

# Local implementation of a broadband network: Social impact issues of new broadband capacity in Australia

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## **Abstract**

In April 2009, the Australian Government announced plans to roll-out the National Broadband Network (NBN) Company Open Access Network in Australia. Australia's NBN will bring high speed internet access to areas and people that otherwise would have been without. Predicting consequences (both positive and negative) arising from the NBN, as well as risks and opportunities that it will generate differentially between places, groups and sectors, is inherently uncertain. With little reliable data available on social impacts of NBN-style access at the household and community level, policy-making and regulation risks responding to optimistic speculation and commercially motivated spin rather than carefully weighed evidence. The research reported in this paper aimed to address this gap with a preliminary assessment of the social impacts of

the NBN-like broadband roll-out at one New South Wales test site in southwest Sydney. The paper discusses the research methods and findings and frames recommendations for further research to address both limitations that arose in the research reported here, and broader gaps in understanding the social impacts of new forms of broadband access and associated applications. Due to the small sample size, this preliminary report provides details and findings from a scoping research perspective that aims to inform future research in this area.

**Keywords:** Social Impacts, Communication Technologies, High Speed Internet

## **Introduction**

### **Roll-out of new broadband capacity in Australia**

Access to high-speed internet capacity is widely agreed to be basic infrastructure, central to economic and educational opportunities, political and social participation, and social equity across geographical scales. The so-called digital divide between those who have access to digital services at reasonable levels of cost, speed and reliability and those who don't is a high profile political issue. Economic and social implications for regions, nations and social groups without access are seen as significant. Commentary on the nature of the social implications of inadequate or unequal broadband internet access, however, is more often a matter of political rhetoric than rigorous research-based knowledge. Creation of high-speed broadband access for the vast majority of Australians has been prioritised across the political spectrum – although the means of achieving this has been a point of significant policy differences between the major parties (Gerrand, 2010).

In April 2009, the Australian Government announced plans to roll-out the National Broadband Network (NBN) Company Open Access Network in Australia. At that time, the estimated cost of the NBN for the Australian Government was forty-three billion dollars over eight years. The NBN proposal became an election issue in the 2010 Federal election and continues to raise controversy, being formally opposed by the

Liberal/National Party Coalition, currently in opposition in the Federal Parliament. The aim of the NBN is to connect all Australian homes, businesses, and education facilities in towns with a population of 1,000 or more with optical fibre-based internet access (Willson, Marshall, & McCann, 2009). Rural communities would receive next generation wireless and satellite facilities that reach speeds of twelve megabits per second. The policy anticipates that at least ninety-three percent of Australian residential and business premises will be connected to high speed optical fibre by the end of the rollout (Australian Labor Party, 2010), with the remaining seven percent having access to wireless or satellite services, potentially having significant impacts at the community and household levels.

Rollout of the fibre-to-the-premises (FTTP) network and wireless services began in Tasmania July 2009, with services launched in July 2010 (Willson et al., 2009). On March 2<sup>nd</sup>, 2010 five additional rollout sites were chosen in New South Wales, Victoria, Queensland, and Tasmania, continuing with a further fourteen sites around Australia, announced in July 2010 by the NBN Company (Crozier, 2010). The NBN Company intends to expand these trials to include surrounding areas for which the Australian Government has commenced some research to analyse impacts. This research remains unavailable to date; although some preliminary reports have been issued by consulting firms (see e.g. Allen Consulting Group, 2003; ACIL Tasman, 2003). Key findings from these reports focus on positive impacts of 'true broadband' deployment include:

- increases in gross regional output and gross state product (GSP);
- increase in local employment through creation of jobs; and
- increases in aggregate consumption at the whole of state scale (Willson et al., 2009, p. 798).

Other research reviews a range of initiatives to improve rural access to Information and Communication Technologies (ICTs) and concludes that these initiatives develop social, human, physical and financial capital amongst the rural

communities in Australia, an essential element for reducing the digital divide (Singh, Molla, Karanasios, & Sargent, 2008, p. 471).

Australia's NBN will bring high speed internet access to areas and people that otherwise would have been without. Predicting consequences (both positive and negative) arising from the NBN, as well as risks and opportunities that it will generate differentially between places, groups and sectors, is inherently uncertain. Willson et al. (2009) report: "there are relatively few papers or reports that measure, evaluate and interpret the actual economic and social impact of broadband technologies post-implementation" (Willson et al., 2009, p. 796). The relatively few reports that are available generally do not report on negative impacts, assuming that only positive impacts are likely. This risks overlooking and leaving unaddressed issues such as addiction, stress, conflict, exposure to inappropriate material, increased cyber-bullying, or other potential harmful consequences to not only the individual, but also to communities (Lacroix, 2007). With little reliable data available on social impacts of NBN-style access at the household and community level, policy-making and regulation risks responding to optimistic speculation and commercially motivated spin rather than carefully weighed evidence.

