Title

Green around the gills?: the challenge of density for urban greenspace planning in SEQ

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ABSTRACT

Australian cities exhibit a quality of life arguably among the best in the world, but rapidly expanding populations may soon threaten this status. The burgeoning conurbation of South East Queensland (SEQ) is an example. Recent growth management policies and plans (e.g. South East Queensland Regional Plan and local authority growth management strategies) have sought to curtail urban sprawl through urban footprints, growth management boundaries, urban consolidation, and other measures. The 'density imperative' presented by these collective urban policies affects the sourcing, provision and management of open space in inner-city locales in SEQ which may soon run out of land for parks and urban greenspace. This paper presents results from recent research into the environmental equity dimensions of providing urban greenspace in SEQ. Critiquing the long-entrenched parks-standards approach, the paper offers a 'needs-based' alternative, and considers its utility for SEQ and other fast-growing Australian urban areas. Questioning orthodox planning perspectives about who lives in higher density areas, we argue that local and state governments should look towards a variety of new types of green and open space to meet the needs of existing and future residents living in denser built environments.

Keywords

Urban parks, greenspace, growth, consolidation, healthy cities, sustainability, infrastructure

Word count = 5,272 (excluding references)

Introduction

Recent population forecasts suggest that Australia's population will swell to 35.9 million by 2050 (Commonwealth of Australia, 2010a). Putting aside the debate about the desirability of this kind of growth, if we accept these numbers at face value they will mean dramatic population increases across Australia's major urban areas. Increasing populations will sorely test the quality of life that many Australians now take for granted. Roads, water, electricity supplies and a range of other essential services are already critically over-subscribed in our major cities and housing affordability is plummeting. Most growth management strategies propose an increase in density to cope with these demands, but this 'density remedy' is hotly contested. Growing numbers of disaffected residents and community groups, together with some planners and urban scholars, now question the efficacy of urban consolidation policies largely due to perceived quality of life impacts. South East Queensland (SEQ), one of Australia's fastest growing urban areas, is a case in point.

Growth management policies and plans in South East Queensland - such as the area's Regional Plan 2009-2031 (SEQRP) (Queensland Government, 2009) and local authority growth management strategies have sought to curtail urban sprawl by using urban footprints, growth management boundaries, urban consolidation, and other measures. The 'density imperative' presented by these collective urban strategies poses major challenges for the sourcing, provision and management of urban greenspace in inner-city locales. In the rush to accommodate new residents, decisions have been made that may now threaten urban greenspace in the conurbation (Byrne and Sipe, 2010). Inner city areas in SEQ may soon run out of land for parks, community gardens and other forms of urban greenspace.

Surprisingly, the urban consolidation literature has precious little to say about greenspace (notable exceptions include Randolph, 2006a; Randolph, 2006b; Randolph, 2008; Searle, 2009). And discussion about green urban infrastructure (e.g. parks and open space) is noticeably absent from the current federal government policy agenda (Byrne et al., 2007). For instance, the State of the Australian Cities report 2010 (Commonwealth of Australia, 2010b) barely mentions parks and other types of greenspace and the third intergenerational report all but ignores them (Commonwealth of Australia, 2010a); while the State of Queensland has begun to prepare a new greenspace strategy, it is still inchoate (Queensland Government, 2010). Yet recent research has demonstrated that parks and other types of urban greenspace are crucial to the health and wellbeing of urban residents and provide a range of ecosystem services benefits that are essential if our cities are to prosper over the long term (Pincetl, 2010). We must plan better for urban greenspace while we still have the chance.

In this paper we concisely review the urban consolidation and greenspace literatures and discuss findings from a recent greenspace pilot study conducted in South East Queensland (SEQ), in whichwe examined the environmental equity dimensions of greenspace distribution in two of the region's cities – Brisbane and Gold Coast. By greenspace we mean: parks, sporting fields, bushland, creeks, rivers and bays, plazas, community gardens, bikeways and paths, spaces around libraries and art galleries as well as attractive and safe streets and 'green' links between these various elements (Brisbane City Council, 1994). But our study focused explicitly upon publicly accessible green and open spaces and therefore excluded private backyards, gardens and balconies. While we excluded communal space around apartment buildings, cemeteries, rock walls, street verges and medians, school grounds, rooftop parks, and stormwater channels, as well as parking lots and open-air, publicly

accessible shopping malls, we recognise these spaces may also provide some recreational opportunities (Harnik, 2009; Pincetl and Gearin, 2005).

Our research found that there appear to be inequalities in access to urban greenspace within the SEQ region, but this preliminary finding requires further investigation. Nonetheless, there seem to be major problems with the way greenspace is currently provided in SEQ, especially in higher density areas. For instance it seems that the supply of greenspace may not be commensurate with residents' needs. We conclude by suggesting alternative ways of suppling greenspace and of estimating present and future demand. We also make some policy recommendations and outline an agenda for further research.

