive Design?

In an Aboriginal housing context, 'culturally responsive design' can be described as responding not only to the form and aesthetic but also the physical environment; local cultural beliefs, history, practices and traditions; orientation; family and household spatial behaviour; and the needs of tenants at different stages of life (Memmott, 2004; Fien et al., 2007; Brackertz et al., 2017; Fantin & Fourmile, 2018). Memmott & Davidson (2007, p.85) describe Aboriginal architecture as *"an expression of highly complex and diverse relationships between the physical, social and cosmological environment"* The authors add, *"There are a range of cognitive, invisible, ephemeral and symbolic properties that instil Aboriginal Architecture with a culturally distinct nature"* (Memmott & Davidson, 2007, p.86). Aboriginal housing designs must address Aboriginal kinship systems and the rules and obligations that can affect socio-spatial behaviour, spatial positions, orientations, or extent of body contact. These can apply to small groups within a single room or how the house is subdivided, where sub-groups occupy separate parts of the house (Memmott, 2014).

As Murphy et al. highlights, each project or set of design principles requires adaptation *"to ensure the design process is responsive to the spatial priorities of the local Indigenous community"* (Murphy et al., 2018, p. 514).

Fien et al. (2008) emphasise that researchers should respect and consider the needs and aspirations of Indigenous Australians and communities through consultative and collaborative procedures. Daniel J. Glenn (2018) also emphasises consultative processes and examining existing literature for cultural research, which is crucial to culturally responsive design. He outlines that *"the challenge now is to reflect on how culture once was completely integral to Indigenous architecture, in form, function, materials, orientation, siting and symbolism…"* (Glenn, 2018, p.771). His earlier work presented questioning that remains relevant, examining how architecture plays *"…a role in the preservation and celebration of those ancient traditions while appropriately serving the needs of today?"* and *"… how can that architecture be designed in a way that takes into account the generations to come?"* (Glenn, 2009, p.28)

1.6.2 The Prevalence of 'Mainstreaming' in the Design and Delivery of Aboriginal Housing

Euro-centric values have historically been projected onto the designing of Aboriginal housing to assume what a household should be or the construct of who lives within it, leading to poor living standards. Timothy O'Rourke highlights that *"in the first decade and a half of the twenty-first century, Aboriginal and Torres Strait Islander housing was still plagued by poor standards and chronic shortfalls of dwellings"* (O'Rourke, 2018, p.48). Between 2018 and 2019, 1 in 5 Aboriginal and Torres Strait Islander households lived in houses that did not meet an acceptable standard of having *"4 working facilities for washing people, clothes/bedding, storing/preparing food and sewerage and not more than 2 major structural problems"* (Australian Institute of Health and Welfare & National Indigenous Australians Agency, 2020).

The Universal Declaration of Human Rights states that everyone has the right to an adequate standard of living with decent housing that provides safety, security, health and well-being (United Nations, 1948). However, Aboriginal housing continues to be substandard compared to non-Aboriginal housing across Australia (Loosemore et al., 2021). This is not unique to Indigenous peoples in Australia but is an issue that is seen in many communities around the world, such as Inuit Nunangat or the Canadian Arctic (Heyes & Dowsley, 2018) and Native American lands (Malnar & Vodvarka, 2018), as outlined in 'The Handbook of Contemporary Indigenous Architecture' (Grant et al., 2018). Daphne Habibis (2022) also comments on substandard Indigenous housing in Australia and on a global scale in countries such as the United States, Canada and New Zealand. She highlights concerns such as increased wear and tear, plumbing and electrical issues and infrastructure hazards, limiting the provision of safe, comfortable and healthy spaces for Indigenous tenants (Habibis, 2022).

Researchers have stressed that a lot of Aboriginal housing still does not consider the specific cultural and environmental needs of Aboriginal tenants (Keys, 1996; Memmott, 2004; Fien et al., 2007; Ware, 2013; Brackertz et al., 2017; Grant et al., 2018). Indigenous designer Francois Lane also presents her frustration, repeatedly *"having other people's values forced upon us"* (Lane et al., 2018, p.344). Researchers have also attributed inadequate Aboriginal housing conditions to failed design approaches, poor construction and material selection, a misunderstanding of site constraints and culturally specific needs, and increased wear and tear due to endemic overcrowding and limited maintenance (McDonald et al., 2009; Lea & Pholeros, 2010; Ware, 2013; Habibis et al., 2016).

Grant et al. describe the term 'mainstreaming' within an Australian context, *"This term is a catch-all for the entire Australian community and is often used to define services and policies that attempt to cater to all Australians rather than for the cultural specificities of one particular sector of Australian society."* (Grant et al., 2018, p.13). Memmott highlights a government approach that contradicts culturally responsive design is the 'mainstreaming' of housing service delivery, which ignores cultural practices, values and obligations, and can *"inadvertently disadvantage a cultural group"* and could *"legally be construed as constituting indirect discrimination"* (Memmott, 2004, para. 13). Fien et al. argue that this 'mainstreaming' has repeated throughout history due to *"a failure to combine a deep understanding of cultural norms with the expertise of a professional designer"* (Fien et al., 2007, p.11). Erin Parke posted an article in 2020 that demonstrated the consequences of this 'mainstreaming.' She highlighted the continuous ignorance of culturally specific needs within Aboriginal communities, resulting in what she described as Australian 'Taj Mahals', large structures unfit for purpose which become unutilised architectural follies (Parke, 2020). This literature review assists in articulating the historic shortfalls in delivering culturally responsive Aboriginal housing due to the lack of consideration of cultural differences between Indigenous and non-Indigenous peoples in Australia.

Building on the arguments of Memmott and Keys, there is an evident need for 'cultural sustainability', which encompasses sensitivities to culturally specific spatial behaviours, cross-cultural contexts and values and is not overly dominated by Western concepts of architecture (Memmott & Keys, 2015).

1.6.3 Paul Memmott's Cultural Design Paradigm

Anthropologist, academic and architect Paul Memmott and Carol Go-Sam outline how the 'cultural design paradigm' examines *"how an understanding of the cultural differences inherent in Aboriginal domiciliary behaviour can inform the design process"* (Memmott & Go-Sam, 2003, p.13). Memmott outlines that *"the*

culturally distinct behavioural use of domiciliary space involves typical diurnal/nocturnal behaviour patterns for different seasonal periods, distinct types of household groups, forms of approach and departure behaviour to domiciliary spaces, external orientation and sensory communication between domiciles, sleeping behaviour, cooking behaviour and use of hearths, characteristic uses of storage for artefacts and resources, and structured sociospatial behaviours" (Memmott, 2004, para. 5).

This paradigm not only focuses on the interior of the home but also emphasises the significance of externally oriented spaces such as the edge of the house, semi-enclosed spaces and yards (Memmott et al., 2000, p.104; Smith, 2000; Groome & Pholeros, 2000; Memmott, 2001, 2003a, pp.33-35; Dillon & Savage, 2003, p. 41,42; Keys, 2003, p. 67). It also examines the preferred internal and external cooking activities (Memmott, 2003a, p.32; Keys, 2003, p.68) and sleeping locations (Memmott, 2003a, p.33). Customary hearth-based activities should also be considered (Smith, 2000; Memmott, 2003a, p.32). Internal and external spaces should respond to the specific local climate and seasons, considering orientation, thermal performance, winds, seasons, rain and sun paths (Memmott et al., 2000, p.50).

Considering fluctuating, large or complex households (Memmott, 2003a, pp.29-31; Dillon & Savage, 2003, p.42), bedrooms, living spaces and verandahs should be adequately sized to suit (Memmott et al., 2000, p.97,98, 101). Potential visitors must be accommodated with overflow spaces (Memmott et al., 2000, p.104; Memmott, 2001, 2003a, pp.30-32; Dillon & Savage, 2003, p.42) and the design should also consider multiple uses and changing functions of space, for example, living rooms as sleeping spaces (Memmott et al., 2000, p.98; Memmott, 2003a, p.30).

Designs should also address culturally specific concepts of privacy (Memmott et al. 2000, p.98, 101; Memmott 2001, 2003a, p.29), preferences for visual surveillance and non-verbal communication (Memmott et al., 2000, p.99, 100; Smith, 2000; Keys, 2003, p.67; Fantin, 2003, p.75).

Generated from effective community consultation, this approach reinforces cultural identity within housing design and procurement (Memmott & Go-Sam 2003, p.13; Centre for Appropriate Technology, 2013). This thesis will examine the development of culturally responsive design principles, informed by this cultural design paradigm and implemented within an Aboriginal housing project in Boggabilla.

1.6.4 Socio-political Context of Aboriginal Housing

Memmott & Moran emphasise the disproportionate levels of social, economic, health, and educational disadvantage that Indigenous Australians have historically experienced compared to the rest of the population, *"arising from the ongoing effects of colonisation, dispossession, disempowerment and successive policies and practices of past governments"* (Memmott & Moran, 2001, p.47).

Libby Porter (2020) highlights the historical and contemporary systemic approaches to delivering Aboriginal housing and their role in ongoing colonial processes. She discusses the failure in the education system and the systemic racism, referring to Bruce Pascoe's comment, *"Almost no Australians know anything about Aboriginal civilisation because our educators, emboldened by historians, politicians and the clergy, have refused to mention it for 230 years. Think of the extent of that fraud. Imagine the excellence of the advocacy required to get our most intelligent people today to believe it. Imagine the organisation required in the publishing industry*

to fail to mention Aboriginal agriculture, science and diplomacy" (Pascoe, 2018, p. 65). This absence of Indigenous knowledge systems, traditions and histories from education and upbringing has only continued to deepen the wounds of colonisation. Porter emphasises these power relations, organised through the structure of settler-colonialism. She comments, *"That Australia has colonial origins is not in dispute. But that this reality of colonisation is a perpetual logic that structures our very social and political fabric today is not only unacknowledged but vehemently contested…"* (Porter, 2020, p.140). Porter stresses that spatial organisation and design within Aboriginal communities are some of the social, political and governance structures that are *"sustaining the structure of violence that is the settler colony"* (Porter, 2020, p.140).

In July 2020, former Prime Minister Scott Morrison announced that the original seven targets within the Closing the Gap Strategy were *"wrong-headed"* and lacked proper consultation with Aboriginal and Torres Strait Islander peoples in Australia (Higgins et al., 2020). A new series of targets was developed by a network of Aboriginal and Torres Strait Islander community-controlled organisations. The ninth target aims for Aboriginal and Torres Strait Islander people to *"secure appropriate, affordable housing that is aligned with their priorities and needs"* (Aboriginal Affairs NSW & NSW Coalition of Aboriginal Peak Organisations, 2022, p.83).

In March 2022, the New South Wales Coalition of Aboriginal Peak Organisations (CAPO) consulted with almost four hundred people in twenty-eight locations across the state to discuss Closing the Gap, informing the development of the New South Wales Closing the Gap Implementation Plan 2022-2024. Among the highlighted areas needing improvement within Aboriginal housing were increased delivery count, catering to differing housing needs, housing suitable for its environment, and improved repairs and maintenance (NSW Coalition of Aboriginal Peak Organisations, 2022).

In July 2023, The Productivity Commission released Closing the Gap data that outlined only four of the fifteen targets to be on track nationwide, none of which were the improvement of Aboriginal housing. However, most targets have noted improvements. There is limited current data to indicate whether or not the housing conditions are improving state-wide and nationally (Productivity Commission, 2023).

In June 2023, the Federal Government invested $2 billion in social housing around Australia (Treasury, 2023a), with the New South Wales government receiving the largest portion at $610 million (Australian Housing and Urban Research Institute, 2023). Prime Minister Anthony Albanese highlighted that the provision of social housing has decreased over the last decade; however, *"Demand for social housing has increased almost three times as fast as the growth in population"* (McIlroy, 2023). This large injection of funding will hopefully help speed up the delivery of new or upgraded social housing, including Aboriginal housing.

1.6.5 The Significance of Developing and Applying Culturally Responsive Design Principles

Researchers have argued that culturally responsive housing can reduce overcrowding and improve safety, physical and mental health, family stability, self-determination, empowerment, educational performance, employment opportunities, and cultural sustainability within Aboriginal communities (Bridge et al., 2003; Phibbs & Young, 2005; Lee & Morris, 2005; Brackertz et al., 2017). Up-front investment in affordable, well-designed Aboriginal housing with quality materials and construction methods can provide long-term cost and maintenance savings for governments (Garnett et al., 2009; Brackertz et al., 2017).

Memmott & Moran outlined in 2001 that the persistence of *"customary domiciliary behaviours in many contemporary settlements has resulted over the last 30 years in the development of a set of architectural design concepts and standards for Indigenous housing that are aimed at supporting such cultural processes rather than inhibiting such…"* (Memmott & Moran, 2001, p.31). The authors highlight that these design principles have historically been ignored but recognise the steady increase in their value and acceptance. They referred to one of the recommendations of the Royal Commission into Aboriginal Deaths in Custody (No.73), *"that the provision of housing and infrastructure in discrete Aboriginal settlements respond to 'cultural perceptions of the use of living space'..."* (Australia. Royal Commission into Aboriginal Deaths in Custody & Johnston, 1991)(Memmott & Moran, 2001, p.32).

Design principles must be developed and applied to the provision of Aboriginal housing, underpinned by meaningful consultation with Aboriginal and Torres Strait Island peoples, as a transdisciplinary response to economic pressures, site constraints and the cultural, social, and environmental needs of the tenants (Fien et al., 2007; Brackertz et al., 2017; O'Rourke, 2018). Kieran Wong of The Fulcrum Agency stresses the need for all levels of government to be held accountable for implementing culturally responsive design principles in Aboriginal housing *"through a cohesive and robust design framework..."* (Wong, 2018, para. 17).

Murphy et al. (2018) outline the hope that principles can assist in informing new decisions, veering away from past design assumptions.

Malnar & Vodvarka discuss how developing and applying architectural design principles can connect spaces with Indigenous peoples' cultural norms, beliefs and needs (Malnar & Vodvarka, 2018). The authors highlight Dr Craig Howe's view of the design process, which states that culture informs the built forms, spaces, and spatial relationships within communities (Malnar & Vodvarka, 2018; Standard, 2010). Similarly, Wanda Dalla Costa articulates the *"intersection of Indigenous perspectives and architecture"* within traditional North American Indigenous societies (Dalla Costa, 2018, p.194). She suggests that *"Architecture is a means of codifying values and telling a story"* (Dalla Costa, 2018, p.200). Parallels can be drawn between these expressions and the design principles developed in this thesis, creating a framework to respond to the culturally specific needs of Aboriginal tenants.

1.6.6 National Culturally Responsive Design Guidelines in Australia

Within a discussion of developing culturally responsive design principles, it is essential to outline the various existing sets applicable within Aboriginal housing projects in New South Wales or nationwide. Of course, there would be ones applicable in other states, but this discussion will be refined to the scope of this thesis.

In 2008, Fien et al. developed a document for the Australian Housing and Urban Research Institute that presented a framework for stakeholders to implement within the provision of Aboriginal housing. These principles built upon the National Framework for the Design, Construction and Maintenance of Indigenous Housing (Department of Family and Community Services, 1999) and align with Alternative Housing Systems for Indigenous People in Remote Communities (SGS Economics and Planning et al., 2007) which came out after the framework was sent for review. The principles emphasise the significance of *"'health hardware' necessary for washing people, washing clothes and bedding, removing waste safely, improving nutrition, reducing crowding, separating people from animals, reducing dust, controlling temperature and*

reducing trauma" (Fien et al., 2008, p.7) as outlined in National Indigenous Housing Guide (Department of Families, Community Services and Indigenous Affairs, 2007). The framework presents recommendations for cultural appropriateness, layout, siting, accommodating dynamic household needs, eco-efficiency, healthy living practices, employment and economic development, life-cycle costing, and innovation in procurement, ownership and construction systems. These principles are encouraged to be applied at each stage of the design and delivery process, including post-occupancy management, and informed by consultation throughout (Fien et al., 2008, p.2). The Australian Housing and Urban Research Institute has continued to build upon this framework over the years, with persistent encouragement for community-informed and culturally responsive housing (2018).

Like Fien et al. (2008), this thesis investigates the development of design principles, the process that informed them and their application within a specific Indigenous community, accompanied by interviews with architects, builders, housing providers and government agencies for validation. This thesis examines the implementation of developed principles within the design and delivery of an Aboriginal housing project in Boggabilla. It analyses the challenges that impacted the evidence or absence of these principles within the final built outcome.

In 2013, Healthabitat published a 'Housing for Health' guide, superseding The National Indigenous Housing Guide (Healthabitat, 2023a). This guide recognises the intrinsic connection between the conditions of Aboriginal housing and tenants' physical and mental health (Torzillo et al., 2013). It provides in-depth recommendations for construction, maintenance, health, safety, and physical and thermal comfort in the home. Whilst the guide is presented predominantly through a health lens, it addresses particular Indigenous-specific cultural aspects of designing for large households and fluctuating populations. To minimise overcrowding, the guide recommends additional health hardware inside the house, developing the yard and edges of the house, providing cooling and heating in several rooms, providing extra sleeping areas, and ensuring functional health hardware throughout the community. However, the guide lacks depth in consideration of externally oriented spaces and internal spatial configurations (Healthabitat, 2023b). The document is also entirely online, and viewing a complete list of the principles is quite convoluted, raising concerns about accessibility and transferability.

1.6.7 State-wide Culturally Responsive Design Guidelines in New South Wales, Australia

Within a New South Wales context, existing sets of culturally responsive design principles include the AHO Design Guidelines (Aboriginal Housing Office, 2020), which will be further unpacked in the following section, and Government Architect New South Wales's framework 'Connecting with Country' (Government Architect New South Wales, 2023). The New South Wales Government endorses both of these. Connecting with Country explores in-depth recommendations for culturally responsive practice, emphasising meaningful, considerate and sustainable relationships with community and Country. Although it provides a framework for honouring and recognising cultural identity through design decisions, the document does not include prescriptive guides for specific features, materiality, layouts and configurations within Aboriginal housing (Government Architect New South Wales, 2023).

In their 2020 draft framework, Government Architect New South Wales discussed the importance of consultation with Indigenous knowledge holders when implementing a framework and the unbiased neutrality of designers to aid in problem-solving and achieving culturally responsive outcomes (Government Architect New South Wales, 2020). They forefronted that their framework *"should not be yet another layer of principles*

or objectives to add to a policy environment already dense with principles that are inconsistently interpreted." Instead, they articulated the need for clear commitments to *"valuing Country, and by extension, Aboriginal culture and people"* (Government Architect New South Wales, 2020, p35). Similarly, this thesis seeks to demonstrate a practical example of how principles can be influenced by existing guidelines, strengthened by community consultation and adapted to be relevant to a specific Aboriginal housing project.

The NSW Aboriginal Housing Office's 'AHO Design Guidelines'

Due to the scope of this thesis, which is tracking a collaborative project with the NSW Aboriginal Housing Office, this section of the literature review will further unpack the AHO Design Guidelines.

In 2019, the NSW Aboriginal Housing Office collaborated with design studio Tzannes to develop the AHO Design Guidelines for low and medium-density residential projects (Aboriginal Housing Office, 2020, p.8). According to interview responses from members of the NSW Aboriginal Housing Office, these guidelines were developed after workshops with Aboriginal Community Housing Providers, in-house regional teams, cultural committees, architects, urban and interior designers, and other key subject matter experts. The NSW Aboriginal Housing Office outlined that this document is intended to be referred to by their staff when reviewing tenders during the design and construction process and utilised by tenderers, builders, architects and designers for guidance and to understand the requirements of the agency (Aboriginal Housing Office, 2020, p.9). It aims to provide recommendations on *"key principles in relation to siting, cultural, sustainability, envelope and internal design principles"* (Aboriginal Housing Office, 2020, p.10). A summarised table of these principles is illustrated in Figure 10.

The introduction to the guidelines outlines that some are mandatory and some are encouraged as best practices. There is no definitive written or visual indication of which guidelines are enforced, but some are encouraged to be *"considered"*, while others are more prescriptive with dimensions or limitations. These apparent mandatory guidelines focus on structure, spatial dimensions, safety, security, accessibility, navigation, storage and lighting (Aboriginal Housing Office, 2020).

The following figures are examples of floor plans that accompany design standards in the Interior Design Principles section of the guidelines, such as spatial organisation and dimensions limitations.

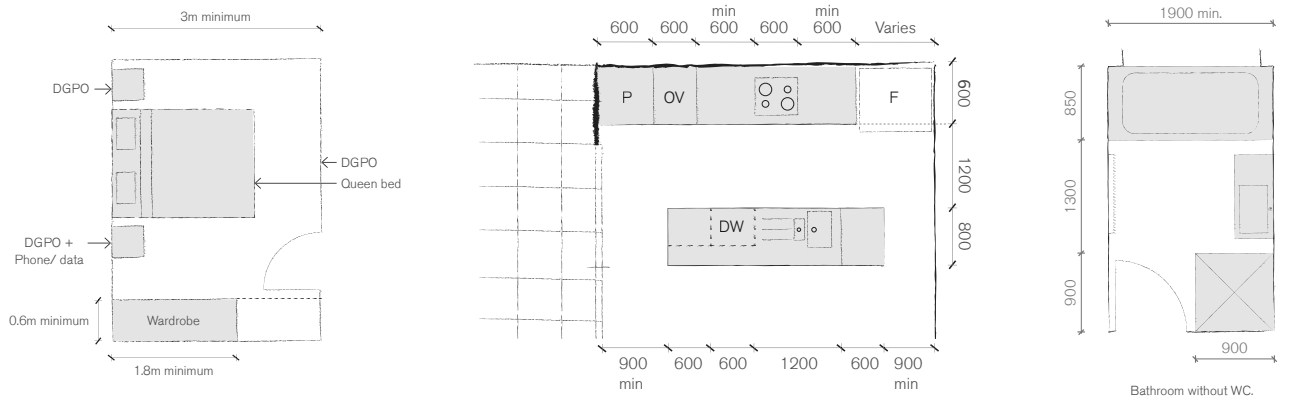


Figure 09. *Recommended bedroom (left), kitchen (middle) and bathroom (right) configurations in the AHO Design Guidelines.* Adapted from *AHO Design Guidelines*, by the Aboriginal Housing Office, 2020.

AHO Design Guidelines Summary		
Location and Climate	Climate Zones	
	Designing for Climate	
	Remoteness Zones	
	Designing for Remoteness	
Cultural Sustainability Principles	What is Cultural Sustainability?	
	What is country?	
	General Principles	
Siting Principles	Siting and Orientation	Walking on Country
		Cultural Principles and Key Features of the Land
		Protecting the Natural Environment
		Topography
		Solar Orientation
		Wind Orientation
		Building Separation
	Ground Conditions	Soil classification
		Water classification
		sediment control
	Access and Movement	Pedestrian and Vehicle Access
		Streetscape
		Safety and Security
Building Envelope Principles	General Design Principles	Facade Design
		Roof Form and Awning Design
	Daylight Control	Shading
		Privacy
		Solar and Daylight Access
		Artificial lighting
	Ventilation	Natural Ventilation
		Stack Ventilation
		Roof Ventilation
		Roof Openings
	Thermal Performance	Performance Guidelines and Ratings
		Insulation and Thermal Bridging
		Thermal Mass
	Construction	External Materials
		Glazing
		Windows and Doors
		Alternative Construction Methodologies
		Safety In Design
		Designing for Seniors and Adaptability
External Design Principles	Front Yard	Car Parking - Garages and Carports
		Driveway
		Front Entry and Yard Principles
		Letterbox
	Rear Yard	Covered Outdoor Area
		Rear Yard Principles
		Pavement and Access
	Utilities	Clotheslines
		Utilities
		External Storage
	Boundary Conditions	Fences
		Retaining Walls
Internal Design Principles	Functional Spaces	Entry
		Circulation and Corridors
		Internal Openings
		Bedrooms
		Multi-use Room
		Kitchen
		Dining Area
		Living Area
		Indoor-Outdoor Connection
		Bathroom and Ensuite Principles
		Laundry Principles
	Circulation and Storage	Internal Storage
		Joinery
		Study Nook
		Internal Stairway
		Balustrades
	Materials and Components	Internal Materials
		Ceiling Heights and Fans
		Internal Lighting
Typical Floor Plans	Large Family Home	
	Multi-generation Home	
	Small Family Home	

Figure 10. *Summary of design principles outlined in the AHO Design Guidelines.* Adapted from *AHO Design Guidelines*, by the Aboriginal Housing Office, 2020.

The existing design principles discussed in this literature review present an intersection of policy, building standards and culturally responsive practice. Some sets, such as the AHO Design Guidelines and Connecting With Country, are accompanied by visuals. However, the other principles lack this. This thesis synthesises and develops principles, accompanied by photographs, diagrams, tables and other visual elements to enhance accessibility and engagement.

These demonstrate expertise in specific areas but lack a comprehensive list of specific design elements to implement within culturally responsive Aboriginal housing. They are all on a broader, more generalised scale to remain adaptable and flexible.

As The Australian Institute of Aboriginal and Torres Strait Islander Studies outlines, *"Aboriginal and Torres Strait Islander Australia is made up of many different and distinct groups, each with their own culture, customs, language and laws"* (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2023). Due to this diversity, developing a one-size-fits-all set of design principles is impossible. This research review has previously outlined the consequences of this 'mainstreaming' on the quality of life of Indigenous Australians.

Considering the diverse cultural and environmental needs in each Aboriginal housing project, principles such as the AHO Design Guidelines can act as a starting point to be expanded on, informed by community consultation, to respond to the needs of tenants in a specific project. This thesis demonstrates an example of this adaptation and further development process within the Aboriginal housing in Boggabilla. As the document outlines, *"Aboriginal people should be consulted and involved in all decisions affecting their cultural heritage, especially the provision of housing to suit their needs and the needs of the community"* (Aboriginal Housing Office, 2020, p.30). The design process should consider how to connect with, design for, and care for Country (Aboriginal Housing Office, 2020, p.28).

1.6.8 The Challenges in Delivering Culturally Responsive Aboriginal Housing in Regional New South Wales

Fien et al. highlight that Aboriginal or Torres Strait Islander peoples are predominantly living in rural and remote areas, which are the *"most difficult to reach, the most climatically inhospitable and the most expensive in which to build appropriately-designed housing"* (Fien et al., 2007, p.39). Implementing culturally responsive design principles such as the AHO Design guidelines can be challenging as government agencies, builders, and housing providers struggle to meet the demands of delivering Aboriginal housing in regional communities.

Fien et al. stressed that *"the costs of remoteness are experienced in increased prices for construction materials due to shortages of materials, a limited range of suppliers, long-distance transport of materials, shortages of skilled trades and a need to specify robust materials and construction technologies"*(Fien et al., 2007, p.52). In 2017, Brackertz et al. illuminated the high deficit in social and affordable housing for Aboriginal households, projected to increase by 62% by 2031 (Brackertz et al., 2017).

In June 2021, the New South Wales Government established the Regional Housing Taskforce to respond to growing housing affordability and supply pressures in regional New South Wales. In September 2021, they released a report containing feedback from over five hundred people across the state (NSW Department of Planning, Industry and Environment, 2021b). This report confirms that the challenges that Fien et al. (2007) highlighted remain, with additional pressures, such as COVID-19, bushfires, flooding, infrastructure

and environmental factors, and declining affordability due to planning systems and land availability (NSW Department of Planning, Industry and Environment, 2021b). This thesis builds on investigating these challenges and seeks to explore their prevalence within Boggabilla and the regional communities where interviewed stakeholders live and work.

In 2020, The World Economic Forum declared the urgent need for a 'Great Reset' to address the social and climate crises significantly impacted by the current global pandemic. Later that year, $150 million was injected into IBA's Indigenous Home Ownership Program to provide more home loans and construct new homes (Indigenous Business Australia, 2020). In 2021, The New South Wales Government awarded the NSW Aboriginal Housing Office $40 million to speed up current projects and deliver more housing across the state (Aboriginal Housing Office, 2021). Despite this increased funding, pressures remained, with CoreLogic reporting in September 2022 that construction costs rose in the state over the past year by a record 10.3% (CoreLogic Australia, 2022). CoreLogic Research Director Tim Lawless commented on the report and stressed challenges such as *"low labour supply, material shortages, rising interest rates and inflationary pressures"* (CoreLogic Australia, 2022, para. 11). Economic shifts like this encourage government agencies to focus on cost and maintenance.

As articulated by Fien et al., economic shifts and cost pressures like this *"are often met by removing important, culturally significant spaces, under-specification of materials, and the neglect of appropriate consultation, monitoring of workmanship and post-occupancy evaluation"* (Fien et al., 2007, p.52). Many other researchers have illuminated the impetus of government agencies on the number of houses delivered, compromising culturally responsive outcomes, often to suit political, technical, cost and time-based constraints that were developed without input from Aboriginal or Torres Strait Islander people (O'Rourke, 2018; Wong, 2018; Fantin & Fourmile, 2018). Andrew Broffman also articulates, *"The top-heavy bureaucratic representation is evident, and a critical element is conspicuously absent. That is, the end user. Aboriginal people living in and around these buildings often have no more than a perfunctory role to play in the project's conception and execution. In this environment, genuine inclusive design is not possible. It is instead replaced by the rhetoric of inclusivity"* (Broffman, 2015, p.123).

Informed by current literature, an analysis of interview responses and the project in Boggabilla, this research explores how complex the procuring and constructing of Aboriginal housing can be.

1.6.9 The Need for Contributed Knowledge on Aboriginal Housing and Culturally Responsive Design Approaches

The term 'Aboriginal architecture' has only been accepted in academic research in Australia since the early 1990s (Memmott 1993; Memmott & Go-Sam, 1999). Memmott & Davidson (2007, p.85) highlight that *"Australian Aboriginal architecture has regularly been portrayed during the colonial and post-colonial periods as little more than primitive huts, and certainly not deserving of the label 'Architecture.' To do so is rather threatening to the status quo (the profession of capital A architects)."* The authors use the term 'capital A architecture' to refer to Euroamerican concepts of architecture (Memmott & Davidson, 2007). The concept of 'Aboriginal Architecture' was recorded in the Encyclopedia of Australian Architecture in 2012 (Goad & Willis, 2012). Fantin & Fourmile (2018) build on this discussion of the short history of analysing Indigenous architecture in Australian academic literature due to the ignorance of the rich Aboriginal and Torres Strait Islander history resulting from imposed colonisation.

Paul Memmott has encouraged governments to *"re-examine their histories"* in the provision of Aboriginal housing and *"document their mistakes instead of constantly re-inventing the wheel and committing the same errors"* (Memmott, 1988, p. 45). In 2013, the Centre for Appropriate Technology (CAT) published a document presenting the same frustrations with the issues raised in their post-occupancy evaluation being noted in previous studies *"and yet remain unresolved even in this program, despite the wealth of knowledge gathered over 30 years of appropriate Indigenous housing development in remote Australia"* (Centre for Appropriate Technology, 2013, p.3). Concerns raised by researchers like Memmott and the Centre for Appropriate Technology over the years indicate the significant need for evaluation within the Indigenous housing sector. Megan Williams highlights that *"attention is increasingly on evaluation, and the need to better understand principles for evaluation, methodological approaches, tools, and mechanisms for translating findings in ways that improve health equity"* (Williams, 2018, p.7). This thesis seeks to contribute to this knowledge through a reflective, action-based evaluation to provide insight into the spatial planning, procurement and construction of Aboriginal housing and how culturally responsive design principles can be developed and applied.

Lane et al. highlight that *"practitioners often lack time and funding to write for academic publications, and documentation of their work is imperative to demonstrate the value and the challenges for practitioners and the Practice of Indigenous architecture"* (Lane et al., 2018, p.331). O'Rourke has outlined that it often focuses on deficiencies and failed design approaches and emphasises the need for case studies and evaluations of the design and delivery of Aboriginal housing (O'Rourke, 2018). Reflecting on the shortfalls explored in the 2018 review of the Closing the Gap Strategy (Holland, 2018), Campbell Drake and Emrah Baki Ulas highlight *"the challenge of the gap"* and emphasise the evident imbalance of energy placed on providing services and treating the 'symptoms' rather than improving structures and looking at the 'systemic causes"' of the housing issues (Drake & Ulas, 2020, p.137). Recognising these areas needing further research, this thesis analyses Aboriginal housing outcomes as the 'symptoms' of 'causes' such as the various social, technical, political and economic challenges within the design and delivery process in regional New South Wales.

The 2022 New South Wales Coalition of Aboriginal Peak Organisations (CAPO) Closing the Gap Community Engagement Report forefronted the need for government procurement and construction processes to be evaluated to *"ensure they are supporting Aboriginal people, businesses, and communities"* (NSW Coalition of Aboriginal Peak Organisations, 2022, p35).

This thesis shares the same questioning as Long et al., who recognise an issue that is *"significant yet it has received very little research attention"* (Long et al., 2007, p. 62). The authors question the compromises designers must make to suit the parameters of housing projects. What culturally responsive design outcomes are compromised to suit budgetary constraints? To what extent do government agencies promote these outcomes? Do these agencies ensure that new houses are designed according to these principles? (Long et al., 2007).

Within the latest NSW Closing the Gap Implementation Plan for 2022-2024, the government recognises the deficit in research on culturally responsive Aboriginal housing. This thesis seeks to contribute to Key Action Area 2 within the ninth socio-economic outcome, which aims for an *"improved understanding of suitable housing for Aboriginal people…from a culturally safe perspective"* (Aboriginal Affairs NSW & NSW Coalition of Aboriginal Peak Organisations, 2022, p.85).

1. How can culturally responsive design principles be developed and implemented within the design and delivery of Aboriginal housing?	
Memmott et al., 2003; Fien et al., 2007; Brackertz et al., 2017	Consider the form, aesthetic, physical environment; local cultural beliefs, practices and traditions; orientation; family and household spatial behaviour and the needs of tenants at different stages of life.
Glenn, 2009, p.28	Reflect on how architecture plays *"…a role in the preservation and celebration of those ancient traditions while appropriately serving the needs of today?"* and *"… takes into account the generations to come?"*
Keys, 1996; Memmott, 2004; Fien et al., 2007; Ware, 2013; Brackertz et al. 2017; Grant et al., 2018; Heyes & Dowsley, 2018; Malnar & Vodvarka, 2018; Parke, 2020	Avoid 'mainstreaming' by considering the specific cultural and environmental needs of Aboriginal tenants, rather than from a Western perspective.
McDonald et al., 2009; Lea & Pholeros, 2010; Ware, 2013; Habibis et al. 2016	Consider site constraints, culturally specific needs, construction methodology, material selection, adequate size housing and sustained maintenance.
Keys & Memmott, 2015	Through avoiding 'mainstreaming,' maintain 'cultural sustainability.'
Memmott, 2004	Implement a 'cultural design paradigm,' addressing culturally specific needs of Aboriginal people within the design process.
Memmott, 2014	Address Aboriginal kinship systems and the rules and obligations which can affect socio-spatial behaviour, spatial positions, orientations or extent of body contact.
Fien et al., 2008, p.7; Department of Families, Community Services and Indigenous Affairs, 2007	Consider *"'health hardware' necessary for washing people, washing clothes and bedding, removing waste safely, improving nutrition, reducing crowding, separating people from animals, reducing dust, controlling temperature and reducing trauma"*
Government Architect New South Wales, 2020	Meaningful, considerate and sustainable relationships with community and Country. Consultation with Indigenous knowledge holders and designers maintaining un-biased neutrality, with no cultural assumptions.
Aboriginal Housing Office, 2020	Refer to principles such as the AHO Design Guidelines and consider location, climate, cultural sustainability, siting, building envelope, external design, internal design, informed by community consultation.
Garnett et al., 2009; Brackertz et al., 2017	Up-front investment in quality materials and construction methods which can provide long-term cost and maintenance savings for governments.
Wong, 2018	Utilise existing research and evidence. Governments should also be held accountable for implementing culturally responsive design principles.
NSW Coalition of Aboriginal Peak Organisations, 2022	Cater to differing housing needs, housing suitable for its environment, more accessible housing application process, and improved repairs and maintenance.
2. How do the challenges within the procurement and construction of Aboriginal housing in regional communities affect the delivery of culturally responsive outcomes?	
Fien et al., 2007	Due to expensive construction because of remoteness, extreme climates, limited trades and resources, and need for robust materials, high quality, culturally significant housing,and in-depth community consultation is often compromised.
NSW Department of Planning, Industry and Environment, 2021	Housing delivery is impacted by factors such as COVID-19, bushfires, flooding, resource scarcity, availability of materials, infrastructure, environment, resource scarcity, and declining affordability due to planning systems, land availability.
CoreLogic Australia, 2022	*"Low labour supply, material shortages, rising interest rates and inflationary pressures"* leads to rising construction costs.
Broffman, 2015; O'Rourke, 2018; Wong, 2018; Fantin & Fourmile, 2018	Government agencies often focus on housing delivery count, compromising culturally responsive outcomes and community consultation, to suit technical and time-based constraints developed without input from Aboriginal or Torres Strait Islander people.

Figure 11. *Diagram of literature review in relation to thesis research questions.*

Figure 12. *Photograph of the Macintyre River in Boggabilla*. From *Photograph* by Campbell Drake, 2020.

1.7 Research Methodology

The foundation of this thesis is that a deep reflection can strengthen the analysis of social, political, and economic challenges within the spatial planning, procurement and construction processes of Aboriginal housing in the north-western districts of New South Wales. Informed by reflective practitioner theory (Schön, 1983), this research methodology analyses iterative architectural documentation and qualitative interview data to produce in-depth accounts of experiences in Aboriginal housing design and delivery in north-western New South Wales. Photographs, mapping, architectural documentation and comparative diagramming accompany this analysis. Various drawing techniques have been utilised to organise, analyse, synthesise and communicate the findings.

A critical review of academic literature, journal articles, government publications, and national and state culturally responsive guidelines has highlighted the challenges in designing, procuring, and constructing Indigenous housing that impact the delivery of culturally responsive outcomes. This review is centred on the specific context of Aboriginal housing in north-western New South Wales. However, an analysis of Indigenous housing across Australia and internationally highlights that many of the same design principles and challenges in designing, procuring or constructing Indigenous housing are prevalent on various scales. This research is further contextualised through examining iterative architectural documentation, diagrams and models and a series of interviews with Members of the NSW Aboriginal Housing Office, Builders, Architects and Aboriginal Community Housing Providers, and the tenants in the completed houses in Boggabilla.

Philosopher and professor in urban planning Donald Schön's reflective practitioner theory proposes that our knowledge is in our actions, and we can use a reflective-based practice to gain insight into our experiences and thought processes (Schön, 1983). This research encompasses both a 'reflection in action' and a 'reflection on action' (Schön, 1983), which is a *"cognitive postmortem"* (Greenwood, 1993, p.1185), analysing and evaluating retrospectively (Schön, 1983).

Jennifer Greenwood emphasises the importance of 'reflection before action' and critiques Schön for not acknowledging this (Greenwood, 1993). She encourages the learning of *"practical reasoning"*, taking into account a *"hierarchically organised series of if/then propositions"* (Greenwood, 1993, p.1186).

This thesis focuses on generative and emergent research to contribute knowledge on culturally responsive design and the challenges within the procurement and construction of Aboriginal housing in north-western New South Wales. The action-based approach within this research is a constant adaptive, iterative process, reflecting and reframing the problem, continuously asking, *"What if, what is next, so what?"* (Buwert, 2012, para. 27; Schön, 1983). Reflective questioning is applied to past (reflection on), current (reflection in) (Schön, 1983) and emerging (reflection before) (Greenwood, 1993) challenges to position 'failures' and difficulties as opportunities for learning (Argyris, 1996; Bolander Laksov & McGrath, 2020).

Pascua Yaqui/Chicana scholar Marisa Elena Duarte (2017, p. 135) describes positionality as a methodology that *"requires researchers to identify their own degrees of privilege through factors of race, class, educational attainment, income, ability, gender, and citizenship, among others."* Researchers, as human beings, will always see the world through their own lens, shaped by personal experiences and the unjust world around us (Duarte, 2017). This is unavoidable, and researchers must be conscious of their own identity, positionality and 'conceptual universe' when undertaking research.

I was born in what is now called East Melbourne, Australia, on the lands of the Wurundjeri, Boonwurrung, Wathaurrung, Taungurung and Dja DjaWrung peoples of the Kulin Nation. I grew up as a cis-gender female with a predominantly white, European and Asian background in the upper middle class of Sydney on the lands of the Gadigal people of the Eora Nation. I acknowledge my own degrees of privilege as an able-bodied, non-Indigenous person who lives and works on the unceded lands of the Eora Nation, with an upbringing, as Porter phrases (2020, p.138), *"entirely constructed from the dispossession and oppression of the peoples whose Country/ies I occupied."*

My role as a research associate within the housing project in Boggabilla positions me as both a participant and an observer in this research. My orientation, professional background, role within this research and the various degrees of privilege all shape the lens through which this research is conducted. Positionality is directly related to the selection of data collection methods. The reflective practice in this thesis is accompanied by intertextual literature, architectural documentation and diagramming, and interview responses to support validity.

1.7.1 Indigenous Data Sovereignty

Aligned with the Closing The Gap Priority Reform 4: Key Action Area 2, this research recognises the significance of *"facilitating Aboriginal sovereignty over data about Aboriginal people and communities. This will increase Aboriginal control over the collection, analysis and reporting of data about Aboriginal people and empower Aboriginal communities"* (Aboriginal Affairs NSW & NSW Coalition of Aboriginal Peak Organisations, 2022, p.51).

Following the Maiam nayri Wingara Indigenous Data Sovereignty Principles, this research will ensure that Aboriginal and Torres Strait Islander peoples have control over and access to relevant, contextual, empowering and respectful data (Maiam nayri Wingara, 2018).

This research has followed ethical guidelines, informed by the National Health and Medical Research Council's National Statement on Ethical Conduct in Human Research (2018c), Australian Code for the Responsible Conduct of Research (2018a) and Ethical Conduct In Research With Aboriginal And Torres Strait Islander Peoples And Communities: Guidelines For Researchers And Stakeholders (2018b). This research project was assessed against these guidelines on responsible research conduct and approved by the University of Technology Sydney Human Ethics Research Committee (See Appendix D).

Acknowledging that I am a non-Indigenous researcher exploring culturally responsive design principles within an Aboriginal community, I have carried out my research recognising the six core principles of 'Ethical conduct in research with Aboriginal and Torres Strait Islander Peoples and communities': spirit and integrity, cultural continuity, equity, reciprocity, respect and responsibility (National Health and Medical Research Council, 2018b).

This research seeks to illustrate spirit and integrity by responding to the need for culturally responsive housing outcomes. To contribute to the sharing of knowledge and data sovereignty, the findings of this research will be compiled and returned to the participants involved. Cultural continuity is shown by appropriately sharing collected information on the design and delivery processes of Aboriginal housing and how culturally responsive design principles can be transferrable and adaptable within this context. The research methodology adapts the

reflective practice to aid in culturally responsive analysis. Reciprocity, equity, respect, and responsibility are demonstrated through communicating all relevant information on the project plan, purpose, and methodology before they give consent, and risk management strategies will be ensured through the research process. The research was carried out with consent from all participants; all interviews were voluntary, and participants were assured of this. All interview responses have been anonymised, listed, and attached to the respective participant groups, with the names of each participant wholly removed from the study. Before commencing this research, I consulted with the NSW Aboriginal Housing Office. I had an existing working relationship through my previously outlined research roles in The Indigenous Infrastructure and Sustainable Housing Alliance and the University of Technology Sydney.

Similarly, this research seeks to demonstrate and implement the AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2020), which is consistent with and supports the National Health and Medical Research Council's document just discussed. This research acknowledges Aboriginal and Torres Strait Islander peoples' right to self-determination through recognition and respect, engagement and collaboration, informed consent, and cultural capability and learning. This research seeks to demonstrate and recognise the significance of Indigenous leadership in research *"informed by Indigenous priorities, values, perspectives and voices"* (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2020, p.17). It seeks to illustrate the principle of impact and value, aiming to benefit Indigenous peoples and ensure mutual understanding of the benefits and risks of the research. This research is *"designed and conducted to meet both present and future needs"* (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2020, p.21), recognising the significance of connections to Country, availability and governance of data, and seeking to demonstrate sustainability and accountability principles.

This research emphasises the significance of utilising several visualisation and diagramming tools to illustrate findings to present data that is transferable for future culturally responsive practice and accessible to community.

1.7.2 Data Collection

This research utilises four methods of data collection.

1. It employs a **literature review** to research and analyse existing Indigenous housing guidelines and the challenges in designing, procuring, and constructing Indigenous housing that impact the delivery of culturally responsive outcomes. The review includes international, national and state publications, such as journal articles, academic literature and non-academic or government literature. It examines information and presents opinions to explore the political, social, and technical aspects of Indigenous housing and gaps in existing research and knowledge.

2. This research **examines iterative architectural documentation, diagrams and models** developed at several project stages to identify changes and understand the decision-making process within the design and delivery of Aboriginal housing. Analysing architectural documentation from the initial architectural concept to the drawings issued for construction, as well as site visits and meetings with the client, builders, and other consultants, deepens this investigation of the evolving design.

3. As displayed in Figure 13, I conducted **eleven semi-structured interviews** with Members of the NSW

Aboriginal Housing Office,Builders, Architects and Aboriginal Community Housing Providers. I conducted one in February 2022 and the rest between September 2022 and February 2023. Given the varying experiences and roles of the participant groups, semi-structured interviews allowed respondents to express their views on their terms and, for myself as the researcher, to engage in a two-way dialogue, adapting to the evolving conversation and inserting new prompts if suited to gain the most information. These semi-structured interviews with participants with ranging expertise allowed for the most in-depth reflective discussions to present knowledge and experience within the design and delivery of Aboriginal housing.

From the NSW Aboriginal Housing Office, I interviewed a Strategy and Portfolio Development Manager, a Construction Manager and a Senior Project Officer with a planning background. The builders I interviewed were from the company constructing the Boggabilla project. One participant was the CEO and Managing Director; the other was a Project and Development Director and the builder on-site in Boggabilla. All interviewed architects worked separately from each other, all with decades of experience with socially and culturally responsive design. All interviewed Aboriginal Community Housing Providers worked and lived in north-western New South Wales. I interviewed a community Elder and former housing provider. The two other participants requested a group interview as they worked with each other in senior positions within the same provider.

Snowball sampling was employed to access an emerging group of participants by asking respondents to suggest who they thought could be interested in participating in the research.

I have worked with the NSW Aboriginal Housing Office since 2020 as a research associate at the University of Technology Sydney and The Indigenous Infrastructure and Sustainable Housing Alliance. This relationship enabled me to acquire the contact details for NSW Aboriginal Housing Office members. The contact details for builders and architects were obtained through existing working relationships or via LinkedIn. I obtained the contact details for the interviewed Aboriginal Community Housing Providers via the NSW Aboriginal Housing Office. I organised interviews with participants either via phone or email.

I conducted one interview in person, and the remaining were online video meetings via Zoom/Microsoft Teams or phone calls - due to differing factors such as distance, COVID-19, participant preference, availability and time constraints. Each semi-structured interview lasted approximately an hour, and participants were asked open-ended questions (see Appendix C) based on my two research questions. Asking the same open-ended questions in each interview, I gathered both similar and competing perspectives on the challenges and experiences within the design and delivery of Aboriginal housing. All interviews were audio-recorded and transcribed to clarify participants' responses and to revisit any significant findings to strengthen the research.

4. In October 2023, I returned to Boggabilla to conduct a **limited post-occupancy evaluation** with the tenants of the two recently constructed homes.

I attempted to contact the tenants weeks before my site visit, providing my contact details if they had any questions or preferences if they wished to participate. Unfortunately, the letters were returned to me due to postal service issues. I also communicated with someone from Moree Local Aboriginal Land Council (LALC) to discuss my planned trip. She offered to accompany me during the consultations in Boggabilla. However,

she was unavailable when I arrived in Moree due to family obligations. She advised that I could travel to Boggabilla and conduct the consultation independently. She also tried to contact someone in Boggabilla to enquire about the status of the homes and if anyone had moved in, but couldn't receive any information.

After knocking on each door, I was able to speak to one tenant from each of the two homes in Boggabilla. However, only one participant was interested in having a more in-depth conversation, prompted by my interview questions (see Appendix B).