The research reported in this paper aimed to address this gap with a preliminary assessment of the social impacts of the NBN-like broadband roll-out at one New South Wales test site, the newly-established community at Parkbridge Estate, Middleton Grange in southwest Sydney (see Figure 1). The research secured only a small sample and is limited in making wider conclusions. Nevertheless, this preliminary report provides details and findings from a scoping research perspective and aims to inform future research in the area. The paper discusses the research methods and findings and frames recommendations for further research to address both limitations that arose in the research reported here, and broader gaps in understanding the social impacts of new forms of broadband access and associated applications. Data limitations, which are discussed in the text, restrict the conclusions that can be drawn from this research, but the paper offers a useful scoping analysis that should inform future research in this field.

## **The research**

The research reported here was requested and supported by the New South Wales Department of Finance and Services, and undertaken by staff and students from the Department of Environment & Geography at Macquarie University in response to a request from the former New South Wales (NSW) Department of Commerce. The research was required to include:

- Literature review;
- Stakeholder interviews; and
- Participant surveys.

Residents from Parkbridge Estate at Middleton Grange who were already connected to the optical broadband network were invited to participate in a survey, which included an invitation to participate in a follow-up semi-structured interview. The total number of residents available for the research was less than twenty and most of the eligible residents were already involved in other studies already underway with commercial service providers to evaluate services, devices and markets by the time the social impact research was commissioned. This significantly restricted participation rates and even with a number of follow-up requests, only three survey forms were returned in the initial period, with only one participant agreeing to a follow-up interview. This work focused on one of the early rollout testbed projects and at the time only a few households in Parkbridge Estate had actually received the relevant products and services. Some people approached to participate declined as they were experiencing faults or limited functionality with the products and services available to them. Many household participants were therefore unable to report on their use of services or their impacts due to these limitations, which they also reported when approached with follow-up requests for participation, made it impossible for them to complete the survey. The resident interview protocol considered, but was not limited to, motivations for participation, most positive and challenging elements of their experience of the broadband services and technologies, perceived personal and/or family benefits and costs, expectations not met or expectations exceeded, and finally changes to

individuals' and households' social connections and sense of belonging to a community that might be attributed to participation in the testbed project.

Interviews with other stakeholders included service providers, regulators and other commercial interests, elicited more responses, with five detailed interviews. The interview protocol included, but was not limited to; discussion on key drivers for their involvement, criteria for success, failure and learning arising from the testbed project, expectations not met or expectations exceeded, and finally social, economic and community issues they see as related to the testbed project.

The research protocol was approved by the Macquarie University Human Ethics Review Committee. The complex relationships between commercial interests, for whom the research participants offer a testbed of considerable commercial value, service providers from key government agencies, for whom the research participants offer a setting for trialling new information services and data collection tools, and more academic research like the social impact research, created a need to protect participants' privacy and avoid both possible conflicts of interest and pressure to participate in multiple research activities. While a necessary constraint on the research, the fact that commercial trials and market research was already underway before the social impact assessment commenced also affected our recruitment in this project. Throughout the data collection, care was taken to protect the participants from pressure from commercial interests.

### **Social impact assessment (SIA) of ICTs**

The research utilized a Social Impact Assessment (SIA) tool for gathering data and analysing potential impacts. SIA offers a well-established framework for anticipating impacts of specified changes on social relationships and processes. It is widely used in predictive evaluation of major development projects as part of the environmental evaluation and approval procedures. It offers a powerful framework for identifying, responding to, managing and monitoring the impacts of change. For reviewing the social implications of technological change in a range of social settings, SIA offers governments, developers and service providers with a means of understanding and responding to change. It also offers a valuable tool for citizens to better understand the

implications of new technological developments and their applications in their various communities and a vehicle for assisting communities to respond to issues as they arise (Howitt, 2003).

SIA is commonly applied to assess development projects (including larger scale urban development and infrastructure projects), social policy and government actions. SIA investigates the impacts and develops strategies for monitoring and management of both unintended and intended consequences. The primary purpose of the SIA is to ensure new developments progress in the most sustainable and equitable way, enhancing inclusion, alleviating poverty, and promoting capacity building (Vanclay, 2003, 2004).

