



University of Technology, Sydney



Sustainability Design Guidelines for Urban Release Areas

A Masterplan Approach for Developers

Prepared by
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Futures

On behalf of
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Preface - A Developers Guide

This tool seeks to assist developers in masterplanning communities. The Institute for Sustainable Futures (ISF) has observed that there is a lack of consolidated literature available to property developers on sustainable land use planning. It is understood that property developers are keen to adopt sustainability practices for a variety of reasons. These can range from the conscientious landowner seeking to improve the functionality of their proposed community, to the expedient developer who is seeking to provide their product with a marketing advantage.

This guide does not present a cookbook for a sustainability masterplan. It presents common goals and outlines design solutions (eg vary densities) to promote an outcome which favours sustainability. The guide is therefore an initial attempt to compile a number of design solutions in one place and relate them directly to a developer's primary objectives.

ISF acknowledges that there is a considerable amount of literature relating to sustainability building design. Documents such as the Environmental Design Guide and the proposed Good Residential Design Guide provide architects and builders with clear guidelines on the building elements necessary to create an energy and water efficient household. Accordingly, ISF's Sustainability Design Guidelines largely avoid the built form by focussing on the masterplanning stage.

The design solutions presented in Section 4 do not need to be adopted in total. They are provided as examples of what can be undertaken to move toward a sustainable outcome. If a developer adopts only a few of the many suggestions, then it is an improvement on current practice.

Furthermore, it is hoped that as the design solutions are adopted more frequently then there will be a greater precedent for their use, greater acceptance by the market and less resistance from the financial sector. These ideas are nothing new. They are found in every major city in the world and in areas which pre date World War 2. They are Newtown, Paddington Stanmore and Roseville. ISF's Sustainability Design Guidelines do not seek to recapture that time but create new communities founded on similar principles.

1. Introduction

This report represents a collaboration between Penrith City Council and the Institute for Sustainable Futures (ISF) as part of the Second Action Research Project. The Action Research project was comprised of a series of Case Studies undertaken by participating Councils.

Councils involved in this research provided 'leading edge' examples of how Ecologically Sustainable Development (ESD) could be applied in an integrated manner. Their experiences have been recorded as Case Studies to guide all Councils throughout Australia.

Each of the six participating Councils undertook projects that strategically advanced ESD integration at an operational level. The Institute provided research assistance and guidance.

Penrith City Council chose as its topic, to “develop ESD guidelines/principles for new urban release areas”. This project was part of Penrith’s broader Sustainable Penrith Strategy, which included:

- State of Environment (SoE) reporting;
- Linking the SoE report to the Management Plan
- an audit and review of Council’s processes and systems;
- education programs;
- conservation strategies;
- waste management and minimisation strategies;
- social plans;
- area assistance scheme;
- economic strategies in partnership with business groups; and
- regional environmental responses.

The ESD Guidelines for new urban release areas offer design solutions, which can be easily understood by developers and regulators in adopting good urban design. A Glossary is contained is appended to the report for reference purposes. The successful implementation of the guidelines is dependent upon ownership by the Council and property developers. It is proposed that such acceptance could be encouraged by Council’s adoption of the guidelines as a formal handbook or as part of a broader Development Control Plan.

2. Penrith

Penrith has a population of approximately 170,000 people and is experiencing a growth rate of 1.0% per annum. Penrith's population is projected to be 206,200 by 2021 (PCC, 1998).

The Penrith Local Government Area (LGA) is located 50km west of the Sydney Central Business District. The LGA occupies an area of 407km². It is estimated that 75% of the Penrith LGA remains rural. Although the area of urban land is now three times greater than in 1960 (25km² -75km²) and pressure for urban expansion will continue as the population grows.

The agricultural sector of Penrith is one of the major sources of primary produce for Sydney and contributes significantly to the Penrith and greater Sydney economy. The Hawkesbury Nepean Catchment is one of the most productive areas in Australia and accounts for 10% of the State's agricultural output. The value of this production has been estimated at \$850 million per annum (WSA, 1998). Accordingly, there is a need to balance urban growth with the existing rural character and agricultural significance of the area.

To balance the pressures of increased population, Penrith has gazetted two LEP's to respond to Urban and Rural needs of the community. The Urban LEP identifies new residential release areas to accommodate population growth for the next 25 years. It is proposed that this be achieved through in-fill development to alleviate the pressure on the rural sector.

Accordingly, the ESD Guidelines inform the planning process by ensuring that new release areas relate to the existing city in terms of transport, social infrastructure and environmental protection.

