The Cost of Housing in remote Indigenous Communities: Views from the Northern Territory Construction Industry

Anna Szava, Mark Moran, Bruce Walker, Gerry West

2007
The Centre for Appropriate Technology (CAT) is the national Indigenous science and technology organisation. CAT's vision is Happy and Safe communities of Indigenous peoples and its purpose is to secure sustainable livelihoods through appropriate technology. CAT is currently funded from a variety of sources including the Commonwealth and State and Territory governments and private sources.

CAT papers document the research, planning and engagement and technical advisory services undertaken by the organisation. Apart from any use permitted under the Copyright Act 1968, no part may be reproduced by any means without prior permission.

The views and opinions expressed in this document are those of the author/project team and do not necessarily reflect the views of the Centre for Appropriate Technology.

www.icat.org.au
The Cost of Housing in Remote Indigenous Communities: Views from the Northern Territory Construction Industry

July 2007

Szava, A. Moran, M. Walker, B. West, G.

Centre for Appropriate Technology
Acknowledgements

The support of the suppliers, builders, project managers, architects, quantity surveyors and housing managers from the construction industry and Australian and Northern Territory government staff who participated in this study is gratefully acknowledged. Their interest in, and willingness to contribute information to the study was remarkable.

Also gratefully acknowledged are the staff of Northern Territory Government departments Local Government, Housing and Sport (DLGHS) and Department of Planning and Infrastructure (DPI) who made available regional and remote area actual construction and housing costs data.

These people demonstrated that they have a wealth of knowledge, although their views are seldom sought, and a keenness to collaboratively improve remote area housing delivery.
The Cost of Housing in Remote Indigenous Communities: Views from the Northern Territory Construction Industry
July 2007

CONTENTS

1 INTRODUCTION ................................................................. 1
2 METHODOLOGY .................................................................. 2
3 BACKGROUND ..................................................................... 3
  3.1 Unmet Need in Indigenous Housing in the Northern Territory ..................... 3
  3.2 Funding Framework for Indigenous Housing .................................................. 6
  3.3 Increase in Remote Housing Prices ................................................................. 7
4 VIEWS OF CONSTRUCTION INDUSTRY PARTICIPANTS ......................... 9
  4.1 Macroeconomic Forces .............................................................................. 10
  4.2 Capacity Restraints in the Construction Industry ............................................ 13
  4.3 Risk Associated with Remote Area Construction ......................................... 17
  4.4 Lifecycle and Functionality of Remote Housing ........................................... 22
  4.5 Lifecycle Cost and Prefabrication of Remote Housing ................................. 26
  4.6 Mixed Purposes ......................................................................................... 29
5 SUMMARY AND CONCLUSIONS .................................................. 32
6 RECOMMENDATIONS FOR FURTHER RESEARCH .............................. 37

APPENDIX 1 TABLES AND MAPS ................................................. 39
APPENDIX 2 INTERVIEW QUESTIONS ............................................... 43
1 Introduction

Regardless of the presence of large-scale programs and yearly supply of new houses, there continues to be greatly inadequate results from investments in Indigenous housing in terms of housing numbers relative to population. The general condition of houses as well as the capacity of community organisations and individuals to be integrated into the housing delivery process also remain inadequate.

It has been recognised in the past that there is no single answer to the needs and aspirations of remote communities. Housing is not the only service that is in short supply. Still, there is an expectation that meeting Indigenous housing needs\(^1\) will result in highly improved social and economic outcomes and enhanced physical and emotional wellbeing.

These expectations result in a growing pressure on the Australian and Northern Territory (NT) Governments to eliminate unmet housing needs in remote Indigenous communities. The slow delivery of new housing programs is often justified by relating it to the increasing cost of remote housing construction.

The housing supply chain for Indigenous communities has been investigated many times. The most frequently examined segments in the supply system are influences from policy, funding issues, the design and appropriateness of housing for Indigenous occupants, and its management and maintenance. Fewer studies have explored supply chain aspects relating to the industry\(^2\) delivering housing, or residents’ engagement with the housing delivery system.

This study set out to find some understanding of what drives the cost of remote Indigenous housing ever higher. In particular, the study sought the views of the construction industry, predominantly in Central Australia, about their perceptions and practices of dealing with planning, costing, logistics, risks, and about comparing building technologies. The study explored the following propositions:

- Nationwide macroeconomic forces, unrelated to Indigenous issues, brought on predominantly by a boom in the mining industry have propelled prices up.
- There are significant additional risks priced into in remote area work which could be shared or better managed to reduce the risk premium and bring prices down.

---

1 The statistical definition of housing needs used by the NT Government (DLGHS) is a limited understanding of needs estimate, calculated on the basis of the ideal average of 1.8 person/bedroom. It disregards any other aspects of needs or aspirations, such as disability, cultural appropriateness or affordability.

2 Construction industry, or industry, for this study is defined as: all parties engaged in designing, constructing and maintaining buildings; including private contractors, housing organisations and some government departments.
• The construction industry is required to meet mixed purposes i.e., provide capacity building and training, substitute for community governance, and sustain the local economy through contract requirements to purchase materials locally.

• Low cost housing is impractical in remote communities where high standards and robust construction are required to maintain functional facilities throughout the lifecycle of the houses against a harsh environment, intensive use, and uncertainties of repair and maintenance regimes.

• Lowering standards will lower the construction cost but not the lifecycle cost of housing.

2 Methodology

Data for analysis was obtained from a variety of sources. Primary data sources comprised structured and semi-structured interviews with members of the construction industry. The interviews were mostly individual, with some face-to-face and some over the telephone. There were a small number of group interviews with government staff.

Secondary data sources included government databases made accessible to the researcher, and publicly available industry data and statistical information.

In the selection of interview participants we sought to include a sample of those members of the NT construction industry who have worked or are currently involved in remote housing, as well as other major stakeholders of the immediate delivery process.

A total of 21 people were interviewed for the study in 18 extensive and 3 short interviews. The interviewee list included 5 builders or managers of construction companies, 2 architects, one Indigenous Community Housing Organisation (ICHO) housing manager, 7 Government officials from 4 State and Commonwealth Departments, 3 project managers, 2 quantity surveyors, and a kit house supplier.

Interviews focused on the participants’ particular field of engagement with Indigenous housing and accordingly not all interview questions were used with all participants. The main themes of the interviews were:

• Planning and programming
• Costing issues and changes in prices
• Housing outcomes
• Standards, regulations and guidelines
• Practice and capacity
• On-site versus prefabricated housing delivery.

The Interview Questions can be found in Appendix 2.
The analysis of emerging patterns and themes from interviews was complemented with an ongoing examination of the secondary data and some of the relevant recent reports on Indigenous housing issues.

**Project scope:**

- The study’s intention was not to evaluate past or current housing policies or programs, but to give voice to those within the construction industry delivering them.
- The study’s focus was on cost and delivery factors, and not design or technical solutions.
- We limited our detailed investigation to Central Australia, although some of the secondary data allowed comparisons with wider (Territory and nationwide) trends.
- Only those people engaged in the provision of, or with expertise in the construction of remote Indigenous housing, were included in the study.

The participants’ interest in, and willingness to contribute to, this study was remarkable. It was often stressed that although they have a wealth of knowledge their views are seldom sought. There was an eagerness to collaborate in the improvement of housing delivery. As expressed by one architect:

“The provision of housing is not a product but a process. If we get the process right it will produce the right product, otherwise it is doomed to fail.”

### 3 Background

To provides background for the study, some of the most important aspects of the Northern Territory Indigenous housing system are discussed in the following section. These include the dimensions of housing needs in remote communities, and an overview of the escalation of construction costs.

The planning and supply process for the delivery of housing is a fundamental facet of the housing system in remote Indigenous communities. However, the ongoing transformation in policy and services provision since mid-2007, and in particular the recommendations and reform which followed the Community Housing and Infrastructure Programme (CHIP) review, render many aspects of the planning, decision making and supply mechanisms uncertain, and have forced the discussion of planning and supply of remote Indigenous housing beyond the scope of this report.

### 3.1 Unmet Need in Indigenous Housing in the Northern Territory

Population and housing statistics show enormous unmet housing needs in remote Indigenous settlements, compounded by generally short lifecycles of housing, and growing community populations.
The following data serves as background information to appreciate the magnitude of the housing needs in the Northern Territory and especially in the Alice Springs service area. Figures and Tables illustrating the information in this section can be found in Appendix 1.

Households and population

In 2006 53,662 people, or approximately 28% of the Northern Territory’s population, were Indigenous (Census 2006). Twenty percent (20%) of all households in the NT were Indigenous, the largest proportion among all States and Territories (Census 2006). As well, the NT has by far the largest average Indigenous households at 5.32 persons per Indigenous household (CHINS 2006).

Of the Territory’s Indigenous population, 4,350 (8%) live in remote communities and 36,590 (68%) live in very remote communities (CHINS 2006). The vast majority of these people can be assumed to live in community housing, as 90% of permanent housing in discrete Indigenous communities is community housing (i.e., managed by ICHOs).

The Apatula Region (an ABS Indigenous statistical region), serviced from Alice Springs, has one of the highest proportions of Indigenous residents (79%) and Indigenous households (62%) in Australia (Census 2006). (The Apatula Region approximately covered the same area as the proposed McDonnell and Central Desert Shires together plus the southern part of the Barkly Shire of the new NT local government system.)

Homelessness and overcrowding

The Australian Institute of Health and Welfare proposes that the extent of housing needs are assessed using a multi-measure needs model (Australian Institute of Health and Welfare, 2005). Of the many dimensions of need this study considers homelessness, overcrowding, and dwelling conditions as most relevant to the context of our inquiry.

Indigenous people are over-represented in all sections of Australia’s homeless population. Overall, 2% of Australia’s people identify as Aboriginal but in 2001 as much as 9% of the homeless were Indigenous. The rate of Indigenous homelessness is by far the highest in the Northern Territory at 288 homeless per 10,000 of the population, with the next highest in Qld with 70 per 10,000 and WA with 64 per 10,000.3

Census data showed the highest rates of homeless Indigenous people in Central Australia, all reported as primary homelessness4 (GISCA 2003). Although the overall number of temporary dwellings in discrete communities in the NT fell from 977 to 679 between 1999 and 2001

---

4 Primary homelessness includes people without conventional accommodation, such as people living in derelict buildings, improvised homes, tents and sleep-outs (Australian Institute of Health and Welfare, 2005 and Chamberlain 2004).
(Commonwealth of Australia 2002) and to 638 in 2006, the 2006 CHINS reported 1734 people still living in temporary dwellings in discrete communities in the NT.

A high proportion of Indigenous Australians live in overcrowded conditions with detrimental effects to their health. Overcrowding also puts stress in particular on health hardware, such as bathroom, kitchen and laundry facilities, and power and sewerage systems. Across Australia some 20% of Indigenous people were living in overcrowded conditions in 2001, while in the NT 32% of all Indigenous households and 55% of Indigenous community housing were overcrowded. (Census 2001).

In 2004 in the NT, in ICHO–managed dwellings, an average 2.7 people lived in each bedroom, the highest ratio in the country. Of overcrowded households, 54% were in very remote areas, indicating that the majority of the overcrowding of Indigenous households occurred in community housing (GISCA 2003). Approximately a quarter of Indigenous community houses in the Territory needed either major repair or replacement (CHINS 2001).

