



## BACKGROUND PAPER 3: City structure, form and land use

### *What was said during Time to Talk Canberra 2030*

Central themes of the Canberra 2030 discussion were how we use our land to accommodate growth, and the quality, structure and diversity of urban form. This is unsurprising given the city's land uses and physical structure help determine movement patterns, environmental performance, urban footprint, character and appearance, economic performance and how equitable the city becomes as the population grows.

To deliver an environmentally responsible Canberra that meets everyone's needs in 2030, the community suggested we need to be more efficient and strategic in how we use our limited land resources – at the region, district and neighbourhood scales. A range of views were expressed and the general trend was support for retaining the bush character of the city – including its garden city suburbs – while intensifying and providing for growth in strategic locations such as centres and transit corridors to contain the city's footprint.

To improve social and environmental outcomes of infill development, the community suggested 'success criteria' for medium and high density locations, including:

locating them next to frequent public transport

- improving the environmental quality and open spaces of new development
- requiring appropriate building heights and forms that can integrate with the surrounding area
- safe and pedestrian-friendly central locations with a mix of land use to achieve good amenities
- more attractive choices in compact housing forms close to locations with services and employment.

### *Definition of issue*

Land use planning is the term used for public policies that seek to order and regulate land use in an efficient and sustainable way, thus preventing land use conflicts. Governments use land use planning to manage the development of land within their jurisdictions. It is the systematic assessment of land potential, alternatives for land use, and economic and social conditions in order to select and adopt the best land use options.

Urban form is the physical layout and architecture of a city and the connections between them. It covers the design of urban structures (buildings, public spaces, roads, paths) from the macro or regional scale, the relationship between individual built forms and public spaces, and the relationship between economic planning and employment centres and transport linkages servicing residential areas.<sup>1</sup> The urban form is significant to the quality of a place, to what extent it fulfils people's needs. It affects how we live, move, work, play and socialise; simply, how liveable our city is. It determines to a great extent the choices and opportunities we have as a community, our wellbeing, the costs we incur and our environmental sustainability.

The Territory Plan<sup>2</sup> is the ACT's key statutory planning document providing the policy framework for administering land use planning and development. The Territory Plan is consistent with the National Capital Plan and strategic directions set by the ACT Government, Legislative Assembly and community. It includes a statement of strategic directions, and sets out zones and precincts, the objectives and development tables applying to each zone, and the general, development and precinct codes.

### *Role of strategic land use planning*

To meet the community objectives from Time to Talk Canberra 2030, strategic and statutory planning needs to:

- offer a wide range of neighbourhood patterns and lifestyle choices for a diverse population
- lower natural resource consumption by embedding performance based development targets





- improve housing diversity in terms of type, tenure, size and price, particularly delivering more dwellings in low rise, medium density housing forms
- strategically locate infill development and mixed uses to support a frequent public transport network
- promote a variety of uses in centres and strategic locations to create a vibrant public life
- reduce urban spread into the region.

## What issues does the ACT Planning Strategy need to consider?

### Responding to Canberra's planning legacy

Canberra has a unique planning legacy and urban form from the last 100 years. As a planned city, Canberra is the result of policies and strategies by successive Commonwealth and Territory governments, planners and planning agencies to deal with our present and anticipated needs – all strongly influenced by economic growth, new technologies and changing lifestyles.

Walter Burley Griffin and Marion Mahony Griffin's original 1912 design gave great attention to the natural setting of the capital. They used ridges, hills and waterways as important visual and symbolic backdrops that also defined the formal elements of his city plan, setting the course for the 'bush capital'.

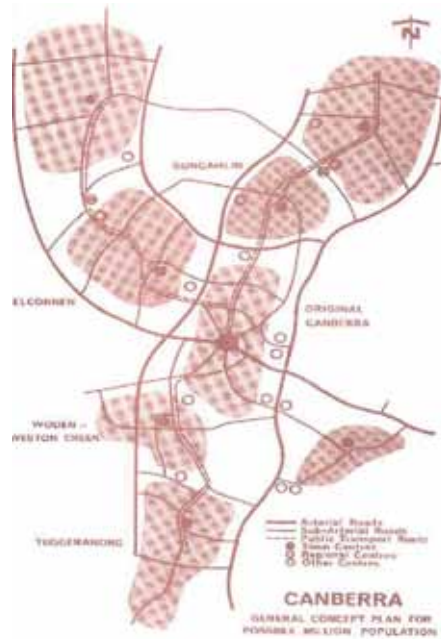
The values of the 'Garden City' movement were closely aligned with the principles of Canberra's planners from Griffin to the National Capital Development Commission (NCDC). The movement aimed to provide better living environments in cities where 'fresh air, sunlight, breathing room and playing room shall all be retained in all needed abundance'<sup>3</sup>.