3. Sustainability Design Principles

3.1 Principles in Context

The principles of urban sustainability often do not translate into action due to their presentation as motherhood statements and the perceived complexity of implementation. The core objectives of sustainability as adopted by the Commonwealth Government are:

- enhance individual and community welfare by following a path of economic development that safeguards the welfare of future generations;
- provide equity within and between generations; and
- protect biological diversity and maintain ecological processes and life support systems (Industry Commission, 1997).

The objectives of sustainability, although sound, provide little guidance to the average property developer and consultant planner. Their implications for road width and lot yield are not explicit beyond an inferred need to preserve more remnant bushland.

These guidelines therefore seek to illustrate what is meant by Sustainability for Urban Release Areas. The guidelines offer design solutions, which can be easily understood by developers and regulators in adopting good urban design. They account for the underlying economic, social and environmental components of sustainability by suggesting design elements, which satisfy all elements.

For example, varied lot densities has the potential to maximise economic return, improve social equity through affordable housing and minimise environmental impact through reduced sprawl.

3.2 Good Urban Design

The City of Penrith has tabled a list of qualities that it believes urban development should possess. These qualities represent in a practical manner, what sustainable urban development is seeking to achieve in a design sense.

Good urban design:

1. demonstrates design excellence in urban development and architecture;
2. distributes benefits widely in the population;
3. produces environmental benefits;
4. responds to local features and needs;
5. is relevant to the contemporary world;
6. leaves open possibility for adaptation and change;
7. forges connections with the past;
8. is concerned with visual meaning functional efficiency and broad access to change in cities and towns;
9. is grounded in local characteristics and needs distinguished by a natural fit with site and context;
10. manifests itself in many ways but is always centred on the quality of the public realm;
11. spells stewardship of the public domain;
12. is concerned with the quality of public space and new building projects and associated atria and plazas;
13. seeks ways of retaining and reusing historic structures of significance;

14. is concerned with means to guide design of these structures for the benefit of the public realm while seeking opportunities for mutual support with the private domain;
15. enhances the quality of private territories through the vitality of the public realm.

Essentially, good urban design or sustainability in urban design seeks to establish a sense of place by enhancing the public domain. This may be evidenced by an effective public transport network, safe streets, equity of access to retail and services as well as traditional commons such as parks.

The guidelines suggest that Urban Sustainability is dependent upon an effective:

- transport pattern
- urban design
- retail sector
- landscaping/open space network
- local employment base

3.3 Presentation

The presentation of the Sustainability Design Guidelines for Urban Release Areas has been divided into 10 discrete sections. These are:

1. infrastructure
2. water cycle management
3. transportation
4. urban design
5. open space
6. community safety/crime prevention
7. employment/economic development
8. waste management
9. heritage; and
10. energy conservation

The headings were chosen by Penrith City Council and correspond to the major areas of interest with respect to urban release areas. The guidelines acknowledge that sustainability advocates a holistic approach. However, the sections mirror the reductionist approach adopted by urban design to address the myriad of detail associated with masterplanning. The headings therefore maintain a common perspective for the developer and regulator.

Each section contains the following attributes:

- a goal
- measures
- application
- sustainability design solutions
- notes
- relevant topics

The goal is a summation of the aims of sustainability in urban design for that particular discipline. The measures are basic sustainability indicators that measure the success of the design solutions, if implemented. Application identifies those activities or built form that relate to the sustainability goal.

The sustainability design solutions offer suggestions that will assist in achieving the goal. They are based on previous experience and best practice. It is not expected that all design solutions be adopted. Adoption of any such design approaches is a move toward sustainability. The notes elaborate on the sustainability design solutions by providing examples and stimulating debate. The relevant topics, heading acknowledges the complementary nature of urban design solutions and the holistic nature of sustainability.

4. Design Targets

4.1 Infrastructure


















Sustainability Goal: To minimise infrastructure costs




Measures

Lower service installation costs
Reduced maintenance costs
Minimised vegetation and soil impacts

Application:

Roads
Sewer
Stormwater drainage
Gas Supply
Telecommunications
Water Supply
Electricity Supply

<i>Sustainability Design Solutions</i>	
1.	Reinforce existing services   
2.	Place telecommunications and electricity supply underground   
3.	Bundle service conduits (electricity phone power)  
4.	Reduce road widths   
5.	Encourage frontal and infill development   
6.	Vary densities   

<i>Key</i>
Environmental Benefits 
Social benefits 
Economic benefits 

Notes

1. Failure to reinforce existing services can result in a doughnut effect whereby existing services such as retail areas fail when the economic activity is transferred to the fringe. Similarly, areas like Penrith were divided when

economic activity was transferred to the Plaza with a corresponding depression of the former town centre (Penrith, 1995). New services should consolidate older areas to reinforce existing economic activity, sustain transit services and maintain community

identity. Between 1970 and 1995 the number of public school students in Maine declined by 27,000, yet the state spent more than \$338 billion building new schools in fast growing suburban towns (Snyder and Bird, 1998).