The trouble with urban consolidation

Australian cities have undergone profound change in recent decades. Politicians, decision-makers and planners have sought to ensure that as urban populations increase, built environments remain liveable and adaptable to new lifestyles and demographic trends. Urban consolidation is one such reform (Forster, 2006). Consolidation is a growth management policy that aims to direct growth away from green-field sites at the metropolitan periphery by increasing density in existing built environments, through smaller suburban lots and higher density dwellings – especially within the inner city (Gleeson and Douglas, 2006). The term is also related to, and sometimes conflated with, 'urban containment', 'smart growth', 'urban renewal', urban revitalisation' or simply 'densification'(Alexander and Tomalty, 2002; Michell *et al.*, 2004; Randolph, 2006b). Proponents of consolidation argue it will lead to more efficient use of existing infrastructure and services, while simultaneously delivering multiple benefits including: protecting valuable green-spaces on the fringes of metropolitan

areas; reducing traffic congestion and pollution; and even combating obesity and sedentary lifestyles (Ewing, 2003; Frank *et al.*, 2007).

But community groups, urban activists and some scholars have criticised urban consolidation, arguing that it can compromise the character and heritage of inner city neighbourhoods and can detrimentally impact residents' quality of life, by placing residents in noisy locations, by concentrating social disadvantage, by undermining social cohesion, and by losing precious public open space to urban infill (Byrne and Houston, 2005; Randolph, 2006b; Searle, 2004; Troy, 1996). Consolidation may also 'silo' certain demographics, selectively concentrating young singles and DINKS (dual income no kids) to the exclusion of families, though recent research suggests this may be changing (City Futures Research Centre, 2007; Randolph, 2006b). In many instances, planners have failed to carefully manage consolidation to preserve the public domain, compromising residential amenity and the character of targeted neighbourhoods (e.g. by developing 'surplus' parkland for housing). This is especially the case where consolidation has been ad-hoc rather than managed through redevelopment schemes.

The incremental demolition of single family houses and replacement with 'six-pack' and 'twelve-pack' style apartment blocks can harm quality of life by reducing privacy, increasing noise levels, worsening road traffic, increasing on-street parking and decreasing access to greenspace within neighbourhoods, with little or no mitigation on the part of developers (Bamford, 2003; Byrne, 2007; Searle, 2004, 2007, 2009). Some planners, leisure scholars and greenspace theorists now suggest that Australian planning systems may be incapable of responding to the challenges that densification and concomitant population increases place on

urban open spaces and greenspace; a worry given the multiple benefits that greenspace provides (Gillen, 2005; Gleeson, 2008; Gleeson *et al.*, 2004; Gleeson and Douglas, 2006; Gleeson *et al.*, 2007).

Reasons to provide urban greenspace

Parks and other greenspaces play multiple roles in making our cities more sustainable and pleasant places (Chiesura, 2004). These include space for ecological benefits (e.g. preserving biodiversity and mitigating pollution), social benefits (e.g. promoting socialisation and healthy living) and economic benefits (e.g. stimulating tourism and improving property values) (Byrne and Sipe, 2010). It is useful to briefly overview the major benefits here, to better appreciate the taken-for-granted services that urban greenspace provides urban residents, and to counter myopic perspectives that suggest greenspace is primarily a public liability due to its acquisition and maintenance costs.

Urban greenspace confers numerous benefits upon its users and provides less tangible 'cost savings' to municipalities (Chen and Jim, 2008). For example, access to greenspace can: prevent health problems linked to sedentary lifestyles such as diabetes, obesity, coronary heart disease (by promoting active living and facilitating walking and cycling); increase worker productivity (by reducing stress and improving concentration); improve conviviality (by providing places to met and socialise); and lessen infrastructure costs (by attenuating flooding, sequestering pollution, cooling heat islands etc.) (Arvanitidis *et al.*, 2009; Bedimo-Rung *et al.*, 2005b; Conner, 2007; Endlicher *et al.*, 2008; Guite *et al.*, 2006; Maller *et al.*, 2006; Pearson *et al.*, 2007; Sherer, 2006). While not immediately obvious, translating these cost savings into dollar values shows that urban greenspace can save municipalities millions

of dollars annually – money that would otherwise be spent on flood barriers, air-conditioning, policing, sick days, stress leave, and the like (Byrne and Yang, 2009).

But greenspace is a potential net revenue earner too (Rosenberg, 1996). Local authorities could generate future revenue from the carbon sequestering capacities of their urban greenspaces, providing a revenue stream for upkeep and developing new parks and recreation facilities (Byrne and Yang, 2009; Killey *et al.*, 2008; Peng *et al.*, 2008). Also, many international cities now allow a range of commercial uses into their greenspaces such as food concessions, kiosks, cafés, restaurants, beer gardens, equipment rental facilities and other sympathetic commercial uses, providing a revenue stream for ongoing maintenance and upkeep. Clearly urban greenspaces are not an expensive luxury; rather they are a vital necessity for the wellbeing of residents. This is perhaps most apparent in denser urban environments.

Density and greenspace interactions

For some time now there has been an ongoing debate about the impacts that increased density has on urban greenspace use. Some theorists suggest that as density increases we should increase the amount of greenspace in a locality, thus offsetting the loss of private backyards (Bamford, 2003; Bedimo-Rung *et al.*, 2005a; Coen and Ross, 2006; Iverson and Cook, 2000; Loukaitou-Sideris and Stieglitz, 2002; Searle, 2007). The theory is that residents will compensate poor access to private greenspace by using public greenspaces such as parks – a notion referred to as the 'compensation hypothesis' (Maat and de Vries, 2006). The idea sounds plausible but is this really the case?