The planning strategy in the mid 1960s (outlined in *The Future Canberra and Tomorrow's Canberra*) was based on accommodating growth and employment diversity through the development of new towns, each with a major town centre. New towns have been established progressively since the early 1960s, with settlement starting in the most recent town, Gungahlin, in 1992. The National Capital Open Space system used the landscape to separate and define the self-contained towns. This town strategy can be characterised as a 'jobs to the people' strategy harnessing the decentralising trends evident after WW2 to enable short trips to work, schools, community services, shopping and open spaces. The strategy was underpinned by the population's preference for low density living facilitated by the mobility provided by the car. Today our residential areas are predominately low density suburbs, with detached houses comprising 75% of all dwellings, generally on blocks over 700m<sup>2</sup>.

The rationale for employment dispersal to town centres was that it provided major transport benefits including shorter journeys to work, higher use of public transport, reduced traffic congestion,

opportunities for multi-purpose trips, and lower fuel, parking and transport infrastructure requirements. Employment at the centres reinforces the trading position of businesses and those employed at the centres have the opportunity to walk to shops, financial services, libraries, gyms etc. Employment dispersal strategies were also associated with the growth of the industrial areas of Fyshwick, Hume and Mitchell and the mixed use areas in Deakin and Bruce.

**Figure 1: The General Plan Concept (the Y-Plan) 1970**



Source: NCDC 1970

At the neighbourhood level, local centres were generally associated with a nearby government primary school and met the day to day convenience needs of the community. Group centres, serving a 'group' of neighbourhoods, were developed to primarily meet the weekly grocery shopping and business needs of the community and were often associated with a government high school. Local shops and schools are close to homes, there is a diversity of housing types, and bus services are available within 400 metres of most homes. The suburbs have a network of paths that facilitate walking and cycling.

Since the Y-Plan was formulated 40 years ago there have been extensive social, environmental and economic changes. These changes have included a generally increased level of affluence with:

- higher labourforce participation, particularly of women
- increased travel, car ownership and consumption of goods
- changed shopping patterns with reduced expenditure at local centres
- increased oil prices and an increasing awareness of the environmental impacts of urban life.

The Canberra experience suggests it may be difficult to achieve the new urbanism strategies based on walkable neighbourhoods that have a corner store, child-care centre, post box, bus stop and several small businesses providing a focus for a local community.



It represents a desire to return to an urban pattern generated by factors including low car availability, lower workforce participation of women, restricted retail-trading hours and, on the supply side, food and groceries provided by small scale businesses. In the current market such frequently spaced centres are only likely to be successful in niche markets such as the high density inner city with high income populations, or where the operator has exceptional business skills. A substantial rise in fuel prices and traffic congestion may assist but in most instances the catchments of centres, if based on a 400 metre radius of homes, are likely to be too small to provide sufficient trade.

### Efficient use of land

While building on the legacy of the existing urban structure, societal changes and the other challenges facing all cities requires consideration of what is the most sustainable future urban form?

The ACT is approximately 2,352 km<sup>2</sup> in area, but only one quarter is suitable for urban development and most of this is already developed. The metropolitan area is 807.6 km<sup>2</sup> with a gross population density of 4.4 persons/ha (varying from 2.3 in North Canberra to 11.9 in Woden). This includes substantial areas of non urban land and Table 1 adjusts the gross population estimates by excluding areas of non-urban land to produce revised gross density estimates. The relatively low population density in South Canberra is primarily due to the inclusion of Fyshwick and Hume industrial areas. If these areas were excluded, South Canberra's gross population density would be 8.3 persons/ha.

Table 2 indicates the distribution of land uses by district. The uses with the greatest area (land take) are bushland and urban open space, suburban residential development (Residential Zone 1) and designated areas of national significance under the National Capital Plan (NCP).