2. Underground cables are also less visually intrusive and protected from the effects of the weather. Technological advances also enable high voltage power lines to be placed underground to negate reduced lot yield from the perceived exposure to electromagnetic radiation on residents (Thomas, pers comm).

3. Installing compatible cables and pipes within the same trench/conduit can lower capital costs associated with service provision.

4. Reduced road widths increase lot yield by minimising the amount of land released being designated for roads. Similarly, the narrower roads (3 to 3.25m) reduce capital expenditure. Narrower roads also assist in slowing down traffic to create a safer neighbourhood.

5. Compact and continuous development can save 15% in capital costs or over 1 billion dollars over 15 years, when compared to existing sprawl practices. Savings for roads alone have been projected 25% savings in capital costs or over three-quarters of a billion dollars over 15 years (TGM, 1999). It is therefore economically imperative to encourage compact frontal and infill development.

6. Increased housing choice leads to greater marketability. The higher densities also generate a larger unit yield for the similar amount of services.

Related Topics

Water Cycle Management

Transportation

Recreation opens Space

4.2 Water Cycle Management











Sustainability Goal: Reduce freshwater consumption and wastage while maintaining water quality.




Measures

Increased groundwater recharge
Reduced erosion and sedimentation
Enhanced water quality of run-off
Protection of receiving environments
Increased capture of run-off for re-use

Application:

Water Sensitive Urban Design using Best Management Practices (BMP's) to form a treatment train. BMP's may include detention basins, swales, gross pollutant traps and spill control separators.

<i>Sustainability Design Solutions</i>	
1. Implement water sensitive urban design principles	  
2. Minimise cut and fill	 
3. Minimise vegetation, particularly deep rooted tree, loss	  
4. Limit impervious surfaces (beyond roads)	 

<i>Key</i>	
Environmental Benefits	
Social benefits	
Economic benefits	

Notes

1. The traditional stormwater management response relied on conveyancing whereby water is conveyed by pipe or channel from a collection area to a discharge point. This has the effect of rapidly transporting large amounts of water with their suspended pollutants directly to their receiving waters (Whelans & Hapern Glick Maunsell, 1993)

Water Sensitive Urban Design is a storage-orientated system, which provides for temporary storage at or near the origin, with subsequent slow release to groundwater and downstream receiving bodies. Detention and/or retention are the principal elements of a

storage-orientated system. Detention systems such as swales and artificial wetlands reduce erosion, filter pollutants, maintain the hydrological regime and enhance the aesthetic value of the area. Best Management Practices include porous pavement, swales, spill control separators, litter racks and detention basins (Evangelisiti, Wong & ATA, 1998).

2. Cut and fill has the potential to alter the local hydrological regime resulting in erosion, localised flooding and vegetation loss. Ideally, the urban design should be responsive to the topography with roads following contours and housing foundations being chosen on a site-specific basis.

3. Similarly vegetation loss alters the hydrological regime. Loss of deep-rooted trees may exacerbate dry land salinity and cause compaction of the soil. Topsoil erosion and pollutants loads may also increase without vegetation remaining to bind the soil, filter nutrients, decrease run-off velocities and capture sediment loads.

4. The design solution is inherent to water sensitive urban design. Roads comprise a significant component of the subdivisional area. This inhibits infiltration, increases pollutant loads (lead, hydrocarbons) and forms to the single largest contributor to run-off volumes. Nevertheless, a balance needs to be established between hard pavement and dirt roads. Trials in the Blue Mountains have confirmed that dirt roads greatly increase stormwater sediment loads leading to siltation of receiving bodies (Riley et al, 1999).

Related Topics

Recreation Open Space

Biodiversity

Infrastructure

Waste Management

4.3 Transportation




Sustainability Goal: Provide safe, efficient and convenient transportation choices.

Measures

Enhanced permeability and legibility
 Improved equity of access
 Improved air quality
 Decreased VKT
 Reduced vehicle noise impact
 Reduced injury rate

Applications:

Public transport provision
 Road layout
 Light/Heavy rail funding

<p><i>Key</i></p> <p>Environmental Benefits </p> <p>Social benefits </p> <p>Economic benefits </p>
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Notes:

General

Land use and urban form of cities are fundamentally shaped by priorities in transportation. Private vehicle use has a cumulative impact on the essential character of a city. Cars driven to work in Sydney in 1997 carried on average 1.1 people each (SEDA, 2000). The average speed of cars on Sydney roads is 37 km/h and falling. It now takes the same amount of time to travel by car from the Sydney CBD to Parramatta, as it did by horse and cart a century ago (Newman & Kenworthy, 1999).

