CITY OF GOSNELLS

SafeCity URBAN DESIGN STRATEGY

MAKING THE CITY OF GOSNELLS A GREAT PLACE

Crime follows opportunity. Making crime harder to commit by designing out opportunities can limit crime significantly, as can considering the needs of vulnerable people and ensuring strategies for greater connectedness to community.

These are the principles underpinning the City of Gosnells *SafeCity* Urban Design Strategy.

When we look at the big picture we know that most places have no crime, and most crime is highly concentrated in a relatively small number of places. Some shops have no robberies, while a few have lots. A few entertainment venues have many problems, most have none. Even in high burglary neighbourhoods most residences have no burglaries, while a few suffer from repeat burglaries. Understanding crime 'hot spots' is very important in developing preventative measures. Blocking criminal opportunities takes place by understanding place – its design and layout – and the different strategies that are appropriate for houses, flats, shops, warehouses, factories, public transport, parks, pubs and other elements of the built environment.

Public space contains risks, but the risks can be lessened by channelling movement patterns and dividing human activities into smaller and more manageable chunks. Public spaces like parks and streets should not be too large, and public

shopping or transport facilities or housing developments shouldn't have vast unassigned spaces. Manageable chunks can help provide social control and thus crime control.

In the City of Gosnells most housing is detached and there is low pedestrian movement. As a result the planning lessons that can be learned from overseas experiences are not always applicable in Australian cities. Furthermore we know that Local Governments do not have control over all of the factors that make for an environment which fosters safety and security. But they can be a positive force for change.

We know that those who feel excluded from participation in community life are more likely to offend against that community. Councils' willingness to address this sense of exclusion can reduce the risk of offending, as can the complementary strategy of reducing opportunities for crimes to be committed through the design, planning and structure of our neighbourhoods. Recognising that the physical environment influences the where and what of crime problems, designing natural surveillance, using building design to put more "eyes on the street", focusing on natural access control and surveillance all contribute to creating a setting in which access control and surveillance are brought about by the normal and routine use of the environment.

The City of Gosnells has taken an enormous leap forward by building on its many years of dedicated experience and publishing this important guide which incorporates crucial design principles with a realistic understanding of the features that make people live comfortably and safely in a thriving Australian city. This is a most useful and innovative publication, and a major contribution to better design, safety enhancement, and the creation of a community in which we all feel comfortable in being able to go about our daily activities in a relaxed and uneventful manner.

I congratulate the City of Gosnells on this publication, but more importantly, on the values and commitment that underpin it, and look forward to the action that will flow from it.

Dr Adam Graycar
Director
Australian Institute of Criminology, Canberra

Why does a Local Government become involved with crime and community safety issues? Simply because the local community asked us to do so.

In response to a customer satisfaction survey, the City of Gosnells has been pro-active, with an innovative study addressing the environmental components that affect crime. The Council has taken a leadership role in setting up the *SafeCity* Initiative and by commissioning a Space Syntax study, both of which have far reaching implications.

Very specific recommendations are contained in the City of Gosnells *SafeCity* Urban Design Strategy resulting from our innovative work on sustainable crime prevention. This is the strategy we would like to pursue, from which policies and other initiatives will be developed.

We are looking at the 'big picture', and developing appropriate policies. The benefits will not always be immediately distinguishable, but they will become apparent over time. A far easier option would be to use reactive measures. These measures can cost ratepayers millions of dollars and still not deal with the core issues that allow crime to occur. It is our intent to deliver real solutions which can offer tangible benefits

There is convincing data to suggest that the investment that Council has made in taking this

approach will pay off in the medium to longer term. The City of Gosnells is committed to taking a multi-faceted, long-term approach to how the built environment and crime affect each other.

Council is also committed to gaining the support of town planners, architects and the wider community to make the City of Gosnells a much safer place, and a local authority that others will look to, for having set the benchmark in this way.

Cr Patricia Morris JP
MAYOR

SafeCity URBAN DESIGN STRATEGY

This report gives the background to the City of Gosnells *SafeCity* Initiative and it also explains the *SafeCity* Urban Design Strategy.

Because it links in closely with the *SafeCity* Urban Design approach, we also publish a summary of the findings of a study completed by researchers at Space Syntax Ltd, London, on behalf of the City of Gosnells. This study sets a benchmark for the future of urban design with respect to safety. (See page 5.)

The Space Syntax document, "The Crime and Urban Design Database", was delivered to the City of Gosnells in May 2001. It contains a good deal of technical information and will, therefore, have limited release. It will be available, on request, to researchers, and may be viewed at public libraries.

The *SafeCity* initiative and the Space Syntax findings are part of a broader program. Both should be used in an on-going educational process to encourage deep consideration to be given to the spaces we design, thus making for safer surroundings.

By spearheading the *SafeCity* initiative and commissioning the Space Syntax study, the City of Gosnells is sending a clear message that it is focused on, and committed to, taking a multi-faceted, long-term, coherent approach to how the built environment and crime are connected with each other.

Changing the urban form will not happen next week. Change, for the better, will occur gradually, and only with the support of Council and key stakeholders, including town planners, architects and the wider community.

Very specific recommendations have been made, which are not yet policy. From this strategy we would like to pursue the incorporation of the recommendations into a range of policies.

Although every effort has been made to keep this summary report less technical, some terms have been used which may be unfamiliar to readers. A glossary is provided at the end of this document.

BACKGROUND

In 1997, the Council undertook a community survey, asking ratepayers and residents to identify critical issues that the City of Gosnells needed to address.

Two main concerns were identified:
1. Community safety (even though the rate of crime in the City of Gosnells was below the average rate in Western Australia).
2. The Gosnells Town Centre needed to be improved.

Work on the Town Centre was undertaken, and the impact of the ensuing Town Centre Revitalisation Scheme was striking. The results have been recognised with numerous awards.

To address concerns about community safety, the City of Gosnells Council took a leadership role in setting up a *SafeCity* Task Force to develop key partnerships, and coordinate the local efforts of the Council, State Government agencies, local community organisations and the WA Police.

The *SafeCity* Initiative was launched, which includes a wide range of programmes and projects intended to address both the perception and actual incidence of crime.

The various initiatives fall under three broad strategies, namely:

- **An Establishment Strategy** This involved research into the nature of crime, enabling more targeted crime prevention strategies to be developed.

  The establishment research is essentially a "desk-top" inquiry into the nature of crime in the City of Gosnells, and a comparison with other areas in the State, and other States in Australia.

- **A Bridging Strategy** This incorporates short-term measures to address priorities.

  The programmes are intended to diminish the negative perception of crime in the City, as well as address actual criminal patterns or crime "hot spots".

- **A Preventative Strategy** This is a long-term strategy to reduce crime.

  It involves detailed evidence-based research into crime patterns, to identify the role the built environment plays in crime reduction. "Designing out Crime" and CPTED (Crime Prevention Through Environmental Design) are the main directions this strategy takes.

It is a holistic approach, and should include environmental redesign to reduce opportunities for crime, as well as address issues such as:

    job creation
    the improvement of choice and
    variety of activities in the City of Gosnells.

The *SafeCity* Initiative was described by the then WA Commissioner of Police, Bob Falconer, as "the best community safety strategy in Australia".

The revitalisation of the Gosnells Town Centre is a key "early start" scheme in meeting these objectives.

Fig 1. Gosnells Town Centre revitalisation - partial plan.

Fig 2. Gosnells Town Centre – vision for a new "Main Street".

This *SafeCity* Urban Design Strategy is intended to provide a framework for policy development within the City of Gosnells. As a critical component of the Council's broader set of strategic policies it will help to guide future development and redevelopment within the City.

Implementation

There are a number of implementation tools available to Council, some of which it has direct control over, and others it can only seek to influence.

Subdivision

While Local Government is required to comment on subdivision proposals, the determining authority in Western Australia is currently the Western Australian Planning Commission (WAPC).

The guidelines for subdivision and community structure as outlined in this strategy are not enforceable by the City of Gosnells.

The WAPC will, however, be guided by the provisions of the City of Gosnells Town Planning Scheme and zoning context. This, in turn, will be influenced by the *SafeCity* Urban Design Strategy.

The *SafeCity* Urban Design Strategy will also be used to influence changes to the WAPC policies relating to subdivision.