In 2001, improvised or temporary dwellings in Northern Territory Indigenous communities comprised a third of all such dwellings nationally, with the percentage of temporary dwellings ranging from 1.8% (Yilli Reung) to 32.2% (Alice Springs) (CHINS 2006).

Lack of growth of the housing stock

The number of permanent dwellings in discrete Indigenous communities grew from 6,485 in 1999 to 7,216 in 2001 then dropped to 7,196 in 2006. An average of 7 people lived in each permanent dwelling in 1999, compared with 6 in 2001 and 5 in 2006. The 2006 CHINS reports a steady reduction in the numbers of temporary dwellings (CHINS 2006).

Housing need

In 2001, 3,873 Indigenous households in the NT required a total of 11,451 additional bedrooms, an average of 3 per household (Australian Institute of Health and Welfare 2005). According to information obtained from the DLGHS in March 2007, in December 2006 the need in the NT was a staggering 11,610 new bedrooms. Based on an average house size of 3.5 bedrooms per house, if this number of bedrooms is provided through new housing stock, approximately 3,300 new houses would need to be built, which would equal approximately 50% growth on existing stock.

The statistical measure of housing needs of the remote Indigenous population is number of bedrooms required. According to NT Government estimates in December 2006,

---


7 Based on 1.8 standard Australian occupancy rate
$1,292,588,889 was necessary for the elimination of current housing shortage in remote communities.8

These figures illustrate the enormity of the task involved in eliminating the housing shortage in remote Indigenous communities in the Northern Territory, and the significance of the escalating construction costs at this scale of needs.

3.2 Funding Framework for Indigenous Housing in the Northern Territory

The housing program

The Overarching Agreement on Indigenous Affairs was signed by the Australian and the Northern Territory Governments in April 2005. It contains a number of Schedules, including an Indigenous Housing Schedule, which underpinned the development of the Indigenous Housing and Infrastructure Agreement 2005–2008 (IHIA) and the Common Policy Framework – Northern Territory Indigenous Housing Program. The principles of the IHIA and the Common Policy Framework are consistent with the Building Better Futures: Indigenous Housing to 2010, the Australian Government’s National Indigenous Housing Strategy.9

The Indigenous Housing and Infrastructure Agreement 2005–2008, signed in December 2005, provides for the pooling of Northern Territory and Australian Government funds and programs and for the delivery of all Indigenous housing programs by the NT Government. This bilateral agreement is the vehicle through which Community Housing and Infrastructure Programme (CHIP) funding is channelled for the Northern Territory Indigenous Housing Program (NTIHP).10 The main objectives of the NTIHP are:

- to increase access to affordable and appropriate housing for Indigenous people,
- to improve the management (maintenance and repair) of housing, and
- to promote employment and training for Indigenous people in housing management and construction in Indigenous communities (Fien at al, 2007, p31).

Somewhat simplifying the above objectives, a government official summarised the aims as “the bottom-line of the housing program is to increase the number of bedrooms”.

As a result of the CHIP review, from 2008–09 CHIP will be abolished and replaced by the Australian Remote Indigenous Accommodation (ARIA) Programme.11 The seven-year

---

8 Information obtained from the DLGHS in March 2007; NTG calculations are based on $100,000 per bedroom average cost.
The Cost of Housing in Remote Indigenous Communities, CAT, 2007

strategy commencing in 2007–08 will start with a large-scale funding increase for the first, transition year.

Table 1: Current formula for calculating the bedroom needs of an Indigenous community

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>HOW COUNTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Population</td>
<td>Number of people counted in community</td>
</tr>
<tr>
<td>B Bedrooms</td>
<td>Number of bedrooms in community</td>
</tr>
<tr>
<td>C New bedrooms needed</td>
<td>( A \div 1.8 - B )</td>
</tr>
<tr>
<td>D Replace improvised bedrooms</td>
<td>Number of improvised bedrooms in community</td>
</tr>
<tr>
<td>E Replace bedrooms in poor condition</td>
<td>Number of bedrooms in community needing to be replaced</td>
</tr>
<tr>
<td>F Bedrooms needing renovation</td>
<td>Number of bedrooms in community needing major repair or renovation</td>
</tr>
<tr>
<td>G TOTAL BEDROOMS NEED</td>
<td>( C + D + E + F )</td>
</tr>
</tbody>
</table>


The NT Emergency Response (NTER) beginning in June 2007 introduced a number of other players into the housing delivery process, including Indigenous Business Australia (IBA) and Defence Housing Australia (DHA). It also injected a large amount of funding – a total of $793 million in four years, starting July 2008 - to be spent on housing upgrades and the construction of new homes in Indigenous communities as well as creating training and employment opportunities.12

In the new paradigm of housing delivery the Commonwealth Government becomes the landlord of remote Indigenous housing. Responsibility for the delivery of municipal and infrastructure services according to the Department of Families, Community Services and Indigenous Affairs (FaCSIA), is left with the NT Government for all towns and communities, which now include town camps and outstations.13

3.3 Increase in Remote Housing Prices

Remote housing prices increased dramatically over the past ten years. Table 2 (next page) compares the cost of building Indigenous housing across the NT regions between 2000/01 and 2004/05, based on DLGHS data, with the 06/07 information added from DPI tenders.14

The change to the exclusive use of the Central Remote Housing Delivery Model (CRM) in Central Australia15 and the 2003 departmental decision that all remote housing must meet

---

Australian and Territory building codes brought about higher quality construction, but at a higher cost. This is reflected in the leap in housing costs in Central Australia around 2004, as illustrated in the Yapakurlangu and Central Remote regions in Table 2 and the Kintore examples in Table 3 (next page).

Table 3 shows a sample of remote and town-based Indigenous housing in Central Australia. It has been compiled from information received from the DLGHS, from DPI’s website and from quantity surveyors. Since the housing programs are not evenly distributed between years and communities, the examples are not consistent in terms of comparison. Nevertheless they demonstrate a clear pattern of considerable growth in housing cost between 2000 and 2007.

Table 2: Examples of increasing housing costs in the Northern Territory (a)

<table>
<thead>
<tr>
<th>Region</th>
<th>00/01</th>
<th>01/02</th>
<th>02/03</th>
<th>03/04</th>
<th>04/05</th>
<th>06/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yilli Reung</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average cost</td>
<td>$165,170</td>
<td>$191,825</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>110%</td>
<td>115%</td>
<td>147%</td>
<td>151%</td>
<td></td>
</tr>
<tr>
<td>Yapakurlangu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Average cost</td>
<td>$139,160</td>
<td>$152,405</td>
<td>$160,000</td>
<td>$204,065</td>
<td>$210,250</td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>110%</td>
<td>115%</td>
<td>147%</td>
<td>151%</td>
<td></td>
</tr>
<tr>
<td>Miwatj</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>6</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Average cost</td>
<td>$148,750</td>
<td>$173,299</td>
<td>$188,561</td>
<td>$230,000</td>
<td>$257,800</td>
<td>$399,916</td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>117%</td>
<td>127%</td>
<td>155%</td>
<td>173%</td>
<td>269%</td>
</tr>
<tr>
<td>Central Remote</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Average cost</td>
<td>$135,150</td>
<td>$182,000</td>
<td></td>
<td></td>
<td></td>
<td>$335,025</td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>135%</td>
<td></td>
<td></td>
<td></td>
<td>248%</td>
</tr>
<tr>
<td>Garrak Jarru</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>6</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Average cost</td>
<td>$150,619</td>
<td>$160,287</td>
<td>$211,000</td>
<td>$188,560</td>
<td>$210,750</td>
<td>$399,692</td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>106%</td>
<td>140%</td>
<td>125%</td>
<td>140%</td>
<td>265%</td>
</tr>
<tr>
<td>North West</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Average cost</td>
<td>$167,775</td>
<td>$169,429</td>
<td>$162,045</td>
<td>$209,506</td>
<td>$244,000</td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>101%</td>
<td>97%</td>
<td>125%</td>
<td>145%</td>
<td></td>
</tr>
<tr>
<td>Alice Springs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. houses</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Average cost</td>
<td>$110,000</td>
<td>$148,676</td>
<td></td>
<td></td>
<td></td>
<td>$270,000</td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>135%</td>
<td></td>
<td></td>
<td></td>
<td>245%</td>
</tr>
<tr>
<td>Total houses</td>
<td>20</td>
<td>35</td>
<td>20</td>
<td>23</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Total cost</td>
<td>$2,986,775</td>
<td>$5,738,910</td>
<td>$3,530,795</td>
<td>$4,518,948</td>
<td>$3,217,000</td>
<td>$9,369,280</td>
</tr>
<tr>
<td>Territory av.</td>
<td>149,339</td>
<td>163,969</td>
<td>176,540</td>
<td>196,476</td>
<td>229,786</td>
<td>347,010</td>
</tr>
<tr>
<td>Increase</td>
<td>100%</td>
<td>110%</td>
<td>118%</td>
<td>132%</td>
<td>154%</td>
<td>232%</td>
</tr>
</tbody>
</table>

(a) Up to 2005 the table shows the estimated cost of three bedroom houses only, at the time of grant confirmations no allocations, but does not include the cost of project management,

Source: Data sourced from DLGHS and DPIFM, NT Government

15 CRM is based on a centralised process of planning and design, with 6 standard designs communities can chose from.
Table 3: Examples of increasing housing costs in Central Australia (a)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice Springs town camp</td>
<td>$199,000 (3bm)</td>
<td>$270,000 (3bm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>100%</td>
<td>136%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kintore</td>
<td>$150,800</td>
<td>$180,000 (3bm)</td>
<td>$360,000 (4bm)</td>
<td>$370,000 (3brm tender)</td>
<td></td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>100%</td>
<td>119%</td>
<td>238%</td>
<td>245%</td>
<td></td>
</tr>
<tr>
<td>Anmatjere</td>
<td>$180,000 (3bm)</td>
<td></td>
<td></td>
<td>$279,900 (duplex)</td>
<td></td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>100%</td>
<td></td>
<td></td>
<td>156%</td>
<td></td>
</tr>
<tr>
<td>Yuendumu</td>
<td>$180,000 (3bm)</td>
<td></td>
<td></td>
<td>$335,000 (prefab) (a)</td>
<td></td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>100%</td>
<td></td>
<td></td>
<td>186%</td>
<td></td>
</tr>
</tbody>
</table>

(a) As no DLGHS data is available yet for 2007 we used this amount which is the accepted tender price for 16 units built in the Central Remote Region, using prefabricated houses

*Source:* Data sourced from DLGHS and DPIFM, NT Government

The first half of the period saw a less dramatic increase than the second three years, when the average prices suddenly almost doubled, increasing from $182,000 to $335,000. It is important to note that while the 2003 cost refers to on-site masonry construction, the 2007 data is on prefabricated housing (see footnote 16). The Kintore houses are all masonry construction, standard models. It is remarkable how the cost of practically identical scope of work has more than doubled in the last three years.

The increasing price of servicing lots, i.e., connecting services such as water, waste and power, in remote communities also adds considerably to housing costs. While the cost of service extension to a lot (assuming that head infrastructure was in place) would have ranged between $22,000 and $30,000 in 1999/2000, it now averages $50,000. The amounts above are quoted for sewer connection, whereas inclusion of an on-site septic system adds approximately $25,000.

