

above. What was immediately striking was that not only were the houses square deep-plan with very little space around them, but that some of the houses were almost completely surrounded by others, an arrangement often referred to as a “battleaxe” layout. A typical street scene is shown by Figure 25 and the limited space at the front of one of the “battleaxe” layout properties by Figure 26. The net density was 19 dph. The front-to-front distance was 25m containing a carriageway of 7m or 4.7m in width, the latter figure being the same as in British practice as discussed below. Plot dimensions were 15x25m, 16x18m, 14x17m or 10x17m, with some 2x(12x17m) duplexes. In some cases there was a back-to-back distance of 10m which permitted a back-to-rear boundary distance of 5-6m, but, in many cases, the rear separation was as little as 3.5m resulting in the space at the back of the house being less than 2m. The coverage of the plot by the dwelling footprint ranged from 40-70%.



Figure 24: Rooty Hill, Mount Druitt, Sydney, aerial view



Figure 25: Rooty Hill, Mount Druitt, Sydney, street scene



**Figure 26: Rooty Hill, Mount Druitt, Sydney, front of a house on a “battleaxe” lot**

Even nearer to the Herbersham area of Meacher Street in Mount Druitt was the example off Meacher Street. Here the 31 houses were arranged in two parallel culs-de-sac at a density of 18 dph. The street scene is shown by Figure 27. An aerial view is shown by Figure 28. Front-to-front distances were 22-23m. Plots were 14-19m wide 22-24m deep. Some houses were comparatively modest in scale and, unusually, shallow plan in form which permitted a space at the back of 3.0-6.5m providing a minimally sized outdoor space at the rear. However, 18 of the dwellings were large deep-plan houses, 10-11m wide, 17-20m deep with near zero space at the rear and back-to-back distances of only 1.5m. The coverage of the plot by the dwelling footprint was 47%.



**Figure 27: Meacher Street, Mount Druitt, Sydney, street scene**





**Figure 28: Meacher Street, Mount Druitt, Sydney, aerial view**

### *Western Australia*

Figure 29 shows a street scene of a recent extension of the Perth suburb of Spearwood, on the opposite of the main Rockingham Road to the older example described above. An aerial view is shown by Figure 30. What was remarkable here was, as with the Gold Coast example, the low density and large plot sizes. At 13.6 dph the density was 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. The front-to-front distance was 24m. Within the cul-de-sac, the carriageway was 5.4m wide while, on the through links, it was 7m plus a 1.7m footway. At around 600-700<sup>2</sup>, the plots were larger than for the other recent examples, being 18-21m wide and 33m deep, and so were the house footprints which were 19x18-23.5 m, 17x20-23 m or 15x22 m. Consequently, with the exception of one case of 8m, the back-to-back distances were generally only 3-5m with some being near zero. Some of the houses were almost entirely surrounded by others. The coverage of the plot by the dwelling footprint ranged from 56-65%. This area had the highest proportion, 48%, of one and two-person resident on census night of any the new developments for which data was available. This is consistent with the familiar hypothesis that very large dwellings do not result directly from a need to accommodate very large families.



Figure 29: Spearwood, Perth, newer development, street scene



Figure 30: Spearwood, Perth, newer development, aerial view

### Comparators from the USA

Three recent sites in the US were selected for comparison with the Australian examples. They did not show the same trends as in Australia and for this reason the data from them raises significant questions.

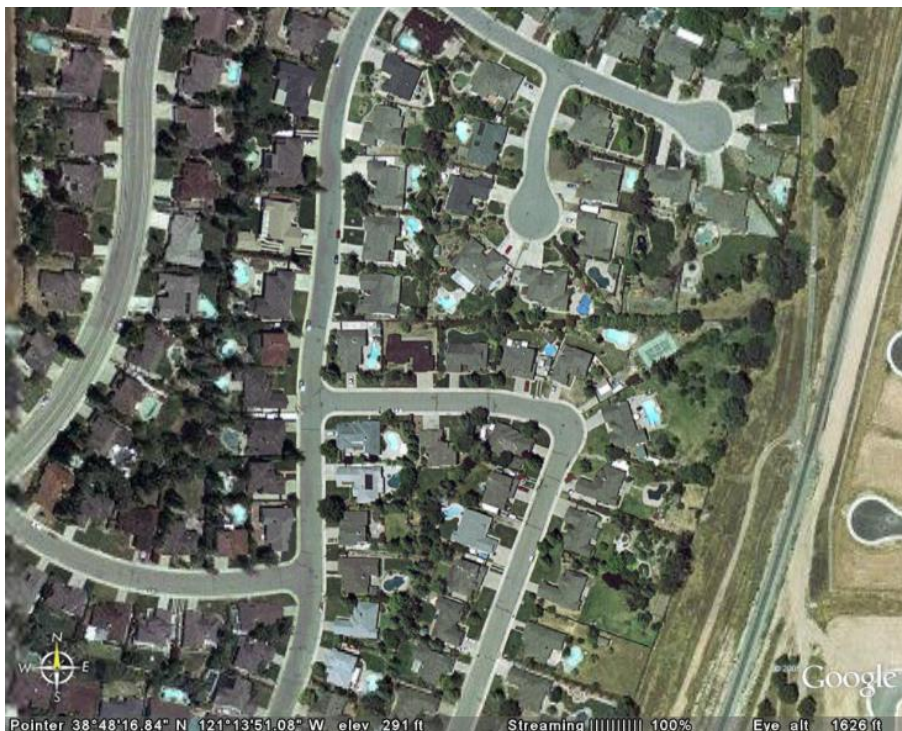
The first was from the outskirts of Columbus, Ohio. An aerial view is shown by Figure 31. The net residential density was 10.3 dph. The front-to-front distance was 29m and contained an 8m carriageway with two 2m wide footways, which would appear excessive for what were only residential access roads. Plots were a uniform 20x35 m. Houses appeared to be two-storey with footprints of 12x12 m, 12x15 m or 15x15 m. This allowed back-to-back distances of 24-30m and ample back gardens of 280m<sup>2</sup>.