The process of social impact assessments ensures that development interventions are informed and take into account the key relevant social issues and include participation strategies for involving a wide range of stakeholders (Howitt, 1993; Buchan, 2003; O’Faircheallaigh, 2010; O’Faircheallaigh & Howitt, 2013). The assessment primarily follows a standardized process, which includes the following steps: gathering baseline conditions and demographics, participant and community involvement, project description, screening, scoping, prediction of impact response, and finally, management and monitoring. All steps are inherently essential for the full capacity and reliability of an SIA. In this preliminary study, the limited scope and response meant that steps required in a full SIA (management and monitoring for example) was not possible within the scope of work requested.

As a critical element of an SIA, scoping provides researchers with an indispensable tool for predicting potential impacts (Vanclay, 2003, 2004). Following screening, determining the boundaries of a SIA and selection of developments for assessment, feedback from participants and stakeholders must be analysed for probable development consequences and consequence response for which scoping allows. Scoping studies can, and often do, stand as independent research outside the full scope of an SIA (Singh et al., 2001). In responding to new technology, the scope of impacts beyond the social sphere, particularly in economic domains, has been emphasised, but in terms of many key issues such as “social inclusion, community, development, local employment, improved health and well-being, participation in local

decision making and enhanced cultural life” (Singh et al., 2008, p. 468), the social implications of ICTs are enormously important. Given the constraints faced by this research, it is essentially a scoping study that identifies issues for consideration and investigation as Australia’s NBN roll-out proceeds.

### **The NSW test site at Middleton Grange**

The NSW Government chose the Parkbridge Estate at Middleton Grange as a suitable trial site because it is “one of the few locations in Australia which is ‘NBN’ ready as it already has fibre optic cable connecting each home” (NSW Government 2010). Parkbridge Estate at Middleton Grange is located in close proximity to Liverpool CBD, approximately 50 km Southwest of Sydney, NSW. Parkbridge Estate is also located next to the Western Sydney Parklands. The new residential estate has been developed by Mirvac Ltd (2011), a large-scale commercial property developer.





*Figure 1.* Plate 1: Aerial view of Parkbridge Estate, NSW. Copyright 2011 by Mirvac Ltd. Reprinted with permission.

The suburb of Middleton Grange has changed rapidly. At the 2006 Census (Australian Bureau of Statistics [ABS], 2007), the suburb of Middleton Grange had a population of 283 individuals, of those, 59.7% were Australian born with a median age of 42. In 2011, this had risen to 515 individuals, 61.2% Australian born and with a median age of 31 (Australian Bureau of Statistics [ABS], 2012). The median household income in 2006 was lower than the median household income for Australia, a median weekly household income of \$900 was reported for Middleton Grange versus \$1,027 for Australia as a whole and the median household size is two (ABS, 2012). In 2011, this had changed significantly with the median household income reported as \$1,568, compared to the national figure of \$1,234. The most commonly reported religious affiliation was Catholicism (36.9% in 2011), with the second most common being Anglican (16.9% in 2011). The highest form of education stated in the area in 2006 was

a Bachelors degree (10 individuals) (ABS, 2007). In 2011 (ABS, 2012), 43 individuals listed a Bachelors degree as their highest qualification, while a further eight listed a graduate or postgraduate qualification. The major industries employing residents in 2006 were manufacturing, construction and transport, postal & warehousing (ABS, 2007). In 2011, there were similar numbers employed in education and training and health care and social assistance. Much of the change witnessed in Middleton Grange 2006-2011 resulted from the Parkbridge Estate development. In 2011, 77.8% of the suburbs 162 dwellings had broadband connections (and only 27 dwellings or 20.5% had no internet connection) (ABS, 2007).

Construction on the Parkbridge Estate at Middleton Grange started in September, 2009. There are plans for over 700 homes in the estate. The developer, Mirvac Ltd. (2011), has engaged Connections Community Development to help residents create a sense of community in the new estate. The community coordinator, Rochelle Jamie, organizes events, for example bingo and picnics, for a more connected and vibrant community life. In addition, the estate has many facilities, such as parks, green spaces, swimming pools, playgrounds, and tennis courts. The Parkbridge Estate is equipped with advanced technologies for internet, television, and phone. Including high speed broadband internet with up to 100 Mbps, enabling downloads at the fastest speed in Australia, as of December, 2009. In addition, the developer has taken many measures to ensure sustainability, including water efficient bathroom facilities, utilizing recycled water, planting native plants and trees, and achieving a score of 40% for the Building Sustainability Index (BASIX) in reference to the water index as well as sustainability (Mircvac Ltd., 2011).

