Sydney

– the urban sustainability challenge

TOTAL ENVIRONMENT CENTRE

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This report does not necessarily reflect the views of the Advisory Committee or the consultants and Total Environment Centre takes responsibility for its contents.

About Total Environment Centre

Total Environment Centre (TEC) was established in 1972 as an environmental advocacy, information and research centre. TEC works on a wide variety of environmental protection campaigns – natural and urban, coastal and inland, country and city. It is a non-profit, non-government organisation funded mainly by donations and grants.

For more information on our campaigns visit our website – **www.tec.org.au**

Comment on this report

Total Environment Centre invites comment on this report by 7 April 2003.

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Introduction

TEC has pursued many environmental campaigns in its 30 year history including - conservation of native forests; restoration of the urbanised Cooks River; removal of lead from petrol; transport action plans including new public transport corridors; the establishment and leadership of Green Games Watch 2000; action on pesticides and toxic trespass; creation of the NSW Sustainability Advisory Council; the Save the Coast Campaign; and environmental sustainability for corporations.

All were concerned with reducing the ecological impact of human activity. In 1999 we released Greenprint for *Sydney – an environmental strategy for the 21st century*, to draw together the many and varied urban themes pursued by the community. In partnership with State agencies, two Sustainable Sydney conferences followed. The program was an attempt to provide a new vision for Sydney and allow concerned individuals and groups to take, for the first time, a metropolitan perspective, based on the goal of environmental sustainability.

Sydney – the urban sustainability challenge is a further step along that path.

As Sydney enters the 21st century embroiled in controversies about its future shape and environment, it is timely to push the debate towards a new vision. Perhaps more than at any time in its past there are contradictory forces battling to put their stamp on the city – medium density; fringe development; international city; car-dependent, resource-guzzling metropolis; sustainable city – are all themes currently in play. Population growth (trends and limits) and reducing the impacts of the existing population are also essential concerns.

From Total Environment Centre's viewpoint the ecological vision of Sydney has not received sufficient attention and the theme of environmental sustainability deserves a central place in the debate.

In the last decade or so community opposition to medium and high-density residential units has emerged in the suburban areas of our cities, especially Sydney. The debate has been skewed by examples of bad practice – poor design, exploitation by some developers of aged and disabled housing provisions, over-development.

Yet Sydney's population is expanding so fast that we have to add within the Greater Metropolitan Region the equivalent of Wagga Wagga every 10 months. The damage to land, air and water is significant. The scale of the environmental problems faced by the Greater Metropolitan Region now and in the future - particularly with an increasing population and traffic, some further fringe development and urban consolidation - cannot be understated. Either the problems will be managed and the ecological footprint reduced or there will be an unwelcome and observable reduction in the quality of life.

Sydney – the urban sustainability challenge is intended to raise the large number of issues in the urban sustainability debate and to increase awareness of stakeholders at all levels of our society. We hope it will lead to the development of better planning and monitoring tools for use by government, business and the community. The final report will make specific recommendations.

TEC welcomes comment by 7 April 2003. A final publication will take your views into account.

Jeff Angel

Director

Total Environment Centre

1 Future Sydney – Key themes

As Sydney enters the 21st century, embroiled in controversies about its future shape and environment, it is timely to review old and new visions. Perhaps more than at any time in its past there are contradictory forces battling to put their stamp on the city – medium density; fringe development; international city; car-dependent, resource-guzzling metropolis; sustainable city – are all themes currently in play.

However, from Total Environment Centre's viewpoint the ecological vision of Sydney has not received sufficient attention and the new theme of environmental sustainability deserves a clearer place in the debate and historical perspective.

Sydney has grown into an international city developed from a colonial outpost on a magnificent Harbour. The early settlers established other towns on the main road and water thoroughfares that fanned out from the centre and subsequent residents tended to do the same.

Since 1949 there has been a strong push to extend the limits of development even further outwards, on the plains and farmlands, as well as infill of the spaces between the radial links in the middle and outer suburbs. The automobile was the most significant technology in this respect and its adoption produced a pattern of development that led to car dependence.

The effects are seen today in a Western Sydney that has almost two million people dependent on cars and paying high health and monetary costs; an overall air basin with heavy ozone and CO_2 emissions at different times of the year; and an ecological footprint that reflects very high per capita consumption levels and extends Sydney's environmental loads massively past its geographical boundaries. Unsustainable development is also increasingly expensive for both private owners and public authorities and threatens Sydney's lifestyle and affordability.

Sydney is spreading into environmentally sensitive riverine and hillside situations with significant loss of biodiversity and other adverse aspects of land disturbance. Its main catchments are facing pollution from household, road and industrial chemical runoffs. The costs of road congestion and low public transport usage are reflected in hospital, medical, business and insurance sectors.

The spread of Sydney has also been associated with changing equity patterns. Recently less than 5% of housing sites on the fringe have been taken up by first homeowners. The houses being built outdo traditional size and quality standards by a fair margin and the penetration rate of air-conditioning is changing regional electricity demand patterns. There are underpinning demographic forces resulting in the need for greater choice in housing.

In recent years the concept of a sustainable Sydney has been popularised. Environmental action is now accepted wisdom at all levels of government in Australia. However, there has been little effective coordination between levels of government over city planning issues.

Since 1968 State bureaucracies have grappled with alternative means of 'planning' Sydney's development so that the State's limited infrastructure budget can achieve greatest benefits. Various efforts have been made (and are still) to convince the public of the merits of consolidation, which is the concentration of population growth within existing areas, as opposed to the expansion or sprawl of population into undeveloped areas.

Regrettably examples of bad practice abound – ugly apartment blocks; developers exploiting legal loopholes to override Council decisions; Councils which have failed to keep their plans relevant and sound in ESD terms; and infrastructure which cannot meet the needs of developing communities.

Sydney is a very sophisticated world city with a variety of built forms, heritage precincts and neighbourhood styles. Increasingly inner and outer areas are becoming expensive and there is a real concern about the affordability of Sydney

for current and especially future generations.

Debate about the future population levels, shape and nature of Sydney will influence the allocation of land, private and public investment in residential, commercial and industrial development, transport infrastructure and environmental capital. While Sydney has always had its 'development and future' debate, the next few years will be crucial to what themes government, business and the community adopt to drive its future.

1.1. Planning failure

The first major planning inquiry in Sydney was the Improvement of Sydney Commission in 1908-09, which proposed suburban railway electrification and various road projects to clear unhealthy inner city slums and move working families into the suburbs. These strategies were implemented in the 1920s and 30s.

The shortage of materials and funds after 1945 led to a revision of planning. London and other cities had introduced green belts to act as fences to the spread of suburbs. The Cumberland County Council (CCC) restricted fringe land supplies and published a major report on the economics of urban expansion. Sydney's Green Belt survived until 1959.

A series of planning reports from 1968 proposed linear corridor development, a highway grid to reduce the "dominance of the radial pattern" and satellite towns (more self-contained through employment growth), and so on. None of the plans were as restrictive or definite on the ground as the CCC's had been. However, the 1968 plan has now been substantially fulfilled.

Whilst an integrated urban administration has been discussed at different times, Sydney is characterised by multiple planning, resource management and implementation agencies. There has been some rationalisation of agencies but there is still competition between agencies, notwithstanding a range of structures to assist in the coordination and integration of planning and design activities. Some 40-odd Councils develop individual Local Environmental Plans, housing strategies, state of the environment reports and other strategies.

To quote John Minnery:

> Sydney's fractured system of metropolitan government has resulted in a development strategy more concerned with the objectives of its operators than the solution of existing problems or the consideration of social objectives in selecting locations for future development. People such as (Jim) Colman see the end result as Sydney 'fouling its nest'.[1]

1.2. The population challenge

Sydney's growth seems unstoppable. In environmental terms a population limit is desirable, but this is unlikely to happen quickly. In the meantime urban policies will need to avoid potential impacts; manage new environmental impacts from population growth; and reduce the very significant current levels of impact arising from existing population levels.

From analysis of the 2001 Census the estimated resident population of Sydney in 2001 was 4.15m. This shows that the city grew by 274,000 between 1996 and 2001, or at an average of 54,800 per year. Between 1991 and 1996 Sydney grew by 208,000, at an average of 41,600 per year. In the early 1990s it was forecast that growth during this period would average 31,000 per year.

It was expected that by 2013 the population would reach 4.5 million, but PlanningNSW now suggests this will be reached by 2010 and that it is likely that in 2021 the population will have grown to 5m.

Sydney comprises 63% of the NSW population and the Greater Metropolitan Region (GMR) stretching from the Illawarra to Sydney to Newcastle comprises 74%. This means that very large proportional changes are needed in the other 26% to have any meaningful impact on the population of the GMR. In the 1990s Sydney grew faster than the balance of NSW, slightly increasing its share of the State's population. This trend has

1 John Minnery, Urban form and development strategies: equity, environmental and economic implication (1992), pp. 53-4

fluctuated in previous periods - in both the late 1970s and late 1980s the Sydney share fell. However these changes have been very marginal. Over the past 30 years the Sydney share of the NSW population has remained relatively constant. Sydney's projected population increase will mean its share of the NSW population will rise marginally above 64% by 2026.

The population of inland areas is projected to decline by 37,000 from 1996 to 2026. There is not a large net drain of population from the inland to Sydney. In fact there is a small net gain to most inland regions from Sydney. The major net population losses are to coastal NSW outside Sydney, and particularly to Queensland.

Realistic targets for a decentralisation policy in inland areas would be centres which are already growing (indicating a viable economic base) and are already large enough to provide infrastructure support - say Albury, Bathurst, Dubbo, Griffith, Orange, Tamworth and Wagga Wagga.[2] Increasing the population of these seven centres by 50 per cent over the next 25 years (1.6% per annum), a total increase of about 110,000, could reduce Sydney's growth by about 80,000 (allowing for already projected growth in these centres). This is less than two years' growth for the GMR.

Coastal areas are the fastest growing parts of the State. Many coastal areas are already suffering the pressures of rapid growth. In most coastal areas expansion slowed in the 1990s, but is projected to grow faster in coming decades. However, the rates remain the highest in the State (1.7% on the North Coast and 1.6% on the South Coast from 1993 to 1998). PlanningNSW's draft projections show that over the next 25 years there will be five major urbanised areas on the coast - Tweed (125,000 people), Ballina-Lismore (115,000), Coffs Harbour (95,000), Port Macquarie (95,000) and Nowra-Shoalhaven (125,000).

Such areas face serious environmental and equity challenges. A significant question is whether new and major coastal development (potential sprawl, lacking transport and pollution control efficiencies) is preferable to better managed GMR growth. As Gosford City Council's *State of the Environment Report* for 2000 pointed out:

> Coastal urban areas (such as the urban areas of Gosford) highlight the most intense example of conflicts in land use planning. Here, the objectives of agriculture, commercial and industrial activities, urban residents, recreational and commercial fishers, tourists and the related industries are in competition for highly desirable land. These land use conflicts bring the risk of damaging significant cultural heritage items … and the natural environment. For example, increasing urban development and tourism has the potential to have an adverse impact on the environmental quality of the coastal zone of Gosford. It also has significant habitat retention implications for fragile foreshore and littoral environments, as well as estuarine and marine waters. The challenge for planning and management in Gosford is to provide for growth and development without placing the natural and socio-cultural values of the environment at risk. (p8)

Australia's only planned new city is Canberra, which now has a population of just over 300,000. In order to stop Sydney's growth, we would need to build three new cities the size of Canberra over the next 25 years (without the attractions of the employment base of the Commonwealth Government) or build a new city the size of Wagga Wagga every 10 months. While regional NSW centres will take some of Sydney's growth, even a doubling of the population of every centre in the next 25 years would have only a marginal impact on relieving growth pressures on Sydney.

Gosford City Council in their *State of the Environment Report* for 2000 also provides this perspective:

> Over a period of more than 25 years Gosford has been a major supplier of new residential land for the Sydney Region. The last major supplies of new land were zoned in the early 1980s and it has been the availability of this land, which has been the primary reason for the large population…
>
> There are now very few remaining new 'greenfields' residential land releases to be developed in Gosford … No major new land source has been identified for residential

2 *Queanbeyan is excluded as it forms part of the Canberra-Queanbeyan urban area, most of which is in the ACT.*

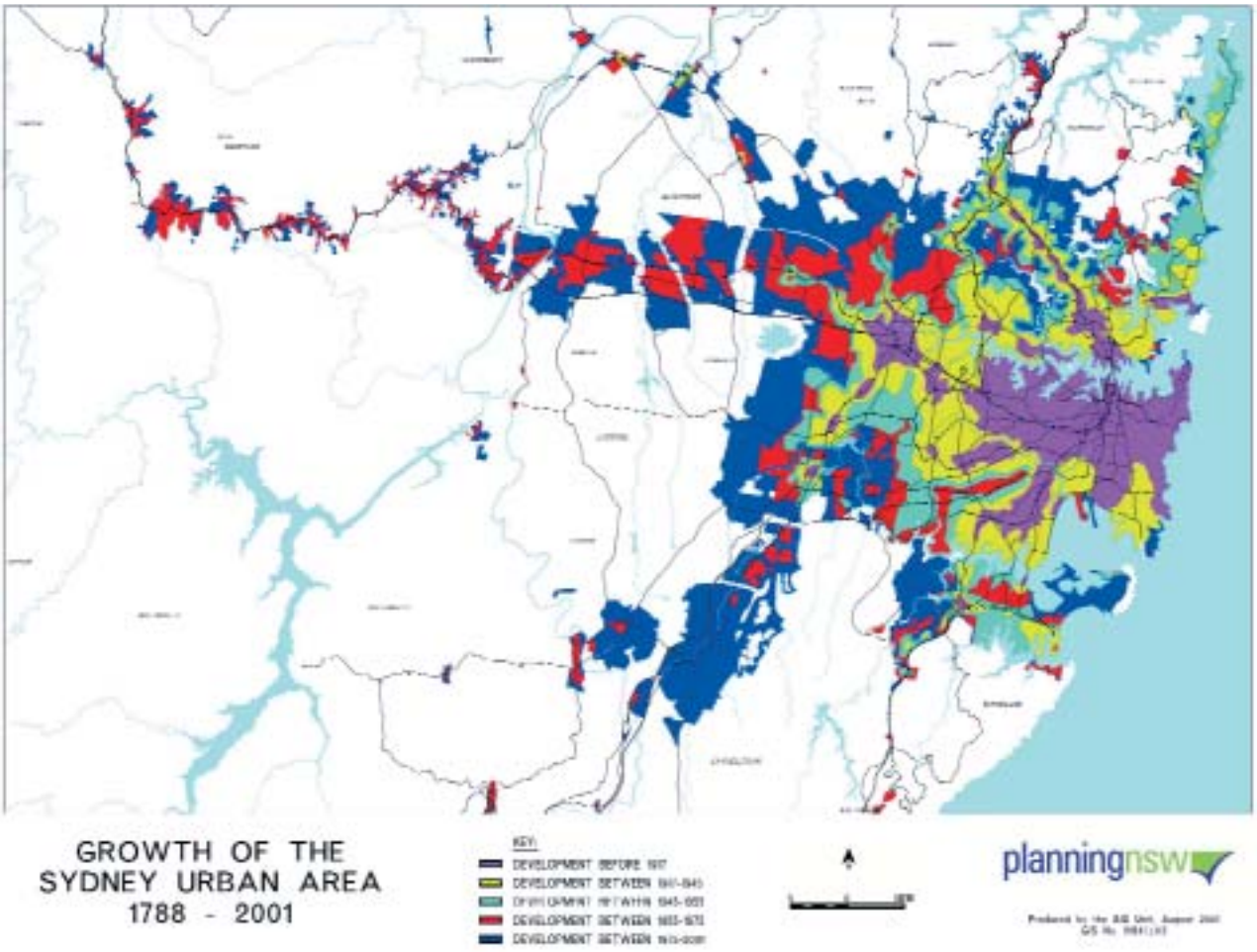
release by either Council or the State Government for a number of reasons including:

- environmental, physical and economic constraints which limit the number of sites available for new urban land release…;
- the increased environmental consciousness and demands of the community, as reflected through the political process and resulting legislation, has resulted in a change of attitude towards the provision of new urban land releases;
- the State Government, through its urban consolidation policies and other strategic policies, has adopted a policy of 'a more compact and sustainable Sydney' where the creation of new residential land is not encouraged and more intense use of existing urban land is preferred. This policy is based upon the changing housing needs of the community as well as the environmental, economic and social costs of urban fringe land development; and
- This change in direction will have impacts on existing local industries and workforce that have grown around the expectation of continued release of new land (e.g. project home builders). However, it is a natural progression in the maturation of a city. (p10ff)

1.3. Building and residential trends

There have been clear trends in Sydney's growth and local and State government policies have variously sought to harness or curtail them. The following map from PlanningNSW shows how Sydney has grown progressively along its transport spurs, then between and beyond:

In addition to the sprawl trend and the higher than expected growth in population, average occupancy ratios have declined from 2.92 in



1981 to 2.72 in 1996 and 2.68 in 2001, reflecting smaller families, increased divorce rate, lifestyle choices and an ageing population. A proportionately greater number of housing units are therefore required (some 50% more each year than had been expected) and this has been reflected in recent government policy and extraordinary levels of apartment construction especially with constrictions on fringe land availability. Further, home building and refurbishment trends have been unusual, with Federal first home owner subsidies at unprecedented levels.

Sydney's westward movement has slowed in the last decade or so as fringe supplies were constricted:

Percentage of new development

	1993/94 %	1999/2000 %
Greenfield	42	27
Inner Ring	13	26
Middle Ring	19	25
Established Outer Ring	26	22

From 1991 to 1996, 75% of Inner Ring and 81% of Middle Ring growth occurred within one kilometre of a rail station.[3]

The pattern of building and development applications since 1986 has changed, with detached houses and semi-detached and flats moving respectively from 26.4% to 32.3%. In addition to meeting demand from population growth, smaller household sizes have meant that an additional 100,000 dwellings have been required over the last two decades.

While it appeared that increased density was the main direction of government policy, the State Government announced in December 2001 that land for Sydney's growth is rapidly running out and that more land (on the fringe) would be moved into the region's land development program over the next 15 years. Prices for lots on the fringe had skyrocketed, with small developers forced out of the market and first home owners being largely unable to access the traditional family-building path.

