

# GOLD

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## ALL THAT GLITTERS IS NOT GOLD: THE EFFECT OF MINING ACTIVITIES AND ROYALTIES ON THE BUILT ENVIRONMENT OF REMOTE NORTH EAST ARNHEM LAND

*This paper explores the effects of mining activities and royalties on the Northern Territory's remote northeast Arnhem Land region, including the mining town of Nhulunbuy (with a 93.8% non-Indigenous population) and surrounding Indigenous communities, and shows that the associated architectures do not provide long-term benefit to local people. In 2014, Rio Tinto Alcan closed their alumina refinery in Nhulunbuy. This resulted in the redundancy or redeployment of 1100 workers and a significant reduction in the town's 4000 strong population.<sup>1</sup> The closure of the refinery calls into question the role of mining settlements and their surrounding regions beyond the life of a mine.*

*Using the case study of northeast Arnhem Land, the paper describes the genesis of the Nhulunbuy Township in the late 1960s and how it precipitated the Indigenous land rights movement in the Northern Territory and the repatriation to homelands throughout the region. The paper analyses the architecture of Nhulunbuy, whose public, commercial and residential buildings were almost exclusively designed and built by the mining company, in comparison to the architectures that emerged through mining royalty funds distributed to traditional land owner groups such as the Gumatj and Rirratjingu Aboriginal Corporations, the Yirrkala Dhanbul Association and the Arnhem Land Trust. It historicises and critiques their respective contextual response to environmental, social and adaptive economic factors.*

*Nhulunbuy has grown to become a significant resource centre for the northeast Arnhem Land region providing services to surrounding Indigenous communities and homelands. Thus the paper turns to a discussion of the recent history of the alumina refinery closure and the subsequent ramifications for the region's architecture, both in the mining town and for mining royalty funded structures throughout the region. With the sudden closure of other mines throughout remote Australia, such as the Alinta coal mine at Leigh Creek, South Australia, which also acts as a service centre to the nearby Iga Warta Indigenous community, this paper is both a timely and relevant contribution.<sup>2</sup>*

### The Context

Over half a century of Rio Tinto Alcan (R.T.A.) (and formerly N.A.B.A.L.C.O.) bauxite extraction and alumina refining mining activities and royalties has resulted in architectures that provide limited long-term environmental, social and/or economic benefits to the North East Arnhem Land (N.E.A.L.) region and its people. For the purposes of this paper, mining is the process of extracting minerals from the ground; while royalties are compensation or revenue taxes on mining.<sup>3</sup>

N.E.A.L. is an extremely remote region of the Northern Territory, Australia with an area of 33,000 km<sup>2</sup> and only 10,772 people, 75% of which are Indigenous Yolngu.<sup>4</sup> The region consists of the Nhulunbuy mining town (established in 1970 with a population currently declining towards 2500), the Indigenous ex-mission Yirrkala (established in 1935 with a population of 843) and between 60-85 surrounding homelands with populations of between 1 and 150 people.<sup>5</sup> There are 13 Yolngu clan groups in N.E.A.L., however mining activities, the airport and the Nhulunbuy Township are located on a 'special town lease' across just three: the Gumatj, Rirratjingu and Galpu clan lands.



FIGURE 1 The North East Arnhem Land Region showing Nhulunbuy mining town, Yirrkala community and the Gungangara, Biritjimi and Dhaniya homelands. Source: Author, 2015.

The contentious history associated with the emergence of mining in N.E.A.L. has had two major and lasting building implications. Firstly, the quick construction and short-term focus underpinning Nhulunbuy's establishment in 1970 failed to consider changing circumstances and existence beyond the original 50-year mining lease. The architectural legacy fulfils housing and services functions but represents a contemporary liability in terms of environmental, economic sustainability and thermal comfort in the tropics.

Secondly, Yolngu (including both traditional owners of the mining lease area and residents of the Yirrkala Indigenous community) reaped limited mining royalty benefits, consequently restricting scope for living condition improvements and livelihood prospects through building. It is only since 2011, with the formation of the Gove Agreement between Traditional Owners and R.T.A., that there has been restitution through a more equitable royalty deal.<sup>6</sup> Royalties have enabled some Traditional Owner-led building initiatives to form using social enterprise models that adapt to local needs and support Indigenous livelihood creation. However, this is largely limited to the Gumatj and Rirratjingu Aboriginal Corporations who hold traditional claims over mining lease lands, thus causing factional divides with other clans in the region whose traditional countries are not on the mining lease and failing to benefit the regional Yolngu population as a whole.

