Shall we dense?
Summary

This paper describes the purpose, process and outcomes of an analytical study of urban planning policy and various city locations, to identify strategic directions towards more efficient, equitable and sustainable urban development.

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1. Policy Potentials

This project is aimed at establishing, and communicating, a comprehensive understanding of development patterns, residential density, and the implications for achieving policy aspirations and sustainable urban form, relevant to Australian cities.

The content of this report is one aspect of a larger, ongoing research and development project being carried out by Simon McPherson (SJB Urban) and Adam Haddow (SJB Urban/SJB Architects), entitled ‘Shall we Dense?’.

1.1 The context of major Australian cities

Australian cities are experiencing unprecedented population growth, with over 1500 people moving into Melbourne each week. Housing prices levels are among the highest in the developed world, and transport systems and other infrastructures are under increasing strain.

The prevailing development patterns in Melbourne include some higher-density infill and redevelopment in central, well-serviced locations, conservation of established middle suburbs in their current state and resistance to redevelopment in these areas, and a strong commitment to new suburban, low-density ‘sprawl’ development.

This growth is driving significant higher-density development in central, well-serviced locations, coupled with significant resistance to change in established, ‘middle-ring’ suburbs. There remains a strong commitment to, and demand for, new suburban, low-density ‘sprawl’ development, often regarded as a strategy to address housing shortages and affordability issues, and resulting in an ever-expanding metropolitan area. Melbourne is approaching an expanse of 100km from east to west.

This pattern is similar in other major Australia cities, with some localised variation.

Australian cities, like many American cities, reflect the shift towards car-based transport and development patterns from around the 1960s. Inner- and middle-urban areas (within 10-15km of the city centre) display predominantly grid-based street layouts, extensive medium- and higher-density development (multi-unit residential developments), and a dense network of local, accessible urban centres, with good transport services.

The outer suburbs (15-50+km from the city centre), however, are highly dispersed, vastly dominated by single detached dwellings on individual lots, irregular and fragmented street patterns, and a general lack of local urban centres.

These areas are highly dependent on car-based transport. Public transport services are more dispersed and less frequent, and walking and cycling are discouraged, by lack of appropriate infrastructure, and significant distances to destinations.

As evidenced by recent events, Australian cities and towns are highly exposed to severe weather events. Severe drought and water shortages, bushfires, storms and dramatic flood events in recent months and years have caused many fatalities and extensive damage. These events are expected to continue to increase in frequency and impact due to climate change.
1.2 Policy context

In 2002, the Victorian State Government launched the metropolitan strategy *Melbourne 2030* [1], establishing a range of initiatives to guide our urban response to projected population growth over 30 years and to limit outward urban sprawl, including urban consolidation in existing Activity Centres and large redevelopment sites, and planned suburban development in identified growth corridors.

An Urban Growth Boundary was established, but has been moved outwards multiple times to allow for further greenfield land supply, generally in response to the prominent argument linking land supply with housing affordability and responding to population growth. In 2010 an additional 43,600 hectares of land was brought inside the boundary.

*Melbourne 2030* called for a new approach to suburban development, establishing clustered neighbourhoods which provide walkable access to local facilities and services, reducing reliance on automobiles.

This is based on the notion of an Activity Centre (local shops, community facilities, transport access) with a 5-minute walking catchment denoted by a 400m radius circle, or 800m/10 minutes for larger centres and transport nodes, based on an accepted understanding of behavioural patterns relating to walking for convenience services and transport.

![Diagrams from Melbourne 2030 indicating the type of urban development outcomes sought](image)

*Fig. 1 Diagrams from Melbourne 2030 indicating the type of urban development outcomes sought*
However the Melbourne 2030 Strategy also suggested that in new growth areas, a general increase in residential density to approximately 15 dwellings per hectare should be achieved. The link between this modest density aim, and the objective for walkable and serviceable neighbourhoods, was never fully explored or tested.

Perth’s Liveable Neighbourhoods policy [2] similarly suggests a minimum net density of 15 dwellings per hectare in new urban areas, suggesting that this will approximately support the minimum size urban centre to support walkable neighbourhoods.

Sydney is more spatially constrained than Melbourne and Perth, located between the ocean and a mountain range. Its new Metropolitan Plan for Sydney 2036 [3] suggests that all centres would have a minimum level of medium density (defined as 25-60 dw/ha), with low density (less that 25 dw/ha) reserved for heritage or physically constrained areas, and higher density (greater than 60 dw/ha) around larger centres.