The second example was from Rocklin, CA on the outskirts of Sacramento, where a somewhat older suburb had been recently extended, as shown by the aerial view in Figure 32. The density here was only 7.4 dph. The front-to-front distance was 27m and contained a carriageway with the astonishing width of 9.3m plus two 2m wide footways. Plots were very large with widths of either 25m or 30m and a depth of 40-45m, sometimes more. The dwelling footprints were 20m by 15-19m. This gives the same back-to-back distances and garden sizes as in the previous example.



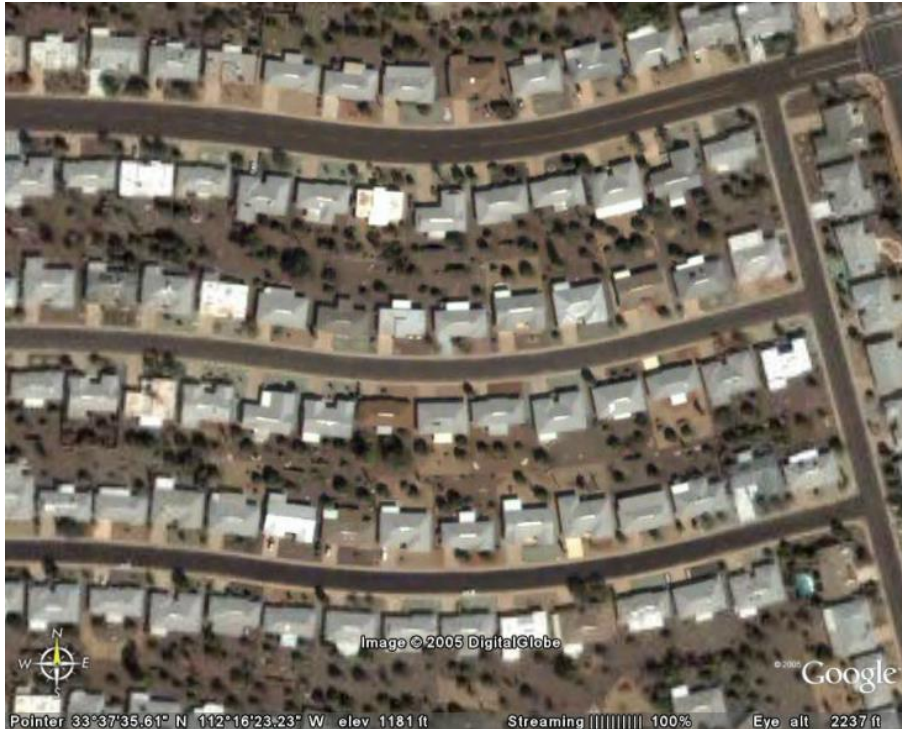
**Figure 31: Columbus OH, USA, aerial view**



**Figure 32: Rocklin, Sacramento CA, USA, aerial view**

The third example was part of Sun City AZ, on the outskirts of Phoenix, and an aerial view is shown in Figure 33. Sun City had the dubious honour of being used to illustrate the edge-city in

Towards an Urban Renaissance (Urban Task Force, 2000) and is easily recognised by its circular road layout. It was more similar to Rocklin than to Columbus. Plots were 23-25m wide and had a uniform depth of 37m. Where dwelling footprints were large, 19-20m wide and 12-16m deep, they were arranged lengthwise (16m deep cannot really be described as shallow plan). This gave back-to-back distances of 26-32m and back-to-rear boundary distances of 14-15m resulting in substantial back gardens.



**Figure 33: Sun City, Phoenix AZ, USA, aerial view**

For all three examples, the house footprints occupied, in general, approximately 30% of the plot area.

## Overview

The international overview and visual inspection suggested that the phenomenon was very much an Australian one. This is illustrated starkly by the plot coverage statistics in Table 1. The new American suburbs, new and older developments in the UK and the older suburbs in Australia all show one-third coverage or less, despite widely differing circumstances.

Comparing the old and new Australian examples we can note immediately an increase in net residential density from 9-13 dph to 13-20 dph. It is worth noting by way of comparison that both these density ranges would be regarded as very low in Europe. There has been a reduction in the front-to-front distances and carriageway widths but only to dimensions that would, until recently, have been regarded as fairly average in Europe. The picture for plot size and dwelling footprint was complex, because of the ranges of shapes and sizes, but it does appear that in the examples described that the plot size in Australia has been getting smaller and the dwelling footprint larger. What should also be noted was that although this same trend was also present in the dwellings in the Gold Coast and Perth examples, the plot areas there were generally larger and the densities lower. Although plot sizes in the recent schemes were comparable with, or larger than, the plot areas in older suburbs in Sydney and Brisbane, they had been almost completely covered by larger dwellings. In the American examples, the house footprints were marginally larger but the plot areas were significantly larger. This permitted a rear private amenity space equivalent in area to the older Australian suburbs.