The Minister for Planning announced that the Government would investigate the following new areas:

		lots
North-West Corridor	Alex Avenue (Blacktown LGA)	**4,000**
	Schofields Aerodrome (Blacktown)	**1,200**
Western Corridor	Marsden Park (Blacktown)	**10,000**
	Glenmore Park (stage 2) (Penrith)	**1,500**
South-West Corridor	Edmondson Park (Composite) (Liverpool & Campbelltown)	**12,000**
	Bringelly (Liverpool & Camden)	**30,000**
	Harrington Park (stage 2) (Camden)	**1,000**

Existing areas already on the land release program to be brought forward for earlier rezoning and servicing are:

		lots
North-West	Riverstone (Blacktown LGA)	**7,500**
	Second Ponds Creek (B'town)	**5,000**
	Balmoral Road (B.Hills)	**4,000**
South-West	Glenfield Road (Campbelltown)	**1,000**
	Yarrunga (Liverpool)	**1,800**
	Hoxton Park (Liverpool)	**1,600**
	Elderslie (Camden)	**2,000**
	Spring Farm (Camden)	**3,000**
	Menangle Park (Campbelltown)	**3,200**

Bringelly is located in both Liverpool and Camden LGAs, in the area north of Narellan and south of the noise footprints of a possible Second Sydney Airport at Badgery's Creek.

The announcement did not include any land in the Macarthur South area identified in earlier strategic documents.

This amounts to housing for about 275,000 people.

3 However, there is a countervailing doughnut effect where longer-term residents around existing stations reduce their rail-travelling needs because they retire from work and the young adults move out. This tends to partly sterilise the pedicentres of suburban stations, further indicating a need for a special scheme to promote rail-based consolidation.

At the same time there are various policy moves to make fringe developments more environmentally sustainable. Importantly, fringe developments are increasingly impacting on the most environmentally sensitive areas and there is only so much that can be done to reduce the impact of such development.

As an example, the Macarthur South corridor has been under review for development for some 30 years, the main constraints being concerns about environmental impacts on the headwaters of the Nepean and Georges rivers, the promotion of long-distance commuting on a rail line that has no significant potential for expansion of capacity, and loss of biodiversity and environmental values generally. In addition, desirable policies such as fringe public transport development and associated high rise can severely impact on remnant bushland areas.

1.4. Pollution and congestion

While this report deals with the key evolving theme of ecological footprint for example, the impacts of energy and water consumption, as associated with different city structure patterns in more detail in future chapters, car-related pollution and associated metropolitan airshed performance and congestion have been a major public concern in past years. *Action for Air* (1998) and *Action for Transport* (1999) and the *Integrated Land Use and Transport Package* (ILUT) are the most recent State Government strategies intended to deal with these issues.

Critics of urban consolidation have pointed to the costs of congestion associated with existing urban centres. Congestion – road usage relative to capacity – is worse in inner areas but outer areas have high levels of car usage, which also significantly affects airshed performance and energy emissions.

Over the last decade key indicators on travel in the Sydney region have shown a consistent and unwelcome direction:

- continuing increase in the number of car trips relative to other means of travel (an extra one million trips per day by car in the last decade);
- average car trip lengths and durations are continuing to increase at more than twice the rate of population growth – this represents an extra 20 million km travelled by car per day relative to a decade ago; and
- household car ownership has increased even though household sizes have fallen[4].

What are the effects of such trends? And what is the impact of development patterns on travel and air quality?

Health impacts

The links between health, urban planning and transport have been recognised for a long time. Fifty four countries (including Australia) adopted the World Health Organization Charter on Transport, Environment and Health in 1999 and the movement has spread since, with a recognition that obesity, asthma, accidents, insurance premiums and private housing costs among other things are all significantly related to the way a modern city functions.

The principal measure of photochemical smog is ground-level concentrations of the major smog component, ozone. Ground level ozone has been shown to have adverse effects on human health including triggering asthma attacks and other respiratory problems and impairing immune function.

The seriousness of ozone pollution in Sydney is revealed by National Environment Protection Council (NEPC) which estimates that approximately 1.5 million Sydney people are exposed to the National Environment Protection Measure (NEPM) 1 hour ozone standard of 0.10 ppm at least once a year while approximately 2.5 million people are exposed to the World Health Organisation (WHO) 1 hour standard of 0.08 ppm (NEPC, 1997).

Apart from its role in producing ozone, nitrogen dioxide (NO_2) has also been found to trigger asthma and respiratory problems on its own. It has also been found to increase the effects of some allergens and is associated with increased hospital admissions for heart disease (NSW Environment Protection Authority 1998).

4 Information from PlanningNSW, 2002

Particle pollution arises from a variety of natural and human sources (including diesel vehicles). Fine particles with a diameter under 10mm (PM10) are of greatest concern as they are small enough to be inhaled and remain within the respiratory system. Research indicates that particles with a diameter of 2.5mm or less (PM2.5) are particularly serious as they are small enough to penetrate deep into the lungs and are most closely associated with health effects (NSW Environment Protection Authority 1998).

Health effects associated with fine particles include increased hospital admissions and mortality from cardiovascular and respiratory diseases, reduced lung function in asthmatic children and respiratory problems in children. Overseas studies have shown a 1% increase in daily mortality (from all causes) per 10mg/m3 increment in PM10. For respiratory and cardiovascular mortality, the observed increases are 3.4% and 1.4% per 10mg/m3 PM10 respectively. Studies in Sydney have shown that for an increase in PM10 of 15mg/m3 to 40mg/m3 ,mortality from all causes increases by 2.6%, while cardiovascular and respiratory mortality increase 2.7% and 3.4% respectively. It is estimated that fine particle pollution in Sydney accounts for 397 premature deaths out of a total of 21,500 (NEPC 1997).

The Bureau of Transport Economics has reviewed the future of air pollution, including greenhouse gases. Its Information Sheet 16 stated:

> In terms of global warming, traffic delays and interruptions to traffic flow in Australia's six major cities would account for around 13 million tonnes of greenhouse gas emissions per annum - comprising about 10.5 million tonnes of CO_2 emissions and emissions of other gases (such as methane, nitrous oxide and ozone precursors) having a possible warming contribution equivalent to a further 2.5 million tonnes of CO_2. This level of emissions is equivalent to around 17 per cent of the annual greenhouse gas emissions due to Australian domestic transport, or about 3 per cent of net Australian greenhouse emissions from all sectors. BTE estimates (based on BTE Information Sheet 14) imply that, of the approximately 10.5 million tonnes of CO_2 emitted per year as the result of congestion, Sydney contributes around 4.0 million tonnes per annum, Melbourne 2.9, Brisbane 1.3, Adelaide 0.9, Perth 1.1 and Canberra 0.2. Order of magnitude estimates for the noxious air pollution due to urban congestion within these six major cities total 780 thousand tonnes per annum of carbon monoxide, 75 thousand tonnes of nitrogen oxides, 115 thousand tonnes of volatile organic compounds, and 5 thousand tonnes of particulate matter.
>
> In the future, increasing vehicle travel will tend to cause congestion to spread across wider areas of our cities than currently. Future vehicle fleets will be more fuel efficient and have better emission performance than the current fleet, but this will be more than offset by the increasing trends in overall VKT [vehicle kilometres travelled] and in the amount of traffic congestion. BTE projections imply that annual greenhouse emissions due to urban congestion could grow to roughly 16 million tonnes of CO_2.

Financial costs

One factor that is too often overlooked is that private households in outer areas have to bear massive monetary costs if adequate public transport is not available.

If one takes the garage component of a house, a single garage costs a family over $150 per month based on a construction cost of $25,000 at the current standard ANZ mortgage rate of 6.57%. (Garages are not normally quoted as a separate element; this figure has been drawn from project home brochures and is indicative only.) The ANZ calculators have been used for these calculations.[5]

Under these assumptions over the life of a normal mortgage, the total amount paid is over $50,000. One garage is taken for granted in Australia; however in many outer suburbs, two three and even four-car garages (seven is the highest sighted) are becoming standard. Current interest rates are historically low, so a reasonable long-term rate might be 10%. The following table shows the amount paid for each of the four garage sizes:

5 *see www.anz.com.au.*

$ Amount paid over 25 years

No. of garages	Mortgage rate 6.57	10
1	50,967	68,148
2	101,934	136,296
3	152,901	204,444
4	203,868	272,592

In addition, the NRMA estimates that the cost of running an average car, including depreciation, is over $100 per week and up to $314 per week at 15,000 km per year and with normal insurance, interest and like assumptions.[6]

Fringe-dwelling families do more than, and inner families less than, 15,000 kms a year, and fringe families average more cars per dwelling, but the effect can be seen. The cost of running one car is roughly equivalent to that of owning one garage, that is, some $100,000 over 25 years.

The important point is - families who move into new areas should have sufficient public transport services available when they build their houses to be confident that they do not need to add multiple garages and cars over the basic level. They would rarely know the cost of adding that extra garage or garages.

The public transport role

A major challenge is how to increase capacity for commuters and reduce environmental and health impacts. *Action for Air* for example adopted vehicle kilometres travelled (vkt) reduction targets and long-term air quality goals, intended to drive transport policy.

In order to address Sydney's chronic air pollution and traffic problems and to overcome current inequities in access to efficient and reliable public transport, a major boost to public transport infrastructure is required. Simply to achieve the State Government's current air quality targets, public transport use will have to roughly double and CityRail patronage increase by 45%, according to the leaked Christie Report (2002) prepared for the NSW Government.

There is also the issue of how to concentrate employment in ways that allow viable public transport to develop. For example, while employment growth in western and outer Sydney has increased slightly faster than population growth, much of this growth has been in dispersed locations leading to a situation where trends in travel-mode share have actually increased in favour of car use, notwithstanding greater employment self-containment in the region. More generally with the shift towards a more dispersed employment pattern (away from major centres), there is the potential for activity and investment to be lost from existing accessible centres. This is reflected in increased car use and loss of investment confidence in affected centres.

In recent years the most popular solution to traffic congestion has been to build more roads. However, as pointed out by Roberta Brandes Gratz in *Cities Back from the Edge*," We now realize that trying to cure traffic congestion with more capacity is like trying to cure obesity by loosening your belt".

She also highlights that after the 1996 earthquake, it was expected the collapse of the San Francisco Central Freeway would cause traffic chaos. In fact, traffic reduced by 80,000 vehicles per day as drivers adjusted by themselves through pooling, cycling and telecommuting. Similar effects were observed when a section of the West Side Highway collapsed in New York City in 1973 and the Williamsburg Bridge was closed for a period in 1988. The defeat of freeway proposals (Westway and Lower Manhattan) and diversion of funds to rail transit saw the emergence of SoHo and regeneration of important sections of NYC.

The Bureau of Transport Economics[7] has documented the fall of rail's share of travel in Australian cities from 40% to 4% from 1945 to 1995 commenting that, "to be effective in addressing congestion and the environmental impacts from traffic, policies designed to affect city transport must target road travel directly".

The BTE's conclusions were:

6 see the calculator at www.mynrma.com.au/motoring

7 BTE Urban Transport – Looking Ahead (Information Sheet 14)

There is projected to be a slow increase in cars per person over (1995 to 2015) which, when combined with population growth, could result in growth in car traffic on the existing networks of roughly 20 to 40 per cent. Although trucks are a small part of the traffic flows, truck traffic growth is likely to be much greater still – between 60 to 80 per cent to 2015, with perhaps nine-tenths of this on existing networks. Total traffic is therefore projected on past trends to grow something like 30 to 45 per cent over the period. Should this occur, the resulting increases in the volume to capacity ratios on our roads (even allowing for a five per cent increase in network capacity), could see future costs of congestion rise to between 1.5 and 3.5 times the current levels, a cost to the Australian economy of around $30 billion a year by 2015...

Of course, increasing levels of congestion can act as a brake on further traffic growth, but there are many cities around the world where current congestion levels are worse than those projected here for 2015. The main point is that congestion will not be an acceptable answer to its own problem. Hence policies that directly affect road travel in our cities will become increasingly important in the years ahead.

1.5. Recent planning responses

As noted above, Sydney has a fragmented planning system. There are about 40 local authorities, each responsible for implementing ESD strategies and housing and commercial policies, most covered by voluntary coordinating bodies but not required by law to consult with others about achieving environmental outcomes. Some councils especially in the south-east have prepared transport, environmental and like strategies to improve community awareness and especially encourage more sustainable strategies at higher governmental intervention levels.

There have been significant governmental moves to improve planning hierarchies and methods. PlanFirst (regional plans and one plan per council), ILUT, stronger housing strategies encompassing medium-density plans and so on.

Integrating land use and transport

In November 1998, the NSW Cabinet adopted *Shaping Our Cities*, a metropolitan planning strategy to provide direction for the Greater Metropolitan Region comprising Sydney, the Central Coast, Newcastle and Wollongong. A basic element of this strategy is the need to moderate growth in traffic by planning to improve the ability for people to choose how they travel. *Shaping Our Cities*, and the associated Cabinet decision, included commitment for the preparation of policies on the integration of land use and transport. The draft SEPP 66 is a component of the policy package *Integrating Land Use and Transport*, the metropolitan strategy and related policy initiatives: *Action for Transport 2010, Action for Air* as well as the *National Greenhouse Strategy*. It covers:

- Land-use change and development consent considerations relating to a range of major travel-generating development (e.g. major retail, bulky goods outlets, offices, entertainment facilities, major residential releases, above a threshold size);
- incorporation of the key elements of the *Integrating Land Use and Transport* policy to be taken into account in the preparation of local environmental plans, development control plans, master plans and development applications;
- the particular access and parking needs of industry sectors including bulky goods outlets; and
- provisions for the achievement of residential densities capable of supporting viable public transport services in new release areas.

Development that has the potential to be inconsistent with the policy direction can be managed through the application of 'net community benefit criteria' to measure (or enhance) the value of the project or plan to the community.

The package was developed through the coordinated actions of PlanningNSW, TransportNSW, the Roads and Traffic Authority, Environment Protection Authority, State Rail and Rail Infrastructure Corporation, with extensive

external consultation. It supports business investment in centres and promotes the achievement by government of value for money on investments in transport and community infrastructure and the efficient delivery of services. Centres offer the greatest opportunity to support a variety of jobs, shops and other opportunities – they have the greatest potential to be accessible other than by car. By encouraging mixed-use centres, trips can be combined and unnecessary travel and congestion reduced.

A key means to achieve this is by planning for the co-location of developments that create a significant demand for transport, so as to allow for single trips to achieve more than one purpose and to support the use of public transport, walking and cycling. Consequently a viable network of centres closely aligned to the public transport system is appropriate to provide opportunities to accommodate this development at a range of scales.

Sprawl v consolidation

The choice between sprawl and higher density is being dramatically presented in public debate in terms of population pressures, lifestyle, affordability, the future of garden suburbs and more. The very nature of a city and financial and environmental costs are under challenge.

Anthony Downs noted in *Some Realities about Sprawl and Urban Decline*, (as quoted and extended by the Fannie Mae Foundation) that areas with stringent control on development growth can lead to growth in other areas with less restrictions (such as the fringe). Further:

> As a result … urban and suburban development today uses natural resources such as land at a much faster rate than in the past. For example, the State of Maryland estimated in 1996, that based on recent trends, in the next 20 years the state would develop more land than had been developed in the previous 360 years in the state. A more common complaint of suburban residents is the rise in traffic congestion, which has made daily life more time consuming, frustrating, and costly. Related to this is the increase in air pollution caused by high traffic volumes resulting from sprawl.
>
> Another impact of sprawl concerns older urban areas that have declined due to disinvestment and population loss over the past several decades. Reducing sprawl on the urban fringe means reinvesting in these areas, and developing on infill sites both in the central city and the existing developed suburbs.[8]

In the early 1990s significant steps were taken by the then Greiner Government to impose broad urban consolidation targets on councils. The new Carr Government reviewed the guidelines adopted a more consultative approach, where councils were required to develop residential strategies with a balance of suburban medium density and higher density in town centres, as suited their circumstances.

At about the same time in Victoria the Kennett Government introduced new housing standards and requirements, which gave developers significant freedom to build medium-density developments through Melbourne suburbs. A popular movement called Save Our Melbourne Suburbs emerged which had a high political impact. This contributed to raising the awareness in New South Wales of the issue.

In recent years anti-consolidation forces have been prominent and highlight bad practice which abounds. The 1999 NSW local government elections saw a new group called Save Our Suburbs, based on the Melbourne model, emerge and anti-consolidation candidates elected in Kur-ing-gai and other places including Blacktown, Willoughby, Hurstville, Woollahra and North Sydney. Councillors are now leading the anti consolidation movement at both State and local media levels, although recently it has become a clear policy difference in the run-up to the 2003 State Election.

Recent community polling by WSROC [Western Sydney Regional Organisation of Councils] and the Warren Centre showed a majority of the community are opposed to continuing medium and high density developments in suburbs. Whilst many were opposed to unplanned consolidation, some accepted it as the lesser of two evils (as opposed to sprawl which encroaches on natural

8 *See http://www.KnowledgePlex.org/fmfportal/hottopics*

bushland) when properly planned. A lack of upgrades to public transport, as well as overshadowing and loss of privacy, were identified as reasons why people objected to higher densities. The authors suggest that the study reflects the fact that consolidation is a "complex phenomenon". They added that policies to reserve areas of natural bushland and to properly plan areas for consolidation will be needed if further development is to be more acceptable to Sydney residents.

Sound 'new urbanism' has shown that people will pay a premium for environmental features and amenities in modern housing estates in both inner and outer urban contexts. Affordability is a further consideration. Higher-density developments are usually more affordable and there has been significant support for the proposition that urban consolidation is a key plank in ensuring the future generations of young Sydneysiders will not be locked out of the housing market.

After consolidation

It is useful to consider what the views of those living in medium-density are, after the consolidation debate has been completed in a particular area.

A brief outline of the consequences of the one of the most controversial early suburban high-density developments is outlined here - Willock Avenue Miranda, which is within Sutherland Shire. It is very different to the built form dominating the Shire.

In 1992 the Council commenced to review planning for this precinct, which is less than 500 metres to the north of Miranda Station and the Westfields shopping complex. The plan exhibited in that year provided for tall buildings ranging from 5 to 15 stories. Adverse community reaction led to the engagement of expert urban designers and the establishment of a representative committee drawn from residents, owners, Councillors and Council staff.