Participant Group	Respondent	Position	Date Conducted	Location of Interview	Idenity as First Nations
Member of the Aboriginal Housing Office (AHO)	R3	Manager of Strategy and Portfolio Development	6/9/2022	Online Video Meeting	NO
	R4	Construction Manager	14/9/2022	Online Video Meeting	NO
	R5	Senior Project Officer	14/9/2022	Online Video Meeting	NO
Builder	R1	Project and Development Director (Limited)	16/2/2022	In person (Moree)	NO
	R8	CEO/Managing Director	6/10/2022	Online Video Meeting	YES
Architect	R2	Architect	5/9/2022	Online Video Meeting	NO
	R6	Architect	16/9/2022	Online Video Meeting	NO
	R11	Managing Director/ Architect	2/2/2023	Online Video Meeting	YES
Aboriginal Community Housing Provider (ACHP)	R7	Elder/Former ACHP	26/9/2022	Phone Call	YES
	R9	ACHP	31/1/2023	Online Video Meeting	YES
	R10	ACHP	31/1/2023	Online Video Meeting	YES
Tenant Of Constructed Home in Boggabilla	R12	Tenant (Limited)	7/10/2023	In person (Boggabilla)	YES
	R13	Tenant	7/10/2023	In person (Boggabilla)	YES

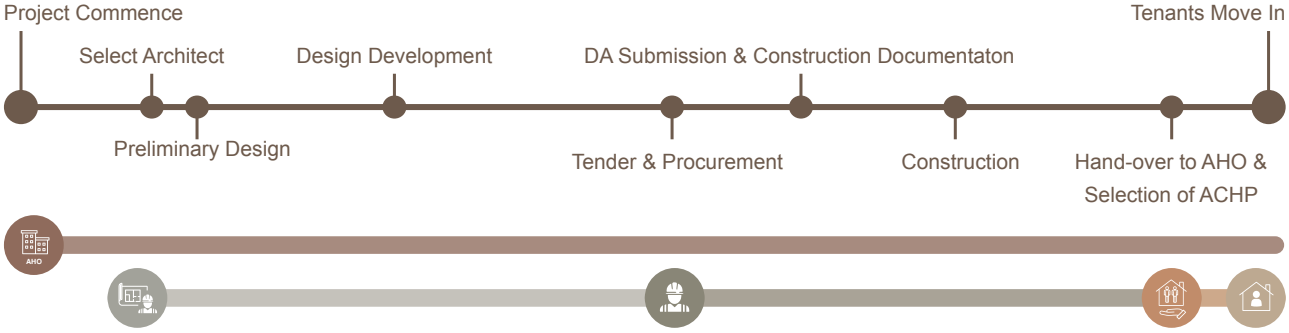


Figure 13. *Respondent sample table (top) and position of participant groups within a Design and Construct delivery model (bottom).*

1.7.3 Analysis

Architectural documentation, diagrams and models of the Boggabilla housing have been analysed through an architectural forensics lens, which can be further explained by referring to Architect Eyal Weizman's work. Weizman founded the research agency Forensic Architecture, which investigates human rights violations and environmental protection. The interdisciplinary team produces evidence files such as building surveys, physical or digital models, animations, videos and maps (Weizman, 2017). Weizman explains that forensic architecture *"regards the common elements of our built environment…as entry points from which to interrogate contemporary processes"* (Weizman, 2017, p. 9). He suggests architecture *"is alternately the object of investigation, the method of research, and the mode of presentation"* (Weizman, 2017, p. 58).

Whilst Weizman's work primarily focuses on conflict and political violence, the concept and approach can be applied to other contexts, such as Aboriginal housing. Forensic Architecture tries to *"present incidents in their historical and political contexts - to reconstruct around them the world that made them possible"* (Weizman, 2017, p. 64). Through conducting site visits and a critical review of architectural documentation, photographs and models of the completed Aboriginal housing in Boggabilla, this research approach aligns with Weizman's emphasis on material traces and architectural evidence in reconstructing past events. It presents an example of the Design and Construct procurement model and the social, environmental, political and economic constraints

when attempting to deliver culturally responsive housing within this framework. Through diagramming over architectural documentation and photographs, this research employs visualisation tools to extract and analyse the design principles implemented in the final built outcome.

Within forensic architecture, oral testimonies are valued as critical sources of information. Similarly, this thesis analyses interview responses from members of the NSW Aboriginal Housing Office, builders, architects and Aboriginal Community Housing Providers to explore the varying perspectives of the Design and Construct procurement model and the contextual constraints when delivering Aboriginal housing.

I conducted a thematic analysis of the qualitative data collected from the interviews. Guest et al. (2012) discuss that researchers can take various analytical approaches within a thematic analysis, either hypothesis-driven confirmatory or content-driven exploratory approaches. The exploratory approach has been utilised within this research. While this approach is not designed to confirm hypotheses, it is worth noting that it is commonly used to develop hypotheses for future research. This approach often involves generative data in addition to existing data. Guest et al. (2012, pp.7-8) describe that the researcher reads and re-reads the data and transcripts, *"looking for key words, trends, themes, or ideas in the data that will help outline the analysis, before any analysis takes place."* Referring to Bernard & Ryan (1998), Guest et al. highlight how text can be analysed as a *"proxy for experience in which we are interested in individuals' perceptions, feelings, knowledge, and behaviour as represented in the text, which is often generated by our interaction with research participants"* (2012, p.9). As outlined by Guest et al. (2012), researchers often use software to scan large amounts of text, extracting areas in which phrases or words are repeated. However, *"context is usually not considered or is highly constrained, limiting the richness of the summary data produced"* (Guest et al., 2012, p.10). Instead of counting explicit words or phrases, the thematic analysis in this research involved reading each interview transcript multiple times, extracting quotes, and categorising them into recurrent themes related to the two research questions. A list of recurrent themes is generated, which remains iterative until all collected data is read. This process is utilised to compare responses from each participant to analyse the similar and opposing perspectives in the design and delivery of Aboriginal housing.

There are concerns about reliability in thematic analysis as more interpretation goes into defining the emerging themes or codes. However, Guest et al. argue that it is still the most useful in *"capturing the complexities of meaning within a textual data set. It is also the most commonly used method of analysis in qualitative research"* (2012, p.10). This qualitative research's credibility, consistency and validity are strengthened with a systematic, transparent approach, using the same questions in each interview, data triangulation, constantly monitoring data, transcribing interviews for verbatim accounts and reporting and analysing evidence contrary to prevailing patterns. Quotes can support themes and interpretations within the research, *"directly connecting the researcher's interpretations with what participants actually said"* (Guest et al., 2012, p.85).

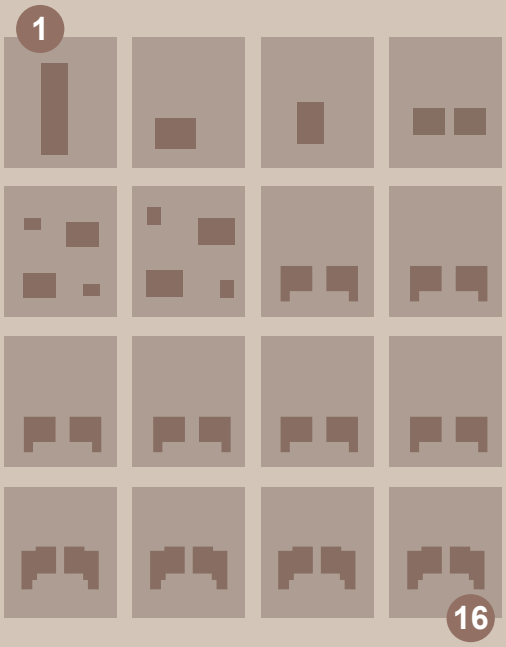
Triangulation of data sources and methods is commonly advocated for enhancing credibility (Guest et al., 2012; Ambert et al., 1995; Fossey et al., 2002) and dependability in research (Denzin, 2017; Baum, 2002; Boyatzis, 1998; Miles & Huberman, 1994). As I am the only observer, data triangulation can minimise bias within this research (Denzin, 2017; Guest et al., 2012). It is utilised to support the interpretive nature of the thematic analysis, accompanying the quotes and findings from the interviews with a literature review and my reflection on the design and delivery of the Aboriginal housing in Boggabilla.

Literature Review

For example, see Figure 11 on page 19

Thematic Analysis

Examining Boggabilla Architectural Documentation



For example, see Figure 44 on page 68

Architectural Forensics

Semi-structured Interviews

Evidence	Codes
Research Question	
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Research Question	
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code
Quote	Theme/code

For example, see Figure 15 on page 28

Limited Post-Occupancy Evaluation

For example, see Appendix A on page 130

Thematic Analysis

Figure 14. *Four methods of data collection utilised within this research and a summary of their analysis.*

Example Table of Thematic Analysis of Semi-structured Interviews

Evidence	Codes
RQ1: How can culturally responsive design principles be developed and implemented within the design and delivery of Aboriginal housing?	
Relevant quotes	Culturally responsive housing
Relevant quotes	Maintaining neutrality as a designer
Relevant quotes	Flexibility
Relevant quotes	Accessibility
Relevant quotes	Minimise Cost of living
Relevant quotes	Significance of external living space
Relevant quotes	Local trade and skill transfer
Relevant quotes	Maintenance
Relevant quotes	Each community has their own unique needs
RQ2: How do the challenges within the procurement and construction of Aboriginal housing in regional communities affect the delivery of culturally responsive outcomes?	
Relevant quotes	Rising demand for Aboriginal housing
Relevant quotes	Pressures to deliver housing within spending timeframes
Relevant quotes	Resource scarcity
Relevant quotes	Distance
Relevant quotes	Climate
Relevant quotes	Shortage of builders
Relevant quotes	Demand is outstripping supply
Relevant quotes	Impact of COVID and recent natural disasters
Relevant quotes	High cost of construction vs metro areas
Relevant quotes	Alternative construction methods
Relevant quotes	Emphasis on increased sharing of knowledge
Relevant quotes	Polarised positions of who should control design within D&C
Relevant quotes	Emphasis to be on quality outcome rather than quantity of houses delivered
Relevant quotes	Concerns with builders in control of design due to risks of strong economic focus
Relevant quotes	Evaluating implementation and maintaining accountability
Relevant quotes	Improved community consultation (was not specific to D&C)
Relevant quotes	Increased emphasis on funding and initial design component
Relevant quotes	Limitations in community consultation

Figure 15. *Example table of thematic analysis of interview responses as per research questions.*

1.7.4 Methodological Limitations

The following outlines the various methodological limitations of this research.

I live and work in Sydney, which is 750km and over a 10-hour drive to Boggabilla, where this research is centred. My employment on the project and conducting several site visits have provided me with valuable insight. However, the distance has created some limitations within my analysis. I could only visit the site under construction once, shortly after the works commenced in September 2022. Floods hit Moree and the surrounding towns of Boggabilla later that year, hindering my return. Fortunately, I received several updates and photographs from a tradesperson working on the construction project in Boggabilla. The builder who constructed the housing also posted updates and images online. To strengthen my research, it would have been beneficial not to rely so heavily on third-party recounts and sources of information. However, a limited budget, time restrictions within my research and the Boggabilla project, distance and accessibility created challenges in conducting site visits and analysing the project.

Reflecting on my interviews with members of the NSW Aboriginal Housing Office, builders, architects, and Aboriginal Community Housing Providers, some factors could strengthen this research.

Referring back to Figure 13, ideally, an equal number of participants from the four participant groups would have been interviewed to represent a balanced and unbiased sample of perspectives and experiences. However, this was not the case due to time constraints of completing the interviews in combination with reluctance from several contacted stakeholders to participate, or they were unavailable due to pressures discussed in this research, such as high demands for construction or provision of Aboriginal housing, shortage of builders and resource scarcity. During the project's construction in Boggabilla, conflict arose between our team and the builder over consultancy fees, expected timelines, required drawings, mismanagement of sub-consultants and substandard quality and execution of the construction. The builder also attempted to manoeuvre around and avoid industry standard processes such as bushfire regulations and building permits, which increased frustration within our team. This impacted our ongoing relationship, and I could not complete my interview with this builder or receive the contact details of the tradespeople on site in Boggabilla to interview them.

The small sample size of interview participants means that this research does not indicate challenges present in every Aboriginal community of north-western New South Wales and is instead centred around a specific project in Boggabilla. Each Aboriginal community has unique social, political, and environmental challenges and cultural needs. This research presents an example of how culturally responsive design principles can be developed and applied by analysing the specific project in Boggabilla, New South Wales. It also investigates the perspectives of various stakeholders to provide insights into some challenges that impact the delivery of culturally responsive outcomes when building Aboriginal housing in regional New South Wales.

After the construction of two dwellings in Boggabilla was completed in March 2023, I asked the NSW Aboriginal Housing Office about the housing provider or if the tenants had moved in. However, they were reluctant to provide this information. I was left uncertain of the houses' appearance and the occupants within. While I had ethics approval, previous reviewers considered a post-occupancy evaluation in excess of this thesis's scope. However, I felt obliged to return to the site and speak with the new tenants to see how the houses worked for them.

I must acknowledge that some non-Indigenous participants have been interviewed. Despite my attempts to interview Indigenous members of the NSW Aboriginal Housing Office, each participant from this group was non-Indigenous. Two interviewed architects were also non-Indigenous. I attempted to set up interviews with various Indigenous architects. However, they did not participate due to various potential factors such as reluctance, time restraints, or professional commitments.

It is essential to reference the under-representation of Indigenous peoples within the workforce designing and delivering Aboriginal housing. In 2018, the University of Technology Sydney highlighted that only 28 of Australia's approximately 12,000 registered architects were Indigenous as per the last Census. However, with Aboriginal and Torres Strait Islander peoples representing around three per cent of Australia's population, this number should be closer to five hundred (University of Technology Sydney, 2018). Aligning with Memmott's critique of architectural schools and the Royal Australian Institute of Architects (now titled the Australian Institute of Architects) nearly two decades ago, there needs to be increased education and professional opportunities for Indigenous people within the industry (Memmott, 2004). In 2020, Carroll Go-Sam highlighted that including Indigenous voices within architectural practice is still an emerging norm (Go-Sam, 2020). However, as Indigenous practitioners are finally being heard in Australia and worldwide, it illustrates *"how approaches to design, agency and voice can give importance to Indigenous culture and its diversity"* (Go-Sam, 2020, para. 15).

These interview responses from non-Indigenous participants provided valuable insights from their experience working in the Aboriginal housing sector. However, presenting Indigenous perspectives to inform Indigenous advancement is also essential.

Throughout the entire duration of this research, the effects of COVID-19 were present. Restrictions or lockdowns lead to a shift in virtual interactions and online meetings. This affected the dynamic of interviews that could no longer be done in person. However, it also provided opportunities for remote consultation, allowing me to video call participants in regional New South Wales, where time, budget and distance would typically be challenging when conducting these interviews in person.

These methodological limitations due to constraints such as the refined scope of a Masters of Architecture (Research) candidature, distance, budget, time, and accessibility to participants illustrate that there is still scope to further explore this research in the field.

1.8 Summary of Project Delivery

Figure 16 summarises the data collection process throughout the various phases of the Aboriginal housing project in Boggabilla. The following timeline in Figure 17 summarises the project's design and delivery in Boggabilla, this thesis's development and the primary shifts in my role within the research project.

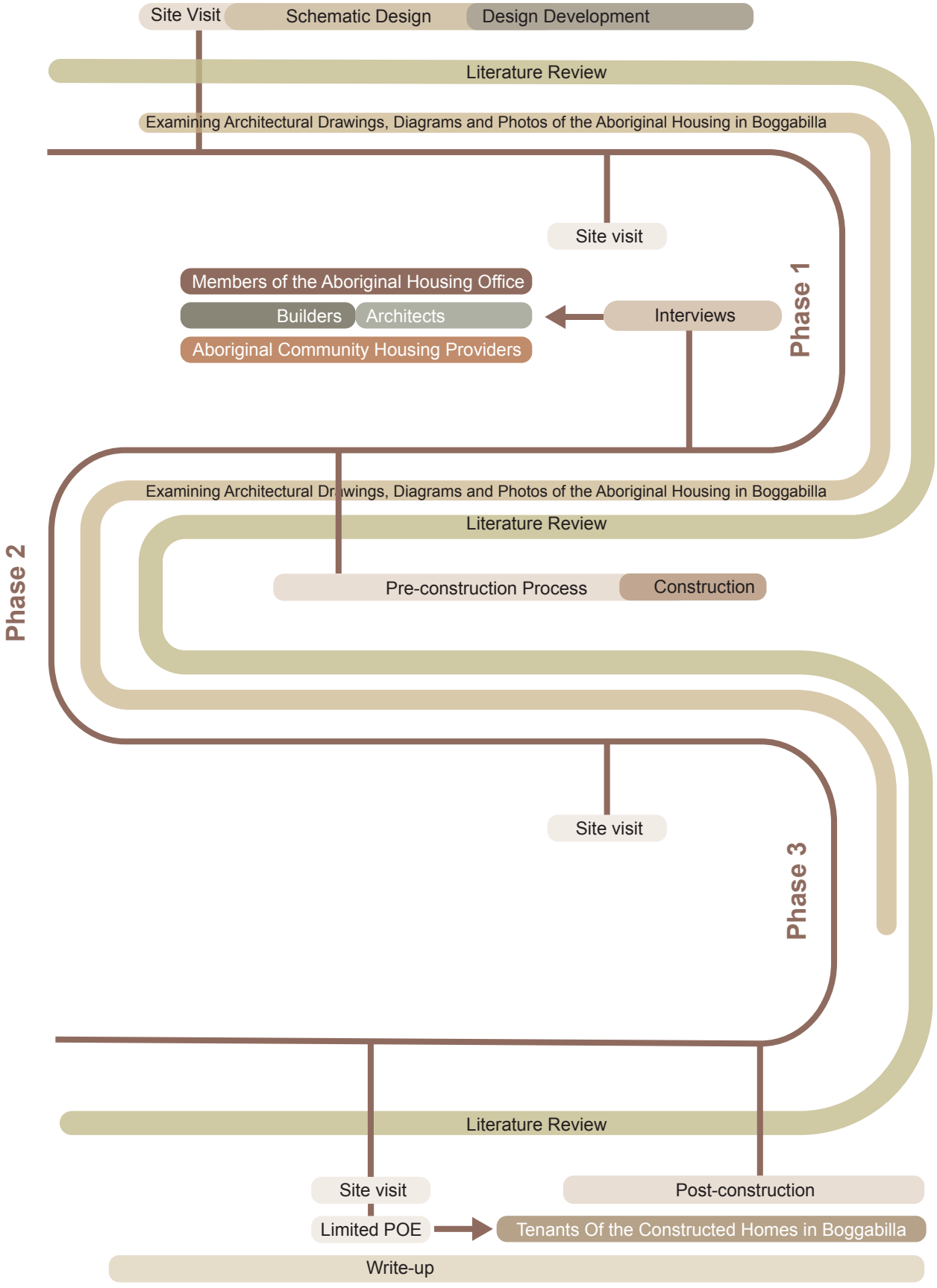


Figure 16. *Chronological diagram of research methodology.*

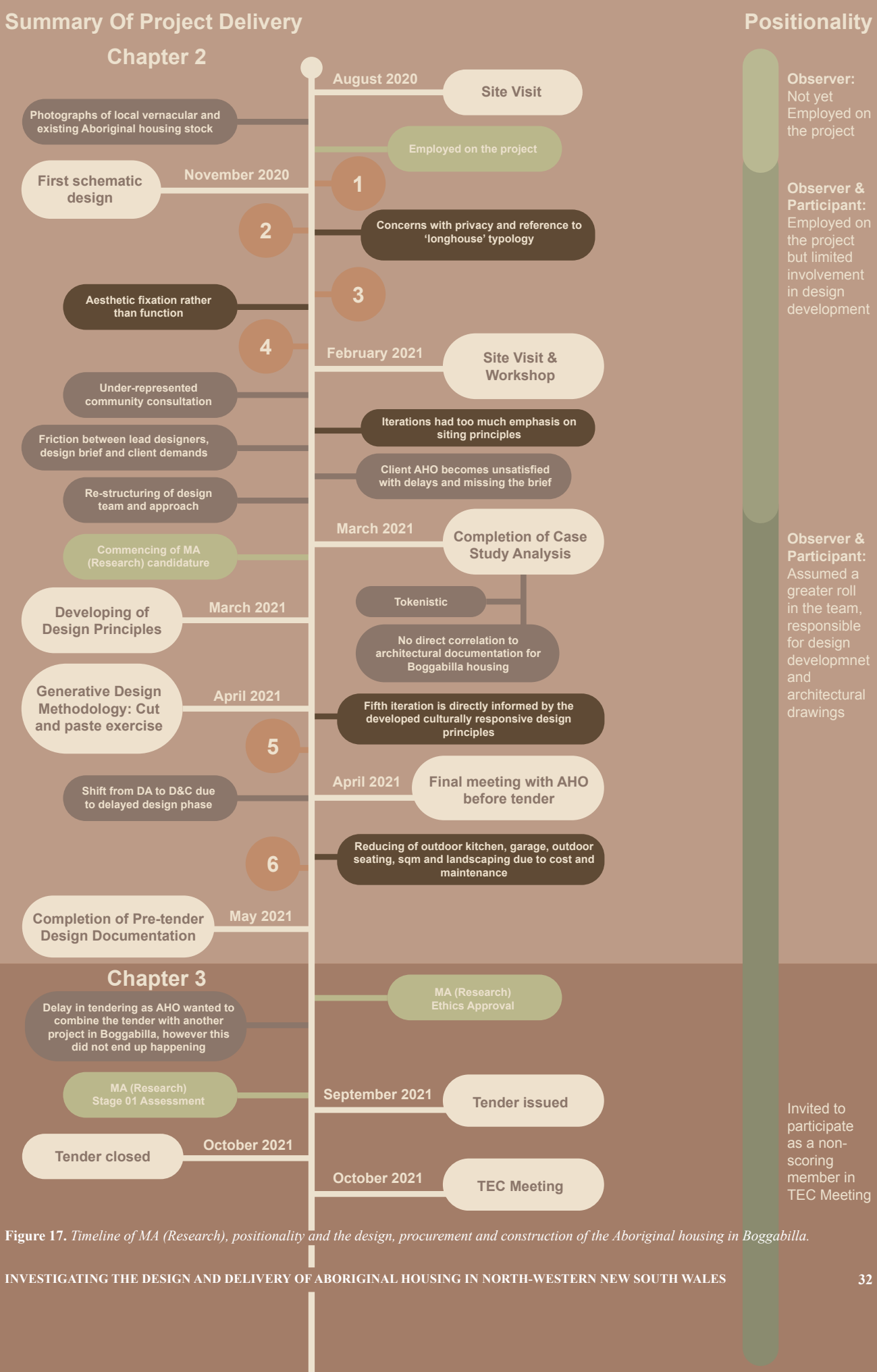


Figure 17. *Timeline of MA (Research), positionality and the design, procurement and construction of the Aboriginal housing in Boggabilla.*

Absence of schematic designs in Tender documentation

Post-clarification TEC Meeting — November 2021

December 2021 — Tender awarded

The team was novated by ASH to complete drawings — December 2021

January 2022 — Meeting with ASH

Subtraction of detached garage and outdoor kitchen and experimenting with placement of dwellings on site

7

Design re-adjusted as per SIP measurements, reducing eaves and window sizes.

February 2022 — Meeting with ASH and AHO

8

February 2022 — Bush fire Report

Site Visit — February 2022

MA (Research) Commencing of interviews

Addition of landscaping

February 2022 — Meeting with ASH

9

Addition of landscaping

10

February 2022 — Submitted drawings for BASIX approval

BASIX Approved — March 2022

Design compromises made in order to reach 6 star BASIX rating

11

Submission of an abstract for IASTE 2022 conference at NUS, Singapore

March 2022 — DA Submitted

BASIX Approved — March 2022

On-boarding of a new Lead Architect

Delay in documentation as SIP supplier contracted COVID-19

Material schedule changes

Re-submitted for BASIX Approval — May 2022

12

May 2022 — BASIX Approved

DA Approved — May 2022

May 2022 — Meeting with AHO, ASH and Engineers

Adjustments to roof design as per engineers request

Observer & Participant: Team was novated by the builder so I was able to retain close proximity

Chapter 3

13

Delayed documentation from engineers

Change in SIP supplier

June 2022

Revised roof plan approved by AHO

Design team to re-work designs as per new supplier

Conflict around consultant fees and abortive work and mutual misunderstanding about roles and responsibilities

June 2022

CAD files sent to structural engineers for roof design

Amendments to drawings as per Development Application

July 2022

Drawings sent for Construction Certificate

14

Chapter 4

September 2022

Architectural documentation issued for construction

Construction commences

Site Visit

15

Further revisions to construction drawings as per daylight and ventilation requirements

16

Final construction documentation sent to builders - with added windows to meet daylight requirements

November 2022

Published "Exploring the political and economic pressures within the design and delivery of Aboriginal housing in the north-western districts of New South Wales" in Working Paper Series for 2022 IASTE Conference in Singapore

Presented at IASTE 2022 conference at NUS, Singapore

MA (Research)
Last interview conducted

Delayed receipt of occupancy certificate due to issues around natural light requirements

Construction completed

March 2023

Housing handed over to the AHO

Tenants moved in

MA (Research)
Stage 02 Assessment

Chapter 5

Site Visit

October 2023

Limited Post-occupancy Evaluation in Boggabilla

MA (Research)
Stage 03Assessment

Observer & Participant: Due to constraints of time, budget and distance, sometimes had to rely on third party recounts and photographs of the project's progress

Observer & Participant: Employment ended, returning to an observerer's stance on the project

Reflective practice during field work and the completing of this thesis retained position of a participant

02

Figure 18. *Photograph of model for the housing project in Boggabilla.* Adapted from photograph by Hamish McIntosh, 2020.

CHAPTER 2: THE PRELIMINARY DESIGN OF ABORIGINAL HOUSING IN BOGGABILLA & THE DEVELOPMENT OF CULTURALLY RESPONSIVE DESIGN PRINCIPLES

Note: This thesis expands on the previously published paper *"Exploring the political and economic pressures within the design and delivery of Aboriginal housing in the north-western districts of New South Wales"* in the International Association for the Study of Traditional Environments (IASTE) Working Paper Series in 2022 (Holmgren, 2022).

2.1 Preliminary Design and Community Consultation

In 2020, The NSW Aboriginal Housing Office commissioned a research team at the University of Technology Sydney to design two two-bedroom dwellings for single-parent families or ageing residents on a lot they owned in Boggabilla, New South Wales. This design was to be informed by site visits, existing Aboriginal housing, local housing typologies in Boggabilla and a community consultation workshop with the local Aboriginal community.

2.1.1 Informing the Design

In August 2020, the team conducted the first site visit to Boggabilla. The team consisted of four researchers and designers from the University of Technology Sydney, with varying experience working within regional Aboriginal communities in Australia. There was one lead researcher, two lead architectural designers and one research assistant. As previously outlined in Figure 17, I was not employed on this project until September 2020. This reflection is observational, informed by recounts from colleagues, photographs and architectural documentation.

Figure 19 shows the site to have been overgrown with grass, shrubs, and other vegetation and scattered with towering palm trees. The parched landscape reflected the extreme temperatures and dry climate within Boggabilla. The lot has access from the main street and the rear, unsealed lane. The property has dry grassland to the back, and at the front, it looks directly across into dense bush and the Macintyre River.

Figure 19. *Photographs of site in Boggabilla, New South Wales.* Adapted from photographs by Campbell Drake, 2020.

Figure 20. *Stitched photographs of site in Boggabilla, New South Wales.* Adapted from photographs by Campbell Drake, 2020.

During this site visit, the team photographed the local vernacular and existing Aboriginal housing stock to inform the development of the first design proposal. No community consultations were conducted on this trip. Along with the site visit and studies of the local housing in Boggabilla, the NSW Aboriginal Housing Office directed the designers to implement the AHO Design guidelines to develop a design proposal.

2.1.2 Developing the First Architectural Proposal

In November 2020, the two lead designers in the team developed the first architectural schematic for the two two-bedroom dwellings in Boggabilla. The design was to suit the needs of single-parent families or ageing residents within the local Aboriginal community, proposing at least one accessibility-compliant dwelling or the opportunity for future fit-out.

These two lead designers were a former University of Technology Sydney employee and a Masters of Architecture student. My involvement in the design was limited at this point. I was working as a research assistant within other Aboriginal housing projects at the University of Technology Sydney. I was contracted to work on this project in Boggabilla to assist in developing the preliminary research report to inform the design proposal. Some of the components in this report were an evaluation of the AHO Innovation Program in Moree, preliminary site analysis in Boggabilla and a review of the AHO Design Guidelines.

Figure 21. *Photographs of local vernacular (left) and existing Aboriginal housing (right) in Boggabilla.* Adapted from photographs by Campbell Drake, 2020.

I assisted in analysing local building types by examining the photographs the team took in Boggabilla during their site visit and identifying roof forms, front facades, cladding, and structural and decorative elements of the houses (see Figure 21). This later informed design decisions to suit the local vernacular.

I also conducted a literature review and best practice analysis of existing Aboriginal housing approaches. Some of these case studies included Troppo Architects' housing project in Angurugu, East Arnhem Land (Wong, 2018), The Centre for Appropriate Technology's Laynhapuy and Marngarr Homelands project (Centre for Appropriate Technology, 2021), Deborah Fisher Architects and Build Up's project in Canteen Creek, Northern Territory (Fisher & Scally, 2008), Glenn Murcutt's Marika-Alderton House (Architecture Foundation Australia & Glenn Murcutt Master Class, n.d) and People Oriented Design's Synapse SAIF, Cairns (People Oriented Design, n.d). Although this analysis could have been more in-depth, it highlighted the significance of co-design approaches, local employment opportunities, durable construction methods and materials, simplistic design, and a carefully considered research and design process.

The lead designers in our team intended for this preliminary report to inform a design scheme. They proposed to deliver the housing through a pre-fabricated method due to the remoteness of Boggabilla. They applied a grid system to inform the spatial sequence of rooms, considering transportation constraints, needing to fit on a flatbed truck.

Within the first three iterations (see Figure 22), the designers focused on accessibility and external living spaces and explored differing site layout and orientation options. However, the NSW Aboriginal Housing Office was critical of the under-developed internal design and lack of privacy, with the close proximity between dwellings and bedrooms opening onto living spaces. There were also safety concerns with the two bedrooms separated from each other, which would be an issue for a household with children or someone who needed supervision or care. The second iteration amended this and proposed splitting the bedrooms from the living room. However, the verandahs were minimised to a redundant, unusable width. Like the first iteration, the second did not have a clear formal entrance, with the front door opening straight into the living and dining space.

The third iteration attempted to enhance privacy by staggering the dwellings on the lot; however, they were still somewhat connected. This design again had a minimal verandah width and lacked spatial consideration. All iterations had ignored the inclusion of laundry, and the services were not grouped, which would increase construction costs. Although the decked breezeway in the third iteration could provide a flexible outdoor living space, it lacked sunlight, storage, security, and fly screening. There was still no formal entryway, lacking a presentation to the street consistent with the surrounding housing aesthetic in Boggabilla. This consistent aesthetic is also something that the Moree Plains Shire Council planning department requires (Moree Plains Shire Council, 2013).

The fourth iteration was developed by the lead designers in January 2021 and focused on addressing privacy concerns by splitting up the dwellings. However, new issues arose with the open plan spatial layout, with all bedrooms again opening onto the living room. The three variations within this iteration examined several ways the dwellings could be placed on the lot, considering orientation towards the sun and the wind. The NSW Aboriginal Housing Office also raised concerns about the defensive aesthetic of the facade, with a long expanse of Crimsafe screening across the front, presenting a hostel or prison-like appearance.

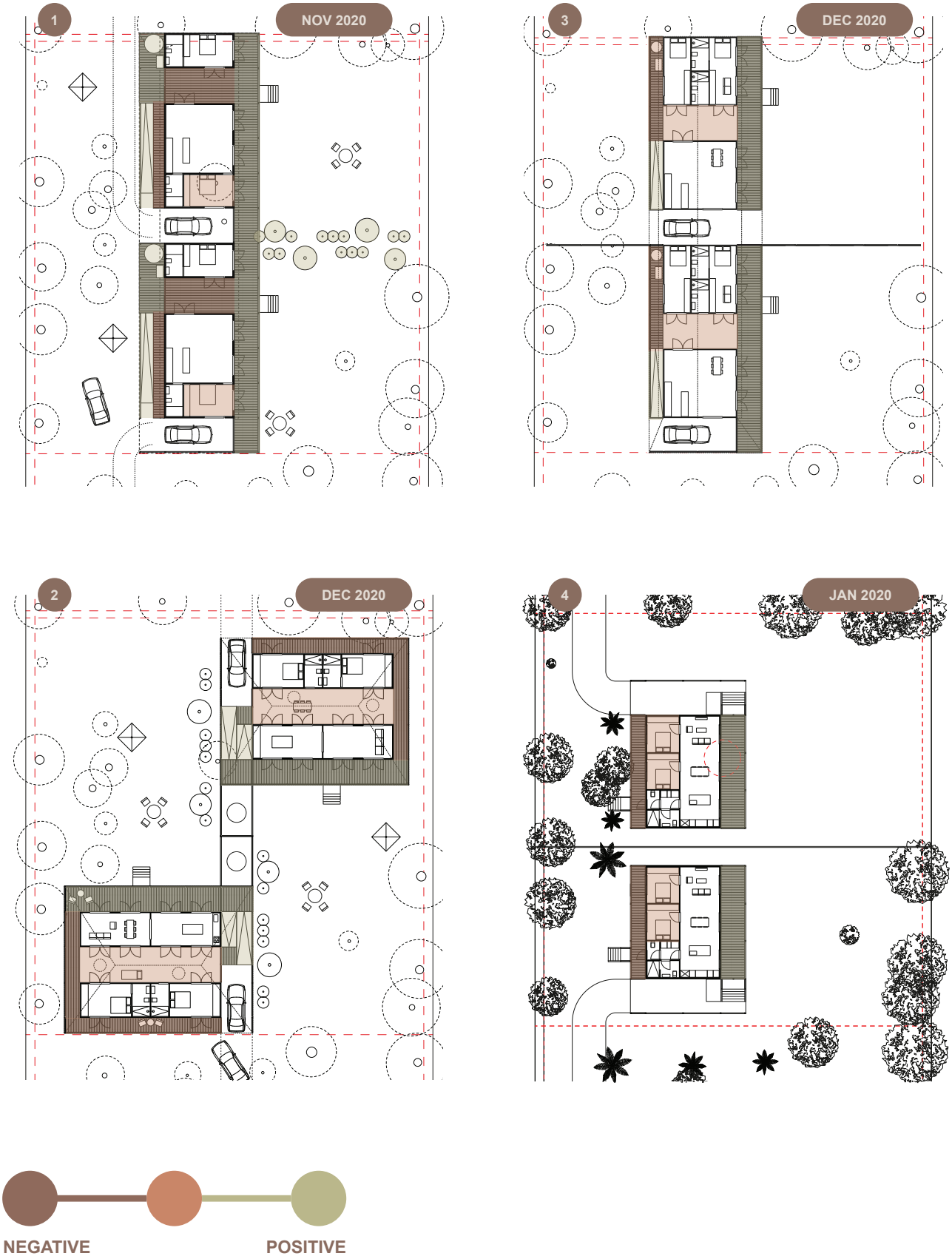


Figure 22. *The first four design iterations for the Aboriginal housing in Boggabilla.*

Figure 23. *Elevation of fourth design iteration for the project in Boggabilla.*

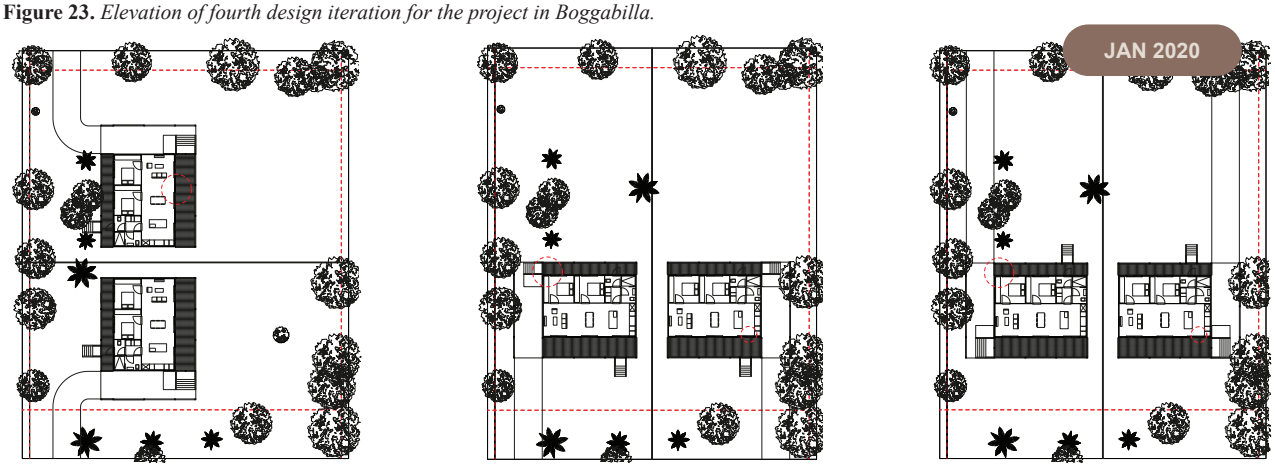


Figure 24. *Experimentating with the placement of the dwellings on the lot as part of the fourth iteration within the Boggabilla project.*

2.1.3 Limitations in Community Consultation

As displayed in Figure 25, the team created architectural models and utilised them in February 2021 when we travelled to Boggabilla for a site visit and to conduct a participatory workshop with local primary school students. The rationale behind this kind of consultation was in response to not knowing who the tenants would be and the difficulty in communicating and organising consultation with local Aboriginal Community Housing Providers (ACHPs).

We consulted with a group of approximately twenty students ranging from kindergarten to year two. We prompted them to use the model to indicate what they liked about their existing homes or what they would hypothetically add or change. Following the workshop, parents of the students, members of the NSW Aboriginal Housing Office and school staff were invited to provide feedback on our housing design. The school principal and less than five parents turned up to the meeting. Unfortunately, this community engagement was under-represented and did not directly inform the development of design principles for the project as initially intended. This limited consultation could have been due to various factors, such as the parents' reluctance to participate, the young age of the students, and a funeral that was taking place in the community.

Through this workshop, we aimed to gain a greater cultural understanding. My colleagues utilised this approach within another project with Murrin Bridge Preschool, which helped inform the design. However, this was not the case in Boggabilla, and in fact, it became somewhat tokenistic and redundant. It was still fruitful in receiving some feedback on the design iterations. Discussions compared the linear and staggered placements of dwellings on the lot. Community members favoured the staggered option with enhanced privacy. Questions were raised about the importance of street frontage consistent with the surrounding housing aesthetic compared to orientation dictated by sun and wind. There were also concerns around safety and accessibility with a driveway from the rear lane.

Figure 25. *Photographs of conducted participatory workshop with primary school students in Boggabilla.* From photographs by Campbell Drake, 2021.

2.1.4 Re-structuring of Approach due to Design Shortfalls and Limited Community Consultation

At this stage in the project, the design needed to be developed with more emphasis on the internal layout and culturally responsive outcomes rather than siting principles. There was friction between the lead designers and the demands from the NSW Aboriginal Housing Office as our client. Despite being directed to do so, the designers were not adhering to the AHO Design Guidelines. The initial conceptual intent was to create a contemporary adaptation of the regional vernacular in Boggabilla. Although some principles were considered, such as addressing site conditions, orientation, thermal performance, accessibility, and construction materials, the designs did not explore much beyond this. There was little to no designed landscaping and utilising of external activity space. The internal layout of the dwellings was also underdeveloped, with limited storage, privacy and consideration of spatial navigation.

Due to the limited community consultation and the continued struggle to produce a culturally responsive design outcome, the NSW Aboriginal Housing Office, as our client, became dissatisfied. In March 2021, we were forced to re-assess. This was a pivotal moment of recognition within the Boggabilla project as we recalibrated the design team and shifted the design approach. This point in the project highlighted the challenge of developing a suitable outcome without rigorously implementing culturally responsive design principles.

With increased experience and knowledge in Indigenous housing, I assumed a greater role in the project, leading the design alongside two of my colleagues from The Indigenous Infrastructure and Sustainable Housing Alliance.

2.2 The Development of Culturally Responsive Design Principles

2.2.1 Developing Culturally Responsive Design Principles within Aboriginal Housing

In March 2021, we developed a set of culturally responsive design principles, informed by the AHO Design Guidelines (Aboriginal Housing Office, 2020) and Paul Memmott's cultural design paradigm, unpacked in the literature review and our previous Aboriginal housing projects. The following diagram maps the various principles extracted from these resources.

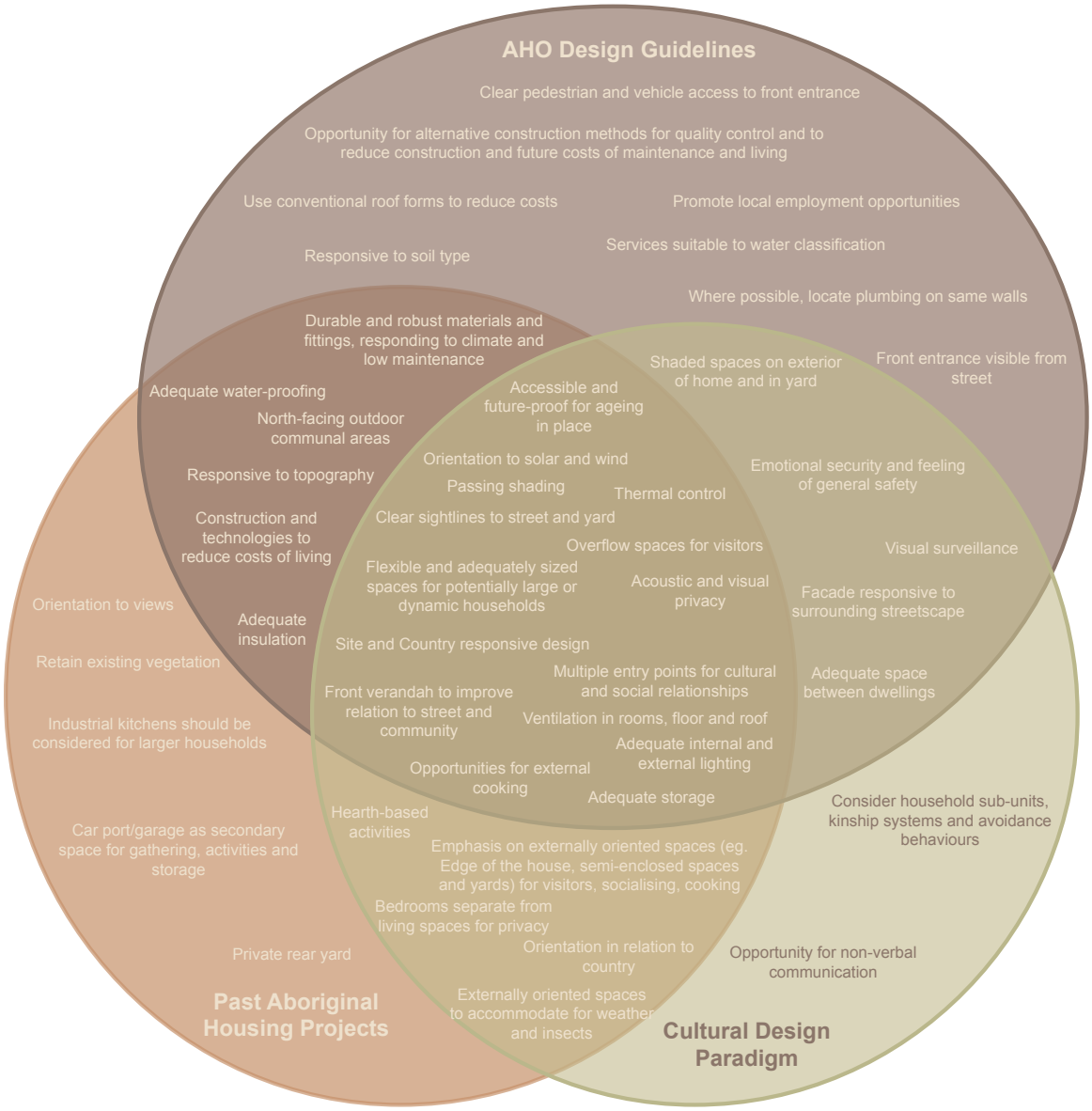


Figure 26. *Diagram of culturally responsive design principles extracted from AHO Design Guidelines, Memmott's cultural design paradigm and past Aboriginal housing projects.*

As previously acknowledged, numerous sets of culturally responsive design principles can be implemented within the delivery of Aboriginal housing. As we collaborated with the NSW Aboriginal Housing Office, the AHO Design Guidelines were relevant to the Boggabilla project. These guidelines exclude in-depth landscaping recommendations and focus on construction systems, siting, internal spatial principles, dimensions and material specifications (Aboriginal Housing Office, 2020). To enhance the opportunities to be flexible and transferrable, the specific dimensions, room configurations and other technical specifications are not included in the following design principles as these recommendations were specific to NSW Aboriginal Housing Office projects. The AHO Design Guidelines are available to the public and can be referred to as a recommendation for these configurations.

Memmott's cultural design paradigm explores many of the principles discussed in the AHO Design Guidelines but places a larger emphasis on the significance of externally oriented spaces, including verandahs, semi-enclosed areas and the yard (Memmott et al., 2000, p.104; Smith, 2000; Groome & Pholeros, 2000; Memmott,

2001, 2003a, pp.33-35; Dillon & Savage, 2003, p.41,42; Keys, 2003, p.76). These spaces can accommodate an overflow of visitors, fluctuating and large households, cooking, sleeping and socialising.

The AHO Design Guidelines were the foundation for this project's design principles, strengthened by the cultural design paradigm and suggestions from past community engagements and professional experience in the Aboriginal housing sector.

Before the Aboriginal housing project in Boggabilla, we had previously developed a set of design principles with The Indigenous Infrastructure and Sustainable Housing Alliance when the Wreck Bay Community Council commissioned us to evaluate the existing housing within Wreck Bay Village. Memmott's cultural design paradigm informed the structuring of surveys and interviews for community consultation. Door knock surveys were carried out with twenty-six of forty-eight households to gain a quantitative analysis of the key issues within their existing homes, evaluating the size, layout, location, privacy, flexibility, security, lighting, ventilation, thermal comfort, plumbing, electricity and materiality. We also asked what they liked about their house and what they would want to change if the opportunity arose. In addition, we conducted in-depth interviews with six resident Elders of Wreck Bay Village to learn how homes were used throughout the year (see Figure 27). From this consultation, we learned about the housing needs within the community, informing the development of culturally responsive design principles. These principles were then implemented within our proposed designs for that community. It is important to note that responses from Elders and other community members were specific to the cultural and environmental needs of the Dharawal and Yuin people in Wreck Bay Village. Many responses correlated with feedback from other previously conducted Aboriginal housing projects.

Culturally responsive design principles should be flexible and adaptable to each Aboriginal housing project's evolving and specific needs. They should be informed by a constant feedback loop with Elders and traditional knowledge holders to ensure they remain applicable and relevant to the particular culture and Country in each project.

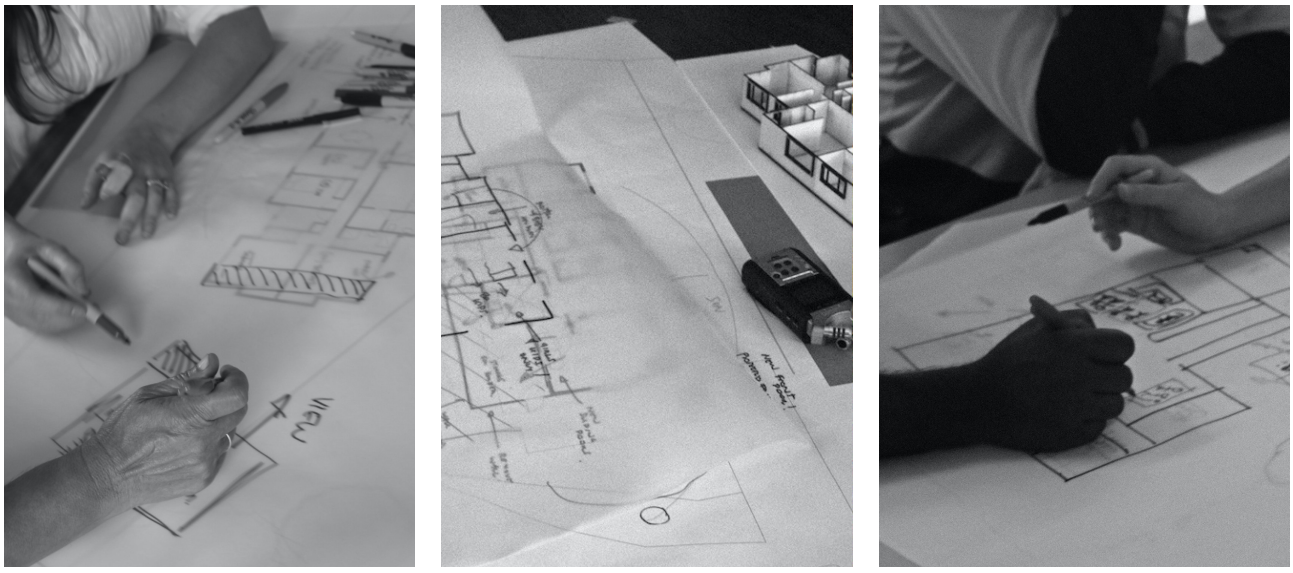


Figure 27. *Photographs of consultation with community Elders in Wreck Bay Village, to inform design principles.* Adapted from photographs taken by the author, 2021.