Circumstances even within the same community may be quite different, as a Finke example demonstrates where there was a $60,000 difference between the costs of servicing two lots in the same year. The cost of servicing 22 lots in Wadeye amounted to $1.6M in 2006-07, which equals $72,700 per lot. For planning purposes, DLGHS budgets $40,000 per lot for servicing. This number has been in use for quite a few years.

### 4 Views of Construction Industry Participants

As described in the previous section, the construction of new remote Indigenous housing is delivered through an open market tendering process intended to introduce competitive downward pressures on prices. However, in practice, the process has proven insufficient in restraining significant cost increases.
Section 4 explores views of participants in the housing delivery system on why remote area Indigenous housing costs are increasing so rapidly.

4.1 Macroeconomic Forces

Throughout 2006 and 2007, high level concern has been expressed by governments and in the media over the apparently high and increasing costs of construction of housing for remote Indigenous communities. As shown in Section 3, there is clear evidence that remote community housing is increasingly expensive. The phenomenon of increasing costs, however, is not unique to this particular segment of the construction industry.

The cost of housing construction has increased not only in remote Indigenous housing in Central Australia, but throughout the nation. This section of the report explores the main macroeconomic forces affecting housing prices nationwide and the reflections of the construction industry on these issues.

Historic perspective

Taking a historic view of building construction prices in the Northern Territory reveals the increase in prices in the Territory lagging behind Australian price increases until early 2004, at which stage the rate of increase exceeded, and then surpassed the national rate in September 2006. In the Northern Territory, building construction prices increased 40.5% from December 2003 to March 2007. Annual price increases over this period were 10.8% over 2004, 10.6% over 2005, and 12.1% over 2006.16

Chart 1: Price indexes for building construction, wages and fuel

![Price Index Chart](chart.png)

*Source:* Producer Price indexes (ABS 6427.0), tables 15 & 16; Labour Price index (ABS 6345.0); Consumer Price Index (ABS 6401.0), Australian Bureau of Statistics

Industry experts estimate the cumulative increase in the cost of construction in the Northern Territory between 64–80% since 2003, with an additional 5% for remote areas. This upsurge

---

16Producer Price indexes (ABS 6427.0), tables 15 & 16; Labour Price index (ABS 6345.0); Consumer Price Index (ABS 6401.0), Australian Bureau of Statistics
is explained in part by the NT construction prices catching up with the Eastern seaboard and closing the historical lag.

The two main elements of construction prices – labour and materials – have been changing at different rates. There is a general agreement among industry representations that the wages component of cost follows a steeper curve in relation to the cost of supplies despite spikes in the prices of some materials.

**Material prices**

All construction industry participants reported that steel, PVC and copper prices rose dramatically and the cost of timber, cement and concrete blocks has also risen. The cost of steel peaked at $8000/ton from $3000, although prices normalized since. Structural steel prices generally increased by 200% in the past 6 years, with different products increasing at different rates, e.g., universal beams more and SHS (square hollow section) less. The price of concrete was reported to have gone up by 30%.

The volatility of copper prices in 2006, when quotes were good only for the day, drove up the cost of plumbing and electrical work, and even the cost of paint increased by 9% since 2000. Generally, it is estimated that there was an 80–100% increase in material prices for the past 6–7 years.

**Fuel and transport costs**

The overall increase in the cost of construction in remote locations is compounded by the rising cost of transport, which increased 30% in the three years 2004–2007. The impact of higher transport costs is especially felt in the Central Australian region where all building materials have to be freighted to Alice Springs by road or railway before they are shipped out to remote areas. Fuel prices, a major component in transport costs, are considerably higher in Alice Springs and remote areas, thus further escalating remote area transport costs.

Beyond transport, fuel prices affect other costs in remote construction, such as running building machinery and the supporting equipment of the builders’ camps and compounds in communities.

**Workforce issues**

A historic view of the construction labour market in the NT illustrates that wages were well over the national award in the 1970’s, then stood still for 25 years, and skyrocketed again in since 2000.

Industry views regarding the ratio of the cost components of construction varied among contributors to this survey, ranging from 40% labour, 50% material and 10% other costs to labour being up to 60% of the total cost.

Most interviewees agreed that the increases in housing prices are driven more dramatically by the cost of labour than by other factors, including the rising material and fuel prices.
According to a quantity surveyor, approximately one third of the increase in housing costs since 2000 could be accounted for by the rising price of materials; the rest is mostly due to the wages component.

Opinions regarding the rate of increase in labour cost varied, and ranged from 20–30% to 40–50% during this period. The cost of remote work sits at the high end of this spectrum, simply because there is a building boom. With abundant demand in town for trades, builders are busy and do not try to undercut each other. The two quotes below are examples of the observations offered:

“I need to make the reasonably strong point that, based on my 18 years experience in remote housing, market conditions have changed.” (quantity surveyor)

“People do not want to work in remote sites, and they do not have to as there is too much work in town.” (builder)

The statistics of construction activity support the respondents’ views regarding the reasons for the unavailability of workers. Major construction projects are siphoning workers away from the Territory to other States, and from rural and remote regions to the major centres within the NT.

Chart 2: Value of construction work done, total building

![Chart 2: Value of construction work done, total building](image)

Source: Construction Work Done, Australia, Preliminary (ABS 8755.0), Australian Bureau of Statistics

At the end of 2006 the total value of current construction work underway in the NT was $3.4 billion, with $2.3 billion worth of work expected to be completed within the 2006–07 financial year. In comparison the output of NT construction industry in 2004–05 was $2.25 billion, with $1.73 billion in engineering construction (roads, bridges, engineering works) and $0.5 billion in building construction (residential and non-residential building). This growth rate places demands on the construction workforce to grow at a similar pace.

Current and planned construction activity in the Northern Territory exceeds the available workforce and will continue to place upward pressure on wage costs.

Conclusion – macroeconomic forces

---

Rising construction costs are not unique to remote Indigenous housing but part of a national trend, and the NT has been merely catching up with growth rates in other states in the last few years.

Nationwide macroeconomic forces, predominantly brought on by a boom in the mining industry, and affecting all major cost components of construction work, are largely responsible for the escalating construction costs. Interventions from areas of Indigenous policy or service provision would be ineffective in reducing these costs, as industry wide supply and demand pressures are beyond their influence.

It is apparent that the general shortage of labour for construction of remote area housing will not be resolved via reliance on market forces alone. While it is unclear what specific market, policy, or regulatory incentives or interventions would be effective in enabling the NT or the national construction industry to supply enough houses in order to meet remote Indigenous needs within a foreseeable timeframe, it appears that innovative approaches to increase workforce capacity are required.

### 4.2 Capacity Restraints in the Construction Industry

Alice Springs is situated in the centre of a vast region with the closest cities approximately 1500 kms away. This is reflected in the large geographical range of operation of all actors in the remote area construction industry. Builders cover an area of up to 600 km radius, some even more, venturing across the NT borders into Western Australia and South Australia. Their work also includes the Alice Springs town camps. Project managers work across the whole Southern half of the Northern Territory, while government department officers based in Alice Springs travel as far as the Barkly region.

The isolation of Alice Springs and its extremely large service area encourages increases not only in construction prices but exacerbates problems in other aspects of the industry also, particularly in relation to capacity issues.

According to a DPI official, the yearly average number of houses delivered to remote Indigenous communities in Central Australia has been around 22–25 for the last few years. Of the 96 currently registered builders in Alice Springs only 8 or 9 are working in remote communities regularly. Furthermore, there is a shortage of plumbers and electrical contractors willing to take on remote area work and just three building certifiers based in Alice Springs to certify major building work.

There are also a variety of other facilities being built in communities funded from government or other sources, such as health clinics, art centres and child care centres. The construction of these buildings is usually undertaken by the same contractors who are

---

working on housing projects, further reducing labour availability for remote residential construction.

Industry practice

Builders work with a large number of subcontractors. A contractor producing prefabricated houses reports that he subcontracts as much work as possible, including the framing of the transportables. The only works done by his labour force are concreting and cabinetry at the Alice Springs plant, and site placement of the houses in communities. In the case of contractors who build masonry houses, subcontractors are doing about 60% of the work which includes concreting, block laying, structural steel, plumbing, electrical and mechanical trades. Some builders sub-contract almost the entire job and only use their own workforce for finishing work. There is a perception that having a small permanent crew offers better control of the budget. As one builder asserted:

“Better to use subs than have a big crew: you know what the bottom figure is when you start the job, not paying labour on hourly rate, which can get dangerous.”

With only a select group of subcontractors willing to do remote work, and the difficulty associated with coordinating trades where long travel distances are involved, reliance on subcontractors may help prime contractors manage and control costs but reduces their willingness to undertake remote area work. This issue is further discussed in Section 4.3.

Remote work

The reluctance of most trades and skilled labour to work in remote communities reported by all participants, and the resulting lack of competition, exacerbates price increases beyond that caused by the skills shortage alone. Lifestyle comfort may be as decisive a factor as money, and with no shortage of work in town, few builders and tradespeople are willing to go out bush. Working in remote communities not only means being away from family and friends for weeks, but also after a day’s hard physical work, often in harsh conditions, very few creature comforts are available to rest and relax with: the usual camp set up is caravans with noisy reverse cycle airconditioning, little privacy and no alcohol.

An Alice Springs builder reported that they would take on more remote work if they could get labour to do it. Unfortunately, even after offering premium wages, their bush work has decreased by 30–40% over recent years.

One of the larger Alice Springs building companies working in remote communities responds to bush camp hardships by rotating work crews between town and bush jobs. What once may have been considered adventure now seems to have lost its appeal.

There were suggestions that the transient nature of labour in Alice Springs is also an issue. Most workplaces in town find it hard to retain a qualified labour force, which may have more to do with its isolation and the associated lifestyle issues than with the income offered or the actual work conditions.
Engaging community-based workers has been encouraged and even prescribed in some government-funded construction contracts. The issues surrounding approaches and opportunities for local construction workers are discussed in Section 4.6.

**Trades shortage**

The prevailing practice of using subcontractors for most aspects of housing construction assumes that a skilled workforce in all trades with an understanding of the subcontractors' roles and responsibilities is available. However, according to our industry sources, this system does not work seamlessly in reality.

There is a consensus that tradespeople are very expensive. Even consulting and project management firms find it difficult to retain experienced staff. Some explain it with the fact that there is a lot of work around, and the NT construction industry is already working to capacity. This creates a skills shortage on the labour market nationwide, in cities and towns as well as in remote locations. Large projects in Darwin are sourcing people not just from the NT but from all over the country, in some cases from overseas. At least one Central Australian builder sponsors workers from Asia.

All participants in this study emphasised the difficulty of engaging well skilled, experienced tradespeople. Although the above mentioned reasons all contribute to this problem, the fundamental cause, as asserted by most of interviewees, is that there have not been enough apprentices trained in the last 10–15 years. There is a general perception that the new generation of potential trainees have not been offered good enough incentives to take up the trades training and jobs, and the older generation of tradespeople are either unwilling to work for others, had enough of remote work, or have retired.