The resulting DCP was released in October 1995 with that committee's support. The DCP was a comprehensive document. Here one graphic is included together with a summary of the principles:

- Setbacks to lower and upper street-facing levels, not to sides, with buildings and basement parking areas built to front boundaries – all creating large useable open spaces to the rear with areas for deep soil plantings
- Common spaces linked to increase useable areas
- High quality, well-designed apartment blocks
- 2:1 FSR where design standards met, 1.5:1 otherwise
- Permanent residential population in precinct of 2,800
- Wide tree-lined streets with narrow pavement for vehicles, wider spaces for pedestrians, pedestrian network to Station and shops. Efficient parking pattern, underground parking for residents

In late 1998 the Council surveyed residents of the Miranda high and medium density areas. The following were key results:[9]

- 38% were aged 25–39; 30% were over 60. The 40–59 group accounted for 24%; 30% were retired or pensioners; 37% single-person

households, adults and no children made up 24%. Families with dependent children accounted for 23%

- higher-income earners live in townhouse or high-rise developments; low-income earners live in a villa or flat or unit up to two storeys
- 63% previously lived in the Shire (15% in Miranda); 23% elsewhere in Sydney; 5% elsewhere in NSW; and 4% each for elsewhere in Australia and overseas
- 77% have motor vehicles; 36% also have visitor parking
- 'most important' reasons for living there - 62% being close to Westfield; 50% close to public transport; 45% being close to family and friends; 44% because of the medium and high rise accommodation; 42% because of range of local shops; 42% being close to Cronulla beaches
- 'high levels of satisfaction' - 88% with the provision of public transport; 80% with health facilities; 61% with open space and parklands;
- Centre residents 'dissatisfied with' - 29% visitor street-parking availability; 24% with parking for residents; 19% local area footpaths and pathways; 31% vandalism and break-ins to cars
- medium and high-rise residents 'dissatisfied' - 39% with night time personal security; 24% with volume of traffic; 17% with night traffic noise;
- 55% of medium and high-rise residents prefer two storey or lower forms; 16% preferred units higher than 2 storeys
- proportions of residents of high rise *who want to see more of this type of dwelling built* - 52% of those aged 40–59; 33% of people living alone; 24% of adults with dependent children; 32% of high-income earners.

The acceptance of this style of living by a variety of people is critical – in particular the retired and demands community-based accommodation rather than 'spread and separate' houses.

9 *Information provided by Sutherland Shire Council*

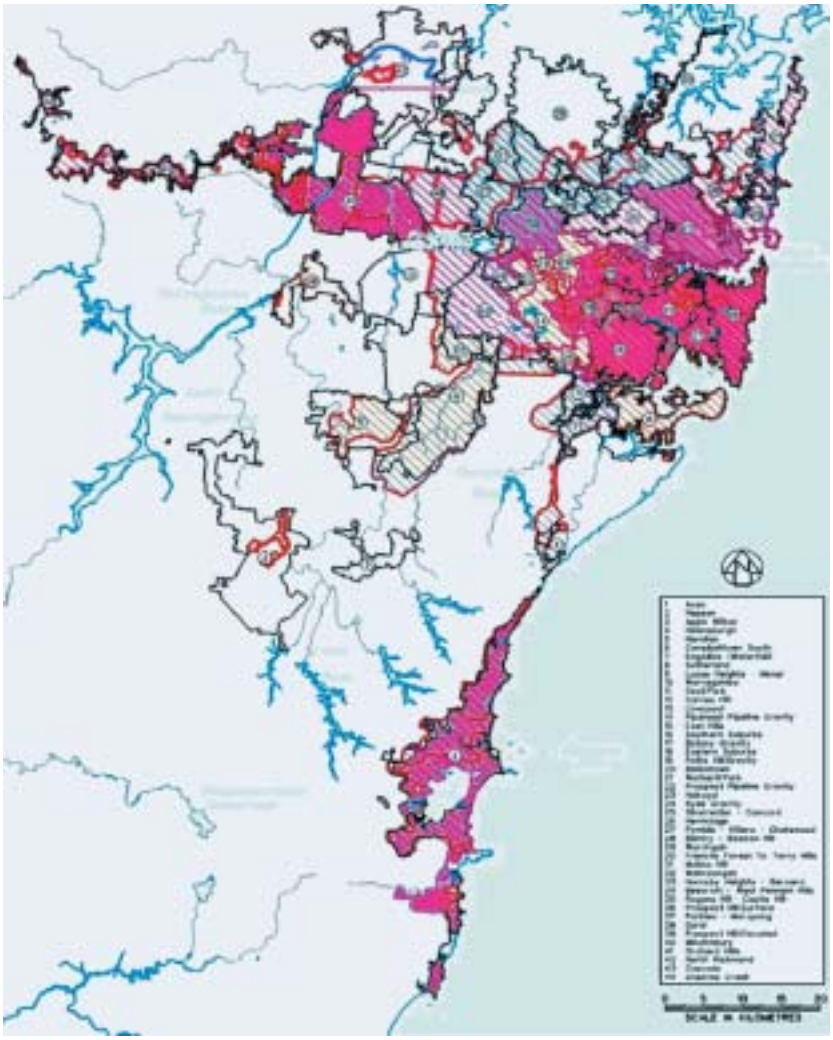
2 Modelling Sydney

Taking population, occupancy and building patterns into account, we begin to see the potential shape of Sydney in the future – and with it, the stresses caused to its ecology, economy and society. The 'base case' would reflect current policies for fringe land releases and urban consolidation, metropolitan housing strategies and the impacts of already-committed infrastructure improvements among other things. However, is the base case appropriate?

The Federal Treasurer published the *Intergenerational Report 2002-03* as part of the May 2002 Budget. This showed among other things that the aged to working-age ratio is expected to rise from 19% currently to almost 41% by 2042. The gentrification of the population will have profound effects on the ways our cities work: accessibility to medical and other community facilities, street safety and neighbourhood surveillance, the size of housing units, the ownership patterns of homes and housing affordability.

The NSW Government is developing metropolitan scenarios over the next year. Recently Sydney Water undertook an extensive research and consultation process in preparing *WaterPlan 21.* Its population growth and urban development data were based on material from PlanningNSW, which can be described as the base case. This included release areas at ADI (Blacktown/Penrith), Marsden Park and Riverstone. The population increase including the release areas was from 4.05 million in 2000 to 4.8 million in 2020.

The number of multi-unit dwellings is estimated to grow by 40% (200,000 units) and detached dwellings by 20% (190,000 units). The following maps show the distributions. The numbers were used for broad direction setting and additional and much more detailed work underpins Sydney Water's planning and operational decision making. The areas in red are the highest growth areas (the other colours are not relevant) while the black lines represent water systems or reservoir zones and the red lines with shading infill the sewer systems.

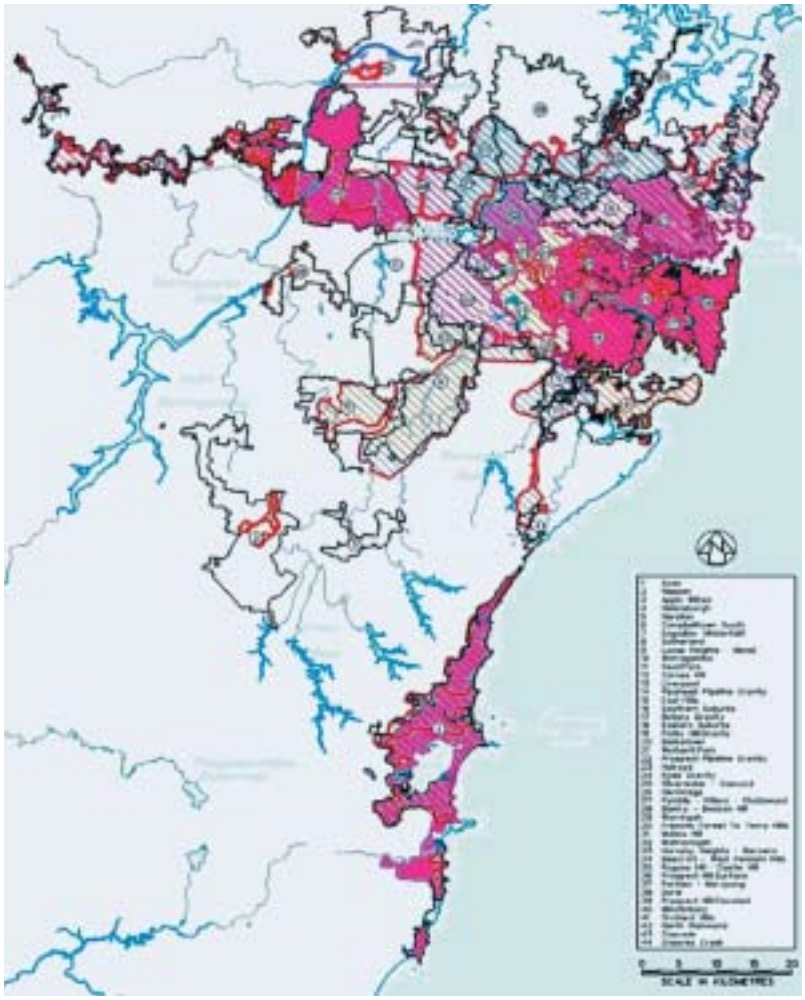


High growth areas for multi-unit dwellings

However, the environmental impact of the base case has not been modelled and thus judgements about its public acceptability cannot be made. Alternatives should be presented - there may be less fringe development and more medium density; or faster fringe and less densification. The display of alternative futures needs to be modelled in relation to, for example, transport demands public and private), loss of bushland, housing choice and affordability, air quality, water use and adverse impacts on local catchments. New infrastructure proposals and environmental management systems should also be included.

Chapters 3 and 4 broadly review some of these factors as affected by different urban patterns.

The table below shows a partial environmental profile of Sydney, including issues that modelling and ecological footprinting would examine.



High growth areas for detached dwellings

Sydney at a glance

Population growth	54,800 pa [a]
Population by 2021	5 million [b]
Occupancy ratios	2.92 in 1981, 2.68 in 2001 [c]
Car use	extra 20m km per day compared to 1990 [d]
Air pollution	2.5m people exposed to WHO 0.08ppm standard [e]
Transport $C0_2$	4m tonnes pa [f]
Rail	need 45% increase in patronage to reach air quality goals [g]
Water	more than 1,600m litres used each day [h]
Wastewater disposed	more than 1,300m litres each day [i]
Electricity greenhouse emissions	8.40 tonnes per person pa [j]
Waste landfilled	4.5m tonnes pa [k]

a *PlanningNSW (2002)*
b *PlanningNSW 2002)*
c *PlanningNSW (2002)*
d *Planning NSW (2002)*
e *National Environment Protection Council (1997), Draft National Environment Protection Measure and Impact Statement for Ambient Air Quality*
f *Bureau of Transport Economics, Information Sheet 16*
g *Christie Report (2002)*
h *Sydney Water (2002), Annual Report 2002*
i *Sydney Water ibid*
j *IPART (2001), Electricity distribution and retail licences, Compliance report for 2000/01*
k *ResourceNSW (2002), Draft Waste Avoidance and Resource Recovery Strategy*

3 Ecological Footprinting

The formal Ecological Footprint methodology was pioneered by Mathis Wackernagel and William Rees at the University of British Columbia. Rees defines an ecological footprint as, "the corresponding area of productive land and aquatic ecosystems required to produce the resources used, and to assimilate the wastes produced, by a defined population at a specified material standard of living, wherever on Earth that land may be located"[10]. Ecological footprint analysis (EFA) has been applied to countries, cities, institutions, corporations and individuals. The methodology itself has been the subject of vigorous debate.

The concept of ecological footprints has much to offer in the assessment of sustainability in urban systems. As an area-based indicator or measure that converts human consumption into quantifiable land area units, ecological footprint analysis fulfils some of the key characteristics required for an indicator of sustainability. It relates human action to environmental impact; it is quantifiable; transparent; easily communicated; and can assist in setting benchmarks and targets - thus providing a key tool for decision making.

During the literature search for this report no studies were found in Australia, which used the formal Ecological Footprint methodology to compare development of different densities and locations within an urban area. One such study exists for Canadian cities, which has the potential to be applied to Sydney.[11] Those Australian reports which do touch on various aspects of ecological footprinting are described below, with a review of their applicability to accurately comparing different urban futures and development patterns.

One key aspect about EFA is that the quality of the data is especially important. For example, if you are wanting to compare high and low density you have to start considering the embodied energy in construction materials, the sources of materials and fit outs, etc. A beginning has been made with analysing Sydney and other Australian cities in these terms, but there is a need for a much higher effort.

It is also important to compare 'like with like', to match areas in terms of social, demographic and economic characteristics, so that invalid comparisons between one group of people (e.g. a conventional family unit on the fringe and retired or single families in units), are not made. A final qualification is necessary. Some studies include analysis of the individual consumption patterns of goods and services (beyond transport) of people living in the areas studied and differences are apparent between fringe development and denser settlement patterns. Besides the issue of whether the two groups would freely alternate between the two urban lifestyles, there is the question as to whether urban planning has the capacity to broadly influence consumption factors beyond housing types and transport. Other policies such as financial instruments (to reflect environmental costs) would need to be brought to bear.

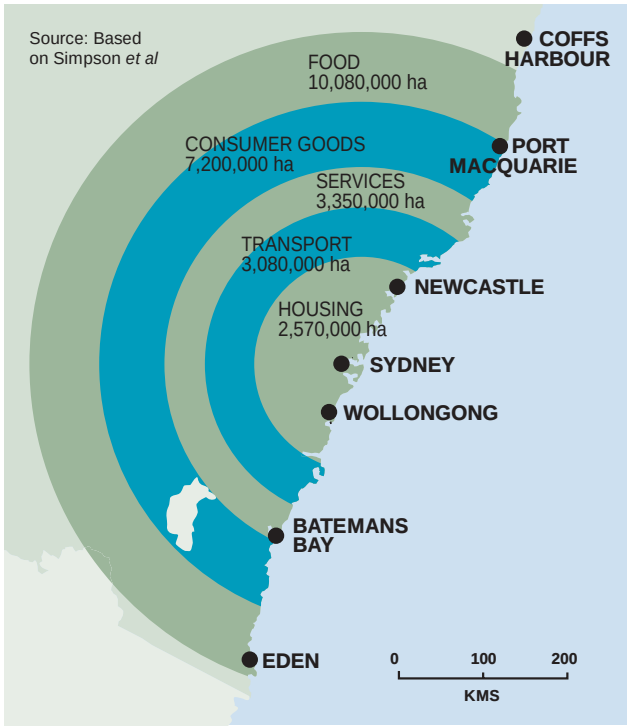
3.1 Ecological footprint overviews

In 1997 the NSW EPA released a *State of the Environment Report* report which contained the first official urban footprint for Sydney (reproduced with some of its explanatory text):

> Principles and objectives of ESD are slowly being incorporated in the strategies and programs of governments, most notably in legislation, education and information programs. Progress in incorporating ESD into other areas is patchy, for example, in pricing and taxation, occupational health and safety and conflict management
>
> While an overall assessment of progress may not be possible, there are some specific

10 William Rees, 1996, "Revisiting carrying capacity: area-based indicators of sustainability", Population and Environment, 17, 3, pp. 195-215. Available from www.dieoff.com, accessed 19 August 2002.

11 Walker, L.A. and Rees, W.H. 1997, "Urban density and ecological footprints", in Roseland, M. (Ed), Eco-City Dimensions, New Society Publishers, Gabriola Isld, BC, Canada, pp96-112



impacts and regions in NSW where the current level of activities or predicted growth rates may be unsustainable ...

Between 1988 and 1990 NSW emissions of greenhouse gases increased by 5%. A level of climate change is already inevitable as a result of past emissions. Although some measures have been implemented to reduce this growth, a significant reduction in emissions is needed from NSW and other states, territories and countries ...

No city can be sustainable on its own, but needs a "global hinterland" (Rees 1996). The ecological footprint ... of Sydney can be estimated at 26 million ha, 37 times the size of its land area (approx 700,000 ha) if the figure of 6.75 ha per person is used .... (pp 359,407)

The following extract from the *Melbourne Principles for Sustainable Cities* (UNEP and Melbourne City Council) further illustrates the significance of the concept:

PRINCIPLE 4: Enable communities to minimise their ecological footprint.

Cities consume significant quantities of resources and have a major impact on the environment, well beyond what they can handle within their borders. These unsustainable trends need to be substantially curbed and eventually reversed. One way of describing the impact of a city is to measure its ecological footprint. The ecological footprint of a city is a measure of the 'load' on nature imposed by meeting the needs of its population. It represents the land area necessary to sustain current levels of resource consumption and waste discharged by that population. Reducing the ecological footprint of a city is a positive contribution towards sustainability. Like any living system, a community consumes material, water and energy inputs, processes them into useable forms and generates wastes. This is the 'metabolism' of the city and making this metabolism more efficient is essential to reducing the city's ecological footprint. In reducing the footprint, problems should be solved locally where possible, rather than shifting them to other geographic locations or future generations.

Thirteen pilots are underway in Victoria to measure household, factory, building, university, area and other specific footprints.

The Australian Institute of Urban Studies[12] commissioned a major review of Sydney's drainage footprint - the impervious surfaces inherent in city construction. This is an important secondary indicator of the load that a city puts on its environment. It found that the level of impervious surfaces in new suburban areas over the last 20 years is higher than in older areas.

3.2 Detailed assessments

TEC commissioned the Institute for Sustainable Futures (ISF) to review studies which compared the environmental impacts of low-density fringe development with medium-to-high density urban consolidation, preferably in the same city in Australia. (The ISF report is attached as Appendix One).

A summary of the Institute's report follows.[13]

The Institute was able to locate a range of studies which cast useful light on the question of

12 *AIUS (NSW) 1999*

13 *References referred to here are cited in the Appendix.*

the differential environmental impacts of different types of urban development.

ENERGY AND GREENHOUSE: It is now well established that per capita transport energy and emissions are lower in high-density parts of cities and in more compact urban forms (Newman and Kenworthy, 1999). This result appears to hold on a per household basis when the analysis is extended to include the embodied and operational energy and emissions of both housing and transport (Perkins, 2001).

Two other studies reviewed raise the question of whether the relationship between energy use, emissions and population density extends to per capita housing and transport energy and emissions (Troy *et al*, 2002) or to the inclusion of the direct and indirect energy required for the production and supply of goods and services for all forms of final household consumption (Lenzen *et al*, 2002).

URBAN AIR POLLUTION EXPOSURE: Urban forms with the lowest greenhouse gas and urban air pollutant emissions are not necessarily the same as those with the lowest urban air pollutant exposures, because of weather patterns (Newton, 1997). The methodology of this study would need to be re-applied to the Sydney airshed to draw specific conclusions about Sydney.

WATER: In results analogous to those in the energy and greenhouse studies, water consumption per household in inner suburbs appears to be lower than in outer suburbs (Robinson and Cordell, 2002). However, in a result that contradicts work by the Institute for Sustainable Futures[14], Troy *et al* (2002) appear to show that per capita water use of medium density housing is very little different to that of people living in houses.

Lundie *et al* (2002) show that alternative delivery of water and wastewater services in new urban areas can substantially reduce environmental impacts.