<p><i>Sustainability Design Solutions</i></p> <ol style="list-style-type: none"> Design a modified grid road pattern    Build a heavy/light rail corridor    Narrow roads and widen footpaths    Vary road surface treatments (eg paved, coloured, cobbled)   Build dual use paths    Create car free zones    Reduce public parking    Improve transit    Facilitate local retail and employment potential    Reduce speed limit    Design tighter road bends   Install landscaped choke points   Plant street trees  

1. A modified grid pattern provides traffic with more options in getting from A to B and therefore possess greater potential to relieve traffic congestion. A modified grid pattern is also easier to navigate when compared to a compounded culs-de-sac design.
2. Access to light or heavy rail would further alleviate traffic and increase choice although this is often compromised by low population densities and limited funding.
3. Narrow roads (3 to 3.25m) and wide footpaths encourage pedestrian use by favouring walking and cycling. The narrow roads also slow traffic with parked cars acting as mobile traffic calming devices.
4. Varied road surfaces can impart particular meanings to drivers and pedestrians alike. Cobbled or red asphalt roads are often employed to denote shared spaces. Surface changes are also used to reinforce speed limit reductions, alert drivers to pedestrians and signal entry into a residential area.
5. Footpaths and dual use paths are not always provided in residential developments. This denies pedestrians safe access and is also an equity issue. Development of a subdivision without roads is unsupportable, similarly, subdivisions without footpaths is unacceptable and unsustainable.
6. Car fee zones have been adopted in some new developments in European cities such as Amsterdam (Holland), Vienna (Austria) and Freiburg (Germany). The principle is reliant on residents parking their car on the fringe of the development and walking into the estate. Vehicle access is reserved for dropping and picking up, emergency services and service vehicles.
7. Reduced public parking is a common demand reduction tool. It is particularly effective in retail areas serviced by effective transit systems. Although reduced public parking may also infer other techniques such as shared parking to reduce the area devoted to cars while maintaining access for various uses offered at different time (eg shop in day and restaurant at night).
8. Feasible alternatives to the private car should be introduced to reduce vehicle demand. Transit options should be safe, convenient and cost effective. This may involve recovering the hidden subsidies received by cars to increase parity. Transit also provides a degree of social equity for those community members without private vehicles such as the young, poor, disabled or elderly.
9. Local retail and employment is the key sustainability in urban design. It focuses the village concept and reduces VKT by limiting travel demand.
10. Most Councils have adopted lower speed limits for residential areas. These can be complemented by good design such as varied road surface treatment, choke points and signage.

11. It is implied that gentle curves on roads increase safety. However, they also increase speed, which is the antithesis to safety. Tighter road bends are a physical reminder to slow down.

12. Landscaped choke points on roads provide safer crossings for pedestrians. They reduce the amount of road required for pedestrians to cross and physically slow vehicles as they approach the narrow section.

13. Tree cover has been linked to affluence with more affluent suburbs having a proportionally higher amount of trees than poorer areas. They may be that treed areas are pleasant to live in as they afford shade and an aesthetic quality. Shade is important to encourage pedestrian use of the residential area as it provides shelter from both sun and rain.

Relevant Topics:

Recreation

Biodiversity

Infrastructure

Energy Conservation

4.4. Urban Design

Sustainability Goal:

To improve the quality of life offered by a residential suburban lifestyle

Measures

Increased lot yield

More distinct 'Sense of Place' and identity

Enhanced marketability
















Application




Lot orientation

Lot size

Village focus

Transit orientated

<i>Sustainability Design Solutions</i>	
1. Create village precincts	  
2. Establish a design theme	  
3. Create landscape precincts	  
4. Vary housing densities	  
5. Develop high population densities around public transit nodes	  

<i>Key</i>
Environmental Benefits 
Social benefits 
Economic benefits 

Notes:

1. Village precincts define the residential estate by presenting the land release on a human scale. The village centre creates a 'sense of place' and identity by anchoring the subdivision. Village Precincts most often consist of a small retail area, a neighbourhood centre and parkland. Glenmore Park is an example of a land release that has sought to achieve this to some degree. Village centres maximise the internal efficiency of neighbourhoods by rationalising the movement of internal goods (Engwicht, 1992). Sustainability advances the position that each neighbourhood should become as self sufficient as possible.