With R.T.A.'s sudden closure of the Gove Alumina Refinery in 2014, the effects of these two factors have come to the fore, highlighting the impact of mining on the associated architecture of the region. As NEAL now strives to assert a more diverse economic and industrial profile, this paper seeks to examine the historical evolution of the confluence of mining and building that has led to the contemporary issues.

## Background

Much has been written on the planning and building design evolution of post-war remote Australian mining settlements by authors such as Geoffrey Blainey, Lee Stickells, Paul Cleary and William M. Taylor, however few have historicised and synthesised the effects of mining on the regional built environment and the local Indigenous population.<sup>7</sup> Amongst writings on post-war era mining towns, there is a general consensus, that they "were vastly different to their predecessors" in three ways.<sup>8</sup> Firstly, the mining company invariably acts as "employer, town manager and landlord".<sup>9</sup> Secondly "many [settlements] were not designed to outlive the mines they served".<sup>10</sup> Lastly, most adopted settlement plans and building designs that "transferred suburbia" to the remote locale.<sup>11</sup> All characteristics are true of Nhulunbuy. However, writings on Nhulunbuy's settlement plan and housing design that predate Indigenous Land Rights recognition by authors such as Jos Adius (Chief Architect to N.A.B.A.L.C.O. for the design of Nhulunbuy) and John Toon do not employ such a critique nor do they make considerations of local Indigenous involvement in the region.<sup>12</sup> Likewise the later author C.C. Neil adopts Nhulunbuy as a case study to investigate housing symbolism and critique the appropriateness of a transferred suburban housing model in new remote settlements, but without considering the broader regional context of a majority Indigenous population.<sup>13</sup>

Conversely, authors focusing on Indigenous building initiatives in N.E.A.L. refer to mining royalties as a funding source without critiquing their origins or connection to mining development in the region as a whole.<sup>14</sup> The most comprehensive writings that outline the historical evolution of mining royalties for Indigenous people in N.E.A.L. are by economist and anthropologist Jon Altman.<sup>15</sup> While Altman's writings do not focus specifically on the built environment they do provide an explanation of royalty inequity both pre and post Land Rights legislation, specifically in reference to the Northern Territory's Aboriginal Land Rights Act (1976). Altman's writings assist understandings of how limited royalty streams may have benefited certain clans but stifled the formation and operation of building initiatives for the benefit of Yolngu at a regional level. Thus while there is a wealth of relevant background material there is a dearth of scholarship that investigates the regional effect of a mine on the built environment over time and the flow-on effects for local Indigenous populations.

There has been extensive analysis and critique of the respective geneses and downfalls of mining towns in their boom and bust nature due to a dependence on the mine and a lack of community identity and regional economic diversity, by authors such as Aitchison, Howroyd and Iwanecki.<sup>16</sup> However, excepting authors like Cleary, Altman, Memmott and Buultjens, who do not focus specifically on building, few have sought to understand the effects of the built environment on the Indigenous population who precede and generally outlast the mining population and who are thus left with the built detritus following a mining downturn.<sup>17</sup> This paper seeks to historicise the effect of mining on the built environment of N.E.A.L. to elicit lessons for contextually sensitive architectural development in other remote mineral rich regions.

### The Effect of Mining Royalties on the Architecture of North East Arnhem Land

Mining presents a major opportunity for Indigenous Traditional Owners (T.O.s) to earn land use rents enabling investment in development initiatives, such as building, that contribute to strengthening the local economy and people. Initially in N.E.A.L. however there was no payment of royalties. From 1976, Indigenous land rights in the Northern Territory were recognised under the Aboriginal Land Rights (Northern Territory) Act, however royalties paid to Yolngu people affected by the N.A.B.A.L.C.O. mine remained far less than the legislated entitlement.<sup>18</sup> Since then, major traditional owner clan groups, the Gumatj and Rirratjingu, directly translated mining royalties into building initiatives and associated manufacture industries such as timber. However, it was only with the signing of the Gove Traditional Owners Agreement in 2011 between Traditional Owners clans, the Northern Land Council (N.L.C.) and R.T.A. that these initiatives were given greater support through a more equitable royalty deal.