3.3 Methodological limitations

The results of the reviewed studies are not sufficiently robust to support policy development. The studies do not provide an adequate basis to answer the policy-relevant question of which types of new urban development in Sydney have lower environmental impacts (or smaller ecological footprints). Each study has some or all of the following limitations.

Failure to compare "like with like"

Most of the studies reviewed did not match the areas compared for the social, demographic and economic characteristics of the populations, such as age, household size and income. Some of the studies state, that their samples were similar on one characteristic, but not on others. Hence, these studies were not comparing like with like in terms of the people and households in the areas studied. Because of the complex sifting process that takes place in urban housing markets, it is unlikely that the types of people and households who would otherwise purchase in new fringe developments would directly switch to new urban consolidation and change their consumption patterns accordingly. (However, new urban consolidation provides greater housing choice and substitutes for new fringe development in the total metropolitan housing market.)

Unless study samples across different types of development can be matched on key characteristics, the best way to compare like with like would be to ask what types of medium density development have lower environmental impacts compared to standard practice for similar market segments, and what types of low-density development have lower environmental impacts compared to standard practice for similar market segments.

Differences in system boundaries, inclusions and exclusions

The difference between full Ecological Footprint Analysis and partial impact assessment is critical. What is included or excluded affects the size of the footprint. More importantly for studies comparing different types of urban development, it affects the relative size of footprints. The figure at the end of this chapter illustrates how the studies reviewed here differ greatly in where they draw the system boundary.

14 *The Institute for Sustainable Futures also conducted this review.*

The argument for limiting studies to the environmental impacts of the use of buildings and transport only is that these two are within the influence of urban planning policy, whereas most other forms of consumption are not. However, this is a partial view. If the objective is to use urban planning to reduce overall environmental impacts, then a more comprehensive view is needed. The results of the studies reviewed here at least raise the question that a more comprehensive view may yield a different answer to the partial view. If this is the case, reliance on the partial view may be an inadequate basis for policy development.

Per person and per household comparisons yield different results

Some of the studies reviewed here compare environmental impacts on a per capita basis; others compare on a per household basis. As households tend to be smaller in inner urban areas and medium-high density developments, per household comparisons may be open to misinterpretation. Smaller households simply mean that more households are needed to accommodate the same population. Hence, per capita (or the total for a stated population) is a fairer basis for comparison, except in the case of water where outdoor use is related more to housing type and garden size than to the number of people in the household.

The failure to analyse new urban developments, as against established areas

Many of the studies reviewed analyse existing urban areas. Care is needed to extrapolate results from existing urban areas to new developments and redevelopments. For example, one cannot assume that households moving into new urban consolidation will have the same consumption profile as households in existing inner areas or existing medium-density housing.

Few of the studies were in Sydney

Some results are robust across different cities, but care is needed to extrapolate from other cities in many impact categories. Also, some of the non-Sydney studies depend on small numbers of case studies which may be heavily influenced by the particular social, economic and demographic patterns in the study city.

3.4 Application to Sydney

Future studies in Sydney could overcome these limitations in the following ways.

1. *Match* the people in the samples in the areas being compared for key social, demographic and economic characteristics, such as age, household size and income, *unless it can reasonably be assumed that the samples have similar characteristics.*

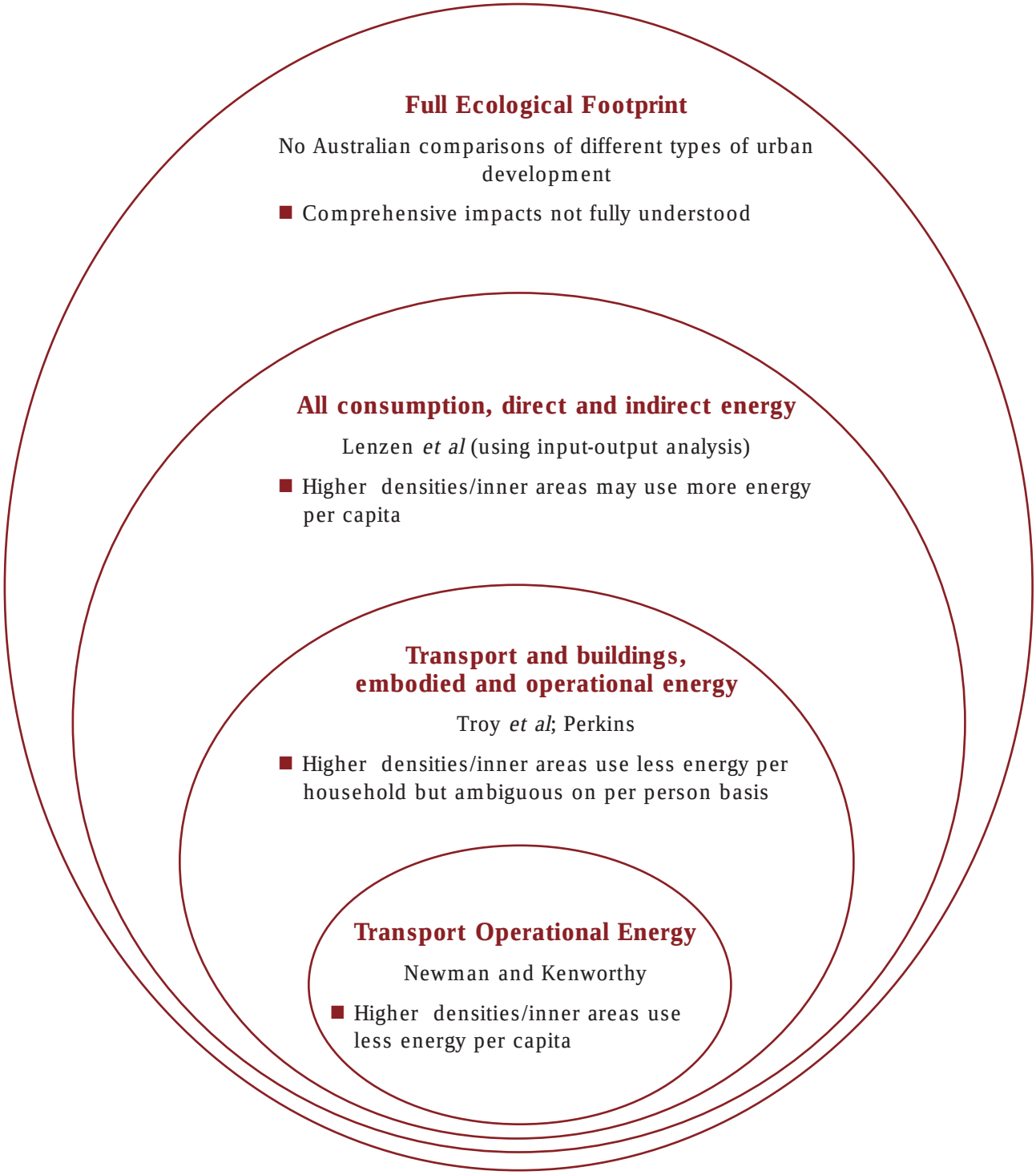
   It may be reasonable to assume that samples are similar when comparing different types and locations of medium density development with standard practice aimed at similar market segments, or when comparing different types and locations of low-density development with standard practice aimed at similar market segments.

2. Take a *comprehensive* view of consumption, *unless it can reasonably be assumed that discretionary consumption patterns would be broadly similar.*

   The main situation where this assumption could be made is where samples are matched for age, household size and income or similar key socio-economic characteristics. With matched samples, a partial analysis of the environmental impacts of the use of *buildings and transport only* may yield results that are useful for policy development. As suggested above, a further simplification is possible in those types of studies where it can reasonably be assumed that the samples would have similar characteristics e.g. comparing different types of medium density development for similar market segments.

3. Compare environmental impacts on a *per capita* basis, except in the case of water, for which both *per household* and *per capita* comparisons may be useful, for the reasons noted above.

4. Compare different types of *new* development or redevelopment, as against existing areas.



The sizes of Ecological Footprints are affected by what is included and what is excluded

4 Economic Analysis of Urban Forms

Many policy analyses of the economics of urban consolidation vis-à-vis fringe development have focused on comparative public infrastructure costs.

However, any economic analysis of future development scenarios for the Sydney region should be concerned with all economic costs and benefits of alternative development scenarios, including developer and environmental costs and benefits. Developer margins are important in determining whether strategies can be implemented and whether taxation and similar strategies are feasible.

The technique that economists use to examine the economic costs and benefits of alternative policy scenarios is benefit cost analysis (BCA). BCA is founded on the principles of market supply and demand and weighs up all the incremental benefits and costs of policy options compared to a base case to determine which alternative provides the greatest net benefit to society. The scenario that provides the greatest net benefit is said to be the most economically efficient.

In the absence of resources to examine detailed alternative scenarios for future urban expansion of Sydney, some of the comparative costs and benefits of urban consolidation vis-à-vis greenfields expansion on the urban fringe have been identified through a literature review. The relative costs/benefits that are examined in this report are summarised below.

Potential economic costs and benefits of greater urban consolidation vis-à-vis fringe development

Potential benefits/costs

ECONOMIC INFRASTRUCTURE such as sewerage, water, stormwater, electricity and telecommunications

SOCIAL INFRASTRUCTURE such as education, recreation, community health and welfare

DEVELOPERS' NET BENEFITS (producer surplus) (revenues minus costs net of infrastructure costs already referred to above)

Private and public **TRANSPORT COSTS AND BENEFITS**

AMENITY/CONGESTION effects

ENVIRONMENTAL effects associated with ecological footprinting including land, water and air pollution.

A detailed report on these aspects has been prepared for TEC by Gillespie Economics in conjunction with Crowdy Consulting. This appears as Appendix Two. A summary is reproduced in this chapter.[15] It is noted that several studies were undertaken in the early 1990s and that it may be necessary to update research as the debate progresses.

4.1. Economic infrastructure

As pointed out by the Industry Commission (1992), the direct costs of economic infrastructure of infill compared to fringe development hinges on the extent of excess capacity and marginal costs. For some infrastructure, such as sewerage and water, there may be excess capacity and hence little incremental infrastructure costs of urban consolidation. For other infrastructure items such as stormwater or roads, capacity constraints may result in high costs because of the expense of retrofitting/expanding infrastructure in developed areas.

Travers Morgan Pty Ltd and Applied Economics Pty Ltd (1991) undertook an economic analysis of fringe development and urban consolidation in Sydney. The study involved comparing costs and benefits of developing the Parklea Precinct of Rouse Hill Development Area to urban consolidation in middle ring suburbs of Parramatta, Ryde and Hornsby.

15 References referred to here are cited in Appendix Two

The study suggested considerable infrastructure cost savings from urban consolidation largely due to the availability of excess capacity in existing infrastructure. The Water Board advised that its existing water and sewerage infrastructure in middle suburbs of Sydney was capable of accommodating development densities in the order of 80 to 100 equivalent persons per net hectare. This is far in excess of the Sydney average of 18.93 person per ha (UITP), or the suburbs with the highest urban densities up to 65 person per ha (Industry Commission 1992).

Electricity, gas and telephone service providers also indicated that there was generally spare capacity in existing distribution networks, whereas greenfields development at Parklea Precinct would require some additional capital costs to establish infrastructure.

Additional stormwater infrastructure for urban consolidation was considered likely to be able to be dealt with by way of small scale onsite works such as onsite detention, compared to a requirement for additional substantive offsite stormwater infrastructure for fringe development.

The study suggested little, if any, significant effect on the road system of increasing urban densities in existing built up areas.

Economic infrastructure cost savings from urban consolidation at Parramatta, Ryde and Hornsby compared to fringe development at Parklea

Economic Infrastructure	Infrastructure Cost Savings Per Net Ha ($1991)
Water	$10,000
Sewerage	$14,000 to $25,000
Stormwater	$17,000
Electricity	$16,400
Gas	$7,500
Telephone	$18,700
Sub-arterial roads	$121,500
Total	**$205,100 to $216,100**

At an average of 10 dwellings per ha on the fringe, this infrastructure cost saving was equivalent to $20,500 to $21,600 per dwelling.

A similar study compared physical infrastructure costs for urban development on the fringe of Sydney (namely Erskine Park/St Clair and Rouse Hill) and urban consolidation of differing densities (ranging from 18, 25, 50 and 150 dwellings per net hectare) at Bankstown and Hurstville stations.[16]

Economic infrastructure costs of consolidation were found to be significantly lower than for fringe development. Connection costs per dwelling dominated urban consolidation infrastructure cost, but reduced substantially with the number of dwellings in the scheme. The only infrastructure that required augmentation in consolidation areas was telephone services at high densities and sewer at Bankstown where, because of local topography and the configuration of the sewer system, augmentation was required, even at densities as low as 25 dwellings per ha.

Again it was considered that stormwater drainage in urban consolidation areas could be handled by retention on site rather than augmentation of Council or Sydney Water systems.

Overall the study found significant economic infrastructure cost savings associated with urban consolidation vis-à-vis fringe development, with the magnitude of the cost saving sensitive to the lot size at the fringe and the density of consolidation options. The analysis excluded public transport and main roads infrastructure.

A study of the preferred pattern of urban development for south-east Queensland (SEQ2001, 1993) identified that its preferred more concentrated pattern of growth would make use of existing capacity in centrally located human and physical services. Compared to the projected trend pattern of development, the preferred more concentrated pattern of development was estimated to result in a cost saving in the order of $3,000M over a 20 year planning period in the basic capital works program for roads. Other estimated

16 *Department of Planning, Sydney Water Board, Department of Industry Technology and Development (1991) Urban Consolidation: Public Sector Savings.*

infrastructure cost savings of a more concentrated pattern of development in south-east Queensland was $54M in water supply headwork costs.

It should be noted that in NSW some physical infrastructure costs are recouped from developers while some are borne by the public purse. Nevertheless, all economic infrastructure costs are costs to the community and hence need to be included in the analysis. To avoid double counting of these costs, however, the component of above infrastructure costs borne by developers is omitted from the consideration of costs and benefits to developers.

4.2. Social infrastructure

In addition to physical infrastructure requirements associated with urban development there are costs associated with the provision of social infrastructure such as education, recreation, community health, policing etc. The capital cost of most social infrastructure does not get recouped from developers and hence is a separate economic cost that needs to be considered when comparing urban consolidation and greenfields development. The recurrent costs of social infrastructure are assumed to be the same for urban consolidation and fringe development and hence are ignored in most analyses.

Travers Morgan Pty Ltd and Applied Economics Pty Ltd (1991) identified that (for health and education services) fringe development would require additional capital expenditures relative to consolidation in middle ring suburbs where aging of the population has led to a decline in the need for existing level of medical/health and education facilities leading to spare capacity. Consolidation is therefore likely to contribute to greater viability for existing human service facilities in existing urban areas by making use of current spare capacity.

A study by Keys Young Consultants examined social infrastructure capacity and costs between case study areas representing inner/middle ring suburbs (Warringah, Land Cove, Hurstville, Bankstown) and fringe areas (St Clair/Erskine Park). The study found that in a number of circumstances developed areas of Sydney have under-utilised human services which may be less costly to make use of to support intensified residential development in the developed areas than to build and staff new facilities in peripheral areas in support of low-density fringe development. For instance there was found to be:

- excess permanent capacity of government primary schools in developed areas
- lesser but ample spare capacity in government high schools in all of the developed case study areas except Bankstown
- physical overcapacity of hospitals in developed areas
- full commitment of police resources in each case study area
- high utilisation of community development and support services in all case study areas
- some capacity in rail services apart from North Shore to the CBD in peak hour.

A case study by the ACT Government (cited by the Industry Commission 1992) examined the comparative costs of two options for accommodating growth:

- a greenfields option, which assumed that for five years development in Gungahlin would accommodate 2,500 households per year and infill and redevelopment would accommodate 500 households per year;
- a consolidation option, which assumed that for five years greenfields development would slow to 1,500 households per year and infill and redevelopment would increase to 1,500 per year.

The study concluded that with greater consolidation the ACT Government could defer over $58M in capital expenditure over five years and would save $6M in recurrent costs.

A number of other Australian studies that compared the costs of development at the fringe and urban consolidation have concluded that physical and/or social infrastructure costs savings would result from urban consolidation:

- Travers Morgan (1987) in a Melbourne study suggested costs savings of $29,000 per additional household (physical and social infrastructure);
- Neilson Associates (1987) in a Melbourne study suggested cost savings of $41,640 per household (physical and social infrastructure);
- Hughes Trueman Ludlow/Dwyer Leslie (1990) in a Sydney study suggested cost savings of $17,000 to $31,000 per lot for physical infrastructure;
- EPAC (1991), Adrian *et al* (1991), Kenworthy and Newman (1992) suggest cost savings of $40,000 to $50,000 per block;
- Hughes *et al* (1991) suggest cost savings of $17,000 to $31,000 per dwelling;
- Newman *et al.* (1992) suggest infrastructure savings of $53,000 per dwelling;
- Newman *et al* (1992) suggest road infrastructure costs of $20,700 to $27,000 per lot for Werribee, South East Growth Area and Plenty Valley Fringe Regions in Melbourne.

While social and physical infrastructure cost savings of urban consolidation have been indicated by many studies, a spatial analysis of social and economic infrastructure capacity across Sydney would be a necessary prerequisite for a broad-scale analysis of urban consolidation options for Sydney.

4.3. Net benefits to developers

Travers Morgan Pty Ltd, Applied Economics Pty Ltd (1991) also estimated that there might be potential gains in producer surplus (net revenue) to developers (net of new infrastructure costs referred to above) from urban consolidation policies. This study examined house prices, building costs and opportunity cost of land per dwelling for fringe development compared to inner/middle suburbs. For Sydney it was found that producer surplus per dwelling for urban consolidation in inner/middle ring suburbs was 20% to 50% higher than for fringe development.

As is the situation for physical and social infrastructure, this result is likely to be sensitive to location since where dwellings are relatively new or have not reached the end of their economic life, the opportunity cost of land may be too high to make urban consolidation financially viable for developers. A case-by-case assessment of different regions within Sydney would be required to identify those areas where it would be profitable for developers to undertake urban consolidation on a large scale.

There are signs from local and international sources that green developments can be more profitable as buyers may be willing to pay a green premium.

4.4. Public and private transport costs

The relationship between urban consolidation and transport costs/benefits is complex and hence most of the small case studies that have been referred to in this report have tended to ignore this issue. For instance, Department of Planning, Sydney Water Board, Department of Industry Technology and Development (1991) stated that a rigorous examination of infrastructure cost differences for public transport and main roads is not possible by a simple examination of test fringe and inner-area case studies. This is because journey-to-work patterns are dispersed, and cannot meaningfully be disaggregated for individual schemes and areas. Consequently, detailed analysis of these issues is best left to assessment of large-scale full options for Sydney's future development.