Land Use and Development Controls

Development and land use controls are determined by the provisions of Council's Town Planning Scheme and policies, which are developed in accordance with the Scheme.

The *SafeCity* Urban Design Strategy will form part of Council's Local Planning strategy, which will guide land use policy and changes to the Town Planning Scheme provisions.

Local Laws

Some aspects of the built environment that are not managed by the Town Planning Scheme or Planning Policy can be (or are) managed through Local Laws, which are enforced under the Western Australian Local Government Act 1995.

The *SafeCity* Urban Design Strategy will guide changes to the current Local Laws (e.g. fencing) as well as the possible development of new Local Laws.

The drawings and sketches shown are indicative, and are not meant to curb creativity or be a standard for architectural style in the City of Gosnells.

Designers are faced with an important choice when it comes to improving safety performance and "designing out crime".

Two theories have emerged, which offer conflicting advice:

1. turn inwards and design segregated and enclosed enclaves, and barricade houses, streets and neighbourhoods, and
2. design to connect and integrate areas and communities, and humanise streets and neighbourhoods.

In recent times there has been an increase in the popularity of "gated communities", where whole areas are cut off and segregated by closing streets, or walling suburbs in order to improve safety. This is highly influenced by the Defensible Space theory and practice developed by architect Oscar Newman ("Defensible Space" 1972), which has been increasingly criticised by researchers, designers and police forces.

"Experience has shown that turning inward has actually increased crime."
(Wekerle & Whitzman, 1995, p53)

The evidence-based research in the City of Gosnells supports this concern. Designers, therefore, must aim to:

• achieve connection and integration
• improve surveillance
• analyse the important social, economic and environmental consequences of design.

Good design is not only essential to improve safety in houses, streets, neighbourhoods and the City, but it can help reduce costs to the broader community as it reduces the need for prisons or larger police forces.

From the Establishment Strategy, research has highlighted the nature of crime in the City of Gosnells. The greatest number falls into the category of "crimes against property" and includes home invasion, burglary, and vehicle theft. In these types of crime, the built environment and location are significant. Safety could therefore be improved by better design and management of the built environment.

The City of Gosnells recognised that taking a long-term view to improving the built environment would provide the greatest potential for long-term success. However, to clearly understand the links between crime and design, the City commissioned researchers at Space Syntax, London, to work with them to analyse over 20,000 crimes committed in the City of Gosnells during the period July 1997 to July 1999.

This innovative method of analysis began in 1998, and was a "first" for WA, and indeed, has broken new ground in Australia. The use of GIS (Global Information Systems) technology in conjunction with Space Syntax techniques and crime data has also broken new ground internationally.

The Space Syntax research clearly identifies how the environment contributes to some crimes. The Space Syntax report "The Crime and Urban Design Database" was submitted to the City of Gosnells in May 2001, and a summary of findings are published on pages 9 to 13.

The *SafeCity* Urban Design Strategy draws on the findings of this report, as well as other literature, design policies and strategies, to provide guidance for policy and decision-making to help make the City of Gosnells safer over time.

Beyond this strategy, the City of Gosnells will develop a range of specific initiatives. These will include promotional programmes, information to residents and landowners, lobbying of State and Federal Governments and other relevant external agencies, and new and modified planning policies and Local Laws.

In the 1970s, Professor Bill Hillier initiated the "Space Syntax" research programme at University College London. Since then, he and his team have developed techniques that analyse the relationship between spatial layout and function.

Space Syntax research supports the view that connected and integrated areas can be safer than complicated, broken-up layouts. Studies have shown that the key to making areas safer from burglary is high levels of "natural surveillance" from residents and, crucially, from passers-by on foot and in vehicles. Space Syntax analysis objectively measures levels of natural surveillance in urban layouts. In doing so it provides a robust tool for studying and tackling crime.

The key to the computer modelling technique is the "axial map" (Fig 3). The axial map is constructed by drawing the longest and fewest straight lines (or "lines of sight") that pass through all the accessible space in an urban area on an accurate scale map. The resulting pattern of intersecting lines is then digitised into the computer and all the inter-relationships among the lines are analysed so that an understanding of the spatial structure and features of an area is built up.

The most important measure for forecasting the potential movement along a line is called "spatial integration". This is calculated by selecting a line on an axial map, and calculating how many other lines must be used wholly or in part to reach every other axial line in the area being analysed. It turns out that some lines require fewer changes of direction than others in order to cover the rest of the axial map. These lines are "more integrated".

In every processed axial map each line has an "integration value" assigned to it. This value reflects the complexity of routes from that line to all the others within the system. This complexity affects pedestrian and vehicular movement potentials in two key ways. First, an integrated line is more easily accessible than a "segregated" one because it can be reached by simpler routes. Second, a more integrated line is more likely to be selected as part of a route between other pairs of lines; that is, it will attract more through movement. It is the combination of their role in "to" and "through" movement that gives "integration values" their power in helping to estimate movement potential.

Values of integration are converted by computer into a coloured graphical representation called the "spatial integration map" (Fig 4). The most integrated lines are automatically coloured red, then through orange, yellow, green, to blue and deep blue for the least integrated. The importance of graphical representation is that many functional properties of the layout (including movement, land use, land value and urban safety potential) can be seen at a glance. Statistical analysis can then be used to confirm what the eye sees.

In summary, Space Syntax analysis provides objective, evidence-based tools for studying urban areas and developing proposals for redesigning these to promote successful space use and safety.

Fig 3. Axial integration map and crime events (Space Syntax, May 2001).
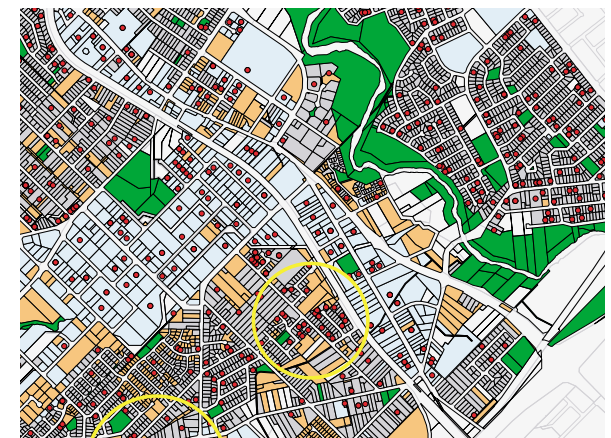

Fig 4. Land-use map and crime events (Space Syntax, May 2001).

The "Crime and Urban Design Database" prepared by Space Syntax summarises the findings of the evidence-based research as follows:

EXECUTIVE SUMMARY AND RECOMMENDATIONS

The report presents the findings of one of the most comprehensive studies of crime and urban layout in the world. This study was undertaken by Space Syntax at University College London on behalf of the City of Gosnells. The findings of the research show that urban layout has powerful effects on safety. They also suggest urban design guidelines that can be adopted to mitigate risk.

1.1 Aims of the Study

Space Syntax was commissioned by the City of Gosnells in 1998 to investigate the relationship between spatial design and crime vulnerability in the district of Gosnells and to provide strategic planning guidance on how urban design can contribute to crime prevention. A first stage report on this work was delivered in March 1999. The second report develops the findings of the first stage work. It also proposes a number of design guidelines emerging from the research and makes several recommendations for future research.

1.2 Predisposing Background Factors

Two background factors are likely to affect the relation of crime and urban layout in Gosnells:

- as shown by the earlier study, pedestrian movement in Gosnells is very low, averaging only six people per hour (or one person every ten minutes)
- most houses in Gosnells are detached (which have been found in previous studies to be the most vulnerable type)

On the basis of previous research these factors, separately and in combination, are likely to make the criminal"s task easier, especially the burglar.

1.3 Relations at "Plot" and "Sub-Area" Level

Against this background, a number of very striking relations between the pattern of crime – especially burglary – and spatial layout have been brought to light by this study. These relations are found both at the level of the "plot" – i.e. the individual dwelling in its context – and at the level of the "sub-area" – i.e. the aggregation of plots in a distinctive local layout. The six sub-areas studied are: Maddington, Kenwick, the section of Thornlie north-east of Spencer Road, Gosnells East, Gosnells North and Gosnells West.