**Quality of work**

Aside from the cost and unwillingness of the trades to work in remote communities, skills shortages lead to some quality assurance problems as well. Consultants and builders agree that the quality of workmanship is inconsistent and while there are some very good tradesmen, there are also some unreliable subcontractors. Skills shortages that have resulted in unskilled labour performing what would normally be done by a tradesperson. As a former government employee in charge of remote Indigenous housing put it:

> *The biggest issue is that trade skills are increasingly poor, there are quality issues not because they want to cut corners but because they are unable to do it well; most work is done by unskilled labour with minimum trade supervision.*

It was pointed out that tradespeople don’t necessarily know what subcontracting involves and many lack the required skills and approach to manage the job.

The poor quality of workmanship sometimes causes a domino effect in that the non-compliance of the work can cause delays for the head contractor, which then delays the entire delivery process. Tight and often unrealistic construction schedules, with some
contracts including high penalty rates, are another difficulty that either turns builders away from remote work or results in premiums being added to prices to protect themselves.

Capacity over-utilisation also creates problems for rectifying defects during the warranty or defect liability period, which usually extends for one year after handover. Interviewees related that it is often impossible to get the tradespeople back after a year to rectify minor issues, either due to communication problems, e.g., they are out bush somewhere else and not contactable, or because it is a low priority for them. The project manager spends considerable time chasing the builder, the builder chasing the subcontractor, and the clients see the work as unfinished and the house as nonfunctional.

**Conclusion – capacity restraints**

The Central Australian construction industry’s capacity to deliver remote Indigenous housing is affected by many factors, e.g., macroeconomic forces that draw skilled labour away, the isolation of Alice Springs and lifestyle related hardships associated with remote work, and, most importantly, a dearth of new entrants into the building industry. Capacity shortage results in high prices, delays, poor quality workmanship and difficulties in finalising jobs.

Yet housing needs are accelerating, and new housing projects have been announced by the Commonwealth and NT Governments. While the NT construction industry work program is already beyond its capacity, an additional 40 to 100 new Indigenous homes were to be delivered by June 2007 under a Commonwealth program, mostly in the Top End.

At the time of the survey, in Central Australia, the proposed large scale (up to $80M) Alice Springs town camps work was feared to siphon workers off bush jobs, while at least two concurrent NT Government funded remote housing projects were in progress. But even in Alice Springs it was questionable whether there would be enough capacity to implement the proposed town camp upgrading and rebuilding work, which consisted of housing and infrastructure components. The likely labour demand of this work could be up to 100 workers. With labour being about half of total construction cost, half the proposed expenditure, i.e., $40M, equates to approximately 800,000 man hours. Assuming a 4 year staged project that translates to 200,000 hours per year, and calculating with 50 hrs per week per person (usual in major construction work) and with 25% for absence, a 10– strong construction workforce would be necessary.

Most respondents expressed that recruiting and training new apprentices is critical. The recently released NT Shelter report on housing affordability also acknowledged this issue:

> The viability and effectiveness of the housing sector is directly affected by the availability of an appropriately skilled workforce. In regional areas particularly, relatively small labour pools and the lure of higher income potential in urban locations act to exacerbate skill shortages.
Of particular concern is the ageing profile of workers in the construction industry – a trend that is underpinned by a diminishing number of new entrants into the trade industries.

Skill shortages can result in lengthy construction times, artificially inflated costs and general market inefficiency. (SGS Economics and Planning 2007p64)

There are other recommendations from the industry as well. Some builders and government officials involved in Indigenous housing delivery were confident that by setting up prefabrication plants in regional centres and a system of transportable or modular delivery, it would become possible to achieve good results in terms of cost and quantity. Evidence of the NT construction industry’s interest in trying new technologies or methods is reflected in the great number of responses to the calls for tender and expressions of interest for innovative solutions in remote housing.

Several builders and consultants stated that without viable construction businesses in communities there could be no fundamental improvement. A local workforce and locally sourced materials, parts and equipment is essential in reducing the transport costs of people, services and volume of goods. Reduction of the social problems in some communities could positively affect tradespeople’s readiness to undertake remote area work without the inflated prices we see now.

“More people [need to be] trained in their own community, a slow process but it would save in the long run, …[instead of] paying extra to contractors to go out bush, this money could be earned in the community.” (builder employed by an ICHO)

In the new housing delivery system the NT Government tender process will be replaced by one which “will utilise a national competitive procurement process to ensure better outcomes”.20 It is possible that some of the capacity issues discussed above will be positively influenced by this change.

4.3 Risk Associated with Remote Area Construction

There are unique risks in remote Indigenous housing delivery. These risks drive prices high and drive builders away. Anecdotally many builders left the Indigenous housing field because they got ‘badly burnt’, having been locked into unrealistically low prices. By better sharing or managing these risk factors, the escalation of the cost of Indigenous housing may be contained.

---

Mobilisation risk

One of the most often mentioned risk factors is distance. The vast and dispersed “workplace” is characterised by long transport distances between regional centres and communities, and between the communities themselves. The isolation and long transport distances have a compounding effect on all other logistics issues, thereby increasing normal risks. This means that any unforeseen events, conditions, or even small mistakes like miscalculating the amount of material needed, or forgetting a tool, can have substantial consequences. Occasional misjudgement of the range and quantity of stock that is needed to be carried by the building team to undertake work in remote locations, and lack of preparedness for unforeseen necessities was reported by even experienced builders.

In Central Australia, where the Alice Springs-based industry covers an area of approximately 600 km radius, there is a lot of travel between jobs. This is the case even with regional building contracts when builders work in several ‘neighbouring’ communities, and work gangs follow each other around. Similarly to the builders, consultants and project managers reported spending too much time on the road ‘jumping between jobs’.

Difficult road conditions mean longer travel time, with consequences for productivity and wages; they also cause substantial wear and tear on vehicles. Building components may arrive damaged and need to be repaired or replaced. Climatic conditions impose a certain work rhythm as very little work can be scheduled for the hot summer months.

Another severe risk factor is unpredictability. Weather conditions, particularly heavy rain, can render even well-maintained dirt roads impassable in Central Australia, and can interrupt the construction process causing its progress to slow down and fall behind schedule. Other conditions are also often unpredictable. For example, ceremonial or ‘sorry business’ can close down a community or a road for a while; community employed staff turnover is generally large, affecting negotiated provisions; and the availability of local workforce is inconsistent.

The difficulties associated with finding trades and labour to work remotely is a concern shared by all industry players. Many participants noted that only exceptionally good pay can overcome the shortage, and even then only for short spells. The section above on Capacity describes this issue in detail.

The logistics of providing accommodation for the building team is almost always difficult. There is usually no capacity in communities to house a construction crew, and when there is, according to industry sources, there is often an extensive charge. The challenge of sourcing plant and equipment out bush is another issue many builders face. The unpredictability of equipment condition and safety of operation makes this an often unattractive option, with builders preferring to transport their own equipment and further increasing transport costs. Builders have to be thoroughly familiar with local conditions in order to manage these uncertainties.
The transient nature of the workforce in client organisations or in the building team also poses a risk for consultants and project managers and can cause coordination problems and delays. Lack of coordination between the allocation of housing and provision and maintenance of infrastructure services may cause severe delays or cancelled projects according to a project manager. Examples included communities that have been given funding for new housing but have no serviced sites.

Procurement risk

According to industry respondents one avenue where it may be possible to reduce risk is through improved procurement processes. However, although many respondents considered there to be problems with the current process, there was no clear advice on how to improve it.

Under the old procurement system, builders were directly engaged by the community organisations, and contractors and subcontractors used to build up relationships with communities. This helped both parties better understand circumstances and expectations and enhanced trust.

The new tender process does not support the development of relationships between builders and community organisations and individuals. Tenders are run by consultants on behalf of community councils, who are usually provided no choice but to accept the list of selected contractors. This affects the community–builder relationship in a way that contributes to construction work in remote communities being at times a negative experience.

The risks and costs associated with issues of trust and relationships can range from loss or damage to property to loss of workforce, recruited locally or elsewhere, resulting in delays and problems with quality.

Tight construction schedules imposed by government spending cycles are often unrealistic and with high penalty rates. Builders who incur penalties get hurt and either do not want to get involved with remote work again or charge much more to cover the risk associated with meeting contract requirements.

Because of the length of time the tender process takes, builders are unable to plan the work knowing which tradespeople or subcontractors are going to be available and at what price when the work materialises. Therefore they make an estimate at their subcontractors’ costs, trying to err on the safe side.

The recent calls for NT and Commonwealth Government tenders and expressions for interest involved the building of large numbers of houses. It was raised during our survey that although most builders in Central Australia cannot afford to invest in the expansion of their capacity before they are awarded the contract, they are required to show in tender submissions evidence of sufficient capacity to undertake the work.
There are risks associated with the procurement process for consultants and project managers as well. These are manifested in the lack of qualified tenderers; instances when all tenders come in above budget; and delays beyond their control in the release of financing and in letting the tenders.

Economies of scale

Another possible area to reduce risk identified by industry participants is in relation to economies of scale. It was generally agreed that it was not good business to undertake construction below a certain volume of work, though opinions varied on what this minimum is, or whether the difference has a great impact on the cost of the project.

A clear message was that there is “nothing worse than one house in a community” for project management, design, or construction work alike. For smaller builders of on-site projects, economy of scale starts at four houses in one location, with a cost reduction of 10–15%. One example was given in Kintore, where the cost of constructing two houses is now at $370,000 per house, while building four of the same dwellings may have reduced this amount by $40,000 for each.

Increasing contract size for a single project, with a few houses in each location, and a few locations in one region, is an attractive option for builders. A single mobilisation reduces the required workforce relative to one house as well and the remote infrastructure that supports them, as a builder’s example shows: while they would need a 10–man camp for the construction of four houses, a 30–man camp is necessary for the building of 16 houses within the same area.

For prefabricated dwellings good economic value represents 20 to 30 houses “going through the shop” per year, and at least three houses to be delivered for any given location.

Quantity surveyors challenge the view that considerable savings can be achieved by improved economies of scale, claiming that increasing contracts in the past have seen a cost decrease of only about 10% maximum. They argue that as the whole of the NT construction industry is not large enough to achieve sufficient economies of scale to make a dramatic difference in cost. To provide perspective, they refer to individual builders in Queensland who build 1200 homes a year, in comparison with a total house market of 600–700 new houses each year in the Northern Territory.

Prefabrication

Prefabrication, that is, the fabrication of whole houses to be transported to remote areas or of building components transported in kit forms, is thought to generally reduce risk associated with transport, on-site labour availability, coordination and project management and other unpredictable factors. This mode of construction moderates the effects of unpredictability such as road closures and allows for scheduling in a way that best fits with seasons and other local factors. This is especially true with fully transportable houses where builders only have to spend 5–7 days on site, but can work at the plant continuously.
Furthermore, since a complete dwelling is transported in built or kit form, it is less likely that miscalculated stock needs can hold up construction. Prefabrication also reduces quality related risk by enabling consistent quality control.

Prefabrication in town-based plants means better access to suppliers and equipment, and therefore a reduction of the risk factor of distance. The coordination of materials and trades is simpler, and the difficulties of having a large crew on site for extended periods are eliminated: masonry construction involves about 20 trades on site, while transportable houses require only 4-5.