## **Discussion**

While the technological options are contested politically, the NBN – or some form of high-speed internet access, is presented in the media and discussed by some politicians as a technological necessity, one which will allow Australia to benefit from future digital innovations. Yet for such an important addition to national infrastructures, there is remarkably little research or discussion on the impacts, particularly in the Australian context.

Most of the questions around the issue in Australia centre on technical and financial aspects of the NBN and its alternatives, rather than their social impacts. Yet, one commercial participant in this research remarked, 'the debate about terabytes and peak speeds misses the point' (Field, 2010). It is the management of the human impacts which is crucial. What is often implicit or missing in discussions and the literature, is that consumers/users would be better off as a result of improved service delivery via online systems. Yet the real benefits and impacts (or the measurement of them) are often not talked about at all. As Aurigi (2005) noted, "digital cities need steering, and that is not just a matter of deciding what to do but above all how, and why it is being done" (Aurigi, 2005, p. 25).

Specifically, in regard to the Australian NBN roll-out a significant amount of capital has been spent on the technological aspects and only a feeble attempt has been made at developing community initiatives or even evaluating the impacts of such technology, especially at the local or micro-scale levels. Like so many aspects of the modern developmental project, the beneficial value of ICTs is assumed to be self-evident, and the idea of investigating possible negative impacts is somehow marginalised in most public discourses. As an independent study, this research attempted to gather as much information as possible to assess possible impacts. There remains, however, a need for a longitudinal SIA with proper measures taken to curb negative impacts, especially at the household and community levels. Recent international and Australian research has predicted that by increasing accessibility of ICTs for Australian communities, may increase social inclusion and reduce the digital divide (Aurigi, 2005). Although, bringing the internet to areas that may have otherwise gone without will have significant impacts on the daily lives of community members, therefore SIAs will become a necessary tool for assessing the impacts.

For instance, there are very few longitudinal, public data sets on Internet usage in Australia, nor are there many impact studies of the technology. ICTs in international research have been shown to have a significant impact on the daily lives of individuals; thus highlighting the imperative for a longitudinal study on the impacts of ICTs in Australia respectively. For instance, recent Australian research indicated that around a third of people felt that the internet had changed the time they spent on other pastimes,

though this is greatly influenced by the persons' occupation (Anderson & Raban 2005; see also Havick 2000).

Another major focus by some literature has been on the impacts of local computer networks and the internet on both rural and urban and communities and on families. However in Australia, there is little empirical data concerning the impact of ICT projects on the lives of any beneficiaries, particularly in the rural context. Singh et al. (2008) found that rural projects did have small positive impacts in the areas of social, human, physical and financial capital, with the biggest impact in social capital. People and communities without access miss out and will continue to be left behind by the digital divide due to low levels of social capital, lack of technical expertise and poor funding (Gaved & Anderson, 2006).

In terms of impacts on families, the literature indicates a number of positive impacts and some areas of concern. One study shows that people are using ICTs to negotiate complex routines, schedules and family life (Kennedy & Wellman, 2007). In addition, around 66% of Australians felt that the internet has not changed the amount of time spent with family and friends, while one in five felt that it had decreased their time with family and friends and 13% felt it had increased it (Australian National University, 2008). However, interestingly, despite the perceived positive perceptions of the Internet and other ICTs as positive domestic resources, parent's attitude to the relationship their children form with the technologies is nuanced, ambiguous and viewed with distrustful anxiety. Parenting is now the ongoing management of domestic ICTs; access to ICTs for parents and their children is a continued site of contestation. (Shklovski, Kraut & Rainie, 2004).

Therefore, the relationship with ICTs in communities and at the domestic level is complicated, with some researchers finding that social capital and digital divide, increased and decreased respectively, although on the other hand families may find spending time together more difficult, as well as the increased stress from curbing the potential negative impacts on children and adolescents (Gaved & Anderson, 2006). Therefore, this research report analysed the potential impacts of the NBN on the community and people of the Parkbridge Estate.