2. A minimalist approach to creating community identity is to establish a design theme. This can be achieved through thematic plantings in common areas such as streets and parks. Similarly, the masterplan may encourage a particular housing style. Distinctive signage, art or road treatments may be employed throughout the residential estate to reinforce the perception that the area is cohesive. This approach is most effective when combined with the village precinct approach, as the design conveys a 'sense of arrival'.

Town planning cannot create communities. Its role is to establish the foundations or a fertile substrate from which the community can grow. Identity is critical in building social capital though growing neighbourhood pride, which may lead to cooperative exchanges, reduced property crime and a greater sense of security.

The feeling of belonging imparted by an area's identity is a marketable product. Formerly, developers sought to promote a release based on its exclusivity, with gated suburbs representing the extreme of that approach. Alternatively, identity promotes inclusivity, which is increasingly sought after within the homogenous, soulless character offered by traditional suburbs.

3. Landscape precincts are a variation on village precincts. Whereas village precincts are defined by their centre, landscape precincts are defined by their topography. Valleys and hills define the boundaries of the neighbourhood and can be used in association with design themes and neighbourhood centres.

4. Suburban sprawl is typified by low-density residential expansion. Changes in household demographics over recent years has meant that a detached house on a 600-750m² block of land is no longer necessary or desirable for a majority of property buyers. However, the market appears to be fixated by this product, as there is a strong precedent for such releases with their consistent returns on investment. This is compounded by government subsidies for frontal growth and conservative lending policies that favour such precedents.

Varied housing options and lot densities provide greater choice for residents and correspondingly present more marketing options for developers. Increased densities have the potential to generate larger lot yield, more open space, with less associated infrastructure and service costs.

Limits to horizontal growth are also necessary to control the time and monetary costs associated with car dependent, low-density suburbs. Capital savings gained from purchasing a property on the city's fringe are converted into transport costs. The cost of running a car typically accounts for one day's average wage earnings (16-20% of total income) (Snyder & Bird, 1998). This is compounded by the time expended in motor vehicle transport. If you commute 45 minutes twice a day for 49 weeks (assuming 3 weeks vacation in a 52 week year), you are spending approximately 15 days 6 hours a year sitting in your car just going back and forth from work (TGM, 1999).

5. Where available, higher population densities should be created adjacent to transit nodes such as train stations or bus interchanges. This maximises the catchment of the transit node making the service more profitable and increasingly competitive with the motor vehicle.

Related Topics:

All

4.5 Open Space

Sustainability Goal: To maintain biodiversity and maximise recreational opportunities

Measures

Vegetation retention
Greater than 10% open space provision
Enhanced marketability
Presence of key indicator species


Application


Bushland conservation
Sporting ovals, district parks, pocket parks


Sustainability Design Solutions

1. Create pocket parks  
2. Choose indigenous vegetation for landscaping  
3. Plant street trees   
4. Create a village common   
5. Pre-fund neighbourhood centres   

Key

Environmental Benefits 

Social benefits 

Economic benefits 

Notes:

1. Pocket parks have the assist in overcoming the potential monotony of the suburban form. Provided the parks are centrally located with good casual surveillance, they can become a community meeting place and neighbourhood focus at a very local level.

The provision of pocket parks can be done at the expense of large ovals as the demographics of typical neighbourhoods often cannot justify multiple sites devoted to such large reservations. Whereas, pocket parks invite casual use and greater variety of uses from dog walking, children's play ground and small ball games.

Pocket parks and other forms of structured open space also retain a dual role as a storage area for run-off. Swales within pocket parks may connect to larger neighbourhood parks containing artificial wetlands via wildlife corridors and cycle paths.

2. The choice of indigenous plants for landscaping retains a degree of representation of the area's original biodiversity. Ideally, seed for the plants should be sourced locally prior to development. Furthermore, the plants possess lower irrigation requirements and may be less prone to disease as they are adapted to the micro-environment.

3. Planting of street trees has been discussed previously within the context of transportation as a benefit for pedestrian traffic. Street trees also provide valuable habitat for birds, establish wind breaks and reinforce the identity of the development.

4. A village common is an area of open space, which abuts and complements the built form of the village centre. The common provides an alternative meeting place and establishes a natural focus of the neighbourhood. Village commons often contain formal gardens, recreational facilities, sculptures or memorials.

5. Fringe residential developments can be quite isolating for sections of the new community. Single income and vehicle families may mean that one partner and their children are physically isolated during the day without access to retail or support services.

Pre-funding recreational centres, corner shops, child-care and community centres in the early stages of the development's life can ease the isolation imposed by new low-density subdivisions. The facilities will also be selling point for the subdivision. Ellenbrook in Western Australia is an example of this approach, whereby it promoted inclusivity through the construction of shops and schools in the early stages of the development. The shops formed the village centre opposite a common area dominated by an artificial wetland. The school was initially a collection display-homes temporarily adopted as classrooms until subsequent population growth enabled the State to build the permanent school.

