

## THE DEATH OF THE AUSTRALIAN BACKYARD - A LESSON FOR CANBERRA

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In the early 1990s, a dramatic change in Australian suburban form began. Houses with large backyards ceased to be built. Dwellings built since then now extend to within a few metres of the side and rear boundaries of the lot. This change has not been subtle or gradual in either space or time. It is a phenomenon that is immediately apparent from any aerial view. It can be seen from the window of any aircraft flying over an Australian city. For example, Figure 1 shows an aerial view of part of the Gold Coast in South East Queensland, around the suburb of Labrador. The contrast between the left and right hand sides of the picture is immediately apparent. On the right are the comparatively older residential areas with modest dwelling footprints and significant tree cover. On the left are the newer developments with large dwelling footprints and few trees. The roofs dominate the land area. They are not interspersed. Figure 2 shows an aerial view of Charnwood in the outer suburbs of Canberra. The difference between the forms from the two periods is again clear. The continuity of the areas covered by both types of suburban form stands out. Note how the most recent construction on the very edge of the urban area has the least private open space. The problem is getting worse over time. The same phenomenon can be seen across Australia. Before the 1990s, suburban form incorporated back gardens of substantial size, useful shape and a significant coverage of trees. After this period, these attributes are absent.

An initial reaction is often that this must be due to higher residential densities and consequently smaller lot sizes. However, although there is certainly a trend towards smaller lots, this is not the case everywhere. We are not talking about the inner or central city but the car-based suburbs on the outer edges of Australian cities. Many suburban developments still incorporate medium size, and sometimes quite large, lots. What is significant is the way the houses are getting bigger in comparison to the lot size.

The change is not something that relates to the backyards alone. House and street design are also changing as part of the same process. In plan, houses frequently have a deep, square shape creating large internal spaces without natural light and ventilation. There is also a trend towards fewer and smaller windows. The view from the street has also changed. The houses are positioned side-to-side with little space in between. Although the density may still be low, and the suburb a long way from the city centre, the appearance is one of an unbroken frontage of houses, predominantly single-storey. This frontage is dominated by the metal doors of integral garages. Where these are double garages the effect is stark. Commonly, there is only one window, often from a secondary bedroom, on the front elevation. This results in a lack of surveillance of the street from the house, reducing its security as well as its aesthetics.

The narrow gap around the single-storey house is dominated by high opaque fences of wood or metal. This gives privacy but no outlook. At the corners of blocks, the lack of both space and corner-type house designs can result in the exposure of the side and rear boundaries to the street further reducing its aesthetics and security. It also reduces the security of the dwelling. There is little opportunity for strangers to be seen by neighbours and, once over the fence, a burglar can work unseen. In some cases, there are houses that have neither space at the front nor at the back. These are built behind the houses with street frontage on what are often known as "battleaxe lots" from the shape of their plan. They are, in effect, surrounded by other

houses on all four sides with only a narrow gap between the house and a high fence. This can but raise serious questions about the quality of life on offer to the occupants.

The newer suburbs share one characteristic with older ones, a wide road reservation and significant setback of the dwelling from it. In some cases the overall scale may be reduced but not to the same degree as has happened to the backyard. In fact the difference in scale between the front and back spaces is far greater in the newer than the older suburb. However, even at the front there are important differences. Whereas the older suburb is characterised by well-planted front gardens demarcated by fences or hedges, in the newer ones open-plan layouts, laid predominantly to grass in the American style, are more common. Some of the newer layouts do include street trees, although it remains to be seen how high they will grow. Although most of the front gardens are often well kept, and sometimes decorative, they are not tended to the same degree as in the older suburb. The open-plan lawns cannot be used for sitting out, which needs privacy, or for the play of young children, which requires security. In other words, although the houses have little private space at the side and rear, they have, in comparison, ample space at the front which is not intensively used.

### **The traditional Australian backyard**

The physical characteristics of the traditional Australian backyard were realised over the first 150 years from colonial settlement in the form of the detached cottage with a large yard on an allotment between 600 and 1200 square metres (Cunningham & Auster, 1996). This dominant low-density form was varied by denser types such as terraces and semi-detached cottages in the inner suburbs in the latter half of the nineteenth century and the residential flat booms of the 1920-30s and the 1960-70s, although the detached suburban house continued to dominate at higher levels than other comparable countries. Despite the obvious cliché of the 'quarter acre block' (1012m<sup>2</sup>) which, although existing, is not, or has ever been, commonplace, the critical point is that, until comparatively recently, most suburban houses in Australia have had big backyards by world urban standards (Seddon, 1997). Based on the size of the genuine quarter acre lot, and assuming a large house with site coverage of 200m<sup>2</sup>, a backyard would be likely to be in the order of 500-600m<sup>2</sup>. A standard sized block in the order of 600m<sup>2</sup>, again assuming a large house with site coverage of 200m<sup>2</sup>, would still be likely to accommodate a backyard in the order of 200m<sup>2</sup>. However, for a better appreciation of the implications of these figures, we need to take a closer look at some actual examples for which a quantitative summary is provided by Table 1.

#### *Kew East VIC*

Figure 3 shows an aerial view of part of the Melbourne suburb of Kew East subdivided in the 1930s. It enjoys a frequent tram service to the city centre, just over 9 km away. The street scene is shown by Figure 4. The low profile of the single-storey houses belies their extensive size at the rear. Most, though, retain their original 1930s structure at the front. The back to rear boundary distances range from 15-30m facilitating substantial back gardens with many large trees.

#### *Camp Hill QLD*

Figure 5 shows an aerial view of part of the suburb of Camp Hill QLD. It lies 5.7 km southeast of the centre of Brisbane and enjoys a frequent and reasonably fast bus service to the city centre. It was subdivided between 1945 and 1947. The houses are generally of the "Queenslander" type, the vernacular architecture of the State. The locality is notable for the number of trees both in front and behind the houses. A typical backyard with Hill's Hoist is shown by Figure 6. The frontages provide a

home for by large trees but they struggle to overcome the dominance of the excessive 9m carriageway.

#### *Hebersham NSW*

Figure 7 shows an aerial view of part of Hebersham NSW, subdivided in the 1980s. It is some 38 km west of the centre of Sydney which is reached by local bus then a long train journey. The street scene is shown by Figure 8. About 20% of the dwellings have fairly small or poorly shaped back gardens, but the majority have significant areas and a square shape. There are comparatively fewer trees than in the other examples but more swimming pools.

#### *Spearwood WA*

Figure 9 shows an aerial view of part of the Perth suburb of Spearwood. Also dating from the 1980s, it is just over 17 km south of the city centre which can be accessed by a bus service. Most of the backyards are of substantial size and accommodate rainwater tanks and Hills Hoists as shown by Figure 10.