## **What has been written?**

Regrettably, the number of studies of the use of private amenity space is very few, whatever country is chosen. For Australia, the principal study, *The Quarter-acre Lot* (Halkett, 1976) is now some decades old. It does, however, confirm the importance and usefulness of back garden to its owners. A study by Gutteridge, Haskin & Davey (1989) found general satisfaction with lot sizes but a desire for more outdoor space by those with smaller lots of 350-450m<sup>2</sup>. An unpublished undergraduate study by Brindley (1999) also confirmed the utility and significance of the back yard for residents. A recent general history (Sims, 2006) has reiterated its importance in the Australian tradition. Researchers in landscape studies have noted that trends to smaller lots have not reduced interest in back gardens nor have they been the cause of increased visits to wetlands in Perth (Syme, Fenton & Cokes, 2001).

The most significant study for the purposes of this paper has been that by Mead (2000) which was, unfortunately, unpublished at the time of writing. In 2000 he surveyed one residential areas in each of three suburbs 21-26 km southeast of Sydney. Two were older suburbs with spacious gardens but one, Menai, was constructed in 1992-3 with much smaller plots. It has 21 dph and plot areas ranged from 252m<sup>2</sup> to 527m<sup>2</sup>. Plot coverage was 55% and back gardens ranged from 46m<sup>2</sup> to 95m<sup>2</sup>. It would be appropriate here to quote Mead's own conclusions:

this analysis highlighted the transformation of the yard from a predominantly working/domestic yard, as was observed by Halkett in 1976, to a more design conscious and recreation oriented space. The backyard was however confirmed as the dominant outdoor recreation venue for the suburbanite. The elements within this transformed yard, particularly elements of children's and adult recreation, are strongly associated with the number and frequency of activities being carried out in the yard. Nevertheless, outdoor domestic and working yard elements still contribute to the number and frequency of activities.

Demographic characteristics such as number of children and total number of persons in a household (but excluding age), as well as a resident's perception of the yard also contribute to the amount of use. Preferences of yard type are predominantly for large and medium sized yards and despite this being related to demographic characteristics of a household (again not age of the respondent), it is also strongly related to a resident's current use level of the yard. (Mead, 2000)

What is interesting from the available literature is not just what is said but what did not come out. There were no responses from residents saying that they disliked back yards and wished to be relieved of the burden of maintaining them. Quite the opposite appears to have been true. No sources that Mead discusses, either in Australia or other countries, give this impression. Moreover, the most recent history of Australian domestic gardens (Sim, 2006) continues to argue that they are part of an Australian tradition. If there has been a dramatic change of public mood against back gardens in line with the physical changes in Australian suburban form, then no academic observer has managed to detect it.

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

### **The advantages of private amenity space**

It may be useful to start the discussion of the problem by setting out the functions of private gardens and yards in residential layouts. They fall into two categories: those affecting the wider community and those limited to the quality of life of individual households.

The wider benefits arise from the presence of trees, other planting and soft surfaces. The trees not only provide shade from the sun but also modify the microclimate and absorb pollutants. The soft surfaces absorb rainwater and reduce run off into drains. They form the first stage in a



system of sustainable drainage. Private gardens exhibit a high degree of biodiversity, when aggregated over a residential area this diversity can be very significant and in excess of that found, for example, on land devoted to sports fields or intensive agriculture. It is not necessary for the whole of each garden to be soft landscape for this benefit to accrue as long as there is an interplay of hard and soft landscaping within each plot.

For the quality of life of the residents, one of the most important roles of the space around the house is to provide outlook, natural light and natural ventilation. These amenities are enjoyed even if the occupants never venture outside.

A garden or yard to the rear of the property offers the advantages of security and privacy not found in public space and can be characterised as an outdoor room. It can provide a space for small children to play in secure surroundings and where adults from inside adjoining rooms can supervise them. It also provides a place for adults to sit out and to dine outdoors, an activity that might be considered very appropriate in the Australian climate. It provides space for barbecue facilities and in-ground swimming pools both of which have often been characterised in the past as important features of the Australian way of life. For the pursuit of a sustainable lifestyle, back gardens and yards provide space for:

- drying laundry without the use of electricity;
- water collection and storage;
- waste disposal (composting, sewerage disposal, etc.),
- home food production (as a supplement, not a replacement, to foodstuffs purchased outside the home).

### The role of plan-form

Although it may not be immediately obvious, the issue of private garden provision is linked to that of the shape of the plan-form of the dwelling. Alternative plan shapes are shown by Figure 34. A square plan, as shown by (a), needs a large plot to provide a good-sized garden and will be a satisfactory arrangement only for very low-density layouts of detached houses. The deep plan arrangement, shown by (b), is popular with developers as they can fit more dwellings into a given length of road. It makes garden provision very difficult, as any reasonably sized area becomes long and narrow. Both the deep-plan and large square-plan forms have interior sections that are difficult to light and ventilate naturally (other than single storey flat roofed dwellings with skylights and interior courtyards). However, from a builder's point of view, the fact that they minimise wall length and fenestration for a given area reduces costs. In contrast, the shallow plan and L-shaped plan forms facilitate useful square-shaped private rear spaces as shown by (c) and (d). They also provide natural light and ventilation, and maximise outlook, for all rooms. They provide space for detached garages and garden sheds. When applied over large areas, the shallow depth reduces block depth and thereby enables economic numbers of dwellings to be accommodated.