2.2.2 A Set of Transferrable Culturally Responsible Design Principles for Aboriginal Housing

This section of the thesis unpacks the developed culturally responsive design principles. Figure 28 identifies each design principle, organised into three categories: (1) Siting, (2) Spatial Planning (Interior) and (3) Materiality & Construction. Figures 30, 31, and 32 diagram each category and the individual principles.

Culturally Responsive Design Principles		
Siting Principles		Landscaping and vegetation to maintain connection to land and country
		Levels of privacy
		Minimise noise transfer
		Secondary spaces for external activity, gathering, possible visitors, storage and cooking
		Passive shading
		Surveillance both within the lot and in relation to the street
		Aspect of dwellings to be oriented in accordance with views, wind and sun
Spatial Planning (Interior) Principles		Flexible space
		Future proof and accessible
		Location of rooms according to sun
		Three points of entry
		Direct access from laundry to yard and clothesline
		Clearly defined undercover entrance
		Grouping of wet areas to reduce costs
		Privacy
		Minimised noise transfer
		Adequate storage
		Secure external living space with opportunity to accommodate overflow of visitors
		Open external living at front of house with street view, connecting with community
Materiality & Construction		Durable external materials that are suitable to the climate and environment
		Minimised maintenance
		Promote local Indigenous labour, employment opportunities and skill transfer
		Conventional roof pitch to reduce cost
		Adequate thermal control
		Minimise cost of living
		Adequate lighting
		Construction typology to respond to local soil type, climate and natural disaster risk
		Installation of services suitable for water chemistry
		Street frontage considering surrounding housing aesthetic

Figure 28. *Table of developed, transferrable culturally responsive design principles.*

2.2.2.1 Siting Principles

The siting principles focus on orientation according to sun and wind, the placement of dwellings on the lot, and the design of external living spaces with levels of privacy to cater to gatherings, outdoor activities, and visitors.

Landscaping can reflect the deep cultural connection to Country within Indigenous cultures. Government Architect New South Wales defines Country to include *"land, waters, and sky. It can be tangible or intangible aspects, knowledge and cultural practices, belonging and identity, wellbeing and relationships. People are part of Country"* (Government Architect New South Wales, 2020, p63). Descriptions of Country can differ between individuals, depending on varying family or community associations and traditions (Queensland Studies Authority, 2008). Retaining existing vegetation, planting local native vegetation and providing spaces for external living in the yard can all assist in responding to this connection to the land. The AHO Design Guidelines does not go into depth about landscaping elements but does promote these features, considering how design can care for and connect with Country (Aboriginal Housing Office, 2020). The design of yard spaces should respond to the externally oriented behaviour of tenants (Memmott et al., 2000; Smith, 2000; Memmott, 2001, 2003a; Keys, 2003).

Aboriginal housing design must consider cultural values, practices, kinship roles, family dynamics, safety and security (Memmott, 2004). Levels of privacy can address these features, promoting the well-being of tenants and instilling a sense of ownership and control. Privacy can be enhanced by retaining vegetation, providing appropriate fence heights (Aboriginal Housing Office, 2020), and staggering dwellings on the lot to minimise overlooking between adjacent houses. Real barriers, such as fencing and gates, and perceived barriers, such as garden beds, can also enhance safety and privacy (Aboriginal Housing Office, 2020).

Minimising noise transfer can enhance audio privacy and comfortability between dwellings and adjacent neighbours. It can promote well-being and mental health, a better learning or working environment within the home, a sense of security and respect for boundaries. Staggering or mirroring dwellings on the lot are ways to minimise noise transfer between households, creating as much distance between adjacent living spaces as possible.

Secondary external living spaces can provide extra room for the overflow of visitors, gathering, storage, cooking, storytelling and other outdoor activities. Outdoor kitchens (Aboriginal Housing Office, 2020; Memmott et al., 2000, p.99; Memmott, 2001, 2003a, p.32; Keys, 2003), detached carports and external storage solutions can incorporate this siting principle into Aboriginal housing design. The design should also accommodate customary hearth-based activities (Smith, 2000; Memmott, 2003a, p.32).

Passive shading can provide space for tenants to use the yard whilst staying out of the sun and give the house cooling properties. The common preference of Aboriginal tenants to sit outside and stay cool in a shaded area under a verandah or a tree has been discussed for decades (Memmott, 1988, pp.40-41; Horne et al., 2013, p.22; Centre for Appropriate Technology, 2013, p.43). Providing adequate eaves, shaded externally oriented spaces, retaining existing vegetation and adding new planting are ways to incorporate this principle (Aboriginal Housing Office, 2020).

Visual surveillance and clear sightlines within the lot and onto the street allow tenants to see potential visitors

or watch out for their children or other household members (Aboriginal Housing Office, 2020). Sightlines are also crucial for maintaining privacy when accommodating specific kinship rules or obligations, for example, when some sub-groups use a particular part of the house or property (Memmott et al., 2000, p.99, 100; Smith, 2000; Memmott, 2001; Keys, 2003, p.67; Fantin, 2003, p.75). Verandahs at the front and rear of the home, large windows and intentional landscaping are all ways to enhance the surveillance within a design.

The location and orientation of dwellings should consider relations to family and Country (Memmott et al., 2000, p.98, 100; Fantin, 2003; Memmott, 2003a, p.29). Designs should consider orienting the house in accordance with views. They should also be orientated according to the sun and wind paths to ensure maximum natural light and keep the house cool in summer and warm in winter (Aboriginal Housing Office, 2020).

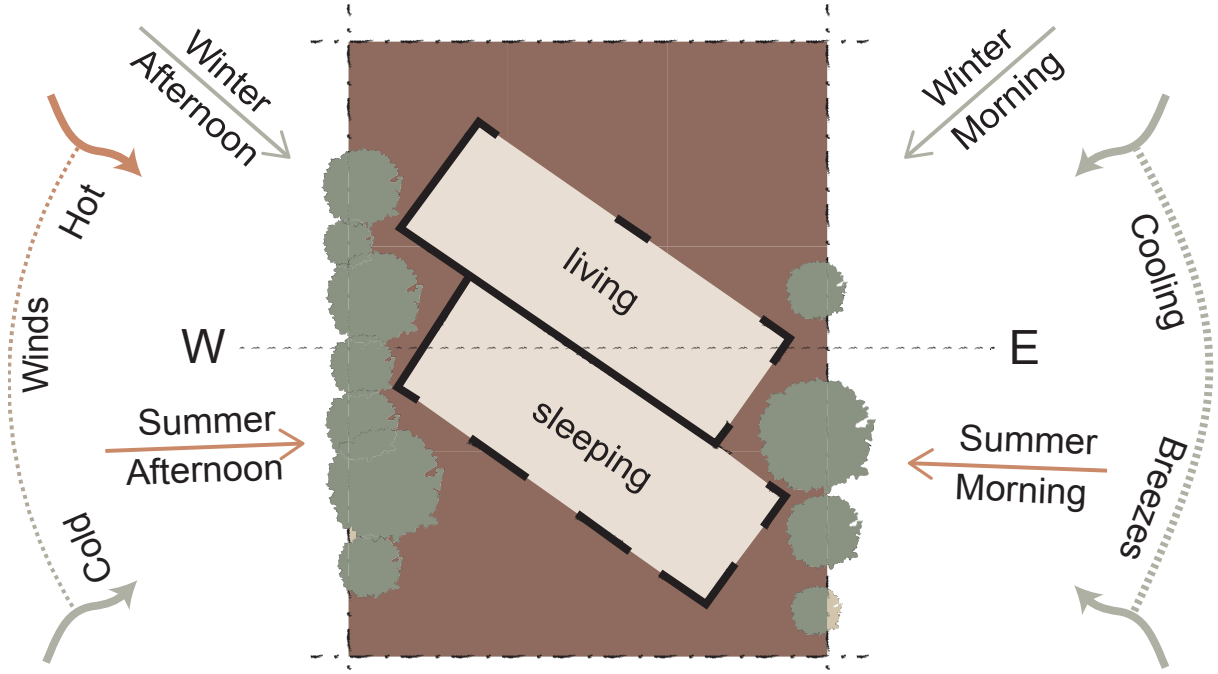


Figure 29. *Ideal orientation of a house according to sun and wind.* Adapted from diagram in AHO Design Guidelines (p.40), Aboriginal Housing Office, 2020.

SITING PRINCIPLES

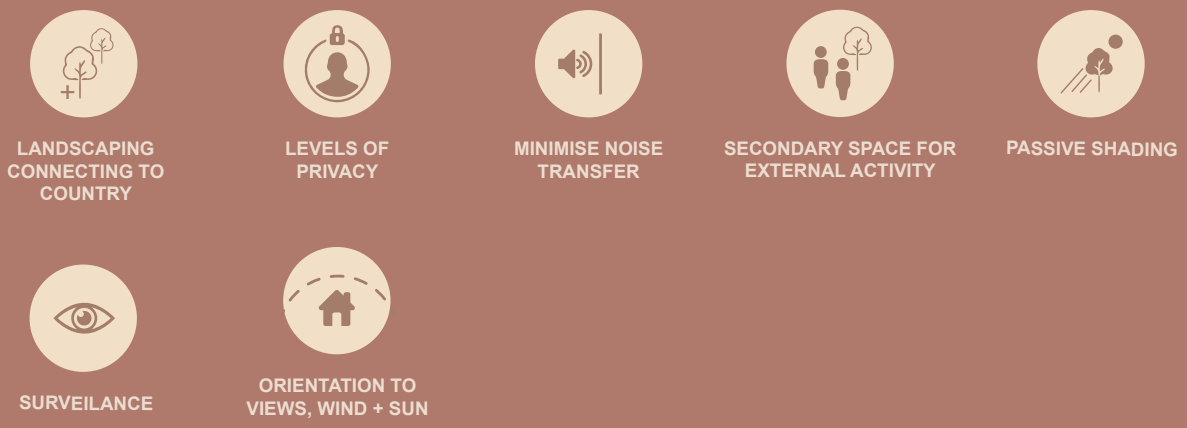


Figure 30. *Diagram of developed culturally responsive Siting Principles.*

2.2.2.2 Spatial Planning (Interior) Principles

The spatial principles focus on the house's interior, exploring flexibility, privacy, navigation and wayfinding. The internal layout should consider kinship and avoidance rules, and toilets, bathrooms, living rooms, and hallways should be located accordingly (Memmott et al., 2000).

The interior spatial design should be flexible in considering specific kinship roles (Memmott, 2003a, p.29) with larger bedrooms, living spaces and verandahs to accommodate potential multi-generational, dynamic and expanding households (Aboriginal Housing Office, 2020; Memmott et al., 2000, p.98,101; Memmott, 2003a; Dillon & Savage, 2003). Wider hallways can provide additional sleeping or storage space (Aboriginal Housing Office, 2020) and accommodate avoidance relationships (Fien et al., 2008). Flexibility within a space instils a sense of ownership and pride in the tenants and allows for maximal personalisation. Examples of ways this can be incorporated are adequate-sized bedrooms for more than one bed or a separate yet connected living/dining/kitchen space in an open-plan L-shaped configuration.

Aboriginal housing must consider accessibility-compliant facilities such as a wheelchair ramp and handrails. This should either be delivered in the design, or the design must incorporate the opportunity for future fit-out (Aboriginal Housing Office, 2020). Creating an accessible environment can cater to multi-generational households with baby prams, Elders or tenants ageing in place. Slip-proof flooring, ramps, wider doorways and hallways, lower benches and mitigated trip hazards can be incorporated into the design (Aboriginal Housing Office, 2020).

Both internal and external living spaces should be north-facing to capture the most sunlight during the day, and bedrooms should be south-facing (Aboriginal Housing Office, 2020).

Three points of entry within the home enhance security and safety while creating a sequenced pathway. For practicality, the laundry should have direct access to the yard and clothesline, the living space should access the yard or veranda, and a clear pathway should lead from the street to the front door (Aboriginal Housing Office, 2020). Multiple access points also accommodate cultural relationships and avoidance behaviours within the home (Aboriginal Housing Office, 2020; Memmott et al., 2000).

A clearly defined front vehicle and pedestrian entrance aids in wayfinding and creates a clear visual connection from the street. It also allows tenants to monitor and control access to their homes (Aboriginal Housing Office, 2020). This should be covered with a roof to ensure a comfortable entryway, out of the elements.

The kitchen, laundry and bathrooms should be grouped where possible (Aboriginal Housing Office, 2020). This can reduce construction costs, improve plumbing efficiency, water management, convenience, maintenance and cleaning, and minimise noise and odours.

Responding to culturally specific concepts of privacy is a significant factor within every home (Memmott et al., 2000, p.98; Memmott, 2001, 2003a, p.29), especially with potentially large, dynamic households with numerous visitors. Privacy within the design can provide a space for cultural practices, kinship roles, family dynamics, safety and security, and avoidance rules (Memmott et al., 2000). It also ensures the health and well-being of the tenants, promoting a sense of ownership and control to relax without observation. Designs should

avoid placing bathroom and laundry windows on the street side of the house (Aboriginal Housing Office, 2020). To enhance privacy, a separate toilet can be provided, bedrooms should be separated from living areas, and a door could be included between these spaces for less noise travel. A partial wall at the entrance creates a transitional, layered sequencing into the house, preventing visitors from just walking into the living space and being able to view the whole house.

Bathrooms and built-in robes can be strategically located within the home to act as sound buffers to minimise noise transfer, which is essential in family households.

Adequate storage promotes a sense of ownership and control over the tenant's belongings. It allows for effective use of space and practical functionality within the home, especially in expanding or multi-generational dynamics (Aboriginal Housing Office, 2020; Centre for Appropriate Technology, 2013). Built-ins in the laundry, bedrooms, and kitchen and sufficient storage in bathroom vanities can be included to provide a comfortable, organised environment.

As articulated by Memmott and qualified by past community engagements I have worked within, *"a distinct norm is to live outside of the house or in semienclosed spaces, where people can maintain wider social surveillance"* (Memmott, 2014, p.98). The Centre for Appropriate Technology (2013) discussed the lack of attention to external living areas in past post-occupancy evaluations, with community members emphasising the need for improvement to accommodate visitors better. A decked area within a design, enclosed with security and insect-proof screening, provides a space for visitors or external living, keeping the insects out and sheltered from the elements and extreme temperatures in Boggabilla.

The verandah out the front of the home allows tenants to greet visitors, watch people passing by, and connect with community and Country. These spaces should be multi-functional and consider orientation, privacy, adequate sizing, and weatherproofing (Memmott et al., 2000).

Figure 31. *Diagram of developed culturally responsive Spatial Planning (Interior) Principles.*

2.2.2.3 Materiality & Construction Principles

The materiality and construction principles focus on robust, durable, and sustainable technologies that cater to extreme climate conditions, ensure thermal control, and keep costs and maintenance low during construction for future tenants and Aboriginal Community Housing Providers.

Fibre-cement cladding, vinyl flooring, Modwood decking and colorbond roofing are all durable materials that can be incorporated into Aboriginal housing design. Light-coloured cladding and roofing can also help reflect heat and keep the house cool in the warmer months (Aboriginal Housing Office, 2020). Windows and screening should be safe and not easily broken (Aboriginal Housing Office 2020; Centre for Appropriate Technology, 2013).

Durable hardware and finishes can withhold potential high-traffic areas, the influx of visitors and large multi-generational families (Aboriginal Housing Office, 2020; Centre for Appropriate Technology, 2013). These materials should be easily replaceable to ensure maintenance stays on track. Wet areas should have adequate waterproofing (Aboriginal Housing Office, 2020) to promote durability and minimise mould. Industrial kitchens should be considered for larger households with increased wear and tear.

Utilising local trades and training programs can support local economies and promote community engagement (Aboriginal Housing Office, 2020). This instils pride, ownership, and economic empowerment within Aboriginal communities, where people can learn and transfer their skills to future employment opportunities. Increased employment of Aboriginal tradespeople within the construction of Aboriginal housing promotes cultural responsiveness and continuity.

Aboriginal housing projects often have limited funds, leading builders, government agencies or Aboriginal Community Housing Providers to rationalise certain culturally responsive design principles. Finding more affordable construction solutions, such as conventional roof pitches, to provide an opportunity for pre-fab or other alternative construction methods can aid in overcoming this obstacle whilst minimising future maintenance of the homes (Aboriginal Housing Office, 2020).

Thermal control must be maximised within Aboriginal housing for comfort. The house should remain cool in the summer and warm in the winter, responding to the changing seasonal needs of Aboriginal households (Memmott et al., 2000). To enhance thermal performance, adequate insulation, ventilation, and eave design should be incorporated into the construction. Glazing can be minimised on the east and west sides of the dwelling, and the design could include elements such as ceiling fans, air conditioners and fireplaces where necessary (Aboriginal Housing Office, 2020).

Housing design should minimise the future costs of the tenants wherever possible. Energy costs are a current topic in Aboriginal housing literature. Simon Quilty and co-authors stress the prevalence of low-quality, poorly insulated housing and energy instability in remote Indigenous communities and the impact this has on Indigenous tenants with a direct association between health and housing quality (Quilty et al., 2022). Another paper that Quilty co-authors raises these concerns, highlighting energy as a necessity within the home for work, education, social life and maintaining healthy living practices (Longden et al., 2022). Sustainable practices such as solar panels and rainwater tanks can reduce costs and also benefit the environment.

In the Connecting With Country framework, the term ‘sustainable’ is described as relating to the *“endurance of systems, buildings, spaces, and processes – their ability to be maintained at a certain rate or level, which contributes positively to environmental, economic, and social outcomes”* (Government Architect New South Wales, 2023, p.85). Durable light fittings with energy-efficient light bulbs can be included in the design to also aid in minimising costs.

Adequate lighting directly impacts tenants’ well-being and mental health within the home. It enhances wayfinding, safety and security internally and externally when entering the house. Windows also strengthen the connection to the outside natural environment. To ensure sufficient lighting in Aboriginal housing, it is essential to consider a combination of natural light sources, such as windows and skylights, and well-placed artificial lighting fixtures (Aboriginal Housing Office, 2020).

The design must respond to the topography, specific soil type, climate, and risks of natural disasters (Aboriginal Housing Office, 2020). These factors will influence how the house is constructed.

Tapware and services such as hot water systems should be installed, considering the specific water condition in the particular area being built in and what kind of minerals and sediment are in it (Aboriginal Housing Office, 2020). For example, many regional communities in New South Wales have hard water and require specific hot water systems and pipes to be installed.

The building facade should reflect the surrounding streetscape (Aboriginal Housing Office, 2020). Existing Aboriginal and social housing can stand out on the street, attract unwanted attention and make the tenants feel like they don’t fit in (Memmott, 2004, para. 6). Considering the surrounding housing design, a street frontage can instil pride in the home and minimise this stigmatisation.

MATERIALITY & CONSTRUCTION PRINCIPLES

DURABLE EXTERNAL MATERIALS

MINIMISED MAINTENANCE

PROMOTE LOCAL INDIGENOUS LABOUR + EMPLOYMENT OPPORTUNITIES

CONVENTIONAL ROOF PITCH TO REDUCE COST

ADEQUATE THERMAL CONTROL

MINIMISE COST OF LIVING

ADEQUATE LIGHTING

CONSTRUCTION TO RESPOND TO SOIL TYPE, CLIMATE AND NATURAL DISASTER RISK

INSTALLATION OF SERVICES SUITABLE FOR WATER CHEMISTRY

STREET FRONTAGE CONSIDERING SURROUNDING HOUSING AESTHETIC

Figure 32. *Diagram of developed culturally responsive Materiality & Construction Principles.*

2.3 Adapting the Culturally Responsive Design Principles to the Project in Boggabilla

This section of the thesis illustrates how we adapted the developed designed principles to the specific context of the Aboriginal housing project in Boggabilla.

Memmott's cultural design paradigm forefronts that it is essential to conduct in-depth community consultation to identify the culturally specific needs of Aboriginal tenants (Memmott & Go-Sam 2003, p.13; Centre for Appropriate Technology, 2013). We tried to extract findings from the participatory workshop we conducted in Boggabilla. However, as previously discussed, this was not as fruitful as hoped. Due to constraints with cost and time, the project moved forward, and no further consultation was conducted with the community. We utilised preliminary research on the specific topography, location, climate and site conditions in Boggabilla to adapt the design principles to the project.

The climate in Boggabilla is characterised by low humidity all year round, sweltering summers, cool winters, low rainfall and a high variation of temperature throughout the day (Aboriginal Housing Office, 2020). The temperatures range from approximately 4-19 degrees Celsius in winter (Bureau of Meteorology, 2023b) and 19-34 degrees in summer (Bureau of Meteorology, 2023a). This emphasises the significance of a design that enhances thermal control and utilises durable and robust construction and material elements.

Although the bushfire damage risk was categorised as low, asset protection zones, intentional landscaping and other planning requirements still had to be enforced.

Boggabilla is located by the western bank of the Macintyre River floodplain, which has historically been subjected to various degrees of flooding. For instance, in December 2021, Boggabilla had a close call, evacuating as the Macintyre River flooded, but fortunately, the town was spared (Power, 2021). The flood report for the Aboriginal housing project in Boggabilla indicated that the site is reasonably flat and categorised as a low hazard. To mitigate the risk of floods, dwellings on this site were to be constructed with a minimum floor level of approximately one metre (Moree Plains Shire Council, 2013).

The soil in Boggabilla is predominantly Vertosol, a rich and fertile soil type, ideal for agriculture but challenging to work with in the dryer seasons with the risk of hardening and deep cracks when dried out (Welsh et al., 2014). To ensure a durable design, the structural foundation of the housing in Boggabilla had to respond to these conditions, utilising a system such as screw piles to anchor the buildings into the ground.

The water in Boggabilla is considered hard water, requiring specific hot water systems and plumbing to be installed to ensure longevity and quality services for future tenants.

The brief for the project was to design two dwellings for single-parent families or ageing residents, emphasising the significance of accessible and future-proof design.

As outlined in 2.2, the house facade should respond to the surrounding streetscape and local typologies. Single-story homes with weatherboard cladding and a hip roof pitch are typical throughout Boggabilla. They often have a front verandah that is either open or semi-enclosed.

2.4 The Implementation of Design Principles into the Aboriginal Housing Design

In April 2021, we implemented the adapted principles within a cut-and-paste exercise to create the new design proposal. We utilised this hands-on generative design method to manipulate and extract elements of existing housing designs that received the highest satisfaction and performance rates in previously conducted surveys within the Aboriginal community of Wreck Bay Village in 2020. Of course, this is on different Country to Boggabilla, and each community has their own cultural and environmental needs. However, we utilised this existing data and drawings as a base for this design generation. These elements were cut and combined with extractions from past design iterations for Boggabilla to create a new architectural design.

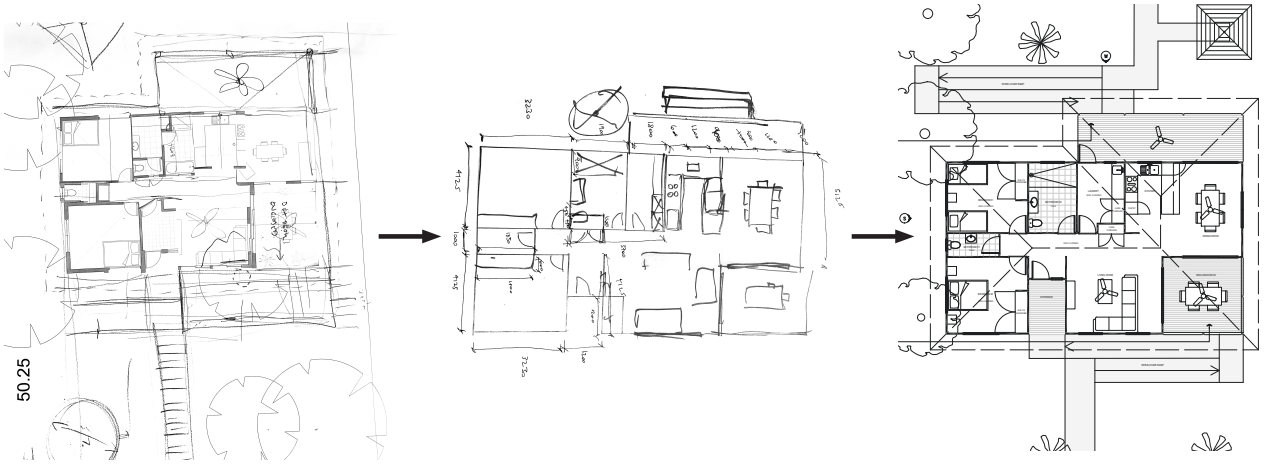


Figure 33. *Development from cut and paste exercise into the fifth design iteration for the Aboriginal housing project in Boggabilla.*

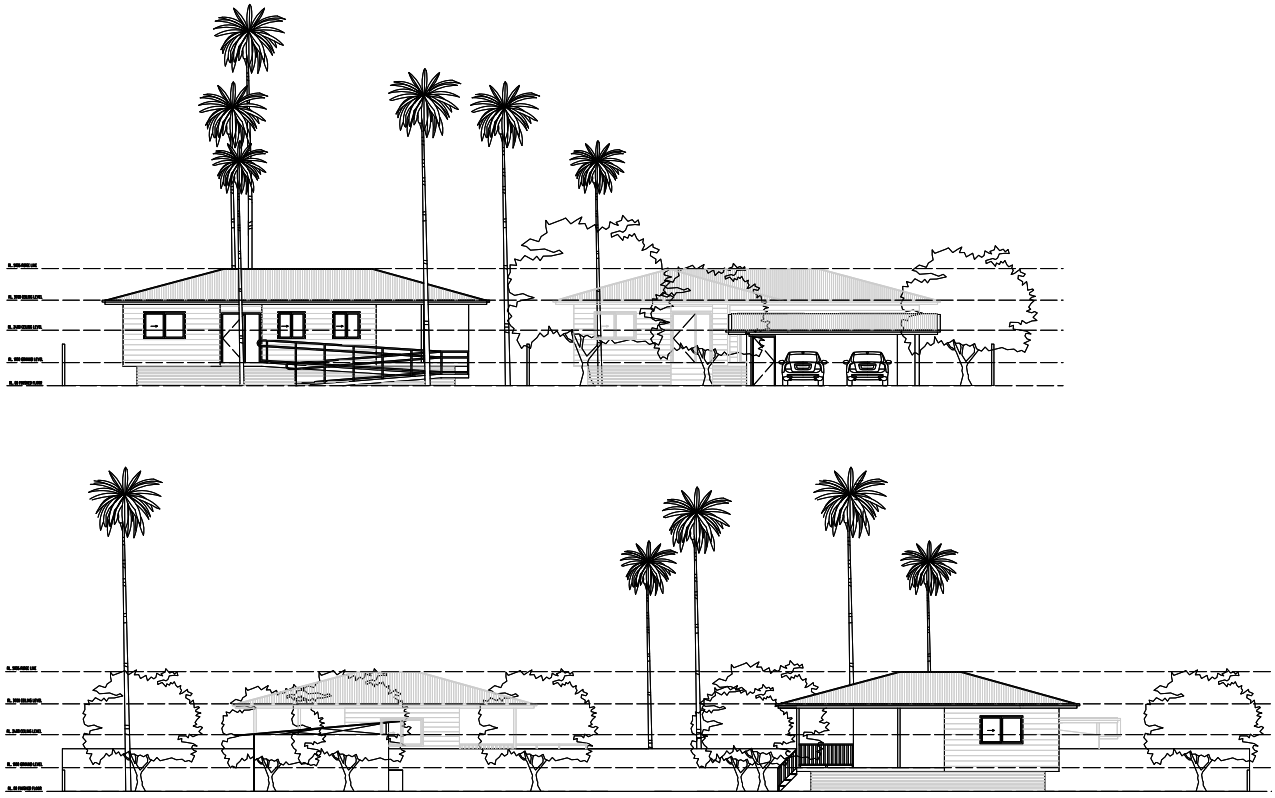
The design outcome drastically differed from the former four as it was directly informed by the newly developed culturally responsive design principles. As displayed in Figures 33-36, the most significant changes were the addition of an external carport, outdoor kitchen and enclosed outdoor deck adjacent to the living room. At this stage of the design process, the landscaping wasn't as developed. We steered away from the pre-fabricated construction method due to size limitations, transportation costs and the restrictions in the spatial layout that did not allow for the most culturally responsive design. A traditional timber stud construction method was proposed, allowing for finer detail and a bespoke design.

In April 2021, the team presented the new scheme to the NSW Aboriginal Housing Office, who were satisfied with the design but suggested some amendments to reduce the square meterage, landscaping, layout, and materiality, attempting to minimise cost and maintenance. The double-car enclosed garage was adjusted to an open, single-car garage, losing the secondary space for tenants' privacy or visitors. The built-in barbeque and seating in the outdoor kitchen were also omitted. It was also suggested that the roof design be simplified to reduce costs and allow an opportunity for the design to be pre-fabricated. Amendments were made, and the architectural documentation was developed in preparation for the NSW Aboriginal Housing Office to submit as part of the tender package in May 2021.

The following table in Figure 34 summarises how the developed culturally responsive design principles were adapted and implemented within the architectural proposal for Boggabilla.

Culturally Responsive Design Principle			Implementation In Pre-tender Design For The Boggabilla Project
Siting Principles		Landscaping and vegetation to maintain connection to land and country	• Retaining of existing vegetation • Under-developed at this stage
		Levels of privacy	• Retaining of existing vegetation • Addition of vegetation • Screening/fencing • Minimised overlooking by staggering dwellings • Adequate space between the dwellings
		Minimise noise transfer	• Staggered dwellings on the lot
		Secondary spaces for external activity, gathering, possible visitors, storage and cooking	• Detached carport/garage • Outdoor kitchen with sink and space for BBQ • Fire pit
		Passive shading	• Retaining of existing vegetation • Undercover verandah • Appropriate eaves
		Surveillance both within the lot and in relation to the street	• Verandahs • Clear sightlines • Placement of windows
		Aspect of dwellings to be oriented in accordance with views, wind and sun	• Internal and external living spaces on the northern/north-eastern side of the house
Spatial Planning (Interior) Principles		Flexible space	• Separate yet connected Living / Dining / Kitchen • Multifunctional balconies/verandahs • Adequate sized rooms to fit more than one bed
		Future proof and accessible	• Wider hallways • Wider space between kitchen counter and island bench • Space for ramps to be installed • Accessibility ramps and rails
		Location of rooms according to sun	• North facing external living spaces • South facing bedrooms
		Three points of entry	• Front entrance, laundry door, door from kitchen to backyard
		Direct access from laundry to yard and clothesline	• Door from laundry into yard
		Clearly defined undercover entrance	• Pedestrian path from street to front door • Visible front entrance from street • Roof to extend over front entrance/verandah
		Grouping of wet areas to reduce costs	• Bathroom, laundry and kitchen located adjacent to one another
		Privacy	• Bedrooms to be separate from communal living spaces • Partial wall at entryway
		Minimised noise transfer	• Sound buffer for bedrooms created by entry & wet areas • Sound buffer with built-ins
		Adequate storage	• Built-ins in laundry, bedrooms & pantry • Storage in bathroom vanities • Storage in the detached carport
		Secure external living space with opportunity to accommodate overflow of visitors	• Decked area enclosed with Crimsafe for security, shelter from weather and keeping insects out
		Open external living at front of house with street view, connecting with community	• Enclosed decked area to street in House A • Multi-functional carport in House B
Materiality & Construction Principles		Durable external materials that are suitable to the climate and environment	• Colorbond roofing • Fibre cement cladding • Recycled plastic or Modwood decking • Light coloured external finishes to combat high temperatures
		Minimised maintenance	• Easily replacable durable hardware and finishes • Vinyl flooring
		Promote local Indigenous labour, employment opportunities and skill transfer	• Traditional timber stud framing for on-site construction
		Conventional roof pitch to reduce cost	
		Adequate thermal control	• Air conditioning • Ceiling fans • Cross ventilation from windows • Appropriate eaves
		Minimise cost of living	• Rainwater tanks • Solar power
		Adequate lighting	• Sufficient windows • Sufficient number of artificial lights installed (both internal and external)
		Construction typology to respond to local soil type, climate and natural disaster risk	• On-stumps for volatile soil and raised above flood risk line • Sub-ventilation to combat extreme temperatures • Materials used that are fire-resistant
		Installation of services suitable for water chemistry	• Hot water system suitable for hardwater
		Street frontage considering surrounding housing aesthetic	• Screened deck area • Weatherboard or FC Board cladding • Colorbond steel hip roof pitch • Raised single-story typology

Figure 34. *Table of culturally responsive design principles and their implementation in the pre-tender design of Aboriginal houisng in Boggabilla.*



Entrance: 7sqm
Dining: 17.5sqm
Kitchen: 11sqm
Living: 25sqm
Laundry: 10sqm
Bathroom: 10sqm
WC: 3sqm
Bed 1: 16sqm
Bed 2: 16sqm
Outdoor Enclosed Living: 17sqm
Balcony: 20sqm
Total: 152.5sqm

Figure 35. *Architectural elevations (top) and floor plan (bottom) for the pre-tender design of the Aboriginal houisng in Boggabilla.*

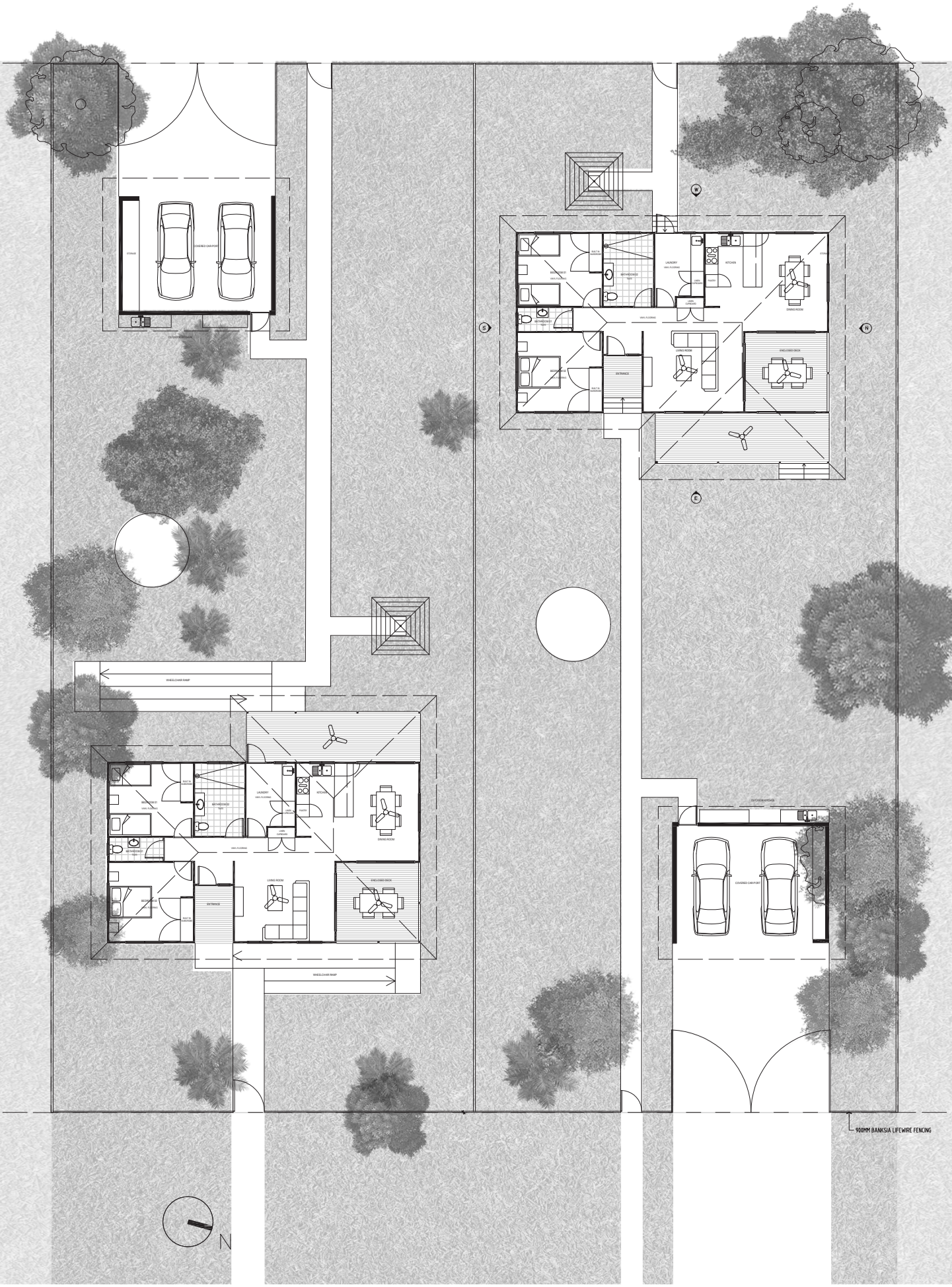


Figure 36. *Architectural site plan of the pre-tender design of the Aboriginal houisng in Boggabilla.*

2.5 Chapter Summary

Chapter 2 of this thesis has provided insight into the preliminary design of two two-bedroom dwellings for single-parent families or ageing residents in Boggabilla, New South Wales, and the development and application of culturally responsive design principles.

Despite the benefits of collaborative design processes and community involvement, the Aboriginal housing in Boggabilla was designed before any community consultation occurred. The NSW Aboriginal Housing Office advised our team to develop the initial designs, informed by an evaluation of the AHO Innovation Program in Moree, preliminary site analysis, local housing vernacular in Boggabilla, literature review and best practice analysis of existing Aboriginal housing approaches, and a review of the AHO Design Guidelines. The team then presented the designs in a community engagement workshop with students, teachers, and parents from Boggabilla Central School, hoping to gain a deeper understanding of the cultural needs of residents and the local context. Unfortunately, this community engagement was under-represented and did not directly inform the development of design principles for the project as initially intended.

The NSW Aboriginal Housing Office was critical of the first four design iterations, with too large a focus on siting rather than spatial principles and lacking consideration of the AHO Design Guidelines. Our team was forced to re-assess, restructuring the team and design approach. We recognised the challenge of developing a suitable outcome without rigorously implementing culturally responsive design principles.

Chapter 2 has provided insight into informing culturally responsive design principles for Aboriginal housing, examining existing literature such as the AHO Design Guidelines (Aboriginal Housing Office, 2020) and Memmott's cultural design paradigm, with a stronger emphasis on externally oriented living spaces (e.g. Memmott et al., 2000, p.104; Groome & Pholeros, 2000; Keys, 2003, p.76). The principles were also informed by past Aboriginal housing projects, such as our work with Wreck Bay Village in 2020. A set of transferable culturally responsive design principles for Aboriginal housing was then organised into three categories: (1) Siting, (2) Spatial Planning (Interior) and (3) Materiality & Construction, accompanied by a series of diagrams. It is essential to acknowledge the local cultural requirements and relationships to or with the site and Country in each community. The lack of consultation in Boggabilla due to cost and time constraints within the project limited our knowledge and understanding of these relationships. This is not best practice and community should be consulted to inform the adaptation of design principles. This chapter has demonstrated how we utilised preliminary research on the particular topography, location, climate, local vernacular and site conditions in Boggabilla to adapt the design principles to the specific context of project.

In April 2021, we implemented the adapted principles within a cut-and-paste drawing exercise to create the new design proposal, combining drawings from past projects with iterations for the Boggabilla housing. Later that month, we presented the new scheme to the NSW Aboriginal Housing Office, who were satisfied with the design but suggested some amendments to reduce the square meterage, landscaping, layout, and materiality, attempting to minimise cost and maintenance. These last-minute amendments demonstrated some of the constraints of time and budget pressures when implementing culturally responsive design principles within Aboriginal housing.

The preliminary architectural, pre-tender design process began in November 2020 and ended in May 2021, marking the end of the first phase of this research.

03

Figure 37. *Photograph of architectural model of the pre-tender design of the Aboriginal houisng in Boggabilla*. From photograph taken by author, 2021.

CHAPTER 3: EVALUATING THE DESIGN DEVELOPMENT AND PROCUREMENT OF ABORIGINAL HOUSING IN BOGGABILLA

This chapter is split into two chronological sections. The first section investigates the tender and procurement process for the Aboriginal housing project in Boggabilla. The second section analyses the design transformation after the builder gained control and the development of architectural documentation in preparation for construction.

3.1 The Tender and Procurement of the Aboriginal Housing Project in Boggabilla

3.1.1 Shifting to a Design and Construct Procurement Model

As outlined in the previous chapter, the pre-tender design process did not end until May 2021. The University of Technology Sydney team initially proposed that this would only take one month and be completed in December 2020. The NSW Aboriginal Housing Office originally intended for a conventional architectural delivery, including planning development approval from the local council and construction certification. However, with the pre-tender design process taking far longer than anticipated, they shifted to Design and Construct delivery to try to speed things along. This consists of a consultant architect preparing the design, which a contracted builder takes over, completes, and constructs.

3.1.2 The Tender Process

In September 2021, the NSW Aboriginal Housing Office issued the tender with submissions closing on 18 October. With approval from the NSW Aboriginal Housing Office, as part of my research, I was invited to participate as a non-scoring member of the Tender Evaluation Committee (TEC) Meeting to gain further insight into the process.

To my surprise, the team's proposed architectural design was not included in the initial tender package sent out to candidates, as the NSW Aboriginal Housing Office wanted to compare the cost of the builder's proposed designs with our developed design. An amendment was later sent out, and they received cost estimates to construct our proposed design.

The tender was awarded in December 2021 to Aboriginal Sustainable Homes, and the design control was transferred to them. It was frustrating to hand over this control after researching and developing culturally responsive design principles. We convinced the builder to novate us to complete the architectural documentation at a less-than-market employment rate, aiming to preserve the culturally responsive principles within the design. Novation *"occurs when the contract between the architect and the principal is extinguished and is replaced by a contract with a new client (the building contractor) usually on the same terms, bringing about a transfer of contractual rights and obligations"* (Australian Institute of Architects, 2019, p.1). This enabled me to remain close to the project, with the ability to continue analysing and observing.

3.2 The ‘Rationalisation’ of the Architectural Design in Boggabilla

3.2.1 The Post-tender Design Meeting with the Builder and Reductions to Follow

In January 2022, our team met online with the builder to review the architectural design and discuss the required adjustments for development approval. We were asked to remodel the roof with a skillion form. Despite our reservations and under the directive of the builder, the layout was no longer staggered, and the detached carport and outdoor kitchens were omitted. The builder was concerned with the lack of safety and accessibility, with tenants potentially having to travel far distances from the property entrance or carport to the main house (see Figure 38). Unfortunately, this led to subtracting the external living and kitchen space attached to the carport, a design element directly informed by our culturally responsive design principles. The enclosed outdoor deck, fortunately, remained after our consistent encouragement. The interior layout of the dwellings remained relatively the same. Street frontage became consistent to minimise conflict between tenants and ensure equity of housing offerings. This was a later addition to the design principles, informed by meetings with the NSW Aboriginal Housing Office and the builder. As seen in Figure 39, internal discussions within our team negotiated the inclusion of front or rear verandahs. They also aided in determining the best layout of dwellings and driveways that would retain the most existing vegetation, consistent with the developed culturally responsive design principles outlined in Chapter 2.

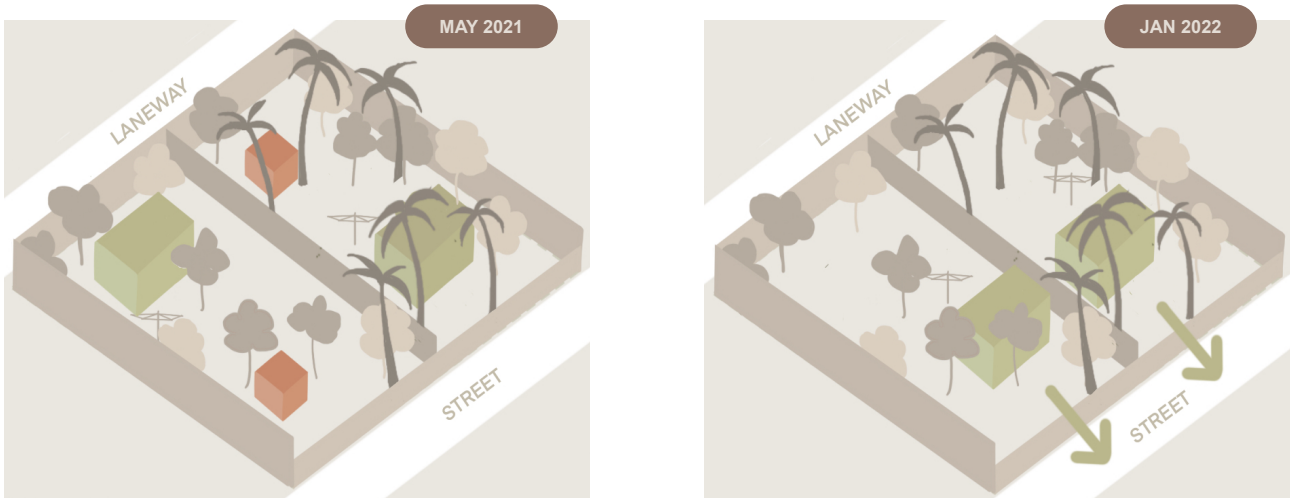


Figure 38. *Diagram comparing the pre-tender site plan to the one after the builder took over design control.*

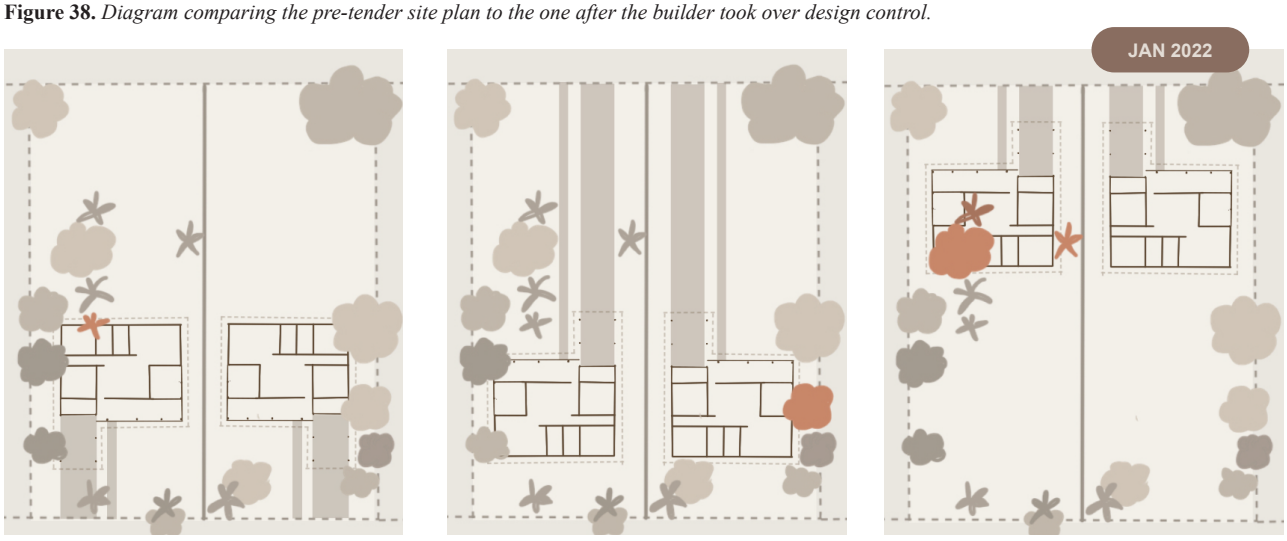


Figure 39. *Comparing access from the main street with the rear lane, and the subtraction of existing vegetation.*

Figure 40. *The eighth design iteration for the project in Boggabilla, adjusting the design as per the Structurally Insulated Panels.*

3.2.2 Adjusting to the Structurally Insulated Panel Construction

Following the builder's advice, we switched to Structurally Insulated Panels, also known as 'SIP' construction, from our proposed timber stud framing. This change prompted drawing adjustments to resize windows and doors to align with panel specifications, forming the eighth design iteration. This task was more complex than overlaying a single grid system, with varying panel widths and joint requirements, which led to the process taking longer than initially anticipated.