Recent research suggests that we should not assume that just because people live in denser environments with little access to private greenspace they will necessarily use neighbourhood public parks and other greenspaces more frequently (Grose, 2009; Maat and de Vries, 2006; Syme *et al.*, 2001). Indeed, a paradox of urban consolidation is that it may actually stimulate leisure-based travel, as city dwellers seek to escape to the countryside or other places for leisure and recreational experiences (Aguiléra *et al.*, 2009; Giles-Corti *et al.*, 2005; Holden, 2007; Limtanakool *et al.*, 2006; Maat and de Vries, 2006; Naess, 2005; Smith, 1980). And existing parks and other greenspaces in higher density areas may become so congested with users (park congestion) or attract new 'undesirable' or 'incompatible' uses that they actually deter additional use, making urban consolidation - without additional greenspace - highly inequitable (Boone *et al.*, 2009; Pincetl and Gearin, 2005; Randolph, 2006a; Sister *et al.*, 2009).

There are therefore three important factors to consider when planning for increased density and park use: (i) different types of people who live in higher density built environments will have different greenspace needs; (ii) because consolidation always involves existing built environments planners need to contend with how to integrate existing greenspaces into denser built environments – many parks for example will have historically been designed for a different clientele than the residents that consolidation brings; and (iii) the character of built environments has been shown to affect how people use urban greenspaces – urban design must ensure that greenspaces are easy to get to, are safe, and have high levels of environmental quality (e.g. shade structures, tree canopies, rain shelters, functional seating, level pathways, barbecue facilities etc.). The design of higher density development must entail careful thinking about the greenspace needs of future residents (e.g. children's playgrounds, dog exercise areas, community gardens etc.) relative to the capacity of the built

environment to meet those needs (Blomley, 2004; Chen et al, 2009; Goličnik and Thompson, 2010; Lee et al., 2009; Nikolopoulou and Lykoudis, 2007; Perkins, 2009; Pincetl and Gearin, 2005; Randolph, 2006a; and Sugiyama and Thompson, 2008).

Higher density residents and their greenspace needs

One of the problems with the simplistic notion that more parks are required when density is increased is that it does not consider the characteristics of people living in higher density environments. The notion assumes a homogeneous population of townhouse and apartment dwellers who need access to a generic park, and a common misconception is that small households live in small dwellings (Wulff et al., 2004). This has prompted some commentators to suggest that there is excess park capacity in many inner city areas. But if we take a closer look at who lives in townhouses, mid-rise and high-rise apartments in Australia, we find that populations are differentiated by income, age, sex, household composition and the like (Randolph, 2006b). In other words, there is no typical 'higher density resident'. Careful scrutiny of the inter-relationships between greenspace users and greenspace characteristics suggests that we need to be open-minded and think strategically when planning for greenspace in urban consolidation projects – flexibility is essential.

People live in higher density dwellings for a variety of reasons. In some cases, but not all, apartments are cheaper than single-family houses, so income plays a role (Arvanitidis *et al.*, 2009; More and Stevens, 2000; Scott and Munson, 1994). Some researchers have found that lower-income residents need better access to parks and open space because they cannot afford other forms of leisure (e.g. ski trips, horse-riding or golf) (More and Stevens, 2000; Scott and Munson, 1994). But not all higher density residents are impoverished. Many people

seeking to live in apartments are actually older retirees seeking a 'sea-change' lifestyle, close to beaches and amenities. These residents choose to live in luxury apartments to be close to shops, restaurants, entertainment venues and public transit routes; they usually have higher disposable incomes. However, researchers have also found that some older people may be less inclined to use parks and other greenspaces for reasons related to personal mobility, health and fear of other park users (Burgess *et al.*, 1988; Payne *et al.*, 2002; Talbot and Kaplan, 1993; Tierney *et al.*, 2001; Tinsley *et al.*, 2002). So there is an interaction effect here between density, income, age and park use that is difficult to tease apart.

The situation becomes even more complicated when we consider the presence of children in higher density dwellings. We might expect that people who live in apartments will have few if any children (Gifford, 2007). This is partly the result of development industry stereotypes of apartment dwellers, and partly the result of past self-selection practices based on Australian concerns about the stigmas of higher density housing and the practicalities of needing room to raise children (Costello, 2005; Fincher, 2004; Fincher, 2007; Gifford, 2007). But a closer inspection of demographic data and recent research shows that increasing numbers of Australian apartment dwellers and inner city residents have children (Bunker *et al.*, 2005; Crane *et al.*, 2006; Forster, 2006; Randolph, 2006a; Randolph, 2008). Younger people with children may not be able to afford a single-family house – at least within reasonable commuting distance of workplaces, but lifestyle values may play a role too. Some generation X and Y parents may choose to stay in inner city areas because they enjoy the cosmopolitan lifestyles these places offer and are unprepared to leave higher density locations for suburbs they perceive as bland and boring (Searle and Byrne, 2002; Stimson *et al.*, 2000).

