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Title: Sustainable Suburbia – Oxymoron or Realistic Goal?

Theme: Limits to Growth

Abstract

In 2009, the New Zealand Government established an Urban Technical Advisory Group to review current approaches to urban planning in New Zealand. One of the approaches subject to the review is the widespread use of metropolitan urban limits (MULs).

Conventional urban planning theory and practice argues that the use of MULs promotes sustainable forms of development by limiting urban sprawl and its associated encroachment into rural land and sensitive ecological areas. It also allows for intensification of urban form, leading to more viable public transport, mixed-use communities and less reliance on private automobile transport.

An alternative view is that the use of MULs generate negative socio-economic consequences, such as inflating land and property prices in cities. This may make the goal of intensification within the existing urban form, the very *raison d'être* of MULs, difficult to achieve. This may then lead to a stalemate where development does not (or cannot) occur, and ultimately results in relaxation of the MUL. Critics of the use of MULs also argue that MUL-driven growth management approaches do not sufficiently recognise the multi-nodal nature of modern cities, with its dispersal of employment centres across a metropolitan region. These critics argue that because of this, people living on the edge of the city do not necessarily face long commutes into the CBD for work, as many will work in regional centres near to where they live on the edge. Alternatively, they may even work from home.

This paper challenges such dualistic notions, critiquing both views. It explores alternatives to dogmatically restricted approaches such as unwavering application of MULs, or its conventional alternative “SLUDGEs” (Sprawl Led Urban Development Growth Environments), and proposes new alternatives such as sustainability-led suburban and ex-urban development to complement rather than compete with compact city models. Case studies of sustainability-led suburban and ex-urban developments and possible rating tools are outlined.

Keywords

Metropolitan Urban Limits, new urbanism, smart growth, suburbia, intensification, medium density housing, high density housing, sustainable suburbia

Presenter Profile

Matthew Paetz is the Planning Manager in the Auckland Office of AECOM. His experience primarily lies in the areas of urban planning and infrastructure.

Introduction: Urban Form and Sustainability

Cities have been described both favourably and unfavourably in relation to sustainability. In terms of the favourable view, their density is considered to be a factor that can promote better economies for public transport, as well as mixed use development which, theoretically at least, can reduce the frequency and distance of trips made by private automobile transport. This helps to support a more energy-efficient urban form, and reduce the emission of greenhouse gases. The alternative view is that cities are the most unsustainable thing to have ever graced the earth, that they are inherently consumptive, wasteful, and polluting.

The positive view of the city in environmental terms has dominated discourse in urban planning circles in recent years. Urban is good, rural is good, but anything in between – suburban or peri-urban – is undesirable and unsustainable. Therefore, the argument follows, strict boundaries should be established around existing urban areas, cities should not spread or sprawl as, although they are good, they are only good if they are dense and efficient.

This view has been promoted heavily over the past 15 years by a number of prominent urban thinkers who subscribe to the “Smart Growth” and “New Urbanist” approaches. These include, in particular, American urbanists such as James Howard Kunstler and Andre Duany. In texts such as Kunstler’s “Geography of Nowhere” (1993) and Duany’s “Suburban Nation” (2002), the negatives of suburban development are set out, and the benefits of neo-traditional urban intensification promoted. These and other commentators have criticised suburbia as soulless and isolating, and environmentally devastating. More extreme commentators have blamed suburbia on a raft of modern ills, including obesity, racism and depression. J.S. Hirschhorn, in “Sprawl Kills – how blandburbs steal your time, health and money”, asserts that sprawl causes “sedentary death syndrome”, amongst other ills (Hirschhorn, 2005).