In 2009, the Victorian Growth Areas Authority, responsible for planning and initiating development in the growth corridors, launched the Precinct Structure Planning Guidelines [4] for Melbourne’s growth areas. This document also suggests a density aim of 15 dwellings per hectare (average).

1.3 People need services / services need people: understanding the links between density and accessibility

A key tenet of sustainable urban planning and design is supporting the viable provision of facilities and services (shops, community and health facilities, public transport, schools), which are accessible by walking, cycling and public transport. In suburban ‘sprawl’ (density range approximately 7-12 dw/ha), development patterns fail to support a sufficient level of localised, accessible services, forcing residents to rely on car-based transport.

Therefore we identified our objective, to establish the level of residential development intensity that is required to deliver the urban outcomes sought by the strategic plans for our cities.

1.4 Learning from Melbourne: testing real places

It was clear that current suburban development patterns were not delivering the stated objectives of walkable, accessible neighbourhoods, and we understood that the aim of 15 dw/ha was also insufficient, based on international references such as Towards an Urban Renaissance [5] which suggests a density of approximately 60 dw/ha to ensure that everyone can walk, usage of local facilities increases and bus services are more frequent. The update to this document [6] suggests specifying a minimum density of 40 dw/ha for all urban development.

However, local relevance and applicability would require local examples, and clear demonstration of the relationships between residential density, urban form and performance outcomes in the Australian context.

We studied several locations within metropolitan Melbourne and Sydney in detail, with the aim of understanding the parameters which would support a more sustainable urban form in other development areas.

Analysis of existing urban areas, local centres and transport services across various regions reveals that inner- and middle-areas benefit from a clustered structure of walkable neighbourhoods, with most dwellings within walking distance of a local centre, and comprehensive public transport coverage. Outer areas, however, display large suburban expanses without any centres, and highly dispersed transport services, reflecting car-dependent development.
In order to understand what ingredients contributed to these visible performance outcomes, our analysis ‘zoomed in’ to selected inner, middle and outer urban locations, in Melbourne and Sydney, to investigate development patterns and residential densities, which determine broader patterns of urban structure (clustered and walkable, or dispersed and car-dependent).

This analysis also looked at other factors, towards confirming the relationships between development patterns, travel behaviours and accessibility, including:
- Land area per capita, and resultant density
- Car ownership per household
- Transport behaviours (travel mode to work)
- Income and housing mortgage

While the results of this investigation were predictable, they confirmed that outer, lower-density suburban locations demanded increased car ownership and usage, thereby limiting choice and options for those unable to drive or own a car, and forcing an additional personal financial impost.

1.5 Housing affordability and real costs

A study by Melbourne-based urban economics consultancy Charter Keck Cramer [7], investigated the personal financial implications of car ownership, as a basis for planning policy decisions which may reduce the need for car usage.

This study found that, by running one less car in the household over the period of home ownership or mortgage payments (25 years), the household could:
- Accumulate in excess of an additional $1 million (694,000 Euros) in superannuation over their working life in 2008 dollars, or;
- Repay a $300,000 housing loan in 12 years instead of 25 years, saving $245,000 (170,000 Euro) in interest payments, or;
- Purchase a home which is $110,000 (76,300 Euros) more expensive than they would otherwise be able to, at the outset.

The study concluded that: Excessive car dependency may impact upon our ability to achieve key economic and social objectives. Lower income households are forced to live in what would at first appear to be more affordable locations, but are actually entering a lifetime of car dependency and the costs associated with that.

The policy implications are that governments may play a key role in creating awareness of the economic benefits of reduced car ownership, and facilitating this through appropriate infrastructure investment. Such an approach will provide the foundation for more sustainable and equitable cities.

By assessing living costs more holistically, these results go some way to disproving the popular assumption that fringe development is the most affordable option.

Other studies and reports have described the additional personal and social costs which can result from low-density living, including social isolation and disconnection, lack of accessibility for those unable to drive, and loss of family/leisure time caused by long-distance commuting and traffic congestion.
1.6 Triggers and thresholds

Our investigation now turns to the population thresholds required to support local shops, facilities and services, or the numbers required to ‘trigger’ the financially viable and sustainable provision of services.