3.2.3 The Development and Reduction of Landscaping Design Elements

After another design meeting in February 2022 with the builder and the NSW Aboriginal Housing Office, the design was adjusted again. Decks were reduced in length by over a metre and located at the back of the dwellings, compromising outdoor living space and connection to the street. Material specifications and fencing decisions were discussed, as well as the suggestion to reduce eaves to 400mm in width concerning the structural capabilities of the adapted SIP construction method with overhang.

Later that month, we returned to Boggabilla to conduct another site visit to locate trees and vegetation on the lot more accurately and confirm where some trees had died and could be removed, further defining the placements of the two dwellings.

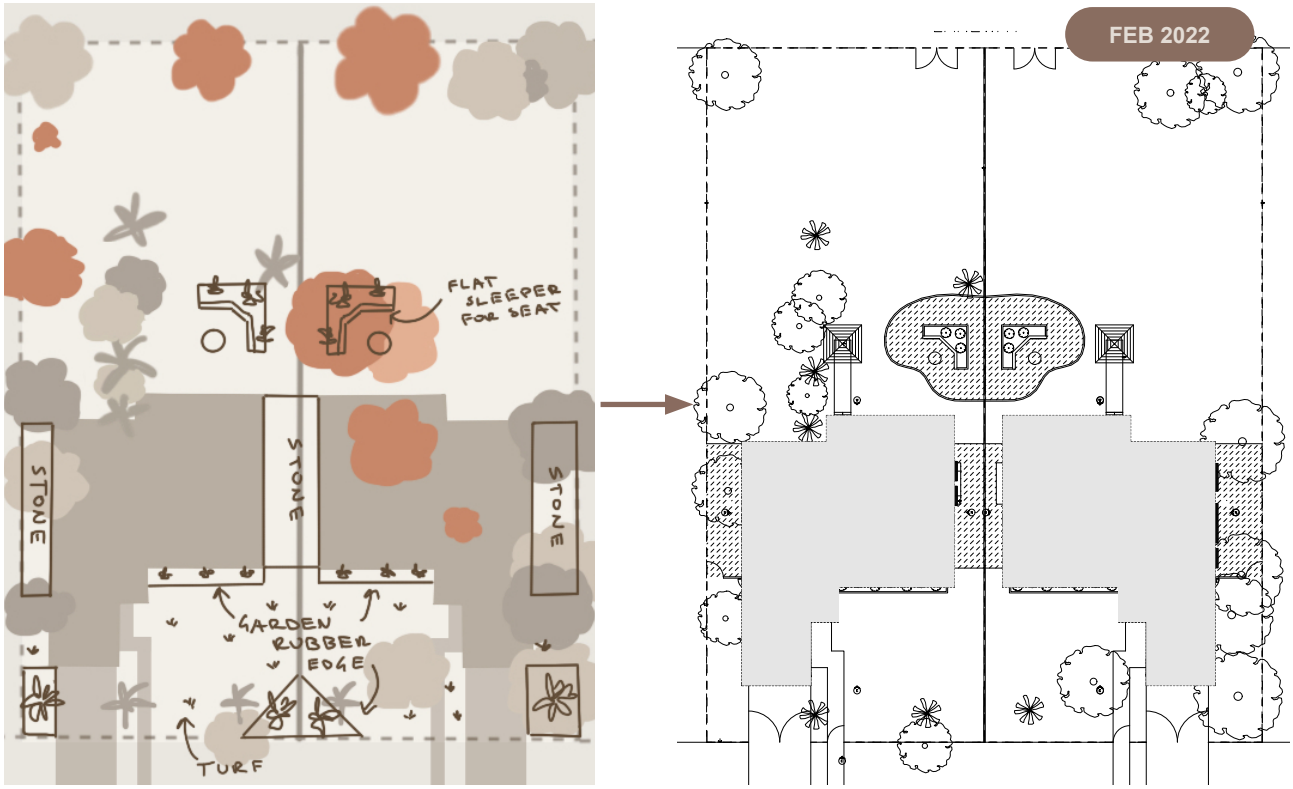


Figure 41. *Sketches of landscaping ideas from the builder (left), implemented within the architectural documentation for the Boggabilla project (right).*

Following the site visit in Boggabilla, we met with the builder in Moree to discuss any final adjustments before submitting a Development Application. Within this meeting, we referred to the culturally responsive design principles and encouraged the builder to consider the importance of landscaping and spaces for external activity. The builder agreed, sketching as we discussed what we could add to improve the design. Elements such as a firepit and raised garden beds were proposed. Within this meeting, I also interviewed the builder, commencing the first of the interviews I conducted for this research.

After consultation with the NSW Aboriginal Housing Office, we were advised to reduce garden beds, planting and turfed areas to remain within budget (see Figure 41).

3.2.4 Pre-Construction Design and Planning Requirements

This project had to receive a six-star Building Sustainability Index (BASIX) rating to meet Development Application requirements. The New South Wales Government introduced this index in 2004 to increase energy efficiency and reduce water consumption within residential dwellings (NSW Department of Planning, Industry and Environment, 2021a). During the same visit to Moree and Boggabilla, our team discussed the requirements to reach this criterion with the builder.

In April 2022, the architectural documentation was finalised, and the drawings were submitted for a BASIX assessment. The BASIX officer advised us that to reach the required six-star rating, we either had to increase the roof's insulation or decrease the window glazing size in the living/kitchen/bedroom areas. As the BASIX officer and the builder suggested, window glazing became smaller, and one window on the northwest side of each dwelling was entirely removed. Eaves were increased again to fit the planning requirements of the Moree Plains Shire Council. The eleventh iteration was developed and submitted again for BASIX approval.

In hopes of speeding up the final documentation phase and preparing for construction, our team onboarded another lead architect in April 2022. From then on, this lead architect and I were predominantly responsible for developing construction documentation for the housing in Boggabilla. His organisational skills and architectural experience assisted in forming a new, streamlined process and aided in building my technical capacity as we completed the drawings together.

In May 2022, both BASIX and the Development Application were approved.

3.2.5 Delays in Completing Architectural Documentation for Construction

The twelfth iteration only comprised material and schedule changes. The builder later changed the specifications of the SIP, shifting to an Aboriginal-owned supplier called Arafura. With this supplier change came abortive work and further delays in documentation as the drawings had to be adjusted as per the new material specifications. Further delays occurred due to changes from a skillion to a hip gable roof form (see Figure 42). Unconventionally, the builder contracted three different structural engineers: one for the sub-floor, another for the framing and another for the pre-fabricated roofing. Due to the mismanaged coordination of these consultants, the engineers specified the frame to be a steel structure. Frustratingly, this deemed the load-bearing capacities of the SIP to be redundant.

The last iterations only had minor adjustments. The fourteenth architectural iteration was sent for construction, but two more iterations followed, with the sixteenth being the final. This iteration saw the adding back of some windows to meet the Building Code of Australia (BCA) requirement of the certifier who had not been engaged by the builder before construction.

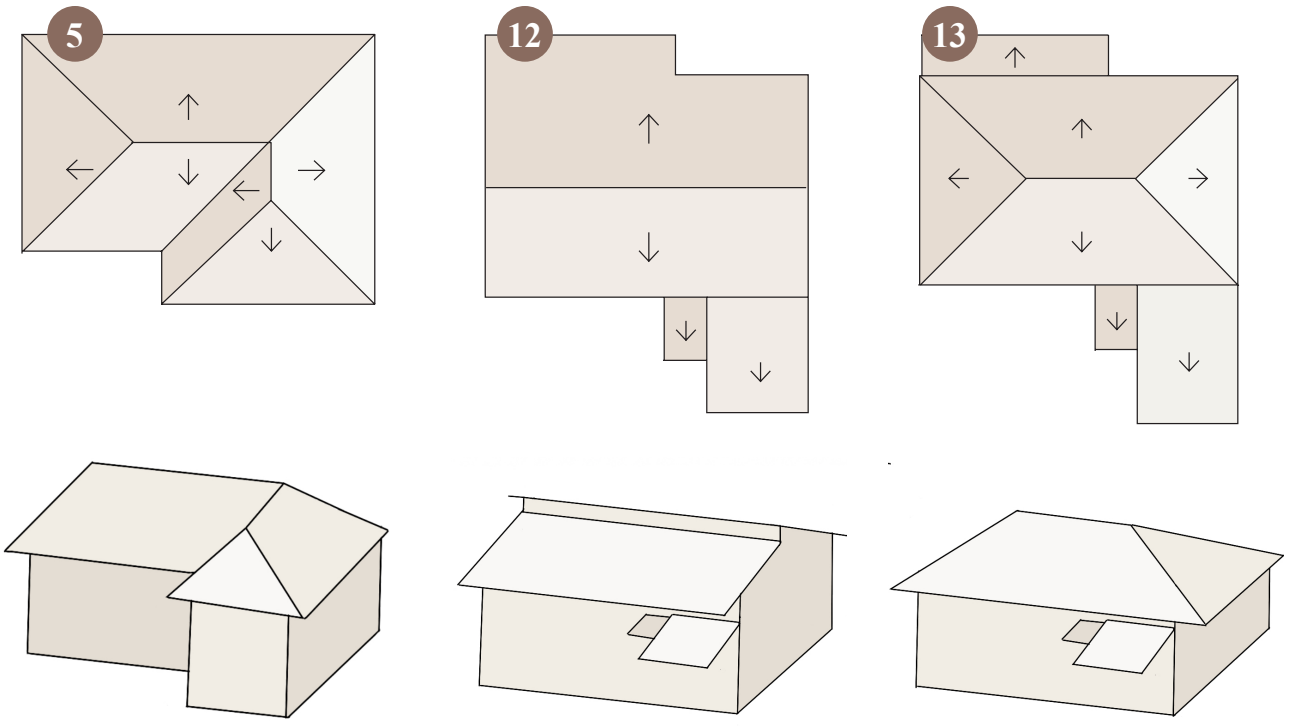


Figure 42. *Comparison of the roof formation throughout the iteration design process for the project in Boggabilla.*

3.3 Chapter Summary

Chapter 3 has examined the tender and procurement of the Aboriginal housing project in Boggabilla. It also analysed the design transformation after the builder gained control and the development of architectural documentation in preparation for construction.

Delays in the pre-tender design process led the NSW Aboriginal Housing Office to shift from a conventional architectural delivery to Design and Construct delivery to try to speed things along. The NSW Aboriginal Housing Office invited me to participate in the Tender Evaluation Committee (TEC) Meeting to gain further insight into the process. Tender submissions were between September and October 2021, and the tender was awarded to Aboriginal Sustainable Homes in December of that year. Aiming to preserve the culturally responsive principles within the design, we convinced the builder to novate us to complete the architectural documentation. This allowed me to remain close to the project, continuing to analyse and observe.

This chapter analysed the 'rationalisation' of the architectural design for the housing in Boggabilla, such as changes to the roof form, placement of the dwellings on the lot, street frontage and the removal of the detached carport and outdoor kitchen, a design element directly informed by our culturally responsive design principle. The enclosed outdoor deck, fortunately, remained after our consistent encouragement. The interior layout of the dwellings remained relatively the same. As advised by the builder, we switched from our proposed timber stud framing to Structurally Insulated Panels (SIP) construction, prompting drawing adjustments to resize openings as per the panel widths. This material change also led to shrinking eave widths to suit the panel's structural capabilities and span.

After a design meeting with the builder and the NSW Aboriginal Housing Office, we were advised to relocate the decks to the rear and reduce the size, compromising outdoor living space and connection to the street. Material specifications and fencing decisions were also discussed.

Following a site visit to locate vegetation, we met with the builder in Moree to discuss final adjustments before submitting a Development Application. Referring to our developed culturally responsive design principles, we forefronted the significance of landscaping elements. The builder agreed, and we began drawing up elements such as raised garden beds, turf and a fire pit. After consultation with the NSW Aboriginal Housing Office, we were advised to reduce garden beds, planting and turfed areas to remain within budget.

Chapter 3 also provided insight into pre-construction design and planning requirements. This included the six-star Building Sustainability Index (BASIX) rating needed to meet Development Application requirements, which decreased window glazing sizes instead of increasing roof insulation as advised by the builder. In May 2022, both BASIX and the Development Application were approved.

This chapter demonstrated various delays and challenges in the design and delivery of Aboriginal housing in regional New South Wales, which will be explored further in the following chapter. Abortive work and further delays in documentation resulted from supplier changes, new material specifications, changes in roof form and mismanaged coordination of consultant engineers. There were sixteen design iterations in total.

Figure 43 displays all sixteen iterations of the proposed floor plans in Boggabilla, Figure 44 displays site plan iterations, and Figure 45 depicts the iterative elevations.

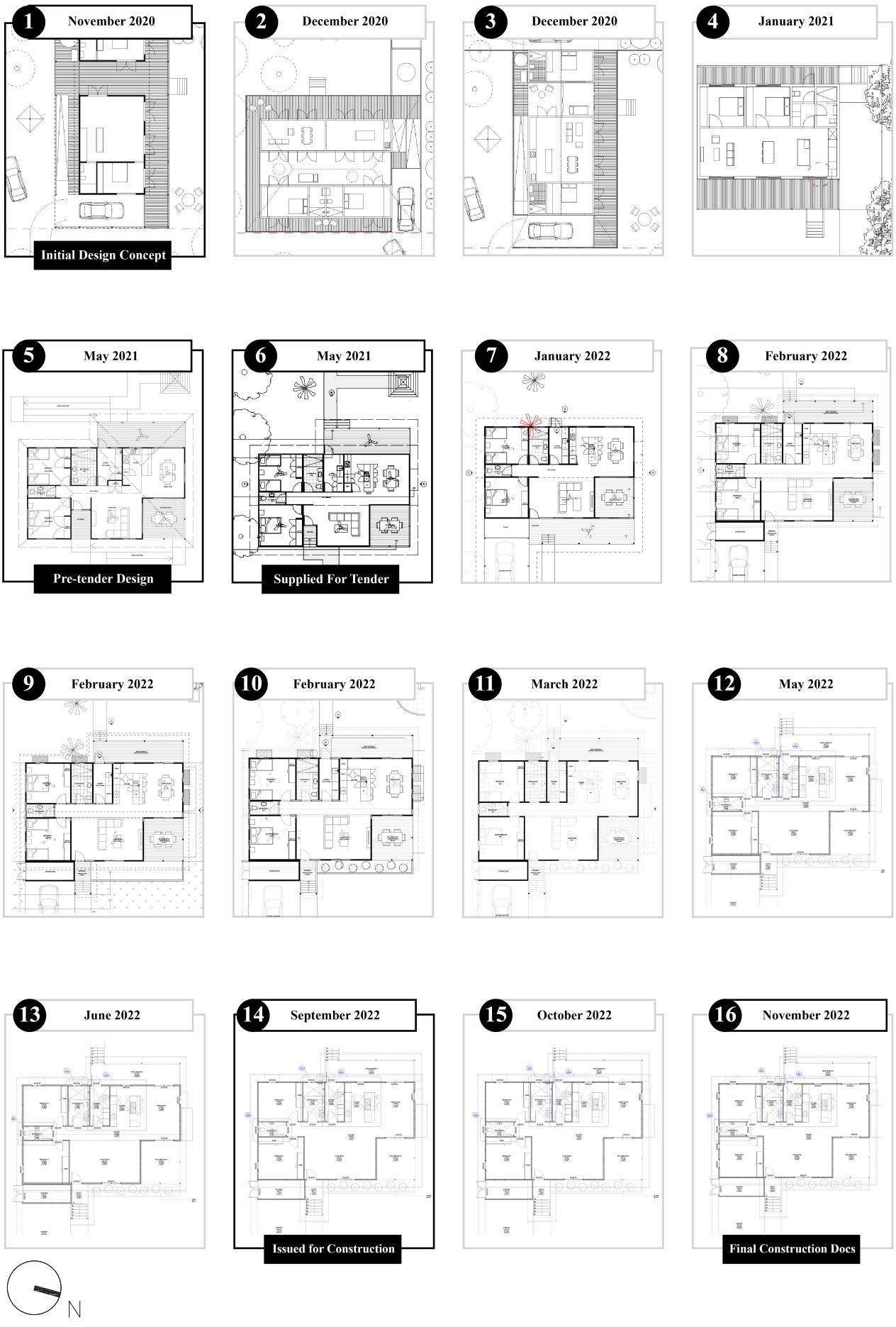


Figure 43. *Comparison of all sixteen floor plan iterations for the Aboriginal housing in Boggabilla.*

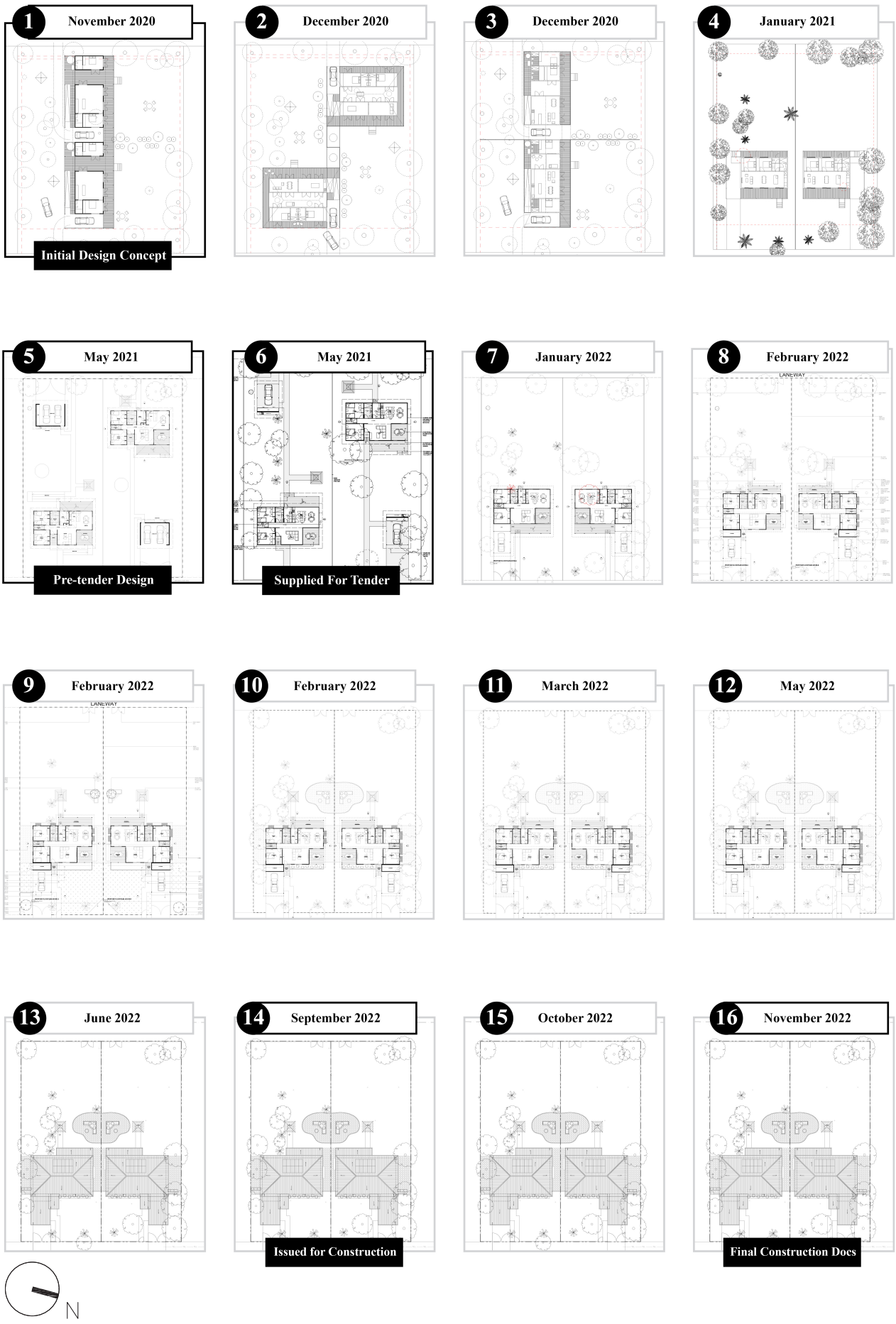


Figure 44. *Comparison of all sixteen site plan iterations for the Aboriginal housing in Boggabilla.*

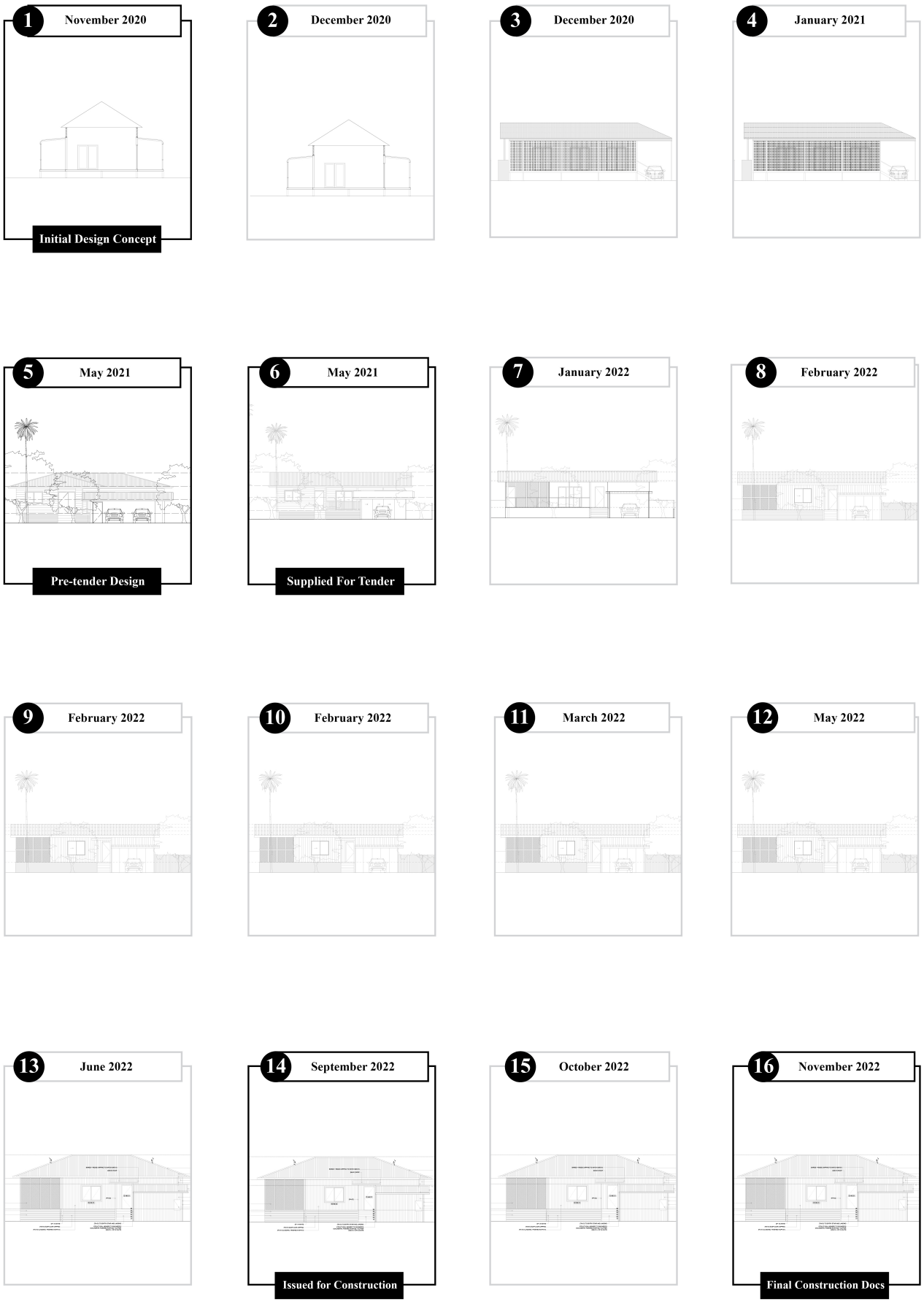


Figure 45. *Comparison of all sixteen elevation iterations for the Aboriginal housing in Boggabilla.*

04

Figure 46. *Photograph of housing in Boggabilla under construction.* Adapted from photograph taken by Rebecca Pillari, 2022

CHAPTER 4: THE CONSTRUCTION OF ABORIGINAL HOUSING IN BOGGABILLLA AND THE CHALLENGES OF BUILDING WITHIN REGIONAL NEW SOUTH WALES

After construction began in Boggabilla, I interviewed members of the NSW Aboriginal Housing Office, builders, architects, and Aboriginal Community Housing Providers directly involved in the project or work within the Aboriginal housing sector. Underpinned by these interviews, this chapter investigates the challenges that affect the delivery of culturally responsive Aboriginal housing in Boggabilla and other regional communities in New South Wales.

4.1 The Challenges of Building Aboriginal Housing in Regional New South Wales

The following discussion has been categorised according to the thematic analysis of responses to explore the varying perspectives on the challenges of building Aboriginal housing in regional communities and their impact on delivering culturally responsive outcomes.

4.1.1 Rising Demand for Housing

In 2019, the NSW Aboriginal Land Council published their Strategy on Aboriginal Housing. Within the document, they stressed, *"There is currently a shortfall of over 24,000 social and affordable dwellings for Aboriginal people in NSW and this will rise to 65,000 dwellings by 2031… Indigenous people make up 3% of Australia's population but 20% of the nation's homeless"* (NSW Aboriginal Land Council, 2019, p.3). Interview respondents emphasised this rising demand for Aboriginal housing.

Respondents highlighted additional pressure from recent bushfires and floods, similar to the Boggabilla project, as explored later in this chapter. An interviewed architect commented, *"In the recent floods, the need for housing became so apparent as a fundamental right, and then it sort of exposed it as well. It highlighted problems of housing."* He also continued, *"Now it's super competitive against other regions and other forms of housing that weren't there before."* Approximately 28% of the land area of New South Wales is subject to flooding (NSW State Emergency Service, 2023).

Responses also outlined the increased industry work in regional areas, such as Inland Rail and mining. Inland Rail is a 1600km freight rail project that commenced in 2018 and is aimed to be completed in 2027. The Australian Government is delivering the project and will connect Melbourne to Brisbane via regional Victoria, New South Wales and Queensland (Australian Rail Track Corporation, 2023). Large-scale projects like this have increased the demand for housing in regional areas, with masses of tradespeople needing accommodation, affecting housing availability for Aboriginal residents. An Elder from Moree emphasised the impact of Inland Rail on the community. This would also affect the nearby town of Boggabilla.

An interviewed NSW Aboriginal Housing Office member emphasised the impact of the AHO Design Guidelines as the demand and supply of housing continue to rise. She suggested, *"...given our project delivery unit count…if you're not getting it right, it obviously has a greater impact."*

The Regional Housing Taskforce released a report in June 2021 that contained feedback from over five hundred people across New South Wales. It outlined the *"urgent need for more social and affordable housing, including*

appropriate housing for Aboriginal people" (NSW Department of Planning, Industry and Environment, 2021b, p. 12)

In June 2022, the New South Wales Government invested $149.8 million to upgrade or build new homes for Aboriginal families (NSW Department of Planning and Environment, 2022). Recently increased funding like this demonstrates the recognition of the urgent need for new housing.

4.1.2 Pressures to Deliver Housing within Spending Timeframes

As part of a $2.8 billion Housing Package the Government delivered through the 2022-23 Budget, the NSW Aboriginal Housing Office received a further $149.8 million to build and deliver 200 new homes and refurbish 260 existing homes over the next three years (NSW Department of Planning and Environment, 2022). This directly affects projects that the NSW Aboriginal Housing Office delivers, like the one in Boggabilla.

According to responses from my conducted interviews, despite investments like this, there is still a struggle to deliver culturally responsive outcomes within such rigid timeframes.

The challenge of conducting thorough community consultation and delivering the housing before the deadline was also highlighted by respondents. A NSW Aboriginal Housing Office member emphasised that they have many projects to deliver due to increased funding; however, *"getting out and getting out frequently is going to be a challenge given that we also need to get things progressing."* An interviewed Aboriginal Community Housing Provider commented on the rushed consultation and community involvement from government agencies, suggesting that *"they're not here long enough. You bring them in and talk about issues, but they're not here long enough… They don't come back too often…."* Pholeros & Phibbs (2012) discussed in a document produced for the Closing the Gap Clearinghouse the decades of evidence on what is not working within the construction and maintenance of Indigenous housing in Australia. Some of the issues the authors raise are the fixed, short-term deadlines for construction and the commencing of projects without collaborating with Indigenous communities, stripping the *"real opportunity for them to let their views be known"* (Pholeros & Phibbs, 2012, p.2). Aligning with Pholeros & Phibbs' remarks, Aboriginal housing must be designed to respond to particular cultural beliefs, requiring close consultation before and during the design and delivery processes. This in-depth, continuous consultation did not occur within the Boggabilla project, and the challenge to design and deliver culturally responsive outcomes without this knowledge and input was evident.

Davidson et al.'s report for the Australian Housing and Urban Research Institute suggests that both state and federal governments must realise that rushed program agendas with short time frames and expectations to deliver large numbers of houses limit time-intensive consultation, increase house maintenance costs and strip social and economic benefits from Aboriginal communities (Davidson et al., 2011). Pholeros & Phibbs (2012) referred to this discussion in their document for the government a year later. Interview responses and recent literature have demonstrated that over the past decade, this has remained a prevalent concern in the Aboriginal housing sector (Wong, 2018; NSW Department of Planning, Industry and Environment, 2021b). The limited community consultation in Boggabilla outlined in Chapter 2 further highlights this prevalence.

Responses from my interviews mirrored this emphasis on the quantity over the quality of Aboriginal housing delivered. Participants suggested that projects should not be confined by spending timeframes and should

instead be going at the pace of the community, with sustained commitment and investment over several years. A NSW Aboriginal Housing Office member commented, *"One of the things that's quite perverse with us is that… we are funded annually by the government, but we're delivering projects that take multiple years."* He suggested, *"You don't want to be railroading over community just to meet some target set by a public servant."* These responses mirror the concerns of Pholeros & Phibbs as they criticise the nature of the construction industry for Aboriginal housing. The authors stressed, *"Some construction firms, faced with remote locations, government funding dependent on achieving timelines, and a lack of independent quality control, may end up 'gaming' the system by overcharging and under-delivering on both new housing and upgrades of houses. Although this practice might not be widespread, it will continue to develop unless several levels of quality control are in place."* They accompany this argument, referring to data collected by Housing for Health Projects on over 168,000 fixed items, which shows that *"22% of work required as a result of poor design or initially faulty construction"* (Pholeros & Phibbs, 2012, p.5).

As suggested by Davidson et al., perhaps the emphasis on on-time and on-budget procurement and construction is not best suited to Indigenous housing. It is evident that the processes need to be improved, with flexibility to allow for significant shifts within the project, allowing time for community consultation during both the design and delivery processes, and having flexible delivery timeframes to accommodate remote community politics and social and climatic contexts (Davidson et al., 2011).

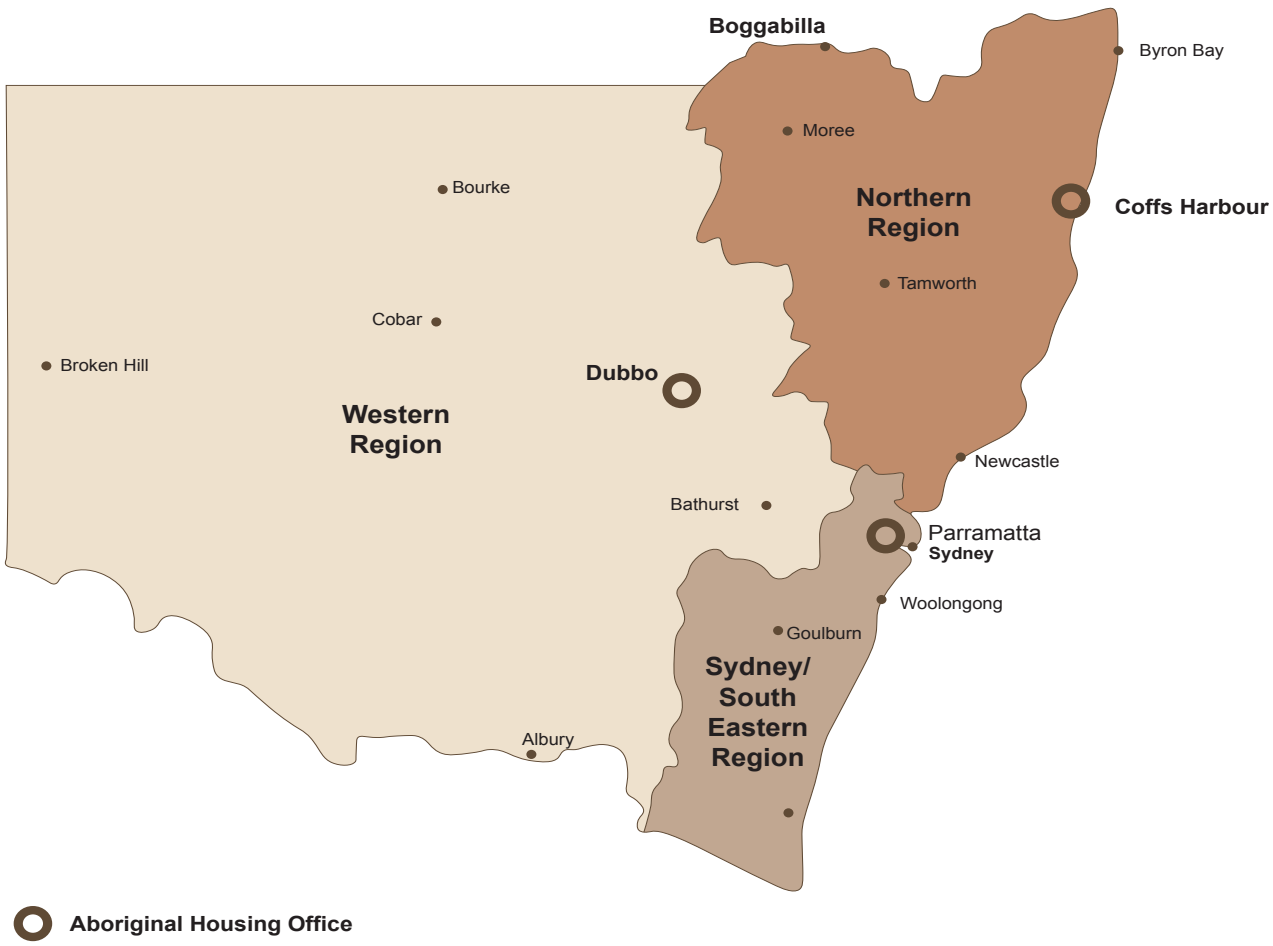


Figure 47. *Map of Aboriginal Housing Office regions within New South Wales*. Adapted from *Aboriginal Housing Office Regions* by Aboriginal Housing Office, 2020, Aboriginal Housing Office (https://www.aho.nsw.gov.au/resources/factsheets/aboriginal-housing-office-regions).

4.1.3 Resource Scarcity within Government Agencies, Councils and Aboriginal Community Housing Providers

Members of the NSW Aboriginal Housing Office stressed the lack of resources within their regional teams due to their widespread geographic coverage. Lack of resources was also noted for councils in regional areas, *"and they take too long which affects our capacity and ability to deliver…."* As the NSW Aboriginal Housing Office owns the lot in Boggabilla, it is considered Crown land, which means the NSW Government manages it. This activates an unusual mechanism of development approval and construction certification, sitting outside private delivery processes. A NSW Aboriginal Housing Office member explained that the government agency has recently gained the ability to self-certify and approve its development projects rather than going through the council. This provides an opportunity for a streamlined pathway to the commencement of construction. However, this also means they can over-write some planning requirements if they see fit, potentially leading to quality control issues and lessening the outcome for future Indigenous tenants.

Interviewed Aboriginal Community Housing Providers also highlighted the challenges in delivering their services, suggesting that due to their organisation's small scale, *"people forget about us."* Participants from Narrabri explained that they find it hard to compete with larger organisations in the large serviced towns of Moree and Tamworth, saying that *"all the funding goes there and just jumps over us."* A provider said, *"We just haven't got the data or the backing needed in the funding application. So it'd be good to be recognised and have money allocated to these areas so that we could apply for it and have something done."* This resource scarcity affects the Aboriginal residents in these smaller towns who need new or improved housing but cannot receive it unless procured by the providers.

Responses also outlined the impact of the local mining industry in some communities and the economic focus of shire councils. A respondent explained, *"When it comes to small organisations like us, it's not really a priority [for the council]" …"The mines are not gonna be there forever. The people are."*

Findings from these interviews highlight the need for councils and governments to shift more of the focus to the needs of Aboriginal community members. Pholeros & Phibbs reflect this finding, suggesting that *"in a resource-constrained environment, it is very important to focus on ensuring that the investment in Indigenous housing generates an improvement in housing function for the residents"* (Pholeros & Phibbs, 2012, p.2)

4.1.4 Shortage of Builders

All interviewed participants agreed that *"there's a lack of builders and quality builders in regional areas."* A NSW Aboriginal Housing Office member commented, *"The businesses that we work with successfully, we go back, and we use them repeatedly."* However, he also outlined that *"across the whole of New South Wales, we've got a shortage of suitable builders that really can work like that."* An Elder and former Aboriginal Community Housing Provider in Moree suggested, *"Our mob would appreciate talking to builders. But… because of COVID and everything else, builders are hard to come by."*

An interviewed builder suggested there are too many construction jobs for tradespeople to keep up with, saying, *"We've been in a drought for so long. Farmers have been doing it so hard for the last ten years or so. Now that they're out of a drought and the construction industry is booming, they want to rebuild."* Aboriginal Community Housing Providers in Narrabri also outlined this competitive market and struggle to find trades, who suggested, *"They're not gonna come and help us, you know, a small little job when they can be out there*

at the mines doing work consistently." Another participant highlighted the challenge of finding local trades and suggested that people often have to get builders from larger towns who bring their tradespeople with them, too. Similarly, within the project in Boggabilla, the trades team lived in Moree and would travel to the construction site.

4.1.5 Demand for Housing is More Significant than Capacities to Supply

Responses indicated that due to this shortage of builders and resource scarcity in the NSW Aboriginal Housing Office and regional councils, there is a struggle to keep up with the rising demand for Aboriginal housing. A NSW Aboriginal Housing Office member suggested that*"demand is outstripping supply dramatically, and I think that's probably the biggest challenge."*

Interviewed Aboriginal Community Housing Providers also highlighted the *"limited land supply"* in some areas, creating challenges in delivering housing that is evidently in need. An interviewed Aboriginal Community Housing Provider from Narrabri emphasised the competitive housing market and the challenges people face finding accommodation in their community that is out of the flood zone. He suggested that this pressure could be circumvented by *"opening up more land for development. That's what the council needs to do."* He explained that a lot of land in their community outside this flood zone is already owned for development, mining industry, or agricultural purposes. A participant commented, *"It's very congested. There is just no space."* Responses also raised concerns about building Aboriginal housing further out of town with the added expenses of transport, cars, and fuel.

Findings within the 2021 Regional Housing Taskforce Findings Report emphasised the struggle to keep up with the demands for housing. The report stressed that the resource scarcity and lack of technical capacity within development, planning and assessment processes was a *"constraint to councils"* (NSW Department of Planning, Industry and Environment, 2021b, p.24). Shortage of builders in some regional areas was viewed as a *"significant barrier to housing supply"*(NSW Department of Planning, Industry and Environment, 2021b, p.13). The difficulties in *"rapidly increasing supply during times of increasing need"* were noted, as well as the high costs of mobilising materials and labour within more remote regional areas (NSW Department of Planning, Industry and Environment, 2021b, p.3). This report outlined that the challenges highlighted by respondents and within the Boggabilla project were relevant in many other regional communities across the state.

Findings from this research align with Memmott & Moran's discussion, where they stressed that the Indigenous housing backlog recognised in the 1970s remained a concern in 2001. Over two decades later, this remains a pressing issue within Indigenous communities, continuing to strain families and households in need. As recommended by Memmott & Moran, *"Not only is funding required in Indigenous communities to offset these shortages but also training and management systems to ensure adequate care and reasonable life expectancy of the physical infrastructure"* (Memmott & Moran, 2001, p.52).

4.1.6 High Costs of Building Regionally Compared to Building in Metro Areas

Interview responses outlined that building in regional communities costs significantly more, with a shortage of trades, increased costs of materials, transportation of such materials, and external labour and providing water, waste and electricity services due to remoteness. Multiple interview respondents highlighted the additional

25% or higher loading cost applied to projects they have worked on. An interviewed builder further emphasises this, *"It's a well-known fact that Aboriginal people don't congregate in the major cities and the major towns; it's predominantly in the outlying areas where the cost to deliver that housing is higher."*

A builder working on the project in Boggabilla commented, *"For what I build out here, I could probably build two houses in town."* He outlined that materials cost less in metro areas, so he orders a bulk product, which takes money and investment from the local and regional communities.

A NSW Aboriginal Housing Office member suggested that *"there is a lack of understanding at a high level about the realities of the cost of delivering…, especially in remote areas."*

An Aboriginal Community Housing Provider said they had recently received funding to build housing. However, due to floodplains, the houses must be on stilts, which creates issues when designing for the ageing community members. He explained, *"We've found in our position, we really have to buy existing houses that are out of the floodplain, which isn't ideal because then we've gotta consider maintenance and upkeep and everything going on."* He emphasised the benefit of buying existing dwellings to reduce costs, *"We were able to update hot water systems, update air conditioners and things like that. If we'd built from scratch, we wouldn't have had money left over."*

Fien & Charlesworth (2012) highlight the high cost of construction due to remoteness, resulting from challenges such as increased cost of materials due to distances from sources and lack of competition, high cost of transporting materials, shortage of trades and high costs of external labour, poor economies of scale in purchasing, and higher labour costs in areas where climate only allows seasonal construction. Pholeros & Phibbs (2012, p.2) refer to this discussion and emphasise the issue of sub-standard housing in Aboriginal communities, often due to this remoteness and cost pressures. Referencing Bailie (2007), the authors stress, *"This is particularly disturbing because we know that there is a clear relationship between the quality of Indigenous housing and the health outcomes of the occupants"* (Pholeros & Phibbs, 2012, p.2).

Similarly, interview respondents suggested that despite the rising construction costs over the past few years and the added expense of building regionally, the quality does not match the price tag. An architect suggested, *"The quality doesn't seem to be delivered as well as what you would get in a more urban setting."* These high costs of constructing in regional communities limit capacities to build and deliver Aboriginal housing that is evidently in need. This further contributes to the housing shortage and rising demands.

4.1.7 The Capacity of Alternative Construction Methods to Address the Challenges of Building in Regional Communities

As alternative construction methods become increasingly popular to cater for varying demands in the delivery of housing in regional areas, we are pushed to reflect on the advantages and disadvantages of these systems compared to traditional methods. When discussing 'alternative' methods, I refer to construction processes that are not conventional timber stud, concrete or brick in-situ structures.

Interviewed participants highlighted the benefits of these alternative methods, which include lower costs, fast implementation, non-reliance on site and weather conditions, better quality control, and minimised vandalism

on site. The economic advantage of having a volume of stock with pre-fabricated homes was also emphasised, with the potential to quickly deliver houses once a suitable model has been developed. Respondents discussed the lower living costs for the tenants and lower maintenance costs for providers so they could spend money on delivering more homes. An interviewed architect suggested, *"Maintenance is probably the biggest issue with Aboriginal housing for the service providers."*

Members of the NSW Aboriginal Housing Office suggested that they predominantly utilise alternative construction, such as pre-fabricated or SIP methods, to manage the challenges of building in regional areas.

The project in Boggabilla demonstrated the several benefits and disadvantages of constructing with SIP. As well as high thermal control, the builder in Boggabilla suggested that it requires less skilled trades and promotes the ability of the community to build their own homes. He commented that in the project in Boggabilla, they are using approximately 65% of local labour to support the local economy rather than the wages being taken out into surrounding large service towns like Moree. However, other methods, such as pre-fabricated construction, have limited community involvement. An interviewed architect commented, *"...basically it comes, and you just plug it in."* An Elder and former Aboriginal Community Housing Provider emphasised, *"It's just a shot in the hand… then the job's done."* He encouraged traditional construction methods: *"You can train Aboriginal young people, men and women, to become tradies and builders…Upgrading and up-skilling our community."*

In addition to the benefits of the SIP construction method, there were also sizing limitations with wall spans, window and door openings, and issues on-site with integrating electrics. Interview respondents also raised these limitations and suggested that some of the products' commercial, industrial style creates a challenge when designing for a residential aesthetic.

4.2 The Construction of the Aboriginal Housing Project in Boggabilla

Aboriginal Sustainable Homes initially planned construction to run from June to October 2022. However, works only commenced in September, with delays such as miscommunication of required architectural drawings from our team and delivery of the wrong building materials. In September 2022, we travelled to Boggabilla again to conduct a site visit and examine how the project was tracking. The screw piles were anchored in the ground, and the steel flooring structure had been constructed. Installation of the Structurally Insulated Panels had begun, but there were no finished walls or roofs.

Figure 48. *Before and after photographs of floodwaters in and around Moree on October 23*. From photographs by Nearmap, 2022, ABC News (https://www.abc.net.au/news/2022-10-28/before-and-during-photos-of-gunnedah-and-moree-floods/101585484).

As outlined in the previous chapter, our team issued the architectural documentation for construction in September 2022. With some window additions to meet natural light requirements, we gave the final construction documentation to the builder in November 2022, two months after the works had begun.

The project in Boggabilla highlights the impact of unprecedented events such as COVID-19 restrictions that led to delays in labour and material deliveries and increasing costs. In October 2022, the regional town of Moree saw its worst floods in the past decade, with many homes and roads underwater (see Figure 48). This temporarily stunted the progress of material deliveries and construction in the nearby community of Boggabilla. I could not travel back to the site at the end of 2022 due to road closures caused by the floods.

Construction was completed in March 2023, and the builder returned the properties to the NSW Aboriginal Housing Office later that month. See Figures 49 and 50 for photographs of this construction process. This marked the end of our employment on the Aboriginal housing project in Boggabilla.