1.4 Highlights and Hot Spots

There are a number of burglary hot spots across the wider study area, most notably the north-east section of Maddington that has a very small-scale, broken-up and complex cul-de-sac pattern. There are also hot spots in Kenwick, again seemingly associated with parts where space is more broken up. Thornlie overall is a burglary hot spot – though it also has the lowest levels of car crime.

1.5 Differences in Sub-Area Crime Rates

There are substantial differences in burglary rates between the sub-areas. Thornlie has the highest burglary rate, then Maddington, Kenwick, Gosnells West and Gosnells North. Gosnells East has the lowest burglary rate. The strong differences between burglary rates are not reflected in parallel differences in other crime rates.

Easier-to-Burgle and Harder-to-Burgle Sub-Areas

At the sub-area level, burglary is strongly correlated to spatial layout, while other crimes are not. This suggests:

- that burglary is the crime most affected by spatial layout
- that the differences between sub-areas are unlikely to be explainable by social factors, since if this were the case then other crimes would reflect the same pattern as burglary, but they do not – for example, the two lowest burglary sub-areas have the highest rates of stealing which is a social rather than spatial crime; and therefore
- that there are in Gosnells sub-areas that are easier to burgle than others due to layout factors.

Layout Factors in Sub-Area Burglary Rates

The key layout factors in sub-area burglary rates are:

- integrated sub-areas like Gosnells East and North have substantially lower burglary rates than more segregated sub-areas
- a sub-area made up of longer sight-lines is less vulnerable that one made up of shorter lines
- the weaker the "intelligibility" (the relation between the "global integration" and "connectivity") of a sub-area, the higher the risk of burglary:

Bivariate scattergram with regression split by area

Legend: Gosnells East, Gosnells North, Gosnells West, Kenwick, Maddington, Thornlie

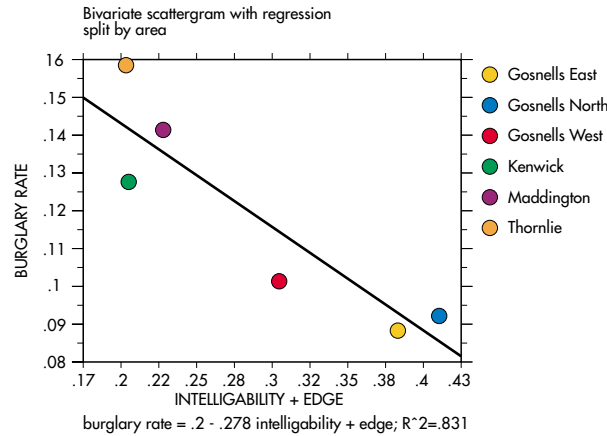burglary rate = .2 - .278 intelligability + edge; R^2=.831

Fig 5.Correlation between burglary rate and spatial layout.

- the weaker the "synergy" (the relation between "global integration" and "local integration") of a sub-area, the higher the risk of burglary.

Overall the effect is that more grid-like sub-areas have lower rates than sub-areas where space is more broken-up.

1.6 Differences by Road Type

There are substantial differences in burglary rates on different road types. We also find a substantial difference between dwellings in cul-de-sacs which are on the first line of sight into the cul-de-sac from the through road, and the visually "deeper" parts of cul-de-sacs:

- the burglary rate for "vehicular" cul-de-sacs (i.e. cul-de-sacs that are linked together by footpaths) is higher than for through roads, but not significantly so
- in "vehicular" cul-de-sacs the burglary rate for the "first line in" dwellings is significantly lower than for dwellings in the deeper parts of the cul-de-sac
- in the deeper parts of the "vehicular" cul-de-sac the rate is significantly higher than for through roads
- the burglary rate for "pure" cul-de-sacs (i.e. cul-de-sacs that prevent both vehicular and pedestrian through movement) is significantly lower than for other road types
- in "pure" cul-de-sacs the burglary rate is also significantly lower for the "first line in" dwellings.

These results show that the City of Gosnells as a whole benefits from the fact that most of its cul-de-sacs are simple, linear and connected visually to through roads. This is confirmed by the fact that the worst burglary hot spot in the sub-areas is the north-east part of Maddington, the only case in Gosnells of a sub-area designed as a complex system of interlinked cul-de-sacs.

1.7 Differences in Road Types by Sub-Area

There are very large differences by road type in the different sub-areas. In Gosnells East, West and North, cul-de-sacs in general are less vulnerable than through roads, while in Maddington and Thornlie they are the most vulnerable. In general "pure" cul-de-sacs are also safer than "impure", but in Kenwick they are less safe.

It is therefore unwise to generalise about the merits of cul-de-sacs or through roads. The greater or lesser vulnerability of either will be strongly affected by the context and by the actual cul-de-sac layout.

1.8 Differences at the Level of the Individual Plot

There are substantial differences in burglary rates for different kinds of plots. In terms of "local" design characteristics:

- we find lower burglary rates for dwellings that face other dwellings
- we find lower burglary (and car crime) rates for dwellings with open or semi-open fronts
  i.e. your neighbours keep you safe, especially those on the other side of the road who you can see and who can seen you

- the same is true of rear and side boundaries: closed means higher burglary rates – the 1.8 metre fibre-cement boundary wall in itself makes no difference
- having secondary exposure of any kind, whether to open space or onto any kind of route increases vulnerability substantially.

1.9 Interaction Between the Variables

Through a substantial program of analysis we have constructed a "logistic regression model" of the factors affecting vulnerability to burglary that is remarkably robust in its findings:

- higher global integration decreases the risk of being burgled by about 45%
- higher connectivity, when accompanied by lower integration, increases the risk by about 30%
- facing other fronts decreases risk by about 29%
- having secondary exposure increases risk by about 32%.

1.10 Design Guidance Emerging from the Study

These findings, and the way in which they augment and deepen the understanding that has been achieved from other studies, permit clear conclusions and design guidance to be drawn:

First, the relation between crime and design has to be understood at the level of the sub-area as a whole, and the relations between sub-areas, as well as at the detailed level of the dwelling. Residential design must therefore take place at both levels if risk is to be minimised through design. In particular:

- local sub-areas must be well structured by a pattern of strategic routes linking centre-to-edge
- these routes should be continuous, not fragmentary
- local, less-integrated sub-areas should not be strongly separated from these centre-to-edge lines
- overly complex and unintelligible sub-areas, especially adjacent to main roads, will always be vulnerable.

Second, and quite simply, do not design whole areas or sub-areas as systems of vehicular cul-de-sacs linked by footpaths – this is the most vulnerable form of layout.

Third, design areas overall as linear networks of streets. These need not be grid-like, but should be sufficiently linear to give a clear and simple structure to the area, to its movement pattern, and to its relations to the neighbouring areas.

Fourth, this "sufficiently regular" grid of through streets may then be interspersed with simple, linear cul de sacs visually connected to a through street and therefore sharing its overall visibility field – these should not be interconnected either with open spaces or footpaths.

Fifth, all dwellings should be faced by the entrances of other dwellings on the other side of the road, and as much as possible of the system of space should be continuously faced on both sides with dwelling entrances (or entrances to blocks of apartments).

Sixth, the layout should not be overly permeable or impermeable. There must be enough connections to minimise movement distances from all parts of the system to all others, but overprovision of permeability will both diffuse and de-structure movement and will also create spaces which are poorly used for movement. The rule is "access-without-use" increases risk, but access with good potential use (i.e. high connectivity "in line" with high integration) should always be created.

Seventh, secondary exposure of dwellings (through adjacency to open space, footpaths, alleys, carparks etc) should be minimised.

These guidelines summarise the main findings of the research but they do not advocate any particular "style" of residential development and are not intended to stifle the creative energies of housing and urban designers. They should instead be treated as "minimum standards" that new proposals can be measured against.

Nor do the guidelines advocate any particular type of street. They do not say "don't build cul-de-sacs" or "only build through streets". The analysis of the six sub-areas shows how many cul-de-sacs in the City of Gosnells are safe and some through streets are not.