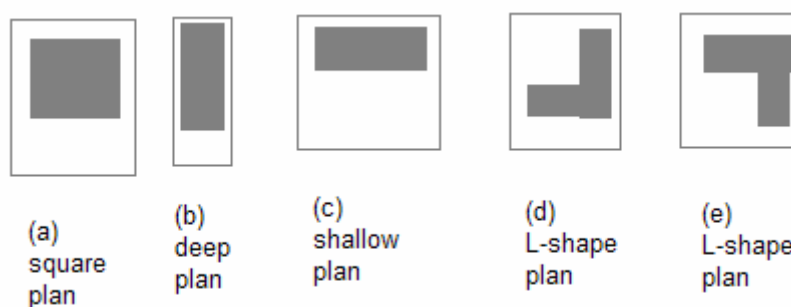


Figure 34: Alternative plan shapes



## The issue of garage location

Integral garages create problems that are closely associated with these issues especially where they are designed for two cars side by side. They have no windows and, consequently, the natural light and ventilation for the interior of the dwelling is substantially reduced. Such provision normally permits only one room, and therefore limited window area, to have outlook to the street, as can be seen from the street scenes in Figures 14, 17, 21, 25, 28 and 30. This reduces the aesthetics and security of the public realm.

On the other hand the provision of space around the dwelling allows cars to be accommodated in detached garages, ideally to the rear, or in carports, avoiding the need for an integral garage. This frees more wall space for windows, which is important at the front of the dwelling as it offers maximum surveillance of the street, adding to the security and aesthetics for passers by. It also benefits the quality of life of the residents as the windows offer the opportunity for natural light and ventilation.

The integral garage is also linked to the issue of large setbacks in front of houses. Such garages are normally at the front of houses and local regulations require space for manoeuvring and parking of at least one car length in front of the garage door. On the other hand a detached garage, which can be linked to the house, or car-port can be set back at the side of the house enabling the house to be set nearer to the road.

## The issue of plot coverage

Table 1 shows the increase in Australian plot coverage by dwellings from 30% to 50-70%. At first glance, this may not seem too problematic. Half of a 600m<sup>2</sup> plot would be 300m<sup>2</sup> and 30% would be 180m<sup>2</sup>. However, this neglects two factors, the first being the effect of the small space left to the sides of the dwelling. Figure 35 shows a house footprint with a 2m gap all around it. (This ought to be seen as a hypothetical exercise but it does correspond to some of the cases observed within the Rooty Hill example.) For a 300m<sup>2</sup> plot area, say 10x30m, this gives a plot coverage of 52%. For a 600m<sup>2</sup> plot area, say 15x40m, the coverage is 66%. To limit, therefore, a dwelling to half the area of a plot will not ensure, in itself, any useful private amenity space.



For a 300m<sup>2</sup> plot area, 10x30m, plot coverage is 52%.

For a 600m<sup>2</sup> plot area, 15x40m, plot coverage is 66%.

**Figure 35: The issue of plot coverage**

Secondly this problem is compounded when the space at the front of the dwelling is taken into account. A front set-back of the dwelling from the front boundary of the plot, facing the road is required in most of Australia. Once this is removed from the 30-50%, then very little remains elsewhere. As Table 1 shows, a useful area at the back is associated with a plot coverage of around 30%.

## Space for 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 reduction of space around the dwellings

described in this paper has the effect of substantially reducing the degree of tree coverage in perpetuity, as there will be no room for them to the sides and backs of the houses.

Within some of the recent developments studied small areas of bush land had been retained and some had newly planted street trees. The street trees were small when surveyed for obvious reasons. Where they grow to a significant height, they will provide useful shade and enclosure of space, constituting a contribution towards the aesthetics and microclimate, where they remain small, this will not occur. However, even where the street trees grow to a significant size, this will not create the degree of tree coverage found in the older suburbs and which can be seen from the aerial photographs. For the beneficial effects on aesthetics, microclimate and control of run-off to be achieved overall, a reasonably uniform distribution is required. Where street trees remain small, or are absent entirely, then the general problem of lack of tree coverage will be aggravated.

### **Natural ventilation**

The point has already been made that the dwellings in the newer suburbs are generally of deep plan layout, have small windows and rarely have balconies and verandas. 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 such ventilation very difficult, especially in those parts of Australia with subtropical climates. A study (Su San Lee, 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”. Exhausts from the air conditioners exacerbated this and 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).

### **Summary of disadvantages**

With the disappearance, or minimisation, of the private space to the rear of dwellings, all the functions and advantages associated with it also disappear. In summary, the following disadvantages are suffered by the wider community:

- reduced aesthetics;
- reduced surveillance of the public realm;
- little or no biodiversity;
- poor microclimate, including loss of shade, in hot weather;
- increased run-off in wet weather.

The residents themselves also lack the space for the following:

- sitting out in private;
- secure outdoor children’s play;
- provision for swimming, barbeques;
- drying laundry and other components of a sustainable lifestyle;

and suffer from:

- lack of pleasant outlook from windows;
- dark interiors;
- lack of natural ventilation;
- increased electricity consumption.

The design implies an entirely indoor lifestyle, insulated from the prevailing climate and with little opportunity for exercise.



## The issue of density – some British examples

A view that has been put to the author is that the minimisation or even elimination of back yards and gardens is a necessary consequence of moves to higher residential densities resulting from policies of urban containment and consolidation. Not only does that data in Table 1 show no direct correlation, but the European experience is that that at least below 70 dph there need be no direct connection between lack of provision of private amenity space and higher densities.

In northwest Europe the type of contemporary low-density suburban development found in North America and Australia does not occur, although large-scale house building does. New suburban housing schemes without private open space cannot be found because they are not allowed. Nevertheless, some comparisons with details of European suburban form can be instructive in order to see what an alternative ways of extending urban areas look like. The point that is of interest to the argument here is that significant back gardens can be provided at net densities two to three times those found in the Australian suburb.