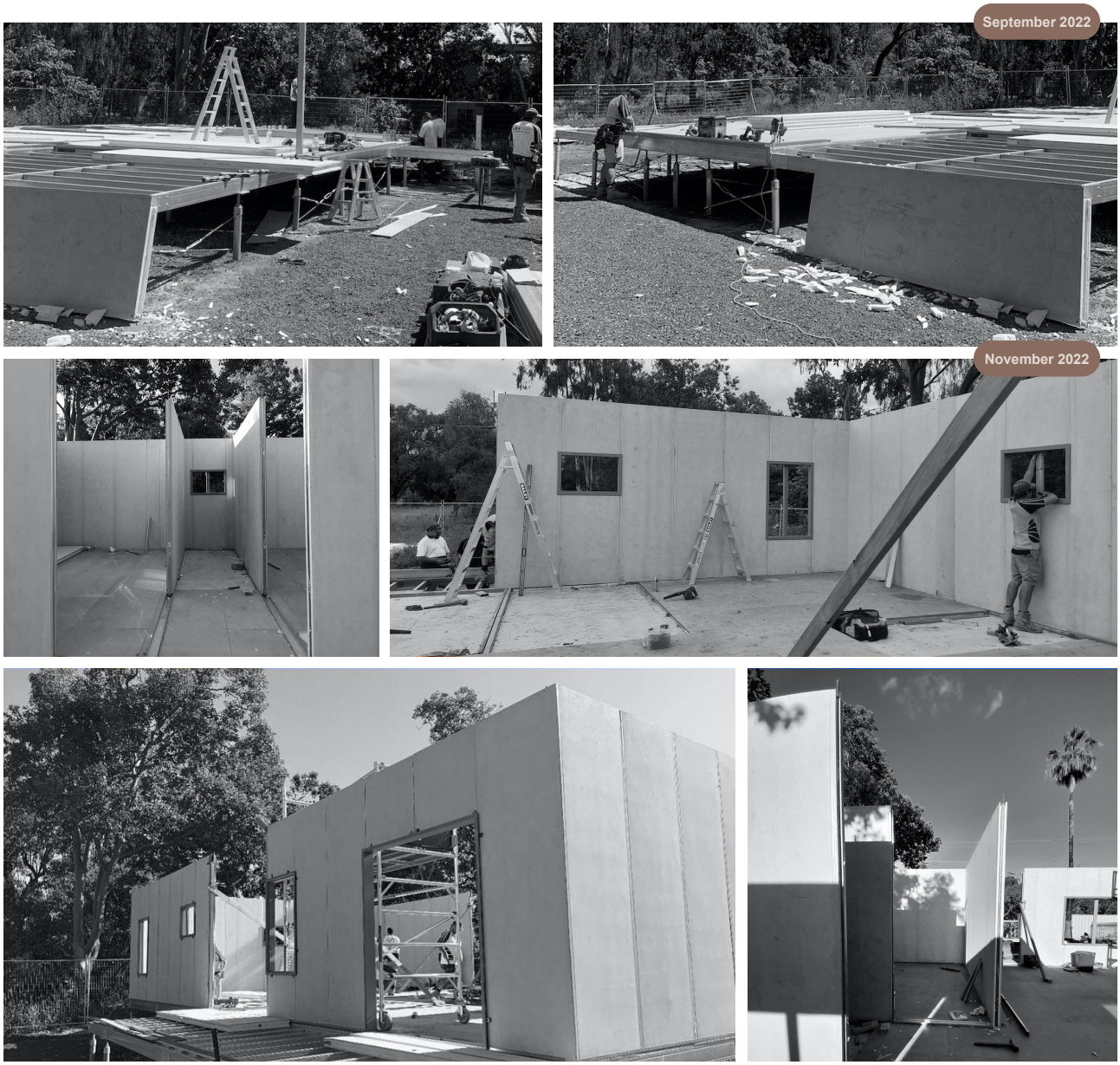


Figure 49. *Construction commencing in Boggabilla (top),* Adapted from photographs taken by author, 2022 *and Structurally Insulated Panels installed,* Adapted from photographs taken by Rebecca Pillari, 2022, and photographs (bottom left) taken by ASH Group Holdings, 2023, Facebook (https://www.facebook.com/ashgroupholding)

Figure 50. *Photographs of final stage of construction in Boggabilla,* Adapted from photographs taken by ASH Group Holdings, 2023, Facebook (https://www.facebook.com/ashgroupholding)

4.3 Chapter Summary

Underpinned by interviews with members of the NSW Aboriginal Housing Office, builders, architects, and Aboriginal Community Housing Providers, Chapter 4 has investigated the challenges that affect the delivery of culturally responsive Aboriginal housing in Boggabilla and other regional communities in New South Wales. Findings that emerged from interview responses highlighted challenges such as rising demand for housing, pressures to deliver housing within spending timeframes, resource scarcity within government agencies, councils and Aboriginal Community Housing Providers (ACHPs), shortage of builders, demand for housing outstripping capacities to supply and high costs of building regionally compared to building in metro areas.

These challenges and pressures can limit abilities to deliver housing that Aboriginal communities are so evidently in need of. Rushed program agendas can compromise in-depth community consultation, stripping opportunities for Aboriginal people to have the necessary input in designing their homes (Pholeros & Phibbs, 2012). This limits the chance for design and delivery processes to be adapted to each Aboriginal community's cultural beliefs and local context. Rushed projects can also increase maintenance costs and strip social and economic benefits to Aboriginal communities (Davidson et al., 2011). Struggling to meet demands and financial constraints, builders may overcharge but under-deliver housing projects, cutting corners and decreasing culturally responsive outcomes for Aboriginal residents (Pholeros & Phibbs, 2012).

To avoid these poor outcomes, procurement and construction processes must remain flexible to Aboriginal community needs, allow time for in-depth and meaningful consultation and accommodate for potential major shifts or delays in the project (Davidson et al., 2011). Stakeholders involved in delivering Aboriginal housing must prioritise investment in quality, culturally responsive outcomes for community (Pholeros & Phibbs, 2012), improved with more funding and training opportunities (Memmott & Moran, 2001).

This chapter has also evaluated the capacity of alternative construction methods to address the challenges of building in regional communities. Interview respondents highlighted the benefits, with lower costs, fast implementation, volume of stock, non-reliance on site and weather conditions, better quality control, minimised vandalism on site. However, participants raised concerns about the commercial aesthetic of some products and the limited community involvement in pre-fabricated construction. The NSW Aboriginal Housing Office predominantly utilise alternative construction, such as pre-fabricated or SIP methods, to manage the challenges of building in regional areas.

The project in Boggabilla demonstrated the several benefits of using SIP with high thermal control and community involvement due to the requirement for less skilled trades. However, the project also highlighted sizing limitations with wall spans and openings and issues integrating electrics on site. Although SIP construction was meant to provide faster and simpler construction, the delays within the Boggabilla project did not necessarily demonstrate these benefits.

This chapter has investigated the delays that can occur while delivering Aboriginal housing, such as COVID-19 restrictions and flooding that led to delays in labour, material deliveries and construction in Boggabilla, increasing costs and inhibiting access to the site. Chapter 4 has analysed how the various challenges in delivering Aboriginal housing in regional areas can delay projects and affect culturally responsive outcomes. The following chapter compares what was intended to be built and what was built in Boggabilla and how some of these challenges impacted the outcome.

05

Figure 51. *Photograph of constructed housing in Boggabilla. Adapted from photograph taken by author, 2023.*

CHAPTER 5: EVALUATING THE ABORIGINAL HOUSING IN BOGGABILLA AND THE EFFICACY OF THE DESIGN AND CONSTRUCT MODEL TO DELIVER CULTURALLY RESPONSIVE OUTCOMES

The collaborative project in Boggabilla between the NSW Aboriginal Housing Office and the University of Technology Sydney has demonstrated how culturally responsive design principles can be developed and implemented within the design and delivery of Aboriginal housing. As explored in the previous chapter, this research has also demonstrated the various challenges in implementing these principles when building in regional communities.

Utilising an architectural forensics approach (Weizman, 2017), this chapter explores the final phase of the research, evaluating whether the culturally responsive design principles we developed for the Aboriginal housing in Boggabilla are evident in the constructed dwellings. Diagrams have been crucial to accompany an analysis of how the building fabric indicates the project's various political, economic, social and environmental challenges. Architectural documentation and photographs have also accompanied this diagramming to compare what we intended to be built with the actual constructed outcome.

Interview respondents illuminated that Aboriginal housing is often *"culturally inappropriate and doesn't reflect how people live."* An interviewed Elder and former Aboriginal Community Housing Provider highlighted government agencies' and organisations' emphasis on health and education, but *"at the end of the day, you give Aboriginal people comfort in their homes, great living conditions and all that other stuff comes with it."* Qualified by responses from members of the NSW Aboriginal Housing Office, architects, builders, Aboriginal Community Housing Providers and the new tenants in Boggabilla, this chapter reflects on the significance of applying these culturally responsive design principles within the design and delivery of Aboriginal housing.

In March 2023, I contacted the construction manager and the project manager, who notified me that the project was complete and Aboriginal Sustainable Homes was preparing to hand over the homes to the NSW Aboriginal Housing Office later that month. Due to little communication with the builder and the NSW Aboriginal Housing Office, I had limited knowledge of the process to follow before the tenants moved in.

In October 2023, I returned to Boggabilla to see the constructed housing and interview the new tenants to discuss how it worked for them. Both tenants said they moved into the homes in late March 2023. The analysis in Chapter 5 is primarily framed by architectural diagramming, and the interviews conducted with the other stakeholders but is supported by excerpts from this informal consultation.

Exploring interview responses, the last section of this chapter reflects on the capacity to deliver culturally responsive Aboriginal housing with the Design and Construct procurement model.

Figure 52. *Photograph of constructed housing in Boggabilla. Adapted from photograph taken by author, 2023.*

Figure 53. *Aerial view of constructed Aboriginal housing in Boggabilla (top),* Adapted from photograph by Google Earth, 2023, Google Earth; *Photograph of constructed Aboriginal housing in Boggabilla,* Adapted from photographs taken by author, 2023.

Figure 54. *Map of road trip from Sydney to Boggabilla for a final site visit. Adapted from Google Earth (https://earth.google.com/web/@-31.55416357,146.16475837,345.28071306a,2530031.37079149d,35y,359.99999893h,0t,0r/data=OgMKATA) and photographs taken by the author, 2022.*

5.1 Final Site Visit in Boggabilla and Consultation with New Tenants

In October 2023, as I was driving into Boggabilla and approaching the two homes, I felt a mix of nervousness, apprehension, and excitement. The long drive and staying in regional towns with not much in between highlighted the remoteness of Boggabilla and the challenges at times to conduct my research.

As I knocked on the tenants' doors in Boggabilla, holding a cake I bought as a housewarming present, I felt so aware of it not being my place. I felt a sense of intrusiveness, taking time out of their weekends to ask about their home, aware of the historical shortfalls of Aboriginal housing. I was also nervous as this was the first time I had gone out to community for consultations on my own. This final trip prompted me to reflect on my growth as a researcher over the past few years as I have conducted this body of work.

It was affirming to hear that the tenants were happy with the designs and that the design principles we fought for largely worked for them.

Only the tenant from House A, an older woman who lives with her granddaughter, was interested in having a more in-depth conversation. She was apprehensive at first, and I wanted to respect her boundaries, but she invited me in and showed me around, discussing what worked and what could be improved. She seemed surprised that I drove all the way from Sydney to see this through. I explained that this was the first Aboriginal housing project I worked on, so this trip was special to see that wrap-up, along with my research. As she showed me around her home, explaining that the builder had to fix loose doors, reinforce shower screens and relocate plumbing in the laundry, I was reminded of the continuing struggle for quality Aboriginal housing. See Appendix A for the transcript from these informal interviews, which will be referred to throughout this chapter to accompany the analysis.

5.2 Investigating Culturally Responsive Outcomes within the Constructed Housing in Boggabilla

This evaluation has been organised per the Siting, Spatial Planning (Interior) and Materiality & Construction culturally responsive design principles outlined in Chapter 2. The siting principles focus on dwelling placement, orientation according to climate, privacy and external living spaces. The spatial principles focus on the house's interior, exploring flexibility, privacy, navigation and wayfinding. The materiality and construction principles focus on robust, durable, and sustainable technologies for climate resilience, cost efficiency and low maintenance.

This analysis has been organised by colour coding the design principles that were not delivered in brown, partially delivered in orange, delivered in green and unconfirmed in grey. Most principles were somewhat delivered, but the outcome could be improved.

The evidence of some Materiality & Construction principles cannot be confirmed, presenting an opportunity for a more in-depth post-occupancy evaluation in the future.

As Figure 55 and the following diagrams display, this research diagrammatically compares the pre-tender design, as shown to the left and the built outcome to the right.

5.2.1 Siting Principles

LANDSCAPING CONNECTING TO COUNTRY

The constructed housing in Boggabilla has incorporated more landscaping than the pre-tender design. The landscaping elements within the design during the lead-up to tender were not as developed as we were focusing on getting the siting and spatial architectural factors right. In planter boxes, several hardy plants were added to the front and rear of the houses. Landscaping is an important design principle that can strengthen cultural connections to Country. An interviewed architect emphasised, *"These communities need to feel connected to the natural environment."* A fire pit was placed in the rear yard to provide a space for gatherings, ceremonies, cultural practices or storytelling. The tenant from House A voiced that fire is an *"important part of our culture."* Unfortunately, she said the fire pit was removed due to bushfire restrictions. Additional landscaping could have been supplied, adding more variety of vegetation and creating different areas for external living. However, economic constraints restricted this.

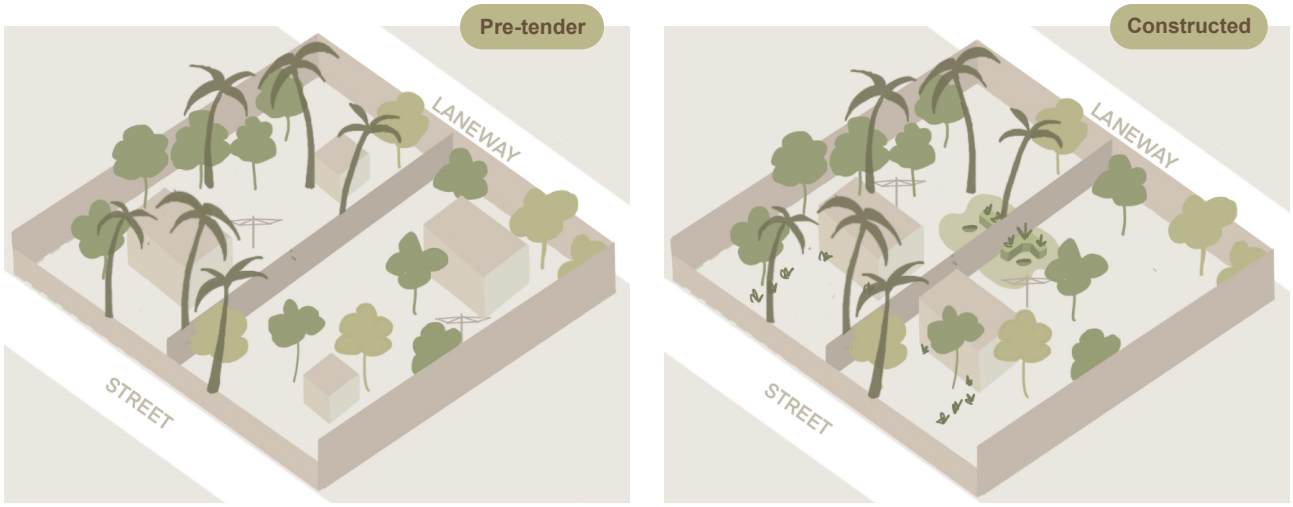


Figure 55. *Comparing evidence of Siting Principle: landscaping connecting to country in pre-tender design and final built outcome.*

LEVELS OF PRIVACY

MINIMISE NOISE TRANSFER

Privacy can be enhanced by minimising overlooking between the dwellings and *"not building houses too close to each other"*, as an interviewed Aboriginal Community Housing Provider suggested. As displayed in Figure 56, the pre-tender design proposed that the houses be staggered to address this design principle and create distance between the living spaces in each home. In both the pre-tender design and the constructed housing, the two dwellings were separated by a fence to enhance privacy. In the constructed housing, the houses were mirrored, so the living spaces were not adjacent. However, the houses were no longer staggered and were situated close together to adhere to council boundary offset limitations and mitigate the removal of existing vegetation.

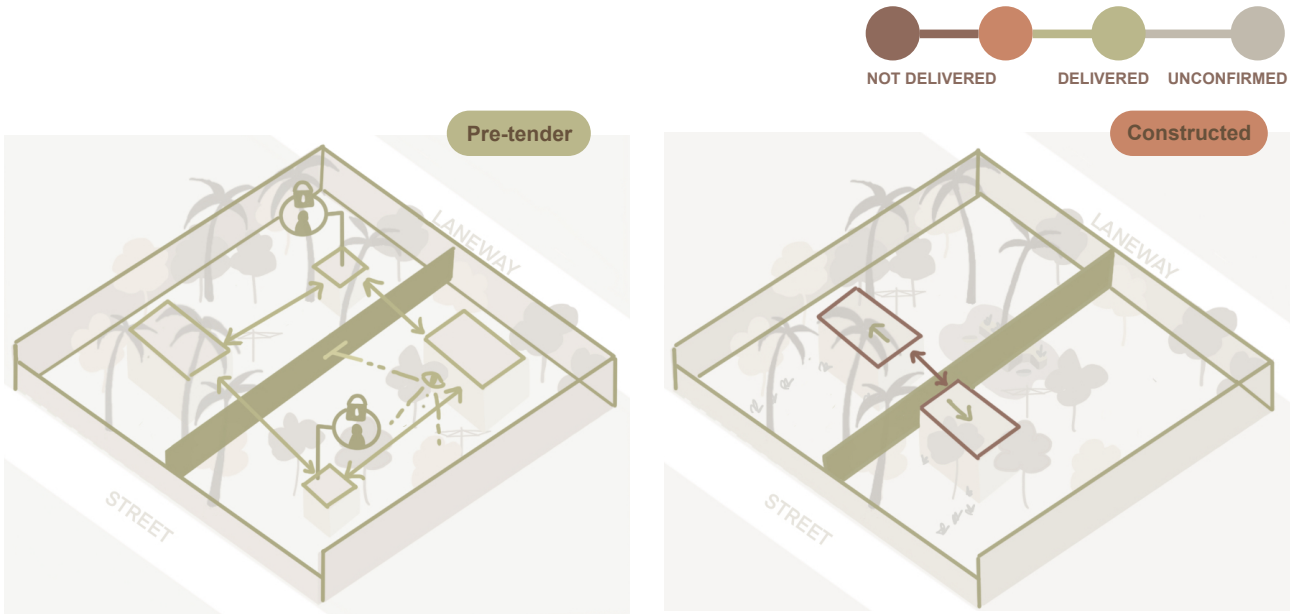


Figure 56. *Comparing evidence of Siting Principle: levels of privacy & minimise noise transfer in pre-tender design and final built outcome.*

SECONDARY SPACE FOR EXTERNAL ACTIVITY

An interviewed builder suggested that open spaces and kitchens for cooking outside *"should be taken more into consideration within Aboriginal communities."* An interviewed architect also articulated the significance of this principle, referring to Paul Memmott's work where he forefronts *"around the house, rather than always focusing on the internalised part."* He continued, *"The reality of it is that there'll be multiple generations living in these houses. So they need to be designed with spaces which can cope for overflow."* These features and emphasis on externally oriented spaces within Memmott's cultural design (Memmott et al., 2000, p.104) were explored in depth in Chapter 2 of this thesis. As Figure 57 illustrates, we proposed a staggered layout, with a carport and outdoor kitchen equipped with a barbeque, sink and seating. This promoted flexibility and provided an external secondary space for visitors, cooking, socialising, sleeping, storage and privacy away from the main dwelling. Aside from the firepit and raised garden bed in the rear yard, no secondary space is evident in the constructed housing in Boggabilla. The carport was attached to the main dwelling, and the outdoor kitchen was omitted. The interviewed tenant suggested both a lockup carport and another living space out the back, qualifying their significance.

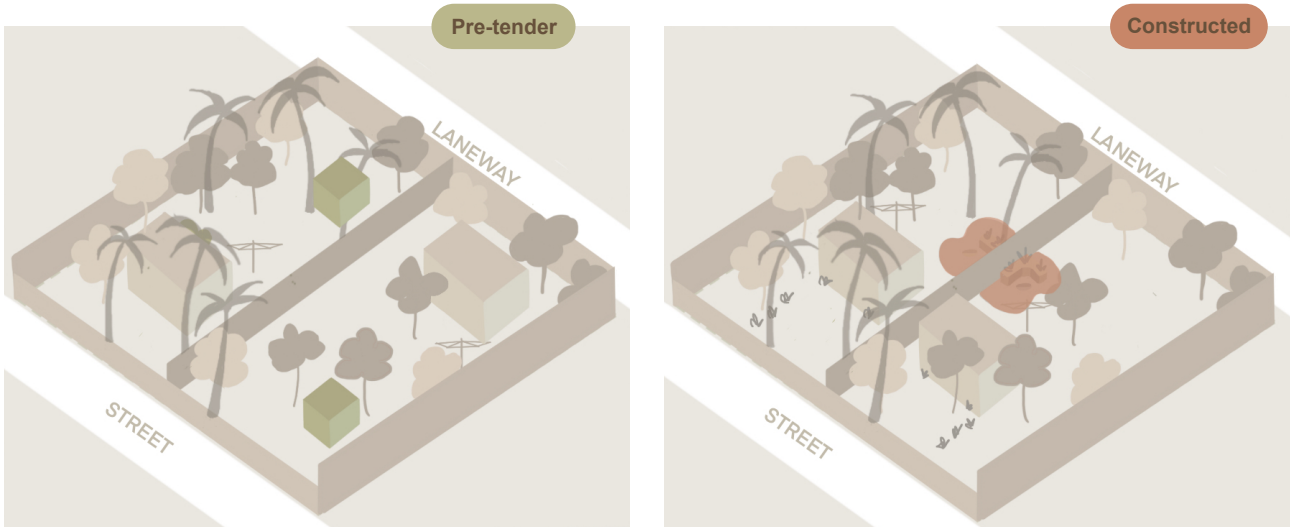


Figure 57. *Comparing evidence of Siting Principle: secondary space for external activity in pre-tender design and final built outcome.*

PASSIVE SHADING

Both the pre-tender and constructed designs have various sources of shade, including planting and covered verandahs. All the trees displayed in Figure 58 already existed, which enhances privacy and provides some passive shading.

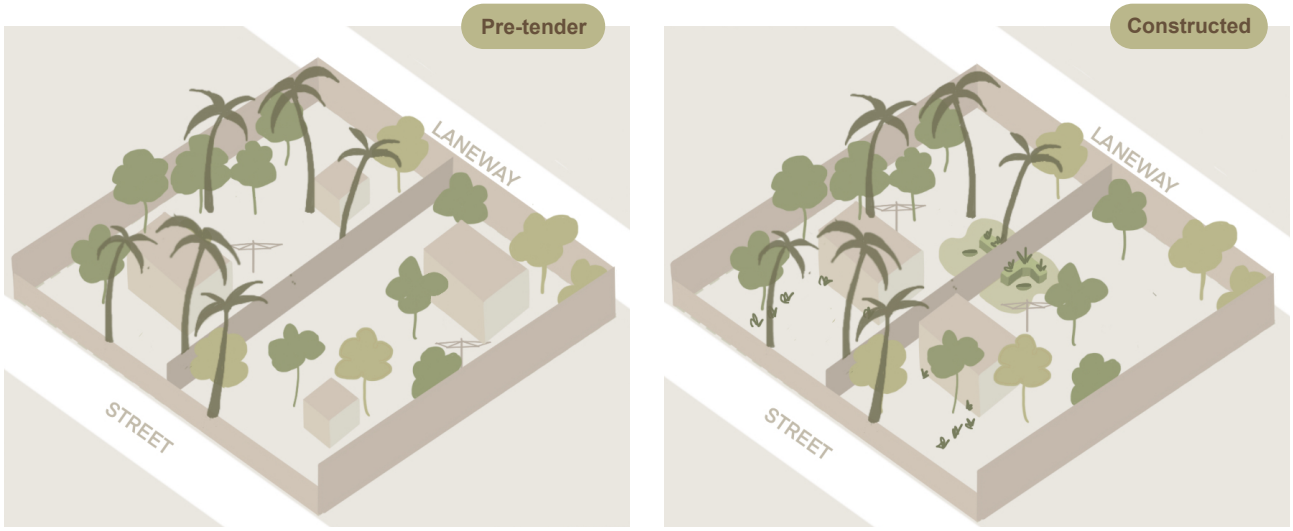


Figure 58. *Comparing evidence of Siting Principle: passive shading in pre-tender design and final built outcome.*

SURVEILLANCE

The pre-tender design staggered the two houses on the lot (see Figure 59). This decreased the street frontage and surveillance capabilities of one of the dwellings, with the carport restricting the view of the main street entrance. The existing trees may interfere with surveillance capabilities in some areas of the lot. The wire mesh fencing in both iterations allow for further peripheral surveillance on the street and in the rear lane. The constructed housing has clear sightlines to the front and rear access of the property. This design principle ensures that family members or carers can view children in the yard or visitors entering the property.

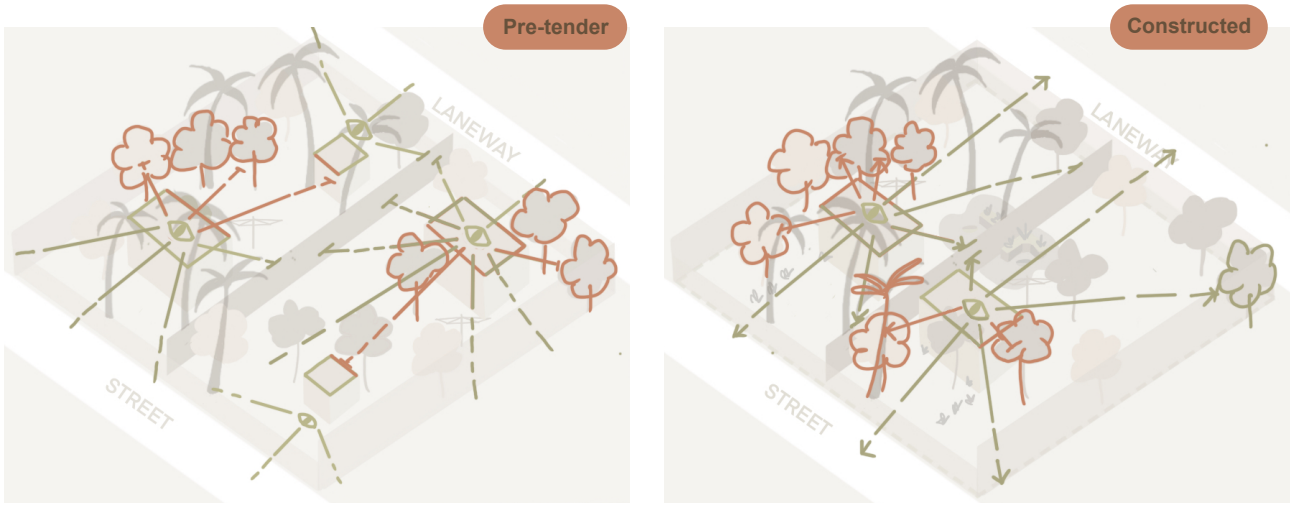


Figure 59. *Comparing evidence of Siting Principle: surveillance in pre-tender design and final built outcome.*

ORIENTATION TO VIEWS, WIND + SUN

The dwellings are not oriented to the ideal sun and wind paths (see Figure 60). As previously mentioned, this was a design decision to ensure street frontage similar to the surrounding vernacular and provide visible, direct access from the street. Orienting the house according to the sun and wind paths can ensure maximum natural light and keep the house cool in summer and warm in winter, minimising living costs for the tenants. Orienting as per the direction of Country, family and kinship groupings could have been strengthened and informed by further community consultation.

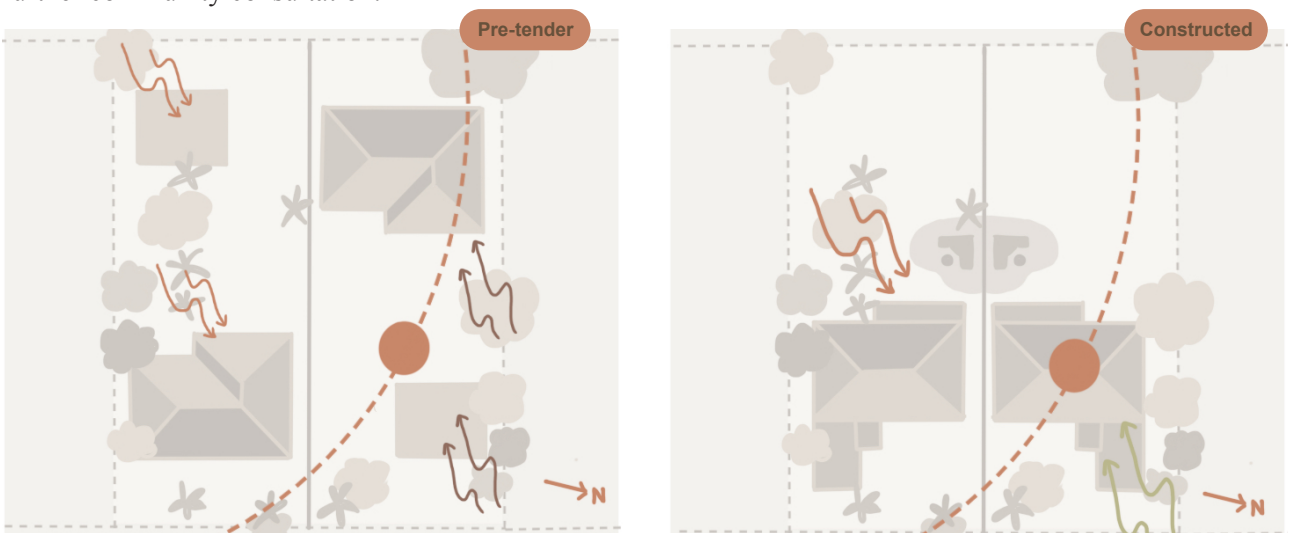


Figure 60. *Comparing evidence of Siting Principle: orientation to views, wind + sun in pre-tender design and final built outcome.*

CONSISTENT STREET FRONTAGE

As displayed in Figure 61, the pre-tender design proposed one dwelling with primary access from the rear unpaved lane, raising concerns with the builder about safety and accessibility. This principle was not developed until later in the project, as the builder suggested consistent street frontage to address these concerns, minimise conflict between the two households, and enhance surveillance.

Figure 61. *Photograph of consistent street frontage in constructing housing in Boggabilla.*

5.2.2 Spatial Planning (Interior) Principles

FLEXIBLE SPACE

Interview respondents stressed the importance of flexible design and highlighted that Aboriginal communities are often transient, moving to family members' homes in different towns depending on the season. A NSW Aboriginal Housing Office member added, *"The family component can change pretty dramatically very quickly."* An interviewed builder outlined that *"the ability to have the house expandable or being able to be added on to is a huge thing…It's building healthy living areas and practices that are going to secure the well-being of Aboriginal people."* The design should consider specific kinship roles and larger rooms to accommodate multi-generational households and dynamic and expanding family sizes. The pre-tender design and constructed housing in Boggabilla exhibit flexibility with separate yet connected living, kitchen and dining spaces with an L-shaped configuration. The tenant from House A said she was happy with the kitchen and *"Everyone loves the island bench."* A verandah at the rear provides space for sheltered outdoor living and visitors. The bedrooms have space for more than one bed if the household expands or visitors come to stay.

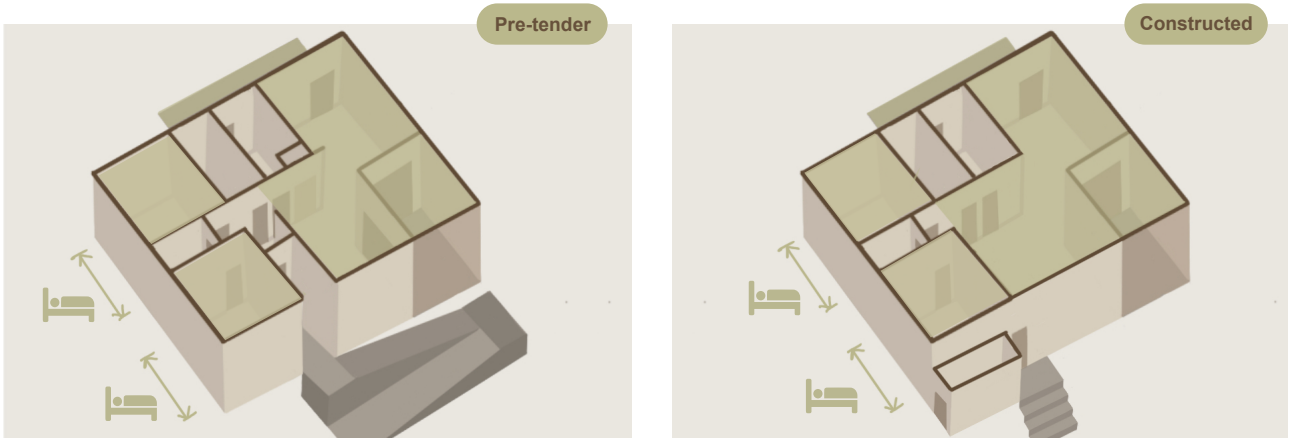


Figure 62. *Comparing evidence of Spatial Planning (Interior) Principle: flexible space in pre-tender design and final built outcome.*

FUTURE PROOF & ACCESSIBLE

The pre-tender design proposed accessibility ramps at the front and rear of one of the two dwellings. Although the built housing in Boggabilla does not have this feature (see Figure 63), it has opportunities for future fit-out and wider doorways, hallways and spaces between kitchen countertops. The attachment of the carport to the house in the constructed design minimises travel from vehicles to the front door, an element that the tenant from House A said she likes.

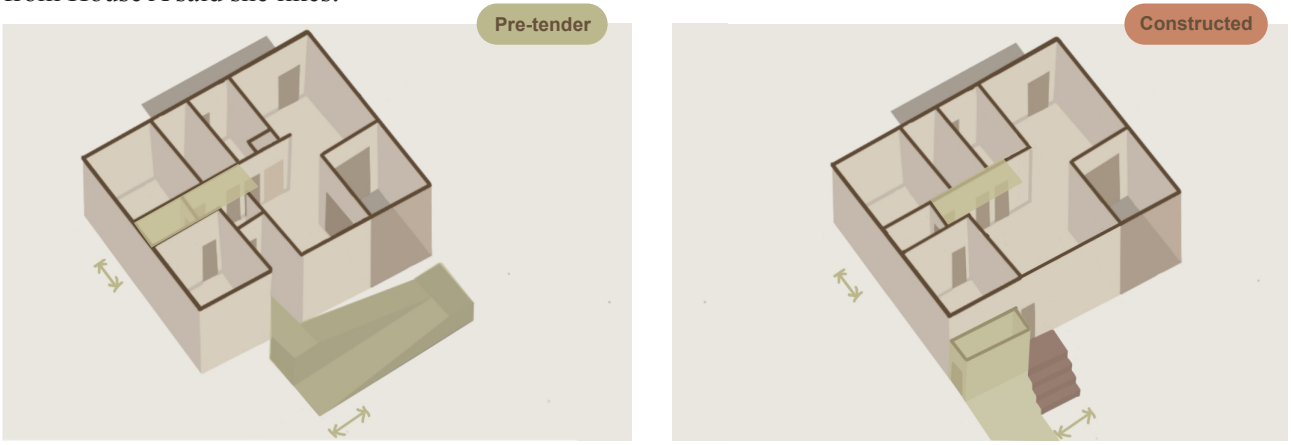


Figure 63. *Comparing evidence of Spatial Planning (Interior) Principle: future proof & accessible in pre-tender design and final built outcome.*

LOCATION OF ROOMS ACCORDING TO SUN

To utilise the natural sun and wind paths on-site to heat and cool the house throughout the year, the bedrooms should be on the south and living spaces on the north. Since the houses are mirrored in the constructed design, only one has rooms oriented according to the sun. Further, Figure 64 shows that this orientation was compromised in both the pre-tender design and constructed housing to ensure a clear street frontage. One house will still receive some of this north light in the living spaces, but since it is more north-west living spaces, the benefits are not maximised.

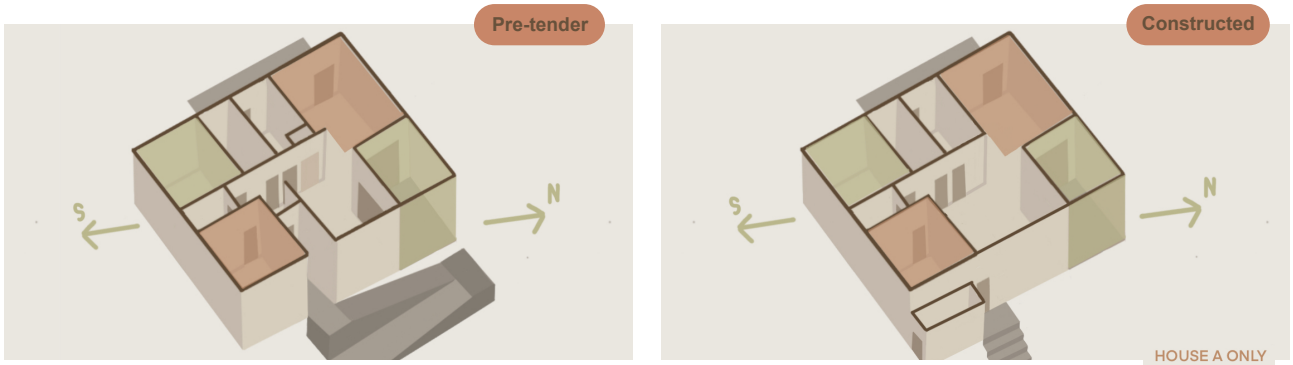


Figure 64. *Comparing evidence of Spatial Planning (Interior) Principle: location of rooms according to sun in pre-tender design and final built outcome.*

THREE POINTS OF ENTRY

DIRECT ACCESS FROM LAUNDRY TO YARD + CLOTHES LINE

CLEARLY DEFINED UNDERCOVER FRONT ENTRANCE

As proposed in the pre-tender design, the constructed housing has three entry points (see Figure 65) for security and wayfinding benefits, direct access to the yard, and accommodation of social or cultural relationships in the home (Aboriginal Housing Office, 2020). These entrances are from the front, laundry, and kitchen doors. For practicality, the dwellings have direct access from the laundry to the clothesline. The tenant from House A said that this is convenient. However, she couldn't open the door for airflow since there was no screen door, and insects would come in. A clearly defined, undercover entrance to both houses is visible from the street, with a pedestrian path to the front door.

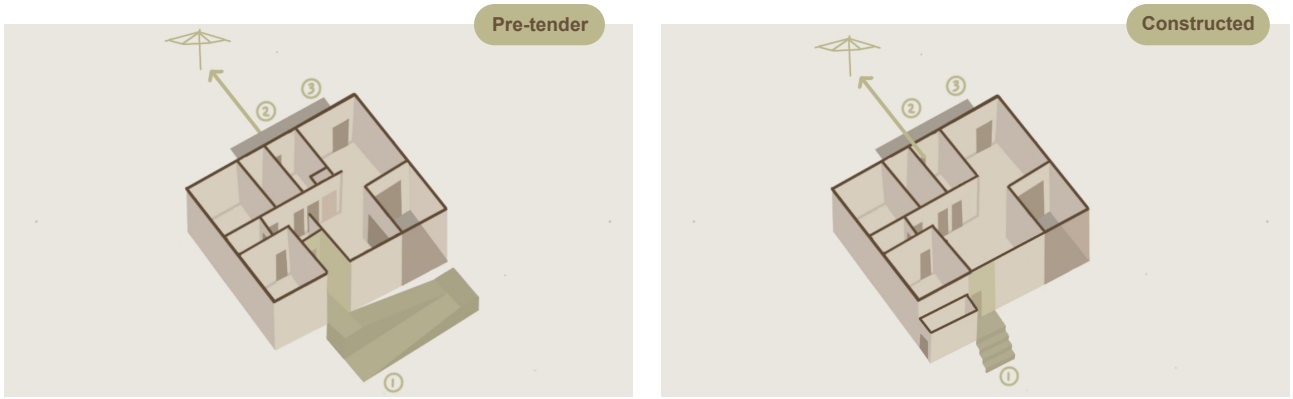


Figure 65. *Comparing evidence of Spatial Planning (Interior) Principle: three points of entry, direct access from laundry to yard & clothesline, and clearly defined undercover front entrance in pre-tender design and final built outcome.*

GROUPING OF WET AREAS TO REDUCE COSTS

Services have been grouped within the dwellings, with the kitchen, bathroom and laundry adjacent. A separate toilet is situated between the bedrooms but is only separated from the other services by one room.

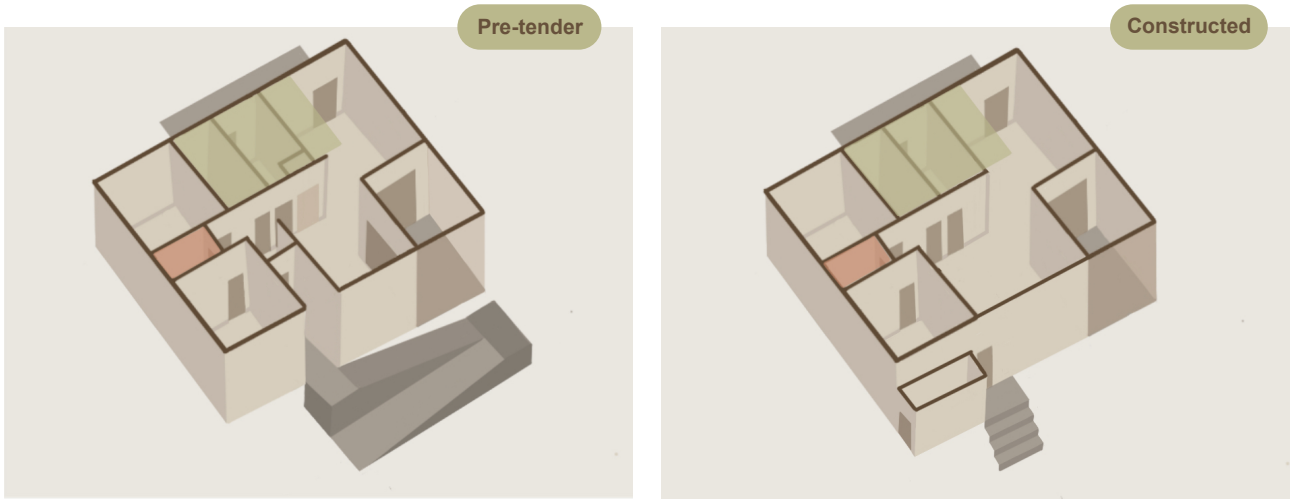


Figure 66. *Comparing evidence of Spatial Planning (Interior) Principle: grouping of wet areas to reducve costs in pre-tender design and final built outcome.*

PRIVACY

MINIMISED NOISE TRANSFER

Similar to the pre-tender design (see Figure 67), privacy could be improved with a dogleg or partial wall at the home's entrance so visitors don't walk straight into the open-plan living and dining areas. Bedrooms are separated from the living spaces for increased privacy and are separated by a bathroom to act as a sound buffer and minimise noise transfer. A door could further separate the living space from the bedrooms and bathrooms, enhancing privacy and accommodating avoidance behaviour. The tenant from House A suggested that it could be more private in general, and she would prefer it if one of the bathrooms were an ensuite to her primary bedroom.

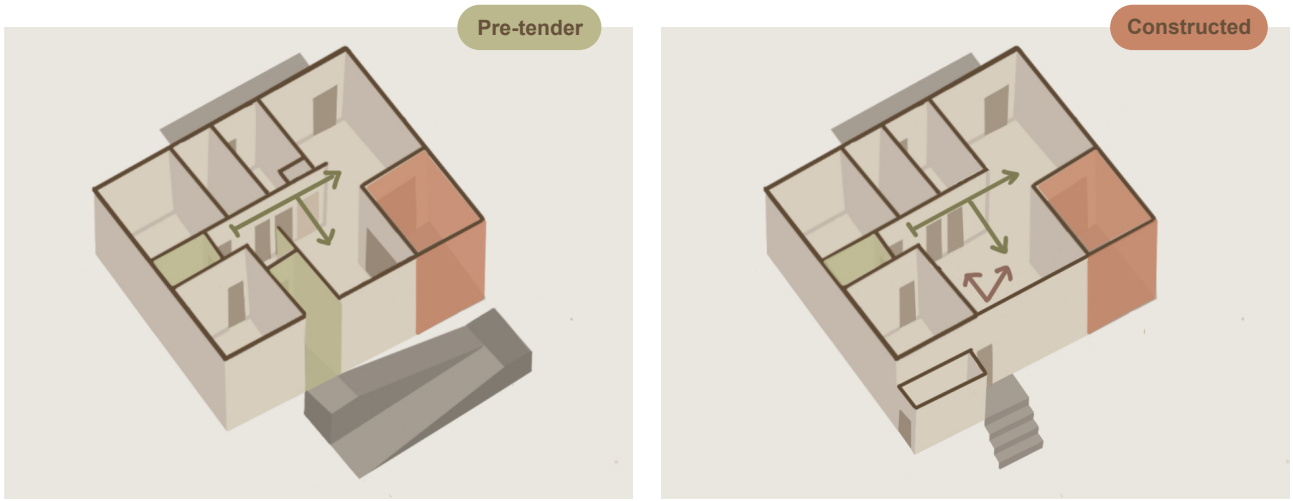


Figure 67. *Comparing evidence of Spatial Planning (Interior) Principle: privacy and minimised noise transfer in pre-tender design and final built outcome.*

ADEQUATE STORAGE

The pre-tender design proposed storage in the detached carport and built-in linen cupboards, wardrobes, kitchen joinery, bathroom vanities and mirror cabinets in the main dwelling. Figure 68 shows the constructed housing has various storage solutions, but less than initially intended.

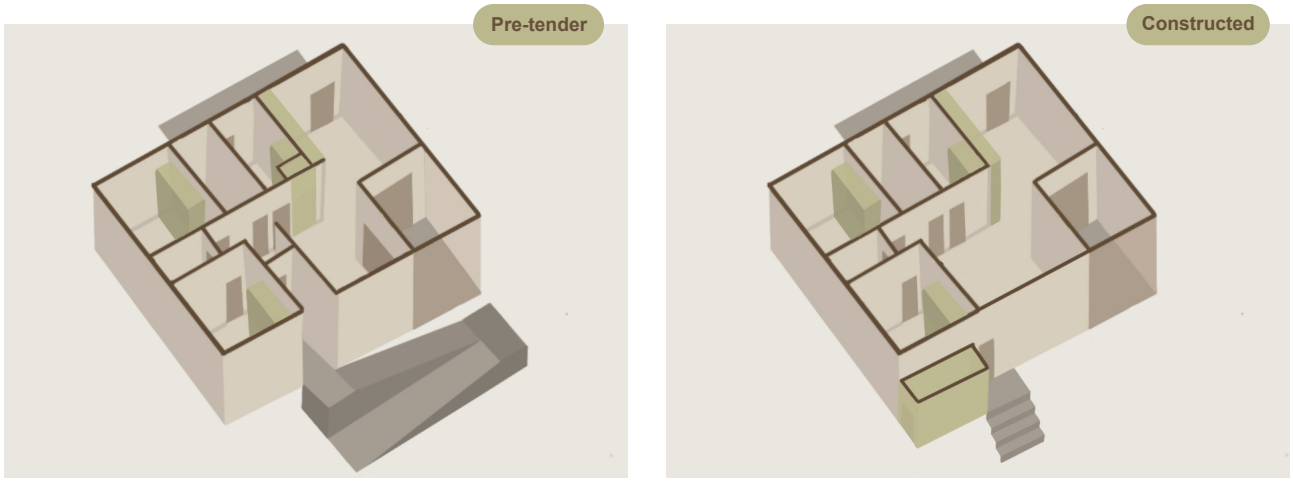


Figure 68. *Comparing evidence of Spatial Planning (Interior) Principle: adequate storage in pre-tender design and final built outcome.*

SECURE EXTERNAL LIVING SPACE

As proposed in the pre-tender design, a secure external living space was constructed (see Figure 69). We fought for this feature, providing an opportunity for an exterior living area or overflow of visitors sheltered from the weather and insects. The tenant from House A confirmed these features and said she currently uses the space for storage and a visitor's sleeping area. Although seeing out into the bush was clear, she suggested the Crimsafe mesh was not private enough to stop people from seeing in. The neighbouring tenant had placed screening within this space for similar reasons. The deck was clad with Modwood decking and enclosed with Crimsafe screening and white frames to match the external paint finish. As explored earlier in this thesis, there were concerns during the preliminary design phase, with screening presenting a jail-like aesthetic. Rather than spanning the whole facade, this screened area only takes up a portion of the pre-tender and constructed design. We did attempt to source white screening, which would also have presented a less dominant front.