One such large-scale assessment was that published a decade ago in the RTA's *Road Transport Future Directions*. Three broad development scenarios for Sydney were evaluated from a transport perspective, in more detail than is presented here:

	2016 Current trends	2016 Planned	2016 Intervention
Population:			
Sydney	5.5 m	5.0 m	4.5 m
Wollongong/Newcastle	0.7 m	0.8 m	1.2 m
Rural NSW	2.3 m	2.7 m	2.8 m
Employment (m)	2.4 m	2.1 m	1.9 m
Travel demand (billion person-kms, all modes)	58	47	39
Road expansion (lane-kms)	473	1,438	356
Rail (million train-km)	34	33	31
Bus (million bus-km)	219	147	146
Peak trip length in Sydney	12.9 km	12.1 km	11.5 km
Delay (% of Travel)	15-43%	14-21%	12-13%
Public transport share	Does not change significantly but amount of travel increases		
CO2 emissions (mt/p.a., approx)	9 - 9.5	8.8 - 9.7	8.2 - 8.3
Road vehicle fuel (B l/p.a.)	8.1 - 8.4	8.1 - 8.3	7.9 - 8.0
Road deaths ('000)	750 - 790	780 - 800	750 - 760
Transport financial performance ($ b)	+ 1.7	+ 2.2	
Air quality	- 55%	- 17%	+ 12%

NOTES: The planned 2016 figures related to limited decentralisation, with growth centred on Macarthur South, South Creek, Rouse Hill and Warnervale. "Intervention" assumed a lower growth rate in Sydney, more elsewhere, plus various combinations of user pays (for water and sewerage especially) and decentralisation, and strong incentives for residents and employers to locate in the "new towns" (as in the previous option).

Pricing options (mixed in the scenarios) were "current pricing", current mix of general and user fee revenues; "road pricing", where demand management (not cost recovery) is the goal; and "real pricing" where prices are set to recover social costs and demand and supply-side approaches would be taken. In effect, bus fares were held at current level under all options, rail fares were doubled under "real" pricing, while distance-related charges were introduced at 4.7 cents/km under "road" and 10 cents/km under "real".

A similar analysis for continuation of the current trends and more urban consolidation across inner and middle ring suburbs would make a valuable contribution.

Despite the absence of a broad-scale assessment of the transport impacts of urban consolidation scenarios for Sydney, the Department of Planning *et al* (1991) study considered that transport efficiencies generally favour urban consolidation as it provides greater opportunities than fringe development for the use of existing or augmented public transport services. From a public transport perspective a more compact, better structured city is therefore preferable to a dispersed, less structured city. Most new fringe areas are remote from public transport or are poorly connected to employment centres and therefore have high car usage with associated issues of pollution, congestion, stress etc.

UITP (2002) has benchmarked major cities in the world for a range of indicators. This benchmarking indicates that Oceania cities (including Sydney and Melbourne) have the lowest urban densities in the world.

This UITP data confirmed the assertion that higher density cities may be better for public transport by showing that higher density cities have lower private passenger vehicle kms per person and higher public transport passenger kilometres per person. It also indicates that total

passenger kms (private passenger vehicle kms and public transport passenger kms) tended to decline in more dense cities.

This lower passenger kms in higher density cities may be associated with considerable travel time savings. This economic benefit is often costed by economists at between 25% and 100% of average wage levels, depending on whether time saved would have been used for recreation or work and the level of enjoyment that people derive from the travel. A comparison of travel time per person per year between low density United States and Australian cities and higher density European and Asian cities has been undertaken by Newman *et al* (1992).

The study of development patterns in south-east Queensland (Regional Planning Advisory Group (1993) suggested annual travel time-cost savings of $6,731M per annum from the preferred more concentrated growth pattern.

Overall, Newman *et al* (1991) found that the relative capital, operating and external costs of rail and buses to be considerably less per passenger km than the use of cars. The operating costs of public transport per passenger km also tended to decline in higher density cities while private transport operating costs per passenger km tended to remain above those for public transport in higher density cities (UITP). This indicates a relative transport cost saving associated with higher density cities.

The SEQ2001 review results were used by consultants to PlanningNSW in assessing some of the probable transport benefits arising from the improved planning arrangements implicit in effective regional structures under PlanFirst. The overall BCA ratio was estimated at 60:1 based on the following:

- more effective regional level settlement patterns savings in transport investment and running costs, reduced pollution and greenhouse gas emissions etc based on stronger regional centres and complementary transport and service infrastructure
- coordinated roll-out of infrastructure in releases and better utilisation of existing infrastructure
- improved place management by alleviating the risk of social exclusion, formation of district centres and clusters etc
- certainty and transparency in the development approval system.

The evaluation was dependent on accountability arrangements such as performance agreements with infrastructure agencies to ensure that anticipated benefits are delivered, and the like. The logic appears below together with the benefits scaled up from the SEQ basis:

- if the transport benefits … are scaled up to reflect relative population growth in the Sydney GMR versus SEQ, effective regional planning in the Sydney region could be expected to deliver the following benefits on a 20 year scenario;
- a reduction in warranted government road expenditure of the order of $3 billion by comparison to a 20 year scenario without effective regional planning;
- a reduction in daily vehicle travel of the order of 11 million kilometres per day in Year 20 compared to ineffective regional planning;
- a reduction in private vehicle operating costs of $1 billion per annum in Year 20 compared to ineffective regional planning;
- savings in travel time costs of some $3 billion per annum in Year 20 compared to ineffective regional planning; and
- reductions in emissions of some 8 tonnes per square kilometre per annum in Year 20 compared to ineffective regional planning.

4.5. Amenity and congestion effects

Travers Morgan Pty Ltd and Applied Economics Pty Ltd (1991) identified local impacts in amenity, traffic congestion or changes in service levels. As these broad changes are likely to be reflected in changes to house prices in a locality, albeit imperfectly, estimated changes in property values may be used as a measure of the total effects of developments on local households. Few studies have empirically examined these effects in relation to urban consolidation versus fringe development.

4.6. Environmental effects

Urban consolidation can also potentially lead to a number of environmental benefits compared to fringe development.

Vegetation and biodiversity

Much of the future potential development sites on the fringe of Sydney contain remnant native vegetation communities of the Cumberland Plain. This Cumberland Plain woodland is now considered to be among the most threatened in NSW and a priority for conservation.

The main potential benefits of growth strategies, such as greater urban consolidation, that minimise the impact on Cumberland Plain Woodland relate to:

- biodiversity conservation;
- catchment protection including controlling land and water degradation including salinity control;
- scenic amenity;
- recreation; and
- carbon sequestration.

These benefits can potentially be measured by how much the community would be willing to pay for them or to avoid negatively impacting them. While there are very few studies of community willingness to pay for vegetation conservation in an urban context, it is evident from studies in a rural context that community valuation of these benefits may be significant. Economic valuation studies of the community's willingness to pay for some of these benefits of native vegetation conservation, mainly in a rural context, include:

- $760 per ha with an additional $3.4M for every extra native plant and animal species conserved in the region;
- $7.36M per percentage increase in the area of a unique ecosystem conserved, with an additional willingness to pay of $22.8M per endangered species protected and an additional willingness to pay of $3.34M per % increase in the population size of non-threatened species;
- $148 per ha of land restored or protected from degradation with an additional willingness to pay of $170,000 per km of waterways restored or protected from degradation and $14M per endangered species protected;
- Between $5 and $25 per ML of permanent reduction in groundwater recharge in 'fast' aquifers with salinity of 5,000 mg/L and between $27 and $60 per ML permanent reduction in groundwater recharge in 'fast' aquifers with salinity of 10,000 mg/L;
- $6/t CO_2e for forest sequestration credits; and
- a 5.9% reduction in terrace house prices from a 1km increase in distance from a forest park and a 4.9% increase in terrace house price associated with a view onto forest.

Air pollution

There is also some evidence that higher density cities may be associated with fewer transport externalities, in the form of air pollution per capita, than less dense cities. UITP (2002) benchmarking indicated that transport emissions of CO_2, VHC and NOx tended to be higher for less dense cities than for higher density cities. The relationship was less obvious for SO_2 emissions.

Economists use a range of valuation methods to place values on the benefits of greenhouse gas (CO_2) reduction and reductions in air pollution. These methods include examining market data, the productivity approach, cost-of-illness method and stated preference techniques such as choice modelling and contingent valuation.

For greenhouse gas emissions it is possible to examine market data relating to carbon credits to estimate an indicative value for reducing carbon dioxide emissions. BDA Group and Gillespie Economics (2001) stated that it appears that the market is valuing carbon credits in the range of $4/t CO_2e to $10/t CO_2e, with forest sequestration credits probably at around $6/t. While there is no price information for non-forest sequestration credits from developed countries, it is likely that potential prices would be less than $1/t CO_2e.

With respect to air pollutants such as NOx, SO_2 and VHC, economists have generally used the cost of illness method to estimate the value of reducing emissions. The cost-of-illness method measures the physical linkage between pollution levels and incidence of mortality and morbidity and places a dollar figure on lost productivity, direct costs of medical treatment and care etc. However, the full measure of value is how much people are willing to pay to reduce adverse health effects or risks. Willingness to pay goes beyond cost-of-illness estimates to also include concerns about discomfort, pain and lost ability to engage in non-work activities.

Most studies relating to vehicle related air pollution tend to focus on vehicle sourced ozone and particulates, however there have been a number of studies relating to NOx, SO_2 and VHC.

Spitzer (1997) suggested that in the USA there would be a 4% to 13% reduction in annual incidence of cancer from the use of reformulated gasoline and oxyfuel containing the additive MTBE which reduced VOC emissions from vehicles.

Zkaynak and Thurston (1987) suggested that an increase in ambient concentration of sulphates of 1% is associated with an increase of 0.086% in total mortality in the USA.

Voorhees, Araki, Sakai and Sato (2000) estimated that there had been substantial avoided medical costs and avoided productivity losses in Tokyo, Japan, from the adoption of past NO2 control policies.

4.7. Overseas perspectives

There have been a number of examples where overseas reviews have assessed several or all of the above parameters.

The Urban Land Institute in America argued in *Environment and Development, Myth and Fact* (2002) that compact development can minimise impervious services and direct growth away from environmentally sensitive areas. It gave many examples in support of its logic, one of which follows:

> The Greater Wasatch region of northern Utah is facing a population growth rate of more than twice the national average with a very limited supply of developable land. Envision Utah, a non-profit partnership of state and local government officials, business leaders, developers, conservationists and landowners, developed four alternative growth scenarios for the next 20 to 50 years for community consultation purposes. The preferred scenario, the Quality Growth Strategy (QGS), emphasises infill development and better patterns of new growth on the urban fringe, with reduced emphasis on roads and more investment in transit.
>
> The modelling of the QGS predicts that more infill development and a reduction of lot sizes from 0.35 of an acre to 0.29 of an acre could lower per capita water consumption from 298 gallons per day to 267 gallons. Under this growth scenario, total vehicle miles travelled would be reduced by 2.4 million per day, average speeds could increase by 12.5 percent, and commute times could increase by 5.2 percent. The reductions in traffic congestion and automobile use would, in turn, lower mobile source pollutants by 7.3 percent.

The ULI gave three examples of significant "concentrated developments" all involving community-based planning with various ‘savings’ identified:

> Atlantic Station, Georgia – the former steelworks was redeveloped for mixed use development with 3,000 to 4,000 residential units, about 2 million square feet of commercial and entertainment space, 3 hotels and 7 million feet of commercial space. This will be linked with mass transit, cycling and pedestrian networks, reducing VKTs by 15 to 52% and nitrous oxide emissions by 37 to 81%.
>
> Reston Town Centre, Virginia – a pedestrian-oriented mixed-use town centre which sees 70% of the evening patronage of restaurants and 40% of total cinema attendance come from within the centre, generating nearly 50% less car traffic than CBDs of a comparable size taken with associated factors.
>
> San Mateo, California – the City and County Association launched a density incentive

> scheme in 1999, allocating State Transport Improvement Program funds of $2,000 per bedroom built where residential projects where projects have a minimum density of 40 units per acre and are within one-third of a mile of a train station. The participating municipalities pass these requirements and incentives on – to be paid only after projects are completed to the required standard. (pp 6-20)

The ULI has pursued practical ways of achieving effective reform. It has argued that suburban large-lot residential development often is both ecologically and financially inefficient; for example Prince William County in Virginia found that providing municipal services to a house on a large lot cost the County $1,600 more than is returned in taxes and other revenues. The State of Rhode Island found it would save $142 million in sewer infrastructure costs if development were more dense and continuous to existing development.

The ULI has also argued that affordable housing depends on the provision of more high-density development, for example in one Los Angeles community where there is a housing deficit of about 30,000 units per year, one project based on mixed use and providing 13,000 housing units at about 43 units per acre, with 25% preserved for low and moderate income renters and buyers, delivered quality housing with nature conservation and a sustainable transit pattern.

In 1992 New Jersey passed a plan to reduce sprawl on a state-wide basis as Oregon had done with its Urban Growth Boundaries. This was advisory only. A Rutgers University study concluded that $1.3 billion could be saved in infrastructure and $400 million in annual operating expenses.

In 1995 the American Farmland Trust focused on the costs of sprawl in California's Central Valley. The region would lose 1 million acres of productive farmland by 2040 if current patterns (3 homes per acre) continue, but if density doubled the agricultural economy would 'benefit' to about $70 billion and public infrastructure costs would be $29 billion lower.

A Rutgers University study of a New Jersey plan to reduce sprawl on a state-wide basis concluded that $1.3 billion could be saved in infrastructure capital costs and $400M in annual operating expenses. Similarly, the State of Rhode Island has found that it would save $142 million in sewer infrastructure costs if development were more dense and continuous to existing development.

5 Urban Visions

There have been many calls for reform and new visions promoted by the community, business and government. With or without urban consolidation, there is an urgent need to move Sydney in the direction of sustainability. However many planners and environmental groups believe urban consolidation is a tool to be used in achieving sustainability – so long as the community finds ways of using that tool in a way that are *acceptable, adaptable* and *affordable*.

5.1. A selection of visions

Planners

From both economic and environmental perspectives, employment distribution is a critical long-term factor. As the doyen of city planning in Australia, Max Neutze, wrote in 1995:

> My own view of an efficient big metropolitan area is one in which employment is located in nodes throughout the urban area so that it is relatively close to where most people live. I think that's the way that Australian cities and cities throughout the world are developing. It is the way in which I think efficient investment in urban infrastructure will move cities, and I think it is a way in which efficient pricing of infrastructure services will also tend to push them.[17]

Several years ago a group of professionals, the NSW leaders of the Building Designers Association, formulated a civic leadership process[18]:

> *2001 an Urban Odyssey* started as the brainchild of some building designers caught between the commercial forces of urban redevelopment, and communities who were fighting for the status quo. These commercial forces are the ones Paul Keating espoused as the necessary catalyst to allow sustainability to occur in urban redevelopment (*Sustainable Sydney Conference*, November 2001).
>
> Typically there would be a developer client who wanted to maximise the returns on investment, urging the designer to push the design right up to the boundaries of the local planning codes. The LEP or DCP would be adhered to exactly, for the designer knows that to exceed the numerical controls will result in certain rejection of the DA, and little chance of winning a Land & Environment Court appeal. In spite of this, many DAs were being refused, often for confusing and conflicting reasons. This caused frustration with the uncertainties inherent in the process, which led to the general question put to councillors in such cases: "Well, what do you want?"
>
> This vexed question has been tossed around for years amongst concerned professionals, including members of the Building Designers Association of NSW. It is one of the manifestations of nimbyism. They saw that some change from the "1/4 acre block" mentality was essential if Sydney was to become more sustainable and grow at the same time, yet understood the concerns of communities who had had change foist upon them.
>
> The missing ingredients were the understanding by the communities of the need for change, the lack of sensitivity on the part of the developers, and the widely held perception that the State Government through its planning arm (then DUAP) was running roughshod over the needs and feelings of local communities.
>
> Some organisations were quick to see the potential of the idea, and quickly the BDA was joined by the Housing Industry Association, Master Builders Association, Royal Australian Planning Institute, and the Society for Responsible Design.

The principles they addressed were:

PEOPLE FEEL DISENFRANCHISED

Many people in the community feel that government at all levels doesn't care about their needs and desires, and at the same time are distrustful of the development industry which is seen as purely profit driven, with no regard for community amenity etc.

17 *Investing in Infrastructure (AURDR Workshop Paper #5 1994) p37*
18 *Notes provided by Dick Clarke, BDA.*

LONG TERM ISSUES

We know that this crisis has not arrived overnight - it has been brewing for generations, and its effects will not be seen overnight. Likewise any solutions will not be discovered overnight.

IMPERATIVE TO FIND SOLUTIONS - NOT MAKEOVERS

But failure to address the problems as a whole will result in dramatic and irreversible changes to the region's ecology, economy and social structure. Quality of life will be the victim, as transport clogs the roads and its exhaust gases clog the air; as the waterways silt up and aquatic life disappears; as social structures fracture and community disintegrates; as economic stability is threatened and wealth tumbles.

This is not about aesthetics, it's about long term survival and sustainability.

PROGRAM TO AIR THE ISSUES

The proposed program *2001: An Urban Odyssey* is a very real and viable attempt to unravel the issues for all to see and understand. It is intended to be down to earth, practical, accessible, and above all effective! It will be funded largely through corporate sponsorship and (hopefully) cooperative effort with DUAP.