However, it should be noted that even within a movement such as New Urbanism a diversity of viewpoints exist. This was expressed clearly in one of the seminal early documents of New Urbanism: “The New Urbanism – Toward an Architecture of Community” (1994) by Peter Katz, who stated that:

“...it is important to note a major philosophical division among the practitioners of the New Urbanism....Some believe that land at the region’s edge shouldn’t be developed until all infill possibilities have been exhausted; others feel that since current economic and political realities favour growth at the edge, it is better to mold such new growth into a more sustainable development pattern that will not drain the vitality of nearby established urban centres.”

In recent years the overall philosophy of the New Urbanist movement has arguably evolved more toward the view of promoting development within existing urban limits unless there are exceptional reasons to justify ex-urban development. Such an evolving philosophy appears to have echoed the growth in concern about climate change, and the impact of urban form on it.

However, such a view has evolved rather uncritically. The reality of urban form's impact in terms of sustainability is not black and white, but rather complex. For example, high density intensification is not necessarily as sustainable as some of its proponents claim.

Studies such as that undertaken by Energy Australia and the NSW Department of Infrastructure, Planning and Natural Resources in 2005 show that per capita consumption of energy and associated greenhouse gas emissions resulting from such energy consumption, is significantly higher in high rise apartments than detached suburban housing, due largely to the significant energy consumed by common facilities- large areas of corridors, basement carparking, and lift systems. It is noted however, that the study did not account for transport energy consumption and associated emissions, which are typically higher in suburban areas dominated by detached housing than in central areas dominated by apartments.

This highlights the need to take comprehensive, multi-sectoral assessments of greenhouse gas emissions. Unfortunately many studies have been one dimensional in their assessment of the impacts of different development forms in terms of emissions.

Perkins, Hamnett, Pullen, Zito, and Trebilcock, approached the issue comprehensively and holistically, addressing both the lifecycle energy consumption and emissions of city centre apartments compared with suburban dwellings. Perkins et al included parameters such as transport sector emissions and embodied CO₂ through the construction process. In addressing these matters comprehensively, they concluded that it cannot be assumed that centralised higher density living will deliver per capita emission reductions, once the combined per capita life cycle emissions from housing and transport have been accounted for (Perkins et al, 2009).

Intensification – Benefits and Limitations

The literature quoted above suggests that high density housing is not necessarily as sustainable as it is often credited with. However studies such as those undertaken by Energy Australia and the NSW Department of Infrastructure, Planning and Natural Resources indicate that medium density housing is potentially the most sustainable of residential development forms, being relatively energy efficient both in terms of household energy consumption and transport energy.

Rightfully, medium density housing will be a central component of Auckland's future development strategy. However the evidence suggests that medium density housing within the existing city boundaries will be insufficient to meet Auckland's projected population growth. A 2008 report by the Department of Building and Housing found that capacity for medium density housing within the Auckland region will be exhausted by the early to mid 2020s, depending on

different growth and zoning scenarios. It is possible that even the Department of Building and Housing report overestimates the amount of housing that can *realistically* be provided within the existing urban limits, as the report is based on development yield projections made by Councils whose assumptions are arguably flawed for the following reasons.

The Author's own development experience in both the public sector, for Housing New Zealand, and in the private sector, has been that the development economics of medium and high density housing is often very much a marginal endeavour. Even with greater incentivisation of medium density development as suggested by the Author, both medium and high density development is likely to be of marginal economic feasibility in the short to medium term, at the very least (Paetz, 2009). Without some significant economic changes, this will limit the amount of housing built in such forms.

As part of a current and ongoing research study (yet to be published) the author has had discussions with a number of prominent development companies and bodies. The unanimous view expressed has been one citing the marginal nature of higher density development.

Such a view is supported by recent presentations by Urban Planners from Boffa Miskell and Urbanism Plus at the Australian and New Zealand Planning Institute Conference in 2010. Boffa Miskell presented findings of a paper undertaken for the Department of Building and Housing. This study involved interviews with a number of developers regarding the constraints to develop housing in growth centres. One of the key conclusions of the study was that the location of development was not based on identified growth areas, but rather on where resource consents could be most easily and economically achieved, which was often in greenfield or lower density areas, or alternatively areas with high amenity not identified as growth areas (Boffa Miskell, 2010).