## **Research findings and recommendations**

On the Parkbridge Estate study, key issues included practical concerns about the reliability of services and the efficacy of support; the relationships between commercial, governmental and citizen interests in terms of privacy, security and ethics; and the expectation that early adopters of the technology will not only be 'tech-savvy' but willing to participate in multiple activities related to trials, research and reviews. The literature suggests one area of policy concern for the testbed settings in Australia's NBN should be the information portals and applications that allow people to access online services. In particular, four areas should be considered in future policy development:

- There is already a digital divide between generations and between professions and 'classes'.
- Users from the same cohort vary both in ability and usage patterns.
- Life-time training/education is required due to the pace of technological change.
- Further impediments are caused by a lack the skills or the means to get online. This can include people with a disability, aged, children at risk and people with literacy and numeracy problems.

The Parkbridge Estate trial faced some specific communication problems: there was strong indication of a lack of access to information for end-users and weak communication linkages between end users and researcher partners and associated service providers. Anecdotal accounts indicated that users in the trial had uneven access to information and service delivery. Whilst, this matter is not directly linked to the broadband technology trials, one householder related how, on moving in to her new home, she arrived to find a bunch of wires poking out of the wall. She had to call the builder to discover their purpose (TV and internet wires) – even though the FTTP connection was seen as a key element of commercial attraction to the site. Furthermore, even after getting the TV connected this participant was still unable to connect to the internet for two months. Her only technical support consisted of multiple telephone contacts with a specialist technician. This homeowner was guided to inspect the wiring and connections herself and expected to relate information about the wiring

connections back to the technician. She also indicated this process was repeated with her neighbours when they moved in some months later.

Such administrative, communication and technological impediments also occurred in the trialling of the ipTV (Internet Protocol TeleVision) set-top box. The National Information and Communications Technology Australia (NICTA) set top box used in the NSW broadband technology trial at Parkbridge Estate was intended to deliver video on demand content (ABC iView, Government information and selected other content) and free-to-air channels across the broadband IP network. Here, stumbling blocks prevented users being aware of the system's capabilities. Ignoring the various technical glitches, the biggest problems for users of this service was the lack of content and training. For example, the first nine volunteers to use the set-top box could only find some old video materials from various NSW government departments and ABC iView rather than the wider suite of services anticipated. When one of the technical project managers went out to the site and happened to visit some of the first users, he showed them what was now available. In his words, they were very surprised and had obviously not used the service due to their poor experience at the beginning of the trial (Field, 2010). In addition, it was later confirmed that part of the fibre network may not have been working for a number of weeks, which the coordinating authority and the service delivery people only discovered by accident, because of inadequate monitoring and feedback mechanisms. Rather, emphasis was placed heavily on the initial infrastructure, overlooking the need for proper training for community members.

In light of these problems and considering the existing literature, a number of observations and recommendations can be made. In particular, within this testbed, by integrating the provision of technological services and infrastructure into a community development model would greatly increase the communication channels between the service providers and the end-users. By utilizing the power of 'community' service providers are enabled to provide on-site support and regular monitoring of services seems to be an essential. As well as, the provision of some face-to-face enquiry and technical support seems to be vital for harnessing the capacities that exist, and for assisting community and further social development, all areas of communication that this study found lacking in this testbed.

Real and pseudo-property rights are another major issue highlighted by this study. ICTs and the need to regulate them have created new markets which present novel management and law enforcement challenges for both commercial enterprises and nation states. Over the past twenty years, losses of intellectual property rights and copyright infringements have already seen commercial interests play out in the courts with victories by both infringers and enforcers. Nation states are increasingly committed to reducing copyright piracy both domestically and internationally and policing of criminal use of ICTs by organised criminal networks and opportunistic criminal activity (Redo, 2000, 2004; Broadhurst, 2006). Although the creation of the NBN is effectively an extension of existing internet delivery, new infrastructure will generate new property right and criminality challenges which must be resolved.

The construction of the NBN will inevitably create a new set of pseudo-property rights and require avenues for public and private organisations to negotiate access to both virtual and real property. For instance, the Tasmanian government (2010), had to make changes to trespass and property laws to ensure households were not left without fixed telephone connections, following the rollout of the fibre optic network (Battersby, 2010). Other states will likely have to follow suit with similar legislation.

In the case of the broadband technology trials at Parkbridge Estate, several organisations' provide services, for instance there is an Internet Service Provider (ISP), but another organisation provides the set-top box for the ipTV. Additionally, there were two separate developers for the green field site and the builder of the house. Such arrangements can fragment access and income generation and services. Bringing this diverse range of service providers together in specific locations can also make it difficult to determine who is specifically responsible when a problem occurs, consequently causing issues on a broad scale, not only amongst providers, but within receiving communities.