Relevant topics:

Water Management
Urban Design

4.6 Community Safety/Crime Prevention

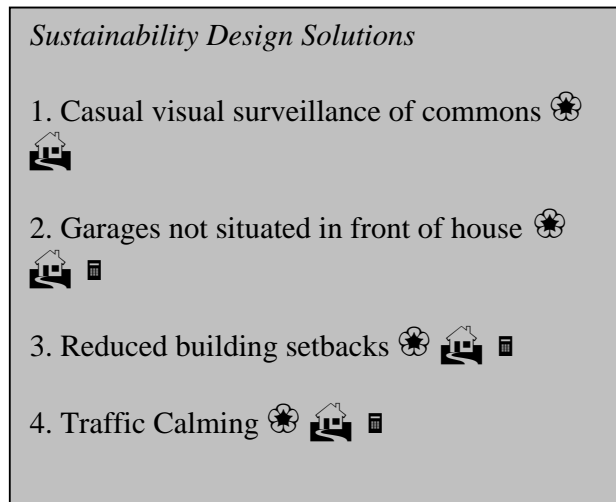
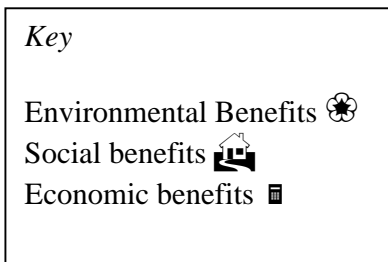
Sustainability Goal: To reduce the crime and the perception of crime within the community

Measures:

Increased sense of community
Reduced perceived crime levels
Increased pedestrian traffic

Application

Housing design (garage location)
Housing setbacks
Road design
Social equity



Notes

General

Earlier in the report it was suggested that urban design cannot create communities beyond establishing a framework for their growth. Similarly, urban design alone does not cause crime or the perception of crime. Crime and the perceived crime are the result of complex social interactions and therefore a single cause would be difficult to apply in a generic sense. People generally tend to perceive that crime levels are higher than they actually are due to the media. Nevertheless, there are design solutions available that can mitigate the circumstances that facilitate crime and the perceived level or fear of crime.

Fear of crime is often attributed to social isolation. Alternatively, people who feel alienated from society are more likely to exhibit those frustrations in a manner that is detrimental to society (Engwicht, 1992). The design solutions outlined below therefore seek to propagate neighbourhood contacts and a sense of community by removing physical barriers to social contact.

1. Casual surveillance of common areas such as parks and streets by pedestrians and neighbours may deter crime and engender confidence in residents (Engwicht, 1992). The presence of pedestrians further reinforces the concept of safety and accessibility.

2. Garages in front of houses impede casual surveillance of common areas and create a barrier between the street and the private domain. Garages ideally should be absent, or located beside or behind houses to maintain the connection between the public and private areas.

3. Reduced building setbacks can also assist in reducing crime and fear of crime by engaging the built form with the street. Opportunities for spontaneous casual exchange are increased between neighbours, which is critical for the development of community.

4. A study by Donald Appleyard (1970) established a link between traffic and social interaction. Appleyard found that residents on streets with heavy traffic (16,000 vehicles per day) had less friends and acquaintances than those on streets with light traffic (2,000 vehicles per day). Residents on light traffic streets felt ownership of the carriageway whereas the heavy streets alienated residents from the common areas like footpaths and the road. The opportunity for social exchange had been removed on the heavy traffic streets along with their sidewalk and their right to peaceful enjoyment and clean air.

The subjugation of the carriageway involves a transfer in ownership. Motorists view pedestrians, cyclists and children playing in the street as intruding into their space. As the speed of traffic increases, the attitude of motorists to pedestrians becomes more ruthless (Engwicht, 1992). The impact is felt most keenly by the young and elderly constituents of the population.

Accordingly, the traffic calming solutions described in Section 4.3 assist in slowing traffic and reducing the zone of influence of motor vehicles. Streets will become safer from an injury perspective but also in terms of crime. Neighbourhoods can prosper if the common areas are accessible and aesthetically engaging.