With the discovery of bauxite in the late 1950s, the Swiss mining company N.A.B.A.L.C.O. sought to create a mine in N.E.A.L. despite objection from Yirrkala's Yolngu residents, who were thus propelled to reassert their traditional land claims.<sup>19</sup> In 1963, Yirrkala's thirteen clan groups submitted the first 'Bark Petitions' to the Commonwealth Government of Australia, calling for land and sea rights and objecting to the proposed N.A.B.A.L.C.O. bauxite mine at Nhulunbuy.<sup>20</sup> Irrespective of the Yolngu opposition an agreement between the Commonwealth Government and N.A.B.A.L.C.O. was forged in 1968 with the creation of a 50-year mining lease over the Arnhem Land Aboriginal Reserve (later renamed Alcan Gove with mining rights sold to Rio Tinto). Initially Yolngu did not receive royalties, however in the decision of *Milirrpum and others versus N.A.B.A.L.C.O.* and the Commonwealth (1971) it was agreed that 10% of statutory royalties would be paid to the Yirrkala Dhanbul Association.<sup>21</sup> As Altman importantly identified however, in order to reach an economically viable agreement in 1968, the Commonwealth Government agreed to a royalty rate based on company output and profitability, which was far less than the legislated 2.5% ad valorem (the proportion of mining revenue).<sup>22</sup>

Bark Petitions were rejected by the Commonwealth Government in both 1963 and 1968 but when Gough Whitlam became Prime Minister in 1972 he appointed Justice Woodward to preside over the Aboriginal Land Rights Commission (1973-4) to explore ways that Aboriginal Land rights could be recognised in the Northern Territory. This in turn precipitated the recognition of Indigenous land rights under the Aboriginal Land Rights (Northern Territory) Act in 1976. Despite all mineral ownership remaining with the crown, royalties to Aboriginal people were acknowledged and paid to an Aboriginal Benefit Trust Account for distribution in three ways: 1) to affected communities as compensation for damages and mining rent; 2) to Land Councils for administration costs; and 3) for wider distribution throughout the Northern Territory.<sup>23</sup> According to Altman this left "significant ambiguity...never clarified by Government policy" regarding how royalties could be distributed both in terms of defining affected area and proportions paid across the three groups.<sup>24</sup> This ambiguity has led to significant long-term issues in N.E.A.L. between different clan groups.

After four decades of mining without traditional owner approval, *The Gove Traditional Owners Agreement* was signed by the Gumatj, Rirratjingu and Galpu clans, the NLC and the RTA in 2011. The agreement states "traditional owners will receive between \$15m and \$18m a year over the next 42 years, depending on the price of bauxite", administered by the Northern Land Council between the traditional owner groups according to proportion of land affected by the mine and Nhulunbuy township.<sup>25</sup> The royalties were thus split three ways with Gumatj Aboriginal Corporation receiving approximately 72%, Rirratjingu Aboriginal Corporation approximately 27% and the Galpu clan group around 0.5%.<sup>26</sup> The major T.O. clan organisations, Gumatj Future Fund and Rirratjingu Aboriginal Corporation (through Bunuwal Investments) directly translated mining royalties into building initiatives.

Unlike the mining company approach to building Nhulunbuy, the independent administration of mining royalties by traditional owner led organisations has enabled the creation of buildings and construction initiatives that benefit Yolngu by responding to local socio-cultural, economic and environmental needs. The Gumatj and Rirratjingu Aboriginal Corporations lead the two major building initiatives and the resulting architectures are more environmentally responsive and supportive of local people. The initiative's limitations are that only the Gumatj, Rirratjingu and Galpu T.O. clans of the thirteen regional groups receive royalties, thus skewing the benefits of mining royalties to some with little net effect for others.