#### *Overview of the examples*

All of the examples described feature good rectangular backyards normally with trees. Only a very small number have areas less than 150m<sup>2</sup> and many are in excess of 300m<sup>2</sup>. The proportion of the total lot covered by the dwelling footprint only occasionally exceeds 40% and, for a very large proportion, it is less than 30%. If all the plots in all the examples were aggregated, then a majority would have less than one third coverage.

Two of the examples are some distance from the city centre. However, this is not necessarily the case for all suburbs containing large backyards. The Melbourne and Brisbane examples are not only fairly near their respective city centres but are linked to them by a good public transport service. Similar examples of spacious older suburbs near the city centre and with good public transport can also be found in Perth and Adelaide.

Net densities are 9-13 dph, low but not excessively so. It does not follow that low density is solely due to the presence of large backyards. The land area taken up by dwelling footprints cannot be ignored in such calculations, as most of the dwellings, taken in aggregate, are substantial single-storey houses. Another significant determinant of the low residential densities is the very large front-to-front distances, in excesses of 30m and sometimes as much as 35-36m. The carriageway widths appear excessive in relation to the small amount of traffic. Where the front gardens and nature strip contain very large trees then a sense of enclosure and much needed shade can be provided. However, this is not always the case. For Hebersham and Spearwood, what stands out is the way the front-to-front distance is large in comparison to the distances at the rear. The relevance of this point is that there is scope for increasing densities without reducing backyard areas.

### **Examples of the newer suburban form**

To achieve an understanding of more recent trends, a number of residential developments built since 1990 will be described. A quantitative summary for these examples is provided by Table 2.

#### *Carina QLD*

Figure 11 shows an aerial view of Charlotte and Prudence Streets in Carina, a suburb of Brisbane lying 8.5 km south east of the city centre. It was completed in 2002. A street scene is shown by Figure 12. It was the extreme nature of the design of this development that triggered the initial research (Hall, 2007a). What is striking

about the design is that useful private amenity space to rear and sides of the dwellings is near to non-existent. More than half of the backyards are less than 50m<sup>2</sup>. There is a space of under 1m at the sides and 1-5m at the back. For 85% of the lots the coverage by the dwelling footprint is over 60%. The front aspect is open-plan, laid to grass and hard standings. There are some small trees, which make little impact on the street scene. The forward position of the double garages, combined with the use of small, tinted windows, creates a blank townscape with a lack of transparency and surveillance. Observing the meagre fenestration, the reader is invited to consider the implications for the standards of amenity in the interiors of the houses.

It might be objected that the scheme at Carina is exceptional, and comparatively near to the city centre, compared to the location of most large-scale housebuilding around Australian cities. Examples from new suburbs some distance from the centres of Adelaide, Brisbane, Melbourne and Sydney, were, therefore, studied. Although they might not be as extreme as the Carina example, would they show the same general characteristics and trends? As it turned out, even where backyards were marginally larger, when compared to the older suburbs their overall characteristics were nearer to the Carina scheme.

#### *Springfield Lakes QLD*

Springfield Lakes is a very extensive development on land lying over 23km southwest of the centre of Brisbane. The land was cleared in 2000 and construction continued for nearly ten years. Although a railway service is planned, the whole development was built around a motorway link to Brisbane and all movement is overwhelmingly car-based.

Figure 13 shows an aerial view of part of Springfield Lakes completed in 2002. The street scene, shown by Figure 14 is dominated by garages, unfenced front lawns with hard standings and a wide road reservation. Note the view of the arrangements at the side and rear of a dwelling that is revealed by Figure 15. The meagre space around the house and lack of windows can be clearly seen. The exposure of the side boundary fence is poor for security and unsightly for the street scene. The strip of land in front of it has no apparent use

Lot and dwelling size show some variation. Some properties have a distance of 6-8m at the rear of the house, resulting in a fairly useful back garden, but many have only 2-3m. For 70% of the properties, the coverage of each lot by the dwelling footprint is over 40%. Most have very little space at the back, 93% less than 100m<sup>2</sup> and 68% less than 50m<sup>2</sup>.

#### *Meadow Heights VIC*

In Victoria, large scale suburban expansion is to be found to the north of Melbourne spreading widely over gently undulating terrain at the end of several commuter rail lines. A large proportion of the new houses is at the lower end of the owner-occupier market, similar to that found on the extremities of most Australian cities. The extensive suburbs built during the 1990s show a transitional period, with some yards area having a significant area and useful shape while others are much less so. However, there is nothing on the scale of the older Melbourne suburbs, such as Kew East, described earlier. The 2000s developments show, nevertheless, a clear trend toward smaller yard areas.

An example of the developments constructed since 2000 is Meadow Heights, nearly 18 km north of the centre of Melbourne. There is a local shopping centre but trips to the city centre require a combination of bus ride and a long train journey. Local movements are overwhelmingly car-based. Figure 16 shows an aerial view of part of

it. 28% of the properties have at least 8m from the back of the house to the rear boundary, allowing a significant size of rear garden. However, this means that 72% do not. In general the coverage of the lot by the dwelling footprint ranges from 55-65%. The street scene shown by Figure 17 is typical of pattern for the newer suburbs with open plan front gardens and only a small amount of decorative planting.

#### *Mount Druitt NSW*

Figure 18 shows an aerial view of a development in the Rooty Hill part of Mount Druitt, nearly 38 km from the centre of Sydney. It is 3 km south east of the older Hebersham area described earlier, and was constructed in the mid to late 1990s. There are local buses but movement is overwhelmingly car-based. Trips to the city centre require a combination of bus ride and a long train journey. The street scene, shown by Figure 19, is dominated by garages, large unfenced front lawns and a wide road reservation. As at Springfield Lakes, the exposure at corners of side and rear boundaries lined by high fences creates reduced security and an unsightly appearance. In this case the fences are metal rather than wood resulting in a harder aesthetic.

What is remarkable from the aerial view is that, not only are the houses deep square plan with very little space around them, but that some of the houses are almost completely surrounded by others, an arrangement often referred to as a “battleaxe” layout. The limited space at the front of one of the “battleaxe” layout properties is shown by Figure 20 and the situation speaks for itself.

#### *Smithfield Plains SA*

Aerial views of the Adelaide region as a whole show a preponderance of the older style of suburban form, especially where the suburbs encroach on the surrounding hills. However, towards the northwest, development has, in recent years, spread linearly on fairly flat land along a major highway and railway line. At 30 km from the city centre, it shows similar street patterns to the recent suburbs in the other Australian cities studied.