LET THE GRIPES BE HEARD

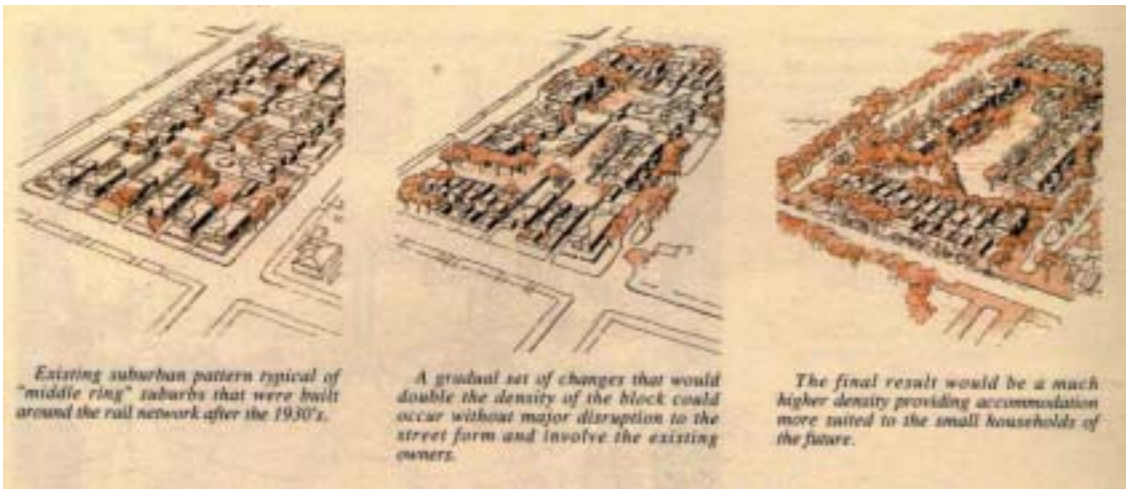
It is intended to be seen by the wider community as an impartial means of letting all sides in the debate have their say. Currently there are many private individuals who feel that they are run roughshod by developers, councils and government, and who have formed well organised and effective - but reactionary - lobby groups. Development of any kind is portrayed as unwelcome and unnecessary.

PUT THE OTHER VIEWPOINT

Because the program is a two way street of information - consultative and educative at the same time - the case for sensible development in the context of increasingly compact cities can be put in a non-threatening way which can be understood and appreciated by the wider community.

Environmentalists

In its report *Strategy for a Sustainable Sydney* (1993), Greenpeace showed how a traditional Sydney suburb could meet demographic changes gently and democratically as shown in the following graphics:



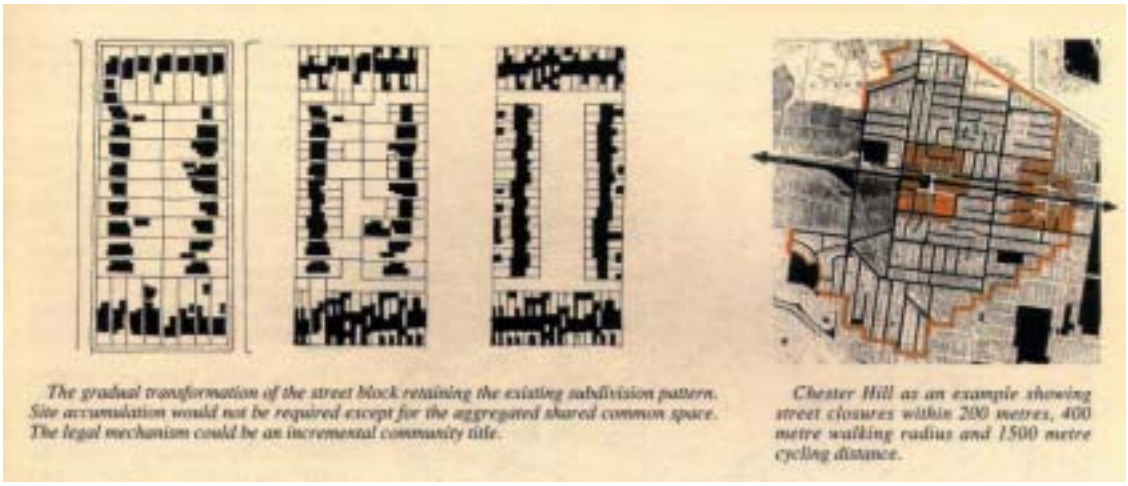
Existing suburban pattern typical of "middle ring" suburbs that were built around the rail network after the 1930's.

A gradual set of changes that would double the density of the block could occur without major disruption to the street form and involve the existing owners.

The final result would be a much higher density providing accommodation more suited to the small households of the future.

Such a transformation is superior to site-by-site incursions of medium density developments – but it is but one option. It could only be achieved through cooperation of all parties, civic leadership and place management.

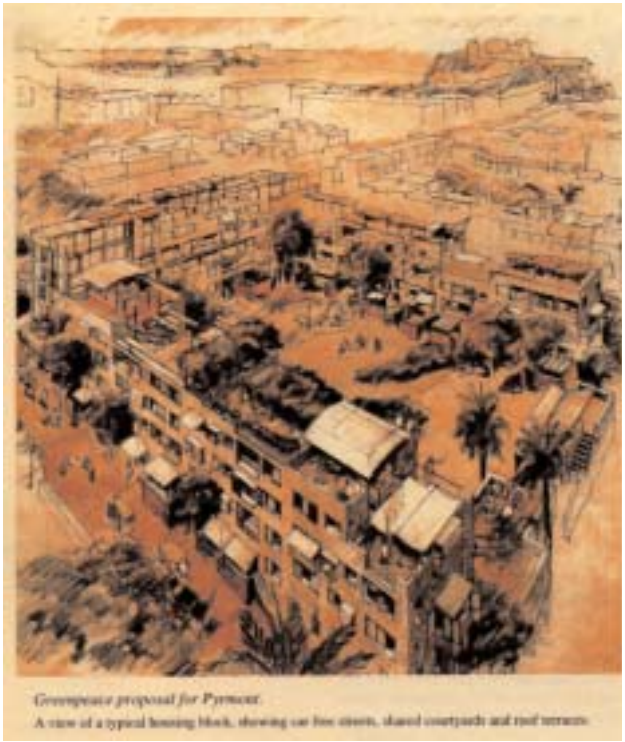
Greenpeace's vision reflected the full implementation of new urbanism. Often this concept is taken to refer only to 'transit villages' such as has been proposed for Green Square and is seen imperfectly in Bondi Junction. Communities as developers will turn transit nodes into high-value urban centres if given incentives, awareness and advice. In reality, it should apply to all suburbs through a civic leadership process and community awareness and incentives.



The gradual transformation of the street block retaining the existing subdivision pattern. Site accumulation would not be required except for the aggregated shared common space. The legal mechanism could be an incremental community title.

Chester Hill as an example showing street closures within 200 metres, 400 metre walking radius and 1500 metre cycling distance.

Greenpeace saw a suburban transformation as producing – which can be compared with the site-by-site infiltration of villas and townhouses into suburbs nowadays. What they proposed for Pyrmont could be reality in 10 to 20 years around 80 or more Sydney suburban rail stations, under a sophisticated planning arrangement for Sydney:



Greenpeace proposal for Pyrmont.
A view of a typical housing block, showing car free streets, shared courtyards and roof terraces

In 1999 Total Environment Centre issued *Greenprint for Sydney, an environmental strategy for the 21st century,* to promote a sustainable city; Sydney is in an environmental crisis. The basic ecological services of clean air and water are failing. Consumption of natural resources causes environmental damage far beyond the city boundaries. And there is great inequity in access to high quality environmental assets by Sydney's citizens.

In the next century Sydney must come to grips with these problems. There is little doubt that a city which operates a clean and green infrastructure, with its citizens minimising pollution and waste, will prosper socially and economically. This is what the people of Sydney want, but for many years the tools available to government and industry have not been effectively utilised.

In order for Sydney to become an environmentally sustainable city, political and corporate governance must improve. This *Greenprint for Sydney* espouses practical solutions and addresses the critical issue of implementation by government and industry. There is very little one person can do to change the major institutions that deliver basic infrastructure like clean air and water, transport and waste services—action is required from all stakeholders.

Sydney has the financial, intellectual and political capital to change its ways. But they need to be mobilised. It would be fanciful for government to rely solely on voluntary means—the job of government is to protect its citizens and improve their quality of life. And while some parts of society may already be taking initiatives, the environmental crisis can't wait for everyone to act at their leisure.

> In the past, new laws, regulations and codes have been positively received by the broad community. A government that legislates to make decisions more responsive to environmental concerns, and establishes legally binding targets with accountability systems for environmental improvement, is a popular government. It will be seen to be taking action for the social good, rather than giving market forces free reign.
>
> Of course there is an important partnership component—business, industry, the community and government must work together to put new systems in place. We live in a democracy, and consultation and participation are crucial to social cohesion and sustained momentum.[19]

The TEC report outlined strategies from key activists, including the development of social capital (i.e. effective community participation), urban water cycle management, bushland protection, waste management, green energy and new public transport corridors and policy making systems.

The Sydney 2000 Olympics were seen as a test case for ecologically sustainable urban development and event management. Sydney's bid to host the 2000 Games proposed that the environment should be seen as central to Olympic activity, including specific environmental guidelines which committed Sydney to hosting the so-called 'Green Games'.

If this improved level of environmental performance, however, were only to be applied to the Olympic developments themselves, the benefits and long-term legacy to Sydney, NSW and Australia would be very limited. As the State Minister for the Olympics said in 1996:

> All this effort is not just focused on a seventeen day event. While the Olympic Games gives us the focus to do something positive, with good management and planning the new environmental applications that are developed and implemented will have practical applications for all future developments. We are working to ensure that any future development - whether it be for housing, industrial or recreational - will have to comply with these new benchmarks.[20]

Green Games Watch 2000, a coalition of major Australian and NSW environment groups, sought to identify ways in which sound environmental practices used for the Games could be disseminated more widely into the community. They pointed to:

- a 'once-in-a-lifetime' opportunity for Australian industry to showcase its expertise on a world stage;
- a strong image for Australia as an environmentally attractive destination for tourism;
- an opportunity for the State Government to demonstrate its commitment to environmental protection; and
- a chance for the community to define and visualise the shape of its future development, within a framework of sustainability.

and

> Past development practices have already had considerable impact on Sydney's environment, resulting in a high level of concern that our current city and life-styles are unsustainable. Future development has the potential either to increase adverse impacts, if we continue with 'business as usual' - or to repair and ameliorate past damage, if the community moves towards an ESD approach. Sydney's population, moreover, is still growing - shortly expected to pass four million and possibly reaching 4.5 million by around 2010 - and such a growth would also increase pressure on the environment unless an ESD approach is adopted. The largest part of the growth is expected in western Sydney, particularly in the local government areas of Blacktown, Fairfield, Holroyd, Liverpool, Parramatta and Penrith.[21]

Government

In early October 2002 the Victorian Government announced a "new blueprint" for urban growth given an expected population increase of one

19 *TEC (1999), p7*

20 *Michael Knight, Minister for the Olympics, speech at the 1996 Lillehammer Forum on Sport, Environment and Development, Lillehammer, Norway*

21 *Myer, Andrew (1997), Raising Environmental Benchmarks in the Olympic City, Green Games Watch 2000 p3. See the website - www.nccnsw.org.au/member/ggw - for more information on benchmarks.*

million by 2030 (620,000 dwellings). The essence was:

> Growth on Melbourne's suburban fringe will be encouraged principally in areas with existing railway connections ... Amid predictions that the city will gain one million residents by 2030, the government is set to define new growth areas and establish "smart growth committees" to help manage them.
>
> Under the plan, outer suburban regions such as Werribee, Hume, Epping, Pakenham and Cranbourne will become designated growth areas in a bid to encourage new residential development in regions best served by existing railway lines ...
>
> "Smart growth" committees - made up of state, local government and industry representatives – would manage the release of land in each growth region over the next few years, to ensure that there was a sufficient supply to meet housing demand. The committees would also consider the rate and density of residential housing, look at ways to roll out the necessary transport and local infrastructure, and develop employment opportunities in each area.
>
> Under the strategy, the government will outline ways to curb urban sprawl, cope with population growth, and monitor land availability to prevent a lack of housing supply, which would create higher house prices.

Finally, a vision for a sustainable Sydney is beginning to emerge from the NSW Government and its planning agency (PlanningNSW) with the establishment of the Sustainability Advisory Council and Sustainability Unit. The agency has held two Sustainable Sydney Conferences (following on from the 1999 TEC Greenprint for Sydney Conference) which have attracted several hundred professionals, community, local and state government attendees, demonstrating a strong level of interest in sustainable outcomes.

The Advisory Council comprises senior representatives from business, government and the community. It is undertaking a number of crucial studies into urban sustainability including overcoming barriers in the financial and industry areas. The major project is the Building Sustainability Index (BASIX) which covers a range of categories in all building types, including site use, energy, water, waste, transport, materials, indoor environment and social.

In the words of the Planning Minister, Andrew Refshauge to the 2001 Conference:

> We want to increase urban density, for a better city. We'll work with councils across the metropolitan area, we'll put in place residential strategies for a more compact and more sustainable city. Imaginative sensitive planning of higher densities shapes a more compact and more efficient and more liveable urban environment. and it also satisfies the needs of our changing society. Busy contemporary lifestyles, smaller average family sizes, more older people in our community: all demand that we deliver more housing choice.
>
> We don't need or want flats in every street. In fact, the leafy suburb will always be the hallmark of Sydney, even under our plans of 70% of new houses in the existing footprint of Sydney, and 30% on the greenfield sites on the edge. Even in 25 years, 60% of the housing in Sydney will continue to be the traditional detached family home. But with more than half of our households now becoming just one or two people, we need to make sure that we do provide that housing choice. We don't want to push our kids ever further beyond the metropolitan fringe because they can't afford to live in Sydney, near transport, near family and friends. I don't want Sydney to become a sprawl into Goulburn, to Cessnock, and Lithgow, under a Los Angeles-style over-development. We condemn our children to long transport hauls that undermine their capacity to participate in Sydney and become active in life.
>
> ... unremitting urban sprawl has a powerful unnerving capacity to fracture neighbourhoods, to disenfranchise people. We have all of the means at our collective disposal to create a sustainable Sydney. We have to broaden the definition of sustainability to embrace social, as well as physical, environmental and economic, preoccupations.
>
> I think there's a message that in fact I got from a U.S. car advertisement, that was done to portray the glamour and speed of a sports car. And I think it really has a potent message for us here. And that ad said "Careful. You may run out of planet."

6 Community and Planning

In an effort to better explain compact metropolitan development the term ‘smart growth’ was devised. It is a term that originated in the U.S. and has been adopted in Australia, by Liverpool City Council among others and by the Victorian Government as quoted in the previous chapter.

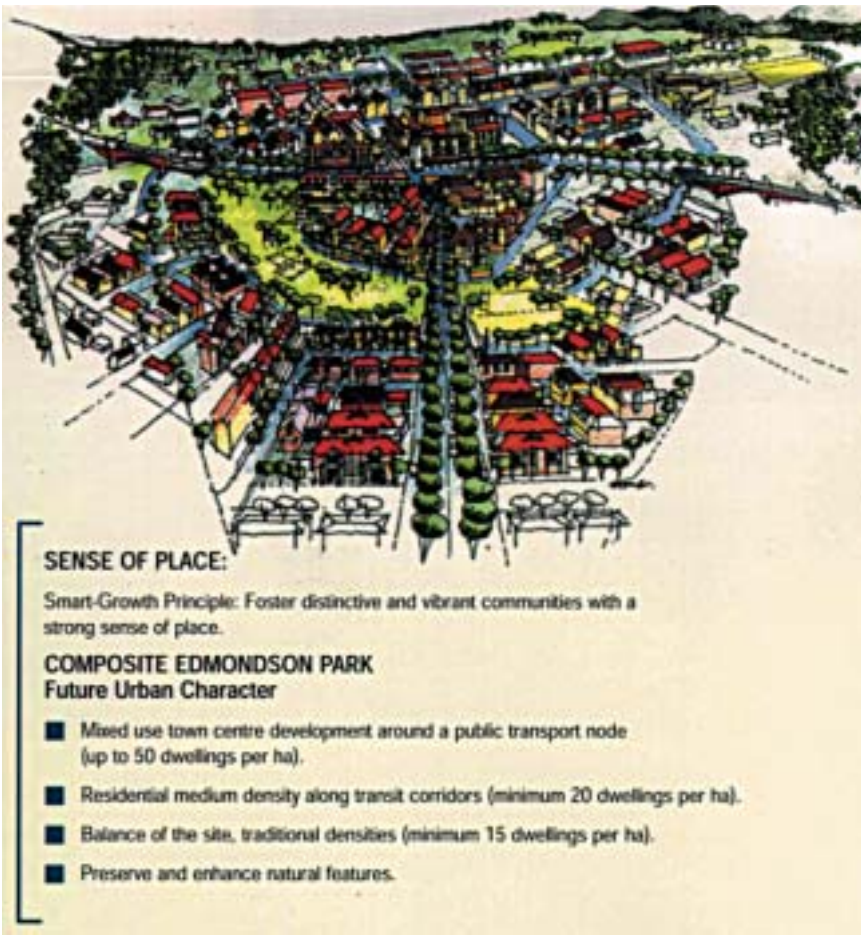
The Fannie Mae Foundation describes the history succinctly with an eye to affordability (note that ‘good practice’ in urban consolidation is emphasised)[22]:

> As a response to unchecked suburban development in the postwar era, local governments initiated "growth control" and "growth management" plans to reduce the negative impacts. These strategies, which became common beginning in the 1970s, typically involved growth controls such as slowing or stopping growth in communities through strict development regulations, impact fees, growth boundaries, permit limitations, or other controls. The primary purpose was to limit the impact of development on environmentally sensitive or rural areas and to improve the government's ability to fund and manage the provision of infrastructure in newly developing areas.
>
> An unintended consequence of these policies was the upward pressure on housing prices throughout the region. While documenting the relationship between growth controls and prices is difficult, there is some evidence that policies that implement restrictions on growth without simultaneously encouraging higher-density development in appropriate built-up areas can increase the cost of land and housing.
>
> Smart growth—a term coined in the 1990s—takes growth management one step further by not only restricting sprawling development at the fringe through more compact development, but also encouraging reinvestment and infill development within existing urban areas. In the beginning, the most active proponents of smart growth were environmental activists and no-growth advocates carrying on the legacy of growth management. In most parts of the country, these groups still lead the movement. For this reason, typical strategies focus on protecting open space, curbing sprawl, and improving regional transportation.
>
> The issue of affordable housing has been mostly absent from the discussion until recently. In fact, many places implement "downzoning," or lower-density development, in direct contradiction to goals of greater housing affordability. Smart growth policies that include a greater emphasis on infill development combined with affordable housing are more likely to prevent displacement of low-income and minority households.
>
> ... Fannie Mae Foundation uses the term "fair growth" to refer to strategies for curbing urban sprawl without endangering housing affordability and access to jobs for minorities and low-income residents. A fundamental component of fair growth is a housing policy that improves access to affordable alternatives throughout a metropolitan area. Several strategies aimed explicitly at housing have been implemented in coordination with smart growth policies to prevent negative impacts on the poor.
>
> Creative design can have a major impact on market acceptability of high-density housing, but many local zoning ordinances set up barriers to such innovations as mixed uses, clustering around transit, rear driveways, accessory ("mother-in-law") apartments, and pedestrian-friendly subdivisions. The New Urbanist movement advocates the use of "old-town" features in the development of new suburban areas, and provides guidance on how to encourage it.