**Table 2: Land use areas by district 2008 in percentage of overall district area**

District	Suburban (RZ 1)	Multires (RZ2-6)	Commercial	Industry	Transport	Community	Open space	Rural, bush	Des. NCP
Canberra Central	22 %	4%	4%	4%	5%	3%	5%	6%	44%
Belconnen	22%	6%	2%	0%	5%	4%	9%	41%	12%
Tuggeranong	17%	3%	1%	1%	5%	2%	6%	57%	8%
Gungahlin	27%	6%	2%	2%	6%	2%	9%	39%	3%
Woden	33%	12%	4%	0%	9%	4%	11%	3%	20%
Weston Creek	33%	6%	1%	0%	9%	3%	6%	29%	9%

**Table 3: Net residential population density by district 2010**

District	Pop 2010	Total area	Residential area/ha	Residentialshare %	Persons/ha
North Canberra	47,783	4270	1324.1	31.0	36.1
South Canberra	25,496	4930	995.4	20.2	25.6
Belconnen	93,523	6670	3288.6	49.3	28.4
Woden	34,124	2860	1348.2	47.1	25.3
Weston Creek	23,561	1590	910.3	57.3	25.9
Tuggeranong	89,142	6390	3169.7	49.6	28.1
Gungahlin	42,240	3030	1139.8	37.6	37.1
Total Canberra	355,869	29,740	12,176.1	40.9	29.2

\* Excludes Kowen and Majura in North Canberra; Pialligo, Jerrabomberra and Symonston in South Canberra; Belconnen statistical balance; Stromlo and statistical balance in Weston Creek; statistical balance in Tuggeranong and suburbs in Gungahlin which were less than 30% settled (Casey, Crace, Bonner, Forde).

**Table 1: Adjusted gross population estimates by district 2010**

District	Population	Suburb Area ha	Density ha
North Canberra (1)	47,783	4270	11.2
South Canberra (2)	25,496	4930	5.2
Belconnen (3)	93,523	6670	14.0
Woden	34,124	2860	11.9
Weston Ck (4)	23,561	1590	14.8
Tuggeranong (5)	89,142	6390	14.0
Gungahlin (6)	42,240	3030	13.9
Total Canberra	355,869	29,740	12.0

Source: ABS, *Regional Population Growth, Australia, cat 3218.0*

1. Excludes Kowen, Majura, 2. Excludes Jerrabomberra, Pialligo, Symonston  
3. Excludes statistical balance 4. Excludes Stromlo, statistical balance  
5. Excludes statistical balance 6. Includes Amaroo, Gungahlin, Harrison, Franklin, Ngunnawal, Nicholls, Palmerston and Mitchell

As the population of a suburb is primarily found in residential zones and, to a lesser extent, in commercial zones, another measure of density is residential population density, calculated by dividing the population of a suburb by its residential area (including internal roads) as defined in the Territory Plan. Table 3 indicates the net residential population density by district in 2010. The table excludes suburbs where there was little or no population in 2010. It indicates 46% of land in Canberra was used for residential, varying from 29% in North Canberra to 57% in Weston Creek.

The low proportion of residential land in north and south Canberra reflects the high proportion, 44%, of designated land in these areas. Designated areas are the responsibility of the Federal Government, through the National Capital Authority, as they are intrinsic to the capital.



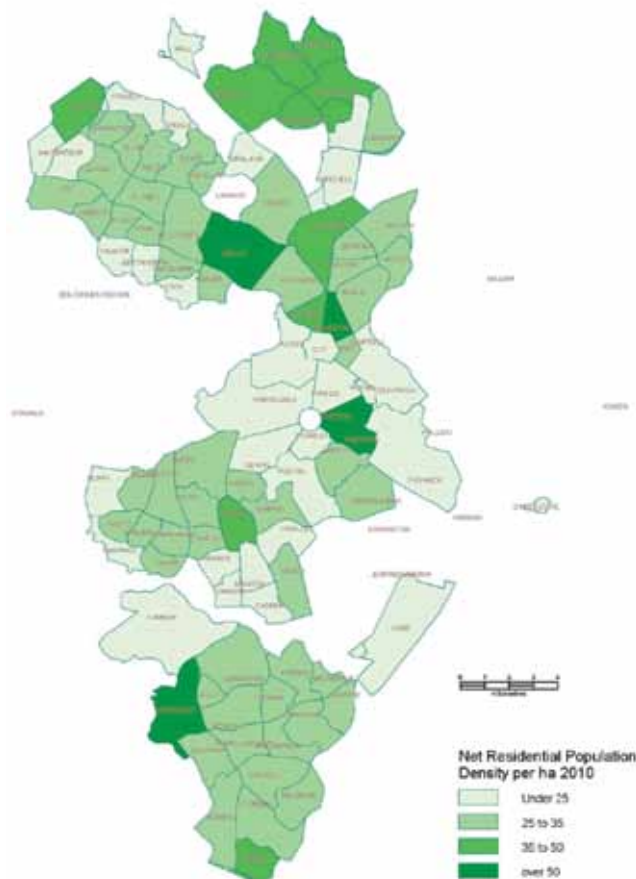
(They include the central national area, Lake Burley Griffin, the parliamentary zone, diplomatic estates, inner hills, main avenues and approach routes.)