Figure 21 shows an aerial view of a site in Smithfield Plains within the northern suburbs. The site was developed in two stages. The western side was subdivided in 1990 and the houses were constructed sporadically between 1991 and 1997. The street scene is shown by Figure 22. It is characterised by deep front gardens, some fenced, with street trees. What this part of the site shows is an increase in site coverage arising from a trend to comparatively smaller lots but a mitigation of its impact on the backyard through the use of L-shaped plan forms. Where these are employed, a reasonable size and shape for the backyard can be obtained, although not on the scale of those in the older suburbs. Where they are not employed, a diminution of the backyard results.

When this study was first carried out in 2006 (Hall, 2007a, 2008), it appeared that Adelaide had been spared the full force of the phenomenon criticised in this paper. Unfortunately, the second, eastern part of the view in Figure 21 shows all the characteristics of the other examples described. It was built as a gated estate in 2007-8. The street scene has large front lawns and hard standings, and a wide carriageway width for such an estate, similar to the other examples of the newer suburbs illustrated in this paper. In contrast, to the rear of the houses, the backyard areas are very confined as can be seen from Figure 23.

#### *Spearwood, WA*

Figure 24 shows an aerial view of a recent extension of the Perth suburb of Spearwood. It is on the opposite side of the main road to the older subdivision

described earlier. What is especially remarkable for this example is the low density and large lot sizes. At 13.6 dph the density is nearer to the older suburbs than to most of the other recent examples described but it did not result in the same amount of green space. At over 600m<sup>2</sup>, the plots are the same size as some of the older suburbs such as Camp Hill QLD. While the lot dimensions are large, so are the house footprints. Consequently, the backyards are very small, especially in comparison to the house and lot size. Some of the houses are almost entirely surrounded by others. The street scene is dominated by large paved areas and by wide garage doors. There are few windows and little sense of enclosure or surveillance. The rear view of two the houses in the bottom right corner of Figure 25 reveals not only how large the houses are, and the smallness of the yards, but also the meagre provision of windows.

This example is highly significant as it clearly demonstrates that the problem is not so much a matter of lot area as of house size. It also shows just how extreme the matter of lack of windows and natural light and ventilation can get and for what must be expensive houses to boot.

#### *Comparison between the older and newer suburbs*

Comparing Table 2 with Table 1, several points stand out immediately. The typical backyard areas in Table 2 are decidedly smaller. Most backyards in the examples in Table 1 are over 150m<sup>2</sup> whereas the great majority of the yards in Table 2 are less than 100m<sup>2</sup>, and a significant proportion are less than 50m<sup>2</sup>. Not only that, but the distance from the rear of the dwelling is also substantially reduced from 10-30m to less than 8m. Most rear setbacks are around 3-5m and some even less. The backyard is no longer a useful square shape but has become a thin strip.

The next point to note is the lot coverage. There is a stark difference between the two sets of site coverage percentages. At around 40%, the maximum values in Table 1 are the minima in Table 2. For the newer suburbs, a large proportion is over 50% and some occasionally reach 70%. At first glance, these proportions may not seem too problematic. Half of a 600m<sup>2</sup> lot would be 300m<sup>2</sup> and 70% would be 180m<sup>2</sup>. However, this neglects two factors. The first is the aggregate amount of the narrow space left around the sides of the dwelling. Figure 26 shows a diagram of a house footprint with a 2m gap all around it. (This ought to be seen as a hypothetical exercise but, unfortunately, it does correspond to the battleaxe lots observed within the Rooty Hill example.) For a 300m<sup>2</sup> lot area, say 10m x 30m, this gives a lot coverage of 52%. For a 600m<sup>2</sup> lot area, say 15m x 40m, the coverage is 66%.

If a dwelling covers half the area of a lot there will be little useful private amenity space. This problem is compounded when the space at the front of the dwelling is taken into account. A front setback of the dwelling from the front boundary of the lot is required in most of Australia. Once this is removed from the uncovered area, very little remains at the back and sides. As Table 1 shows, a useful area at the back is associated with a lot coverage of around 30%.

Densities are generally higher in Table 2 but closer examination reveals no necessary connection between density and lot coverage. Comparing the older and newer examples we can, indeed, note an increase in net residential density from 9-13 dph to 13-20 dph. However, visual examination of the aerial photos of shows houses covering a substantial part of the lot however large the lot area may be. This trend is starkly illustrated by the dwellings in the Spearwood example where the lot areas are generally larger, and the densities lower, than in the other examples. Site coverages of 40-70%, combined with substantial setbacks at the front, create a situation worse than some of the examples with smaller lots.

In summary, the figures in the tables confirm the picture seen in the aerial photos. It is one of a clear-cut and uniform change to larger dwelling footprints in proportion to the lot area at the expense of the backyard.

### **Why should this be a problem?**

#### **Damage to the local ecology and microclimate**

The domestic backyard has a function and importance that goes way beyond the interests of the individual household. In aggregate, it helps to create a residential area that is landscape dominated, bringing with it ecological climatic and aesthetic advantages. It is not just a matter of personal taste, such as style and decoration, much less a consumer good, such as home entertainment or a washing machine. The presence of private open space in aggregate brings significant advantages to the community as a whole.

The statistic that most clearly differentiates the form of newer Australian suburb from the older one is the larger proportion of the land area that is occupied by the dwellings. When taken together with patios, verandas and pergolas, and with the carriageways and driveways, the greater part, in some cases nearly all, of the land area is treeless and covered by impervious surfaces. Aside from the front lawns, only a small residue is permeable and planted. The damaging affect this has on the local ecology and microclimate is a problem for the whole community, not just the individual residents.

#### *Lack of trees*

Trees need space to grow both for the canopy and, most importantly, the roots. Structural damage to buildings by roots needs to be avoided. The narrow dimensions of the space around the more recent dwellings will lead to a substantial reduction in tree cover in perpetuity, as there will be no room for trees to grow at the sides and backs of the houses.

Within some of the recent developments studied, small areas of bush land have been retained and some have newly planted street trees. While the areas of bush land are welcome, they do not compensate for the lack of trees amongst the houses. For the beneficial effects to be achieved overall, a reasonably uniform distribution is required. The street trees were small at the time of writing, as the developments studied were still fairly new. If they grow to a significant height, they will provide useful shade and enclosure of space. Where they remain small, these benefits will not occur. However, even where the street trees grow to a significant size, this will still not create the degree of tree coverage found in the older suburbs.