Researchers have found that children living in higher density housing have a greater need for publicly accessible greenspaces for play, mental health and social and physical development (Crane *et al.*, 2006; Gilliland *et al.*, 2006; L'Aoustet and Griffet, 2004; Loukaitou-Sideris and Stieglitz, 2002; Woolley, 2006a; Woolley, 2006b, 2008; Ziviani *et al.*, 2008). While parents living within apartments may not be avid park-goers for their own benefit, they often visit parks so their children can play and vent excess energy (Bittman and Wajcman, 2004; Miller and Brown, 2005). Apartment living means that time that would otherwise be spent on yard or garden maintenance is available for taking children to parks for socialising and relaxing, even if this means forgoing personal recreation (Brown *et al.*, 2001; Claxton and Perry-Jenkins, 2008). Children's sporting activities may also necessitate night-time and weekend visits to playing fields (Miles *et al.*, 1993; Wolch *et al.*, 2005). Apartment living may place unique demands upon children who may lack the private play spaces enjoyed by their low-density counterparts. Children need space to play away from traffic, where their parents can monitor them, and where their play will not disturb other apartment-dwellers. Yet most consolidation to date has failed to cater to children's (and parents') needs (Randolph, 2006a).

These various considerations mean that open space and greenspace near higher density dwellings must cater to very diverse populations – older people, children, adolescents, parents, wealthy people and the poor – with diverse expectations about the functions that greenspace should perform (Barbosa *et al.*, 2007; Groenewegen *et al.*, 2006; Hillsdon *et al.*, 2006; Mäkinen and Tyrväinen, 2008; Seeland *et al.*, 2009). A 'one size fits all' approach to greenspace design for higher density areas will likely be prone to failure.

Planning for inner city greenspace

Planners have traditionally planned for parks and open space using a 'standards approach'. Typically, a certain amount of open space is required in any development, based on longstanding assumptions about park use. The 'standards approach' has conventionally provided certainty for greenspace planning as one set of rules are applied uniformly to all situations. This approach to parks and open space provision dates back to the early twentieth century when park reformers sought to establish minimum acceptable park allocations for urban residents (Taylor, 1999; Wilkinson, 1985). For example, the firm of Olmstead, Bartholomew and Associates – responsible for designing many early American parks – specified that no resident should be further than ¼ mile (400 metres) from a park (Wilkinson, 1985). And early legislation in Massachusetts for instance, established a minimum of 1 playground per 20,000 residents (Taylor, 1999). These early ideas were modified over time, eventually being enshrined in US national standards by the National Recreation and Park Association (NRPA) in the early 1970s (Buechner, 1971; Haley, 1988). The NRPA standards prescribed a park allocation of 10 acres (4 ha) per 1,000 residents, with variations by park size and political / administrative jurisdiction (see table 1) (Hendon, 1974). Similar approaches were adopted in the United Kingdom. In the 1920s a standard of 6 acres (2.4 ha) per 1,000 residents was embraced by the National Playing Fields Association and not long after the Second World War, a national standard emerged of four acres of open space per 1,000 residents, with no resident expected to live more than a half-mile from a park (Hindley, 2007; Veal, 2008).

Australia appears to have followed a comparable trajectory to the United Kingdom. A national standard of 7 acres (3 ha) per 1,000 residents emerged in the 1940s (Queensland Government, 2003; Veal, 2008). Some Australian states have also implemented spatial

standards whereby a proportion of the developable area (typically 10%) is expected to be provided for parks and recreation (Grose, 2007; Moir, 1995). In SEQ there is a generally accepted standard of 4 – 5 ha per 1,000 residents, whereas in Brisbane the standard ranges between 2 and 4 ha per 1,000 residents (Brisbane City Council, 2009a: p. 35), and on the Gold Coast, a desired standard of service policy requires between 3.7 and 5.1 ha per 1,000 residents (Gold Coast City Council, 2006; Queensland Government, 2003).

INSERT TABLE 1 AROUND HERE

The problem with standards

International research has shown that many local authorities facing development pressure fail to implement their 'standards' (Harnik, 2000; Harnik and Simms, 2004; Searle, 2009). Since the 1970s, the parks standards approach has been criticised for failing to deliver high quality parks and open space, and for producing bland green-spaces that people do not use (Gold, 1977). Studies have found that recommended park service areas (catchments) were beyond many people's typical walking distance (Bangs Jr. and Mahler, 1970). And some scholars have castigated planners for blindly applying park standards that failed to consider changing demographic patterns, changes in leisure preferences and behaviours, and which ignored the capabilities of older and younger people (Wilkinson, 1985). Many of these standards have never been empirically evaluated or 'scientifically' tested (Wilkinson, 1985).

Where standards have been scrutinised, they have been found to be problematic. For instance, recent studies of United States municipalities found that local authorities have seldom

achieved the standards articulated in their planning instruments; many are unable to provide parks even within a mile (1.6 km) of most residents (Harnik and Simms, 2004). Other commentators have criticised the boring park landscapes that a standards approach can produce (Hindley, 2007; Loukaitou-Sideris, 1995; Loukaitou-Sideris and Stieglitz, 2002). And public health researchers have recently argued that the whole notion of 'walking distance' to parks and other greenspaces that most standards are based on is spurious. Many people may not be able to accurately judge how far their home is from a park and even the ¼ mile (400 metre) standard may be beyond the time, physical or motivational capabilities of most residents. Where parks are located in close proximity to residents, barriers like railway lines or busy roads, uneven or non-existent footpaths, lack of shelter from the weather or isolated stretches without passive surveillance may still deter people from walking to the park (Giles-Corti *et al.*, 2005; Harnik and Simms, 2004; Macintyre *et al.*, 2008). Is this the case in South East Queensland?