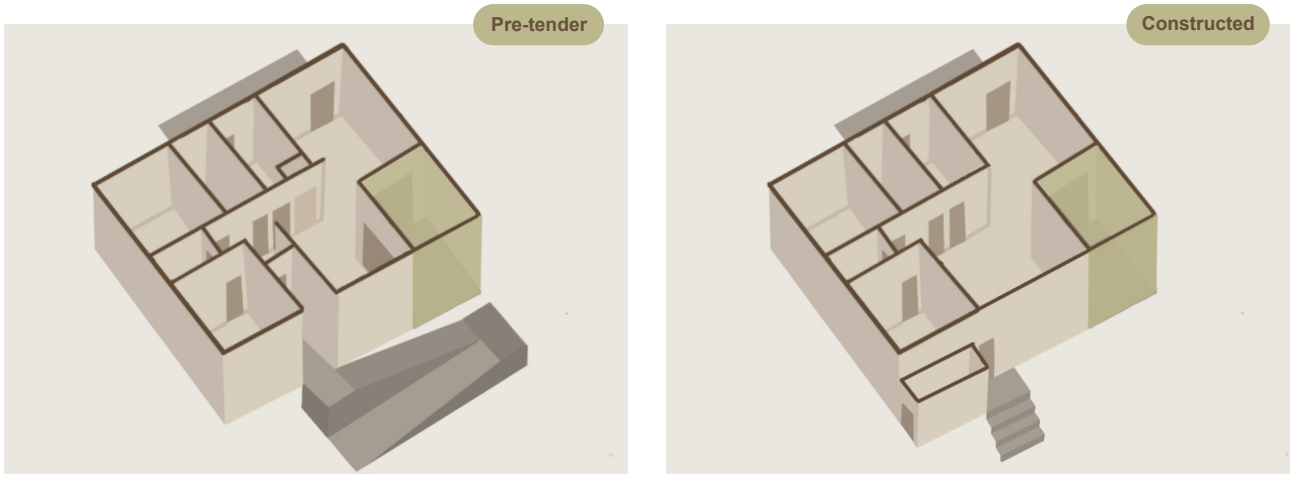


Figure 69. *Comparing evidence of Spatial Planning (Interior) Principle: secure external living space in pre-tender design and final built outcome.*

EXTERNAL LIVING SPACE AT FRONT OF HOUSE WITH STREET VIEW

Figure 70 shows that aside from this screened-off living space, there is no decked area at the front of the house as it was omitted due to economic and budgetary constraints, despite our attempts to convince the NSW Aboriginal Housing Office and builder of its importance. A verandah could enhance the design by providing a space to greet visitors before entering the house and an opportunity to connect with the community from the street. As displayed in Figure 71, walking around Boggabilla showed how popular a front verandah is within the local community. An interviewed builder suggested, *"The verandas around houses are a big thing for us… being a real meeting place where elders can gather and sit and talk with, you know, some of the youth that are in their families."* When I asked the tenant from House A if she would have liked a verandah out the front, she said she didn't mind and preferred it out the back anyway.

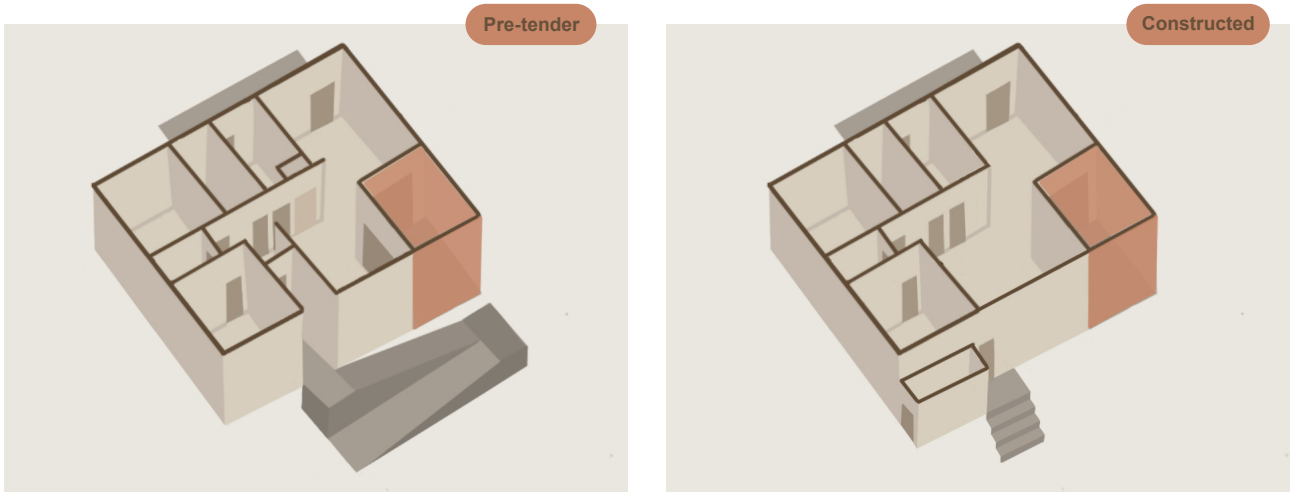


Figure 70. *Comparing evidence of Spatial Planning (Interior) Principle: external living space at front of house with street view in pre-tender design and final built outcome.*

Figure 71. *Photographs evidencing the prevelance of front verandahs with street views in Boggabilla,* Adapted from photographs taken by Campbell Drake, 2020.

5.2.3 Materiality & Construction Principles

DURABLE EXTERNAL MATERIALS

Durable external materials were used to combat extreme temperatures, potential floods and bushfire threats. The roof was clad with Colorbond steel in the colour Evening Haze (see Figure 72) to suit the natural tones in the surrounding environment whilst providing a durable material in a light shade to reflect the heat in the warmer months. Similarly, the dwellings were clad with fibre cement sheets on some walls and boards on others, similar to the James Hardy Scyon Axon™ cladding. This material has grooves to create a timber look with increased durability benefits, is fire resistant and has minimised shrinking, warping and swelling (James Hardie, 2023). These, too, were painted in a light shade to reflect the heat.

Figure 72. *Photographs of materials used in constructed housing in Boggabilla.* Adapted from photographs taken by author, 2023.

MINIMISED MAINTENANCE

There has been consistent feedback from past community consultations I have conducted, and interviews for this research, that forefront the necessity of durable hardware and finishes. Interview respondents outlined that some government agencies or Aboriginal Community Housing Providers have been reluctant to spend their limited funding on higher quality, more durable materials even though it could benefit in the long run, especially with maintenance. In past projects I have worked on with the NSW Aboriginal Housing Office, they supplied schedules with suggested materials, fittings and hardware. Specifications were outlined with recommended products to ensure durability standards for minimised maintenance. The builder had previously worked with the NSW Aboriginal Housing Office, so I selected the finishes for the project in Boggabilla, referencing items they had used before. Since it is beyond the scope of this thesis to conduct an in-depth post-occupancy evaluation, I cannot confirm what specific items have been installed.

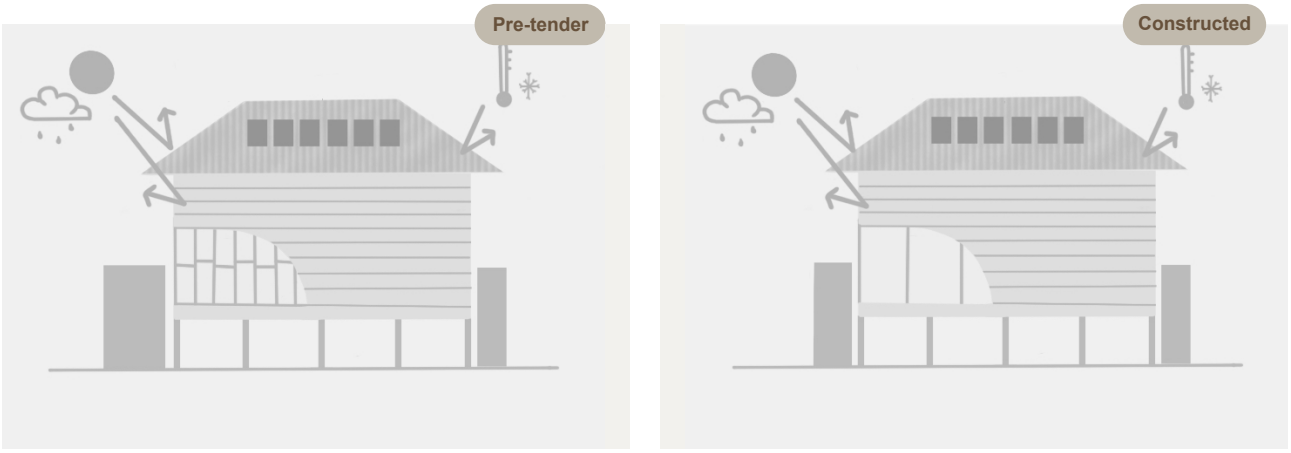


Figure 73. *Comparing evidence of Materiality & Construction Principle: durable external materials and minimised maintenance in pre-tender design and final built outcome.*

PROMOTE LOCAL INDIGENOUS LABOUR + EMPLOYMENT OPPORTUNITIES

Providing employment and training opportunities for local Aboriginal people within the construction of Aboriginal housing promotes community engagement, cultural responsiveness and continuity. An interviewed NSW Aboriginal Housing Office member emphasised the significance of providing employment opportunities for local Aboriginal people as limited jobs are available in many towns in regional New South Wales. Before the project went to tender, our team proposed that the two dwellings be constructed in a conventional timber stud structure, allowing for a lightweight, bespoke design that minimises off-site construction to promote local employment opportunities. However, the builder shifted to constructing the homes in Structurally Insulated Panels or 'SIP.' The structural frame of the houses was built in steel, as advised by the engineering consultants. This was selected for its durability, thermal benefits and minimised construction time. An interviewed builder working on the project in Boggabilla suggested that they utilised approximately 65% local labour as the SIP installation required minimal skilled trades. He also discussed the social benefits and skill transition of a training program he was running, *"The skills that those individuals then attain allow them to go into other areas."* While I can confirm that Aboriginal trainees and tradespeople were on site when I visited in September 2022, I cannot confirm the percentage of local labour utilised within the project.

CONVENTIONAL ROOF PITCH TO REDUCE COST

Designing Aboriginal housing with conventional roof pitches is encouraged to provide an opportunity for pre-fabrication to minimise construction costs (Aboriginal Housing Office, 2020). This allows Aboriginal Community Housing Providers or government agencies to utilise the money elsewhere in the project. The housing in Boggabilla was constructed with a conventional hip roof pitch (see Figure 74), but it was built on-site with a steel frame.

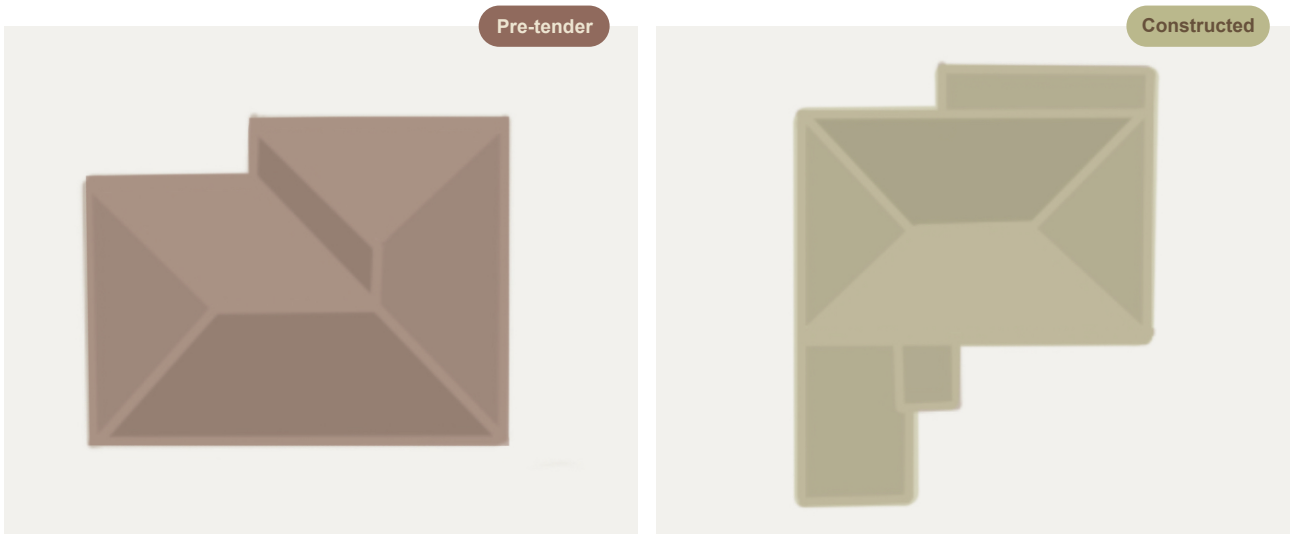


Figure 74. *Comparing evidence of Materiality & Construction Principle: conventional roof pitch to reduce cost in pre-tender design and final built outcome.*

ADEQUATE THERMAL CONTROL

An interviewed Elder and former Aboriginal Community Housing Provider stressed the importance of having air conditioning, explaining in *"summertime, we get 40, 47 degrees…"* and much cooler nights in the winter. He suggested including a fireplace, which *"cuts down a lot of power and money for the winter."* The constructed housing in Boggabilla was built with air conditioning and ceiling fans. As previously mentioned, the SIP construction also enhanced the thermal performance. To meet BASIX ratings, glazing was reduced in the constructed design, which would also improve thermal control. When I was invited into the two homes, they were relatively cool compared to the 28-degree weather outside. Thermal control and comfort principles could be analysed more in-depth in a future post-occupancy evaluation.

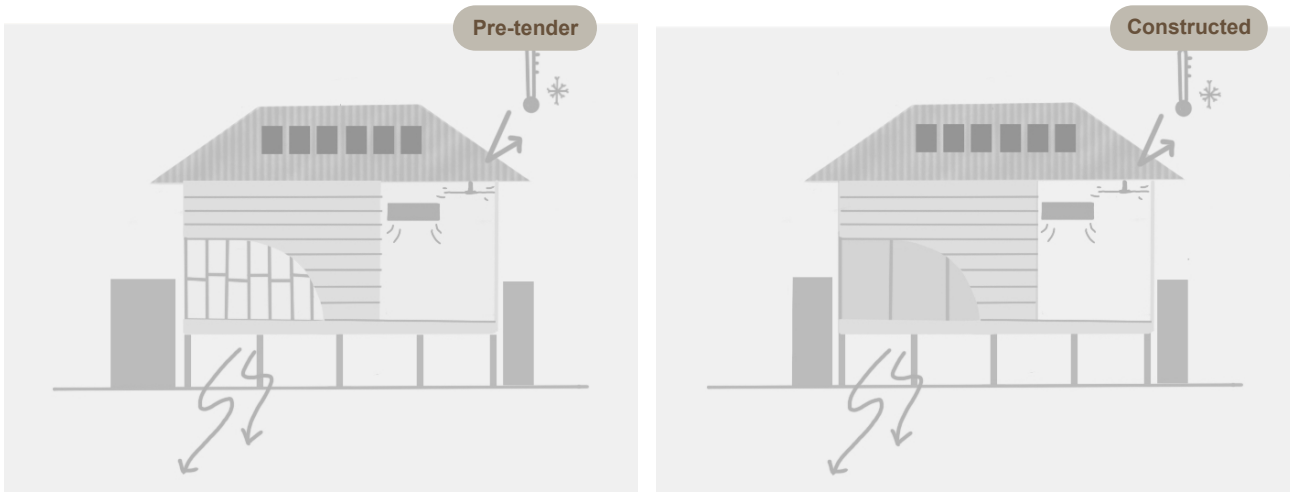


Figure 75. *Comparing evidence of Materiality & Construction Principle: adequate thermal control in pre-tender design and final built outcome.*

MINIMISE COST OF LIVING

An interviewed builder highlighted, *"The cost of both heating and cooling that house and dwelling is something that we are passing on to the tenants, and those tenants predominantly are people that are in the lower socioeconomic."* He emphasised the significant impact that sustainable technologies like solar power would have on cutting costs, suggesting *"whilst they are all additional costs, the long-term benefits of those you know over a five to ten year period are astronomical…..back to the tenant."* Several respondents presented similar arguments. This has also been raised in every past consultation with Aboriginal communities I have been involved in. Solar panels and rainwater tanks have been included in the Boggabilla housing to aid in minimising future costs for the tenants. As an interviewed builder suggested, solar batteries could further enhance this, allowing for storing energy rather than just when the sun is out. A NSW Aboriginal Housing Office member emphasised the ability to utilise alternative construction methods to maximise thermal benefits, suggesting, *"I think the biggest thing is climate and environment. I think cultural overlay and the lens of culture can be applied to any sort of construction method."*

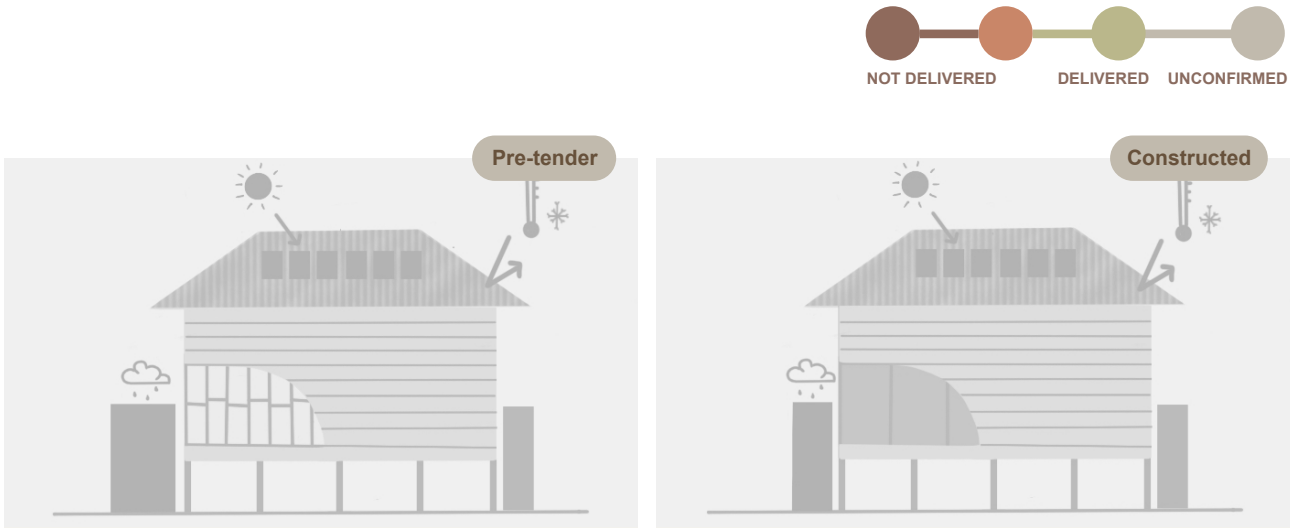


Figure 76. *Comparing evidence of Materiality & Construction Principle: minimise cost of living in pre-tender design and final built outcome.*

ADEQUATE LIGHTING

The pre-tender design proposed ample window glazing to maximise natural light in the home and connection to the outdoor environment (see Figure 77). As discussed in previous chapters, glazing was reduced due to budget limitations and to meet the BASIX energy efficiency rating. This could have been avoided if the builder was willing to increase insulation instead. The builders later ran into daylight requirement shortfalls and had to add back in some windows before the build could proceed. Despite these changes to glazing, the tenant in House A said that she was happy with the lighting in her home.

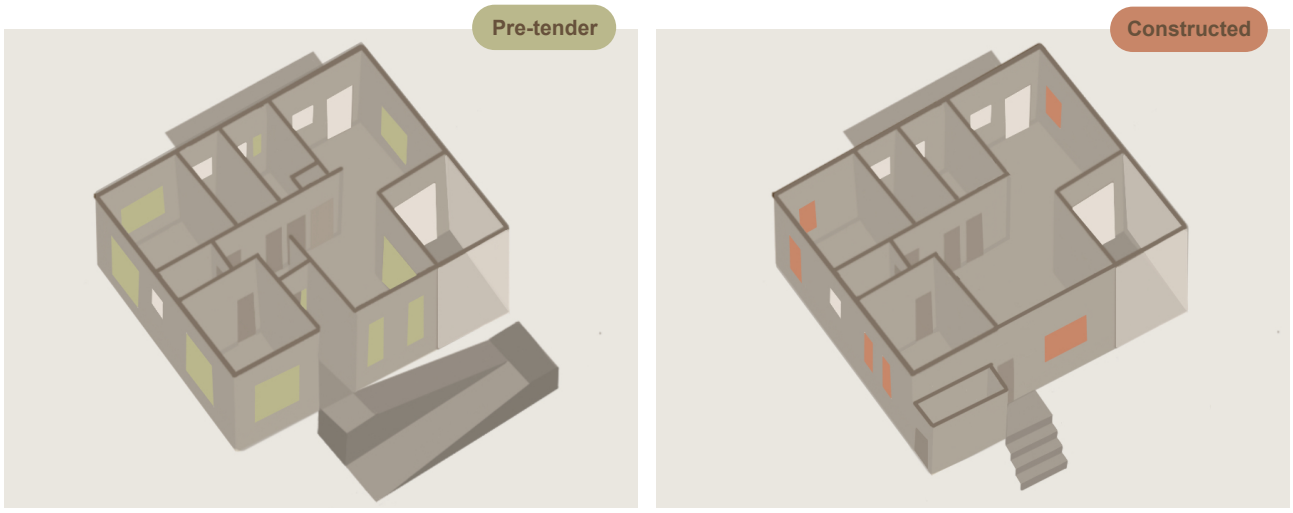


Figure 77. *Comparing evidence of Materiality & Construction Principle: adequate lighting in pre-tender design and final built outcome.*

CONSTRUCTION TO RESPOND TO SOIL TYPE, CLIMATE AND NATURAL DISASTER RISK

To suit the volatile, clay-like soil in Boggabilla, the dwellings are anchored in the ground with screw piles (see Figure 78). A one-metre height off the ground was required per the flood report, which can also provide sub-ventilation in the warmer months.

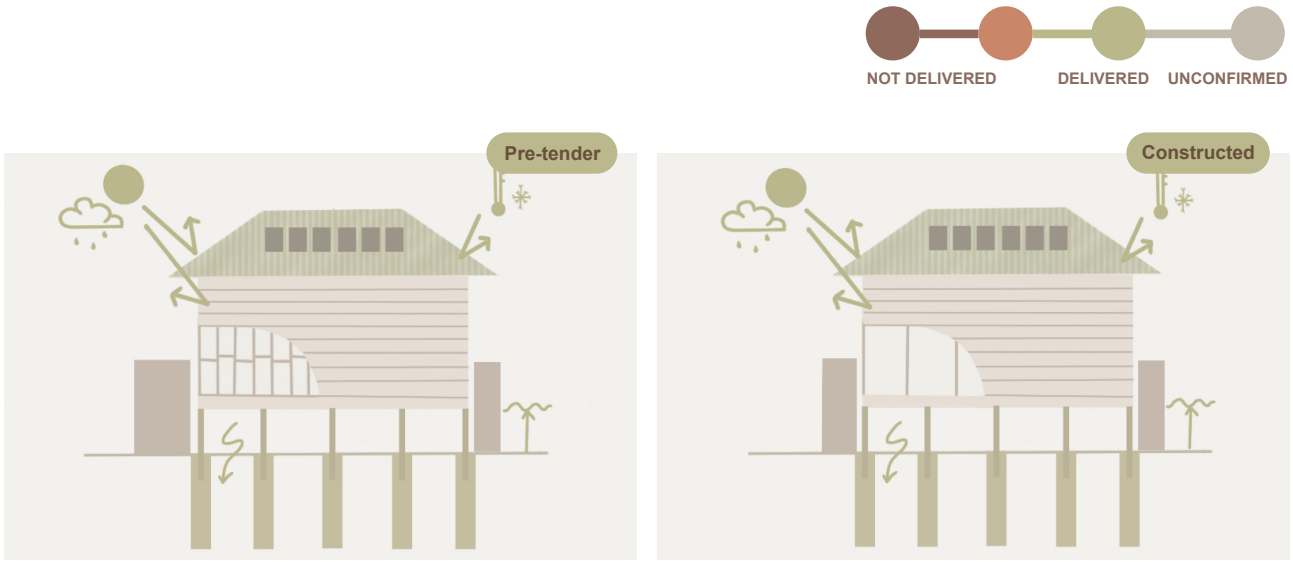


Figure 78. *Comparing evidence of Materiality & Construction Principle: construction to respond to soil type, climate and natural disaster risk in pre-tender design and final built outcome.*

INSTALLATION OF SERVICES SUITABLE FOR WATER CHEMISTRY

I contacted Rheem while developing the specification schedules for the project in Boggabilla. They confirmed that the water was hard water and the hot water systems must be installed with specific fittings to suit this. As previously outlined, limited access to the site and communication with the builder means I cannot confirm the installation of this particular system.

STREET FRONTAGE CONSIDERING SURROUNDING HOUSING AESTHETIC

Existing Aboriginal and social housing can often stand out on the street, attract unwanted attention and make the tenants feel like they don't fit in (Memmott, 2004, para. 6). Figure 81 demonstrates this is a relevant issue in Boggabilla, with a large portion of built-on or vacant land owned by Toomelah LALC or the NSW Aboriginal Housing Office to provide social housing services. An interviewed Aboriginal Community Housing Provider emphasised that people *"don't want it to be a situation of "oh yeah, that house down the road, number four is Aboriginal housing…that happens quite easily in a smaller rural community… you know, the stigmatisation and everything."* Considering the surrounding housing vernacular, a street frontage and design can instil pride in the home and minimise this stigmatisation. The constructed housing in Boggabilla connects to the surrounding vernacular with the screened-off deck at the front. The single-story raised housing typology with fibre cement cladding and a steel hip roof pitch is also evident throughout the town (see Figure 80).

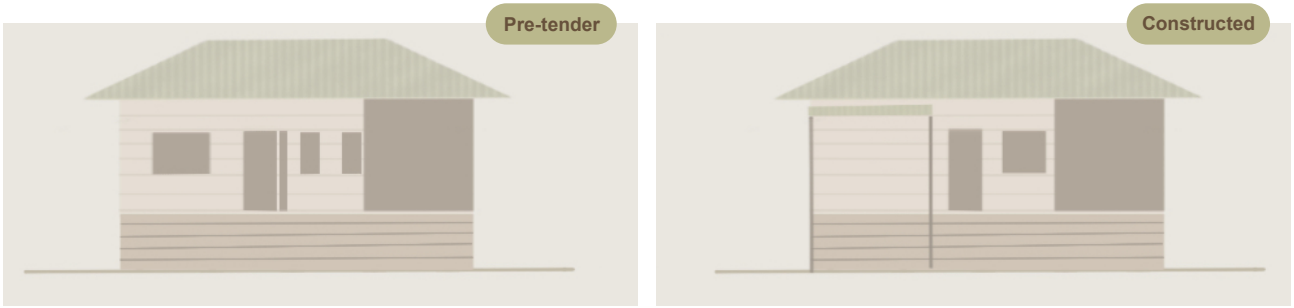


Figure 79. *Comparing evidence of Materiality & Construction Principle: street frontage considering surrounding housing aesthetic in pre-tender design and final built outcome.*

Upon reflection, the builder seemed to focus more on these material principles than the siting and spatial ones.

Figure 80. *Sketches of local housing vernacular in Boggabilla.*

Figure 81. *Map indicating the vacant or built on land in Boggabilla, owned by Toomelah LALC or Aboriginal Housing Office for social housing.*

5.3 Reflecting on the Capacity to Deliver Culturally Responsive Aboriginal Housing with the Design and Construct Procurement Model

The project in Boggabilla presents an example of this Design and Construct process and highlights the challenges faced when delivering a culturally responsive model of Aboriginal housing. I asked interview participants for their opinion of a Design and Construct model and its efficacy in providing culturally responsive outcomes compared to a conventional delivery model. A Design and Construct procurement model consists of a consulted architect preparing the design, in which a contracted builder takes over and further develops the documentation, seeks development approval from the council, receives construction certification, and then constructs. In a conventional delivery model, an architect controls the design, completes all construction documentation, seeks planning development approval from the local council, and provides construction certification and drawings to a contracted builder to construct. I acknowledge that there are many procurement methods. However, these two are relevant to the project in Boggabilla, on which this research is centred.

5.3.1 Contrasting Views of Who Should Control the Designing of Aboriginal Housing

When analysing interview responses, contrasting opinions emerged from the various participant groups regarding what procurement model was best fit for the delivery of Aboriginal housing and who should retain control over the design.

All interviewed members of the NSW Aboriginal Housing Office said that due to pressures to deliver more housing, they favoured the Design and Construct model. They suggested it was a *"quicker and easier solution."* – allowing them to focus on larger projects or ones with specific requirements. A participant explained, *"We can tap into the expertise that's out there in the market and not have to manage it entirely ourselves."* Another NSW Aboriginal Housing Office member explained that when they deliver through a Design and Construct model, the sign-off of the design remains in their hands. She also highlighted, *"It gives us the opportunity to consult with our key stakeholders like community"*, but pointed out the concern when agencies don't have this power, and it's in the hands of the builder.

An interviewed builder encouraged the Design and Construct, suggesting it *"should be more of the norm"*, and displayed his concern with some architects designing regional Aboriginal housing when they have never left the big city. Several respondents highlighted the risk of builders' control of design decisions, suggesting they often have a strong economic focus. An interviewed NSW Aboriginal Housing Office member commented, *"If you hand control of the design over to the builder, they're gonna try and give you the cheapest version that they can get away with…."* An interviewed architect indicated that there needs to be *"less kneejerk allocations to substandard builders to do Design and Construct "* and suggested that a higher quality outcome could be achieved if they had control and could fight for certain design aspects. Another architect commented, *"You may not get a great result because the first thing they'll do is cut corners on the architecture, on the design."* However, he acknowledged that *"if you lock in the bones of the design first, then you can come up with awesome design outcomes for Aboriginal people. Then you can also potentially include Indigenous people in the making."*

Interviewed Aboriginal Community Housing Providers preferred the Design and Construct model as it was more suited to their limited funding. One participant explained, *"If you had to hire an architect to design a house and then hire a builder to build the house, You know, that would be an extra cost, just hiring an*

architect…unless we had an endless bucket of money, it's probably not a way we'd go." Responses from providers suggested that instead, they would prefer to use the Design and Construct model and work with their in-house builder to design it themselves, embedded in the community.

5.3.2 Emphasis Needs to Be on the Quality Outcome Rather than the Number of Houses Delivered

Respondents suggested that due to pressures such as spending timeframes, there is often too much emphasis on the quantity of delivered Aboriginal housing rather than the culturally specific, quality outcome. An interviewed architect suggested that *"…decisions are made to make certain ministers and politicians and senior executives look good"* and focus on *"spending stimulus money, and the quantity rather than the quality of housing."*

The interviews revealed that both conventional and Design and Construct models could produce successful outcomes if the design and delivery are culturally appropriate and well-researched. An interviewed architect suggested that *"It's really the outcome that is the most important thing…from a procurement point of view… unless, of course, you're involving the Indigenous community."*

Respondents stressed the need for more time and funding for an in-depth consultation to understand the community's needs in order to deliver culturally responsive Aboriginal housing. It was suggested that designers and government agencies must *"actually have a discussion with community and understand how they're going to use the house."* This is not just exclusively within the design and construct delivery model. An interviewed builder stressed that when delivering Aboriginal housing, consultation *"should be paramount"* in the community being built in, which will *"provide good housing, good relevant housing for the climate in the regions in which we're in."*

5.3.3 Significance of Accountability and Evaluating the Implementation of Culturally Responsive Design Principles

Respondents suggested that in order to reach a culturally responsive outcome, there must be a rigorous evaluation of the implementation of design and delivery practices and ensure accountability.

I asked members of the NSW Aboriginal Housing Office if the implementation of these guidelines within each of their projects has been formally evaluated. Responses outlined that *"there hasn't been anything like formal to date"*; however, they have recently received the power to approve development without consent from councils. This was explained: *"When we are determining whether we should approve our own plans or not…we have to consider them against our own design guidelines."* Another member of the NSW Aboriginal Housing Office highlighted that architects and builders must follow the AHO Design Guidelines in all of their projects, which allows them to promote cultural responsiveness. However, she noted that there are sometimes limitations in meeting all the guidelines, such as the capability of the construction method, site conditions and available resources. Another member acknowledged that project managers within their agency must ensure these guidelines are being adhered to for the Design and Construct model to work.

An interviewed builder suggested that to enhance accountability, building codes should address more elements such as sustainable technologies to reduce the cost of living, flexible or expandable living capabilities and durable materials to reduce maintenance.

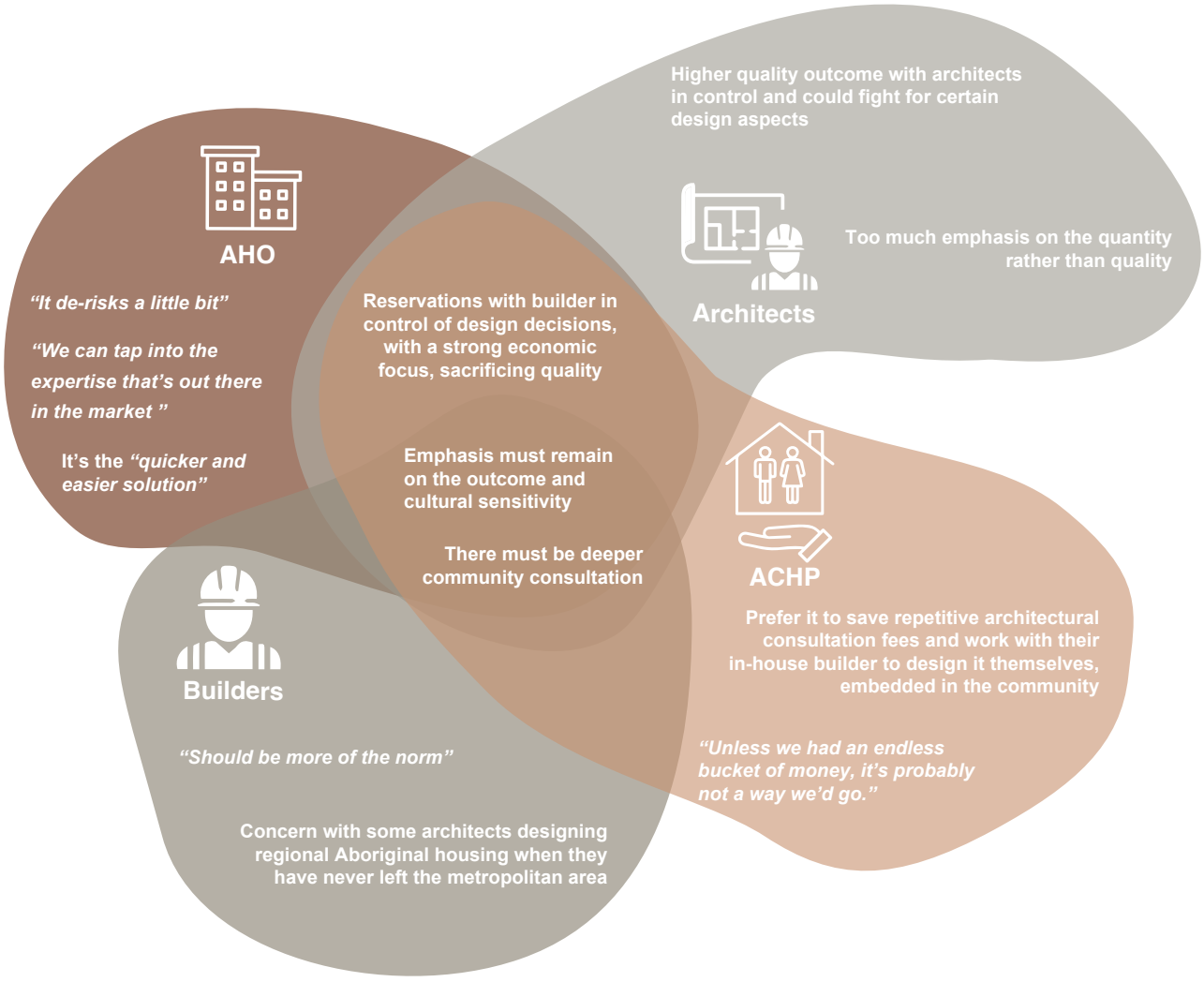


Figure 82. *Diagram comparing interview respondents' opinions of the Design and Construct procurement model.*

5.4 Chapter Summary

The final chapter of this thesis has evaluated the built Aboriginal housing in Boggabilla and the efficacy of the design and construct model in delivering culturally responsive outcomes. It investigated whether the culturally responsive design principles we developed for the Aboriginal housing in Boggabilla are evident in the constructed dwellings. Diagrams, architectural documentation and photographs have accompanied this analysis, comparing the pre-tender design we intended to build with what was actually constructed. Although this analysis was predominantly framed by architectural diagramming and interviews with other stakeholders, it is supported by informal consultation with the tenants of the completed housing in Boggabilla.

This evaluation was organised per the Siting, Spatial Planning (Interior) and Materiality & Construction culturally responsive design principles outlined in Chapter 2. Most design principles were somewhat delivered, but the outcome could be improved. Responses from members of the NSW Aboriginal Housing Office, architects, builders, Aboriginal Community Housing Providers and the new tenants in Boggabilla qualified the significance of applying these culturally responsive design principles within the design and delivery of Aboriginal housing.

The Siting Principles that were delivered in the constructed housing in Boggabilla were landscaping and vegetation to maintain a connection to land and Country, passive shading, and consistent street frontage to minimise conflict between dwellings. Levels of privacy; minimised noise transfer; secondary spaces for external activity, gathering, possible visitors, storage and cooking; surveillance both within the lot and to the street; aspect of dwellings to be oriented in accordance with views, wind and sun, were all partially delivered.

The Spatial Planning (Interior) Principles that were delivered were flexible space; three points of entry; direct access from laundry to yard and clothesline; clearly defined undercover entrance; a grouping of wet areas to reduce costs; adequate storage; and secure external living space with the opportunity to accommodate the overflow of visitors. Future proof and accessibility; location of rooms according to the sun; privacy; minimised noise transfer; and open external living at the front of the house with street view, connecting with the community were partially delivered principles were all partially delivered.

The delivered Materiality & Construction Principles were durable external materials suitable to the climate and environment; conventional roof pitch to reduce cost; construction typology to respond to local soil type, climate and natural disaster risk; and street frontage considering surrounding housing aesthetic. Adequate lighting was partially delivered. The evidence of some Materiality & Construction principles cannot be confirmed, presenting an opportunity for a more in-depth post-occupancy evaluation in the future.

Exploring interview responses, the last section of this chapter reflected on the capacity to deliver culturally responsive Aboriginal housing with the Design and Construct procurement model. The Boggabilla project presented an example of this Design and Construct process and its various challenges, with shifting design control, over-consultancy and the fight for culturally responsive design principles to remain.

From the interview findings emerged a series of perspectives on the Design and Construct model, with contrasting views of who should control the design in procuring Aboriginal housing and suggestions that an emphasis should be on the quality outcome rather than the number of houses delivered. Respondents also highlighted the significance of accountability and evaluating the implementation of culturally responsive design principles.

CONCLUSION

This research presents both a reflection in and a reflection on (Schön, 1983) the design and delivery of the Aboriginal housing project in Boggabilla, New South Wales. I wrote this thesis in tandem with my employment on the project in Boggabilla, presenting a reflection in action. The construction of the dwellings was completed in March 2023, so I have also since presented a reflection on action, retrospectively analysing the various social, political, economic and environmental factors that influenced culturally responsive design outcomes within Boggabilla.

I acknowledge that researchers are always shaped by personal experiences, seeing the world through their own lens (Duarte, 2017). This research has been conducted and presented through my lens as a non-Indigenous female living and working on Gadigal land in the Eora Nation. My position both as a participant in the Boggabilla project and as an observer in this research also shapes this lens. To support the validity of my reflective practice, I have accompanied it with a literature review, architectural documentation, diagrams and models, and interview responses from Members of the NSW Aboriginal Housing Office, builders, and Aboriginal Community Housing Providers (ACHPs).

This research has provided insight into the design and delivery of Aboriginal housing but has also revealed various challenges in investigating these processes. Factors such as distance, cost, timing and floods created challenges in conducting site visits and analysing the project. Although relying so heavily on third-party recounts is not ideal, I received updates on the project's process from a tradesperson on-site and via the builder's posts on social media. The conflict between my team and the builder impacted our ongoing relationship and my ability to complete interviews with them. The effects of COVID-19 restricted access to conduct in-person interviews. However, the shift in virtual interactions and meetings allowed me to video call participants in regional New South Wales, where time, budget and distance would typically be challenging when conducting these interviews in person.

These methodological limitations, in addition to the refined scope of a Masters of Architecture (Research) candidature, illustrate that there is still scope to further explore this research in the field.

To conclude this thesis, I will present a series of insights that have emerged from this analysis. Utilising a reflective practice, these insights focus on evaluating outcomes and discussing learnings and opportunities for future improvement (Schön, 1983; Argyris, 1996; Bolander Laksov & McGrath, 2020).

The first research question explored in this thesis is: ***How can culturally responsive design principles be developed and implemented within the design and delivery of Aboriginal housing?***

Overarching Insight 01: Existing sets of design principles that are implemented within Aboriginal housing, either within New South Wales or nationwide, need to be further developed to better address the social, cultural and environmental needs of Aboriginal tenants.

By analysing the project in Boggabilla, this thesis identified, explored and developed a set of transferable culturally responsive design principles for Aboriginal housing in New South Wales.

The AHO Design Guidelines provided guides for siting principles, flexibility, room sizing, layouts, construction systems and materiality decisions, and recommendations to consult with and involve community within the design and delivery of Aboriginal housing (Aboriginal Housing Office, 2020). This document lacked depth in areas concerning landscaping and externally oriented spaces. Memmott's cultural design paradigm can be overlayed to better consider external and internal configurations. This paradigm has a deeper emphasis on accompanying responsive interior design with semi-enclosed spaces, verandahs, yards, outdoor kitchens (Memmott et al., 2000, p.104; Memmott, 2001, 2003; Keys, 2003, p.67), and hearths (Smith, 2000; Memmott, 2003, p.32). It urges the consideration of the needs of fluctuating households, sub-groups within the home, avoidance rules, kinship systems, cooking and sleeping patterns (Memmott, 2003). Both the AHO Design Guidelines (Aboriginal Housing Office, 2020) and Memmott's cultural design paradigm (Memmott et al., 2000; Memmott & Go-Sam, 2003; Memmott, 2004); forefront that for these considerations to be specific, meaningful consultation must be conducted with the community of the particular Aboriginal housing project.

As discussed in the literature review, various design principles are implemented both in New South Wales and nationwide in Australia within the delivery of Aboriginal housing. However, there is yet to be a comprehensive list of principles that meets all the needs of Indigenous tenants and is applied on a large scale both state and nationwide. Similarly to the arguments against 'mainstreaming' raised by Memmott (2004), Fien et al. (2007), Ware (2013), Brackertz et al. (2017), and Grant et al. (2018), my research revealed that when designing Aboriginal housing, one must keep a *"neutral attitude"* and not make any cultural assumptions, as each project, Aboriginal community or client can be vastly different. This must be considered when applying culturally responsive design principles. Due to the necessity of this neutral stance, no set of design principles can be developed to cater to every community's specific environmental or cultural needs. This adaptation and development must occur within each Aboriginal housing project.

Recommendations

A deep analysis of site and climate constraints and meaningful community consultation is paramount to identifying tenants' needs within each Aboriginal housing project. The AHO Design Guidelines assist in identifying some specific constraints of locations such as climate, remoteness, soil, and water classification (Aboriginal Housing Office, 2020). As was done in the Boggabilla project, further analysis of land surveys, flood reports, and bushfire reports was conducted as standard practice within each architectural project.

Existing state-wide guidelines, such as the Connecting with Country framework (Government Architect New South Wales, 2023) or AHO Design Guidelines (Aboriginal Housing Office, 2020) in New South Wales or nation-wide guidelines, such as Housing for Health (Healthhabitat, 2023a) or literature on the cultural design paradigm, can be utilised as a checklist to determine culturally responsive design principles relevant for a specific project.

Despite the various shortcomings or gaps in these guidelines and design principles, this existing research should not be ignored and should be used as a foundation to deepen knowledge of needs within each Aboriginal community, strengthened with specific consultation in each project.

Overarching Insight 02: Insufficient consultation limits abilities to develop culturally responsive design principles that are informed and tailored to the specific needs of community

Limited and ineffective consultation has been identified as a key contributor to the challenges of delivering culturally responsive housing (Lee & Morris, 2005). In their Connecting With Country framework, Government Architect New South Wales forefronted, *"Aboriginal people need to be invited to co-design and co-manage projects rather than just being asked to provide their cultural knowledge, stories and insights to help develop projects"* (Government Architect New South Wales, 2023, p.41). The initial intent for the Aboriginal housing in Boggabilla was to design a contemporary adaptation of the local vernacular informed by community consultation and co-design approaches. The conducted consultation at the local primary school was under-represented and did not directly inform the development of culturally responsive design principles. This somewhat tokenistic community engagement parallels the Productivity Commission's latest progress review of the National Agreement on Closing the Gap, which raised concerns about similar outcomes (Productivity Commission, 2023).

Our team did not know the specific end users of the housing in Boggabilla, which is a common situation when designing Aboriginal housing. An interviewed architect commented, *"At some point, it needs to be generic enough to be flexible for a whole range of different tenancy types, which I think is problematic."* It is also important to note that our team could not consult with potential Aboriginal Community Housing Providers in Boggabilla. Members of the NSW Aboriginal Housing Office explained that the provider is not allocated until near or after construction, so consulting with potential providers before then could be prejudicial. Respondents did highlight that consultation with Aboriginal Community Housing Providers is beneficial as they have on-the-ground input and community knowledge. An interviewed Elder and former Aboriginal Community Housing Provider emphasised the lack of consultation that is had within his community and also highlighted the importance of consulting the tenants who will be moving into the homes *"because they are the people that will be living in these homes, not the people that design 'em or, who organise the building."* Interview respondents suggested the need for sustained community involvement rather than completing projects within rushed spending timeframes.

Following limited community consultation, a delayed design process and friction between the lead designers and the client's demands, two colleagues and I took over the project and reconceptualised the design approach. Informed by the AHO Design Guidelines (Aboriginal Housing Office, 2020), findings from past consultations with other Aboriginal communities and Paul Memmott's cultural design paradigm, we developed and adapted a set of culturally responsive design principles to the site's specific context in Boggabilla. Similar to the emphasis from McDonald et al. (2009), Lea & Pholeros (2010), Ware (2013) and Habibis et al. (2016), our team considered the site constraints, culturally specific needs, construction methodology, material selection, adequate rooms sizes and sustained maintenance.

The developed Siting, Spatial and Materiality & Construction principles became the foundation of the architectural design for the Aboriginal housing in Boggabilla.

Each community has their own local cultural requirements and relationships to or with the site and Country. This must be addressed within culturally responsive design principles for Aboriginal housing. However, in

the context of the Boggabilla project, it was virtually impossible to gain this kind of knowledge as we did not have access to community or potential tenants. We utilised preliminary research on the particular topography, location, climate and site conditions in Boggabilla to adapt the design principles to the project.

Due to the limited community consultation and timeframe restrictions within the Aboriginal housing project in Boggabilla, our team utilised existing knowledge from past community consultations. This leads me to question what the outcome of the housing in Boggabilla could have been if someone had designed it with no reference to culturally responsive design principles or no prior consultation, which is a risk when handing the design control over to the builder as part of the Design and Construct model.

Since the commencement of the project in Boggabilla, these design principles have been further developed and implemented within several other Aboriginal housing projects. For example, The Indigenous Infrastructure and Sustainable Housing Alliance (TIISHA) collaborated with the NSW Aboriginal Housing Office to design a home in Narooma, New South Wales, for a single-parent family with an autistic child. Our team consulted with the occupational therapist, who provided in-depth information on the family's needs. This rich data and approach allowed us to adapt the set of culturally responsive design principles further, considering the context of Narooma and the particular need to create a comfortable home for a neuro-divergent tenant and their family.

Recommendations

This research has revealed that a more in-depth consultation with potential tenants, Aboriginal Community Housing Providers and community Elders could have deepened our team's understanding of local cultural beliefs, practices and traditions, the spatial needs of the tenants, and kinship systems. This reflects arguments repeatedly discussed by researchers (Memmott et al. 2003, 2014; Fien et al. 2007; Brackertz et al. 2017).

The structure of Aboriginal housing projects should not be rushed but instead more flexible to suit community needs and potential challenges working in regional or remote areas, as well as incorporating consultation throughout both design and delivery processes (Pholeros & Phibbs, 2012). This can prevent the compromising of rich and meaningful consultation with community, where residents are provided the opportunity to voice their needs, particular cultural beliefs, local context and connection to Country.

This research has stressed that there cannot be a 'one-size-fits-all' approach to designing and delivering Aboriginal housing. Consultation becomes complex when the end user is unknown. This was evident in the Boggabilla project, where the design had to remain flexible since we did not know who the specific tenants would be or whether the tenants would actually be Elders, ageing residents or single-parent families. It is also hard to know if the tenancy will change after initial occupation, acknowledging mobility within Aboriginal cultures. In this case, the house must still serve the new tenants and respond to their needs. For effective consultation in this context, a small committee from the client community can be held, comprising of Elders, leaders and housing representatives to assist in developing and adapting culturally responsive design principles relevant to their average tenants.