Two examples from Britain were studied examples were not taken from other European countries because the context of local culture, planning policy and interventionist planning practice were even further removed from the situation in Australia than was the British one. The data are shown in Table 3. The first British example was Letchworth Garden City in Hertfordshire, the first “garden city”. 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. It was also interesting because the actual density was much higher than visitors usually imagine when they first see its landscape-dominated townscape.

**Table 3: Data from the British examples**

	Net density	Typical distances			Area ranges		Plot coverage
		front to front	back to back	back to rear of plot	plot	dwelling footprint	
	dph	m	m	m	m <sup>2</sup>	m <sup>2</sup>	%
Letchworth Garden City	22	20-35	40-70	15-20	200-480	56	12-28
Chelmsford – Bishop’s Mead	34	10	30	12-20	210-270	63-96	30-36

Figure 36 shows a map of the Pixmore Hill estate within Letchworth Garden City, Hertfordshire. This neighbourhood was designed by Parker and Unwin and built 1906-1911 and was one of the most representative residential areas of this town. Letchworth was the world’s first planned “garden city” and its landscape-dominated form and neo-vernacular architecture, illustrated by Figure 37, became a model that was influential and widely copied. The gross density of area shown was 20 dph. The net residential density was mostly 22 dph rising in the southeast quarter of the area shown, to 35 dph. The front-to-front distances of 20-35m were not too dissimilar from those in Australia but were devoted predominantly to front gardens and roadside verges with street trees, rather than to road space. The back-to-back distances ranged from 40-70m, greatly in excess of even the older Australian suburbs. Plots had dimensions of 8x25 m, 9x28 m, 11x38 m, and 8x60 m, long and narrow but with a very significant total area. The really dramatic difference from Australia was the size of the dwelling footprint: 7x8 m. Even allowing for the fact that the dwellings were all two-storey, this was still very small in comparison. In consequence, the house footprints occupied less than 30% of the plot area, and often this figure was as low as 12%.



**Figure 36: Letchworth, UK, map**



**Figure 37: Letchworth, UK, street scene**

The second British example was chosen to represent current best practice. The scheme used was that known as Bishops Mead, by Reeves Bailey Architects, within the Chancellor Park development at Chelmsford, Essex. The scheme was constructed in 1999 and won a UK Housing Design Award in 2002. It was a faithful implementation of the principles of the revised Essex Design Guide (EPOA, 1997) and the policy direction now favoured by the British government and its advisory institutions, such as the Commission for Architecture and the Built Environment.

Figure 38 shows the layout of the Bishop's Mead scheme. Back-to-back distances were a minimum of 30m providing back gardens of 150m<sup>2</sup>, equal only to that found in the lowest density Australian suburbs. The net density here was 33 dph and this had been achieved by reducing the front-to-front distance to 10m. House footprints were 7x7 m, 12x8 m, 11x6 m, all shallow plan and two to three storeys in height, as can be seen in the street scene shown by



Figure 39. The dimensions of the plots were 10x21 m, 10x27 m, or 13x18 m, comparable in area to the newer Australian suburbs. The house footprints occupied, in general, approximately one third of the plot area.



**Figure 38: Bishop's Mead, Chelmsford, UK, layout**

For further comparisons with the British situation, Table 4 shows the results of a survey of the characteristic of different types of urban form carried out by the author in Chelmsford in the mid-1980s (Hall, 1986). What was notable was that not only did the standard 20th century mass housing types have substantial rear gardens but they were also at densities of 25-30 dph. A review of public and planning authority attitudes to the provision of back gardens in Britain was also undertaken by the author at this time Hall (1987). This supported the view that residents saw such provision as positive and useful.



**Figure 39: Bishop's Mead, Chelmsford, UK, street scene**

**Table 4: Density and garden area for exemplar UK housing estates by type**

Housing type	Net density dph	Rear garden mean area - m <sup>2</sup>
Late 19C bye-law (Marconi Road)	54	73
1930s semi-detached (The Avenues)	27	151
1930s-1950s public (Springfield Park)	29	140
1970s private (Humber Road)	30	166

Data from survey in Chelmsford Essex, UK (Hall, 1987)

What was notable about the British examples was that, at a density far higher than in the newer Australian suburbs, back-to-back distances and rear garden sizes were greater than in both the American and the older Australian suburbs. What was really striking, however, was the small size of the dwelling footprint. This implied two-storey construction but, even then, the gross floor area would still be at the lower end of ranges in the Australian and American examples. Detached bungalows are a popular and sought after house type in the UK but they form only a minority of total dwellings. For the past 20 years, at least, they have not featured in volume house building. Urban design thinking and government policy have raised the density for new construction in England to a minimum of 30 dph. As illustrated by the Chelmsford example, this has been achieved by reducing the front-to-front distances so that a house and garden form is maintained even when the street space is definitely urban in character.

Another point is that British planning control requires back-to-back distances of 25-30m, 20m at the absolute minimum. This is to prevent overlooking rather than for back garden provision but ensures space is available at the rear of the dwelling. Planning authorities often make use of minimum back garden standards but they do not carry the same weight as the overlooking criteria. One result of this is that, in both British and North American suburbs, rear boundaries are usually demarcated by light fences, often transparent open-work, rather than the metal walls that are now used in the new Australian suburb.

## Some examples from Adelaide

It was remarked earlier that the overall visual inspection of aerial photographs did not reveal evidence of the problem occurring in Adelaide, where most of the urban area has the characteristic of the older suburbs described in this paper. However, in some parts of city there appeared to be newer layouts that, while superficially similar to the schemes described from elsewhere, still maintained a useful amount of private space. To investigate this point in more detail, some examples from Adelaide were analysed in the same way as those from the other Australian cities.