Greenspace planning for urban consolidation in SEQ

As a first step in addressing the question of equitable access to urban greenspace in higher density areas, we examined green and open space distribution in Brisbane and the Gold Coast (see figures 1 & 2). We explored the relationships between greenspace type, socio-demographic characteristics and potential quality of life issues by using the Australian Bureau of Statistics socio-economic indexes for areas (SEIFA) based on 2006 census data for these two cities. Using a geographic information system (ArcGIS) we examined the spatial distribution of different types of urban greenspace and the socio-demographic composition of residential areas.

INSERT FIGURE 1 AROUND HERE

We tested for statistically significant relationships using Analysis of variance (ANOVA), t-tests and adjusted r square and found that parks on the Gold Coast and in Brisbane are unevenly distributed. In many cases, park distribution does not meet the desired standards of service for these cities. Moreover, less than half of parks are accessible by public transport and this situation worsens for regional parks (see table 2). But we found no significant associations between park distribution and SEIFA. What this likely means however, is that further investigation is required into indices of socio-economic disadvantage, density and park distribution, as our analysis was likely too course to pick up local and scale-dependent associations. Future research should consider using variables such as *age* (people aged less than 14 and over 55); *sex*; *income* (low-income earners); *occupation* (service-sector employees); *race/ethnicity* (non-White); *education* (high-school graduate or below); *country of origin* (overseas born); *household composition* (single-parents), *tenure* (renters) and *dwelling type* (apartment, townhouse, duplex). People with some of, or a combination of these socio-demographic characteristics seem to have the highest level of need for access to parks (Nicholls, 2001; Sister et al., 2009; Talen, 1997, 1998; Talen and Anselin, 1998). A look at greenspace planning in inner-city Brisbane sheds some light on the nature of park-provision problems and the issues warranting investigation in future research.

INSERT FIGURE 2 AROUND HERE

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A Brisbane case study

A key focus of urban consolidation within SEQ is Brisbane City. Brisbane City planners acknowledge the need to provide park and other greenspaces within the city. They use a

traditional standards approach where developers are levied on a 'local park space per capita' cost basis. Park planning in Brisbane does not incorporate more recent concepts and ideas discussed in earlier sections. This raises important issues concerning the adequacy of the standards used, the feasibility of providing local park space at the current standards, and the nexus between adequate local park provision and dwelling affordability.

A typical greenspace standard being used in inner Brisbane for higher density development is 'one hectare per 1,000 residents' (Brisbane City Council, 2008b). Not only is this significantly below most other international open space standards, it is also below the 'preferred' standard for new subdivisions in metropolitan Brisbane of '8 per cent of total subdivision area' (Brisbane City Council, 2008a) and below the 'two hectares per 1,000 residents' minimum standard for infill specified in Council's City Plan (Brisbane City Council, 2009a). If we assume 15 dwellings per hectare and 3 persons per dwelling, this higher density standard equates to a subdivision standard of 1.8 hectares per 1,000 residents. It is also doubtful whether even the low provision of 'one hectare per 1,000' can be achieved in the higher density zones. A Brisbane City Council policy document acknowledges that high land values and elevated demand for available land in the proposed higher density riverside zones in inner West End for example (see figure 3), mean that 'it is unlikely that sufficient land will be available to meet current standards of service for land for local public parks' (Brisbane City Council, 2008b p. 40). This view rests on two considerations: (i) the physical feasibility of providing new local parks in such contested environments, and (ii) the financial feasibility of doing so.

INSERT FIGURE 3 AROUND HERE

In terms of physical feasibility, new high density residential development in West End is planned to be concentrated on the suburb's industrial sites. In theory, older low density housing in the suburb could be acquired and converted to local parks, but this would be politically contentious and ideologically unsound (destroying existing housing to provide for the greenspace needs of new housing). This leaves remaining commercial areas and the industrial sites themselves as potential sources of local park space. The West End Riverside infrastructure contributions document proposes the purchase of just two non-residential lots totalling 0.65 hectares as parkland - grossly inadequate to meet the 'one hectare per 1,000 standard' for the several tens of thousands of new residents that could be accommodated under West End's new higher density zonings. It is unclear how the Council's local parks infrastructure contributions from high rise developers will be spent, other than on the rezoned old industrial areas themselves.

These concerns lead us to the question of 'how best to finance local park provision for urban consolidation in Brisbane?', and the related issue of affordability. As the West End Riverside contributions policy notes (Brisbane City Council, 2008a), high land values make providing local parks at desired standards very problematic. Yet such concerns do not recognise the wider reasons why urban consolidation is appropriate in the first place. High land values in places like West End reflect their accessibility to the city centre and the river, and their good access to public transport. These same factors make these areas favourable sites for urban consolidation. In other words, the provision of land necessary for the community infrastructure required by higher density residents is necessarily expensive, and needs to be recognised as such by planners and politicians.

Where land is being rezoned from lower value uses such as industry for residential consolidation, as in West End, it is appropriate that land owners/developers pay for the necessary land from windfall gains via rezoning. The problem in the West End plan is that it does not show how such developer contributions will be spent on local parks. Indeed, there is a lack of transparency about exactly where Council spends infrastructure charges and other developer contributions. Paradoxically, adequate provision of local parks might mean that urban consolidation becomes less affordable. Calculations based on Sydney local open space standards show that providing such space at desired standards can virtually double the land required by consolidation developers (Searle, 2009). Applying the higher planned densities and the lower park space standard of West End suggests that a similar situation could exist for this part of inner Brisbane. The question then becomes 'to what extent should local greenspace provision be traded off against urban consolidation affordability?'. This is an issue that planners in Brisbane – and elsewhere – have thus far avoided.