The net residential population density in Canberra was 29.2 persons/ha varying from 37.1 in Gungahlin to 25.3 in Woden. Figure 2 indicates the net residential density by suburb. The relatively high residential population densities at the town centres, Bruce, Kingston and suburbs along Northbourne Avenue reflects the development of residential dwellings on commercial land.

As part of the ACT Government's Sustainable future program, the urban form analysis project<sup>5</sup> measured various aspects of sustainability for different sub-divisions of Canberra to provide evidence for strategic planning decisions. The study compared land-use, social and environmental performance of census collector districts in Kingston, Reid, Gungahlin and Weston Creek against a series of indicators in four themes:

- land use – compact layout and efficient land use
- resource use – efficient energy and water use in private homes
- diversity – housing choice and socio-demographic mix
- connectivity – ease of movement, amenity and proximity of local services.

**Figure 2: Net residential population density by suburb 2010**



Three international showcase developments were included in the study to highlight performance requirements if Canberra suburbs were to be more sustainable. Kronsberg in Hannover and Vauban in Freiburg in Germany, and Dockside Green in Victoria, Canada were chosen because they set new benchmarks for more sustainable urban form outcomes. Some results of the study are shown in Table 4 below.

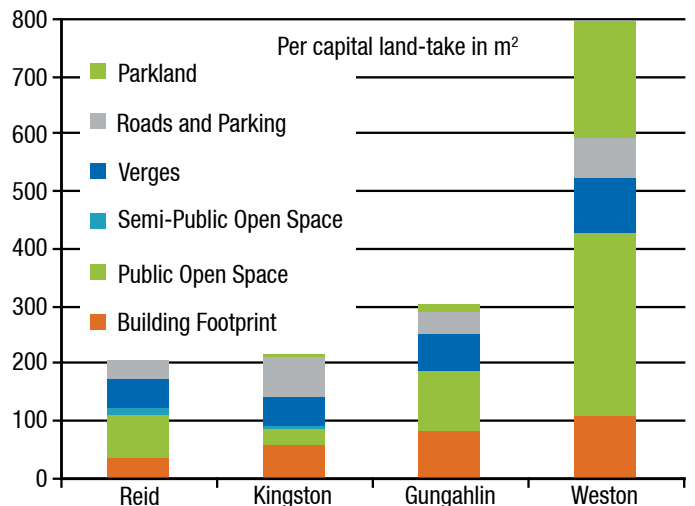
**Table 4: Key outcomes of Canberra's urban form analysis in comparison**

	Reid	Kingston	Gungahlin	Weston	Hannover	Freiburg	Dockside
People per ha Urban Area	48	47	33	13	85	134	288
Land Take per Person (m <sup>2</sup> )	206	214	303	796	117	75	35
Public Open Space per Person (m <sup>2</sup> )	14	9	13	204	27	34	14
Road per Person (m <sup>2</sup> )	32	71	36	70	11	3	4
Water use per Person (kL)	86	66	76	111	51	29	37
CO2 Emissions per Person (t per year)	5.4	3.6	3.6	6.4	0.9	0.5	0.2
Low Income Households (%)	9	2	12	0	37	10	10

Source: Urban form analysis, 2009

In that comparison, the urban form of the area around Kingston group centre is the most land efficient, closely followed by the subdivision pattern of the Reid example with a mix of detached houses, townhouses and apartments close to the city centre. These higher density areas use less land, water and energy per person to provide housing, open space, roads, pedestrian networks and other amenities (see Figure 3 below). However, the predominant use of electricity from the grid to heat apartment buildings in these areas results in comparatively high greenhouse gas emissions.