Similarly, Ian Munro of Urbanism Plus highlighted the barriers to intensification within identified growth areas. Munro highlighted the flaws inherent in Council catchment analysis and projection of realisable development yield. Reviewing Albany Centre as a case study, he concluded that even on optimistic assumptions the development yield realised in this centre was likely to be at least 30% lower than that planned for by Council. This projection took account of factors such as the realities of development economics, land ownership fragmentation, recently developed land that would be unlikely to be redeveloped over the next 30 years and so forth (Munro, 2010).

Not only are there significant economic barriers to higher density development, but there are also significant cultural, and therefore political barriers. Many New Zealanders still aspire to live in detached houses. Furthermore the perception of higher density living has been soured by the legacy of an overall poor architectural quality of higher density development, and the stigma of the "leaky building" issue. All of these issues are inter-related, because it is difficult for developers to substantially lift architectural quality (other than at the high end of the market) when the economics of development are so marginal.

An Alternative Vision of Suburbia

None of the above is to suggest that compact, intensified development should be abandoned. Such intensive development will necessarily form an integral part of the sustainable growth management approach of cities such as Auckland. However as the weight of evidence shows that urban intensification, even achieved at optimistic levels, will be insufficient to meet Auckland's housing needs, some form of peri-urban and ex-urban development will be essential. The key question then becomes not whether we should allow peri-urban and ex-urban development but rather how can we build such development models in a way that is significantly more sustainable than the conventional model that has dominated the vast majority of suburban development in the western world since World War II.

“Sustainable Suburbia”, or at least “More Sustainable Suburbia” is not necessarily an oxymoron, because as this paper has shown, with reference to literature, no one form of urban development is necessarily inherently more sustainable than others. Suburbia has some potential strengths and benefits (such as greater landscaping and significant tree planting opportunities, greater ease to pursue localised food production, and dwelling construction that involves less embodied CO₂ than higher rise apartment buildings) over other development forms in terms of sustainability approaches, and some potential weaknesses and costs (such as greater inherent reliance on private automobile transport).

A key approach must be to ensure that the adverse effects of new suburban developments are internalised and mitigated as far as possible. If, as this paper argues, suburbia and peri-urban development is an unavoidable development scenario within the Auckland and New Zealand context in general, then it becomes important to provide a framework to ensure that its future realisation is as sustainable as it can be. This ambition is consistent with the arm of the New Urbanism movement that believes that it is perhaps futile to plan for scenarios that are not realistic given economic and political constraints, and focus rather on molding development within these realities in a more sustainable pattern (Katz, 1994).

However, what is clear is that the market is not likely to deliver sustainable peri-urban development on its own. Councils will need to develop planning requirements that mandate and incentivise suburban development outside of growth management areas and potentially the MUL to meet strict sustainability standards.

Garden Cities and Suburbs – Precedence for Sustainable Suburbia

Before moving forward to search for ways in which suburbia can become more sustainable, it is worth looking back to historical precedence, in the form of garden cities and suburbs, as precedence for modern sustainable suburbia.

Riverside in Illinois, USA, is frequently cited in the historical analysis of suburbia as a seminal development. Developed from 1869 following the design of Frederick Law Olmsted and Calvin Vaux, Riverside was located in the countryside some 15km from Chicago. The designers took a canvas of flat prairie land and developed it in accordance with the romantic landscape ideals that were popular at the time. Thousands of trees were imported, and the development was

characterised by its leisurely curvilinear block and street network with heavily tree-lined streets. The organic and curvilinear design approach was a conscious break from the mechanical and engineered grid pattern prevalent in traditional towns and cities. (Kostof, 1991)