Instead, the guidelines provide a set of standards against which new designs can be tested. Some of these tests can be carried out "over the drawing board", for example:

- *do proposed housing units face others (whether these are existing or proposed)?*
- *has secondary exposure been minimised?*
- *what type of streets are being proposed?*
- *are routes continuous or fragmented?*

Other tests can be carried out using the Space Syntax computer model, for example:

- *are lines of sight sufficiently long?*
- *is the proposed housing area sufficiently globally and locally integrated?*
- *are levels of connectivity "in line" with levels of integration?*
- *is the layout intelligible?*

1.11 Conclusions

The central conclusions of the research are that:

- *patterns of burglary are highly influenced by spatial layout and can be effectively analysed using Space Syntax research techniques*
- *burglary patterns are strongly affected by local-to-global relations i.e. by the overall layout of the street network and the linkages within and between sub-areas*
- *burglary patterns are also affected by local design factors such as the height of the boundary wall (higher is not safer) and the inter-visibility of dwellings (more intervisibility is safer)*
- *these factors must be considered at the earliest stage when planning new housing or refurbishing existing areas*
- *more vulnerable streets and more vulnerable areas can be identified through Space Syntax computer modelling. New housing proposals should be subject to scrutiny using the City of Gosnells Space Syntax model*
- *safer streets and ultimately a Safer City can be created if the factors that influence burglary are mitigated through careful policy-making and rigorous enforcement of design guidelines.*

Space Syntax
Professor Bill Hillier
Shinichi Iida
Maria Zerdila
Tim Stonor

STRUCTURE

The *SafeCity* Urban Design Strategy sets out:
Safety Objectives,
Safety Principles and
SafeCity Design Recommendations

SAFETY OBJECTIVES

There are three Safety Objectives:

1. To reduce the opportunity for crime in the City of Gosnells, and reduce the fear of crime for residents.
2. To reduce crime and not just displace it to other places in the City.
3. To consider the needs of the most vulnerable groups in society. These groups fear crime more than others, therefore their needs should be met as a priority.

SAFETY PRINCIPLES

Drawing on the evidence-based research conducted in the City of Gosnells, relevant literature and other strategies and documents, these Safety Principles are important in meeting Safety Objectives, and they provide the basis for all Design Recommendations.

There are four Safety Principles:

1. To reduce the isolation of people, houses, and areas, which make them vulnerable to crime.
2. To maximise visibility and surveillance. If there are "eyes on the street" or "natural surveillance" from passers-by and neighbours, people feel safer and criminals feel exposed. Natural surveillance should be the primary aid towards crime prevention.
3. To make a clear distinction between private and public areas. This involves reinforcing a sense of ownership. Where areas are doubtful, they are not "claimed" and become the focus of anti-social and criminal behaviour. This is often unchallenged because of a lack of ownership.
4. To create balanced relationships in streets and public places so that pedestrians feel comfortable and safe. If more people are encouraged to walk surveillance is increased.

SafeCity DESIGN RECOMMENDATIONS

The City of Gosnells *SafeCity* Urban Design Strategy is applicable at various scales, from the design and development of overall suburbs and towns, to the scale of individual buildings.

The *SafeCity* Design Recommendations are specific requirements, which incorporate the Safety Principles, and will meet the Safety Objectives over time.

The Design Recommendations are set out in seven areas, namely:

1. URBAN STRUCTURE

2. STREETS AND PARKING

3. SUBDIVISION AND HOUSES

4. PARKS AND LANDSCAPE

5. FENCES AND WALLS

6. WINDOWS AND DOORS

7. LIGHTING AND SIGNAGE

Design a coherent network of neighbourhoods, which has clear and legible structure, and where neighbourhoods cluster to support town centres.

- Neighbourhoods should be defined as the area within a five-minute walk (400 metre radius) from a Neighbourhood Centre, which could include a public transport stop, local shopping area, community facility, or a combination of these and other facilities.
- Neighbourhoods should be clustered to support town centres with direct linking streets between neighbourhoods, and between neighbourhoods and town centres.
- Design layouts which integrate and connect areas rather than segregate and isolate.
- Neighbourhoods should be designed with long sight lines to improve legibility and intelligibility, i.e. the layout is easily understood.

Improve the legibility of towns and neighbourhoods by ensuring that access routes are easy to understand and use. If more people use an area it will be kept safer through "natural surveillance".

- The use of hierarchical patterns of streets should be avoided. Inter-connected networks and grids of streets should be designed to disperse traffic and increase motorist and pedestrian safety.
- One or two streets should link across a neighbourhood, from "centre" to "edge" to improve legibility and ease of use.

- Networks of streets should provide pedestrians with alternative routes.
- Street blocks should not, however, be too permeable, as the movement of people with all of the associated qualities of "natural surveillance" is a resource not to be wasted or dispersed.
- Overly complex street patterns should be avoided as these reduce legibility and use.
- Street networks comprising cul-de-sacs linked by public access ways (PAWs) should be avoided at all costs, as research shows that these produce areas most vulnerable to crime.
- Curvilinear patterns for major, linking streets should be avoided. A street does not have to be absolutely straight in its design, but the direct line of sight should not be broken up.
- Plan for net residential density in the range of 30-80 dwellings/ha to increase the number of potential "eyes on the street".
- Where well–used pedestrian paths exist through a land parcel, new subdivisions should incorporate and provide frontage to those paths.

Fig 6. Desirable urban structure. Neighbourhoods defined by five-minute walking distance (400 metres) from a neighbourhood centre, with net residential density of 30-80 dwellings/ha, clustered around a town centre with railway station. Neighbourhoods are linked directly to each other and with the town centre. Primary schools are located to facilitate easy, safe access, and are "shared" between several neighbourhoods. Large industrial areas, and other large land users are ideally located at the edge of the town or neighbourhood.
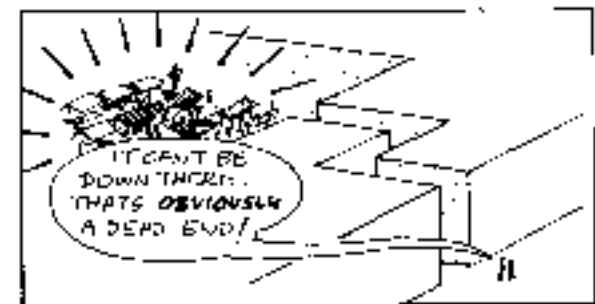

Fig 7. When layouts are "legible" they enable people to make use of areas. Without legibility people can become disoriented (Bentley et al, 1985).

Provide a variety of living, recreation and work opportunities to improve quality of life for people and reduce boredom, which can lead to criminal activity.

- Provide a mix of lot sizes to facilitate a mix of dwelling sizes and incomes.
- Provide a variety of parks and public places for passive and active recreation within easy walking distance from most houses.
- Ensure that these are very visible from adjoining properties, and well lit if used at night.

Grow the local economy by providing local work opportunities, including home-based businesses to provide jobs, vitality, quality of life and interest for all people.

- To achieve activity in areas throughout the day, a mix of land use should be promoted and allowed, and appropriate sizes of lots provided.
- Density in the range of 30-80 dwellings/ha will assist the economic viability of centres.
- Where non-residential land uses are planned, the change of land use should occur along the rear boundary of lots and not across streets to ensure compatible uses in streets.
- Home-based business should be located along busier roads in neighbourhoods, near neighbourhood centres, and at entrances to cul-de-sacs to promote constant activity and surveillance of areas.

Integrate new and existing development to assist in developing a sense of community and belonging to a broader neighbourhood.

- New streets should connect to existing streets and areas wherever possible i.e. no area should be developed as a separate "enclave".
- Major streets in new and existing development should link directly to each other.
- At least one or two streets should connect new development from centre to edge, and should be more or less in a straight line to improve legibility and ease of use.

Improve ease of use and access for cyclists and pedestrians.

- Pedestrian movement through an area should be the first consideration, taking into account people with disabilities.
- Street layout design should allow for cyclists, both experienced and inexperienced.
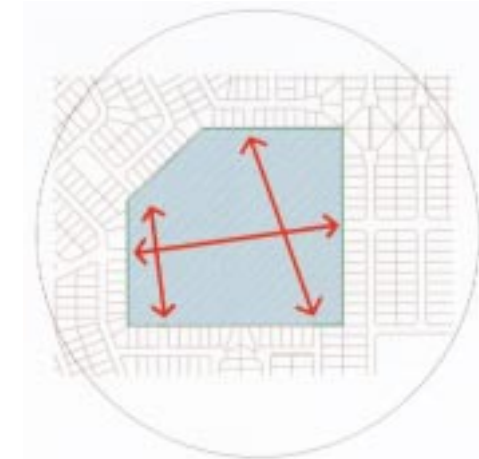
Fig 8. A notional site for urban infill – showing desire lines for access across the site. The circle represents a five-minute walking distance from the centre of the site. Note that the pattern of existing lots shows an inherent lack of connectivity and linkage.