The Northern Territory Government's Homelands Policy of 2009 represented a shift of support away from homelands, with no funds allocated for new construction. Thus mining royalties for Gumatj and Rirratjingu clans provided an opportunity to support Traditional Owner-led building initiatives. To date Rirratjingu initiatives include the Malpi

Village subdivision in Nhulunbuy (providing housing to Rirratjingu people and non-Rio Tinto employees in the town), Gumatj initiatives include the construction of the Garma cultural festival site, dorms and outbuildings at Garrathiya homeland (2008-9), a four bedroom house at Dhaniya Homeland (2010) and verandahs added to several kit homes in Gungangara community (2010-11).<sup>27</sup> As of 2015, Gumatj designed housing for the major settlements of Yirrkala and Gungangara using blockwork construction that while incorporating an imported material is cyclone rated and uses a local Yolngu building team in the process. There are also current plans, at the time of writing, to build new housing at Biritjimi homeland.<sup>28</sup>

A Gumatj project that exemplified royalty flexibility to address Yolngu needs was the construction of a five-room bunkhouse at Garrathiya homeland in 2008-9. The project resulted from a partnership between Fairbrother Builders, Forestry Tasmania, the University of Tasmania's School of Architecture and local Yolngu people whom respectively provided construction supervision, timber milling training, construction drawings and labour.<sup>29</sup> It sustainably milled local timbers and employed a team of up to eighteen Yolngu with flexible work conditions given only nine people were required on site, with paid hunting and fishing time bonuses for finishing on time.<sup>30</sup> The cost of building the bunkhouse (shown in Fig. 1) was around \$200,000 as opposed to the \$800,000 average spent on a government house, where little local benefit is derived due to dependency on imported materials and labour.<sup>31</sup> Thus the construction cost was not only lower but the construction process provided local flow-on benefits that kept resources in the region.

Aside from Gumatj and Rirratjingu royalty recipients, the opportunity has not been available to other clan groups who do not have access to a royalty stream. Thus while the Gumatj initiative represents a very responsive way of improving livelihoods through the use of royalties for building initiatives, it does not benefit all in the region.

#### **The Evolution of Nhulunbuy and the Effect of Mining Activities on its Architecture**

Between 1968 and 1970, the Nhulunbuy Township was planned entirely by N.A.B.A.L.C.O. and Switzerland Mining Company staff including Jos Agius (chief architect), Walter Lapor (deputy general manager who studied town planning in Switzerland) and Peter Hughes (chief engineer).<sup>32</sup> The planning phase acted as a feasibility study to determine the most cost effective arrangement to minimise transportation between the three main functions, in descending order of importance according to N.A.B.A.L.C.O.: the harbour; the alumina plant and the township.<sup>33</sup> In the writings of Toon and Agius, the decision to build Nhulunbuy at Mount Saunders did not take into account Indigenous connections to the land. For instance, the strip of land between the Township and the beach adjoined by the town lagoon (or Gayngaru in Yolngu) was originally intended to be the 'main public attraction' however this is a culturally significant hunting area. It is only since the advent of Aboriginal Land Rights (Northern Territory) Act in 1976 that this area has restricted access as a protected site under Dhimurru Aboriginal Corporation's Indigenous Protected Area (I.P.A.).<sup>34</sup>



FIGURE 2 The Gumatj Bunkhouse at Garrathiya Homeland 2009. Source: Klaus Helms, CEO, Gumatj Aboriginal Corporation, 2009.

Nhulunbuy was designed according to the minimum estimated population figure of 700 employees and their families and thus “allow[ed] for little diversification of activity beyond the principal alumina industry”.<sup>35</sup> Township buildings formed three types: housing (individual cottages for families and apartments for married couples and singles); service activities (including a shopping precinct (as shown in Fig. 2 c. 1971), school and hospital) and recreation services (including a pub, swimming pool and sports grounds). Although it was not a direct priority of the mining company, the provision of services such as the hospital, airport, shipping port and supermarket (with price subsidies), benefit Yolngu at a scale that would not have been possible without mining funding. The counter argument that the impact of the pub providing easy access to alcohol has had disastrous effects for Yolngu has also been used.



FIGURE 3 ‘Endeavour Square’ Nhulunbuy Town Centre circa 1971 showing the administrative offices and shops, all of which are connected by a centralised air-conditioning system. Source: Kiran Gordhandhas.