Conclusion: are there better approaches to park planning for consolidation?

From our examination of the literature and our SEQ pilot study research, it is evident that parks are not evenly distributed throughout Brisbane and Gold Coast, that park provision does not meet the required standards of service for these cities, and that inequalities in greenspace accessibility may exist. There are both park supply and park demand issues related to this problem and we now briefly explore some potential solutions to these issues.

Potential supply-side solutions

From a supply-side perspective, the draft neighbourhood plan (Brisbane City Council, 2009b) sets maximum building heights across its several precincts that vary according to plot size,

but does not identify separate areas for local parks. A way of providing such parks might be to allow building height to be traded off against local park provision – a type of transferable development right (Panayotou, 1994). Higher buildings would be allowed where more land for local parks was provided. This could be achieved by setting an upper limit on overall densities. Developers could then build higher if building footprints occupied a smaller total area. Provision of local park space beyond a certain proportion of the total site could trigger infrastructure contribution concessions. At the same time, there are potentially negative urban design implications of this approach, such as streetscape incoherence and setback issues that would need to be carefully regulated. At the very least, such neighbourhood plans should map out future local park spaces on the rezoned industrial land. Full rezoned land value could be paid via infrastructure contributions to those land owners with the best sites for local parks.

Demand-side solutions

Open space use is closely associated with the pool of potential users – that is, the people who live within a specific community who would normally want or need to access that space (Giles-Corti et al., 2005). But not all potential users will be the same; they will vary from each other by age, sex, race, ethnicity, education, income levels, disability, physical fitness, home ownership, and household composition, and these differences all affect residents' needs and preferences for greenspace use (Burns and Graefe, 2007; Coen and Ross, 2006; Floyd *et al.*, 2008; Kemperman and Timmermans, 2008). Greenspace use is also closely associated with the physical characteristics of parks, playgrounds, plazas etc. and the neighbourhoods within which these spaces are situated (Bedimo-Rung *et al.*, 2005a; Pikora *et al.*, 2006; Shores and West, 2008). Spaces that are larger and contain more facilities – especially paved

trails and wooded areas – will likely be used more often (Crawford *et al.*, 2008; Kaczynski *et al.*, 2008). Preferences for different recreational activities will also influence how far a person travels to access a particular type of green/open space (McCormack et al., 2006). The alternative to a standards approach for park planning is a 'needs based' assessment, which considers these socio-demographic and bio-physical characteristics of areas for which parks are needed, or areas where park facilities might be upgraded.

Needs assessment is driven by the idea that greenspace provision should be calculated according to the needs of the population for whom it is planned (Lucy, 1981; Smoyer-Tomic *et al.*, 2004). It assumes that the spatial distribution of both populations and resources within a given area will be uneven – as is the case with Gold Coast and Brisbane (Coen and Ross, 2006; Nicholls, 2001; Smoyer-Tomic *et al.*, 2004; Talen, 1997, 1998; Talen and Anselin, 1998). And a needs-assessment assumes that people will minimise travel costs (e.g. time, fuel costs & energy) by using the closest available resource (Hanink and White, 1999; Harnik and Simms, 2004; Maat and de Vries, 2006; Macintyre *et al.*, 2008; Smith, 1980; Stouffer, 1940). Finally a needs-based approach will account for the leisure and recreation preferences of residents and the number and type of facilities required to meet those needs. These considerations should also reflect projected residential densities, which can change population compositions.

While potentially more time consuming and resource intensive than a standards approach, a needs-based assessment may provide the capability to better estimate the amount of open space required, the design of that space, and the facilities and programs that foster recreation within that space. This is especially important for areas where density increases are planned,

but where there is little or no opportunity for additional greenspace – either because there are insufficient funds available to purchase new parks, because relevant agencies have other priorities, or because there is simply no land available for new parks. But a needs-based assessment must necessarily go beyond the needs of existing residents to also forecast those of future residents – a difficult task (Chen *et al.*, 2003; Cicchetti *et al.*, 1972; Glover and Prideaux, 2008). This necessitates a very good understanding of the likely demographics that new built environments will foster so as to avoid future 'park congestion' where demand grossly outstrips supply. It is beyond the scope of this paper to evaluate the various techniques for forecasting greenspace use, but there are several options available that merit further attention (e.g. Chen *et al.*, 2003; Cicchetti *et al.*, 1972; Cummings and Busser, 1994; Train, 1998).

Planners who have undertaken such needs-based assessments invariably conclude that parks and greenspaces must be versatile – capable of sustaining present trends but also future activities that may be beyond our capability to accurately forecast. And this is the challenge facing planners in South East Queensland. The latest park planning trends suggest that we will continue to see demands for access to more unconventional greenspaces and for alternative uses of existing greenspaces as the region's population burgeons. Yet innovative solutions may be possible. For example some foreshore parks of the Seine River in Paris have recently been converted into beaches for sunbathing – like the Southbank Lagoon in Brisbane. And in Hangzhou China, spaces under freeways, alongside railway lines and beside former transport canals have recently been converted into beautiful linear parks. Other examples include climbing walls, green walls, green roofs, urban micro-pocket parks, densely planted medians/verges, and greening streets through the use of permeable pavements through which grass can grow. The question facing planners is: 'how best to use new

greenspace options in a way that meets the needs of existing and future residents without breaking the bank?'. The answers may come from unexpected places – such as the high density, rapidly developing cities of south-east Asia, and planners will need to keep an open mind when trying to resolve this vexing problem.