Fig 9.Safe, sustainable development is achieved by integrating new and existing areas. (A) shows a possible site for new shops at an intersection. (B) shows possible sites for home-based businesses along main connecting streets. There are a variety of residential lots and local parks.

Avoid designs which isolate areas and houses, and limit the number of cul-de-sacs.

- Limit the number of cul-de-sacs in any development or neighbourhood.
- Cul-de-sacs should be no longer than 75 metres from the intersection with another street to the end of the cul-de-sac head.
- Curved cul-de-sacs should be avoided at all costs. Attempt to maintain a direct line of sight from adjoining streets to the deepest point in a cul-de-sac.

Increase surveillance in towns and neighbourhoods.

- Land should be subdivided to maximise potential surveillance and visibility.
- Re-orientate the end lots on the short side of the block. This "end grain" will increase frontage and avoid blank high fencing and walls. (See page 20.)

Ensure that there is a clear demarcation and distinction between public and private land, and that visibility is maintained between public and private land and spaces.

- To avoid the need for high walls and barriers, private space in dwellings and on lots should not be located adjacent to public spaces. A transition from public space to private space should be achieved through buildings. (See page 21.)

- Clear demarcation of private land is essential. Use low walls and fences to achieve this.
- Avoid providing any land where the ownership is ambiguous, it should be obvious that it is either entirely private or entirely public.

Use rear lanes only where required as these provide opportunities for criminals to gain access to rear gardens.

- Rear lanes must only be provided where lots are narrower than 9m, or where traffic volumes prevent safe vehicular access to blocks, or where front access cannot be achieved.
- On streets with volumes greater than 3,000 vehicles per day, lots should be designed to avoid reversing onto streets. In these circumstances the use of rear lanes is justified.
- Rear lanes should be as short as possible, and as straight as possible to facilitate good visibility from adjoining streets.
- Where possible rear lanes should have access control devices installed to limit unauthorised access.

Incorporate safe design principles in parking areas.

- Parking areas should be visible and should be designed to be overlooked from streets and occupied buildings.
- Clear pedestrian paths should be provided in all car parks which lead directly to streets and buildings.
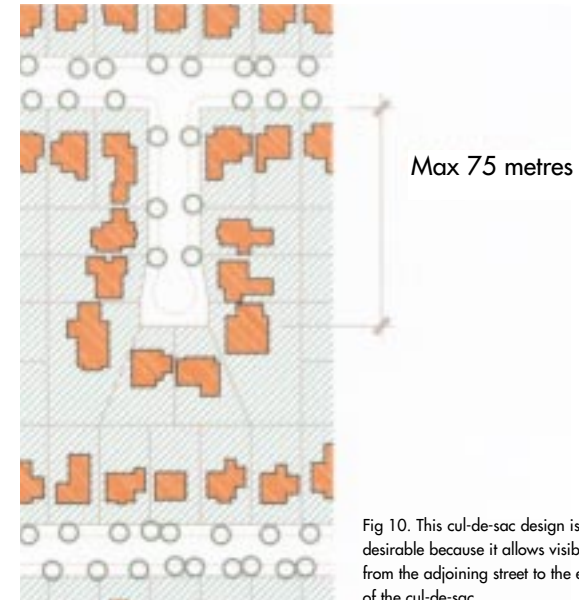

Max 75 metres

Fig 10. This cul-de-sac design is desirable because it allows visibility from the adjoining street to the end of the cul-de-sac.

Fig 11. Example of poor subdivisional design from a safety point of view. There are no streets which link "centre to edge", and the high number of long cul-de-sacs and public access ways lead to isolation and poor safety performance.

STREETS

Ensure that streets are designed to balance the safety needs of all potential users.

- Streets should be designed to support the designated speed limit.
- Traffic calming devices should be used to keep speed below or at the designated speed limit.
- Kerb radii should be kept to a reasonable minimum to cause vehicular traffic to slow to negotiate tighter corners and enable pedestrians to make the shortest possible crossing of traffic. This is especially important at high speed roads where the tendency is to provide greater kerb radii to accommodate cars.
- On-street parking should be provided wherever possible at all centres to slow traffic and protect pedestrians and shoppers from the negative impact of traffic while providing a "barrier of steel" between pedestrians and moving traffic.
- Bike lanes may be physically, but never visually, separated from vehicular and pedestrian traffic routes.
- Generally grade separation between modes of movement should be avoided and only considered if there are other traffic safety considerations. Grade separation isolates pedestrians and makes them more vulnerable to crime.

Design streets that encourage walking, as walkers offer the highest level of passive surveillance and "eyes on the streets". The more people that walk, the more "eyes on the street", which, in turn, encourages more people to walk.

- Both sides of a street should have a footpath, except where traffic volumes are below 1,000 vehicles per day, in which case, a footpath on one side is considered adequate.
- Ramps with a maximum grade of 1:12 should be provided for wheelchair and pram crossing at all intersections and other desirable crossing points.
- Pedestrian paths should be provided adjacent to the kerb in streets with traffic volumes predicted to be less than 3,000 vehicles per day.
- Pedestrian paths should be provided adjacent to property boundaries in streets with traffic volumes predicted to be more than 3,000 vehicles per day.
- Pedestrian paths should be 1.5m minimum width, widened to 2.0m in the vicinity of schools, shops and other activity centres.
- Traffic signals should be used at centres to regularly stop the flow of traffic to allow safe pedestrian crossing.
- A coherent and continuous network of lanes and paths for cyclists should be provided in accordance with Austroads Guide to Traffic Engineering Practice, Part 14: Bicycles.
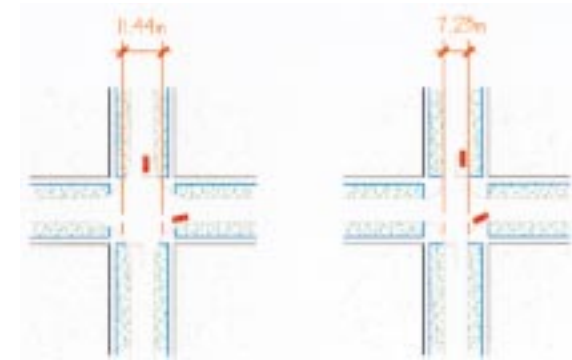- Pedestrian underpasses must not be considered as these pose great safety risks.

Fig 12. The importance of kerb radius geometry. As the radius of the kerb of this 7.2m wide street is increased from 6m to 12m radius, cars are able to travel faster, and the distance pedestrians have to cross increases by nearly 60%. This is more hazardous for pedestrians.

Fig 13. On-street parking as a "barrier of steel" protecting pedestrians.

Fig 14. Desirable positions of footpaths (A) for streets with fewer than 3,000 vehicles per day, (B) for streets with more than 3,000 vehicles per day.

- Pedestrian access ways should not be designed unless they are less than 30m in total length, and visually straight, with no recesses or kinks in their length and are clearly visible from adjacent properties, and well lit at night.
- Pedestrian paths should be provided in streets to ensure a continuous network of paths from all houses to town and neighbourhood centres, parks, schools and workplaces.

PARKING AREAS

Safe parking areas should be designed to support pedestrian movement to and from vehicles.

- In parking lots, clear pedestrian paths and networks should be provided to ensure safe pedestrian access through car parking areas to shops and other facilities.
- Where parking is provided within buildings, this should not be at the front of the building. Other active uses, such as shops or residential units should be used to animate the fronts of buildings, and provide surveillance of streets.

Parking areas should be visible from adjacent properties.