### Outer-suburban Adelaide

Two recent developments on the northwest extremities of Adelaide were selected for detailed study. General examination of the aerial photographs of the city as a whole showed a preponderance of the older style of suburban form especially where the suburbs encroached on the surrounding hills. However, towards the northwest, development had, in recent years, spread linearly on fairly flat land along a major highway and railway line. The area known as Elizabeth, 30 km from the city centre, showed similar street patterns to the recent suburbs in the other Australian cities studied. Although this area was not so typical of Adelaide as a whole, by taking examples nearer in equivalence to those studied elsewhere it was hoped to isolate what might be different in South Australia. Two examples on the outer edge of the Elizabeth area were chosen. The net density for both examples was approximately 16 dph.



The first example was a site in Smithfield Plains, for which an aerial view is shown by Figure 40. When comparing it with the other examples studied, what was noticeable was the preponderance of L-shaped house plans. This house type uses two wings to enclose a small garden area. Each wing is shallow in plan providing the possibility of natural light and ventilation. When used as a convex shape, pointing at the street, it is the back rather than the front, garden which is enclosed. The houses here had sides of 14-17m and depths of 7-7.5m resulting in area of at least 50m<sup>2</sup> being enclosed by the two wings. When combined with a distance from the back to the rear boundary of 5-7m, another 70-90m<sup>2</sup> were added creating a total rear amenity area of 120-140m<sup>2</sup>. The front-to-front distance was 20m but a back-to-back distance was not really applicable because of the irregular form of this particular layout. Side-to-side distances were very small. Plot sizes ranged from 360-510m<sup>2</sup> and were commonly 430m<sup>2</sup>. Dwelling footprints ranged from 150-200m<sup>2</sup> with the L-shaped houses being around 175m<sup>2</sup> in area. Plot coverages ranged from 34-48%.



**Figure 40: Smithfield Plains, Adelaide, aerial view**

The second example was nearby in an area called Blakeview. An aerial view is shown by Figure 41. It can be seen that while L-shaped plans were still common they were not universal. Here the front-to-front distance was 25m and the back-to-back distances 10-20m. Side-to-side distances were very small. Generally, the distances from the back to the rear boundary were 5-9m, although there were some significant exceptions with less than 3m. Plot sizes ranged from 270-500m<sup>2</sup> and were commonly around 470m<sup>2</sup>. Dwelling footprints ranged from 150-225m<sup>2</sup>. The L-shaped houses were approximately 175m<sup>2</sup> in area, as at Smithfield Plains. Plot coverages ranged from 40-48%, although with important exceptions. These exceptions were case every bit as bad as the worst cases seen in the other Australian cities studied with plot coverages of 71%. To the south of this development such case appeared very rare.



Figure 41: Blakeview, Adelaide, aerial view

### Port Adelaide

Part of an urban infill scheme in Port Adelaide, built in 1999 and 13 km from the City centre, was also studied. It was chosen because the author had the opportunity to stay in one of the houses as a participant observer and because it raised some interesting issues.

At first glance the aerial view shown by Figure 42 appears to show the same urban form as in the recent examples from other Australian cities: deep plan houses with integral garages arranged close together at the back and the sides but not at the front. In this case the houses were very close together side-to-side. There was a separation of 2m divided by a fence into two 1m strips, except at the side of each garage which were on the plot boundary leaving a 1m for the neighbouring house only. When, however, a close comparison was made with the other examples the differences were very significant. Although the front-to-front distances, 19-22m, back-to-back distances, 14-16m, and back to rear boundary distances, 7-8.5m, were less than those for the older suburbs, compared to the other newer suburbs the front-to-front distances were smaller and the distances at the rear larger. In particular, back to rear boundary distances provided a back garden area of 70-100m<sup>2</sup>. Its positive contribution to residential amenity can be seen from Figure 43 which shows the view from the living room into the back garden from one of the houses.





**Figure 42: Port Adelaide, aerial view**



**Figure 43: Port Adelaide, view from the living room into the back garden**

These back gardens, although not significant in size compared to those in Britain or America, were remarkable when compared to the situation in the new Australian suburb. Back gardens of this size were found with the less extreme examples Springfield Lakes, Forest Lake and Meadow Heights but in these case they represented only a proportion of the provision with many back yards being small and some negligible in size. In the case of Port Adelaide all the houses had back garden of this size.



Remarkably, this garden size was being achieved with plot sizes of 320-384m<sup>2</sup>, plot coverages of 56-60% and a net density of 25 dph. (The density ranging over the whole development of 116 dwellings was 18 dph.) The street scene shown by Figure 44 shows the visual advantages of smaller front-to-front distances combined with a nature strip cum footway of 3m and a carriageway width of 4.2m. A nature strip of this width could still support an avenue of trees which will provide significant visual enclosure and shade when full grown. Note that all the garages were singles which reduced their adverse impact on the street scene.



Figure 44: Port Adelaide, street scene

Table 5: Data from the Adelaide examples

	Net density	Typical distances			Area ranges		Plot coverage
		front to front	back to back	back to rear of plot	plot	dwelling footprint	
	dph	m	m	m	m <sup>2</sup>	m <sup>2</sup>	%
Smithfield Plains	16	20		5-7	360-510	150-200	34-48
Blakeview	16	25	10-20	5-9	270-500	150-225	40-48*
Port Adelaide	25	19-22	14-16	7-8.5	320-384	180-230	56-60

\* with some exceptions of up to 71%

## Summary

The lessons that can be drawn from the Adelaide examples is that adequate, but not generous, back garden sizes can be achieved with only a marginal deviation from the new suburban form now current in other Australian cities. It is not suggested that their design was ideal, or represented best practice, but that some solution should be within easy reach.