Prefabricated homes are faster to deliver and more can be produced in a given time because of the industrialised technology, usually offering a better economy of scale than the conventional masonry on-site building technology. Some builders, however, maintain that there is no real difference in the length of the entire process, or its responsiveness to demand. Nevertheless, it is said to be a very dramatic style of delivery: virtually instant housing can appear from nowhere and be ready for moving in within a matter of a few days, which is a popular aspect with community residents.

Recruiting and retaining labour is considerably easier in town than for bush work, and the productivity of a plant-based workforce is thought to be better by some of the builders. Prefabrication allows for a “happier workforce, less stress”; the team is more cohesive and productive because they know each other and are familiar with the task at hand.

In comparing prefabricated and on-site construction technologies, one view presented is that cost mainly depends on the economy of scale and the location of the project, e.g., one house in Alice Springs or close by is generally cheaper to build on-site while delivering five houses to a location 600 kms from Alice Springs is generally less expensive with transportables. The prefabricated houses are thought to be less expensive because of the reduction in the cost of establishing a workers’ camp on site, and the need for less remote workforce generally; “they can create more value for the money in the yard”. At the same time, the investment into the prefabricating plant plus the cost of purchase or lease of a large yard in town for the plant and for the storage of completed homes prior to delivery are costs that on-site construction does not attract.

**Budget control**

Costing experts suggest construction budgets can be better controlled by having a good understanding of remote construction issues and conditions and familiarity with the actual location and parties involved. The current reliance on cost estimates based on CPI is not practical in the case of the remote construction industry. A current example is a Kintore house, where a 2007 tender came in at $3000/m² while the estimate derived from CPI forecasts would have been around $2000/m².

Quantity surveyors argued that their contribution to improving budget control could be considerably strengthened if they were able to get regular and reliable feedback on tender
outcomes and actual construction costs, were funded for site visits, and were more actively involved with the tender process.

According to one project manager, a different project management approach could reduce costs in some cases. This involves the project manager being directly involved with the engagement of subcontractors and suppliers, charging a preset fee rather than the usual up to 15% margin of head contractors.

**Conclusion – risk associated with remote area construction**

The main risk factors in the construction of remote Indigenous housing are related to the vast distances that building components and the construction workforce have to travel, and a high level of unpredictability, mostly due to environmental and social factors.

Management of these risk factors requires changes in the procurement process to allow the development of delivery models more suited to the remoteness and the rhythm of construction seasons, and less dependent on the yearly funding cycle. Devising the scope of the contracts to improve economies of scale and to take advantage of prefabrication technologies are other recommendations from the building industry. However, there is a concern among the majority of industry participants that present prefabrication technologies do not offer the same long term value–for–money as on–site construction, as discussed in the following section on lifecycle cost and quality issues.

## 4.4 Lifecycle and Functionality of Remote Housing

Houses in remote communities are thought to have a short lifecycle, which based on anecdotal information averages around 7 years. Their full functionality diminishes very fast, and it becomes compromised in terms of environmental health and safety to a point where repair or major renovation work is not economic, and the dwelling has to be replaced.

The table below shows the number and proportion of ICHO managed houses in the Northern Territory that need to be repaired or replaced.

**Table 4: Condition of permanent dwellings managed by ICHOs in NT**

<table>
<thead>
<tr>
<th></th>
<th>Minor/no repair</th>
<th>Major repair</th>
<th>Replacement</th>
<th>Total no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>%</td>
<td>no.</td>
<td>%</td>
</tr>
<tr>
<td>1999</td>
<td>4188</td>
<td>69.5</td>
<td>1216</td>
<td>20.2</td>
</tr>
<tr>
<td>2001</td>
<td>4742</td>
<td>70.6</td>
<td>1042</td>
<td>15.5</td>
</tr>
<tr>
<td>2006</td>
<td>4432</td>
<td>68.7</td>
<td>1356</td>
<td>21.0</td>
</tr>
</tbody>
</table>

*Source: Housing and Infrastructure in Aboriginal and Torres Strait Islander Communities, Australia, 2006, (CHINS 2006) Commonwealth Families and Community Services and Indigenous Affairs.*

The data shows that the percentage and the number of houses that need replacement constantly grew between 1999 and 2006. At the same time the number of ICHO–managed
permanent dwellings grew from 6023 to 6715 and then dropped to 6448. This seems to indicate that the construction of new houses is not keeping up with the deterioration of the housing stock. Together with the growing number of dwellings in need of major repair, houses with severely diminished functionality now make up nearly one third of ICHO-managed homes.

Nevertheless, the study participants report that in those areas where significant capital interventions (such as a NAHS infrastructure and housing program) have upgraded the housing stock, and where regular cyclic repair and maintenance regimes operate, there is a significant and generally enduring improvement in housing standards. Despite the fact that large scale programs only affect a limited number of communities, some surveys produced data which shows improvements of the functioning of Indigenous housing in some aspects of health hardware and safety.

The functionality of housing

In the NT approximately 76% of the Indigenous population lives in social housing, with 12% in public housing and nearly 64% in community housing. The Australian Institute of Health and Welfare (2005) investigated the housing indicators of this population and found that of those over 15, in 2002, 97.2% had access to working facilities to wash people; 96.5% to wash clothes; and 68.2% to store and prepare food. This indicates a relatively high functionality of bathrooms; however, a nearly a third of houses had failure in kitchen facilities.

Based on data from approximately 4000 houses in Indigenous communities nationwide, the Fixing Houses for Better Health (FHBH) program reported some progress in the general state of community housing during the years between 2003 and 2006. The most significant improvements were in the integrity of exterior and interior walls, and to the safety standards of housing such as gas and electrical safety, hot water systems and fire safety (smoke detectors, fire escape).

Some facilities, however, declined between 2003 and 2006, including the number of wet areas with separate toilet, shower and laundry, an important function in houses where overcrowding is the normal condition. The number of functioning tapware and hot water systems decreased too. The FHBH also reported that the summer thermal performance of houses declined; they found less insulation of walls and roofs, and a smaller number of ceiling fans (FHBH, Commonwealth of Australia 2007).

In many places, including the Alice Springs town camps, in agreement with the FHBH surveys, repair and maintenance planning figures show that most work is done in kitchens and wet areas, with some minor structural work, allocating most resources for plumbing, about half as much for electrical work, and a large proportion for doors and windows.

Lifecycle and functionality

The weak points of Indigenous community housing in terms of technical functionality are ablution and kitchen facilities, electrical safety, and the structural integrity of the envelope.
These functions are vital for the achievement of the nine ‘Healthy Living Practices’ outlined in the Uwankara Palyanyku Kanyintjaku (UPK) report\textsuperscript{21} and subsequent environmental health standards.\textsuperscript{22}

These functions, and the technical components supporting them, are critical to the useful ‘life’ of a remote community house. However, they are vulnerable to the harsh environment of Central Australia, including the high dissolved solids content of the bore water as well as dust, heat and pests. At the same time, these functions are those most susceptible to overuse due to overcrowding.

Most industry participants of this study agreed that generally houses last longer than they used to some years ago, and that this is mainly due to two factors: there seems to be a much greater understanding of how to use houses among the residents of remote communities; and houses now are better designed and built, therefore more durable.

\textit{“Houses built 20 years ago have been more or less trashed, but houses built 5 years ago are in better nick now than those earlier ones would have been.”} (builder)

Overcrowding

Overcrowding is seen as the predominant contributor to the relatively short lifecycles of housing. As described in the background to this report (Section 1), in the Northern Territory 32\% of all Indigenous households and 55\% of Indigenous community houses were overcrowded (Census 2001). Of overcrowded households, 54\% were in very remote areas, indicating that the majority of the overcrowding of Indigenous households occurred in community housing (GISCA 2003) and approximately a quarter of Indigenous community houses in the Territory needed either major repair or replacement (CHINS 2001).

There are some perceptions that a major reason for the lack of improvement in housing conditions is the increased mobility of the Indigenous population, which brings about periods of increased overcrowding, and consequent overuse of facilities. The large numbers of transient visitors is thought to reduce the ability of the residents to maintain their home. Although resolving overcrowding generally is a distant goal, the Life Skills program, currently rolled out in several Central Australian communities, aims to address the issues of families’ capacity and capability involved in looking after their living environment.

Mobility and certain cultural practices may also result in many houses being abandoned for periods of time, effectively increasing pressure on available community housing stock. Many of these houses quickly become dilapidated and turn into shelters for substance abusers,


\textsuperscript{22} The nine Healthy Living Practices developed in the UPK report form the foundations of many environmental health programs and standards, and most importantly of the National Indigenous Housing Guide.
Standard designs

Two fundamental changes were initiated in the early 2000s to improve the quality of remote Indigenous housing in Central Australia, and to increase the control of construction costs. The initiatives were the implementation of the Central Remote Housing Model, and the introduction of compulsory standards to remote construction.

The Central Remote Model (CRM), based on a suite of six standard housing designs, is considered a step in the right direction. Industry participants praise it because it utilises learning from past mistakes and thus raises the quality of housing, and because it attempts to cater for the realities of overcrowding by robust structure and hardware installation. An evaluation of the CRM in 2003 stated that

*The CRM has provided housing in a more efficient manner, and has also provided real training opportunities for Indigenous people. These were the main aims of the CRM and they have been met effectively.* (SGS 2003, p ix)

Since 2001 with a handful of exceptions, remote housing in Central Australia has been supplied based on CRM designs. These dwellings are built on site with concrete block walls and steel framed roof structure, and fitted out according to a high standard of details and specifications. It was pointed out, however, that regardless of how robust the concrete block shell and the hardware inside is, they take a lot of use, abuse, overuse, and they have to be repaired and maintained regularly.

Although not eliminating risk, the standard designs are considered to offer better control over the budget, as contractors' familiarity with what is required reduces the need for unnecessary contingency in their tender. A different viewpoint was that the standard CRM designs are too much of a 'one size fits all' approach and diminish the opportunity for a better match with needs, and do not offer economy of scale.

Standards, regulations, guidelines

Since 2003, based on a DPI decision, all Indigenous housing and other infrastructure projects are built in compliance with the BCA and Australian Standards, regardless of location, although the process of approvals and certification is different from that in regulated areas. The suite of 'standard designs' of the Central Remote Model will need to be reviewed as they do not meet new BCA energy efficiency standards, and also will have to be checked for changes in the Environmental Health Standards, which are due for a review shortly.

The broad attitude expressed towards standards, regulations and guidelines is a general acknowledgement that they are necessary and acceptable. The NT Environmental Health Standards as well as the National Indigenous Housing Guide are considered valuable and useful documents. It was also raised that all work should be standardised, including manufacturers' recommendations for installations not currently covered by Australian Standards, to create consistent minimum standards across community housing construction.
Standards and regulations are considered to generally affect the cost of remote housing mostly through requirements for disability access. Although standards were not perceived to be an overly significant driver of rising costs by builders, evidence shows that there had been a considerable jump in the housing prices in the year 2003/04 (refer Tables 2 and 3).

Meeting standards does make houses costlier but may be a better investment, and one which will pay dividends if Indigenous housing is integrated into mainstream public housing management.