- Parking spaces should be clearly allocated to specific properties, and if remote from the house, then in clear sight of the house.
- Parking courts at the rear of grouped residences (flats and townhouses) should be avoided. The same does not apply to commercial properties, because large parking areas at the front of shops reduce pedestrian safety and comfort.
- Where rear lanes are used for vehicular access, position houses to provide surveillance of these lanes. This should occur during the subdivision process.
- Parking areas should generally be provided at the rear of single residential and commercial properties. In this way, surveillance of streets and commercial properties is maintained, and vehicles are parked in safety on private land. On-street parking should support retail and commercial properties.
- Visibility at night is a key consideration. Paths to and from parking areas should be well lit.
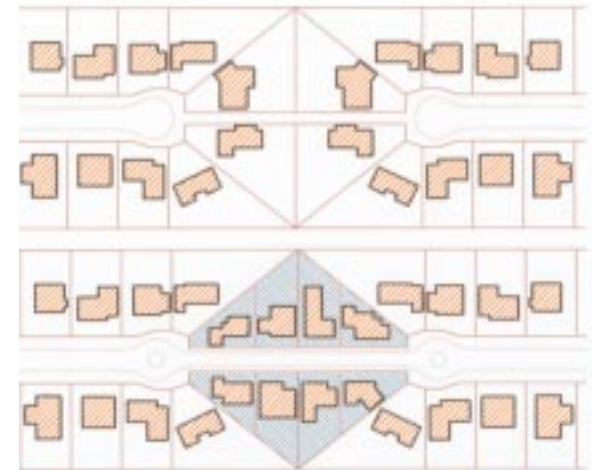
Fig 15. An example of the redesign of a public access way, or pedestrian path, showing the widening of the access way to allow for a 5m wide road for cars, and increased density and subdivision of lots as an incentive to provide a linking street.
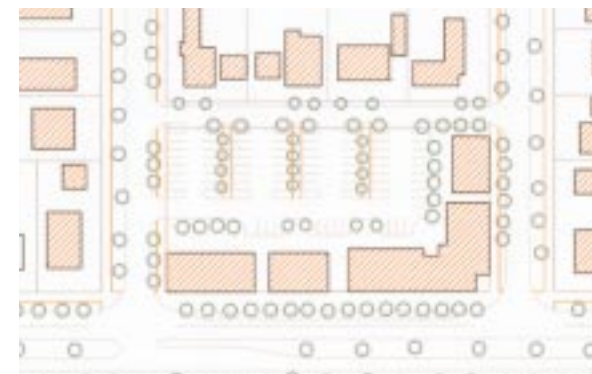
Fig 16. An example of a parking area designed for increased safety. Note the location of parking behind the commercial buildings, leaving the street frontage free for shoppers and pedestrians, and the fact that parked cars can be observed from people in the buildings. Dedicated pedestrian paths are designed to provide safe access.

Develop legible, safe and interesting neighbourhoods, which provide people with a range of living, recreation and work opportunities.

- Mix the size of lots to ensure a variety of dwelling size. This will encourage a mix of income groups and age groups. Locating aged persons units near first time home owners will ensure surveillance during most of the day and night.
- Locating civic and community buildings at the ends of important visual axes should increase the legibility of areas. This affords people the ability to orientate themselves in an area, making it more useable.
- Houses should be numbered logically.
- Lots along major roads should be sufficiently deep to allow for the future establishment of home-based businesses. Generally these lots should be deeper than 40 metres. Refer also to the section on Urban Structure. (See page 15.)
- Deeper lots on major streets allows for houses to be set back from noisy traffic, avoiding the need for high walls to reduce sound.

Maximise visibility and surveillance of streets and public areas.

- Turn lots at the ends of blocks to ensure frontage on short streets in order to maximise surveillance.
- Landforms should be used to increase surveillance.

- Entrances of all houses must face the street. It is not sufficient just to have windows facing the street. In multi-unit infill schemes, houses should face the internal street, with entrances directly from this street. The priority, however, is to have units face the public streets with at least a pedestrian path and gate from the public street giving direct access to the front door of the unit. "Natural surveillance" of streets is the primary aid to crime prevention.
- Houses on corner lots should be designed to offer surveillance of the street on both sides. Wherever possible, blank sidewalls should be avoided, and houses should be designed to "turn the corner". This helps increase surveillance, and reduces opportunities for graffiti.

Design to limit opportunities for unauthorised entry to houses.

- Every effort should be made to reduce the potential for blank walls. At the point of subdivision the implications of the end result should be contemplated. Subdivision should anticipate the eventual construction of buildings which are able to maximise surveillance, especially at corner lots.
- Houses should be designed to limit the number of recesses adjacent to entrances, which may allow opportunities for criminals to hide.
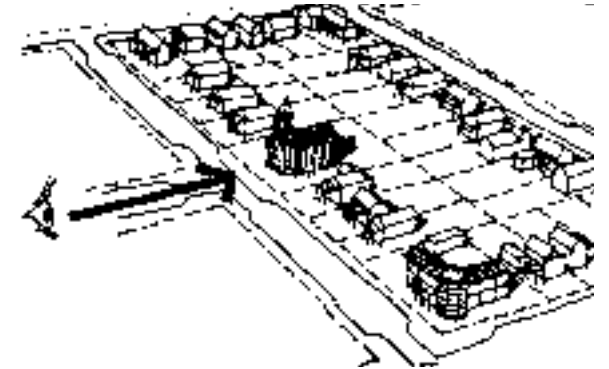

Fig 17. Public buildings such as churches and community halls located in such a way that they become landmarks which assist people to "read" and find their way around a neighbourhood.
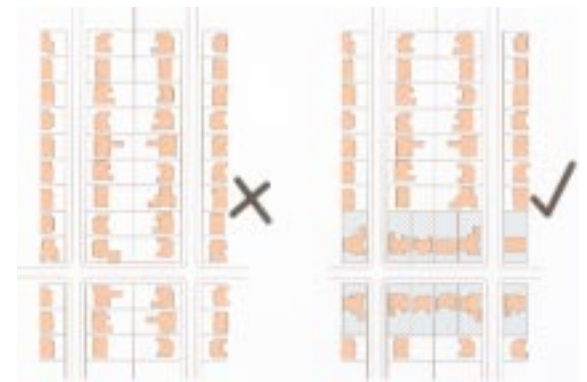

Fig 18. "End grain". Lots at the end of blocks designed to face the side street. This increases safety by avoiding blank side fences and increasing surveillance of streets.

Fig 19.The creative use of landform to increase surveillance of public areas.

Design appropriate and clear separation of public and private spaces.

- Other rear gardens or private open spaces should surround rear gardens. Where public and private space is co-located during the process of subdivision, the result is almost always unsatisfactory, and very often a blank wall. This decreases safety in public space because surveillance is reduced, and safety in the private space is also reduced because visibility is curtailed.
- Houses should be designed with the most public spaces near the street, and the most private to the rear of the building.
- Each unit in multi-unit developments should have its own distinct entrance from the street. When flats are designed up to three storeys, avoid deck access, and provide each flat with an entrance from ground floor. Flats above three storeys will require elevators and elevator lobbies. Ground floor units should be designed to provide surveillance of these areas.
- Public and private space should be clearly identified and demarcated to avoid ambiguity. Private space must be defined by a clear boundary which allows visibility. (See Fences and Walls, page 24.)

Fig 20. When designing buildings, ensure that the most public rooms, such as living rooms, are nearer the street; and the private rooms, such as bedrooms are located away from the street to increase privacy, and reduce exposure to noise at night.

Fig 21. This diagram shows a number of techniques which can be used to achieve frontage and vehicle access in difficult circumstances. (A) rear lane access, (B) reciprocal right of way, (C) battle-axe lots entering from a side street, (D) battle-axe lots entering from a back street, (E) battle axe lots facing a park. This should only be done when the lots facing the park are also north-facing, to avoid high walls fronting the park.

Maximise visibility and surveillance of parks and open spaces.

- Local parks should be easily seen from surrounding houses and streets.
- Paths in parks should be visible from nearby streets and houses.
- Locate children's play areas so they are visible from adjoining property and houses, but with physical barriers between the play area and streets.

Ensure that landscaping does not provide hiding places for criminals.

- Landscaping in parks should not block views of paths and open spaces from streets and surrounding houses.
- Where landscaping is provided in public open spaces, or adjacent to public open spaces like streets or parks, no plants or shrubs should be planted to block the field of vision between 700mm above ground level and 2,000mm above ground level.
- Trees should be regularly pruned to ensure high branching and avoid obscuring visibility.
- In parks there should be at least one safe route, with frequent "escape routes" back to surrounding streets and car parking areas.
- Where blank walls exist, consider planting bougainvillea or similar thorny plants to discourage climbing or graffiti on walls.