Relevant Topics

Transportation
Urban Design
Open Space
Heritage

4.7 Employment and Economic Development

Sustainability Goal: Maximise local employment and economic growth














Measures

Decreased VKT
Increased level of local employment
Local business growth
Increased consumer confidence


Application:


Shopping centres
Corner stores
Zonings


Sustainability Design Solutions

1. Reinforce existing retail  
2. Encourage retail anchor  
3. Subsidise corner store   
4. Mixed use zonings   
5. Home office   

Key

Environmental Benefits 

Social benefits 

Economic benefits 

Notes:

1. Section 4.1 discusses the issue within the context of infrastructure. Retail failure resulting from a duplication of service centres has social, economic and environmental consequences for a community. Reinforcing existing retail shares parking requirements, consolidates the CBD, acknowledges the history of the town, centralises consumer spending and stimulates the town centre. Retail is the economic focus of a community and therefore any proposal to split the shopping precinct may similarly splinter the town's identity. Penrith's horizontal retail growth has blurred the city centre, with three distinct shopping precincts within one kilometre one another (Penrith Plaza, High Street & Nepean Square). The city centre is therefore difficult to identify, particularly within the context of the depressed nature of the historic town centre.

2. The economic sustainability of a shopping centre is often dependent upon the presence of a retail anchor such as a chain supermarket. Their presence is often determined by population growth potential of a region. Accordingly, it is evident that higher populations will yield a vigorous and diverse retail centre. The urban design should therefore provide for and attract a retail anchor with incentives such as higher population densities via variable lot sizes, transit, access to ancillary services and a centralised location.

3. Corner stores can reduce VKT by providing convenience goods within walking or cycling distance of home. Typically, such goods (milk etc) have a low retail catchment as people are not prepared to travel far to purchase them. For example, consumers would only be prepared to travel 1km for a bottle of milk, 5 km for groceries, 10 km for clothes and 20 km for furniture. Accordingly the number retailers within the community would depend upon the type of product sold (eg lots of delis/milk bars and few furniture specialists).

However, the motor vehicle has distorted this pattern with milk bars and district retail centres becoming economically unviable. Once people are in their car, they are prepared to travel further to reach a larger regional centre with more choice.

It is advocated that the service station has largely replaced the corner store in strictly economic terms. However, this development represents a move away from sustainability as service stations are not dispersed throughout the neighbourhood but concentrated on major transport arterials. Their physical distance separates them from the community they serve and often necessitates a motor vehicle to access them. A return to corner stores returns a valuable social and economic node to the community and negates access to a motor vehicle for convenience items.

4. Mixed-use zonings can improve the vitality of neighbourhood or shopping precinct by allowing complementary activities to exist adjacent to one another. Shops with accommodation above are examples of this approach. The advantage of mixed-use zonings is to maintain a level of activity over longer periods with restaurants, retail and accommodation activity peaking at different times. This creates more vital atmosphere as distinct from dormitory suburbs and can contribute to a greater feeling of security and prosperity.

5. Home office or telecommuting has been advocated widely as a solution to increasing commuting times and traffic congestion. Its application remains valid under certain circumstances although its adoption has remained below expectations. Accordingly, provision can be made within the urban design, zoning provisions and homes to facilitate telecommuting.

Relevant Topics:

Infrastructure
Urban Design
Transportation

4.8 Waste Management

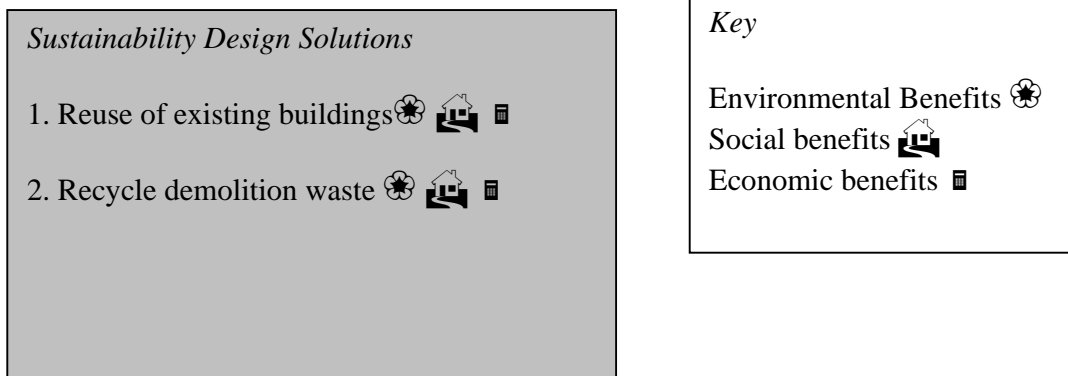
Sustainability Goal: To reduce the volume demolition and construction waste being consigned to landfill

Measures:

Reduced construction and demolition waste in landfill
Conservation of historic buildings

Application:

Construction materials
Building restoration



Notes:

General

Waste management has limited implications for sustainability at the masterplanning design stage. Notwithstanding, it is important to recognise waste management as an important component of residential developments.