**Figure 3: The amount of land used per person**



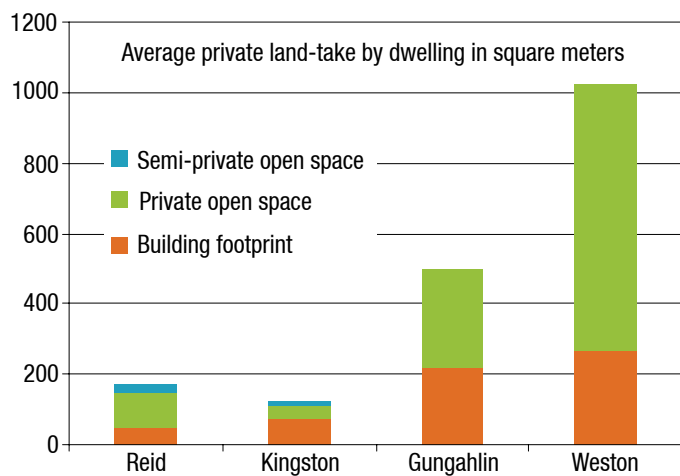
Source: ACTPLA 2010



Not surprisingly the suburban Weston example, established in the 1960s and 70s, was the least compact, had the greatest water use and highest greenhouse gas emissions per person compared to newer suburban subdivisions with smaller block sizes in Gungahlin. The private land use per person, incorporating the building footprint and private and semi-private open spaces, is highest in Weston, followed by Gungahlin and Reid (see Figure 4). Weston has more than 20 times the public open space available per person than Kingston but there are longer distances to local services, a dependency on cars and less housing choice.

All study areas in Canberra lack diversity in terms of social mix, mix of dwelling types, tenures and household types.

**Figure 4: Private land use per person**



Source: ACTPLA 2010

The international examples, all providing rapid public transit services, were found to have two to ten times more land-efficient neighbourhood design than Kingston, the most land-efficient of the Canberra study areas. With the exception of Weston, the Canberra examples provide less open space per person than the low rise, medium density subdivision patterns in Hannover and Freiburg. Reid and Gungahlin show more efficient road patterns and parking design than Kingston, but still have three times or more the amount of land for roads than the overseas examples.

The urban form analysis provides some quantitative and qualitative evidence of how Canberra's various urban form patterns perform. This evidence base represents a 'baseline' by which future planning and change can be assessed, and allows us to benchmark our progress.

Key considerations in the development of a more sustainable urban form are residential and employment location. (Refer to background paper on employment). Projections for the ACT identify Canberra's population could increase by some 95,000 between 2010 and 2030. This will require the construction of around 40-50,000 more dwellings (refer background papers on population and housing). Where is this growth best located? How much of the development should be accommodated within the existing urban area (referred to as infill development,

intensification or urban consolidation) and how much in greenfield areas? Strategic land use planning has to consider complex issues and balance economic, social and environmental concerns when assessing how to make the best, most sustainable use of our limited land resources.

### *Urban intensification and the Spatial Plan*

Residential consolidation policies were introduced in the Territory Plan in 1993 to place additional population close to employment (to reduce the amount of travel and car use), make better use of existing infrastructure and widen housing choice. The policies have contributed to an increase in dwellings and population in north and south Canberra. Providing additional housing close to existing employment centres has reduced the level of travel required and contributed to the reversal of the decline in population in older areas. In the Northbourne Avenue corridor, some 1500 additional dwellings have been developed since 1993, with the capacity for a further 2500 dwellings at the same density.

The benefits of urban consolidation are illustrated in Turner, which has experienced substantial redevelopment. The number of dwellings doubled between 2001 and 2006. Being next to Civic, where employment grew by over 9000 over the period, contributed to the increase from 9% to 37% of residents walking, cycling or using public transport. Walking alone increased from under 3% to 24%. In comparison, the average Canberra share of trips to work using public transport, cycling or walking was under 12%.