#### *Lack of biodiversity*

The minimisation, and even elimination, of planted areas also has serious consequences for biodiversity in general. Once lost, species may take many decades to re-establish themselves or may disappear from the area forever. The interconnecting area of soft landscaping created by adjoining backyards hosts a high degree of biodiversity. The density and variety of the planting in a domestic garden is something that is not found elsewhere. For example farming monocultures, and even playing fields, have very limited biodiversity in comparison. Authors have remarked upon the number of plant species to be found in back gardens in European cities (Gilbert, 1991; Pysek, 1989). From studies of English gardens, Gilbert (1991) draws attention to the variety of vegetation to be found not only in planted beds but also in lawns, ponds and on walls. He also describes the variety of the associated fauna which includes insects and other small creatures. He makes the valuable point that all this not dependent solely on a 'wild' garden.

*A further misconception is that to be rich in wild life, a substantial part of the garden needs to be wilderness. Nothing could be further from the truth. Gardens managed along conventional lines, not aping more ancient parts of the countryside, are a community in their own right.*

Gilbert, O. L. (1991)

Jennifer Owen has argued strongly (Owen, J. & D. F., 1975) for the high degree of biodiversity in the English garden on the basis of her studies of insect life. Cannon (1999), taking an international perspective, has drawn attention to the importance of the private garden for bird life.

Turning to Australia, the same situation is to be found. Daniels and Kirkpatrick (2006) have drawn attention to the important role played by back gardens in the conservation of bird species in Hobart and Taylor, Leach and Smith (2006) state for the city of Adelaide:

*“Studies of individual home gardens have shown them to be astonishingly diverse, with more than 300 plant species found growing on some suburban housing blocks, although this can include both productive cultivars (e.g. vegetables and fruit trees) and ornamental cultivars, as well as some adventive plant species (garden weeds).*

*The number of cultivated plant species currently growing in Adelaide’s home gardens is unknown. However, using indirect evidence we can speculate that the floristic diversity of the area currently occupied by Adelaide’s home gardens considerably exceeds the estimated 1130 vascular plant species found in the native vegetation that suburban development has replaced.”*

Taylor, S., Leach, R. M. and Smith, K. (2006)

Moroney and Jones (2006) have drawn attention to how decreasing lot sizes in Southeast Queensland have shown a reduction in biodiversity. Such losses have a wider cultural and educational significance which is often not readily appreciated. Miller (2005) has lamented the lack of contact with nature in the contemporary urban environment and the impoverishment of human experience that results from it. As he rightly points out, this is especially important for children many of whom now grow up with minimal direct contact with the natural world. He and a collaborator had previously argued (Miller and Hobbs, 2002) the need for the active promotion of environmental conservation in suburban gardens because of its social and educational value.

#### *Lack of natural drainage*

The reduction in the size of planted areas to the sides and rear of the dwelling is not just a matter of fewer trees. It represents a loss of vegetation in general and its replacement by contiguous paved and built areas. There is, consequently, less permeable surface area to absorb rainfall. In aggregate, this increases storm water run-off, a matter that has serious implications. The most direct consequence is the increase in cost arising from expenditure on concrete storm drains, not just for the development itself but also for other communities “downstream” of it. It also represents a loss of water that could have been used to support local planting and so encourage biodiversity. A number of American studies (McPherson *et al*, 2005) have revealed the contribution of urban trees to the reducing storm water run-off and the financial benefits that accrue from this. This is an issue that is particularly important for the Australian climate where long dry spells can be punctuated with episodes of heavy rainfall. Moreover, it is not helping moves to establish patterns of sustainable drainage whereby water is collected by local swales and ponds. Sustainable drainage not only brings financial and ecological advantages but can also be used to enhance the aesthetic appeal of residential schemes.



### *Reduced carbon sequestration and pollutant removal*

One of the advantages of the planted areas created by contiguous backyards is sequestration of carbon dioxide, and various other pollutants, from the atmosphere. Although most, but not all, of the recent examples described in this paper have front lawns, the drastic reduction in the contiguous planted areas to the rear, and their replacement by buildings and hard landscaping, will reduce carbon sequestration just when and where it is most needed.

This role of urban vegetation has been the subject of a number of scientific studies. For example, Nowak and Crane (2002) have demonstrated the effectiveness of American urban trees in the sequestration of carbon in American cities. Golubiewski (2006) has demonstrated the role of lawn grass in the same process and shown how its efficacy exceeds that of native and agricultural grasslands. The same findings have been obtained by Pouyat, Yesilonis and Nowak (2006). McPherson *et al* (2005), in their studies of urban trees in American cities, found not only significant carbon sequestration but also an important reduction in ozone, nitrogen dioxide, sulphur dioxide and small particulates, both through the direct absorption by leaves and by the avoidance of pollution through energy reduction in the home. Turning to Australia, Coutts, Beringer and Tapper (2007) have shown how urban vegetation in Melbourne plays an important role in mitigating the carbon emissions in that city. The studies by the City Council in Brisbane (Plant, 2006) found that, in 2000, Brisbane's residential tree cover was estimated to be absorbing the equivalent amount of carbon dioxide emitted by 30,000 cars per year.

### *Lack of natural climate control*

The importance for trees, plants and water for a beneficent microclimate, especially in the hot and dry circumstances of Australia, was explained earlier. For example, studies by the City Council in Brisbane (Plant, 2006) found that Brisbane's residential tree cover cooled surface temperatures in the relatively mild month of October 1999 by up to 5 degrees Celsius. When applying the effects of tree shade on the eastern and western sides of a single-storey, 3 star energy-rated home, energy savings of up to 50% per annum could be achieved. For the more recent suburbs, the reduction in tree cover and absorption of water coupled with the increased absorption of solar heat and its expulsion into the narrow confines between the dwellings will have a notably adverse effect. What is so worrying is that what is happening here is going in exactly the opposite direction what would be expected in a hot dry climate. The lack of tree cover will greatly increase the heat absorption by the buildings.

The dwellings in the newer suburbs are generally of deep-plan layout with small windows. Their design relies on air conditioning for them to be habitable. However, even if they had been designed for natural ventilation, the reduction in width between the dwellings would make this very difficult, especially in those parts of Australia with subtropical climates. A study by Lee Su San (1998) of suburban development in the Douglas area of Townsville revealed that the narrowness of the gaps between the houses prevented airflow around them, creating a "heat island effect". Her studies of actual buildings confirmed previous experimental results from wind-tunnel tests with models of buildings (Lee, Hussain and Soliman, 1980). For single-storey dwellings with a comparatively narrow gap between them, the prevailing winds skim over the roofs without exerting air pressure within the gaps to force natural ventilation. Natural ventilation of houses from the wind is increased if the buildings are two, rather than one, storey high. The problem was exacerbated by the exhaust from the air conditioners and the dark coloured roofs which absorbed, rather than reflected, the heat. The use of impervious sheet metal fencing, rather than, open link fencing, was also a factor in reducing airflow. These findings were confirmed by numerous complaints from the residents (Clark, 2006).