## Why is it happening?

Why then is this phenomenon happening? More particularly, is it a response to changing patterns of consumer demand? This is a very important question but providing an answer is far from easy. To try to explore the answers to this question the research method was augmented by interviews with professionals involved with the planning and development process. The names of those who took part are given in the acknowledgements. They were supplemented by numerous discussions with fellow academics at Griffith University, Queensland University of

Technology and the University of Queensland. These exploratory dialogues proved invaluable in attempting to make sense of the empirical data.

The statistics at the macro level (ABS, 2005) show a substantial rise in the floor area of new houses over the last 20 years. From a figure of 162.2m<sup>2</sup> in 1984-5, by 2003-4 the average floor area had risen to 227.6m<sup>2</sup>, an increase of 40%. The increase in the ten-year period from 1993-4 to 2003-4 was just over 20%. The average site area also declined over the same ten-year period, from 802m<sup>2</sup> in 1993-4 to 735m<sup>2</sup> in 2003-4 (ABS, 2004). However, the evidence presented in this paper suggests that it was the increase in the dwelling area, rather than the decrease in the site area, that was driving the disappearance of back yards and gardens.

### **The issue of consumer choice**

The first evidence that the disappearance of back yards may not have been a straightforward response to changing household preferences was 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 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 appears to themselves to be rational choices but which are, nevertheless, made within an extremely limited framework.

#### *Location and property prices*

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 costs of private transport. With the presence of the same type of “sprawl” in Australia, it is plausible that the same purchaser behaviour would be found here too.

#### *Comparison with the inner and central city*

A piece of evidence that would suggest a continuing public interest from a significant sector of the public in views and outdoor amenities is the market in city-centre and inner-city residential property. This is just the location where it might be expected that they would be least important. High land values would be expected to militate against swimming pools and barbeque facilities. In the past, purchasers would have been expected to accept less, or more likely no, outdoor facilities because of the advantages of a central location. In reality the opposite is now happening. It is the older blocks that have no swimming pools and terraces for barbeques. The newer apartment complexes not only sport these features but have increasingly larger “entertaining balconies” and floor to ceiling windows that take maximum advantage of views. Advertisements for houses in inner suburbs stress the advantages of views.

### **The role of house builders**

A particular characteristic of the contemporary Australian housing market (and one that can also be found in the US) is the separation of the purchase of the plot and the dwelling. This is not found in Europe where developers build the houses and sell house and plot together as one item. The hypothesis is that the sequence is as follows. Prospective purchasers drive to a locality where they can afford the price of a plot. Having selected their plot, 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. This objective, pursued in the absence of other considerations, such as running

cost or quality of life, leads inexorably to this 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.

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 predominated in nearly all the examples of new suburbs studied. (The exception was the gated estate at Hendra, the reason for its two-storey construction is discussed below.)

It is revealing to compare this with the situation in the UK. Although the degree of intervention by planning authorities in matters of design is substantially higher than in Australia (and increasing), it can be stronger in some places than others. Moreover, during the 1980s it was discouraged by central government policy. There are therefore plentiful examples in Britain of what happens when there is minimal design intervention. One result is the standard volume housebuilder product of which an example is shown by Figure 45. What they have in common with the Australian examples is that they are cheap structures with integral garages, space for cars in front of the garage and decoration on the front of the house only. Where they differ is that they are two storey and that the garage is for only one car, the building footprint will, therefore, be much smaller. From views that people express, it is likely that there would be a demand from house buyers in Britain for single-storey dwellings. However, they are not built by the volume housebuilders. As the housebuilders buy the land and build the houses, they fit as many on to the site as they can. Planning control requires back-to-back distances of 25-30m, 20m at the absolute minimum. If they built single-storey houses then the reduced number sold would cost them far more than any saving in construction costs. In these circumstances, therefore, single-storey dwellings would not be the most profitable. What this illustrates is how residential urban form is a product of commercial forces operating within a regulatory framework. If planning control does not require otherwise, a uniform product results.



**Figure 45: An example of the standard British volume housebuilder product**



The British experience may also explain the presence of two-storey houses in the Hendra example and the provision of some two-storey dwellings in the Carina one. In both cases, the development appears to have been constructed by one builder at one time to a fairly uniform design. The builder was able to maximise the financial return by using an extra storey to reduce the footprint and increase the number of dwellings. The extra income from the additional sales outweighed a marginal increase in construction costs.

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

Notwithstanding the point made above about the demand for views and outdoor facilities in recent city-centre developments, the fact remains that people do choose to live the type of suburban form criticised in this paper in spite of the disadvantages. 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 as advantages. It may be that they will change their views over time. It is certainly a possibility that residents may not find it as satisfactory as they first thought and as the new suburbs become down-market with age the residents may move on to something new.

One argument is that the occupants of the houses do not 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 an outdoor lifestyle, it results from long working hours and commuting times. The occupants leave for work early in the morning and return 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. The Relationships Forum Australia (2007) has assembled a substantial amount of evidence from a range of official statistical sources that portrays a convincing picture. Their conclusion was:

Working patterns have altered to such an extent that Australia is now the only high-income country in the world that combines:

- average working hours that are at the top end amongst high-income nations
- a strong tendency for work on weeknights and weekends, and
- a relatively large proportion of the working population employed on a casual basis.

An equivalent message has been delivered by Australian Human Rights and Equal Opportunities Commission (2007). It would appear, therefore, that physical form described in this paper fits all to well into a wider picture of adverse changes in Australian lifestyles.