The appropriateness of the Y-Plan as a strategic model for the development of the city was reviewed in light of changes to city structure and employment. In 2004 the Canberra Spatial Plan was released to guide Canberra's growth to 500,000 people. It is typical of the 'compact city' planning response adopted in major Australian cities. It recognised the need for limited suburban expansion, increased housing density within a 7.5 kilometre radius of Civic and the protection of the natural environment. It promoted the development of high density housing and employment in and around centres and along transport corridors in order to reduce greenhouse gas emissions and fuel use. It identified Molonglo Valley and Kowen as areas for future greenfield development.

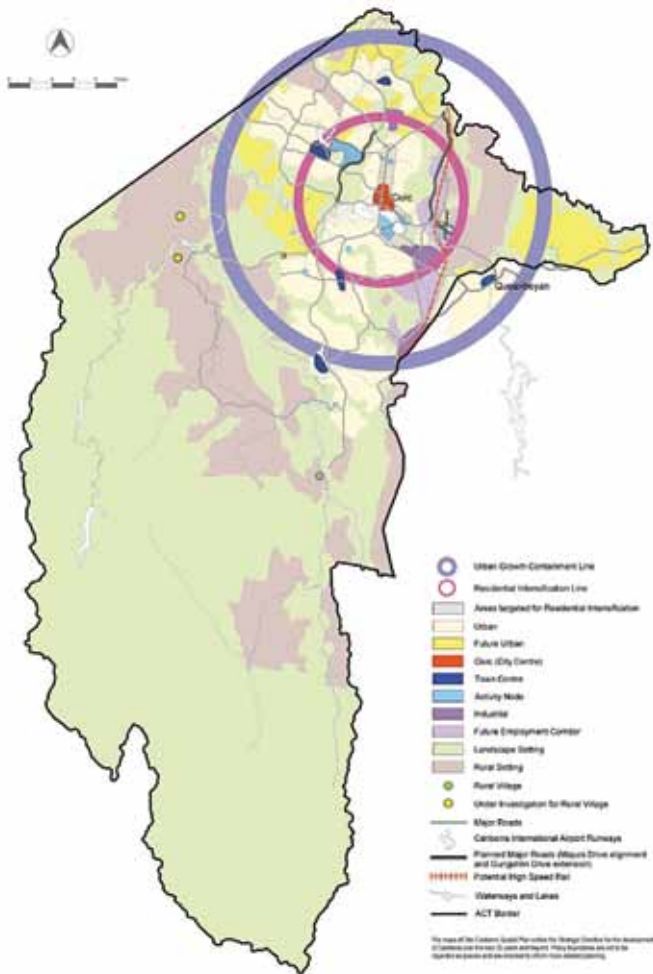
The Spatial Plan identified City and the town centres as priority locations for office development. Office employment at these locations contributes to a more sustainable urban settlement pattern by supporting greater use of public transport. The concentration of activities in specific nodes also achieves efficiency in the provision of government infrastructure, provides support for businesses and encourages vitality at the centres.

### *Reducing car dependence*

While Canberra has an apparent high level of dependence on the car, it has been argued that the city's urban structure (sub centres, local schools and shops and public transport routes within walking distance of most homes) could enable it to function without widespread use of the car.



**Figure 5: 2004 Canberra Spatial Plan**



Car use is a matter of choice for many rather than a necessity. Changes in urban form and structure can provide greater opportunity for households to choose alternatives to cars that reduce energy consumption.

A major challenge is how to influence the future distribution of population and employment in a manner that increases the sustainability of the city. The effectiveness of the current urban form is being reduced by economic, social, demographic and administrative changes that have led to the closure of several schools and local centres, the establishment of significant office and retail employment at Canberra Airport and the possibility of substantial residential development in surrounding NSW. This emerging development pattern, if continued, is likely to result in increased travel and car dependence. This pattern of development, combined with increasing size of houses, could counteract the benefits from improved energy efficiency of homes, commercial buildings and residential subdivisions.

Assessments of urban consolidation and urban containment strategies need to consider the level of travel, the infrastructure costs, the housing demand and the implications for housing affordability.

### Climate change

The potential effects of climate change, with more extreme conditions leading to severe storms and disastrous events such as the 2003 bushfires, underscores the need to reconsider how we use and manage our land (refer to background paper on climate change). If we are to act with greater environmental responsibility and remain a liveable city, we need a land use pattern that offers greater flexibility, diversity and intensity of use.

Developing a more compact city requires working with current decentralisation trends, the gradual increase in demand for medium and higher density housing forms and the population's lifestyle choices. These lifestyle choices shape daily activity patterns and are influenced by household characteristics including income, size, structure, tenure and age and the households' attitudes and behaviour in regard to energy use.