Ebenezer Howard, author of the highly influential 1902 text “Garden Cities of To-Morrow” spent some time in Chicago and witnessed first-hand Riverside, which influenced his theories. Howard’s vision of the Garden City was also heavily influenced by the dense urban squalor of the time prevalent in cities such as London. As a result, he proposed a decentralised approach that would see the creation of new towns in the countryside. The towns would be self contained with a mix of landuses, so that people living within the towns had ease of access to employment, services and the countryside. Although Howard’s ideas formed the basis of the development of suburbia, in many ways they were radically different from the model of suburbia that would evolve. Unlike conventional suburbia, which was often characterised as being a bed town for large urban centres that was intrinsically reliant on the urban centre for employment, Howard’s towns were self contained, and would minimise the kind of traffic phenomenon – the long commute – that would come to characterise conventional suburbia. In addition, Howard’s concept relied on a mix of housing types and lot sizes, that would help allow for a mix of residents. Again, this concept differs fundamentally from the evolution of conventional suburbia which came to be dominated by the single family home sitting on a quarter acre section, resulting in a quite one dimensional demographic.

The first Garden City proper – Letchworth – was designed by Raymond Unwin and Barry Parker, and was located some 130km north of London on a main railroad line. Begun in 1920, the scheme made use of existing country lanes in its street layout, and it sought to retain many natural features, such as stands of trees, as much as possible. In addition, substantial new tree plantings were introduced. Traffic dominance was sought to be minimised as far as possible, and some provision of mixed land use reduced reliance on long commutes. (Kostof, 1991)

Although post war suburbia departed substantially from these philosophies, some post-war suburbs were developed which followed in these traditions. One of the finest examples is Reston in Virginia, USA. Reston was conceived as a planned community by Robert E. Simon. Founded in 1964, the development made strong use of medium and higher density housing in clusters to conserve open space, as well as mixed use areas for industry, business, recreation, education, and housing.

The careful planning and zoning within Reston allows for common grounds, several parks, large swaths of wooded areas with picturesque runs (streams), wildflower meadows, two golf courses, nearly 20 public swimming pools, bridle paths, a bike path, four lakes, tennis courts, and extensive foot pathways. These pathways, combined with bridges and tunnels, help to separate pedestrians from vehicular traffic and increase safety at certain street crossings. The design of Reston encourages a healthy lifestyle where residents can walk and cycle with ease and safety.

As is shown above, Garden towns and suburbs therefore subscribed to a number of key objectives that form an important base for the concept of sustainable suburban and ex-urban communities today – a degree of mixed use, the generous employment of tree planting and park areas, mixed forms of housing, and the avoidance of a car dominated environment. However

modern technology and knowledge now allows us to take such baseline principles further, with the use of renewable energy technologies, and sustainable approaches to wastewater and stormwater treatment and disposal.

Sustainable Suburbia – Case Studies

Ladera Ranch New Community Masterplan, California, USA

On the historic Rancho Mission Viejo, a vast cattle ranch in Orange County just outside the city limits of San Juan Capistrano, a site of more than 1 600 hectares was identified for the creation of a new, environmentally responsible and well served ex-urban community of around 30000 people in more than 8000 homes. Surrounded on three sides by open landscape, the development sought to provide a balance between much needed housing and preserving natural habitat and resources.

The masterplan, developed by AECOM, evolved from four cornerstone ideas:

1. to respect the legacy of the land
2. to ensure that each village design was distinctive
3. to give neighbourhoods a fresh, authentic character
4. to integrate an emphasis on social interaction.

Around 650 hectares of sensitive habitat was set aside from development land, to be preserved in a perpetual land trust. A conservation and management program is integrated with features such as the careful use of water, and native and drought-resistant planting.

Mixed use was encouraged in village centres, and a unique zoning and housing type, called “Home Based Business”, was developed in two of the villages to combine living and working spaces. Open space is easily accessible, and includes walking and cycling trails with connections to the regional trail system, parks and recreational facilities. The presence of cars is downplayed, with most traffic dispatched to the edge of the development. To reduce speeds, traffic calming measures including narrow roads and roundabouts were utilised.