A simple example of this presented itself at a round-table meeting of stakeholders. Sydney Water were attending the meeting for the first time, and they informed the group of the problems they had in getting access to an optic fibre conduit, both in terms of administrative approval from the conduit proprietors and the size of access fee. They presented their case, that the access fee quoted was at a substantial

commercial rate, which they thought was inappropriate for a not-for-profit, essential service. This situation suggests that fragmented supply lines may lead to relationships which cause market blockages or monopolistic-pricing hurdles to organisations. As such, it seems reasonable that some form of regulatory regime will be needed to solve any property related issues.

## **Conclusion**

This report offers a preliminary scoping analysis on the Parkbridge Estate at Middleton Grange testbed project for broadband technologies. Taking into account time and resource constraints, a complete SIA was unattainable, and there was no capacity to commit to ongoing monitoring and management of impacts in any case. The research reported here, therefore, focused on policy implications, the 'digital divide', the lack of access to information for end-users and weak communication linkages between end users and service providers, administrative, communication and technological impediments, and property rights, as well as suggestions and further observations. This paper offers some valuable insights into implications of the ICT roll-outs on the daily lives of Australians and the potential for an increase in social inclusion and a decrease in the digital divide. Furthermore, the paper concludes that there is a need for government initiatives to concurrently invest in social and human capital as well as supporting technological improvements, and to take note of the impacts that ICT initiatives have on the livelihoods of the community members receiving the technology.

In conclusion, revisiting the information highway analogy, there is going to have to be policy development in driver training, access ramps, road side assistance, governance and policing, with funded research and development in order to make the highway safe, efficient, cheap, non-discriminatory and relevant for both stakeholders and users. In addition, existing bricks-and-mortar service centres will need to be maintained and accessible to consumers, so as to support people who are unable or unwilling to access digital services. Furthermore, because technology may diverge considerably from its originally intended purpose, it is important to conduct historical analysis as a baseline for addressing decisions about the future (Universität Siegen, 2007).



In addition, in light of the difficulty in contacting users and stakeholders, getting users to participate in the test bed research, and the problems in regards to the delivery of services and information, it is recommended that a more comprehensive scoping of any future ICT projects involve commitment to social impact assessment from the outset. As stated previously, SIAs on ICT initiatives is significantly lacking. This scoping research was merely a preliminary report aiming to inform future research in the area.

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### **Biographical Notes**

**Tiffany Tenty** is currently a Community Development Officer at the Benevolent Society. In 2011, Tiffany received a Masters of Applied Anthropology from Macquarie University. From the University of Massachusetts she completed her undergraduate degree in Social Psychology. Throughout her undergraduate and postgraduate career, Tiffany worked as a Research Assistant at several institutions and hospitals including; Harvard Medical School / Children's Hospital-Boston, Westmead Hospital, and the Department of Psychology at Macquarie University. Tiffany's main areas of research focus on multiculturalism policies, community development, and social impact.

**Brendan Wallis** is currently working for CARE in Timor Leste on a rural roads project based on community development/ social impact assessment methodologies and practices. He completed his Master of Development Studies and Culture Change with a Vice-Chancellor's commendation in 2010. Brendan graduated with a degree in engineering from the University of Tasmania but has worked over the past decade in the areas of education management, ESL teaching and social development. Brendan's main areas of research interest are the development processes of projects in the developing world, community development, social and cultural Impact studies.

**Sumita Ghosh** was awarded a PhD in Architecture from the School of Architecture and Planning, University of Auckland, New Zealand in 2004. She completed a postgraduate degree in City Planning at the Indian Institute of Technology (IIT) and a bachelor degree in Architecture. Her research interests focus on: sustainable settlement planning and morphologies; urban performance indicators; sustainability assessments and tools; alternative energy and water infrastructure and innovative Geographic Information Systems (GIS) applications. Sumita has teaching, research and professional experiences in Australia, New Zealand and India and has been with the Urban Research Centre since January 2009.

**Richard Howitt's** professional practice as a geographer includes work in the fields of human rights, indigenous rights, environmental justice, sustainability and social theory. He has undertaken major social impact studies for various Aboriginal groups, and contributed to native title and mining negotiations in several areas. Richards's current research focuses on the interfaces between Indigenous and non-Indigenous peoples, considering the fragile geographies of coexistence, avenues for sustainable and just development in remote communities and the implications of relational concepts of geographical scale for our analysis of and responses to these situations. His teaching covers areas of cultural, social and environmental geography at undergraduate, honours, Masters and PhD levels.