Conclusions – quality and functionality of remote housing

Remote Indigenous housing operates under tremendous pressure because of the harsh environment, unconventional use patterns, mostly due to overcrowding, and because of the difficulties of ensuring that scheduled maintenance and responsive repair programs operate in remote communities.

In the past 10–15 years increased quality standards for Indigenous housing have added additional costs to prices beyond the mere increase of material and labour costs, but have also improved the functional life of community housing. In effect, building remote Indigenous houses in accordance with BCA and other standards has brought remote Indigenous housing under the same quality requirements as mainstream public housing. An important aspect of lifecycle cost is that the number of social housing clients per dwelling in remote community housing is significantly larger than in public housing generally in Australia.

4.5 Lifecycle Cost and Prefabrication of Remote Housing

There is a growing interest in exploring the advantages and opportunities prefabrication methods may offer in solving the cost, quantity and quality issues in the supply of remote Indigenous housing. A number of technologies fit under the umbrella of prefabrication, ranging from prefabrication of entire transportable homes to smaller modules and ‘kits’ for on–site assembly.

The previous sections discussed a number of aspects of prefabrication. Comparing the cost of prefabricated and on–site housing through some examples we found that, for similar quality of construction, prefabrication did not result in significant cost reduction. Skills and labour shortage are also experienced by prefabricators, despite the significantly diminished remote area work. While prefabrication can provide better quality control, economy of scale and better scheduling, the approach does not facilitate employment opportunities or transfer of skills to communities.

In terms of quality and lifecycle cost, there are differing views among the study participants when comparing on–site masonry houses, which comprise most of the recent Central
Australian Indigenous housing supply, and prefabricated, transportable, kit or modular homes, which are the subject of some current pilot programs.

Most agree that for remote locations, similar quality finishes cost similar amounts regardless of a prefab of in-situ build approach. Actual examples in the APY Lands in SA show that there was virtually no difference between the cost of on-site lightweight construction and prefabricated houses built based on the same specifications, in the same location (see Appendix). The cost of delivering 16 prefabricated homes to Central Australian communities under a current contract with DPI is approximately $335,000 per house, higher than the NT average for the same year. These homes, however, are of high standard, with pre-stressed concrete slab floor structure, lightweight steel wall and roof framing, and durable fitout, and follow the recommendations of the National Indigenous Housing Guide.

The majority of the interviewees suggested that the cost of remote community houses evens out once the initial investment and the expenses during the lifecycle of the house are taken into account, which challenges the argument for cost savings by the prefabrication of houses. Despite the controlled environment of offsite fabrication, which promotes quality control, the most widely held opinion is that prefabricated structures are not as durable as on-site construction. It is suggested that as a rule, lightweight steel construction, which at the moment are the only alternative used in prefabrication of community housing, generally does not stand up to the heavy use community housing is subject to, especially in Central Australia. There are also issues with the rusting due to corrosive environment and in the wet areas.

“The best housing I have seen out bush is the ones used now: concrete block, practical, durable” (builder)

“Prefabricated homes are halfway between a permanent house and a trailer–park house” (quantity surveyor)

However, a minority of industry experts disagree with this approach. According to their opinion there is nothing inherent in prefabrication that would make it inferior to on-site housing, as the high quality of products delivered by one Central Australian company proves.

There are claims about the relative ease of, and the lesser need for, repair and maintenance of on-site masonry structures compared with prefabricated ones. It is generally believed that conventional masonry structures are easier to repair, in particular with the skills and materials readily available in remote communities.

The most significant difference between prefabricated lightweight and on-site masonry homes is in regards to major renovation and upgrade work. Because of their robustness, masonry dwellings can be cleaned and repainted, and certain components such as doors or wet area fittings replaced, without replacing structural elements. A lot of this work can be done by unskilled community workers. Lightweight construction is more vulnerable to
damage to the building envelope, therefore often requiring structural upgrade work. The more sophisticated detailing of transportables is an impediment for the involvement of the local workforce.

It has been emphasised that future innovative solutions, especially ones applied in prefabrication, can lead to unique detailing and materials as well as to the need for specialist skills, all of which can be difficult to access in remote areas, leading to long delays in repair. Although most respondents have strong opinions, there is a distinct lack of evidence in regard to the relative appropriateness and cost effectiveness of masonry and prefabrication technologies for remote Indigenous housing.

A comparative analysis of the regular asset reports and repeated post-occupancy evaluations (POEs) could yield rich and useful data for the verification of benefits and weaknesses of either technology.

“We do not have a good handle on this issue, and no good lifecycle costing of new designs either” said one government official.

Conclusion – lifecycle cost and quality in prefabrication

In general, the industry view was that significant savings could only be achieved over the lifecycle cost of transportable, prefabricated or kit dwellings, if both of the following two conditions are met: the construction cost of the dwelling is reduced to practically half of the construction cost of the on-site model to allow for a higher repair and maintenance budget throughout the life of the house; and, a repair and maintenance regime is implemented and working effectively to extend prefab building lifecycles so they are comparable with on-site masonry constructions.

For remote Indigenous housing, the cost, durability and ease of repair of prefabricated versus on-site construction are untested over the long term. Consequently it seems unwise to invest into a large-scale program until information enabling this assessment is obtained. Questions were raised during the survey about whether transportable dwellings were in the long term an effective investment of public money or whether they adequately fulfilled the State’s duty of care towards residents of social housing.

An opportunity for the comparative lifecycle assessment of prefabricated and on-site construction remote housing is arising in Yuendumu where, according to DLGHS plans seven new houses will be handed over in July 2007. Three of these are Central Remote standard models, i.e., on-site built masonry dwellings, while the other four are prefabricated homes by Murray River North. The lifecycle assessment would provide a rich data, especially as all the new tenants will be participating in the Living Skills program.
4.6 Mixed Purposes

A factor of construction prices related uniquely to Indigenous housing is the expectation that the house delivery process will deliver more than just dwellings to the communities. The mixed outcomes expected from construction activity in remote communities extend to skills training, capacity building, subsidising the local economy through local supply of labour, materials and equipment hire, and even dealing with community governance issues.

Community based workforce

With the proposed changes in the CDEP and work–for–dole schemes, beginning in August 2007, the volume of training and the number of employed workers in communities is expected to multiply compared to current numbers. At present there are less than a handful of Indigenous community–based construction crews in Central Australia. Also, the present housing capital allocation system, with relatively short periods of building activity in each community, unevenly distributed form year to year, does not allow for continuous employment of community–based labour. Community revenue from locally sourced building materials and equipment, and from accommodation hire for the builders, is intermittent and unreliable.

Building contracts generally encourage, but do not prescribe, local engagement, although there are several capital works programs that do include a training and employment component. DPI’s 2005–06 Annual Report lists among its achievements the provision of construction training to 29 Indigenous trainees in seven communities in the Northern Territory, and there are plans to extend this to 40 trainees in ten communities, allocating 25% of the construction program to training programs (DPI 2006).

The construction training programs are a mixed success. It is suggested that they try “to get people in at too high a level” – training for qualifications when elementary skills are still missing. There are attempts to correct this in the new training program, which starts at the level of basic maintenance work to then go on to construction. Another reason for the limited results of the training programs is the short engagement builders have with their trainees, staying in a community only for 3–4 months.

There have been a few success stories: trainees from communities getting jobs in mainstream industry, however, they then become unavailable for community work.

Probably the most provocative statement regarding the community–based workforce was that it was a “misnomer”. A general feeling across the industry was that community labour is unreliable and unpredictable, and often increases the risks and cost of building work:

“If you need four people to pour concrete and the two locals don’t show up when it [the concrete mix] comes, you are stuck, and you do not risk it again” (owner of building company)
Most builders have mixed experience with community–based labour, and some suggest that it differs from language group to language group, or by community to community. It seems that for some types of work it is easier to get local participation than to others. According to a Kintore example cited by one of our respondents, the initial demolition work went well, but once it was over local workers did not return to continue with building.

A local workforce in most remote communities is simply not available as those with skills and willingness are working in community jobs already. CDEP has not been very successful in utilising local labour for ongoing small–scale construction work or repair and maintenance. However, there are a number of qualified people in communities in Central Australia, for example in Amoonguna and Papunya.

One builder described how 15 years ago it was expected that CDEP workers would be employed by contractors out bush:

“It seemed at the time that it worked really well; I don’t understand why it changed. There is no training now, just have to pump out the work quickly”

Engagement of a community workforce works better where there had been an ongoing good relationship and support for local people. In an example given, the builder provided breakfast and lunch to the community workers, who took breaks and ate together with his employees. This was part of an innovative deal in the construction contract. It worked for team building as well as controlled the rhythm of work. However, this was made possible by the familiarity and trust already existing between the contractor and the community. The builder had been working in this community before, and having long–term engagement there people already knew him and some of his crew.

Despite the varied levels of success, quite a few communities are keen to participate in construction training programs, and several people interviewed for this study suggested that this could be the step to eventually address the shortage of trades. However, they see some obstacles, the main one being that “bush people” do not want to move around with the jobs to work in other communities, a disincentive to training. It is also suggested that town–based Indigenous people do not have the same issues with travelling around to communities.

Many interviewees expressed a strong sentiment that we need to act on every opportunity to engage communities in knowledge and skills transfer. They state that there is very little opportunity for locals to pick up knowledge from tradespeople because most community employment never gets past employing labourers. It is suggested that a structured training program through supporting/subsidising private industry to deliver training could be the most efficient. “The builder–trainer is the key to holding it together,” said a builder.

An option suggested is a housing delivery model based on building components and smaller modules, aligned with training and local industry development, which would allow more
participation. The recent RFTs and EOIs\textsuperscript{23}, issued by the NT and Commonwealth Governments, do not seem to support this approach. Kits and prefabricated homes may be manufactured interstate or regionally, losing out on local training and employment opportunities.

**The price of local resources**

Communities have a lot to offer to support the construction process beyond supplying a workforce. It makes good sense to use locally available bulk materials such as gravel and sand, from the viewpoints of economy – both the builder’s and the community’s – and environment. It also makes sense to share resources with community organisations, such as accommodation for work crew and heavy equipment. Equipment hire or identifying sites from where sand or gravel can be taken are relatively easy transactions which do not require much participation on the community’s side, while at the same time they may be a significant source of revenue.

Agreements between communities and builders, however, often favour the former. The prohibitive costs and logistical difficulties associated with sourcing materials from elsewhere, or setting up accommodation camps for smaller projects, force the builder to accept the sometimes excessive charges the community chooses to demand. Plant and equipment hire locally is also charged at high prices.

This especially affects conventional on-site masonry technology with its high needs of concrete and fill, extended equipment time, and the long stay of the crew in the location. Contractors are facing the choice between transporting concrete mix or setting up a batching plant. In examples given by costing experts, a cubic metre of concrete costs $150 in Darwin and $500 in Lajamanu; another example is the price of fill, which is $20/m3 in regional centres and can be $60/m3 in some remote communities.

It is a growing expectation that communities will make use of their local resources in commercial enterprises. The dearth of opportunities to do this is a strong motivation behind the exploitative prices charged for local resources. It is questionable whether the construction of community housing should become a subsidy for the scarce economic activity of remote communities.