The threshold population must be located within easy walking distance of the centre, to encourage patronage of local centres, and therefore their ongoing viability. Beyond 5-10 minutes walk, the behavioural tendency is to opt for car use, and then to potentially bypass local centres to travel further to larger centres, undermining the viability of the smaller centres. Some of these indicative thresholds are outlined below:

<table>
<thead>
<tr>
<th>Community/commercial facilities in activity centre</th>
<th>Population threshold for viability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local shops/corner store</td>
<td>800 – 1,000 dwellings</td>
</tr>
<tr>
<td>Small Neighbourhood Activity Centre (shops, community centre, primary school)</td>
<td>1,200 – 4,000 dwellings</td>
</tr>
<tr>
<td>Large Neighbourhood Activity Centre</td>
<td>4,000 – 10,000 dwellings</td>
</tr>
<tr>
<td>Community health centre</td>
<td>8,000 – 12,000 dwellings</td>
</tr>
<tr>
<td>Primary School</td>
<td>1,200 – 5,000 dwellings</td>
</tr>
<tr>
<td>Secondary School</td>
<td>8,000 – 10,000 dwellings</td>
</tr>
<tr>
<td>Train Station</td>
<td>10,000 – 12,000 dwellings</td>
</tr>
<tr>
<td>Civic Centre</td>
<td>12,000 – 48,000 dwellings</td>
</tr>
</tbody>
</table>

1.7 Disproving the policy

In many ways, the smallest, lowest-order Activity Centre is the most important, providing localised access for small communities, and forming the ‘glue’ within the wider urban structure, filling the gaps between the larger nodes within a clustered network. These centres also help to define neighbourhoods, forming a local focus point and meeting place which is familiar and close to home. Without these small centres, there would be large areas of suburban development without local access to facilities and services.

To support these centres, the minimum threshold population must be accommodated within easy walking distance, to provide a sufficient number of residents with a realistic and convenient alternative to car usage.

To fit the minimum threshold of 800-1000 dwellings for the smallest local centre within 5 minutes’ walk of that centre, while also allowing space for non-residential uses, requires a density of approximately 26 dwellings per hectare.

Developing the same catchment area at 15 dw/ha, as the policy suggests, delivers approximately 510 dwellings within walking distance, or just over half of the required population to support the centre’s viability and sustainability, and so the centre is unlikely to be economically viable.

It is therefore evident that developing suburbs at an average of 15 dw/ha will fail to support local centres, and therefore will fail to achieve the clustered network of neighbourhoods that the policy framework encourages. There is a fundamental disconnect between the objectives of the policy framework, and the guidance provided by policy.
1.8 The model: aligning centres and populations

Based on the above thresholds, we have developed a model hierarchy of centres and corresponding population catchments, and therefore development densities within walking catchments, spanning the full range for smallest/lowest order local centre, to large regional centre.

This hierarchy accommodates an average density range of 16-72 dwellings per hectare (with further variation within these averages), proving that there is no single numerical density requirement, but opportunity for the full range of housing types and development patterns, providing for all household types and diverse communities. Spatial application of this hierarchy across large areas, with an appropriate distribution of the various activity centre types, has indicated a typical overall average density of approximately 26 dw/ha.

![Image: SWD density column chart with ABCDE bars across top]

Fig. 2 Residential density and dwelling-type mix, with the density range of proposed hierarchy of activity centres

1.9 Application: built form outcomes

The illustration below shows a reliable representation of the five proposed activity centre types and the mix of dwelling types within each catchment. Importantly for greenfield/suburban development and associated community values, it shows that while the performance improvement from this approach is significant, the built form change is very modest.

The urban area is still mostly comprised of detached dwellings, but with other dwelling types located in and around activity centres, major open spaces and other key locations.

Significant average densities, and significant improvements in accessibility, walkability and sustainability can be achieved without so-called high-density or high-rise buildings, and without a
significant shift away from prevailing suburban development types. The key element is an appropriate and varied mix of dwelling types across the urban area, providing a high level of choice for residents throughout the lifecycle, within the local area, as well as high-quality streets and public spaces.

Fig. 3 Proposed Activity Centre Hierarchy

1.10 Conclusion and next steps

It is clear that current urban policy in some Australian cities is failing to address the disconnect between objectives and specific requirements, and that the relatively low density aims stated in these policies will not deliver a sustainable, walkable, compact neighbourhood structure.

Further, the ongoing costs of low-density, fragmented and car-dependent suburban development are significant and largely unacknowledged. These costs include additional infrastructure costs, travel, additional necessary car ownership, personal time spent commuting, health impacts and associated costs, and various other factors.

However it is also evident that, by aligning population thresholds for services and facilities, with spatial distribution of dwellings within walkable catchments, appropriate housing-type mix and corresponding densities, it is possible to achieve an urban structure, of clustered neighbourhoods, where all dwellings are within walking distance to at least a local activity centre.

We see this approach as having significant potential for application through planning policy and more rigorous structure plans and development plans for new growth development, as well as guiding infill development in established urban areas.


1.11 References


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