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Table 1 – Comparison of park standards

Place	Year	Size	Population	Distance
United States	1970s	10 acres/ 4 ha	1,000 residents	¼ mile / 400 metres
United Kingdom	1920s	6 acres / 2.4 ha	1,000 residents	unspecified
United Kingdom	1950s	4 acres / 1.6 ha	1,000 residents	½ mile / 800 metres
Australia	1940s	7 acres / 3 ha	1,000 residents	unspecified
Western Australia	1955	10% subdivision	n/a	unspecified
Queensland	present	4-5 ha	1,000 residents	unspecified
Brisbane	present	4 ha (standard) 2 ha (minimum)	1,000 residents	local park = 500 m district park = 2 -5 km regional park = > 5 km
Gold Coast	present	3.7-5.1 ha	1,000 residents	unspecified

Table 2 – Comparison of park types (Gold Coast and Brisbane)

	Local Parks		**Metropolitan Parks**		**District Parks**		**Total (all park types)**		**Others**	
Variable	Brisbane	Gold Coast	Brisbane	Gold Coast	Brisbane	Gold Coast	Brisbane	Gold Coast	Brisbane*	Gold Coast**
Total number of collection districts (CDs)	1,743	859	1,743	859	1,743	859	1,743	859	1,743	859
CDs containing a park	931	626	69	16	401	18	1,035	658	9	208
Percentage of CDs containing a park	53.4%	72.9%	4.0%	1.9%	23.0%	2.1%	59.4%	76.6%	0.5%	24.2%
Total park area (sq m)	32,899,779	10,973,853	28,512,565	2,627,667	57,023,618	5,626,773	118,435,962	19,228,293	17,175,498	3,799,462
Average park area/collection district	35,338	17,530	413,226	145,981	142,204	27,052	114,431	29,222	1,908,389	18,267
Population	1,027,847	402,648	1,027,847	402,648	1,027,847	402,648	1,027,847	402,648	1,027,847	402,648
Park Area/capita (sq m)	32.0	27.3	27.7	6.5	55.5	14.0	115.2	47.8	16.7	9.4
Regression (SEIFA Independent Variable)										
T-Stat	0.0006	0.008	0.0003	0.001	0.0006	-0.00067	0.0009	0.0086		
P value	0.96	2.82	-0.26	1.36	0.96	0.65	0.888	2.909		
Adjusted R Square	0.3363	0.0049	0.7929	0.172	0.3363	0.5158	0.3741	0.0037		