Like most other post-war mining settlements, Nhulunbuy was designed to provide a middle-class suburban standard of living with an “equivalent quality to project builder’s homes in southern capitals” and a climate controlled environment that did not respond to the surrounding tropical context at all.<sup>36</sup> N.A.B.A.L.C.O. built Nhulunbuy over 3.5 years between 1970-3, by shipping in all construction materials and labour. The houses conformed to a handful of standard designs all with flat roofs, concrete slabs on ground, inflexible internal configurations, pebble-crete and central air-conditioning systems. The chillers require continuous operation, even when unoccupied, to maintain a comfortable climate and also to prevent mould growth and degradation of building materials, which are not designed to be moisture and heat resistant. Thus many windows are permanently sealed because opening them undermines the system.

In response to original design shortcomings and in an attempt to make the houses more environmentally responsive, the mining company has funded various housing improvement programs since the 1970s. Given the presence of asbestos, the improvements are additions rather than alterations (as shown in Fig. 3) including: a steel verandah either at the front or the back of the house to provide shade, a chiller upgrade, a further room in the former carport, and a further carport.<sup>37</sup> Many verandahs and carport spaces have since been personalised into external rooms where the majority of living activities occur.<sup>38</sup>



FIGURE 4 a 3-Bedroom Standard Nabalco House at left and an indication of the successive improvements at right including a new room, pergola, carport and shed. Source: LJ Hooker & RTA, Nhulunbuy, 2015.



FIGURE 5 Original 1970s NABALCO house with no visible additions from the street. Source: Author, 2015.



FIGURE 6 Original 1970s NABALCO house with later additions including a verandah, carport and extra room. Source: Author, 2015.

The need for additions revealed the original design shortcomings; however, lessons were not learned in the subsequent housing to meet the growth of Nhulunbuy until 2014. Subsequent housing designs ranged from lightweight prefabricated modules to concrete blockwork duplexes, which sought different means to address the expensive cost and lack of local material industry. However, a continued transferred suburban focus limited local economic and environmental responsiveness. For instance, a 2006 housing design by Ark Modular Structures consisted of lightweight prefabricated modules imported by road train from Queensland that only required stitching together on site. The prefabricated system supported fast construction but not diversification of local industry. For instance, the use of imported materials created a dependency on the external region for all materials and the prefabricated construction limited opportunities for local employment. From an environmental perspective, verandahs and a raised structure appear to allow comfortable passive airflow, however, plans do not promote cross-flow ventilation and still require five air-conditioning units (Fig. 7).



FIGURE 7 Air-conditioning units mounted onto prefabricated housing designed and prefabricated by Ark manufacturers in Queensland in Nhulunbuy. Source: Author, 2015.

Nhulunbuy's sudden growth and contraction has resulted in wasteful infrastructure that presents many challenges for re-appropriation to meet the existing needs of the region. For instance, the Arnhem Village G3 fly-in fly-out (F.I.F.O.) camp (Fig. 8) was built in 2004 (prior to the refinery expansion) with accommodation for 2000 people in air-conditioned prefabricated steel dongas with connecting steel framed walkways.<sup>39</sup> The camp has been empty since mid 2014 following the refinery closure. Not only did the dwelling construction type use no local labour or materials, a mess hall and shop on site minimised the need for F.I.F.O. workers to contribute to the local economy. With no economic incentive to send the dongas back, the camp remains a vacant ghost town. Even if the dongas were transferred to Yirrkala and surrounding homelands to address housing shortages, it would not be viable to run air-conditioning constantly on a welfare budget and without air-conditioning the structures are unfit for habitation. Thus there was no foresight into the use of the infrastructure beyond the immediate mining need.



FIGURE 8 The empty Arnhem Village G3 Camp, April 2015. Source: Author, 2015.

#### **Recent History Following the Alumina Refinery Closure**

Since the closure of the alumina refinery, the existing infrastructure of Nhulunbuy comes into question. There are now around 250 vacant houses in the township (plus the vacant Arnhem Village) indicating a gross inequity between Nhulunbuy and the surrounding Indigenous communities, given that the 2015 Productivity Commission's report on Housing and Homelessness has cited N.E.A.L. as having the highest rate of homelessness in Australia at 28.78% as opposed to the national average of 0.49%.<sup>40</sup> To tackle the empty housing situation a combined Government and

R.T.A. initiative 'Developing East Arnhem Land (D.E.A.L.)' with \$4,000,000 of seed funding was created in 2014.<sup>41</sup> The aim of D.E.A.L. is to attract new or expanding existing business to the region by providing them with access to subsidised rental housing (from the 250 vacant RTA houses) for their employees. In 2015, there was some local critique that D.E.A.L. fail to benefit existing employees in the region, many of whom require housing and live in Yirrkala, which has a severe housing shortage.<sup>42</sup>