**Governance**

Contractors sometimes, and not out of choice, get involved in governance issues in the communities. Looking after the safety and security of their workforce and assets is not always easy, and responsibility for this is often not shared with the leadership of the community. Making sure that trainees or labour turn up as agreed often depends on the builders. In the void of community governance procedures it is left to them to use whatever means they see fit to manage their relationship with community members.

---

\textsuperscript{23} RFT: Request for Tender; EOI: Expression of Interest
Conclusion – mixed purposes

There is widespread agreement about the future value of the local workforce, and a general notion of how critical it is to support the development of independent community economies. However, it is questionable whether housing construction programs, considering the present levels of community capacity and the pressure to deliver large numbers of housing quickly and at lower cost, are the best vehicle to fulfil this function, and deliver community development outcomes as an add–on objective.

Although value adding to construction programs towards social outcomes is a constructive idea, it comes with a price, and it has much more to do with social services than with building. The philosophy and plans behind these initiatives are distant from the realities of the field. Most importantly, the additional costs to meet the mixed expectations and purposes attached to remote area construction need to be separately identified to allow for an accurate assessment of remote housing construction costs.

5 Summary and Conclusions

The cost of meeting housing needs in the remote Indigenous communities of the Northern Territory is escalating in two dimensions; one being the escalating demand, the other the increasing construction prices.

Despite considerable efforts by all levels of government to create a better structured, more accountable and better funded process, the supply of Indigenous housing does not keep up with demand. Prices of remote community housing construction are also increasing steeply, even with competitive tender processes.

The current Northern Territory remote housing need, as estimated by the DLGHS, is nearly 11,500 bedrooms at an occupancy standard of 1.8 persons per bedroom, or over $1.25 billion at current costs. If housing prices follow the current trend, and the pace of constructing remote housing remains the same, the exercise to calculate the funding needed just to meet the current housing shortage would result in an even more astronomical number.

The Northern Territory construction industry would be facing a mammoth challenge even if funding to meet the unmet Indigenous housing needs is made available, with its capacity stretched thin already with large–scale work happening mainly in the Top End, and labour siphoned away by the expanding sectors of the economy in other states.

The Australian and Territory governments are calling for innovative solutions to contain the cost and increase the speed of construction. This study is a response to this challenge, and outlines some of the critical factors for consideration obtained from the views of the experts in the NT construction industry familiar with the supply of remote Indigenous housing.
**Macroeconomic forces**

Escalating costs are not unique to remote Indigenous housing construction in the Northern Territory. Construction costs are increasing nationwide, partly due to rising prices for materials and fuel.

The labour component of construction costs is increasing at a greater rate than other costs associated with building work and is a major contributor to rising prices. The chief cause of the climbing cost of labour is likely to be the mining boom, which is attracting workforce from all sectors ranging from unskilled labour to project managers. At the same time there is an almost unprecedented level of activity generally in the construction industry nationwide.

The Northern Territory is no exception. The shortage of labour here is just as acute, if not worse, than elsewhere. Attractive opportunities along the Eastern seaboard and WA drive wages up in the NT as employers seek to obtain and retain staff, closing the historic gap in construction costs between the NT and the rest of the country.

The relatively small economy of the Northern Territory may not sustain strong enough incentives through market forces to attract the building industry to government-funded housing construction programs in remote locations. Interventions from areas of Indigenous policy or service provision are ineffective in reducing these costs, as these trends are beyond their reach. It is evident that the competitive tender processes do not result in competitive prices.

Only an industry development approach, through market incentives and regulations, will have the capacity to substantially affect the causes of the escalating construction costs in the long term.

**Capacity**

The high cost of labour is primarily due to a nationwide capacity shortage in trades and labour. There is a shortage of new entrants into the building industry and a failure to attract new apprentices into trades training.

Construction industry capacity in the Northern Territory is considerably affected by this general skills shortage. A further impediment is Central Australia’s remoteness from the capital cities and the unwillingness of construction workers to work out bush, prioritising quality of life choice for themselves and their families. The workforce shortage naturally drives the cost of labour up and, just as importantly, creates a bottleneck in project delivery.

Throughout our inquiry it has been emphasised that most cost and capacity issues are related to a dearth of qualified and experienced people to work in remote communities. As the cost of labour is the most powerful factor in the escalation of prices, reducing the skills
shortage is an absolute priority which can be only resolved with increasing the number of new industry entrants into apprenticeships and the construction workforce.

*In facilitating the availability of an appropriately skilled workforce, factors such as workforce entry points, training and education systems, barriers to entry, and licensing and regulation frameworks would be reviewed and amended to ensure that the labour market operates as efficiently as possible.* (SGS Economics and Planning 2007 p64)

Prefabrication technologies are considered to have a potential to respond to the challenge of skills shortage by concentrating work in urban and regional centres, and providing ongoing and consistent training opportunities.

The recruitment and training of new apprentices is critical to the availability of appropriately skilled workforce in the construction industry. In particular, the potential of prefabrication technologies in the training and retaining of new construction industry workforce should be further explored.

**Risk factors**

Risk associated with remote area construction is another factor driving the cost of construction. Distances and unpredictability exacerbate the normal risks of construction work.

A predominant risk factor is the high level of unpredictability in important aspects of the construction process, from procurement to delivery to inspections, due to policy changes as well as social and weather events. Remoteness and long distances increase transport costs, and the complex logistics of setting up and maintaining a safe workplace and accommodation in remote locations add another compounding dimension to existing risks. Builders generally protect themselves against these additional or heightened risks by including large amounts in tender prices to cover contingencies.

Current procurement processes, driven by funding guidelines and cycles, do not easily accommodate managing or sharing these risk factors any other way than with increased cost.

It was suggested that a partnership model between government, communities and industry, structured around delivery performance and long term arrangements, could more effectively share risk and therefore reduce costs associated with risk. This innovative model could achieve not only better housing provision outcomes but also a more effective integration of community economies into the delivery process.

By promoting better economies of scale, a new model of program planning and procurement based on long-term engagement would have the benefits of reducing risk and associated costs. Long-term planning will also encourage private investment into building equipment
and prefabrication plants, as well as promoting the building of relationships between industry and community.

Improved planning and innovative procurement processes are essential for the reduction of cost associated with risk. Governments need to consider an active role in risk management in remote area construction.

**Lifecycle costs and quality**

Since 2003 the Northern Territory Government has required that all remote Indigenous housing meets the Australian Building Code and the NT Environmental Health Standards. Beyond these requirements the National Indigenous Housing Guide recommends the use of durable building components to withstand the combined pressures of high and unconventional use, harsh environment, and the lack of scheduled repair and maintenance programs. Meeting these standards represents a substantial portion of the cost increase.

The ‘Central remote standard model’, comprising a suite of standardised designs, has wide support among the builders, although less among the architects because of some of its design faults. The model was considered successful by an evaluation study for IHANT, commissioned in 2003 (SGS Economics and Planning 2003).

There is a strong sense from the industry participants that over the total lifecycle of remote houses, on-site masonry construction maintains its functional integrity better and for longer than lightweight (steel frame) construction, and fares better in lifecycle costs comparisons.

Expectations that remote housing costs can be greatly reduced by innovative technologies did not resonate with the Indigenous housing industry players participating in our study, despite their obvious interest in developing innovative solutions.

With the current and impending review of the National Indigenous Housing Guide and the NT Environmental Health Standards respectively, and the acknowledged need for updating the standard models’ thermal performance to comply with the new energy ratings of the BCA, it seems opportune for the standard designs to undergo an integrated re-assessment.

Remote Indigenous housing is operating under tremendous pressures and will have to be exceptionally robust until such time as environmental, economic and social factors now present in communities are mitigated to reduce these pressures. Remote area housing costs should be measured through total lifecycle costs and in addition to the cost of construction. Consideration should also be given to the number of residents served by the housing program (e.g., a per capita cost measure) and the level of functional service provided throughout the life of the dwelling.

**Prefabrication**

Prefabricated houses, if not at the cost of compromising quality, are not generally considered less expensive to build, as demonstrated by the most recent award of the
delivery of 16 high standard prefabricated homes at a total cost of $5.5M. Nevertheless the 
option of relocating transportable or kit structures to accommodate population changes may 
provide distinct advantages, beyond the obvious benefit of having houses where they are 
most needed, such as access to cheaper skilled labour and rapid on-site erection.

It has been proposed that setting up plants in regional centres, closer to the target areas of 
housing programs, could also create economies of scale that may eventuate in cost 
reduction. This proposition echoed some of the viewpoints put forward at the July 2006 
Indigenous Housing Workshop chaired by the Minister for Housing Elliot McAdam in Darwin.

Although most interviewees have a strong opinion on the subject of comparing technologies 
and delivery models, there is agreement that most of this is based on anecdotal evidence. A 
systematic monitoring of the performance of Indigenous housing, beyond the regular 
condition and needs surveys by ICHOs, could provide a wealth of data in order to better 
understand outcomes. An AHURI study on design frameworks for Indigenous housing 
recommends that this monitoring work take place every 18 months (J. Fien at al 2007).

Aspects of lifecycle cost, functional durability and ease of repair of prefabricated versus on-
site construction, in the field of remote Indigenous housing, are untested in the long term. 
Assessment of these technologies, before a commitment to a large scale program, is critical.

The implementation of comparative lifecycle assessment of different house models and 
building approaches should be considered as an integral part of remote area housing 
programs. The data acquired in the assessments is necessary to provide the evidence base 
necessary for design and delivery of functional and durable remote Indigenous housing. 
Two initiatives in particular would contribute enormously, namely:

1. Regular Post–Occupancy Evaluations (POEs) to assess how the overall design and the 
quality of detailing responds to residents’ needs and use patterns; and regular 
monitoring of ongoing maintenance requirements and costs and compliance with 
environmental health standards.

2. A comparative monitoring study of masonry, on–site lightweight and prefabricated 
dwellings should be established to provide an evidence base of comparative lifecycle 
construction/maintenance costs for various housing models and delivery approaches.

Mixed purposes and community workforce

Although there have been only a very limited number of successful training and employment 
schemes, and the builders’ experience of community engagement has been disappointing, 
all agree that the development of independent community economies and the capacity of the 
local workforce are critical for better and less expensive housing delivery. However, it is 
questioned whether housing construction programs can deliver these additional outcomes
without the dedication of a much stronger focus and resources towards the community development objectives.

Construction costs could be reduced if community-based skilled labour and tradespeople were available to work in the remote communities. This, however, requires a long-term commitment and the consistent dedication of resources to capacity building and training programs, as well as to support and strong incentives for employment within and away from the home community.

Furthermore, planning and implementation objectives relating to housing provision and community development would need to have quite separate and clear boundaries. Nevertheless, processes, technology and standards of the housing system could be reviewed to identify opportunities and barriers to community participation in housing delivery.

6 Recommendations for further research

The study concludes that comparative assessment of lifecycle costs of masonry, on-site lightweight and prefabricated dwellings is essential to obtain evidence to support development of remote area housing policy and program development.

The Yuendumu housing program provides an excellent opportunity to undertake a POE of the comparative lifecycle costs and performance of prefabricated houses with on-site constructions. As noted above, the program comprises construction of seven new houses to be completed in 2007. Three will be on-site built CRM masonry dwellings and four will be prefabricated homes by Murray River North. All the new tenants will participate in the Living Skills program.