Overall, in the conditions of the Australian summer, a vicious circle is created. The houses absorb more heat because of their deep-plan form and large roof area. This heat is expelled by the air conditioning systems. It is not dispersed by prevailing winds and further increases the temperature around the house. This causes the heat to be re-absorbed by the structure, making even more work for the air conditioners. The gaps between the houses are not only made insufferably hot but are also affected by the noise of the air conditioners rendering the environment of the side and rear spaces, however they are planted and decorated, unpleasant. The overall effect is an increase in electricity consumption for the household at a time when more emphasis on the prudent conservation of energy is required.

### **Damage to the amenity of the dwelling**

In addition to the benefits to the community as a whole, the backyard provides important benefits to the individual household. The most important ones, those relating to outlook and ventilation, apply even if the occupants never venture out into their back garden. The issue for the use of space surrounding the dwelling is not just its area but also its shape and degree of surveillance. The problem in the newer suburbs is that the space is long and narrow thus limiting the range of facilities and activities that can be accommodated within it. In the worst examples, the windows are small and few in number, making it difficult for people inside to see what is happening in the yard and for those in the backyard to connect with activities in the house.

#### *Lack of outlook*

One of the most important roles of private open space around the home is to provide a pleasant outlook from inside the dwelling. For the examples from the more recent suburbs, the single-storey houses often have an outlook on to a high fence to the sides and rear, perhaps only 2m away. There is often a lack of windows as there is little for them to look out on to. Two or more storeys can increase the outlook for the upper floors but the problem still remains for the ground floor. The degree of enjoyment of the house by its occupants is consequently reduced. Studies in medical settings (Ulrich, 1981, 1984; Moore, 1981) have shown that a pleasant view and natural sunlight can have beneficial effect on personal health and well-being. This is an important quality of life issue.

#### *Reduction in outdoor facilities*

The great majority of the backyards studied in this chapter would not be able to accommodate an in-ground swimming pool. Barbecues would be possible but the space is limited and large social gatherings would be very restricted, as would other outdoor dining events. Home food production would not be possible and accommodating large external rainwater tanks and home composters very difficult. For many there is no room for a Hill's Hoist and the ability to dry laundry in the open air would be very limited.

#### *Little scope for children's play outdoors*

In many of the examples children would be the principal sufferers as there is little space for them to run around make a noise without disturbing others while, at the same time, remaining in a secure environment with a responsible adult keeping watch from inside the house. This is especially important for very young children. A study by Flinders University (Spurrier, Magarey, Golley, Curnow and Sawyer, 2008) has pointed to less physical activity where children lack access to significant backyards. This was not compensated for by public open space and playgrounds. The authors saw this as leading to sedentary lifestyles and childhood obesity.

## Why is it happening?

### Is urban consolidation the problem?

Both urban consolidation policies and market pressures contribute to increases in residential densities and smaller lot sizes in parts of Australian cities. This is happening to a greater extent than in the US where densities in the extreme outer suburbs remain low and lot sizes continue to increase. However, the Australian situation has a long way to go before it even approaches the suburban densities common in Europe. Is, then, real urban consolidation actually occurring in Australia to any significant extent? At the time of writing, large expanses of low-density housing are still under construction on, and beyond, the edges of most Australian cities, including Canberra. It might be countered that the effects of newer planning policies at State level have yet to be seen on the ground. However, an increase in density to, say, 15 dph, as is now the policy in some parts of the country, is still low-density by European and, even in the Australian context, hardly represents high-density urban form.

Even if urban consolidation did become a reality, would this necessitate a reduction in size, or even elimination of, private space around the dwelling? What the European, particularly the British, experience shows, is that there is no necessary connection between higher densities and very small or non-existent backyards. Letchworth Garden City in Hertfordshire was the world's first planned "garden city" and its landscape-dominated form and neo-vernacular architecture became a model that was influential and widely copied. Both its plan, and its neo-vernacular architecture by Parker and Unwin, became an archetype not only for British public housing but also for "garden city" schemes in many disparate parts of the world, including Canberra. What is particularly interesting is that the actual density is much higher than visitors usually imagine when they first encounter its landscape-dominated townscape. Gross densities can be as high as 20 dph and net residential densities can range from 22 dph to 35 dph. Even allowing for the fact that the dwellings are all two-storey, dwelling footprints are very small in comparison to Australia. In consequence, the house footprint occupies less than 30% of the lot area, and often as little as 12% (Hall, 2007b).

Current British central government policy requires a minimum net density of 30 dph. However, new suburban housing schemes without private open space cannot be found because they are not allowed. What is notable about the British situation is that at densities in the range 30-55 dph, many times those in the newer Australian suburbs, back-to-back distances and rear garden sizes are greater than in many of the older Australian suburbs. With good urban design and strong planning intervention, front-to-front distances can be reduced and houses can have more storeys giving more floor area for the same footprint. Houses do not need to be bigger if lots are smaller. Backyards of 100-150m<sup>2</sup> can be provided at densities up to 40 dph, even 60 dph. A house and garden form is maintained even when the street space is definitely urban in character. This is achieved by reducing front-to-front distances and maintaining a small dwelling footprint (Hall, 2007b).

The diminution of the Australian backyard is not, therefore, a necessary consequence of higher densities. On the contrary, what is so remarkable about the phenomenon is at its worst in the extreme outer suburbs where densities are at their lowest. Even where plots are very large, as in the Spearwood example, the very large lots are completely covered by very large houses. The problem occurs in both low and moderately high-density areas. The causes must, therefore, lie elsewhere.

### **Is it just consumer choice?**

Why then is this phenomenon happening? More particularly, is it a response to changing patterns of consumer demand? The first evidence that the disappearance of backyards may not be a straightforward response to changing household preferences is the clear discontinuity in space and time. Normal markets take time to adjust and variations in preferences can take time to work through. However, what we see is that, after a certain point in time, the construction of one type of suburban form was almost totally replaced by another. In effect, the building of houses with significant gardens ceased within large-scale housing developments. The newer outer suburban houses now have no views, no in-ground pools and precious little room for other outdoor activities. However, these features are not proclaimed as advantages in advertisements which do not draw attention to “no outlook” and “no backyard”.

Two points have sometimes been made to the author in conversation. One is that people in general no longer want to, or have the time to, engage in gardening. The other is that water shortages, now common in many parts of Australia, and the consequent restrictions on water use, are making gardening unpopular or even undesirable. However, as reasons for the change in suburban form these assertions do seem to be supported by the evidence. Regarding the second point, gardens can, of course, be created from native species that require a minimum of watering compared to those laid out in a European style. However, the important evidence comes from the front of the house. Development codes usually require a substantial front setback. The land area so created can be laid out as a fenced decorative garden as can be seen, for example, in Figures 4 and 8. In many recent developments, American style open-plan lawns are more in evidence, as shown by Figures 12, 14, 17, and 19. Both styles need attention and watering but there is never any evidence of neglect. There is also no evidence of campaigns against front setbacks and no moves by local councils, or state governments, to reduce, or eliminate, the front setback requirements in order to save water.