### **Why are the layouts allowed?**

Why do the regulations and codes in Australia not prevent the problem? They are more detailed and explicit than in the UK and have similarities with regimes in the US and New Zealand. There will be, of course, variation in the scope and in the details of plans regulatory instruments across the many planning authorities in Australia. One reason for choosing examples from a number of cities was to hopefully take in a range of regulatory regimes. What was remarkable was the overall persistence of the phenomenon being studied, with the possible exception of Adelaide.

They generally specify minimum distances from the building to the plot boundaries and the setback at the front. This contrasts with the situation in the UK where, although there is not the same use of regulations and codes, standards are applied and distances are measured from building to building rather than to plot boundaries. This has the advantage of being able to

connect the standards to the urban design objectives which relate to spaces between buildings. The disadvantage of the Australian approach is that it cannot be linked to these objectives, or at least, not very easily. In reality, little connection is made.

Nevertheless, even allowing for these limitations, the regulations could ensure back garden provision by specifying rear set-backs in the same way that front set-backs are required. Most sets of regulations specify minimum distances from buildings to plot boundaries. The issue is how large they are on the rear boundary. Similarly, planning regulation may make reference to site coverage. However, what is written down in plans and regulations is only part of the story. There can be variations in the strictness and in the style of enforcement, there can be variations in interpretation. Positive advice and negotiation can also play a very significant role if need be. What appears to have been happening is that local councils have been taking a more relaxed attitude to plot coverage. This is the most plausible explanation of the move from 30-40% to 50-60%, or more, and of the way that this trend has become both uniform and seemingly irreversible.

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

#### *The justification for intervention*

One objection that is often made to doing anything to remedy this problem is that any intervention would interfere with individual consumer choice. The immediate response to this is the fairly obvious one that there are advantages that are not related to individual preferences but to the general public good. The benefits the provision of private open space behind dwellings brings to the wider community include:

- aesthetic townscape;
- biodiversity;
- amenable microclimate, including shade in hot weather;
- absorption of run-off in wet weather.

In other words, it is part of an environment whose sustainability and quality affect everyone, not just the individual residents.

There is also the issue which, within public policy, is peculiar to town planning, the desirability of the long-term robustness of urban form. Dwellings are not like other consumer products such clothes, household appliances, home entertainment, even furniture. They last very much longer. They may last for at least 60 years and, possibly, many centuries. The road layouts may last as long, if not longer. Well-planned housing schemes should be designed to be robust over time. In other words, they should be able to adapt to changing patterns of use without major reconstruction. While it may difficult for a particular urban form to necessarily promote a particular activity, it is very easy for it to prevent something. For example, a housing layout cannot, of itself, guarantee that a bus service will be provided but it can make such provision very difficult or even impossible. The argument against the absence of private open space behind dwellings should not turn on whether or not people want to make use of at present. The argument is that it rules out this use permanently. Large areas of suburban housing have been built, and continue to be built, that can never possess the outdoor facilities that this space permits. Similarly, view and outlook are not benefits that can be retrofitted at a later date without widespread demolition. It would also be difficult to retrofit natural light and ventilation to single-storey deep-plan or square-plan houses. Even if current residents do not want an outlook, garden, swimming pool or barbeque terrace why should these amenities be ruled out in perpetuity?

## **Action through the planning system**

A general characteristic of the planning systems of both North America and Australasia, when compared to those of Europe, is that although there may be a reluctance to intervene in the design of development they nevertheless possess plentiful regulations for its control. There is therefore scope for design intervention through the planning system in Australia if there is a political will and if it can 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. It must be remembered 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. It should be emphasised that this something that could apply at all densities and 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 evidence discussed in this paper shows that 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 80m<sup>2</sup> back yard 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 examples studied. At Port Adelaide it was achieved for all dwellings at a density of 25 dph. If necessary it could be compensated for by a reduction in the front set-back, as at Port Adelaide. It should also be noted that current front set-backs normally result in fairly large, planted, front gardens, a circumstance which appears to be accepted by all parties.

## **Conclusion**

Within the past 10 years private amenity space has largely disappeared from the rear of new suburban houses in Australia. This is characterised by an increase in plot coverage from 30-40% to 50-60% or even more. The change appears both permanent and uniform, as it is to be found in all major Australian cities, except Adelaide. It appears to be confined to Australia, in other parts of the world where back gardens have been standard features, North America, New Zealand, Northwest Europe, this trend is not to be found. The outer suburban landscape in Australia has ceased to be one of large gardens with trees. Such landscapes are now confined to the inner suburbs. This trend represents a loss that has serious ecological implications. It also raises important questions about lifestyles changing for the worse, a trend rendered permanent by the changes to the housing stock.

This phenomenon does not result from urban consolidation, smaller plots and higher densities. It is most obvious in the car-based development on the extremities of cities, a long way from city centres. Whatever the size of plot, the dwelling now extends over nearly the whole area except



where a front set-back is required. It is a feature of low-cost housing which provides extensive floor area but not high standards of amenity and lifestyle, in marked contrast to contemporary housing in city centres. It has its origins in a situation where the plot is purchased separately from the house. The incentive is now to maximise floor area for the lowest cost, rather than to maximise amenity.

There has been little comment on what is happening in either professional or public circles, let alone any action by planning authorities to prevent it. Nevertheless, even minor amendments to local regulations on how plots are developed could bring about a significant change for the better. In the longer term, however, what is needed is an awakening of a general concern for better residential design and comprehensive action to secure higher quality in the future.

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