The second research question in this thesis is: ***How do the challenges within the procurement and construction of Aboriginal housing in regional communities affect the delivery of culturally responsive outcomes?***

The following table in Figure 82 summarises which design principles are evident in the final built outcome and how they have been applied to the design.

Culturally Responsive Design Principle			Proof of Implementation In Constructed Housing In Boggabilla
Siting Principles		Landscaping and vegetation to maintain connection to land and country	• Utilising of native plants and vegetation • Planter boxes • Fire pit
		Levels of privacy	
		Minimise noise transfer	• Mirror adjacent dwellings to separate living spaces
		Secondary spaces for external activity, gathering, possible visitors, storage and cooking	
		Passive shading	• Retaining of existing vegetation
		Surveillance both within the lot and in relation to the street	• Rear verandah • Undercover, screened deck area at front • Placement of windows
		Aspect of dwellings to be oriented in accordance with views, wind and sun	
		Consistent street frontage to minimise conflict between the two dwellings	• Both dwellings with entrance facing the main street
Spatial Planning (Interior) Principles		Flexible space	• Separate yet connected Living / Dining / Kitchen • Multifunctional balconies/verandahs • Adequate sized rooms to fit more than one bed for potentially large and complex households
		Future proof and accessible	• Wider hallways • Wider space between kitchen counter and island bench • Space for ramps to be installed
		Location of rooms according to sun	•(Only in one dwelling) Bedrooms to the south and Living to the right
		Three points of entry	• Front entrance, laundry door, door from kitchen to backyard
		Direct access from laundry to yard and clothesline	• Door from laundry into yard
		Clearly defined undercover entrance	• Pedestrian path from street to front door • Visible front entrance from street • Roof to extend over front entrance/verandah
		Grouping of wet areas to reduce costs	• Bathroom, laundry and kitchen located adjacent to one another
		Privacy	• Bedrooms to be separate from communal living spaces
		Minimised noise transfer	• Sound buffer for bedrooms created by entry & wet areas • Sound buffer with built-ins
		Adequate storage	• Built-ins in laundry, bedrooms & pantry • Storage in bathroom vanities
		Secure external living space with opportunity to accommodate overflow of visitors	• Decked area enclosed with screening/mesh/crimsafe
		Open external living at front of house with street view, connecting with community	• Semi-enclosed deck at the front of house, but no access to street

Figure 83. *Table outlining the evidence of Siting and Spatial Planning (Interior) Principles in the constructed Aboriginal housing in Boggabilla.*

Culturally Responsive Design Principle			Proof of Implementation In Constructed Housing In Boggabilla
Materiality & Construction Principles		Durable external materials that are suitable to the climate and environment	• Colorbond steel roofing in light colour Evening Haze • Fibre cement cladding in James Hardie Scyon Axon or similar • Modwood decking • Light coloured external finishes to combat high temperatures
		Minimised maintenance	• Easily replacable durable hardware and finishes • Vinyl flooring
		Promote local Indigenous labour, employment opportunities and skill transfer	• Training programs • Employ local tradespeople • SIP required minimal skilled trades
		Conventional roof pitch to reduce cost	
		Adequate thermal control	• Air conditioning • Ceiling fans • Sufficient insulation in walls, floor and roof • SIP construction
		Minimise cost of living	• Rainwater tanks • Solar power • Utilisiing Structurally Insulated Panel for increased thermal control
		Adequate lighting	• Sufficient windows • Sufficient number of artificial lights installed (both internal and external)
		Construction typology to respond to local soil type, climate and natural disaster risk	• Anchored into the ground with screw piles, addressing volatile soil • Raised for sub-ventilation • House raised above the flood line
		Installation of services suitable for water chemistry	• Hot water system suitable for hardwater
		Street frontage considering surrounding housing aesthetic	• Hip roof pitch • Horizontal fibre cement cladding • Screened deck at front • Single story, raised typology

Figure 84. *Table outlining the evidence of Materiality & Construction Principles in the constructed Aboriginal housing in Boggabilla.*

Overarching Insight 03: Most culturally responsive design principles were evident in the constructed Aboriginal housing in Boggabilla. However, some identified as fundamental were not retained due to time and cost constraints.

As the discussion in Chapter 5 and Figures 83 and 84 demonstrate, various design principles were not delivered in the constructed housing in Boggabilla. This analysis identified shortfalls in Siting Principles, including privacy, noise transfer reduction, secondary external living spaces, surveillance and orientation within the constructed housing. Spatial Planning (Interior) Principles regarding accessibility, the orientation of rooms, privacy, and noise transfer reduction were identified as partially delivered in the constructed housing, and there was no open external living at the front of the home. Regarding Materiality & Construction Principles, lighting could have been improved, and the retaining of many other principles in this category could not be confirmed.

Although most design principles were delivered, the intention was for all the principles to be delivered, not nearly all. Qualified by interview respondents, each developed design principle significantly contributed to providing culturally responsive Aboriginal housing.

This research recognises the impact of whether or not each of the developed design principles is delivered in determining how culturally responsive a house may be. Implementing culturally responsive design principles can accommodate multi-generational or fluctuating households. It can provide privacy, accommodating cultural values, practices, kinship roles, family dynamics, avoidance behaviours and cultural relationships, and instilling a sense of ownership and control. It can also provide a comfortable home for Aboriginal tenants, promote safety and security, respond to climate and environmental constraints, and lower living and maintenance costs. Implementing all of these principles can reflect deep cultural connections to community and Country. Design principles are created as a tool to translate cultural needs, values, and relationships. If some principles are not delivered, then there is a disconnect between what is needed in design compared to what actually exists. It was outside the scope of this thesis to conduct an in-depth post-occupancy evaluation. This presents an opportunity in the future for conducting this analysis to understand how the housing has responded to the cultural needs of the tenants.

Analysing the iterative design process for the Boggabilla housing demonstrates the impact of project changes on applying culturally responsive design principles. The dissatisfaction of the NSW Aboriginal Housing Office with the designers missing the brief and the limited community consultation led to a restructuring of our design team and our approach. Before this change, the design iterations were not informed by a set of design principles, making it challenging to rigorously conduct and assess the implementation of culturally responsive design elements. Two colleagues and I took over the design lead. We were able to develop and apply a set of culturally responsive design principles informed by experience in past Aboriginal housing projects. After the delivery model was shifted from a conventional architectural delivery to a Design and Construct, the direct representation of principles within the design became blurred as control was shifted to the builder. Significant features, such as a detached carport and outdoor kitchen, were removed, and landscaping was reduced. Shifting to SIP construction resulted in reduced eaves and window glazing sizes due to material specifications, span and structural capabilities. This compromised the delivery of lighting, surveillance, and thermal control principles. Window glazings and lighting principles were further compromised due to required BASIX ratings but were later slightly improved due to daylight and ventilation requirements for construction certification. Delays in the

project placed further pressure on the NSW Aboriginal Housing Office and builder to deliver within cost and time budgets. These pressures can impact the delivery of culturally responsive design principles if the priority is shifted too far from this quality outcome to remaining within these project constraints.

The NSW Aboriginal Housing Office and the winning builder mostly welcomed the design our team proposed for tender. However, throughout the design development and procurement process, they pushed us to 'rationalise' external living spaces, landscaping and square meterage to ensure timely delivery and minimise budget and maintenance.

An interviewed architect mirrored this sentiment, suggesting, *"The landscaping and outdoor spaces will be the first thing to be stripped out of these developments."* This has been the case for past Aboriginal housing projects I have worked on, including Boggabilla, where the verandah, outdoor kitchen and detached garage were all rationalised straight after the builder won the tender. In the same interview, the architect commented on government agencies currently promoting health-enabling infrastructure. He suggested that these external living spaces or landscaping *"which aren't considered essential could be considered essential if they were evaluated… and really understood as being essential."*

The term 'rationalise' is generally described as making a system or business more efficient by reorganising, reducing or eliminating unnecessary costs such as labour, time and materials (Oxford University Press, 2023; Cambridge University Press & Assessment, 2023b). Maybe the term 'economise' was better suited, intending to spend less money, time and resources (Cambridge University Press & Assessment, 2023a). Government agencies stripping verandahs, external living spaces and landscaping in the name of 'economising' has been a prevalent issue within Aboriginal housing for decades. Despite our team being novated and having some influence on retaining design elements, the impetus on cost and maintenance prevailed. One key finding from the Boggabilla project was the builder's favouring attention towards materiality rather than siting or spatial principles, arising from the cost and maintenance pressures. At what point are culturally responsive design principles considered 'unnecessary' or a 'waste', and at what cost of Aboriginal tenants' future quality of life living in these dwellings?

What is more important or 'rational' – a quick turnover with low cost and maintenance or the genuine response and catering to the social, spatial and cultural needs of the Aboriginal tenants? Shouldn't focusing on saving time and money allow for more principles to be met, not less?

Recommendations

Linking to discussions from Libby Porter (2020), housing design has historically been a central tool in the everyday work of settler-colonialism, maintaining systemically culturally inappropriate notions of how and where Aboriginal people should live. Porter suggests that whiteness is not just an appearance but a way in which people act. She criticises, *"…the histories of placemaking, architecture and engineering in Australia have been written so as to erase the global origins of towns, large-scale aquaculture and democracy right here on this continent (Pascoe, 2018) is whiteness at work. To now invite Indigenous people to get involved (usually expected for free) in Western institutions of knowledge making, and then get fragile and frustrated when challenged by Indigenous people, is whiteness at work"* (Porter, 2020, p.141). As Drake & Baki Ulas (2020) suggest, energy needs to be shifted from treating the 'symptoms' to addressing the 'systemic causes' within the delivery of housing and services in Indigenous communities.

Architects, builders and government agencies must be held accountable during the design and delivery of Aboriginal housing to ensure the implementation of culturally responsive design principles. Aligning with Porter's emphasis (2020), holding these stakeholders accountable extends beyond a critical lens of the historic presumptions within Aboriginal housing design and delivery. It also involves the unlearning of colonial attitudes and governance within these processes. Similar to Porter's reflection on this unlearning, rather than questioning how to 'include', often in a tokenistic way, components of Indigenous knowledge within Aboriginal housing, recognise its existence for tens of thousands of years before settler-colonial Australia. This knowledge is deeply ingrained in Indigenous culture, traditions, and ways of living. It should be the backbone of designing and delivering culturally responsive Aboriginal housing. Isn't that what cultural responsivity is? This should be a non-negotiable priority and objective. The houses are not for settler-colonial residents, so they should not be designed or delivered following these 'white' notions of living.

Culturally responsive design principles should be utilised as a tool by stakeholders to translate cultural needs into designed or built outcomes for Aboriginal residents. This tool should not be moulded to suit or respond to builders' or government agencies' contractual or political pressures, where they decide what principles to retain or not. If research has informed that these design principles are considered culturally responsive for future Aboriginal tenants, then they should be included. As Porter suggests, *"We would do well to become more adept at working in different registers—there are times when we need to lend our bodies, intellects, resources and solidarity to help hold a space (use the privilege our whiteness affords), but not take it up"* (Porter, 2020, p.144).

As the design control continued to change hands from our team to the builder and the engineers, the significance of culturally responsive design principles seemed to become blurred. We asked the builder to novate us at less than market value to complete the architectural documentation so we could maintain the implementation of culturally responsive design principles. However, this was only advisory as the builder, as our client, always had the final say over the design. Building on Wong's argument (2018, para. 17), delivering culturally responsive design principles for Aboriginal tenants cannot be guaranteed unless stakeholders are held accountable for rigorous implementation. In addition, if the design process for the Aboriginal housing in Boggabilla had been more streamlined with less consultancy and change of hands, the outcome could have been more culturally responsive, with fewer delays in consultation, construction, and abortive work.

Aligning with existing literature (Garnett et al., 2009; Brackertz et al., 2017) and suggestions from an interviewed architect, up-front investments in affordable, well-designed houses and deeper preliminary research can provide long-term, cost and maintenance savings and better ensure quality Aboriginal housing.

An interviewed NSW Aboriginal Housing Office member highlighted that *"obviously a poorly designed house can cost the same to build as a well-designed house"* and emphasised investing in the planning component of delivery. This could also ensure builders and designers are held accountable for including culturally responsive design elements if they become part of the criteria for planning approval.

Similarly, the Regional Housing Taskforce presented the suggestions from hundreds of consulted community members that *"the appropriate weighting of design quality matters in planning assessments and decision making was discussed by stakeholders, with a need to balance the need to create a well-designed built*

environment with cost and ease of development" (NSW Department of Planning, Industry and Environment, 2021b, p.24).

Hopefully, recent funding, such as the $10 billion investment in social housing around Australia, will assist in speeding up and improving Aboriginal housing outcomes (Treasury, 2023b). However, unless architects, builders and government agencies involved in the design and delivery are held accountable for implementing culturally responsive design principles, how can we ensure that the needs of Aboriginal tenants will be met? Will the same shortfalls in history repeat themselves?

Overarching Insight 04: Shortage of builders, resource scarcity, high construction costs, and rising demands for Aboriginal housing in regional New South Wales can encourage government agencies and builders to focus on economic efficiencies, compromising culturally responsive outcomes.

Within Davidson et al. comparative study of Aboriginal housing within regional communities, they are*"led to question the reasons underlying the continual generation of variable, and often poor, housing results"* (Davidson et al., 2011, p.5). This thesis built on this questioning twelve years later. This research has allowed me to empathise with builders and government agencies as they struggle to meet the demand for Aboriginal housing. Of course, there must be some economic focus to continue delivery. However, the project in Boggabilla reflected the concerns previously raised by researchers. This focus on economic efficiencies can encourage a race to the finish line, compromising longevity, in-depth community consultation, social outcomes and culturally responsive design (Fien et al., 2007; Broffman, 2015; O'Rourke, 2018; Wong, 2018; Fantin & Fourmile, 2018).

My conducted interviews qualified that within regional New South Wales, the demand for Aboriginal housing is often outstripping supply due to limited builders and resource scarcity amongst government agency offices, councils and Aboriginal Community Housing Providers. This resource scarcity affects capacities to apply for planning or funding and delays the procurement process, limiting the provision of new Aboriginal housing. Respondents also highlighted the challenging remoteness of some Aboriginal communities and designing from a distance with limited community consultation rather than designing on Country, working with the traditional owners and knowledge holders. The cost of building in these regional locations is much higher than those in metropolitan areas, which has further increased over recent years from material shortages due to the pandemic. These pressures lead government agencies and builders to cut corners while delivering Aboriginal housing, compromising culturally responsive design.

Recognising the small sample size of interview participants, this research does not indicate challenges present in every Aboriginal community. Each Aboriginal community has unique social, political, and environmental challenges and cultural needs. This research investigates the perspectives of various stakeholders to provide insights into some challenges that impact the delivery of culturally responsive outcomes when building Aboriginal housing in regional New South Wales, supported by existing literature. I must also acknowledge that some non-Indigenous participants have been interviewed. Despite my attempts to interview more Indigenous participants, they did not participate due to various potential factors such as reluctance, time restraints, or professional commitments. It is also important to note the under-representation of Indigenous peoples within the workforce designing and delivering Aboriginal housing. This research process highlighted this.

Responses from non-Indigenous participants have provided valuable insights from experience working in the Aboriginal housing sector. However, presenting Indigenous perspectives to inform Indigenous advancement is also essential.

It is important to foreground the limited budgets assigned to many Aboriginal housing projects, including the project in Boggabilla. These restricted funds, in addition to the challenges within regional locations, create numerous constraints within the design and procurement. It is extraordinary that in a country as wealthy as Australia, there remains a vast disparity between the wealth in metro areas and the rudimentary budgets we are contending with for Aboriginal housing. Architect John Cary stated once, *"If good design is only for a privileged few, then what good is it?"* (Cary, 2017). Memmott & Davidson (2007, pp.79-80) forefront the recognition and acknowledgement of Indigenous architecture and the culturally specific needs within this, *"Are such Indigenous building traditions any less significant in the value systems of Indigenous peoples than Euroamerican 'architecture' is to Western people? Why should these traditions not hold 'equal billing' in status and importance to the capital A 'Architecture' of the Euroamerican tradition in a program of architectural research?"*

Recommendation

Interview respondents suggested that alternative construction methods can assist with some challenges of constructing Aboriginal housing in regional New South Wales, such as access to materials, site and climate constraints and reducing vandalism on site. However, some respondents had reservations about whether or not these alternative methods are best suited to deliver culturally responsive Aboriginal housing with limited community involvement, sizing and design restrictions.

Interviewed Aboriginal Community Housing Providers voiced the need for more funding in smaller communities to provide more opportunities to deliver housing that is so evidently in need. Similarly, Memmott & Moran highlight the necessity of more funding in Indigenous communities to offset housing shortages, in addition to more training and management systems *"to ensure adequate care and reasonable life expectancy of the physical infrastructure"* (Memmott & Moran, 2001, p.52). The authors also stress that although there have been government programs that have attempted to address the challenges, *"it will take a much larger budget over many decades before Indigenous people can enjoy the same quality of built environment and health in remote and rural settlements as Australians do in metropolitan centres"* (Memmott & Moran, 2001, p.52). The findings within this thesis demonstrate that over two decades later, this challenge remains.

Aligning with Memmott's (1988, p.45) and Wong's (2018) arguments, this research has revealed the significance of utilising existing research and evidence and encouraging better knowledge sharing to create awareness and inform improved design outcomes. An interviewed architect highlighted, *"There's not that consistent conversation that people can engage with between housing suppliers, clients, and designers, and it's always like starting from scratch every time, and it's a battle, and it's a battle to get anything good going."*

A more significant focus on the research, design and sustainability components of projects, a *"reflection-before-action"* (Greenwood, 1993, p.1186), could assist in responding to the pressures of delivering housing in regional communities and better address the culturally specific needs of Aboriginal tenants. Interview respondents said this could lower construction costs without sacrificing quality and culturally responsive outcomes.

This research has revealed that stressing on-time and on-budget delivery is perhaps not the best suited for Indigenous housing. Procurement and construction processes should allow time for in-depth community consultation during both the design and delivery and remain flexible to allow for significant shifts in projects and accommodate remote community politics and social and climatic contexts (Davidson et al., 2011). This allows design and delivery processes to be adapted to the particular cultural needs and local context of each Aboriginal community. Perhaps if the procurement of the Aboriginal housing in Boggabilla incorporated these characteristics, the outcome could have been more culturally responsive.

As recommended by Pholeros & Phibbs (2012), several levels of quality control must be put in place to prevent builders from cutting corners as they struggle with remoteness as well as rigid spending and construction timelines. A response to this could include site visits and inspections throughout the construction process and holding all stakeholders involved in the delivery of Aboriginal housing accountable for implementing culturally responsive design principles relevant to each project's specific cultural and local context.

Overarching Insight 05: Interviewed builders highlighted the significance of quality outcomes and a community-driven process. However, other stakeholders raised concerns with builders with design control as they often have an economic focus.

Interview respondents had differing views on the Design and Construct model compared to a conventional delivery model where the architect submits a development application. They suggested that the Design and Construct model can sometimes respond to economic and time pressures but can also limit quality Aboriginal housing.

Although each model has its benefits, the Design and Construct was supported by builders as they had control, believing they were the best fit to steer the design process. Architects opposed this model as they had limited control over the design, voicing the risk of this being in the hands of builders, who often focus on profit. Other interviewed stakeholders also shared these concerns with builders. Members of the NSW Aboriginal Housing Office favoured the model for its efficiency, allowing them to focus on different projects. With additional political and economic pressures, housing providers sat somewhere in between.

Memmott & Davidson (2007) comment on relationships with 'environmental power' and authority in designing and controlling environmental change and architectural construction. The authors suggest that within Aboriginal architecture, *"authority' referents for form-making take on extra-ego forms such as cosmology and mythology,"* compared to contemporary Western architecture, which is centred on ego-driven views of who makes the correct and wisest decisions (Memmott & Davidson, 2007, p.83).

The findings from my conducted interviews demonstrate this debate of authority. Although this thesis is focused on Aboriginal housing, I acknowledge that colonial and Western notions of design and delivery still overshadow this space. Linking to Memmott & Davidson's (2007) comments and concerns from interview respondents, I question: Are builders' egos getting in the way of culturally responsive design outcomes in Aboriginal housing?

Although the interviewed builders discussed the desire for quality outcomes and a community-driven process,

other stakeholders were concerned with them in control of the design within the Design and Construct procurement model due to the risks of them cutting corners or focusing on economic advancement.

Within the Boggabilla project, the NSW Aboriginal Housing Office switched to the Design and Construct model, and the builder adjusted to the SIP construction method in hopes of cheaper and faster delivery. However, as displayed in Figure 85, the process was not as efficient and streamlined as hoped. Figure 85 demonstrates that construction took far longer than the builder initially proposed after they won the tender.

The question remains - responding to pressures to minimise costs and construction time whilst maintaining cultural sensitivity, what delivery model best suits Aboriginal housing? Which stakeholder is best fit to be in control of the design? Shouldn't this be up to Aboriginal tenants?

Recommendation

This research has highlighted that rushed program agendas and cost pressures can limit the delivery of culturally responsive Aboriginal housing. The debate of which stakeholders should remain in control of the design is left unsolved and would likely differ for each project.

Davidson et al. stressed that *"the procurement process is arguably just as important as the final housing product itself"* (Davidson et al., 2011, p.1). I acknowledge that it is difficult for stakeholders to disconnect their cost and time pressures from their preferred delivery model. However, this research has forefronted the need to emphasise quality outcomes rather than economic efficiencies and the number of houses delivered. It seems like this issue needs to be addressed not only within builders, government agencies and housing providers but also at a higher level within government with funding allocations and rushed spending time frames.

Aligning with recommendations from Wong (2018) and Porter (2020), accountability must be emphasised and enforced. If builders are held more accountable for implementing culturally responsive outcomes, then perhaps this will alleviate concerns about them being in control of the design. Similarly, if each stakeholder within the delivery of Aboriginal housing is held to the same account, then no matter who controls the design, it will be enforced to shift priority and forefront community needs.

As Porter suggests, there needs to be a *"relinquishing of privilege, to not create space for ourselves, but for those who have too often been erased from space"* (Porter, 2020, p.144). The design and delivery of Aboriginal housing should be a space held for Aboriginal residents. As emphasised by Memmott & Davidson (2007), Indigenous peoples have been versed in the design and construction of dwellings for tens of thousands of years before colonisation. Architects, builders and government agencies need to recognise that this is not a new space for Aboriginal residents. These stakeholders should join the space and the conversation, not lead it. They must hold space, not take it up with their own potential egos, agendas or pressures.

For any procurement model to deliver culturally responsive Aboriginal housing, it must be genuinely consultative and community-driven.

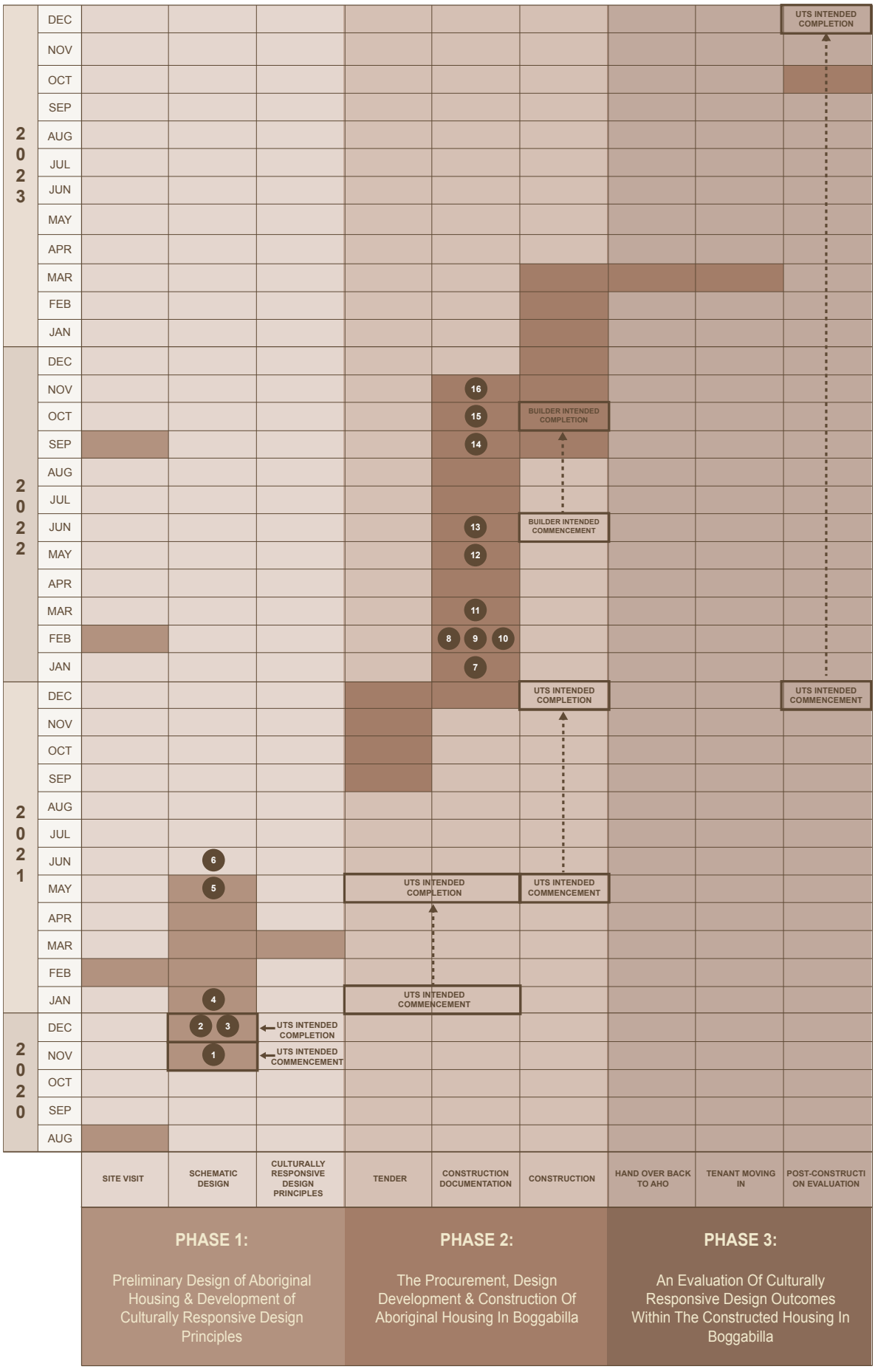


Figure 85. *Timeline of project delivery for the Aboriginal housing project in Boggabilla.*

To conclude, this thesis has revealed a response to the first research question, demonstrating ways to develop and implement culturally responsive design principles within the design and delivery of Aboriginal housing. This research analysed one version of this process, which was specific to the project in Boggabilla. There is no definitive answer to the best approach as each project is unique, and with that comes individual needs. Existing principles, such as the AHO Design Guidelines (Aboriginal Housing Office, 2020) and Memmott's cultural design paradigm (e.g. Memmott & Go-Sam, 2003; Memmott, 2004), can strengthen one another to deepen considerations of siting, spatial and materiality & construction principles. Due to their broad nature, these principles must be further developed, analysing each Aboriginal housing project's specific environmental and cultural needs. These needs can be understood through preliminary research, site visits, and consultation with tenants, housing providers, Elders and other Aboriginal community members. The project in Boggabilla is not a best practice model as it was not as consultative and community-oriented as intended. However, it explores other ways to develop design principles and highlights the challenges of developing these without in-depth community engagement. As I implement these design principles within different projects with my team at The Indigenous Infrastructure and Sustainable Housing Alliance, they evolve and develop, informed by new experiences, learnings and insights from each community.

Responding to the second research question, this thesis identified the effects of various challenges in procuring and constructing Aboriginal housing in regional communities on delivering culturally responsive outcomes. Shortage of builders, resource scarcity, high construction costs, and rising demands for Aboriginal housing are evident in regional New South Wales. These challenges can shift the focus of government agencies and builders to economic efficiencies, compromising capacities to build, quality construction, in-depth community consultations, social outcomes and culturally responsive design. The Aboriginal housing project in Boggabilla demonstrated these challenges, highlighting their impact as some of the developed culturally responsive design principles were not retained in the constructed housing. I also learned of these challenges within my research, with my sample size and unbalanced participant groups due to time constraints within my project, reluctance from potential participants, or their inability due to pressures and high demands like those previously discussed.

I look forward to continuing to grow and apply my research, exploring and investigating culturally responsive design and ways to hopefully improve places and spaces for Indigenous peoples that honour and recognise their rich cultural history and tradition.

Figure 86. *Constructed housing in Boggabilla. From photograph taken by author, 2023.*

BIBLIOGRAPHY

Aboriginal Affairs NSW & NSW Coalition of Aboriginal Peak Organisations. (2022). 2022–2024 NSW Implementation Plan for Closing the Gap (pp. 83–85). https://www.aboriginalaffairs.nsw.gov.au/media/website_pages/closingthegap/nsw-implementation-plan/2022-24-implementation-plan/NSW-Closing-the-Gap-Implementation-Plan-2022-2024.pdf

Aboriginal Housing Office. (2020). AHO Design Guidelines NSW. Aboriginal Housing Office.

Aboriginal Housing Office. (2021). $43.3 million in new funding for the AHO. https://www.aho.nsw.gov.au/news/433-million-new-funding-aho

Aboriginal Housing Office. (2022). Aboriginal Housing Office Annual Report 2021–22. https://www.parliament.nsw.gov.au/tp/files/83440/AHO%20-%20Annual%20Report%202021-2022%20-%20CE%20Approved.pdf

Ambert, A.-M., Adler, P. A., Adler, P., & Detzner, D. F. (1995). Understanding and Evaluating Qualitative Research. Journal of Marriage and the Family, 57(4), 879. https://doi.org/10.2307/353409

Appleton, B., & Appleton, R. (1992). The Cambridge dictionary of Australian places. Cambridge University Press. Cambridge University Press.

Architecture Foundation Australia & Glenn Murcutt Master Class. (n.d.). Marika-Alderton House. OZ.E.TECTURE. https://www.ozetecture.org/marika-alderton-house

Argyris, C. (1996). Organizational learning II. Theory, Method, and Practice.

Australia. Royal Commission into Aboriginal Deaths in Custody & Commissioner Elliott Johnston. (1991). National report / by Commissioner Elliott Johnston. Australian Government Publication Service.

Australian Housing and Urban Research Institute. (2018, August 2). Creating culturally sensitive housing for remote Indigenous communities. AHURI. https://www.ahuri.edu.au/analysis/brief/creating-culturally-sensitive-housing-remote-indigenous-communities

Australian Housing and Urban Research Institute. (2023, June 23). Federal Government announces Social Housing Accelerator. AHURI. https://www.ahuri.edu.au/analysis/news/federal-government-announces-social-housing-accelerator

Australian Institute of Aboriginal and Torres Strait Islander Studies. (2020). AIATSIS code of ethics for Aboriginal and Torres Strait Islander research.

Australian Institute of Aboriginal and Torres Strait Islander Studies. (2023). Map of Indigenous Australia. AIATSIS. https://aiatsis.gov.au/explore/map-indigenous-australia

Australian Institute of Architects. (2019). The Benefits and Challenges of Novation for Architects—Victoria. Australian Institute of Architects.

Australian Institute of Health and Welfare. (2022). Profile of First Nations people. https://www.aihw.gov.au/reports/australias-health/profile-of-indigenous-australians#Population

Australian Institute of Health and Welfare & National Indigenous Australians Agency. (2020). Aboriginal and Torres Strait Islander Health Performance Framework: 2.02 Access to functional housing with utilities. Australian Government. https://www.indigenoushpf.gov.au/Measures/2-02-Access-functional-housing-utilities

Australian Rail Track Corporation. (2023). What is Inland Rail.

Bailie, R. (2007). Housing. In B. Carson, T. Dunbar, R. D. Chenhall, & R. Bailie (Eds.), Social Determinants of Indigenous Health (1st ed.). Routledge. https://doi.org/10.4324/9781003117247

Baum, F. (2002). The new public health (2nd ed). Oxford University Press.

Bernard, H. R., & Ryan, G. W. (1998). Text analysis: Qualitative and quantitative methods. In Handbook of methods in

cultural anthropology (pp. 595–645). AltaMira Press.

Bolander Laksov, K., & McGrath, C. (2020). Failure as a catalyst for learning: Towards deliberate reflection in academic development work. International Journal for Academic Development, 25(1), 1–4. https://doi.org/10.1080/1360144X.2020.1717783

Boyatzis, R. E. (1998). Transforming qualitative information: Thematic analysis and code development. Sage Publications.

Brackertz, D. N., Davidson, J., & Wilkinson, A. (2017). How can Aboriginal housing in NSW and the Aboriginal Housing Office provide the best opportunity for Aboriginal people? (Melbourne). Australian Housing and Urban Research Institute Limited. https://www.ahuri.edu.au/research/research-papers/how-can-aboriginal-housing-in-nsw-and-the-aboriginal-housing-office-provide-the-best-opportunity-for-aboriginal-people

Bridge, C., Flatau, P., Whelan, S., Wood, G., & Yates, J. (2003). Housing assistance and non-shelter outcomes. Australian Housing and Urban Research Institute. https://www.ahuri.edu.au/research/final-reports/40

Broffman, A. (2015). The Building Story: Architecture and Inclusive Design in Remote Aboriginal Australian Communities. In The Design Journal (1st ed., Vol. 18, pp. 107–137).

Broffman, A. (2022). Connecting with Country: A pathway to listening.

Bureau of Meteorology. (2023a). Mean Maximum Temperature (degrees Celsius) GOONDIWINDI AIRPORT. Bureau of Meteorology.

Bureau of Meteorology. (2023b). Mean Minimum Temperature (degrees Celsius) GOONDIWINDI AIRPORT. Bureau of Meteorology.

Buwert, P. (2012). The Reflective Practitioner by Donald Schön. Gray's Research Reading Group, para. 27.

Cambridge University Press & Assessment. (2023a). Meaning of economize in English. Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english/economize

Cambridge University Press & Assessment. (2023b). Meaning of rationalize in English. Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english/rationalize

Cary, J. (2017). How architecture can create dignity for all [TED Talk]. https://ted2srt.org/talks/john_cary_how_architecture_can_create_dignity_for_all

Centre for Appropriate Technology. (2013). Housing Experience: Post Occupancy Evaluation of Alice Springs Town Camp Housing 2008-2011 (p. 3). Centre for Appropriate Technology.

Centre for Appropriate Technology. (2021). Laynhapuy & Marngarr Homelands Project. Centre for Appropriate Technology Limited. https://cfat.org.au/laynhapuy-marngarr-homelands-project

Community Housing Industry Association NSW. (2021). Aboriginal Community Housing Industry Association (ACHIA). https://communityhousing.org.au/achia/

CoreLogic Australia. (2022). Australia's construction costs continue to rise at record rates. Research News, para. 11.

Dalla Costa, W. (2018). Metrics and Margins: Envisioning Frameworks in Indigenous Architecture in Canada. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 193–221). Springer Singapore.

Davidson, J., Memmott, P., Go-Sam, C., Grant, E., & Australian Housing and Urban Research Institute. (2011). Remote Indigenous housing procurement: A comparative study. Australian Housing and Urban Research Institute. https://www.ahuri.edu.au/sites/default/files/migration/documents/AHURI_Final_Report_No167_Remote_Indigenous_housing_procurement_a_comparative_study.pdf

Denzin, N. K. (2017). The Research Act: A Theoretical Introduction to Sociological Methods (1st ed.). Routledge. https://doi.org/10.4324/9781315134543

Department of Families, Community Services and Indigenous Affairs. (2007). National Indigenous Housing Guide (3rd

ed.). Department of Family and Community Services.

Dillon, J., & Savage, M. (2003). House Design in Alice Springs Town Camps. In TAKE 2: Housing Design in Indigenous Australia (pp. 40–46). Royal Australian Institute of Architects.

Drake, C., & Ulas, E. B. (2020). Solar Lighting Namoi and Gingie Reserves: Exploring sociotechnical relations through outdoor lighting. Proceedings of the Annual Design Research Conference 2019: Real/Material/Ethereal, 137.

Duarte, M. E. (2017). Network Sovereignty: Building the Internet across Indian Country. University of Washington Press.

Fantin, S. (2003). Yolngu Cultural Imperatives and Housing Design: Rumaru, Mirriri and Galka. In TAKE 2: Housing Design in Indigenous Australia (pp. 72–79). Royal Australian Institute of Architects.

Fantin, S., & Fourmile, G. G. (2018). Design in Perspective: Reflections on Intercultural Design Practice in Australia. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 433–464). Springer Singapore.

Fien, J., Charlesworth, E., Lee, G., Morris, D., Baker, D., & Grice, T. (2007). Flexible guidelines for the design of remote Indigenous community housing: Positioning paper. AHURi.

Fien, J., Charlesworth, E., Lee, G., Morris, D., Baker, D., & Grice, T. (2008). Towards a design framework for remote Indigenous housing. AHURI.

Fisher, D., & Scally, S. (n.d.). The detail of things. Architecture Australia, 1 September 2008.

Fossey, E., Harvey, C., Mcdermott, F., & Davidson, L. (2002). Understanding and Evaluating Qualitative Research. Australian & New Zealand Journal of Psychiatry, 36(6), 717–732. https://doi.org/10.1046/j.1440-1614.2002.01100.x

Garnett, S. T., Sithole, B., Whitehead, P. J., Burgess, C. P., Johnston, F. H., & Lea, T. (2009). Healthy Country, Healthy People: Policy Implications of Links between Indigenous Human Health and Environmental Condition in Tropical Australia. Australian Journal of Public Administration, 68(1), 53–66. https://doi.org/10.1111/j.1467-8500.2008.00609.x

Glenn, D. (2009, April 1). Design for the seven generations: Explorations in contemporary native American Architecture. Open session on American Indian Architecture, Society of Architectural Historians Annual Meeting, Pasadena, CA.

Glenn, D. J. (2018). Learning from Our Elders: Returning to Culturally and Climatically Responsive Design in Native American Architecture. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 733–775). Springer Singapore.

Goad, P., & Willis, J. (2012). The Encyclopedia of Australian Architecture. Cambridge University Press.

Go-Sam, C. (2020). Future Indigeneity: Shared values in the built environment. https://architectureau.com/articles/future-indigeneity/

Government Architect New South Wales. (2020). Draft Connecting With Country. Government Architect New South Wales.

Government Architect New South Wales. (2023). Connecting With Country. Government Architect New South Wales.

Grant, E., Greenop, K., Refiti, A. L., & Glenn, D. J. (Eds.). (2018). The Handbook of Contemporary Indigenous Architecture. Springer Singapore. https://doi.org/10.1007/978-981-10-6904-8

Greenwood, J. (1993). Reflective practice: A critique of the work of Argyris and Schön. Journal of Advanced Nursing, 18(8), 1185–1186. https://doi.org/10.1046/j.1365-2648.1993.18081183.x

Groome, S., & Pholeros, P. (2000). Designing the House and Living Areas. In Environmental Health Handbook: A Practical Guide for Remote Communities. Menzies School of Health Research.

Guest, G., MacQueen, K., & Namey, E. (2012). Applied Thematic Analysis. SAGE Publications, Inc. https://doi.org/10.4135/9781483384436

Habibis, D. (2022). A Framework For Culturally Appropriate and Sustainable Indigenous Housing. Emerald Publishing Limited. https://emeraldopenresearch.com/documents/4-22

Habibis, D., Phillips, R., Spinney, A., Phibbs, P., & Churchill, B. (2016). Reviewing changes to housing management on remote Indigenous communities. Australian Housing and Urban Research Institute.

Healthabitat. (2023a). Housing for Health – The Guide. Healthabitat. https://www.healthabitat.com/resources/housing-for-health-the-guide/

Healthabitat. (2023b). Quality Control. Housing for Health – The Guide. https://www.housingforhealth.com/toolbox/quality-control/

Heyes, S., & Dowsley, M. (2018). Practices and Processes of Placemaking in Inuit Nunangat (The Canadian Arctic). In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 283–299). Springer Singapore.

Higgins, I., Collard, S., & Ryan, B. (2020). Closing the Gap agreement reset with 16 new targets to improve lives of Aboriginal and Torres Strait Islander Australians. https://www.abc.net.au/news/2020-07-30/closing-gap-targets-agreement-aboriginal-torres-strait-islander/12506232

Holland, Chris. (2018). A ten-year review: The Closing the Gap Strategy and Recommendations for Reset. The Close the Gap Campaign Steering Committee.

Horne, R., Martel, A., Arcari, P., Foster, D., & McCormack, A. (2013). Living change: Adaptive housing responses to climate change in the town camps of Alice Springs (Final report). National Climate Change Adaptation Research Facility.

Human Rights and Equal Opportunity Commission. (1988). Toomelah report: Report on the problems and needs of Aborigines living on the New South Wales-Queensland border. Human Rights and Equal Opportunity Commission.

Indigenous Business Australia. (2020). Building homes for the future. https://iba.gov.au/2020/10/building-homes-for-the-future/

James Hardie. (2023). AxonTM Cladding. James Hardie. https://www.jameshardie.com.au/productrange/applications/cavity-construction/scyon-axon-cladding

Keys, C. (1996). Defining Single Aboriginal Women's Housing Needs In Central Australia: Dealing With Issues Of Culture, Gender And Environment. Architectural Theory Review, 1(1), 69–77.

Keys, C. (2003). Housing Design Principles from a Study of Warlpiri Women's Jilimi. In TAKE 2: Housing Design in Indigenous Australia (pp. 64–71). Royal Australian Institute of Architects.

Lane, F., Lane, A., & Greenop, K. (2018). What's the Story? Contemporary Indigenous Architecture in Practice in Australia. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 331–346). Springer Singapore.

Lea, T., & Pholeros, P. (2010). This Is Not a Pipe: The Treacheries of Indigenous Housing. Duke University Press.

Lee, G., & Morris, D. (2005). Best practice models for effective consultation: Towards improving built environment outcomes for remote Indigenous communities : final report. Australian Housing and Urban Research Institute, Southern Research Centre.

Long, S., Memmott, P., & Seelig, T. (2007). An audit and review of Australian Indigenous housing research. Australian Housing and Urban Research Institute.

Longden, T., Quilty, S., Riley, B., White, L. V., Klerck, M., Davis, V. N., & Frank Jupurrurla, N. (2021). Energy insecurity during temperature extremes in remote Australia. Nature Energy, 7(1), 43–54. https://doi.org/10.1038/s41560-021-00942-2

Loosemore, M., Drake, C., Evans, J., & Wilkinson, S. J. (2021). Aboriginal housing policies must be based on community

needs—Not what non-Indigenous people think they need. https://theconversation.com/aboriginal-housing-policies-must-be-based-on-community-needs-not-what-non-indigenous-people-think-they-need-162999

Maiam nayri Wingara. (2018, June 20). Indigenous Data Sovereignty Communique Indigenous Data Sovereignty Summit 20th June 2018. https://static1.squarespace.com/static/5b3043afb40b9d20411f3512/t/63ed934fe861fa061ebb9202/1676514134724/Communique-Indigenous-Data-Sovereignty-Summit.pdf

Malnar, J. M., & Vodvarka, F. (2018). Recent Architectural and Planning Strategies on Native American Lands. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 161–191). Springer Singapore.

McDonald, E., Bailie, R., Grace, J., & Brewster, D. (2009). A case study of physical and social barriers to hygiene and child growth in remote Australian Aboriginal communities. BMC Public Health, 9(1), 346. https://doi.org/10.1186/1471-2458-9-346

McIlroy, T. (2023, June 16). States to share in $2b for public housing. https://www.afr.com/politics/federal/states-to-share-in-2b-for-public-housing-20230616-p5dh64

Memmott, P. (1988). Aboriginal Housing: The State of the Art (or The Non-state of the Art). In Architecture Australia (pp. 34–45). Architecture Media.

Memmott, P. (1993). Aboriginal and Islander architecture in Queensland. In Special edition of Queensland architect, chapter news and views. Royal Australian Institute of Architects.

Memmott, P. (2001). Remote Prototypes. In Architecture Australia (pp. 61–65).

Memmott, P. (2003a). Customary Aboriginal Behaviour Patterns and Housing Design. In TAKE 2: Housing Design in Indigenous Australia (pp. 26–39). Royal Australian Institute of Architects.

Memmott, P. (Ed.). (2003b). TAKE 2: Housing Design in Indigenous Australia. The Royal Australian Institute of Architects. https://www.healthabitat.com/wp-content/uploads/2020/02/Take-2_Housing-Design-in-Indigenous-Australia_full-book-version.pdf

Memmott, P. (2004). Aboriginal Housing: Has the State of the Art Improved? Architecture Australia, 93(1), paras. 4, 12.

Memmott, P. (2014). Inside the Remote-Area Aboriginal House. In D. Smith, M. Lommerse, & P. Metcalfe (Eds.), Perspectives on Social Sustainability and Interior Architecture (pp. 93–99). Springer Singapore. https://doi.org/10.1007/978-981-4585-39-2_7

Memmott, P., & Davidson, J. (2007). 'Architecture': Exploring the treatise. Architectural Theory Review, 12(1), 78–96. https://doi.org/10.1080/13264820701553112

Memmott, P., & Go-Sam, C. (1999). Australian indigenous architecture: Its forms and evolution. In R. Blythe & R. Spence (Eds.), Thresholds: Papers from the sixteenth annual conference of the Society of Architectural Historians Australia and New Zealand, Launceton and Hobart, Australia, 1998. Society of Architectural Historians Australia and New Zealand.

Memmott, P., & Go-Sam, C. (2003). Synthesising Indigenous Housing Paradigms: An Introduction to TAKE 2. In TAKE 2: Housing design in Indigenous Australia (pp. 12–17). Royal Australian Institute of Architects.

Memmott, P., & Keys, C. (2015). Redefining architecture to accommodate cultural difference: Designing for cultural sustainability. In Architectural Science Review (Vol. 58, pp. 278–289).

Memmott, P., Long, S., Fantin, S., & Eckermann, K. (2000). Post-Occupancy Evaluation of Aboriginal Housing In The NT For IHANT: Social Response Component. Paul Memmott & Associates.

Memmott, P., & Moran, M. (2001). Indigenous settlements of Australia. Dept. of the Environment and Heritage.

Miles, M. B., & Huberman, A. M. (1994). An Expanded Source Book: Qualitative Data Analysis (2nd ed.). SAGE Publications.

Moree Plains Shire Council. (2013). Moree Plains Development Control Plan 2013.

Murphy, J. R., Grant, E., & Anthony, T. (2018). Indigenous Courthouse and Courtroom Design in Australia: Case Studies, Design Paradigms and the Issue of Cultural Agency. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 495–525). Springer Singapore.

National framework for the design, construction and maintenance of indigenous housing: Overview. (1999). Department of Family and Community Services.

National Health and Medical Research Council. (2018a). Australian Code for Responsible Conduct of Research.

National Health and Medical Research Council. (2018b). Ethical conduct in research with Aboriginal and Torres Strait Islander peoples and communities: Guidelines for researchers and stakeholders. National Health and Medical Research Council (Australia).

National Health and Medical Research Council. (2018c). National statement on ethical conduct in human research 2007 (updated 2018). National Health and Medical Research Council.

NSW Aboriginal Land Council. (2019). NSW Aboriginal Land Council Strategy on Aboriginal Housing. NSW Aboriginal Land Council. https://alc.org.au/wp-content/uploads/2020/04/NSWALC-Strategy-on-Aboriginal-Housing-Sep-2019.pdf

NSW Coalition of Aboriginal Peak Organisations. (2022). NSW CAPO Closing the Gap Community Engagement Report.

NSW Department of Planning and Environment. (2022, June 21). $554.1 million investment for new and improved social and Aboriginal housing. NSW Government Planning. https://www.planning.nsw.gov.au/News/2022/Millions-investment-for-new-and-improved-social-and-Aboriginal-housing

NSW Department of Planning, Industry and Environment. (2021a). About BASIX. BASIX. https://www.basix.nsw.gov.au/iframe/81-about-basix.html

NSW Department of Planning, Industry and Environment. (2021b). Regional Housing Taskforce Findings Report. https://www.planning.nsw.gov.au/sites/default/files/2023-03/regional-housing-taskforce-findings-report.pdf

NSW State Emergency Service. (2023). Know Your Risk. https://www.ses.nsw.gov.au/flood-resources/before-a-flood/know-your-risk/

O'Rourke, T. (2018). Aboriginal and Torres Strait Islander Domestic Architecture in Australia. In E. Grant, K. Greenop, A. L. Refiti, & D. J. Glenn (Eds.), The Handbook of Contemporary Indigenous Architecture (pp. 25–56). Springer Singapore.