### **An economic hypothesis**

The economic model that may be most appropriate is not the simplistic one of the perfect accommodation of supply and demand, but one where producers and consumers make what appear to themselves to be rational choices but which are taken within an extremely limited framework and have unintended consequences.

The evidence from observers of the situation in the US is that in circumstances of extensive car-borne “sprawl”, prospective house buyers drive to a distance where property prices are at level they can afford (Levine, 2006). The further they drive from major centres the lower the prices. This is pattern of behaviour facilitated by the low cost of private transport. With the presence of the same type of “sprawl” in Australia, it is plausible that the same purchaser behaviour occurs here too. Another particular characteristic of the contemporary Australian housing market (and one that can also be found in the US) is the separation of purchase of the lot and the dwelling. This is not found in Europe, where the developers build the houses and sell house and lot together as one item.

The hypothesis presented here is that the sequence is as follows. Prospective purchasers drive to a locality where they can afford the price of a lot. Having selected their lot, they approach a builder who is offering standard house designs. Their perception is that it is to their financial advantage to maximise the resale value of their house and this means maximising its floor area. However, they wish to do this for the lowest initial outlay. They therefore seek the maximum floor area for the minimum price. They do not perceive, in their own minds, the open space around

the house as having investment value. This objective, pursued in the absence of other considerations, such as running cost or quality of life, leads inexorably to the particular house types and urban layouts that we now see.

The building firms are, by and large, not technically sophisticated and do not offer imaginative designs. They respond to the situation in which they find themselves. Their response to consumer demand for the largest floor area for the lowest price, results in particular design features:

- single storey
- large integral garage
- deep square or rectangular plan form
- limited fenestration.

The deep square or rectangular plan form minimises the wall length and fenestration for a given area which, consequently, reduces costs. The integral garage is a very cheap structure which is counted as part of the floor area of the dwelling. Styling, ornament and landscaping is concentrated on the front of the house where it has greatest impact on prospective purchasers. This is the house type that predominates in nearly all the examples of new suburbs studied.

What does not happen is that cost savings are turned into cheaper houses. Purchasers tend to pay the maximum allowed by their mortgage lender on the basis of their income. It is in the commercial interest of the builders, mortgage lenders and real estate agents to encourage house buyers to maximise the size of the dwelling in relation to the purchaser's income. The builders, in particular, benefit from more space within, rather than around, the house.

In summary, it would appear that the outer suburban residents are basing their decisions on maximising their financial investment at minimum personal cost. The investment is seen as being contained the floor area of the property but not in the backyard or other space around it.

### **Why are the houses an acceptable purchase?**

In contrast to city centre residents, who demand views and outdoor facilities in locations where they are expensive, the fact remains that other people do choose to live the type of suburban form criticised in this paper in spite of the disadvantages. This is an important point and one that must be addressed. There is, at the very least, an apparent lack of consumer resistance to the trends described. The same could be said about the other characteristics of the "edge city" living which have become almost a commonplace. They include excessive car use, disadvantages to non-car owners such as children, reduced exercise leading to health problems and reduced casual social contact. Residents of the edge city do not rate these problems as significantly as do environmental commentators and may even perceive them to be advantages.

It may be that they will change their views over time. Purchasers do not normally possess architectural skill and an ability to envisage what it would be like to live in a particular house before they experience it. When selling their property it is not in their interest to draw attention to any deficiencies. It is certainly a possibility that residents may not find the suburban form criticised here as satisfactory as they first thought and, as the new suburbs become down-market with age, the residents may move on to something new.

Nevertheless, people have been buying such properties since the early 1990s on a large scale. Why do they do they consistently put investment before amenity? The answer appears to come from a direction not, at first sight, explicitly connected with

physical planning, that of trends in working and family life. An argument that has been put to the author many times is that the occupants of the houses do not, in reality, spend much time at home during the daytime. The lack of any outlook, probably the most serious disadvantage for day-to-day amenity, is not, therefore, experienced. However, far from this arising from the pursuit of a fresh-air lifestyle outside of the house, it results from long working hours and commuting times. The occupants leave for work early in the morning and return late in the evening. Weekends, when not spent at work, are devoted to many hours of shopping. There is, regrettably, considerable evidence that, for a majority of Australians, this pattern of work is, indeed, the case.

Paul Shepanski and Michael Diamond (2007) writing for the Relationships Forum Australia have assembled a substantial amount of evidence from a range of official statistical sources that portrays a convincing picture. Their 2007 report, *An Unexpected Tragedy*, shows how Australia has become a land of long working hours, including significant weekend working. Whereas, in an industrial economy, this is characteristic of blue-collar workers who, at least, are paid over-time, in contemporary Australia, the USA and Japan, it is characteristic of white-collar employees who are not. Figure 27 shows how Australia has moved in regard to proportion of employees working over 50 hours per week and working at weekends since the 1970s in comparison to other advanced countries. Figure 28 show the trend over time in actual weekly hours. The period of dramatic increase in working hours was the early 1990s, which coincides remarkably with change in suburban physical form discussed in this paper.

An equivalent message has been delivered by Sarah Squire and Jo Tilly (2007) writing for the Australian Human Rights and Equal Opportunities Commission. It would appear, therefore, that the changes in suburban housing described in this paper fit all too well into a wider picture of adverse changes in Australian lifestyles. The increase in working hours is not just permitting the building of houses with minimal backyards, for the reasons outlined above, but is actually driving it. In other words, the urban form criticised here is an outward expression of fundamental changes in Australian society.

### **Why is it not prevented?**

#### **National guidance**

There is significant variation in the scope and in the details of plans and regulatory instruments across the many planning authorities in Australia. One reason for describing examples from a number of cities was, hopefully, to take in a range of regulatory regimes. Nevertheless, what is remarkable was how the phenomenon is occurring over the whole country. As the problem appears to be national in its scope, the first place to look for answers is the guidance given by the federal government. In 1987, it established a task force of professionals with the charge of developing an *Australian Model Code for Residential Development* (AMCORD). The task was completed in 1989, with a revised edition being released in 1990, in 1992 a version for sites less than 300m<sup>2</sup> and a further revised and consolidated version in 1995 (Green Street Joint Venture, 1989, 1990, 1992, 1995). The minimum private open space requirement in AMCORD 1995 was expressed in the form of a percentage (20%) of the site area. Within this, the codes required a minimum "principal area", an "outdoor room" that had to be contained within the general provision of private open space. The 1992 Edition specified a minimum space of 4m x 4m and the 1995 Edition an area of 25m<sup>2</sup> with a minimum dimension of 4m. What is remarkable is just how small these figures are compared with older suburban gardens. No empirical justification was offered for these very low figures, but they have tended to be copied in local codes across Australia over the years.