- Tall shrubs can provide hiding places, and should not be planted within 2m of footpaths.

Achieve good relationships between public and private spaces

- Parks should have streets and houses fronting streets on at least three sides to improve safety.
- Where houses "back onto" parks, they should be redesigned to create frontage to the parks in order to increase safety.
- Where parks are unable to be redesigned to meet safety requirements, consider means to discourage after dark use, such as reducing lighting and/or fencing the park.
- New subdivision layouts should avoid rear gardens backing onto public open spaces, streets or parks.
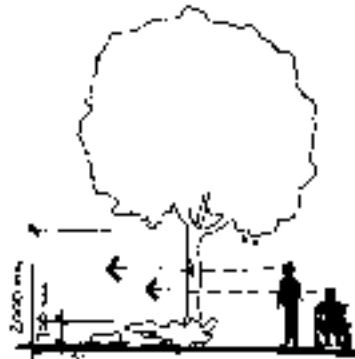
Fig 22. A diagram showing the zone in landscaped areas which should be clear of visibility blockage to increase safety.
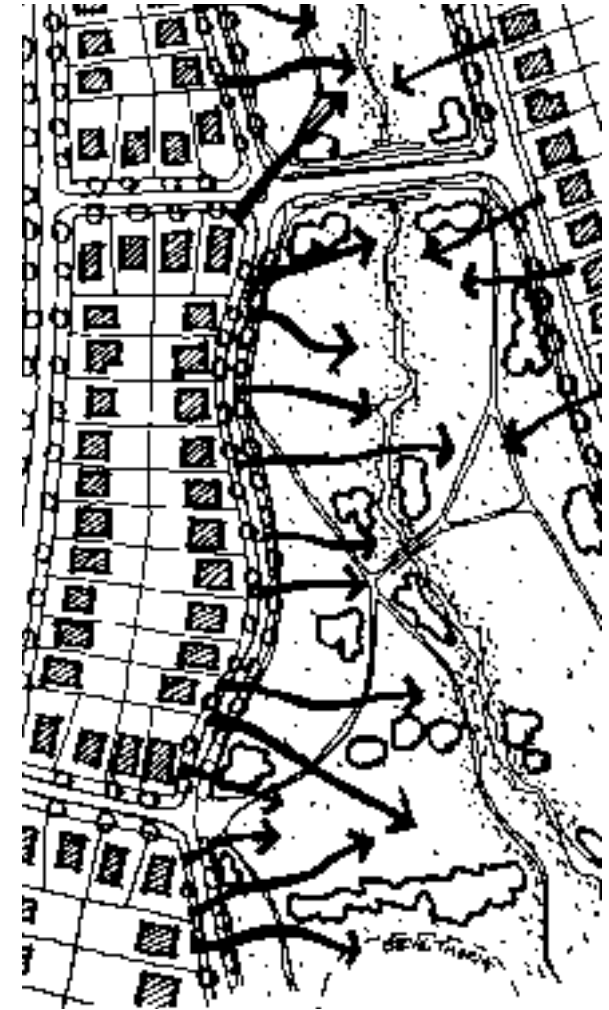
Fig 23. To improve safety in parks, and the perception of safety, it is important to achieve good visibility from adjacent streets and houses. Views should penetrate deep into the park.

Increase the use of streets, parks and open space by making them more appealing.

- Street trees should be planted at regular intervals to provide adequate shading for pedestrians on footpaths. If walking is pleasant more people will consider this as an option, which will increase "natural surveillance" in streets and open spaces.
- Motor cycle barriers should be provided at the entrances to parks to improve the amenity of walkers in parks.
- Views into parks from surrounding streets increase visibility of activities in parks, and make them more inviting. Avoid planting to obscure views.
- Active areas or sports fields where teams compete should be located away from houses.
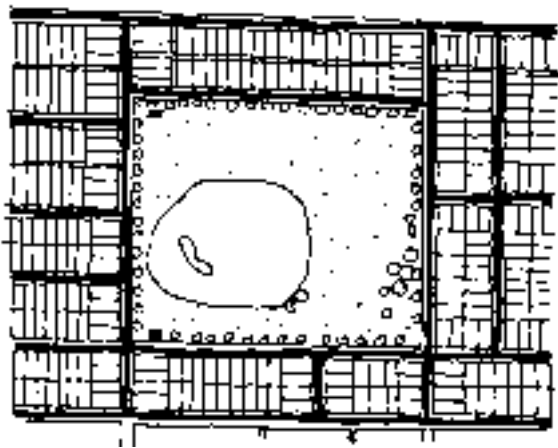
Fig 24. A Perth example of a good park design – Shenton Park.

Fig 25. An example of the redesign of a park to achieve better safety outcomes. The park has houses "backing onto" the park with high fences facing the park. This condition achieves poor levels of safety in both the houses and park. The redesign introduces new houses, which face the park, creating safety in the houses and in the new park. Streets have been connected to provide safe access to the park from surrounding areas.

Use fences and walls to achieve clear demarcation between public and private land or development.

- Ambiguous spaces tend to attract anti-social behaviour. There should be no such spaces in any urban area. If these exist, examine the possibility of incorporating the land into the nearest obvious adjacent area, either in public or private ownership.

Generally, high walls should be limited to providing barriers between areas of private land, while demarcation between private and public land should be via low walls and/or palisade fences, which allow visibility.

Maintain visibility and surveillance of public space. It is important to maintain visibility between houses and streets, as good security is provided by passers-by in streets and neighbours across the street.

- Low walls, fences, hedges or railings which are lower than 1,000mm in height to allow views over and through are best for front boundaries.
- Where timber fences are provided more than 1,000mm above natural ground level, timber railings or pickets should be spaced to ensure more than 50% visibility.
- Do not plant shrubs and plants that obscure visibility on front fences.

Achieve good levels of security.

- Where graffiti is a potential problem, railings or palisade fences are recommended. If an existing wall suffers graffiti or is a potential security hazard, bougainvillea or other thorny creeper can be planted to cover the wall, to discourage climbing and improve the attractiveness of the area. Care should be taken to prune plants to prevent injury to pedestrians on footpaths.
- Where walls are required, provide angled bases, which make climbing over difficult. Also angle coping stones at the top of walls.
- If security to a front boundary is required, avoid walls and fencing that reduce visibility. Palisade (or pool type) fencing is recommended.
- To avoid arson, bin storage areas should not have timber fencing.
- Bin storage areas and bins should be designed and placed in such a way that they do not assist in climbing over walls and fences.

Limit unauthorised access to private land.

- Gates into laneways should permit visibility into the laneway from private areas.
- Gates into rear gardens should be lockable from the private side and should be solid to prevent views into the private space. Alternatively make use of one-way laminated glazing panels.
- Consideration must be given to fire escape, and access for the fire brigade during emergencies.
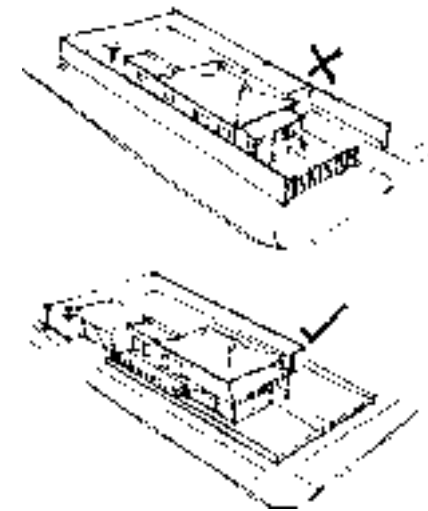

Fig 26. Achieving surveillance and safety without fences at corners.
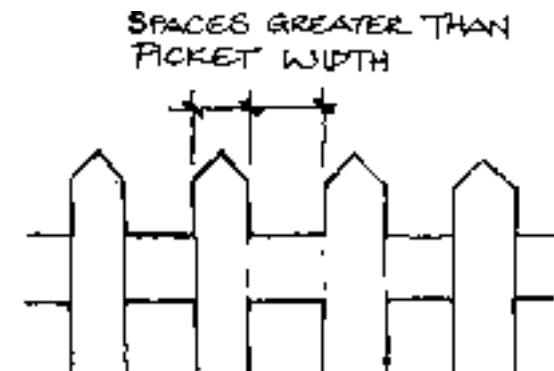

SPACES GREATER THAN PICKET WIDTH

Fig 27. The desirable spacing of pickets to prevent access and still achieve visibility. It is as important to maintain visibility as it is to create a barrier.