22 *See http://www.KnowledgePlex.org/fmfportal/hottopics*

6.1 Some examples

Liverpool City Council has illustrated smart growth in the following manner[23]:



Parramatta City Council's redevelopment of its civic precinct (see graphic over page) has a similar orientation[24]:

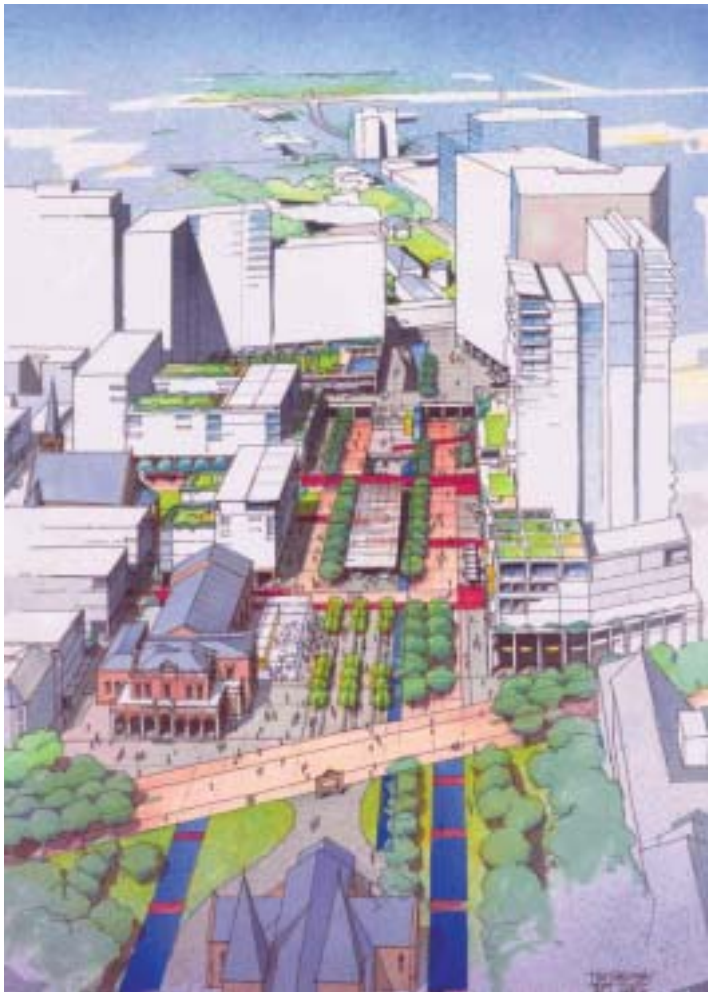
> The Masterplan covers Civic Place, the new Parramatta Transport Interchange and the Headquarters for the NSW Police Service, currently under construction on Charles Street.
>
> As envisaged, Civic Place will:
>
> - open up more than 6,000 square metres of public space
> - develop more than 65,000 square metres of government and private office space
> - incorporate approximately 35,000 square metres of new retail space
> - provide 1,500 underground car parking spaces for city shoppers
> - create an area full of activity and life by including more than 600 residential apartments
> - link the new public transport rail/bus interchange to the city centre
> - rebuild the central library, council offices and other public facilities
> - generate nearly 4,800 jobs and act as a catalyst for further investment and employment.

23 Taken from Smart-Growth wall chart issued by Liverpool City Council.
24 See www.parracity.nsw.gov.au

The transport hub will:

- upgrade the existing railway station to cater for a substantial increase in morning peak passenger movements
- cater for up to 330 bus movements per morning peak hour by 2021
- strengthen pedestrian connections across the city
- improve pedestrian safety through increased street life, better lighting and visibility.

The combination of good design at a precinct, building, public place and catchment level could show Sydney that urban consolidation is not to be feared if it is done well. However, there is still a need to integrate and involve the community in planning that allows a better expression of views and participation in solutions.



6.2 Place management and democracy

Government, planners and the community have sought better ways of planning in recent years, and one of the best ways to improve consultation processes and outcomes is through 'place management'.

Recapitalising Australia's Cities, a report prepared by The Allen Consulting Group for the Property Council of Australia (May 2002, pp7-14), reviewed international best practice and pointed out:

> The continued rapid expansion of cities in Australia threatens to further deplete our essential, non-reproducible environmental capital. Enhancing sustainability is strongly linked to the socio-economic aspects of cities.
>
> More sustainable use of environmental capital often hinges on changing the way that cities are structured. That is, where people live, work and rest. It is also apparent that making progress towards more sustainable cities requires shared responsibility for action. Cooperation and partnership between levels of government, the private sector and community groups are crucial.

New approaches are also emerging in Australia that focus on broader approaches to governance. For example:

- Top down cooperation: The development of National Competition Policy (NCP) provides a strong example of intergovernmental cooperation in Australia and an approach with a different governance structure. While clearly cooperative, the vision and the money flow downwards in the NCP strategy. It can be characterised as top down cooperation.
- Bottom up cooperation: The National Action Plan for Salinity and Water Quality (NAP) is another example of new governance approaches to advance strategic change involving different levels of government. While momentum for change was driven as a Commonwealth initiative and with an initial Commonwealth funding offer, the NAP has a strong bottom up orientation. Plans are to be constructed at the catchment

level involving catchment authorities which draw upon the expertise of farmers, environmental scientists and the community.

It is important to establish guiding principles for actions to promote consistency and coherence towards a national vision. Suggested principles to guide action to address the changes include:

- Subsidiarity — provides for decision making at the lowest appropriate level.
- Integration — Many of the characteristic problems of urban areas are multidimensional and can be traced to a lack of integration amongst public sector activities, between different levels of government and between various policy sectors.
- Partnership — this is needed because complex urban problems cannot be solved by single government bodies or agencies alone.
- Environmental sustainability — involves a precautionary approach and the efficient use of natural resources and minimising waste and pollution. Actions and policies have to be reconciled with their implications for environmental systems.
- Equity — actions and policies taken in cities must be designed to promote equity and equal opportunity.
- Economic efficiency — reflects a wish to strengthen the economic potential of urban areas.

The need for community-based planning was emphasised in the Premier's Department' *Future Directions in the NSW Public Sector* (1998). Similar community-based thrusts are being pursued through the Rebuild America Coalition and State-based initiatives such as California's Metropolitan Forum Project ('reviving citizen civic engagement').

Effective decision making for our city's future, the design of projects and suburbs, the relocation of residences and employment into centres, and community awareness and education depend on such principles.

6.3 Turning principles into action

The principles outlined above can be implemented through three levels of action.

The first is **OUTCOME BASED MANAGEMENT** that can be used - for example by Councils and with the support of PlanningNSW - so that planning instruments, planning applications and operational teams all work to the same drumbeat. This will involve restructuring of operational structures and budget plans - as in Fairfield City Council and in Warringah's LEP 2000.

Community-driven visions are incorporated – in the words of one of its architects, John Mant:

> If redevelopment at higher densities is being sought, place management and place formatted development controls can assist to ensure a reasonable degree of contextual fitting-in.
>
> One of the problems with traditional zone-based controls is the application of standard controls over a wide number of places. This is convenient for the producers of standard urban products such as the old Schedule 7 three storey walk ups or the display house. It is often not welcomed where there is a community that cares about the qualities of the neighbourhood.
>
> With a place formatted system the Desired Future Character Statement is the linchpin of the system. It is the primary connection to the strategic planning process for the place. The place-based format allows for the ready integration of all the controls applying to a place in the one part of a document.
>
> The strategic plan for the place should have as its vision something that will look very like the DFC. The provisions of the strategic plan, of course, are about much more than development control. A Strategic Plan is about the positive actions that need to be taken by a range of people if the Vision is to be achieved, as well as what development controls should be imposed. This is where the Place Manager comes in. The Place Manager's task is to do whatever he or she can to achieve the vision for the place.

A place is the product of positive actions by a place manager and the application of place formatted controls designed to assist in achieving the DFC for the place.

Involving others in DFC drafting:

The drafting of a DFC or a Vision is an excellent exercise in which to involve the community. The more one can use stakeholder words the more ownership there will be.

The community is likely to have a conservative approach to the wording of a DFC, given that most persons do not welcome change. And, in any event, for most areas substantial change is not going to occur. The problem is handling marginal changes in a manner that protects what is good about a place.

It is important therefore for the ground rules to be clear. If policy requires substantial change (that is, significant increases in density) then this should be clear from the beginning. It is similar to organisational change. In the end staff need to know the direction for the organisation; they can then sit down and work out how best to achieve it.

So too with the community. If a higher level of government has regional objectives that require change in a particular locality, and has clearly demonstrated it is prepared to wear the political costs, then it should state what objectives are to be achieved. The community can then work out how to achieve those objectives with the least pain, and maybe some gain.

The experience is that most community groups revel in the task of drafting DFCs. These are meaningful exercises, the purpose of which is easily explained. They are about drafting the future of one's own locality rather than commenting on abstract terms drafted by experts.[25]

DFCs of course, need to be benchmarked against broader metropolitan goals, not just local outcomes.

Associated with the debate about appropriate zoning is the push by some for flexible place-based planning. One of Australia's leading urban economists, Marcus Spiller, is firmly in favour of flexibility, as a way of increasing the amount of medium-density and affording greater choice[26]:

> I must take issue with the view expressed ... that ResCode should direct higher density housing forms to 'the right places' rather than allowing such development to occur in any residential zone (*ResCode - The Promise and the Practice*, PN August 2000).
>
> Call me old fashioned but I believe the best people to judge the 'right place' to live are individual households rather than some directive planning system. I would agree absolutely that these private choices should be made with full responsibility to meet the external costs (pollution, congestion etc) as well as the private costs involved (land plus construction plus the developers margin for profit and risk). We planners should be thinking about innovative ways of confronting households with the cost of these externalities, rather than coming up with arbitrary and prescriptive systems which tell them where and how they should live.
>
> A major flaw in [the] argument is that a medium density unit in a suburban location 'remote' from fixed rail public transport or an activity centre is a perfect substitute for such a unit located close to these facilities. These markets can be quite different from each other. There are plenty of households who want to be away from the action of activity centres and simply desire to continue their quiet suburban life in a much more compact home.
>
> ... I don't want my view to be misconstrued as suggesting that private choices should prevail over public benefit. On the contrary, those people choosing the unit in a quiet suburban location are operating in a different environmental context and it is reasonable that the planning system should place additional demands on development proponents consistent with these differing environmental values.

On the other hand, there is a strong community demand for certainty in zoning and protection of environmental assets. There is a deep suspicion that flexible arrangements are too open to

25 *Personal communication from John Mant*
26 *Planning News (Journal of the Royal Australian Planning Institute - Victorian Division), September 2000*

abuse, especially in the absence of resources for communities to argue their case through the development assessment process.

The second is through PlanningNSW's **PLANFIRST** program which is progressively being implemented (it has a reported benefit-cost ratio of 60:1 based on producing improved land use patterns and development control systems). This includes a cascading of regional and local plans and new regional research into environmental, social and development needs. There will be one planning instrument per region, one per council, and 'Living Community' centres to provide an interface between local communities and the State and better regional planning.

PlanningNSW houses the Resource and Conservation Assessment Council and its activity is a guide to improving community consultation. The Council includes government and non-government stakeholders and oversees original research into a region in a fashion that involves non-government parties in the development of research briefs, management of the project and review of drafts. In addition funds are provided for each sector's own research and development of options. Special sessions are arranged so that community representatives can interrogate the research and government agencies. Such measures should be included in the PlanFirst rollout as they can significantly enhance community capacity.

Finally, the extension of **INDEPENDENT HEARING AND ASSESSMENT PANELS (IHAPS)** would be a useful step. SEPP 65 now provides a formal mechanism for Councils to set up Design Review Panels comprised of experts. The model should also include community representatives and be expanded to a range of development matters. They prepare recommendations to Councils (which retain approval powers).

Geraldine O'Brien reported in *The Sydney Morning Herald* (13/10/2002):

> The Green Square area of South Sydney – old Waterloo, Rosebery, Zetland and Alexandria – may be one spot where Sydney is getting medium-density development right. … a design review panel chaired by the Government Architect, Chris Johnson, vets all major development schemes before they are submitted … This makes it easier to modify proposals to achieve the best results.

Councillors are generally not well-qualified to assess the aesthetic aspects of proposed buildings or their various environmental impacts and can benefit from expert independent advice. Sometimes there is too close a relationship between developers, staff and Councillors. Some Councillors are on record as rejecting the concept with the claim that it would reduce democracy, but as long as they retain approval powers, local communities can be better served by use of IHAPs.

Conclusion

The current planning system is opaque to Sydney's citizens. Land-use planning instruments are technical and rarely if ever sighted by residents; journalists from local newspapers depend on the press releases from Councillors and dissident groups for their stories; and Council notifications to affected neighbours contain technical drawings rather than streetscape impressions and impact statements (real traffic, drainage, security, noise and other impacts). There is great scope for improvement.

Better practice will produce greater community acceptance of the changing urban character as Sydney moves through its ongoing transitions. Current arrangements mean that local plans and the way that DAs are treated can defeat the intentions of planners who are seeking positive and sustainable outcomes for Sydney.

If Sydney is to be sustainable, the State Government and its agencies, Councils and local communities need to focus on a planning process that achieves better outcomes on the ground – instead of highlighting medium-density suburban failures. Sydney will continue to be more concentrated - how to make that a successful process is the challenge.

7 Strategies for Sustainability

In order to achieve sustainability, a complex system of aspirations, economic forces and governance arrangements will require effective deployment over several decades. It will be necessary to not only improve the context of new development but to retrofit existing urban areas and patterns. The following are proposed for consideration (and as indicated in previous chapters involve urban consolidation and densities of various scales). It is a vigorous agenda but that is exactly what Sydney's future generations need from us.

The key areas for action addressed here are:

- Centres
- Public transport
- Fringe developments
- Building sustainability
- Incentives and penalties.

7.1 Centres planning

The existing Centres strategy is established through the State government's overall *Metropolitan Strategy Shaping Our Cities*, with support from key policies such as the *Integrating Land Use and Transport* package, as well as specific place interventions such the involvement of the Government Architect at Hurstville and elsewhere; the Minister's calling-in of specific areas and projects and several transport projects. Centres are a core component of urban sustainability strategies.

Officially there are four major regional centres but there are potentially many others performing different roles at different scales. Most shopping centres; railway stations and other nodal points; and urban infill sites are targets under a proactive urban consolidation strategy with matched transport and other public sector strategies. PlanningNSW is proceeding to integrate accessibility – making any nodal point a centre, in recognition that remote suburban shopping malls and other isolated traffic generating activities have adverse urban outcomes such as the promotion of car usage and undermining the long-term viability and use of public transport.

It is recognised that there is a community and environmental cost of dispersed commercial activity. Community facilities including transport infrastructure and shopping convenience should not be placed in jeopardy by decisions in favour of new isolated retail (or other trip-generating) development that would strip activity and vitality from centres able to offer greater choice in transport. Future communities should be built on a sustainable basis.

The lead has been shown by American jurisdictions. In 1993 Wal-Mart proposed a project in Massachusetts; in 1994 Disney announced a major development in Virginia; and in 1997 Wal-Mart a strategy to intensify the extension of its stand-alone superstores. All produced major political reactions driven by the increasing popular awareness of the social and economic costs of sprawl. The movement has become known as 'sprawlmart resistance'. Local governments have restricted sprawlmarts.

It is essential that the draft SEPP 66 be completed. Shopping centres have the potential to be transit centres, community centres, medical centres, recreation centres as well as retail centres – either *as a part of* or *apart from* local communities. The intent would be to make them part of the densification of Sydney not its sprawl – then the public would find it easier to use public transport which in turn would be more financially viable. The place of shops in town centres is illustrated in Edmondson Park and the Greenpeace plan for Pyrmont. However, the need for design quality improvements has been seen in Chatswood, Bondi Junction and other places.

7.2 Public transport

It is one thing to provide a policy requiring integration between land use and transport but another to ensure that the public transport infrastructure is actually built and used. Declining public transport patronage shown up by recent authority annual reports is largely a result of the Government's road building and pricing strategies. There is an urgent need to correct the adverse context in which public transport operates in Sydney. The Warren Centre's survey showed that 78% of the public and 84% of decision-makers rated Sydney's transport and traffic problems as significant or worse, and getter worse or demanding drastic action.

The car culture is being reinforced by Government decisions. It needs to develop public transport to a much more significant level especially in those broad geographic areas where the public has no public transport option for most trips.

There are a number of essentials:

- Land-use change and development consent decisions relating to a range of major travel-generating development (e.g. major retail, bulky goods outlets, offices, entertainment facilities, major residential releases – above a threshold size) under the final SEPP 66;
- extending the route and service coverage of the main modes (trains, trams and buses) and improving their co-ordination and services, in order to raise public transport patronage in areas with high levels of dependence on cars. This includes innovative systems like:
  - high-frequency busways on congested roads (such as the Grand Parade and Victoria Road) with tidal flow systems so that the off-peak direction loses space, not the peak
  - operational systems as in the Olympics to make the services more accessible, efficient and appropriate;
- adopting special programs in new areas so that residents do not have to build two-, three- and even four-car garages, in the knowledge that some of their trips will be serviced by buses from the time they live there;
- congestion pricing – adopting cordon (entry) and route tolls where there are public transport and parking options, together with restrictions on inner parking supply;
- street reclaiming – to involve communities in making their streets more productive, safe and quiet; and
- proactive corridor development – putting light rail or dedicated busways into one or more corridors capable of and suitable for more intensive development, for strategic reasons. (It has been seen that Parramatta City Council has done some such analyses.) The market will do the rest as at Bondi Junction or Chatswood – with stronger design quality - and the initial investment can be recouped through incremental value capture (betterment) as was used for Sydney Harbour Bridge in the 1930s.

Among the policy-based measures suggested by the BTE in *Looking Ahead* (Information Sheet 14) were:

- Road system supply policies – traffic calming, intersection improvements and the like;
- Road system demand policies – for example road pricing, travel blending, fuel excise, policies to encourage car occupancy, CBD parking restrictions;
- Traffic management policies – for example intelligent transport systems, road rule enforcement, black spot amelioration;
- Vehicle performance policies – for example new car fuel efficiency and emission standards, safety and emissions testing;
- Policies and technologies to target the 'worst offending vehicles'; and
- Land planning policies to affect the long-term 'car intensity' of the cities – for example encouraging linear development along rail lines, lot size restrictions, medium and heavy density development.