### State and local government standards

The AMCORD codes were advisory and requirements for private open space for detached housing are largely enforced through building and development codes by state governments and local councils. Many jurisdictions have gone over to a criteria-based approach where the dimensions specified are intended to be examples of how the objectives are to be achieved. State government and local council planning documents now commonly employ objectives, and it must be said, they are often very positive ones. The issue is why they have not prevented the form of development criticised in this paper.

There are certain parameters that nearly all the codes specify, no matter how simple they are. Most codes specify maximum requirements for lot coverage as a total percentage of lot area. The problem is that a maximum figure of 50% is very common. As is demonstrated by Figure 26 and the content of the Tables, this is insufficient to prevent the erosion of the backyard. To maintain a useful size of backyard the figure would need to be at most 40%, ideally 25-35%. Also, there is normally a specification of the minimum distance allowed between the edge of a building and the edge of the lot. This is not for recreational space as the minimum distance is usually just 1-2m. In addition, the codes normally require that a dwelling must be set back a certain distance from the lot boundary adjoining the road reservation, typically 4-6m. The requirement for a large amount of space to the front of dwellings is a tradition that is maintained in the newer suburbs and is a major contributor to low residential densities. Remarkably, the space at the front now exceeds that at the back. To maintain a proper size and shape of backyard a rear setback of 8-10m would be necessary.

Some councils have codes specifically regulating many more details of residential development and site layout, including private open space. Some specify minimum dimensions for a "useable" or "secluded" area, an "outdoor room", within the private open space. Privacy may be dealt with by objectives ensuring a space is free from overlooking, and adequate solar access is achieved by encouraging northern orientation. The problem is that the dimensions specified are tiny when compared those with of the traditional backyard. The AMCORD figure of 4m x 4m appears to have been copied in all too many cases. Moreover, the justification given in the text refers only to private amenity. The wider environmental benefits are not mentioned.

### Canberra codes

The content of the codes for Canberra (Australian Capital Territory, 2009) is, unfortunately, typical of those in other parts of the country. When it comes to the details of the layout of new residential development, there is no indication of any recognition of the special garden city character of Canberra. In particular, there is nothing to require significant, and planted, private open space to the sides and rear of new suburban houses. Rule 4 deals with *Plot Ratio* and requires that: "maximum site density, on a *standard block*, does not exceed a plot ratio of 50%." For a single storey dwelling this represents a maximum of 50% lot coverage which, as we have seen, does not ensure a significant backyard. To do this, the figure would need to be at most 40% and ideally 30-35%. Rule 32 deals with *Rear Setback* and requires that "rear setbacks are a minimum of 3m to the lower floor level." The illustrative diagrams that accompany the Rules explicitly show only a 3m gap at the rear of a house in compared to a front setback of 4-6m. The criteria for Rule 32 are:

*"Buildings and other structures are sited and reflect residential (suburban) scale, height and length to ensure:*

*a) sufficient spatial separation between adjoining developments*

*b) the protection of a reasonable amount of privacy and solar access to the dwelling (or adjacent dwellings) and outdoor spaces (or adjacent outdoor spaces)."*

*(Australian Capital Territory, 2009)*

Note that there is no reference to planting, climatic, drainage, ecological or any other environmental considerations affecting the wider community. There is also no explicit reference to sufficient space for social and recreational activities. There is nothing, therefore, in the codes that would prevent in Canberra the same trends that have been occurring in other parts of Australia. This is, indeed, what is now happening all around the edge of the city, as illustrated not only by Figure 2 but by aerial view of the suburb of Conder shown by Figure 29.

### **What can be done?**

A general characteristic of the planning systems of both North America and Australasia is that, although there may be a reluctance to intervene in the design of development, they nevertheless possess plentiful regulations for its control. There would be, therefore, scope for design intervention through the planning system in Australia if there was a political will and if this will could be appropriately steered and focused.

Ideally, there should be moves to achieve a far higher standard of residential design on a comprehensive basis, so that the issue of the provision of private amenity space is considered alongside all the other properties of a dwelling. The European experience suggests that this can be achieved if there is detailed guidance, consistency of policy over a wide area, consultation with developers at an early stage and, ultimately, the threat of compulsion (Hall, 2007b). It must be remembered there that current trends in Australian suburban house design, in particular the single-storey deep-plan house built on a concrete slab, are comparatively recent in historical context. Rather than constitute some radical departure, promotion of quality of design could represent more of a return to traditional Australian values. To say this is not to say that there should not be higher-density housing. It has been emphasised that backyards can be provided at all densities and in all locations.

Even in the absence of a comprehensive approach, there is a much that could be done merely by adjusting quantities within existing regulations. If maximum plot coverage was set at 35% then the problem would effectively be solved. To achieve the amount of floor space that they do at present, purchasers would have to pay more and build to two storeys. Failing this, they would have to accept less floorspace. However, the indications are that they have no functional need for this floor area, nor does it benefit their lifestyle, rather it is pursued as a financial investment. If the policy were applied uniformly, then expenditure on two storeys would still represent an investment.

Failing a restriction on maximum plot coverage, merely specifying a minimum distance from the back of the dwelling to the rear plot boundary of, say, 8m, would make a significant difference. For a 10m wide plot it would give an 80m<sup>2</sup> backyard and at wider plots approximately 100m<sup>2</sup> or more. This was the actual provision for some of the houses in some of the older examples. A 10m distance would produce an even more satisfactory size of backyard. It should also be noted that current front setbacks normally result in fairly large, planted, front gardens, a circumstance which appears to be accepted by all parties.

Changing planning policies and regulations would not, in itself, address the fundamental issues. Contemporary social values and behaviour are at the heart of the problem. People are focussing on monetary goals rather than quality of life. The result is excessive working hours, personal stress and investment in floorspace



rather than enjoyable houses and gardens. Changing this situation, although difficult, would not be outside the bounds of possibility. It would, after all, mean a return to traditional Australian values and a reversal of comparatively recent trends. It would also call upon people to relax and start enjoying life again, hardly a negative or puritanical goal. The past half-century has seen far changes that would have seemed far more difficult at their inception. The dramatic reduction in smoking would have been inconceivable as little as 30 years ago, as would the present levels of support for environmental conservation and protection. Such turnabouts are achieved through long-term campaigning. They do not happen overnight. They start with public debate. The problem at the time of writing in regard to issues of working hours, indoor lifestyles and suburban ecology is the lack of any such discussion. It is the purpose of this paper to help to start it.