Nhulunbuy's buildings were designed with a short-term vision of the settlement's duration, which brings into question viability from a sustainable development perspective with a lack of cyclonic building performance, the presence of asbestos and high ongoing electrical costs. While the architectural assets of Nhulunbuy present an opportunity to provide housing, the air-conditioning running costs are astronomical representing a liability rather than an asset. With the retraction of R.T.A. subsidised electricity, residents are now facing the prospect of paying their own electrical bills and with examples totalling \$300 per fortnight for a three bedroom dwelling this is unfeasible.<sup>43</sup> The alternative of switching to a passive system by removing the air-conditioning is limited, because the existing building materials are not designed to withstand the increase in moisture and heat. Further to this, the 'special town lease' status exempted Nhulunbuy from Building Code of Australia (B.C.A.) compliance, thus the original 1970s houses do not meet national cyclone ratings. Although the buildings have survived to date, as cyclonic activity is expected to become more intense, the lack of formal rating may present a hazard.<sup>44</sup> Even if all of the empty RTA houses in Nhulunbuy were handed over to local Indigenous people to address the housing shortage at Yirrkala, aside from potential social dislocation issues this could also present an environmental health hazard. For the unemployed and welfare dependent most in need of housing, the electrical running costs are exorbitant and if any maintenance work is needed the presence of asbestos necessitates skilled labour and costly materials. A direct example where former N.A.B.A.L.C.O. executive houses were gifted to Rirratjingu Traditional Owners in the 1980s following the A.L.R.A. declaration can be found in N.E.A.L. at Birritjimi, also known as Wallaby Beach, which lies between the Nhulunbuy Township and the Alumina Refinery. Like the original N.A.B.A.L.C.O. houses at Nhulunbuy, Birritjimi consists of twenty-five air-conditioning reliant, flat-roofed and asbestos houses. Without ongoing funding support from R.T.A. for maintenance, the houses have fallen into disrepair representing an environmental health hazard. During Category II or higher cyclones the whole settlement is required to relocate to the cyclone shelter at Gove Hospital, despite their Nhulunbuy counterparts remaining in housings of the same construction typology.<sup>45</sup> Given Nhulunbuy's housing no longer facilitates contemporary needs, the most appropriate course of action may be gradual demolition over an extended period of years. In doing so asbestos could be safely removed and it would enable a local Yolngu team to be trained with the assurance of job sustainability.

To assist in identifying sustainable infrastructure pathways for N.E.A.L. beyond the life of the mine authors such as Buultjens and Memmott et al offer solutions industry sustainability, but not infrastructure specifically, in remote and largely indigenous regions of Australia where mining occurs by looking at the possibilities for Indigenous owned and operated tourism enterprises.<sup>46</sup> For instance, Buultjens et al identify the case study of Weipa in western Cape York as an example where remote natural and Indigenous cultural tourism is an industrial alternative beyond mining. The authors advocate for the mining company, also R.T.A., to adopt a role beyond funding provision to collectives to instead provide technical and business advice support to individual tourism enterprises. This proposal may have some relevance in the context of N.E.A.L. In N.E.A.L. there is a newly established (in 2012), collectively Yolngu owned and operated cultural tourism organisation, Lirrwi Yolngu Tourism Aboriginal Corporation. The organisation has struggled with funding management and went into voluntary administration in January 2016. R.T.A. could thus offer technical personnel and funding support for tourism-related infrastructure to overcome the barriers of "a lack of access to capital", "communal Indigenous land tenure", "lower levels of education and training" and the primacy of "cultural values and belief systems [that]..can often conflict with the requirements of running a business" as identified by Buultjens et al.<sup>47</sup> This proposal requires caution as the greater involvement of R.T.A. in Lirrwi's decision-making processes may undermine existing Yolngu traditional owner agency given the onus on socio-cultural rather than purely market oriented foundations.