It is recommended that interested parties establish a research project based on the excellent opportunity presented by the Yuendumu housing project.
References


Commonwealth of Australia.

———. CHINS 2001, 2006 – *Housing and Infrastructure in Aboriginal and Torres Strait Islander Communities*. Department of Family and Community Services and Indigenous Affairs;


———. 2007. *Levers to Promote Affordable Housing in the Northern Territory*. NT Shelter
## Appendix 1 Tables and Maps

### Population Distribution, Aboriginal and Torres Strait Islander Australians, 2006

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Indigenous Status</th>
<th>Proportion of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>%</td>
</tr>
<tr>
<td>New South Wales</td>
<td>138,507</td>
<td>30.4</td>
</tr>
<tr>
<td>Victoria</td>
<td>30,143</td>
<td>6.6</td>
</tr>
<tr>
<td>Queensland</td>
<td>127,580</td>
<td>28.0</td>
</tr>
<tr>
<td>South Australia</td>
<td>25,556</td>
<td>5.6</td>
</tr>
<tr>
<td>Western Australia</td>
<td>58,710</td>
<td>12.9</td>
</tr>
<tr>
<td>Tasmania</td>
<td>16,768</td>
<td>3.7</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>53,661</td>
<td>11.8</td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>3,875</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td>455,028</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Source: Census 2006, Australian Bureau of Statistics*

### Indigenous households by Tenure by State, 2001

![Indigenous households by Tenure by State, 2001](image)

*Source: GISCA, 2003*
Estimated number of people per dwelling in discrete Indigenous communities, 2006

<table>
<thead>
<tr>
<th></th>
<th>Occupied temporary dwellings</th>
<th>Permanent dwellings</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dwellings Pop. living in temp dwellings</td>
<td>Dwellings Pop. living in perm. Dwellings (b)</td>
<td>Dwellings Pop. per house</td>
</tr>
<tr>
<td></td>
<td>Dwellings</td>
<td>Pop. living in temp dwellings</td>
<td>Pop. per house</td>
</tr>
<tr>
<td>1999</td>
<td>977</td>
<td>3,798</td>
<td>3.89</td>
</tr>
<tr>
<td>2001</td>
<td>679</td>
<td>2,242</td>
<td>3.30</td>
</tr>
<tr>
<td>2006</td>
<td>638</td>
<td>1,734</td>
<td>2.72</td>
</tr>
</tbody>
</table>

(a) Number of people per house is calculated by dividing the reported usual population by the total number of dwellings

Source: Housing and Infrastructure in Aboriginal and Torres Straight Islander Communities, 2006 and 2001 (ABS: 4710.0), published and unpublished data, Commonwealth Department of Family and Community Service and Indigenous Affairs.

Distribution of Indigenous Homelessness by State and Territory, 2001

<table>
<thead>
<tr>
<th>State</th>
<th>Improvised Dwellings</th>
<th>Homeless Hostels</th>
<th>Visitors with no permanent residence</th>
<th>Total Homeless</th>
<th>Total Indigenous Persons</th>
<th>Share of Homeless</th>
<th>Homelessness Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>No.</td>
<td>No.</td>
<td>No.</td>
<td>No.</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>NSW</td>
<td>203</td>
<td>229</td>
<td>220</td>
<td>652</td>
<td>119,868</td>
<td>16.8</td>
<td>0.5</td>
</tr>
<tr>
<td>VIC</td>
<td>64</td>
<td>60</td>
<td>49</td>
<td>173</td>
<td>25,075</td>
<td>4.5</td>
<td>0.7</td>
</tr>
<tr>
<td>QLD</td>
<td>441</td>
<td>291</td>
<td>166</td>
<td>898</td>
<td>112,773</td>
<td>23.2</td>
<td>0.8</td>
</tr>
<tr>
<td>SA</td>
<td>150</td>
<td>89</td>
<td>47</td>
<td>286</td>
<td>23,426</td>
<td>7.4</td>
<td>1.2</td>
</tr>
<tr>
<td>WA</td>
<td>344</td>
<td>183</td>
<td>68</td>
<td>595</td>
<td>58,495</td>
<td>15.4</td>
<td>1.0</td>
</tr>
<tr>
<td>TAS</td>
<td>9</td>
<td>13</td>
<td>33</td>
<td>55</td>
<td>15,773</td>
<td>1.4</td>
<td>0.3</td>
</tr>
<tr>
<td>NT</td>
<td>1,066</td>
<td>92</td>
<td>37</td>
<td>1,195</td>
<td>50,785</td>
<td>30.8</td>
<td>2.4</td>
</tr>
<tr>
<td>ACT</td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>22</td>
<td>3,576</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Other Territories</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>232</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,282</td>
<td>968</td>
<td>626</td>
<td>3,876</td>
<td>410,003</td>
<td>100.0</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Source: GISCA, 2003
Indigenous homelessness

Indigenous Persons Experiencing Homelessness Number by ATSIC Region, 2001

People in improvised dwellings, hostels for the homeless, and those staying at another residence without a usual residence of their own

Top five regions by percentage

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warburton</td>
<td>5.1</td>
<td>146</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>4.4</td>
<td>217</td>
</tr>
<tr>
<td>Apantula</td>
<td>3.7</td>
<td>267</td>
</tr>
<tr>
<td>Darwin</td>
<td>3.6</td>
<td>368</td>
</tr>
<tr>
<td>Ceduna</td>
<td>2.0</td>
<td>38</td>
</tr>
</tbody>
</table>

Top five regions by number

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin</td>
<td>3.6</td>
<td>368</td>
</tr>
<tr>
<td>Apantula</td>
<td>3.7</td>
<td>267</td>
</tr>
<tr>
<td>Sydney</td>
<td>0.9</td>
<td>261</td>
</tr>
<tr>
<td>Brisbane</td>
<td>0.6</td>
<td>228</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>4.4</td>
<td>217</td>
</tr>
</tbody>
</table>

Source: ABS Customised Census Tables, 2001 Census

The Cost of Housing in Remote Indigenous Communities, CAT, 2007
The new NT shire system (preliminary map) in comparison with the old ATSIC regions

Cost comparison of transportable and on-site light weight construction

<table>
<thead>
<tr>
<th>Work</th>
<th>Mimili, SA: transportable 2005</th>
<th>Mimili, SA: on-site steel frame 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminaries</td>
<td>27000</td>
<td>19000</td>
</tr>
<tr>
<td>Siteworks</td>
<td>3000</td>
<td>3200</td>
</tr>
<tr>
<td>Footings</td>
<td>15000</td>
<td>29270</td>
</tr>
<tr>
<td>Structural</td>
<td>27500</td>
<td>23450</td>
</tr>
<tr>
<td>External fabric</td>
<td>14000</td>
<td>11100</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>9000</td>
<td>21760</td>
</tr>
<tr>
<td>Roofing and guttering</td>
<td>9000</td>
<td>12500</td>
</tr>
<tr>
<td>Electrical</td>
<td>6000</td>
<td>9000</td>
</tr>
<tr>
<td>Plumbing</td>
<td>26000</td>
<td>28200</td>
</tr>
<tr>
<td>Mechanical</td>
<td>9000</td>
<td>10000</td>
</tr>
<tr>
<td>Internal fabric</td>
<td>10000</td>
<td>23680</td>
</tr>
<tr>
<td>Joinery</td>
<td>9000</td>
<td>8740</td>
</tr>
<tr>
<td>Appliances</td>
<td>5500</td>
<td>3250</td>
</tr>
<tr>
<td>Floor coverings</td>
<td>4000</td>
<td>4900</td>
</tr>
<tr>
<td>Tiling</td>
<td>4000</td>
<td>4600</td>
</tr>
<tr>
<td>Painting external</td>
<td>3600</td>
<td>1200</td>
</tr>
<tr>
<td>Painting internal</td>
<td>6000</td>
<td>7200</td>
</tr>
<tr>
<td>Fencing</td>
<td>9000</td>
<td>7700</td>
</tr>
<tr>
<td>External works</td>
<td>14500</td>
<td>3900</td>
</tr>
<tr>
<td>Other</td>
<td>24885</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total excluding GST</strong></td>
<td><strong>235,985</strong></td>
<td><strong>232,650</strong></td>
</tr>
</tbody>
</table>

*Source: Day, T. 2007, pers. comm.*
Appendix 2  Interview Questions

1  Statistics

1.1  Data: population demographics – remote indigenous Central Australia

1.2  Data: number of houses - remote indigenous Central Australia

   1.2.1  How many are functional?
   1.2.2  How many are condemned?
   1.2.3  How many are for major upgrade?

2  Planning and costing

2.1  What are the plans for new houses and upgrades – budget, number of dwellings?

2.2  What is the current planning process?

2.3  What is the projected average cost of infrastructure per dwelling now – water, power, wastewater – in remote areas?
   
   2.3.1  Compared to urban areas?
   2.3.2  What was the actual cost in 2006, remote?
   2.3.3  What was the cost in 1999-2000, remote/urban areas?

2.4  What is the projected average cost of dwellings – by number of bedrooms – in remote areas?
   
   2.4.1  Compared to urban areas?
   2.4.2  What were the actual costs in 2006, remote?
   2.4.3  What were the costs in 1999-2000, remote/urban?

3  Outcomes

3.1  How many houses have been built using the standardised designs?
   
   3.1.1  What versions?
   3.1.2  Where?

3.2  What other designs are used?

3.3  Are you familiar with the NIHG?

3.4  Are the dwellings currently in the housing program designed and constructed in consideration of the NIHG?
3.5 Are there any changes in health indicators that you are aware of? What are they?

3.6 Are there any changes in asset conditions that you are aware of? What are they?

4 Practice

4.1 What is the footprint of your construction work in terms of remote and regional Indigenous housing projects?

4.2 What is the footprint of your project management work in terms of remote and regional Indigenous housing projects?

4.3 What is the footprint of your program management work in terms of remote and regional Indigenous housing projects?

4.4 Please tell me about the current tender/procurement process for remote Indigenous housing work

4.5 What are your contractual arrangements – upstream and downstream (who engages you and whom do you engage?)

4.6 Does working for … (see above) pose any cash flow/payment schedule issues?

4.7 What are the main logistics issues?

4.8 Has there been any major change in material costs in the last 6-7 years?

4.9 How are inspections scheduled?

4.10 Can you describe your experience with subcontractors and labour – local, regional?

4.11 What is your experience with community-based labour?

5 Perceptions

5.1 How would you compare prefabricated/modular/kit construction to on-site construction (cost, speed, logistics, durability, ease of repair)

5.1.1 cost,

5.1.2 speed,

5.1.3 logistics,

5.1.4 durability,

5.1.5 ease of repair

5.2 Do you consider economies of scale a significant factor in your practice?

5.3 Do you have any comments on the current standards and regulations?

5.4 In your opinion what would be the single most effective change to lower the cost of house construction?
5.5 In your opinion what would be the single most effective change to increase the life of the house?

6 Low cost pilot products

- Ecovilla – Wadeye
- Bluescope/Lysaght - Beswick
- Bakanu – Cape York

6.1 What is the cost of the finished product?
6.2 Are they defined as houses or shelters?
6.3 What services are included?
6.4 Are they in compliance with standards and regulations?
6.5 Do they follow the NIHG?