In Terramor, the last of the villages to be developed in the community, a variety of housing types was developed, and green building approaches became a central feature of the development. Elements included water and energy efficient measures through features such as formaldehyde-free insulation, fluorescent lighting, energy efficient appliances, and instant hot water systems. A mandatory program for recycling ensured that two-thirds of construction waste materials were reused. Roof-fixed photovoltaic panels are fitted to almost 40% of houses.

A 6.5km long central bio-filtration system which runs through the core of the site was engineered to collect and naturally treat low-flow stormwater runoff. This green spine also accommodates an activity corridor for walking, cycling and running that links all villages.

Earthsong Eco-Neighbourhood, Waitakere City

Earthsong Eco-Neighbourhood (“Earthsong”) displays many of the sustainable development characteristics evident at Ladera Ranch and in the garden cities, but on a much smaller scale. By utilising terrace housing and semi-detached housing, Earthsong is able to retain large areas of its 1.3 hectare site as open space, which includes groves of native plantings, open play area, and orchard areas for local food production. With 32 households distributed over its site area, the development achieves a medium density gross development yield of close to one household unit per 400 square metres. By comparison, this is equivalent to the gross density of much conventional suburban development. Developers of such conventional development would argue that in their developments residents obtain the benefit of detached homes rather than semi-detached homes, and attain greater privacy. However this argument is highly contestable, as such developments are typically characterised by very large houses dominating small outdoor living areas, and poor visual and aural privacy. Through good design, developments utilising housing forms such as employed at Earthsong can attain just as good if not better privacy, whilst providing the benefits of generous areas of common open space for the residents of the development and the environment.

In addition to housing, communal amenities are provided on the site, and some on-site office working environments are being developed to reduce commuting requirements and enhance community. Like Ladera Ranch, carparking is positioned at the edge of the development to enhance safety and amenity.

Water tanks are utilised to recycle water, and stormwater is treated on site. Unfortunately regulatory constraints prevented the use of an on-site wastewater treatment device. Houses are constructed from recycled and sustainable materials, and with good insulation, passive and active solar energy, the energy consumption of households is much lower than conventional housing developments. (Earthsong Eco-Neighbourhood, 2010)

Measuring the Sustainability of Suburbs

“Sustainability” is a rather subjective term, therefore tools that can provide a quantitative measurement of sustainability at a neighbourhood level are of great utility and indeed essential if sustainable suburbia is to be mandated.

A number of international tools exist that measure sustainability at the neighbourhood level. For example, in the USA the Green Building Council has developed The LEED for Neighbourhood Development Rating System (LEED-ND). This system integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED certification provides independent, third-party verification that a development's location and design meet accepted high levels of environmentally responsible, sustainable development. It should be noted that the highest rating possible – a Platinum rating – is only achievable if a development or a rezoning occurs within an existing urban area. However an ex-urban or peri-urban development can still attain a Gold rating.

The Green Building Council in Australia is progressing the development of its “Green Star Communities” tool. A two stage process was embarked upon. Firstly, a National Framework expressing 5 key principles was developed, that formed the basis for the development of the Green Star Communities tool. A draft Tool scoping paper has been released that invites feedback as part of a collaborative tool development process.

Another tool has been developed by AECOM Planners and Environmental experts. The Sustainable Systems Integrated Model (SSIM) provides a holistic approach to measuring environmental, social and economic sustainability. Designed around the themes of energy, water, transportation, green building, ecology, carbon footprints and socio-cultural factors, the land planning tool measures the costs and benefits of different planning strategies.

For example, in evaluating a number of alternative masterplans for new development, the SSIM makes it possible to measure components such as projected water consumption, energy use and greenhouse gas emissions and then identify the most sustainable plan option. For each component of a masterplan, the SSIM provides a rational basis for deciding how masterplan forms, primary infrastructure systems, building designs and ecological footprint should be configured to optimise sustainability within given cost and budget frameworks. This is perhaps the key distinguishing factor between SSIM and other rating tools.