These need to be supported by administrative arrangements:

- independent cost-benefit analysis - full analysis of costs and benefits of improved public transport versus more roadways by an independent committee (including NGO representatives and Treasury) to assess the actual cost of roadways including air emissions, health and greenhouse gases;
- planner/provider model - adoption of the planner/provider model where modal agencies do not undertake planning or develop their own projects or in association with the private sector. Rather an integrated land-use/transport planning agency should investigate the appropriate modes of public transport first and then develop a project to be undertaken by mode-constructing agencies and/or the private sector. This has been recommended many times in Sydney and the benefit of doing this has been seen in the USA and UK;
- introduction of an urban budget – so that all areas of urban expenditure can be assessed against outcome performance indicators so that funds can be allocated, progress can be measured, and government can judge on a best-practice basis;
- EPA licensing of roadway pollution - roadway pollution must be subject to the pollution licensing system so that polluter pays applies, rather than the environment subsidising road use. Best-practice stack filters should be installed on all ventilated underground roadways both to reduce pollution and stormwater generated by major roads (and polluting local creeks) subject to pollution elimination controls – to accurately reflect the full costs of such roadways; and
- emphasis on easing truck movements through the city and moving freight onto rail – a long-term priority recently strongly reinforced by the finding[27] that "the soot produced by diesel engines will warm the climate more over the next century than the extra carbon dioxide emitted by petrol-powered vehicles. ... overall 1 gram of black carbon is 360,000 to 840,000 times as powerful a global warming agent as 1 gram of CO2."

Additional revenue needs to be raised from:

- redirection of funds from the roads budget to public transport. A 1999 study by the Warren Centre revealed that 70% of Sydney residents would support increased spending on public transport at the expense of the road budget and similar results were reported in Western Sydney by the Clean Air 2000 Task Force;
- applying a levy on developers and businesses which create transport demand in new fringe development areas to help pay for additional services, along betterment lines (but not so as to impose a pass-on super tax on poorer families);
- beneficiary levy to link property value increases with sale of air space and commercial activity at stations;
- increased direct investment from the State Budget for public transport programs; and
- reintroduced tolls on freeways and a new CBD toll for private vehicles.

The super-profits reported by the private operators of various road and bridge schemes in Sydney – all sponsored and supported by the RTA – are funds that could have been allocated to community ESD projects. The Government's argument, that projects are delivered earlier through PPP schemes, is usually incorrect as Government can use private construction contracts and/or government bonds to construct projects earlier. Therefore there should be no further privatised profits from such infrastructure schemes; and RTA funding arrangements should subsidise public transport at a much higher level than has applied under 3 x 3, Harbour Tunnel, motorway and National Highway schemes so that the whole of the Western Sydney basin is less car-dependent and less congested.

7.3 Fringe developments

There are national moves to educate, encourage and lead home builders and buyers as well as local government approval authorities regarding energy and water efficient designs, active street

27 See New Scientist 2 November 2002 p 9 reporting a Stamford University research project's findings

frontages (encouraging commercial and safety improvements) and more efficient development using less land.

The Federal Department of the Environment and Heritage sponsored the Housing Industry Association to produce individual guides through the PATHE program (Partnership Advancing the Housing Environment). These guides included waste, stormwater, energy and insulation management. The State Department of Urban Affairs and Planning (as it was then) joined with the Commonwealth and the building and design industries to produce *Your Home*, which covers site-specific matters.

The HIA and Design Collaborative Pty Ltd have produced a Model Development Control Plan for the consideration of Councils for detached and small lot housing, the essence of sprawl. It is to achieve "a sensible balance between the need to build homes that people want while protecting the environment. The HIA considers that environmental protection and economic development can be achieved while mutually reinforcing the goal of sustainable development".[28]

Their study showed the inconsistency between Councils on design standards and approval criteria. The AIUS study of drainage footprints cited earlier revealed dramatic differences between Councils in the awareness of their officers of environmental design and performance matters.

Some Councils use flocculation of water in retention ponds to reduce small-particle pollution of waterways while others seem to believe that building drains is the best way to manage development. The two approaches are poles apart in performance terms.

The Premier has introduced a 'pattern book' approach to residential-flat building, together with architect-design and independent certification. A similar approach is needed for fringe developments, with sensible codes being mandatory. The BASIX code is mentioned in the next section, but there are many locality matters that should be mandated.

A major American example of integrated housing, parks and gardens, open space corridors and greenways is High Plains Village at Centerra in Colorado. The Village is a short walk from shops and offices and unit prices are in the mid-range for the area, demonstrating that green development practices can meet mid-market price points. There are 403 condominiums, 386 townhouses and 961 small and medium single family houses. Natural areas were preserved and the project included a 275 acre living laboratory, the High Plans Environmental Centre. Energy efficient heating and cooling, improved installation, high efficiency windows, energy conserving appliances and other green techniques and materials were used to reduce energy and conserve natural resources[29]. The design guidelines are widely known.

Recently Sydney Water commissioned the University of NSW to prepare a life cycle assessment of 'greenfields urbanisation' to compare traditional water and wastewater services with a local treatment and water efficiency option.[30] Rainwater tanks, triple A household water appliances and a combination of household primary sewage treatment with neighbourhood reticulated sand filters and irrigation with treated effluent were modelled. The sustainability option performed significantly better on nine environmental indicators.

Clearly, where fringe or greenfield development must occur it can be done with far less demand on resources and best practice should be mandated. Nevertheless, such development should not be seen as a replacement for urban consolidation, as environmental savings particularly in the transport sector are readily apparent with greater densities.

7.4 Building sustainability

Environmentally sustainable urban buildings and precincts are very much the exception and ways must be found to make them the norm. As the

28 *Discussion Paper, HIA and Design Collaborative (August 2002)*
29 *Urban Land Institute – cited earlier.*
30 *Sven Lundie and Peters, Greg (2002), Sydney Water WaterPlan21 Life Cycle Assessment, paper for 3rd Australian LCA Conference*

Urban Land Institute further noted:

> Proposed projects that are innovative in their approach frequently encounter significant barriers. In fact, many developers find that environmentally sensitive projects are the most challenging kind of project to develop. Zoning and other development regulations and policies make them difficult, if not impossible. Financial institutions are often reluctant to fund innovations for which they can come up with few comparables. Neighbours are often difficult to persuade. Finally a way around these too numerous barriers is too time-consuming and too costly. Unless the barriers to environmentally sensitive development are lowered, prospects for wholesale changes in the form and type of development are slim - despite the apparent strengthening market appeal of green development projects[31].

A general concern has been to move from showcase to mainstream. In order to do this and allow the sustainability market to grow there needs to be a move to minimum benchmarks and government 'trigger' funding.

Taking account of local variations (for example, climate), benchmarks for energy and water use, waste minimisation, indoor air quality and materials could be mandated to provide a consistency across the GMR. PlanningNSW and the Sustainability Advisory Council are currently trialling BASIX, which has the potential to provide a tool for development assessment and application of sustainability benchmarks. There would be provision for a development to receive greater points if it exceeded the benchmarks. A key benefit of BASIX is that it allows for a quantitative assessment, replacing the many wordy DCPs that require interpretation and vary from one Council area to another. Funding would be required for local government training. Provision is also being made for a web based BASIX tool and inclusion of regional differences.

Currently fringe builders frequently offer air conditioning as an incentive to buy. Integral Energy has already shown that this is driving their investment needs in many areas, adding seasonal demand to such an extent that the peak is shifting from winter to summer in Sydney's West. Positive government intervention is needed at solar orientation, building design and passive energy conservation levels to obviate this trend.

In addition to the challenge posed by new housing and subdivisions, the existing housing stock is the main resource consumption block. In this regard retrofitting of low density or redevelopment for appropriate medium density is a priority. The establishment of a Demand Management Fund to introduce measures to reduce energy and water consumption would greatly assist.

Sydney Water already undertakes demand management programs for households through supply of water-efficient devices and Energy Australia and Transgrid are providing funds to reduce the energy demand of the CBD. A broader ranging integrated program is necessary to achieve the reach necessary and lead to substantial gains.

At the same time, government attention should be paid to the culture of the major water and energy utilities, which have been slow to appreciate the value of selling less water and energy per capita. It is likely that continued regulation and auditing will be necessary.

Presently Sydney Water is bound by targets in their Operating Licence and is audited by IPART. The greenhouse benchmark scheme for the NSW electricity industry also involves targets and IPART auditing. The key utilities should be prompted to engage in demand management and low-emission energy and wastewater services at the time of subdivision and construction, not as service providers after development.

Attention should be paid to those that install household equipment, be it builders, plumbers or electricians as they are often a key source of information for householders on the advisability of resource-efficient products. Mandatory design codes should include notice as to advice to be provided to purchasers and who can provide auditing of practice.

However, the main water conservation challenge in Sydney is to retrofit existing housing stock and reform industry practices.

31 *Urban Land Institute – cited earlier*

7.5 Incentives and Penalties

A potentially successful way of influencing behaviour is through incentives and penalties. Land use and related planning in Sydney has been conducted through limited controls and permissions. Other places have used different signals.

Transport usage is not very elastic in respect of (say) fuel taxes, but there are other taxation, congestion, standard of service and like signals that will affect travel behaviour and patterns. Further, owner decisions about land management can be influenced substantially through planning rules, land holding charges and the way neighbours are compensated for adverse effects.

This section will deal with:

- holding charges on land
- community stake in reform process, community title
- compensation for loss of view, amenity etc
- community development and infrastructure support
- incentives through government services etc.

The first specific opportunity is what is called the **SPRAWL BUSTER** in America[32]. This is a special land tax on land deemed to be capable of higher density development, typically in inner suburbs. Normal land taxes are levied on an *ad valorem* basis and are therefore lower in outer suburbs, providing some incentive to buyers in the outer areas. The new tax exaggerates that effect but produces the opposite result so the Sprawl Buster works like an 'inferior good' in economic theory:

> If the property tax is a centrifugal force that flings structures outward, its opposite is a land levy. To pay this charge, owners try to put their parcels to better use. "Owners of the most valuable sites, paying the most, try hardest', explains Tom Gihring ... 'Since the most valuable lots lie about the centre, it is the centre which draws development.'
>
> A computer model of Boston modestly shifted tax liability landward; the city contracted by a half mile. Johannesburg, SA, taxing land alone recycled sites so rapidly that little development was left over to sprawl into suburbs. The Northwest Environmental Watch calls this levy 'the sprawl tax'.

The second and related tool is a **HOUSING VOUCHER**. Smith from the same source in relation to the revenue from the inner tax, explains:

> It may be easier to pull than to push the sprawl debate. To create pull, reformers could propose a housing voucher, funded from a hefty portion of the collected revenue and good for rent, mortgage or taxes. Land value in many cities is astronomical. Tapping it, a locality could fund basic services, repeal other taxes, and pay residents this income supplement from the surplus, much like Alaska's oil dividend .... As land values rise, so would one's voucher, letting even poor residents stay where they love, and love where they live. Spending the vouchers on buying or leasing land or improvements would keep employment high in construction ... Thus urban advocates might ally with environmentalists, attaining a critical mass for shifting the property tax.
>
> The Housing Voucher also sweetens the pot for the middle class. Currently, in order to tap their site value, they must cash in and move out, or take on a second mortgage and go into debt. Getting back a voucher much greater than the land tax or fee they pay in would constantly recycle their community's site values, making them available in real time. It's like cashing in while staying put.
>
> While attracting some people, the Housing Voucher may help neutralise others. Builders and owners, accustomed to capturing land values for themselves, would profit as vouchers are spent on real estate, the source of much income for many owners.

The combination of the tax and vouchers would provide powerful incentives to improve the carrying capacity of inner areas and the ability of those communities to cope with urban transitions.

32 Jeffery J Smith, How Profit Shapes Urban Space (EcolQ Magazine) – not dated but see www.ecoiq.com/magazine/opinion/opinion6.html.

The third possible tool is **COMMUNITY TITLE**. Greenpeace's suburban transition referred to earlier depends on a legal mechanism which would allow neighbours to share backyards without loss of capital. This might be done through valuing the whole parcel and pro rating the parts on the basis of the initial area or value basis (along with maintenance costs). Alternatively the initial owners could be bought out by a trust funded through one or more of the above and following means but with the owners retaining title to their home blocks.

Another form of community title might be a **TOWN CENTRE TRUST**. One of the issues associated with developing suburban centres is the facilitation of transition to urban villages as proposed by *Action for Transport 2010* and other strategic documents. The SRA has pointed to the "dough-nutting" of existing centres where the older residents live around the stations but no longer use them for work trips. Current pressures on Councils to approve medium-density developments within suburban areas can only be ameliorated by the rapid implementation of urban villages.

There is no mechanism in law in Australia or elsewhere to compensate landowners for the inevitable dislocation caused by changes in zoning and the attraction of apartments, commercial centres and higher levels of transport operations. Existing suburban rail centres could become, over time, something like Greenpeace's Pyrmont image but there would be major dislocation for the initial owners and many legal and other impediments. However, if the owner's stake could be imputed in an investment trust, say to equivalent value of their current valuation, they could then share in the betterment to a pro rata level, while the trust could raise sufficient money to develop the properties and temporarily relocate the owners and their tenants. This would make the building of suburban centres much more attractive to local residents.

The fifth tool is **COMMUNITY COMPENSATION**. Developments often change traffic, noise, shadow and other amenity aspects of a neighbourhood; and almost always neighbours object to DAs. The externalities of a development can be compensated - indirectly through Section 94 contributions (the money goes into gardens, car parks and the like) but in the future through direct negotiations between developers and neighbours.

A sixth item is **BANK-LED COMMUNITY IMPROVEMENT**. The US Community Reinvestment Act (CRA) passed in 1977 requires urban investment by banks which raise deposits in run-down districts. The welfare lobby Fanny Mae Institute[33] has noted major progress through a variety of tools all of which contribute to the regeneration and re-habitation of run-down neighbourhoods:

> Community development finance has made several strides in the past decade as more mainstream financial institutions have taken notice of community development as a potentially profitable opportunity.
>
> Several innovations have also made an impact, such as the maturing community development financial institution (CDFI) movement and the recent surge of interest in innovative market-based tools such as securitisation, real estate investment trusts (REITs), and microfinance. Support from the public sector has also shifted from direct subsidy to facilitating more private investment through tax incentives and leveraging public dollars.
>
> The Community Renewal and Tax Relief Act of 2000 created the New Markets Tax Credit within the U.S. Department of the Treasury's CDFI Fund, as well as the New Markets Venture Capital program administered by the U.S. Small Business Administration (SBA). These programs will provide new sources of capital to small businesses located in low-income inner-city and distressed rural areas.
>
> … tax credits are provided to eligible community development entities (CDEs), which will "trade" these credits for equity investments from private investors. The private investors may then take a credit worth a total of approximately 30 percent of their equity investment over a seven-year period. CDEs will then invest these funds in businesses located in low- or moderate-income census tracts.

33 *See http://www.KnowledgePlex.org/fmfportal/hottopics*

> [Under the] New Markets Venture Capital Program debenture guarantees and technical assistance grants [are provided] to newly formed venture capital companies that invest in low-income areas.

A variety of administrations allow municipal bonds to be raised for area improvement, say where, infrastructure has been allowed to deteriorate (the case with much of NSW's municipal assets, especially drainage) or where changed environmental or like requirements necessitate a large investment program (as on the coast). Professor Percy Allan pointed out in his book *Succession* that there are a range of models for community revitalisation including 'street associations' (assuming responsibility for a range of municipal services), business improvement districts and mainstreet committees[34].

The eighth possibility is a **COMPLETE INFRASTRUCTURE MANAGEMENT CYCLE**. The UK Government, as one example, runs a complete cycle starting at the bottom where local programs of national and local authorities are co-ordinated, to the top where Infrastructure UK looks at the total national capital budget and works out the best ways of achieving greatest value. It also uses a concise set of outcome-based indicators to measure progress as seen by the people. This would have benefits at regional and urban levels in achieving sustainability – say by spending more on cycleways community education and community transport, instead of road widening.

The ninth option is the prospect of an **URBAN BUDGET** together with the capture of betterment. The strategic assessments of Sydney's needs have shown that, to meet the city's long-term environmental and social needs, extensive networks of public transport improvements would be needed, to put Sydney back in the same position of public transport leadership that it was in at the beginning of this century. There is no doubt that this network would be beyond the resources and capabilities of government; but there is also a strong belief that the direct and indirect benefits of such a network would exceed its costs, and therefore that the issue is not whether it should be built, but how. It is well understood that transport projects increase land values – generally by 40%.

Another methodology has been developed in the United States under the pioneering US legislation introduced by the Bush Administration in 1991. (The UK has also moved along this path.) This was the Integrated Surface Transportation Efficiency Act (ISTEA). It increased transport funding for six years by 25% over past trends, but put in place conditions at implementation levels so that States and metropolitan planning organisations would only be funded where:

- a 20-year plan has been developed, revised every five years; and
- projects were included in a Transportation Improvement Plan (3-5 years' perspective) consistent with the 20-year plan.

In both cases, engineering criteria have to be balanced against energy, environmental, land use, equity and other criteria. The key directions were:

- emphasis on alternative solutions - modes, mobility and environmental protection, and full integration of the levels of government (federal, state and local);
- emphasis on flexibility - funding roads, public transport, pedestrians, bicycles and so on to achieve the best outcomes (holistically defined) regardless of the vested interests;
- emphasis on performance - preserving, maintaining and managing the existing and new systems;
- emphasis on safety and aesthetics; and
- emphasis on public involvement – 'moving the nation towards a participatory model of decision-making, in which an informed citizenry plays a key role'.

A way to proceed would be to pass umbrella legislation requiring that in each case of infrastructure funding and approval, the government would submit to Parliament a regulation specifying how much local government bodies (acting together, perhaps via the regional organisations of councils) in the

34 *Percy Allan, Succession (2001), pages 47 ff*

catchment of each project would be required to raise over the period of a project's usefulness; and requiring such Councils to impose levies on residential, industrial, commercial and other rates in consultation with their communities over the period covered by the regulation. A partial precedent was the establishment by Sydney Water in the 1960s of a 'priming fund' which helped pay for water and sewerage works in subdivisions, with repayment from rates and other sources once the subdivisions were occupied. Several catchment management trusts already raise special rates for projects that directly benefit their communities.

7.6 Conclusion

The above ideas may appear radical to some readers. They nevertheless deserve serious consideration.

The scale of the environmental problems faced by the Greater Metropolitan Region now and in the future particularly with increasing population and traffic - mean drastic action has to be taken, in the context of some further fringe development and urban consolidation. Either the problems will be managed and the ecological footprint reduced or there will be an unwelcome and observable reduction in the quality of life at a metropolitan scale.