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**Table 1 - Examples of Older Australian Suburbs**

	distance from city	net density	front to front	typical lot area	dwelling footprint	lot coverage	typical backyard	back to rear of lot
	km	dph	m	m <sup>2</sup>	m <sup>2</sup>	%	m <sup>2</sup>	m
Kew East VIC	9	11.6	22-36	775-1000	150-350	13-44	220-500	15-30
Camp Hill QLD	5.7	11	30	625	130-250	18-42	150-300	10-25
Hebersham NSW	38	13	34	448-684	132-154	23-30	120-240	8-15
Spearwood WA	17	9.3	33	700-730	130-260	20-37	150-350	10-20

**Table 2 - Examples of Newer Suburban Developments**

	distance from city	net density	front to front	typical lot area	dwelling footprint	lot coverage	typical backyard	back to rear of lot
	km	dph	m	m <sup>2</sup>	m <sup>2</sup>	%	m <sup>2</sup>	m
Carina QLD	8.5	23	21	250-280	123, 162	40-70	35-60	1-5
Springfield Lakes QLD	23	16	23	400-640	170-300	24-64	40-200	3-8
Meadow Heights VIC	18	18.5	21-26	300-495	106-270	44-65	35-115	2-8
Rooty Hill, Mt Druitt NSW	38	19	25	238-375	168-264	40-70	35-100	<2; 5.5
Smithfield Plains SA 1990s	30	16	20	360-510	110-160	41	60-160	5-7
Smithfield Plains SA 2000s	30	22	23	288-448	136	41-47	20-80	3-7
Spearwood WA	17	13.6	24	600-620	250-350	40-70	45-80	2-8





1 Gold Coast, QLD, aerial view, older tree-dominated suburbs to the right, newer roof-dominated ones to the left



2 Charnwood, ACT aerial view, older tree-dominated suburbs to the right, newer roof-dominated ones to the left



3 Kew East, VIC, aerial view



4 Kew East, VIC, street scene



5 Camp Hill, QLD, aerial view



6 Camp Hill, QLD, back yard with Hills' Hoist





7 Hebersham, NSW, aerial view



8 Hebersham, NSW street scene



9 Spearwood, SA, aerial view



10 Spearwood, SA, backyard with trees, water tank and Hill's Hoist



11 Carina, QLD, aerial view

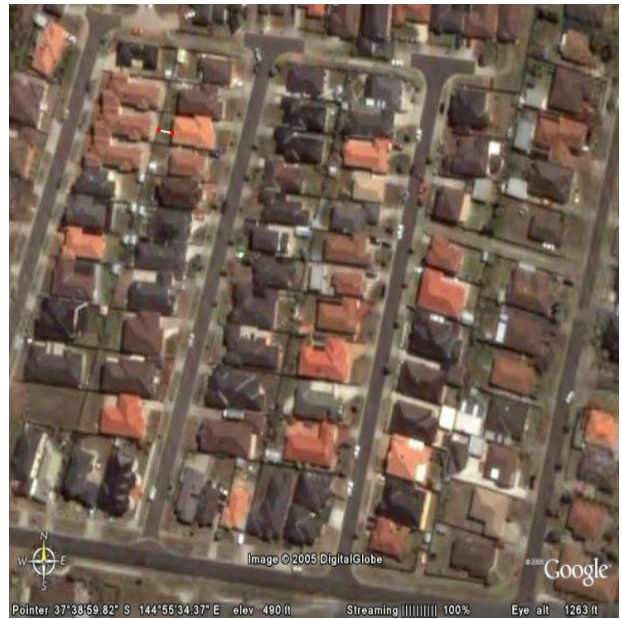


12 Carina, QLD, street scene. Note lack of windows and dominance of garage doors, unfenced front gardens laid to grass





13 Springfield Lakes, QLD, aerial view



16 Meadow Heights, VIC, aerial view. Note varying size of backyards



14 Springfield Lakes, QLD, street scene. Note the unfenced front gardens, predominantly grass, and wide road reservation



17 Meadow Heights, VIC, street scene



15 Springfield Lakes, QLD, exposed side and back of a dwelling. Note the unused grass strip along the road, the narrow space around the house and the lack of windows



18 Rooty Hill, Mount Druitt, NSW, aerial view. Note "battleaxe" lots with houses on all four sides





19 Rooty Hill, Mount Druitt, NSW street scene. Note large unfenced front gardens, predominantly grass, wide road reservation and garage dominance



22 Smithfield Plains, SA, street scene in older 1990s part. Note the front gardens, some fenced, with street trees



20 Rooty Hill, Mount Druitt NSW, front of a house on a "battleaxe" lot



23 Smithfield Plains, SA - newer 2000s part showing small backyards



21 Smithfield Plains, SA, 2008 aerial view. The older 1990s part, featuring L-shaped house plans is to the left. The newer 2000s gated-estate is to the right



24 Spearwood, WA, aerial view. Note the large sizes of houses



25 Spearwood WA, rear of houses. Note the narrow gap around the houses and the lack of windows

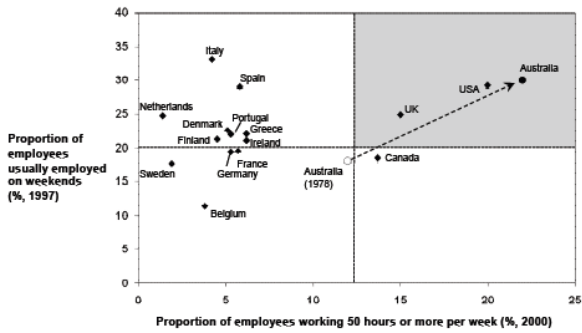


29 Conder, ACT aerial view



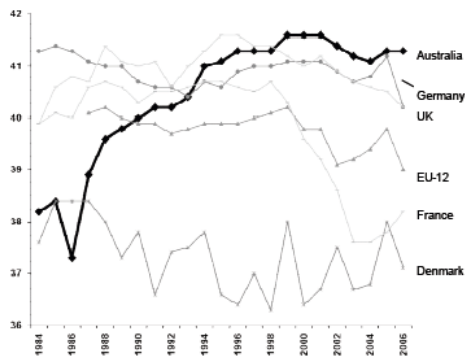
26 The issue of lot coverage. With a 2m gap, for a 300m<sup>2</sup> lot area, 10x30m, site coverage is 52%, for a 600m<sup>2</sup> lot area, 15x40m, site coverage is 66%.

Incidence Of Atypical Working Patterns In Selected Countries



27 The shift in Australian working patterns

Average Actual Weekly Hours For Full-Time Employees (Australia And Selected EU Countries)



28 Change in weekly hours over time