Nhulunbuy has failed to provide long-term architecture and infrastructure to support a viable region because it was predicted on a set of short-term circumstances that did not take into account that the settlement might become a permanent place of inhabitation. N.A.B.A.L.C.O. relied on its mining agreement conditions to create a built environment that did not meet national standards, as well as subsidised refinery power, and standardised designs built with imported labour and materials to save on cost and time. Nhulunbuy has provided some beneficial larger scale infrastructures that continue to serve regional needs, such as the swimming pool, hospital, shipping port, power plant and the airport. However, Nhulunbuy's housing is largely inappropriate for its environmental context and contemporary

needs and even if it were retrofitted, the costs are prohibitive, thus the best course of action may be gradual removal. Perhaps the most short sighted error of Nhulunbuy's development was the complete lack of involvement of Yolngu in development and construction. Thus without being complicit but by virtue of their traditional ownership, the Yolngu have inherited a built environment liability.

### **Discussion and Lessons Learnt**

There is a disparity between the way architecture was developed in mining towns and through mining royalties. Nhulunbuy's mining town architecture is characterised by structures that were erected as quickly as possible with the aim of creating an environment that dislocated the inhabitants to internally conditioned 'comfort'. Beyond the life of the mine there was no long-term development strategy for Nhulunbuy, which resulted in a surplus of inappropriate housing from an ongoing electrical and maintenance cost and environmental health and safety perspective. Nhulunbuy is typical of post-war mining settlement design in this way. While there were some post-war mining towns such as Shay Gap and Weipa that sought to design housing in response to their local context, these were the exception and did not incorporate local Indigenous people in the development process.<sup>48</sup>

It is only in recent years since national land rights recognition under the Native Title Act (1993) that mining town planning in remote Australia has deliberately sought to incorporate input and meet specific needs of local Indigenous populations to provide a more diverse economic base to grow. For example, mining magnate Andrew (Twiggy) Forrest's GenerationOne initiative established at Fortescue Mine in the Pilbara (now with Federal Government support for wider application) seeks to provide Indigenous training in both construction and building maintenance in an attempt to create 'real jobs' and promote a diversity of economic activities that aim to reduce the monopoly effect of the mine.<sup>49</sup> Ultimately however mines are not in the business of building communities, thus a number of other mining companies such as, Rio Tinto's 'Mine of the Future' program, are moving away from building remote settlements altogether, instead favouring centralised automated systems that enable staff to work from regional and metropolitan centres.<sup>50</sup> Although this approach mitigates the need for architecture to house and service miners, it does not change the fact that mining still occurs on Aboriginal Land, thus there is a responsibility to consider the effect of the mining operation by involving the local Indigenous population to determine if and how it could occur.

In comparison, mining royalties allow for autonomy of funding use that enables communities to determine how to spend their funds according to self-identified need (sometimes for better or worse). Due to the necessity for a more diverse local industry and low ongoing costs to overcome remoteness market barriers the architecture that emerges through royalties is invariably more environmentally responsive and intensive in local resource usage. This is exemplified in the Gumatj and Rirratjingu Aboriginal Corporations business development enterprises of recent years that involve the construction of much-needed infrastructure and the training and skill building of local Indigenous people.

The shared experience of architectures that emerge from mining activities and mining royalties is a lack of long-term planning beyond the life of the mine. When a mine operation closes, the effects are sudden and catastrophic leaving the town and broader region looking to alternatives to sustain themselves. Without adaptive architectures that respond to their local context, the situation is exacerbated. While the mine itself leaves a benign scar where the damage is done, Nhulunbuy's mining town architecture continues to plague the region with costly and wasteful electricity bills, building materials that are an environmental and health liability, and little benefit to the remaining majority Indigenous population.

The experience of N.E.A.L. following the 2014 closure of the R.T.A. alumina refinery raises the question of how the design of future mines is to be approached and integrated with the broader community to support diverse use of built infrastructure beyond the life of a mine. If remote mining town architecture is to be more responsive to its local context with a long-term vision of sustainability, perhaps traditional owner driven building initiatives that emerge from mining royalties offer lessons. In N.E.A.L. these were characterised by: slower development, a holistic vision that supports more local industry diversity, involvement of local labour and materials and building typology diversity to meet different needs.

## Endnotes

- 1 Nhlunbuy had 3933 residents in 2011. Australian Bureau of Statistics (ABS), 2011 Census Quick Stats: Nhlunbuy, Commonwealth of Australia, 2011. Accessed 17 February 2016, [http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/UCL715006?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/UCL715006?opendocument&navpos=220)
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