The preferences of businesses and households need to be shaped by regulations/price signals that reflect the externalities associated with their consumption decisions, including those associated with location, energy and water use. Increased energy prices in the future could change the current preferences, leading to an increase in demand for well located higher density dwellings.

As oil supplies fall and oil costs increase, the city will increasingly need to adopt less petrol-dependent forms of transport. Land use-transport strategies to contribute to a more sustainable city are likely to include the development of mixed use sub-centres, well served by public transport and supported by travel demand management strategies (including the provision of frequent, safe and convenient public transport, reduced parking supply, car-pooling, higher parking charges). Assessment of the impacts of development has to include both location and built form aspects. The diversity of destinations for work, retail and recreation trips suggest that the car will remain the dominant transport mode. Consequently efforts need to continue to increase the energy efficiency of motor vehicles and sourcing energy from less carbon intensive and renewable sources in an attempt to reduce greenhouse gas emissions.

To reduce greenhouse emissions building codes also need to require the adoption of sustainable technologies and building practices that incorporate good design and proper orientation and the use of local materials and technologies.

### Things to think about

How best can we provide for projected urban growth, while reducing greenhouse emissions and consumption of other resources, and maintain our lifestyles?

The urban structure of Canberra, the 'Y Plan', provided separated towns with regional employment and 'downtown' centres across a wide spread area supported by group and local centres. This structure is similar to that advocated by researchers as an appropriate model to address the current issues facing the development of Australian cities



to make them resilient – able to withstand the uncertainties of climate change and declining oil supplies.

Canberra is a very low density city with the infrastructure to support many more people. With only a limited amount of land suitable for urban development we need to use our land more efficiently. To halt the decline at smaller scale centres and promote the social, health, employment and environment benefits they provide, we need to support businesses and increase centre vibrancy. Their renewal through more dwellings, as part of a mixed use precinct, could assist greatly.

## Further reading

Time to Talk issue paper *Land Use and Planning*

<http://www.canberra2030.org.au/files/view/?id=84>

Time to Talk issue paper *City Form*

<http://www.canberra2030.org.au/files/view/?id=91>

Griffin Legacy

[http://www.nationalcapital.gov.au/index.php?option=com\\_content&view=article&id=374&Itemid=267](http://www.nationalcapital.gov.au/index.php?option=com_content&view=article&id=374&Itemid=267)

ACTPLA, *Urban Form Analysis: Canberra's Sustainability Performance*, June 2010

[http://www.actpla.act.gov.au/\\_data/assets/pdf\\_file/0020/18461/20100830\\_-\\_InDesign\\_-\\_Urban\\_Form\\_Analysis\\_-\\_web.pdf](http://www.actpla.act.gov.au/_data/assets/pdf_file/0020/18461/20100830_-_InDesign_-_Urban_Form_Analysis_-_web.pdf)

Infrastructure Australia (2010): *Our Cities, Our Future – A National policy for a productive, sustainable and liveable future*

[http://www.infrastructure.gov.au/infrastructure/mcu/files/Our\\_Cities\\_National\\_Urban\\_Policy\\_Paper\\_2011.pdf](http://www.infrastructure.gov.au/infrastructure/mcu/files/Our_Cities_National_Urban_Policy_Paper_2011.pdf)

## Endnotes

- 1 LGPMC - Local Government and Planning Ministers Council 2009, National Planning Systems Principals, prepared by the Queensland Government.
- 2 The Territory Plan is available on the web: [http://www.actpla.act.gov.au/tools\\_resources/legislation\\_plans\\_registers/plans/territory\\_plan](http://www.actpla.act.gov.au/tools_resources/legislation_plans_registers/plans/territory_plan)
- 3 Ebenezer Howard 1902
- 4 Australian Bureau of Statistics (ABS) Canberra Statistical District
- 5 Urban Form Analysis – Canberra's sustainability performance, ACTPLA 2010, [http://www.actpla.act.gov.au/topics/significant\\_projects/planning\\_studies/sustainable\\_future/sustainable\\_future\\_research#Urban%20form%20analysis](http://www.actpla.act.gov.au/topics/significant_projects/planning_studies/sustainable_future/sustainable_future_research#Urban%20form%20analysis)