Until the New Zealand Green Building Council develops a New Zealand-specific Neighbourhood rating tool (possibly still several years away), any one of these tools could be adopted as an interim rating measure. For example, LEED-ND has been applied to the Lincoln Land Developments scheme in Lincoln, Canterbury. This scheme, which comprises 850 household units, received a Gold rating under LEED-ND. (Aston, F. 2010)

A Place for Holistic Policy in Sustainable Peri-Urban Development

Suburban and ex-urban development will be an important part of providing for population growth in our metropolitan regions, as indicated by the limitations of intensification to deliver upon a growing city’s housing needs. It is essential that if sustainability is a key consideration, developments at the urban fringes and beyond, are mandated to meet certain environmental criteria. Although such mandates could be pursued at the regional or local level via Council planning documents, it would be most effective and efficient as a National Policy Statement for peri-urban development. That Policy Statement could allow Councils to relax metropolitan urban limits in some circumstances, subject to certain criteria being satisfied. In addition, the policy statement could link to the development of a Green Star rating for neighbourhood design. This would give a quantitative rating system against which peri-urban developments would be measured to attain a minimum rating standard.

As a basis for discussion, successful implementation of sustainable peri-urban development could include the following requirements:

- All dwellings to meet a certain minimum Green Star building rating;
- Implementation of comprehensive sustainable frameworks for stormwater and wastewater management – including mandatory water collection via water tanks;

- Large areas of open space to be set aside. As a guide, at least 20% of the land area being developed to be set aside for such purposes. A large proportion of the land to be planted with trees to offer carbon sequestration, amenity, stormwater management and wider ecological benefits;
- The amount of land dedicated to roading to be minimised as far as practicable;
- A minimum of non-residential land use shall be provided. In smaller developments (less than 200 households) this may amount to a small provision of land for retail such as a dairy/small supermarket and cafe. For a larger development with greater critical mass, a wider provision of non-residential land use should be provided. Provision should also be made for work/live land use activities. Sites that are located further from existing town/suburban centres should be required to meet higher Green Star building rating standards and include more stringent tree planting requirements to mitigate this factor;
- Developers shall be encouraged to set aside some land for food production. This could be by way of fruit trees, nut trees, and vegetable gardens. These food production areas could be set aside within the open space areas as previously referred to;
- Sensitive ecological features within a site should be protected; and
- A mix of housing types and section sizes to be provided. As a guide, at least 10% of the dwellings shall be two bedroom townhouses to cater for housing for smaller households (elderly, singles, etc) and allow for lifecycle transitions within a community;

Conclusion

This paper has shown that suburban and ex-urban development can be a legitimate part of a sustainable development approach. However, where sustainable approaches have been taken to such development forms locally and internationally they have been largely driven by voluntary impulses, and their implementation is still relatively infrequent. Throughout the world, including New Zealand and Australia, the majority of suburban and peri-urban development that occurs is largely devoid of any substantive and comprehensive sustainable approaches.

A National Policy statement such as that outlined above relating to sustainable peri-urban and suburban development would direct development in a manner that adequately avoided or mitigated environmental impacts. It would ensure that New Zealand's population growth and resulting housing needs are met in a framework with sustainability at its core. Such a statutory requirement should be complemented by the utilisation of neighbourhood-level sustainability rating tools, so that such development is mandated to conform to minimum quantifiable standards, preferably LEED ND Silver rating equivalent. LEED ND Gold Rating equivalent could be an aspirational target incentivised through various mechanisms.

Such requirements would acknowledge the economic and political realities of the need to plan for peri-urban development, within the context of a sustainability-driven framework ensuring avoidance or mitigation of the adverse consequences of such development.

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