1. Reuse of existing buildings, where practicable, conserves the embodied energy present in those buildings. Embodied energy is the energy that was used to harvest natural resources (timber, stone & clay) and manufacture them into building materials (planks, mortar & bricks). Disposal of those products releases the embodied energy and requires further resource expenditure to create new building materials. The application of this principle is primarily confined to brownfield developments where existing buildings can be converted.

2. Recycling demolition waste is similar to point one in that it reuses the fabric of existing buildings within new structures. Bricks and timber are commonly recycled for this purpose. From a sustainability perspective, it conserves the embodied energy of the product and reduces the volume of demolition waste entering the landfill.

Relevant Topics

Heritage
Urban Design

4.9 Heritage

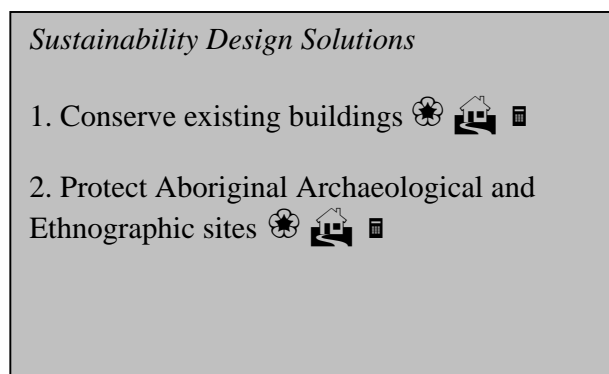
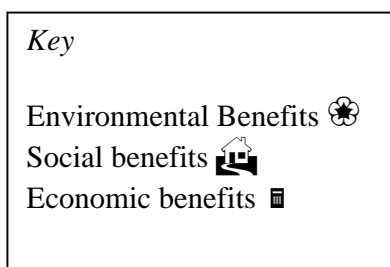
Sustainability Goal: Conserve historic buildings and gardens
Protect Aboriginal Archaeological and Ethnographic sites

Measures:

Decreased demolition of existing buildings

Application:

Heritage building conservation
Increased number of listed Aboriginal Heritage sites



Notes:

1. Conservation of existing historic buildings contributes to the sustainability of the urban design by recognising the history of the land. Old buildings convey the passage of time and create a sense of place or identity. Farmer’s cottages like those at Rouse Hill or warehouses typify the type of buildings encountered by urban release proposals. Heritage buildings become landmarks within new residential developments aside the modern milestone exemplified by the ‘Golden Arches’.

2. Aboriginal Archaeological and Ethnographic sites have to be protected by law. The stories associated with a site can serve as a valuable narrative in interpretative material for open space, if the custodians permit the disclosure of the site’s existence.

Relevant Topics:

Infrastructure
Water Cycle Management
Urban Design
Recreation/Open Space
Biodiversity
Waste Management

4.10 Energy Conservation

Sustainability Goal: To minimise energy consumption










Measures:

Reduced power bills


Application:


Road layout
Lot orientation


Sustainability Design Solutions

1. Passive solar lot orientation   
2. Model sustainability display homes  

3. Tree retention   

Key

Environmental Benefits 

Social benefits 

Economic benefits 

Notes:

1. Passive solar lot orientation enables the house to be positioned in a manner, which the majority of living spaces face toward the north. Areas such as the kitchen, dining room and living room have windows that orientate to the north. The south side of the building is therefore reserved primarily for bedrooms. This potentially minimises the number of windows facing the east and west that would ordinarily receive the sunrise and sunset and cause the house to overheat. A northern orientation allows the winter sun to penetrate the house but excludes the summer sun as it climbs higher into the sky.

The implications for urban design are as follows:

- Align streets east-west and north-south
- If 45 degree angle streets are unavoidable, then angle lots to improve solar access
- Concentrate highest density lots on north facing slopes and north facing streets

- Allow for wider lots and/or allow buildings to the southern boundary when lots face an east-west street
- Allow for deeper lots on south facing slopes
- Allow attached housing only when each dwelling can face north
- Use difficult lots for non-residential uses

2. Display homes are a common feature of urban release areas. Accordingly, the opportunity should be embraced to exhibit sustainability best practice. This has been undertaken in Rouse Hill, Sydney where the passive solar features of the display home are emphasised. A rainwater collection system and drought adapted (xeric) garden are also highlighted.

3. Tree retention has already been noted within this report as a sustainability feature of urban release areas. Tree retention aids energy conservation through shading. Planting of deciduous trees may be considered on the immediate north side of houses as they provide shade in summer while admitting light in winter.

Relevant Topics

Transportation
Urban Design

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