Oxford University Press. (2023). Definition of rationalize verb from the Oxford Advanced Learner's Dictionary. Oxford Learner's Dictionaries. https://www.oxfordlearnersdictionaries.com/definition/english/rationalize?q=rationalise

Parke, E. (2020, August 16). As governments spend big on stimulus, WA communities warn of more official *"Taj Mahals."* ABC News. https://www.abc.net.au/news/2020-08-16/the-taj-mahals-of-northern-western-australia/12546806

Pascoe, B. (2018). Australia: Temper and bias. Meanjin, 77(3), 64–69.

People Oriented Design. (n.d.). Synapse SAIF, Cairns. People Oriented Design. https://www.peopleorienteddesign.com.au/projects-research/architecture/synapse-saif-cairns

Phibbs, P. J., & Young, P. (2005). Housing assistance and non shelter outcomes: Final report. Australian Housing and Urban Research Institute.

Pholeros, P., & Phibbs, P. (2012). Constructing and maintaining houses. Closing the Gap Clearinghouse.

Porter, L. (2020). Learning to Live Lawfully on Country. In S. Maddison & S. Nakata (Eds.), Questioning Indigenous-Settler Relations (Vol. 1, pp. 137–146). Springer Singapore. https://doi.org/10.1007/978-981-13-9205-4_9

Power, C. (2021, December 4). Boggabilla residents breathe sigh of relief as town avoids flooding. https://www.abc.net.au/news/2021-12-04/boggabilla-breathes-easy-as-town-avoids-flooding/100674362

Productivity Commission. (2023). Closing the Gap Annual Data Compilation Report July 2023 (p. 61). Productivity Commission.

Queensland Studies Authority. (2008). Relationships to country: Aboriginal people and Torres Strait Islander people. https://www.qcaa.qld.edu.au/downloads/approach2/indigenous_res005_0803.pdf

Quilty, S., Frank Jupurrurla, N., Bailie, R. S., & Gruen, R. L. (2022). Climate, housing, energy and Indigenous health: A call to action. Medical Journal of Australia, 217(1), 9–12. https://doi.org/10.5694/mja2.51610

Schön, D. A. (1983). The reflective practitioner: How professionals think in action. Basic Books.

SGS Economics and Planning, Pholeros, P., & Merrima Design. (2007). Alternative Housing Systems for Indigenous People in Remote Communities. Department of Families, Community Services and Indigenous Affairs.

Smith, S. (2000). The Tin Camps: Self-constructed Housing on the Goodooga Reserve, New South Wales, 1970-96. In Settlement: A History of Australian Indigenous Housing (pp. 179–198). Aboriginal Studies Press.

Standard, K. D. (2010). The Art of Business: Building From Within: Craig Howe's Cultural Architecture. In Art of the Hills: Celebrating Dakota Creative Culture (1st ed., Vol. 4, pp. 32–36).

Torzillo, P., Pholeros, P., & Rainow, S. (2013). The Health Story. Healthabitat. https://www.housingforhealth.com/wp-content/uploads/2013/09/The-Health-Story.pdf

Treasury. (2023a, June 17). Federal government to spend $2 billion on social housing around Australia. Ministers Treasury Portfolio. https://ministers.treasury.gov.au/ministers/julie-collins-2022/media-releases/albanese-government-delivers-immediate-2-billion#:~:text=Today%20the%20Albanese%20Government%20announces,more%20parts%20of%20our%20nation.

Treasury. (2023b, September 11). Delivering on the $10 billion Housing Australia Future Fund. Ministers Treasury Portfolio. https://ministers.treasury.gov.au/ministers/julie-collins-2022/media-releases/delivering-10-billion-housing-australia-future-fund

United Nations. (1948). Universal Declaration of Human Rights. United Nations. https://www.un.org/en/about-us/universal-declaration-of-human-rights

University of Technology Sydney. (2018, March 26). How to fix the worst number in Australian architecture. University of Technology Sydney. https://www.uts.edu.au/news/education/how-fix-worst-number-australian-architecture

Ware, V.-A. (2013). Housing strategies that improve Indigenous health outcomes. AIHW.

Weizman, E. (2017). Forensic architecture: Violence at the threshold of detectability. Zone Books.

Welsh, W., Herron, N., Rohead-O'Brien, H., Cook, S., Aryal, S., Mitchell, P., Ransley, T., & Cassel, R. (2014). Context statement for the Gwydir subregion. Product 1.1 for the Northern Inland Catchments Bioregional Assessment. Department of the Environment, Bureau of Meteorology, CSIRO and Geoscience Australia.

Williams, M. (2018). Ngaa-bi-nya Aboriginal and Torres Strait Islander program evaluation framework. Evaluation Journal of Australasia, 18(1), 6–20. https://doi.org/10.1177/1035719X18760141

Wong, K. (2018, May 31). We need to stop innovating in Indigenous housing and get on with Closing the Gap. The Conversation. https://theconversation.com/we-need-to-stop-innovating-in-indigenous-housing-and-get-on-with-closing-the-gap-96266

APPENDIX A: LIMITED POST-OCCUPANCY EVALUATION TRANSCRIPT

07/10/2023

NEW TENANT INTERVIEW TRANSCRIPT

House A:

- In her 60, lives with her granddaughter – has a big family though so often there are visitors
- Likes the house
- Has a car - Granddaughter has a car and often parks out the back
- Would prefer an ensuite in the main bedroom
- I commented that you could see out well from the enclosed deck – she responded "yes and you can see in well too!"
- Both houses seemed (House B had privacy screen) to want more privacy in the enclosed deck
- House keeps cool
- Builders took away fire pit due to fire risk?? Family member brought over another one – "it's an important part of our culture"
- The shower screen needed reinforcement – builders came back to fix
- No hole for washer dryer (in the cabinet rather than behind machine) – builders came back to fix
- No screen door in laundry so can't keep open due to bugs
- Said it was better than the Simpson street ones - doesn't know if it was transitional or not
- Would like something else out the back down the back
- Sometimes visitors sleep in the enclosed deck
- Likes and prefers verandas out the back
- Doesn't mind looking the same as the neighbours
- Doesn't hear noise too much
- Could be more private in general
- "Everyone loves the island bench"
- Rooms are okay size
- "There's good lighting"
- Likes and prefers the car entry at the front – accessible
- Enough storage
- Would like a lockup car spot
- Keeps mozzies out in enclosed deck
- Neighbours are cousins but don't really talk
- The door to the bedroom doesn't close properly –property managers are coming to fix next week.
- Had play equipment in the front yard

House B:

- I asked if the house is working for her and if she likes it "Yeah I love it"
- Was cool inside
- Said it was really nice for Boggabilla
- Went inside and had a quick look
- Both houses tenants moved in March

APPENDIX B: INTERVIEW QUESTIONS FROM LIMITED POST-OCCUPANCY EVALUATION

Tenant Interview Questions

Siting – the way the house is sitting on the block

1. Do you use the outdoor areas? Any suggestions for improvement?

2. Do you often see the neighbours? Is it private enough for you? Would you prefer more screening or is it fine to have that contact with your neighbour?

3. Do you and your household/family use the outdoor areas? Is there enough shade? What other features would be useful to you eg. veg garden, swing set, outdoor kitchen or sink etc.

4. When we designed the building, a lot of discussion around connection to the street – would you more often use the front space (enclosed verandah) or the rear space – visual connection to the street

5. Both the houses are the same but mirrored. If you were to design it, would you have it the same as the neighbours or different?

Spatial (Interior) – Internal layout

6. Are the rooms big enough for your family? Is everyone happy with their bedrooms? Are the lounge rooms big enough?
    a) Any suggestions for how you would change the layout?
    b) Do you often have extended family stay with you, if so, where do they sleep? – understanding of this need for flexibility, is this relevant for your family or too early to tell?

7. Is there enough privacy within your home? How's the noise between rooms?

8. Do you have enough storage space in your home?

9. Do you often use the enclosed decked area at the front of your house? Does it stay warm in the winter and cool in summer? Does it keep the mosquitos out? Does this space work for you?

Material & Construction

10. Does the house stay relatively cool in the recent warm summer, do you need to use the fans and the AC?

11. Are there any other insights or recommendations you would like to share that could improve this house?

APPENDIX C: INTERVIEW QUESTIONS

Procurement and Project Delivery

1. What are some challenges faced with the design and construction of Aboriginal housing in remote communities such as Boggabilla?

a. How do you think these challenges can be circumvented?

2. What are the factors that influence Aboriginal housing outcomes?

a. Do you have comments on the below in relation to this?

i. Funding

ii. Environment (Climate)

iii. Location (Regional vs Urban settings)

iv. Procurement processes/methods ? eg. D&C, DA etc.

3. How do you think the recent turbulent political and economic climate has effected recent/current Aboriginal housing projects?

a. Do you have comments on the below in relation to this?

i. Climate change (recent floods and fires)

ii. Covid-19

iii. Stimulus package

4. What are the pros and cons of the different ways that Aboriginal housing is delivered eg. pre-fab, tender, bulk, D&C etc.? Is there one you have seen to be more successful?

5. What is your position on trying to improve Aboriginal housing through new building technologies? Eg. SIP, Hebel, Pre-fab (CSI) AHO Innovation Program

6. How can future models of Aboriginal housing be improved in terms of design and delivery?

Culturally Responsive Design

7. What do you think are the most important factors to consider when creating culturally responsive housing for Aboriginal tenants?

a. How does cost impact these factors?

b. How does maintenance impact these factors?

c. Other?

8. Are there any culturally specific attributes to providing housing services to remote Aboriginal Communities?

9. What kind of processes or policies has your company/organisation developed in relation to Aboriginal advancement?

a. How were these informed?

b. How are they mandated?

c. Is the application of these policies evaluated?

d. What kind of opportunities for Indigenous employment are there within your company/organisation?

Community Consultation

10. What kind of consultation is had with host communities and/or service providers during the design and delivery of Aboriginal housing? How do you feel this can be improved?

APPENDIX D: ETHICS APPROVAL

Dear Applicant

Re: ETH21-6107 - "A socio-technical evaluation of Aboriginal Housing in the New South Wales north-western districts."

Thank you for your response to the Committee's comments for your project. The Committee agreed that this application now meets the requirements of the National Statement on Ethical Conduct in Human Research (2007) and has been approved on that basis. You are therefore authorised to commence activities as outlined in your application. You are reminded that this letter constitutes ethics approval only. This research project must also be undertaken in accordance with all UTS policies and guidelines including the Research Management Policy.

Your approval number is UTS HREC REF NO. ETH21-6107.

Approval will be for a period of five (5) years from the date of this correspondence subject to the submission of annual progress reports.

The following standard conditions apply to your approval:

- Your approval number must be included in all participant material and advertisements. Any advertisements on Staff Connect without an approval number will be removed.
- The Principal Investigator will immediately report anything that might warrant review of ethical approval of the project to the Ethics Secretariat.
- The Principal Investigator will notify the Committee of any event that requires a modification to the protocol or other project documents, and submit any required amendments prior to implementation. Instructions on how to submit an amendment application can be found here.
- The Principal Investigator will promptly report adverse events to the Ethics Secretariat. An adverse event is any event (anticipated or otherwise) that has a negative impact on participants, researchers or the reputation of the University. Adverse events can also include privacy breaches, loss of data and damage to property.
- The Principal Investigator will report to the UTS HREC or UTS MREC annually and notify the Committee when the project is completed at all sites. The Principal Investigator will notify the Committee of any plan to extend the duration of the project past the approval period listed above.
- The Principal Investigator will obtain any additional approvals or authorisations as required (e.g. from other ethics committees, collaborating institutions, supporting organisations).
- The Principal Investigator will notify the Committee of his or her inability to continue as Principal Investigator including the name of and contact information for a replacement.

This research must be
undertaken in compliance with the Australian Code for the Responsible Conduct of Research and National Statement on Ethical Conduct in Human Research.

You should consider this your official letter of approval. If you require a hardcopy please contact the Ethics Secretariat.

If you have any queries about your ethics approval, or require any amendments to your research in the future, please don't hesitate to contact the Ethics Secretariat and quote the ethics application number (e.g. ETH20-xxxx) in all correspondence.

Yours sincerely,
The Research Ethics Secretariat

On behalf of the UTS Human Research Ethics Committees
C/- Research Office
University of Technology Sydney
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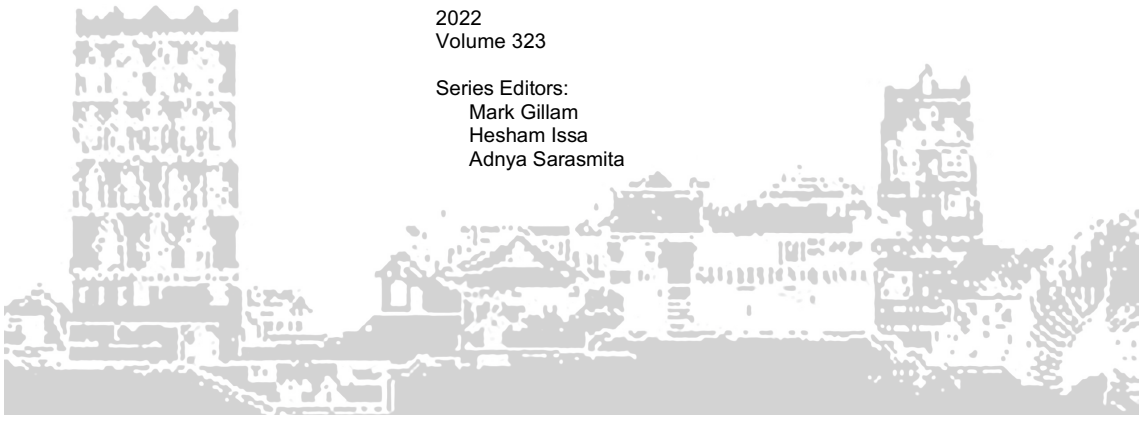

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EXPLORING THE POLITICAL AND ECONOMIC PRESSURES WITHIN THE DESIGN AND DELIVERY OF ABORIGINAL HOUSING IN THE NORTH-WESTERN DISTRICTS NEW SOUTH WALES, AUSTRALIA

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EXPLORING THE POLITICAL AND ECONOMIC PRESSURES WITHIN THE DESIGN AND DELIVERY OF ABORIGINAL HOUSING IN THE NORTH-WESTERN DISTRICTS NEW SOUTH WALES, AUSTRALIA.

◆ ◆ ◆

This research explores the political and economic pressures and the efficacy of various procurement processes within the design and delivery of Aboriginal housing in the north-western districts of New South Wales, Australia.

Centred on the design and delivery of a case study in Boggabilla, this research presents a socio-technical evaluation of Aboriginal housing to inform future models and improvements of culturally responsive design.

The current global pandemic has placed immense political pressure on Indigenous housing, including the declared urgent need for a 'Great Reset' in 2020 which led to increased funding being injected into the Australian economy. The NSW Government implemented a large social housing fund of $183.3m as part of their COVID-19 economic recovery strategy[1]. Despite this investment, it seems that Aboriginal housing continues to fail to meet the needs of Aboriginal tenants. In 2021, depreciating provision of services and material shortages as a consequence of the pandemic led construction costs to rise in New South Wales by "6.6 per cent – the highest annual growth on record for the state."[2] Rising construction costs encourage government agencies to 'rationalise' the design of Aboriginal housing, with focus on cost, maintenance and turnover timeframes. This is often to the detriment of effective design outcomes that address the cultural and domiciliary needs of Aboriginal people.

Questioning the logic of economic rationalisation over delivering culturally responsive outcomes, this research evaluates iterative architectural documentation of a case study project in Boggabilla. The design process is critically reviewed, tracking the initial concepts through to completion of construction. This will be accompanied by interviews with members of the Aboriginal Housing Office, builders, architects and service providers to explore various perspectives within the design and delivery of Aboriginal housing. This reflective and practice-based research explores the political and economic pressures within Aboriginal housing.

Mindful of the legacy of flawed Aboriginal housing and contextualised within the case study of Boggabilla, this research seeks to contribute to the evaluation and development of new housing models to respond to the needs of Aboriginal residents.

1. INTRODUCTION

Political and economic pressures often encourage government agencies to 'rationalise' the design and delivery of Aboriginal housing, placing preference on cost, maintenance and timely delivery of dwellings. This economic focus on the quantity rather than the quality of housing is often to the detriment of effective design that addresses the cultural and domiciliary needs of Aboriginal people.

This research presents a socio-technical evaluation of the design, procurement, and project delivery of Aboriginal housing in north-western districts of New South Wales Australia.

Centred on a case study analysis of a project to be built in Boggabilla, the research evaluates the transformation from the initial design concept through to commencing of construction. Over three years, the research tracks significant political and economic pressures that shaped the design and delivery of the two

dwellings in Boggabilla. The research explores challenges faced such as pressures to spend stimulus money, the global pandemic, natural disasters, and the hardships faced when building in remote communities. Through this analysis, this research seeks to contribute to improved Aboriginal housing outcomes that can contribute to Aboriginal advancement.

Fig. 1: Image of housing in Boggabilla, New South Wales, Australia (Source: Jack Cooper 2020)

2. CONTEXT

2.1. Context: Socio Political

The Centre for Appropriate Technology (CAT) conducted a post-occupancy evaluation of Alice Springs Town Camp Housing between 2008 and 2011. In 2013 they released a report stating that although there was an overall consensus that occupants were happy to have received new or fixed homes, issues remained that '*have been noted in previous POEs of Indigenous housing, and yet remain unresolved even in this program, despite the wealth of knowledge gathered over 30 years of appropriate Indigenous housing development in remote Australia.*'[3]

In 2018, a 10-Year Review of the Council of Australian Government's (COAG) Closing the Gap Strategy was released. It stated that the *'outcomes are fundamentally the result of underlying structural factors, such as social determinants, institutional racism, the quality of housing, and access to appropriate primary health care.*'[4] This explicitly outlines the cruciality of appropriate Indigenous Housing in successfully closing the gap between Indigenous and non-Indigenous Australians. According to the Australian Institute of Health and Welfare (AIHW), between 2018 and 2019 *"1 in 5 Indigenous households were living in dwellings that did not meet an acceptable standard."*[5]

In July 2020, Australian Prime Minister at the time Scott Morrison commented that the initial Closing the

Gap targets were *"wrong-headed"*, lacking proper consultation with Indigenous Australians.[6] These have since been replaced with new targets, developed by a network of Aboriginal and Torres Strait Islander community-controlled organisations called the Coalition of Peaks. The ninth socio-economic outcome aims for Aboriginal and Torres Strait Islander people to *'secure appropriate, affordable housing that is aligned with their priorities and needs.'*[7] However in July 2022, Sarah Collard commented in her article in The Guardian *"The nation is failing to address the systemic disadvantages experienced by First Nations communities, according to the latest Closing the Gap data released by the Productivity Commission on Thursday."*[8] The report outlined that four of the seventeen targets are on track, none of which are improvements in Aboriginal housing.

Existing research outlines the prevalence of a one-size-fits-all model and its impact within Indigenous communities. In 'Housing Strategies That Improve Indigenous Health Outcomes' - a document produced for Closing the Gap, author Vicki-Ann Ware addresses the ignorance of differences between Indigenous and non-Indigenous peoples' ways of living. She suggests that the design elements typically found in a lot of homes across Australia are often not built for the environment or cultural needs within Indigenous communities so therefore should not be implemented within Aboriginal communities[9]. Erin Park posted an article that discusses the impacts of this failed consideration in Indigenous Housing design. She presents the notion of Australian 'Taj Mahals,' to describe large structures that are not fit for purpose which in turn become un-utilised, architectural follies.[10] Paul Memmott demonstrates the consequences of this 'mainstreaming' and outlines how it may *'inadvertently disadvantage a cultural group due to conflict with their customary values, practices and obligations, in which case it can legally be construed as constituting indirect discrimination.'*[11] He describes a 'cultural design paradigm' which outlines the importance of addressing the specific cultural needs of Indigenous peoples. He emphasises that *"to competently design appropriate residential accommodation for Aboriginal people who have traditionally oriented lifestyles, architects must understand the nature of those lifestyles, particularly in the domiciliary context."*[12] Memmott builds further explores this with Cathy Keys as they outline the need for 'cultural sustainability' where architecture is *"sensitive to cross-cultural contexts and values and not overly dominated by Western concepts of what architecture is."*[13]

The current global pandemic has placed immense political pressure on Indigenous housing, including the declared urgent need for a 'Great Reset' in 2020 which led to increased funding being injected into the Australian economy. The New South Wales Government implemented a large social housing fund of $183.3m as part of their COVID-19 economic recovery strategy.[14] In 2021, depreciating provision of services and material shortages led construction costs to rise in New South Wales by *"6.6 per cent – the highest annual growth on record for the state."*[15] It is economic shifts like this that encourage government agencies to focus on cost, maintenance and turnover timeframes, disregarding the specific cultural needs of Indigenous communities.

Some efforts have been made to address the issues within Aboriginal housing however the desired targets and outcomes are yet to be met. Despite various investments in response to pressures from the pandemic, it seems that Aboriginal housing still fails to meet the needs of Aboriginal tenants. As outlined in the above literature review, a deep understanding of the social, spatial and cultural uses within domiciliary environments is a crucial factor of successful, culturally responsive design. Through a socio-technical evaluation of the challenges within the design and delivery of Aboriginal housing, my research seeks to contribute knowledge to inform future improvements within the Aboriginal housing sector.

Fig. 2: Photograph of the vacant lot in Boggabilla before construction commenced. (Source: Jack Cooper 2020)

2.2. Context: Boggabilla

Boggabilla is part of the Gamilaraay nation and is situated just below the Queensland border in New South Wales. It is a 35km travel from Goondiwindi, 115km south from Moree and 15km from the Aboriginal community of Toomelah, which faces ongoing issues such as poverty and racism.

It is important to note the political ramifications within border towns such as Toomelah and Boggabilla where service provision and jurisdiction become complicated and harder to access especially in recent times where COVID-19 has seen state border closures. Residents in these towns who would usually travel to Goondiwindi for goods and services, as well as in times of emergency, had to travel much further to Moree. The separation between large, serviced towns and small Aboriginal communities, missions and reserves, highlights the colonial imposition and mechanism of exclusion that has been prevalent since white settlement.

Fig. 3: Map of Australia, highlighting Boggabilla where case study project is located (left) and Map of Aboriginal Nations within New South Wales, locating Boggabilla (right)

3. RESEARCH METHODOLOGY

This research has emerged from experience gained working on a series of funded research projects. Within my role as a researcher for the University of Technology Sydney (UTS) School of Architecture and a member of The Indigenous Infrastructure and Sustainable Housing Alliance (TIISHA) I have had the opportunity to work with various remote Indigenous communities and government agencies.

The case study project is centred on the design and construction of two two-bedroom dwellings for ageing residents and/or single parents in Boggabilla. Within the project, my role is to assist in the development of culturally responsive design principles and staged architectural documentation. My research tracks this case study project to provide insights into the social and economic decision-making within the delivery of Aboriginal housing in north-western New South Wales.

My research adopts both an action and reflection-based practice methodology. This draws reference to philosopher and professor of urban planning Donald Schön's 'The Reflective Practitioner: How Professionals Think in Action.' Schön proposes that *'our knowledge is in our action'*[16] and we can use a reflective-based practice to gain insight into our experiences and thought processes. Schön describes, *'this capacity to do the right thing.… exhibiting the more that we know in what we do by the way in which we do it, is what we mean by knowing-in-action. And this capacity to respond to surprise through improvisation on the spot is what we mean by reflection-in-action.'*[17] Whereas 'reflection on action' is a 'cognitive postmortem,' reflecting, analysing, and evaluating in retrospect.[18] I have adapted all three of these both within my role in the Boggabilla project and as a researcher presenting this paper.

The *'reflection on action'* within my research retrospectively evaluates moments of impact within design, procurement and project delivery. *'Reflection in action'* is utilised to adapt to the challenges presently faced, taking into account the *'unintended changes.'* [19]An emphasis is placed by Schön on not only problem solving within this practice but 'problem setting' where '*each decision is a local experiment that contributes to the reframing of the problem'* [20]*Problem setting allows this research to inform future improvements in culturally responsive design through the constant adaptive and reflective process, asking 'what if, what is next, so what?'*[21]

Jennifer Greenwood emphasises the importance of 'reflection before action' and 'practical reasoning', where one takes into account a 'series of if/then propositions.'[22] Within my own 'reflection before action', it is important to note the potential bias within this methodology as everyone has their own orientation, background and positioning.Architectural bias could also become present where a designer may sub-consciously override culturally specific needs of Aboriginal residents with what they see best fit as per their professional knowledge. To minimise the risk of my research becoming what Linda Finlay critiques to be 'psychologically explosive'[23], the reflection is accompanied by findings from literature review, architectural documentation, and interviews with government agency representatives, builders, architects and Aboriginal housing providers.

Although significance must be placed on existing data and models of culturally responsive housing, the research methodology adapted within this paper is a contestation of traditional methodologies - shifting the focus to generative and emergent knowledge. It examines systemic issues that have remained present for centuries but focus on innovation and unknown outcomes. The project is yet to be complete and there is an opportunity for future post-occupancy evaluation so it is important to reflect on past, current and emerging issues within the process. This outlines the necessity to adapt 'reflection in action,' 'reflection on action' and 'knowing in action.'

The foundation of this adapted research methodology is that a deep reflection on the social, political, and economic impacts throughout the design and delivery process can assist in addressing such impacts to inform future improvements.

4. COLLECTION OF DATA (RESEARCH METHODS)

1. **Architectural drawings, diagrams and models** of the case study dwellings in Boggabilla are analysed to explore the changes and developments within the iterative design process. This iterative architectural documentation will be evaluated to critically review the design process in Boggabilla, from the initial concepts to development approval and construction.

2. **Interviews** with seven participants from three participant groups; Government Agency Representatives, Builders/trades/Architects, and Aboriginal Housing Providers. I asked the same set of questions in each interview, focusing on the political and economic challenges faced as well as the various processes of procurement within the design and delivery of Aboriginal housing. This allowed me to analyse both similar and competing perspectives within Aboriginal housing in north-western districts of New South Wales. It is important to note that I have received interview responses from largely non-Indigenous perspectives and must take this into consideration. This consultation can highlight issues from these participant's experience in the field however as outlined by preliminary and emerging research, it is essential to present Aboriginal perspectives to inform Aboriginal advancement. I intend to continue to interview more participants to contribute to this knowledge.

5. EVALUATION FRAMEWORK

The collected data is analysed through a socio-technical lens to assess the political and economic influence on the design, procurement, and project delivery processes in Aboriginal housing in north-western districts of New South Wales.

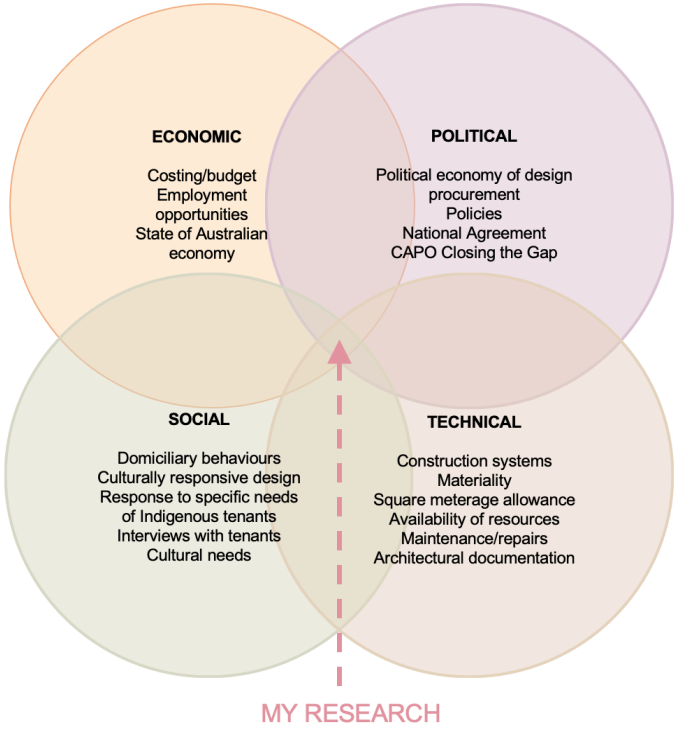

Fig. 4: Ven diagram demonstrating the evaluation framework that has been developed within this research

A Socio-technical analysis is explained through Markusson and co-authors' suggestion that when looking at technologies, the evaluation framework must be socio-technical and co-evolutionary. The authors describe socio-technical systems as analysing *'the full range of technical, economic, political, etc. uncertainties and their interactions,'*[24] where 'uncertainties' refers to gaps in knowledge of such studied technology. They add that *"socio- technical systems are therefore conceptualised as clusters of aligned elements, such as technical artefacts, knowledge, markets, regulation, policies, cultural meaning, rules, infrastructure, etc. Focusing on systems recognises that technologies are embedded within societal systems."*[25]

The socio-technical framework I have developed for this research is influenced by Wiebe E. Bijker and John Law's definition of social technology, stating *"ultimately its purpose is to produce changes in human behaviour;"* and outlines the intrinsic connection between humans and objects; constantly influencing and being defined by one another[26]. In this instance, the technological object is the Aboriginal housing. It is therefore highlighted as essential that this research not only assesses the social aspects of the procurement process but also the determinants of which the house politically and economically came to be.

This framework presents a foundation for an in-depth analysis of the procurement of the works in Boggabilla, exploring design conception through to the constructed dwellings. My research will also evaluate the performance of such processes and their capacity to inform future culturally responsive housing.

6. ANALYSIS & FINDINGS

During the conducted interviews, I asked the participants to discuss the recent turbulent political and economic climate and how it has affected recent Aboriginal housing projects. The interview responses presented three prominent discussions about; pressures to spend stimulus package funding, the difficulties in building regionally, and whether the traditional or Design and Construct procurement process best suits these emerging economic and political demands. The project in Boggabilla presents a case study example of this Design and Construct process and highlights the challenges faced when trying to deliver a culturally responsive model of Aboriginal housing.

6.1. Pressures to Spend Stimulus Funding

In 2020, the Aboriginal Housing Office received $212 million of funding to deliver housing and maintenance upgrades and encourage economic recovery associated with the global pandemic. This was to spend over the next four years.[27] In June 2022 they received another $149.8 million to build and deliver 200 new homes and refurbish 260 existing homes over the next 3 years. This funding was part of a $2.8 billion Housing Package the Government delivered through the 2022-23 Budget.[28]

According to interview responses, it seems that despite these large injections of funds, the challenge remains to deliver a culturally responsive outcome within these rigid timeframes. A manager within the Aboriginal Housing Office commented in our interview *"one of the things that's quite perverse with us is that… we are funded annually by the government, but we're delivering projects that take multiple years."* He suggested that *"these projects need sustained investment and commitment over many years and they need to go really at the pace of community as well." He also commented that "you don't want to be railroading over community, just to meet some target set by a public servant."* However, whilst alluding to these unrealistic timeframes, an interviewed architect suggested that decisions are being made around "*spending stimulus money"* and "*to make certain ministers, politicians and senior executives look good"* rather than *"actually delivering housing which is of high quality."*

An increase in funding has led to a rapidly rising demand of delivery count for the Aboriginal Housing Office. A construction manager highlighted that *"demand is outstripping supply dramatically and I think that's probably the biggest challenge."* Further exploring this point, another manager highlighted the difficulty in conducting thorough community engagement before the stimulus money expires stating *"it's a lot of sites"* and *"getting out and getting out frequently is going to be a challenge given that we also need to get things progressing."* He also commented *"we don't have the resources"* and highlighted the strain on their regional teams as their geographic coverage is so widely spread. A project officer who works in planning and acquisitions within the Aboriginal Housing Office highlighted that there is also strain within Councils in regional areas where *"they have very little resources, and they take too long which affects our capacity and ability to deliver…"*

In 2020, the Aboriginal Housing Office developed a document called the 'AHO Guidelines' which presented a series of culturally responsive design principles to be considered in the designing of Aboriginal Housing. These guidelines are implemented within every housing project that the Aboriginal Housing Office delivers. A construction manager within this government agency highlighted the significance of developing and maintaining these guidelines "*because the effect is much broader now given our project delivery unit count…if you're not getting it right, it's obviously has a greater impact."*

In 2022, communities within New South Wales suffered various devastating floods. Bronwyn Herbert wrote in an ABC News article *"Lismore was hit with its biggest flood in recorded history in February, displacing thousands of people and damaging more than 1,800 homes."*[29] One of the architects I interviewed commented on these recent floods where *"the need for housing became so apparent as a fundamental right, and then it's sort of exposed it as well. It highlighted the problems in housing"* He suggested that the media coverage of these devastating events perhaps aligned more understanding of *"housing conditions and how precarious houses can be."* He also commented that despite there being funding for Aboriginal housing, *"now it's super competitive against other regions and other forms ofhousing that wasn't there before. I think that's going to be interesting in the in the next five to ten years."*

6.2. Challenges of Building Regionally

Interview responses also highlighted the significant challenges in building within remote communities, impacting the delivery of Aboriginal housing located within these contexts.

A manager within the Aboriginal Housing Office suggested that *"there is a lack of understanding at a high level about the realities of the cost of delivering…especially in remote areas."* These realities are alluded to by a builder who is working on the case study project in Boggabilla. He commented, *"for what I build out here, I could probably build two houses in town."* He continued to highlight that materials cost less in metro areas so he orders a bulk of products which then takes money and investment out of the local, regional communities. An architect commented that most of the housing in these remote areas *"attracted a rather large cost"* however *"the quality doesn't seem to be delivered as well as what you would get in a more urban setting."* A construction manager from the Aboriginal Housing Office outlined that *"obviously a poorly designed house can cost the same to build as a well-designed house,"* placing emphasis on "*investing in the planning component and the design component"* to reach a culturally responsive outcome.

Discussions within the interviews also outlined the shortage of quality builders within remote communities. A manager within the Aboriginal Housing Office commented, *"the businesses that we work with successfully, we go back and we use them repeatedly"* however he also outlined that *"across the whole of New South Wales, we've got a shortage of suitable builders that really can work like that."* A construction manager also suggested, *"broadly the greatest need is just having a builder available in the location you need them.* A member of Moree Local Aboriginal Land Council who lives in town suggested *"our mob would appreciate talking to builders. But… because of COVID and everything else builders are hard to come by."* A builder also alluded to this, reflecting on a potential reason for this shortage of trades. He highlighted *"we've been in a drought for so long. Farmers have been doing it so hard for the last ten years or so. Now that they're out of a drought and the construction industry is booming, they want to rebuild."*

6.3. The Boggabilla Project: A Case Study Analysis of The Design and Construct Procurement Process

Within the conducted interviews, comparisons were drawn between the traditional and Design and Construct procurement process and whether one is more suited to address the challenges faced in the delivery of Aboriginal housing. The case study project in Boggabilla is being delivered using this Design and Construct process which consists of a consultant preparing the design, which is then taken over, completed, and constructed by a contracted builder.

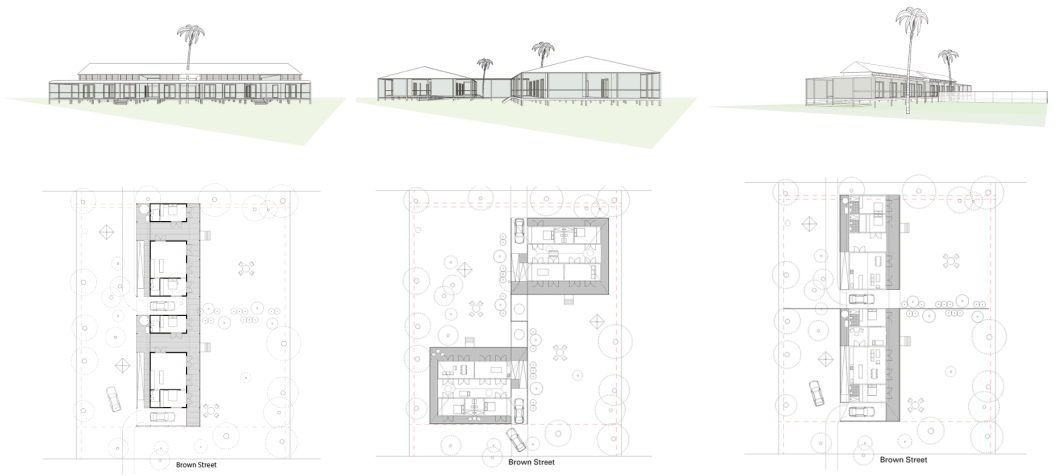

Fig. 5: Architectural drawings of the three options within the first schematic design for the Boggabilla case study project

In December 2020, our research and architectural team completed the first schematic design for two two-bedroom dwellings to be built on a vacant lot in Boggabilla. In February 2021, we travelled to Boggabilla for a site visit and to carry out a participatory workshop with local primary school students. This consultation was unfortunately extremely under-represented and did not directly inform the development of design principles as initially intended. Through this workshop, we aimed to gain a greater cultural understanding however this was not the case and in fact, the participatory workshop became somewhat tokenistic and redundant.

At this stage in the project, the design failed to address significant culturally responsive design principles with too much emphasis placed on siting and orientation of the dwellings. Concerns were raised around privacy and overlooking issues and the internal layout of the dwellings being extremely underdeveloped. Due to the under-represented consultation and the design team's continued failure to develop a culturally responsive design, the Aboriginal Housing Office as our client became dissatisfied. Being forced to re-assess, our team was restructured. With more experience within the Aboriginal housing sector, the leading of the architectural project was transferred to two colleagues and me.

In March 2021, my team developed a set of culturally responsive design principles that were informed by previously conducted surveys with members of Aboriginal communities. These newly developed principles were then implemented within conducted a cut-and-paste exercise to create the next design iteration. This generative design method allowed us to visualise and extract elements of existing housing designs that received the highest satisfaction and performance rates in surveys with Aboriginal tenants from a previous project my team had worked on.

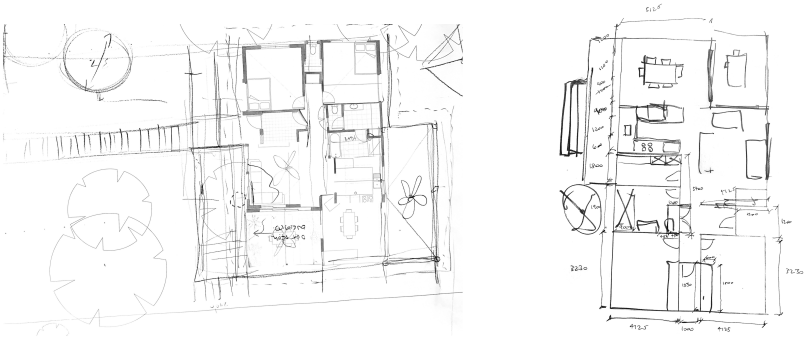

Fig. 6: Scanned drawings from the culturally responsive design principle informed cut-and-paste exercise within the Boggabilla Project

In April 2021, we presented the new scheme to the Aboriginal Housing Office. The design was well received and was followed by minor amendments to reduce the square meterage, landscaping, layout, and materiality, attempting to minimise cost and maintenance. Originally the project was to be submitted as a Development Application however the prolonged design process led the Aboriginal Housing Office to deliver as a Design and Construct which was submitted in May 2021.

In September 2021 the project tender was issued, in December it was awarded, and the control of the design was transferred to the builder. My architectural team was then onboarded by the builder to complete the architectural documentation for the project. This fortunately allowed us to encourage the inclusion of specific design elements that were informed by our previously developed culturally responsive principles.

The most significant adjustment made to the design during this stage was the removal of the detached carport, with a suggestion to instead attach it to the house for improved safety and accessibility. This however resulted in the loss of private, external living space and the outdoor kitchen, two elements that were directly informed and deemed significant as per our developed design principles. An element that we encouraged to remain and did stay within the design was the enclosed outdoor living space. The interior layout of the dwelling also remained relatively the same.

The design was also adapted to an alternative construction method using Structurally Insulated Panels instead of the initially intended traditional timber stud walls. The drawing set had to be adjusted accordingly. During this design revision stage, the builder changed the supplier of the Structurally Insulated Panels. These new material specifications resulted in some of this drawing work becoming abortive as we had to redraw the entire main structure of the two dwellings. The engineers only provided advice and consultation after we had begun these revisions which resulted in more abortive work. These engineers also created a new roof design,

advising that a structural steel frame would support this which then made the structural component of the Structurally Insulated Panels redundant.

The final drawings issued for construction displayed an over-engineered design that took far longer to generate than anticipated. After winning the tender, the builder proposed construction to commence in June 2022 to be completed in October. In late September, I went out to Boggabilla to conduct a site visit and examine how the project was tracking. It appeared that construction commenced only earlier that month with only the main steel flooring structure in. Installation of the Structurally Insulated Panels had commenced but there were not yet any complete walls or roof. After discussions with my architectural team and the builder on site, it is hoped that the project will be complete by end of the year, but it is not certain.

All interviewed members of the Aboriginal Housing Office highlighted their favour of Design and Construct over the traditional process of procurement stating that it is the *"quicker and easier solution"* for them. *An* architect presented an opposing opinion, stating *"whilst it's faster and it's less hassle… I don't think it returns the best quality housing…the builder will always argue otherwise."* He compared Design and Construct to *"a conventional delivery model where the architect will fight for certain design aspects…that in my opinion would make for a better building."*

The Boggabilla project is a somewhat unique example of Design and Construct as we were able to be involved in the documentation after the builder won the tender. An interviewed architect suggested that there needs to be "*less knee-jerk allocations to substandard builders to do Design and Construct"* who often make decisions *"governed by the triple bottom line or economic decisions."* This poses the question; how culturally responsive would the design outcome be if we were not responsible for the architectural documentation? What could our schematic designs have transformed into without reference to culturally responsive design principles?

Fig. 7: Photograph of construction site in Boggabilla, New South Wales during site visit in September 2022

4. CONCLUSION

Through an analysis of preliminary research and interview responses, there are evident political and economic pressures in delivering Aboriginal housing stock. Interview responses outlined the push to spend government funding, difficulties in building regionally and reflected on whether the traditional or Design and Construct procurement process best suits these emerging economic and political demands. This research has highlighted that impetus within the delivery of Aboriginal housing is too often driven by economic efficiencies rather than longevity and social outcomes thus mandating more low-quality housing outcomes rather than less housing of a higher quality.

According to interview responses, it seems that the Design and Construct procurement process can sometimes respond to economic and time pressures however it can also be to the detriment of quality Aboriginal housing. The case study of the Boggabilla project with its delays in consultation, construction, and abortive work, poses the question of how much faster and more efficient the Design and Construct process really is? The project in Boggabilla is just one example of the Design and Construct model. I will continue to conduct further research to better investigate the efficacy of alternative procurement processes.

Referencing Schön's reflective practice, my research presents both a current and retrospective reflection of the project in Boggabilla to inform future improvements and models of culturally responsive design. It is important to note that this project is not yet complete, with an opportunity for future research and post-occupancy evaluation. I intend to continue tracking the project in Boggabilla until construction is complete. I will also conduct further interviews with members of the Aboriginal Housing Office, builders, tradesmen, architects, and Indigenous housing providers to explore the political and economic pressures involved in the delivery of Aboriginal housing in north-western districts of New South Wales.

NOTES AND REFERENCES

[1] NSW Aboriginal Housing Office. 2021. '$43.3 Million in New Funding for the AHO', October. https://www.aho.nsw.gov.au/news/433-million-new-funding-aho.

[2] Australian Financial News and afndaily. "Construction Costs Soar amid Labour and Material Shortage," November 11, 2021. https://afndaily.com.au/2021/11/11/construction- costs-soar-amid-labour-and-material-shortage/.

[3] Centre for Appropriate Technology. 2013. 'Housing Experience: Post Occupancy Evaluation of Alice Springs Town Camp Housing 2008-2011'. Centre for Appropriate Technology.

[4] Holland, Chris. 2018. 'A Ten-Year Review: The Closing the Gap Strategy and Recommendations for Reset'. The Close the Gap Campaign Steering Committee.

[5] Australian Institute of Health and Welfare. "Indigenous Housing." Australia: AIHW, September 16, 2021. https://www.aihw.gov.au/reports/australias-welfare/indigenous-housing.

[6] Higgins, Isabella, Sarah Collard, and Brad Ryan. 2020. 'Closing the Gap Agreement Reset with 16 New Targets to Improve Lives of Aboriginal and Torres Strait Islander Australians', July. https://www.abc.net.au/news/2020-07-30/closing-gap-targets-agreement- aboriginal-torres-strait-islander/12506232.

[7] Closing the Gap Annual Data Compilation Report. East Melbourne VIC, Australian Capital Territory: Productivity Commission, 2022.

[8] Collard, Sarah. "Australia Still Failing to Hit More than Two-Thirds of Closing the Gap Targets, New Data Shows." The Guardian, July 28, 2022. https://www.theguardian.com/ australia-news/2022/jul/28/australia-still-failing-to-hit-more-than-two-thirds-of-closing-the- gap-targets-new-data-shows.

[9] Ware, Vicki-Ann. 2013. 'Housing Strategies That Improve Indigenous Health Outcomes'. Canberra: AIHW.

[10] Parke, Erin. 2020. 'As Governments Spend Big on Stimulus, WA Communities Warn of More Official "Taj Mahals"'. ABC News. 16 August 2020. https://www.abc.net.au/ news/2020-08-16/the-taj-mahals-of-northern-western-australia/12546806.

[11] Memmott, Paul. 2004. "Aboriginal Housing: Has the State of the Art Improved?" Architecture Australia.

[12] Memmott, Paul. 2004. 'Aboriginal Housing: Has the State of the Art Improved?' Architecture Australia. p2

[13] Memmott, Paul, and Cathy Keys. 2015. 'Redefining Architecture to Accommodate Cultural Difference: Designing for Cultural Sustainability'. In *Architectural Science Review*, 58:278–89.

[14] Aboriginal Housing Office. 2021. '$43.3 Million in New Funding for the AHO', October. https://www.aho.nsw.gov.au/news/433-million-new-funding-aho.

[15] Australian Financial News and afndaily. "Construction Costs Soar amid Labour and Material Shortage," November 11, 2021. https://afndaily.com.au/2021/11/11/construction- costs-soar-amid-labour-and-material-shortage/.

[16] Schön, Donald A. The Reflective Practitioner: How Professionals Think in Action. New York: Basic Books, 1983.

[17] Ibid

[18] Ibid

[19] Ibid

[20] Ibid

[21] Ibid

[22] Greenwood, Jennifer. "Reflective Practice: A Critique of the Work of Argyris and Schon." Journal of Advanced Nursing 18, no. 8 (August 1993): 1183–87. https://doi.org/ 10.1046/j.1365-2648.1993.18081183.x.

[23] Finlay, Linda. "Reflecting on 'Reflective Practice.'" Practise-based Professional Learning Centre Centre for Excellence in Teaching and Learning, January 2008.

[24] Markusson, Nils, Florian Kern, Jim Watson, Stathis Arapostathis, Hannah Chalmers, Navraj Ghaleigh, Philip Heptonstall, Peter Pearson, David Rossati, and Stewart Russell. 2012. 'A Socio-Technical Framework for Assessing the Viability of Carbon Capture and Storage Technology'. In Technological Forecasting and Social Change, 5th ed., 79:903–18. https://www.sciencedirect.com/science/article/pii/S0040162511002769.

[25] Ibid

[26] Bijker, Wiebe E., and John Law, eds. 1992. Shaping Technology/Building Society: Studies in Sociotechnical Change. Inside Technology. Cambridge, Mass: MIT Press.

[27] NSW Aboriginal Housing Office. "Strong Families Strong Communities - What We Have Delivered – Housing Solutions." NSW Aboriginal Housing Office, 2022. https:// www.aho.nsw.gov.au/strong-family-strong-communities/housing-solutions.

[28] NSW Department of Planning and Environment (last). "$554.1 Million Investment for New and Improved Social and Aboriginal Housing," June 21, 2022. https:// www.planning.nsw.gov.au/News/2022/Millions-investment-for-new-and-improved-social- and-Aboriginal-housing

[29]Herbert, Bronwyn. "Lismore Council Estimates $500 Million Spend on Retreat Plan for Flood-Affected Homes." ABC News, September 27, 2022. https://www.abc.net.au/ news/2022-09-27/lismore-council-housing-strategy-floods-buyback/101475594.