* regional parks

** foreshore reserves

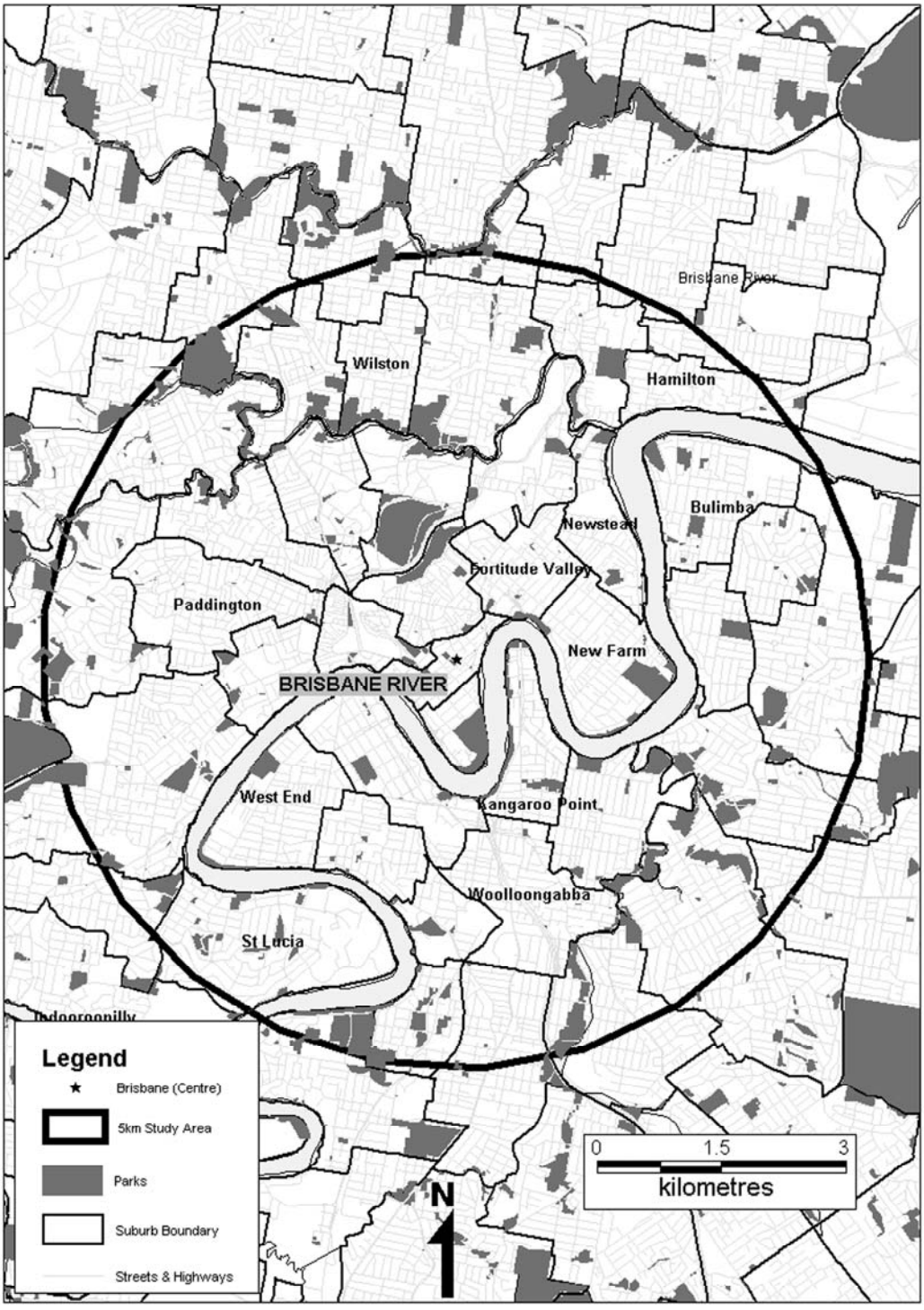

Figure 1 – Green and open space in inner Brisbane

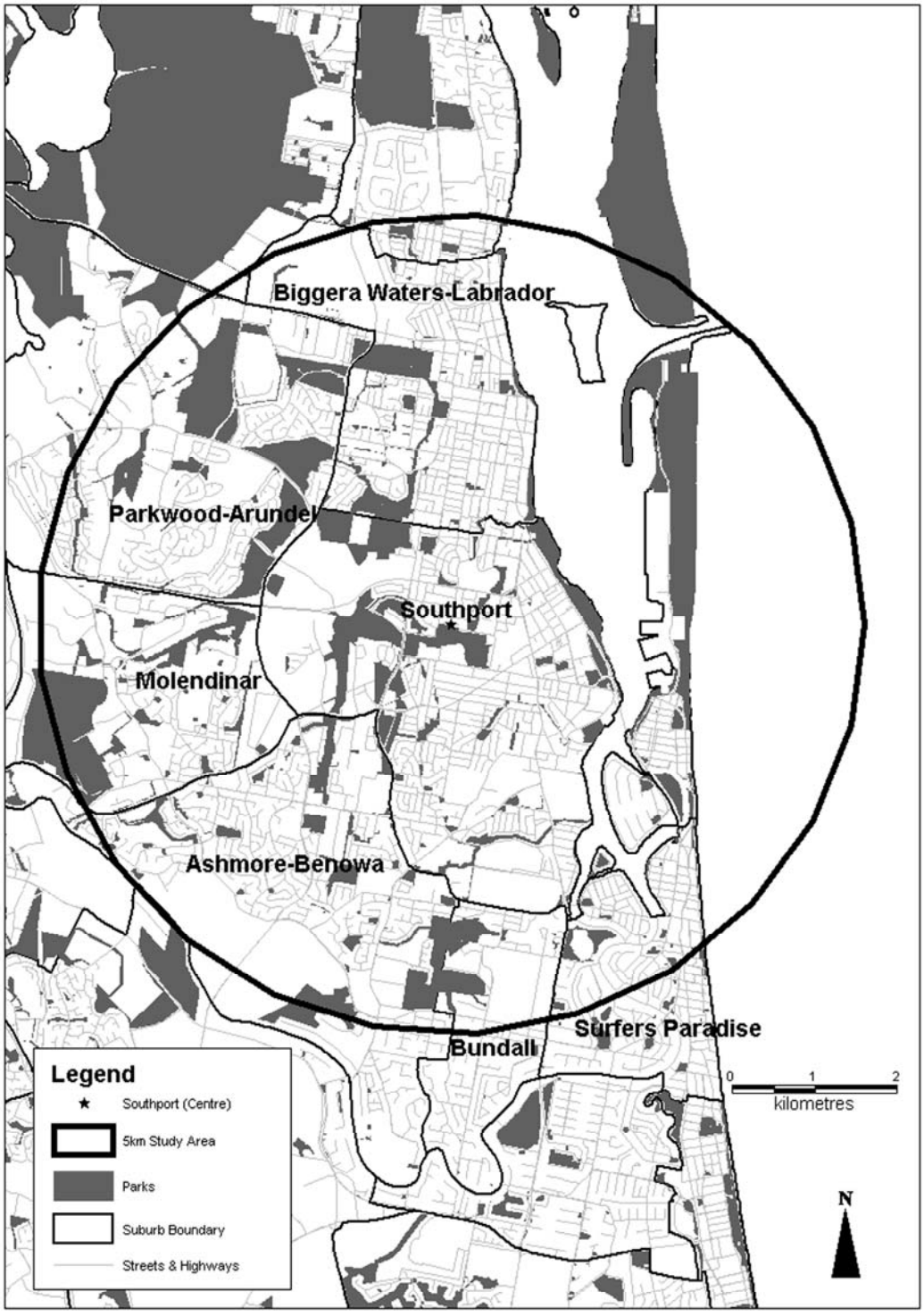

Figure 2 – Green and open space in inner Gold Coast

Figure 3 – View from a Highgate Hill/West End park towards the Brisbane CBD