Reduce hiding places for criminals.

- Gates at the front should be on or close to the front boundary or front of the house to reduce hiding areas. They should be located so they are visible from front windows.
- Walls with deep piers or recesses should be avoided if they provide hiding places, especially near gates and entrances.
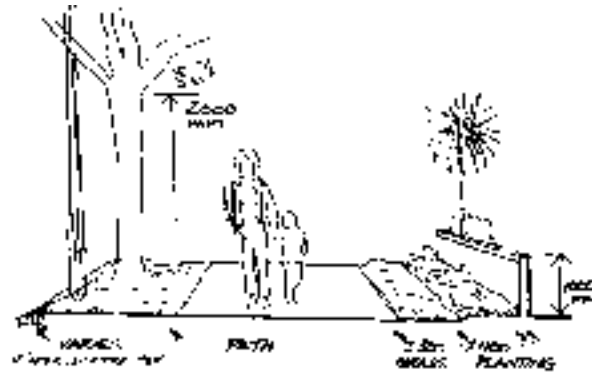- Remove shrubs and low-branching trees from areas near gates or entrances to avoid providing hiding places.

Fig 29. Avoid creating hiding places. People should feel safe approaching any gate or house by having full visibility. Limit high landscaping near paths.

Fig 30. For safe bin storage design, avoid using timber fencing and do not place these areas in such a way that they provide access to houses and flats.

Fig 28. Splay the bases of walls and slope coping stones to make climbing difficult.

Maintain visibility and surveillance.

- Glazed panels or spyholes should be provided in doors, at a height no more than 1,500mm above interior floor level, to allow residents to see callers without opening doors.
- Laminated glazing should be used in locations within reach of internally operated door and window locks.
- Glazed panels on doors should be beaded internally to prevent access by removing from the outside, and should also be glazed using laminated glass of at least 7.5mm thickness.
- At communal entrances a lobby should be provided which is lockable and visible from the street or adjacent dwellings.

Limit unauthorised access.

Windows

- Extra care to secure kitchen windows should be taken, as this is a common point of entry for burglars.
- Additional security devices should be placed on all ground floor window opening sections.
- All accessible windows including ground floor windows and those accessible from stair landings, drain pipes and flat roofs, should be fitted with good quality window locks. For large opening sections consideration should be given to providing two locks to avoid access by bending large window frames open.

- All window frames should be securely fixed to surrounding structure at 600mm intervals, preferable on at least two points per side including head and sill.
- External beading should not be relied upon to provide security. Further barriers to access should be provided in conjunction with external beading.

Doors

- Sliding door chains or limiters should be provided to prevent access.
- The main front door should have as a minimum a five level mortise lock.
- Where Yale locks are provided, these should be used in conjunction with a rebate to avoid opening from outside.
- Barrel bolts can be used to provide additional security to all ground floor doors, and doors from external landings. The top bolt should be no higher than 1,500mm above interior floor level.
- Plywood panels in doors should have a minimum thickness of 9mm.
- Front and back doors should be of solid construction, at least 40mm thick, or made of vandal-proof ply (VPP).
- Three hinges supplemented by hinge bolts should be used on doors which open outwards. A rebate stop should be used on these outward-opening doors either shaped or glued and pinned to the main part of the door frame.
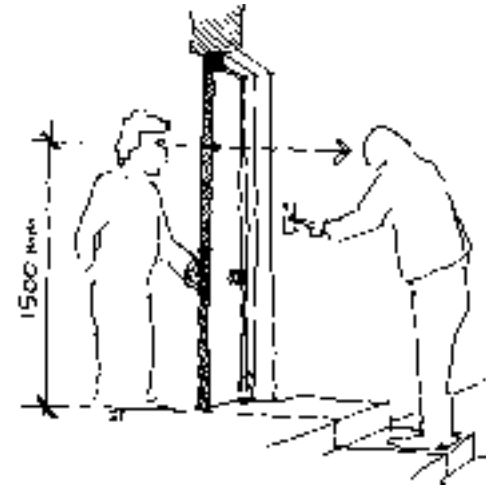

Fig 31. The correct placement of spyholes in doors.

Fig 32. Design and locate windows to increase surveillance, especially of doors and other points of access.

- Doors connecting garages and houses should be designed to the same standard as the front and back doors.
- Sliding patio doors should always be glazed with laminated safety glass and fitted with anti-lifting devices, and should have a minimum of three point locking.
- Where letter boxes are provided in doors, locks should be located at least 400mm from the letter box.
- Communal entrances should open outwards to prevent kicking in. Care should be taken to avoid providing recesses for hiding.
- Locks on back doors should allow easy exit in the event of an emergency.

Maintain aesthetic values and visual appearance.

- Doors and windows should remain attractive and not be dominated by security devices, as these tend to create the impression of insecurity and, ironically, encourage break-in attempts.
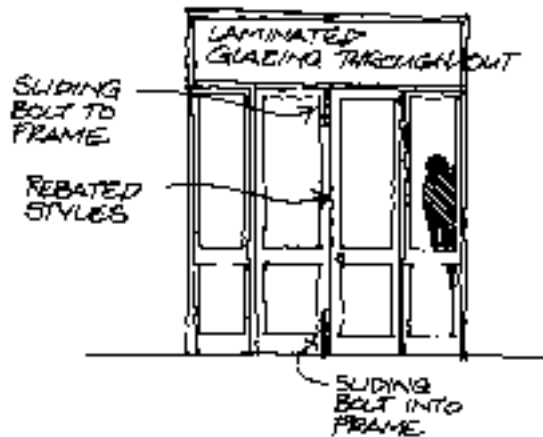
Fig 33. Glazed front door design.
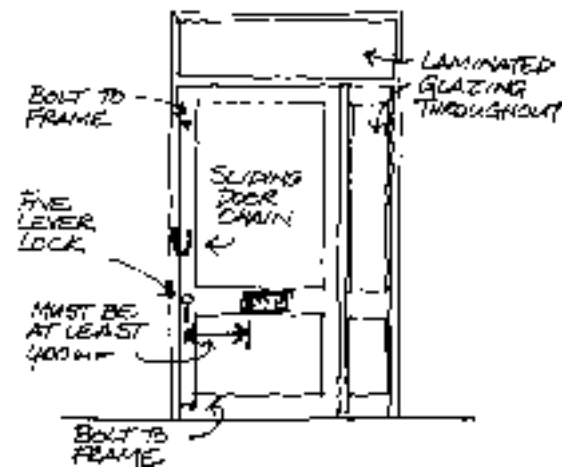
Fig 34. Front door security.
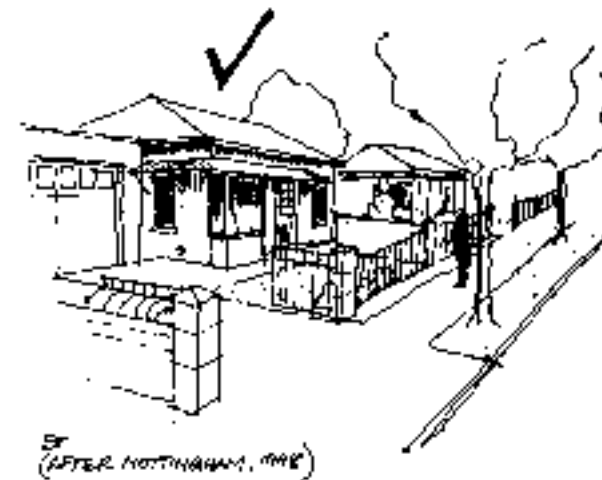
Fig 35. Examples of good and bad design from a security and safety point of view.

Make public areas and paths visible and inviting at night to encourage their use. Public spaces are made safer if more people use them, therefore it is important to make people feel comfortable and safe after dark in such places.

- Street lighting should generally be in accordance with Australian Standard 1158.1.
- Public lighting should be provided to streets, footpaths, public telephones, public transport stops and any public spaces likely to be well used at night to assist in providing safe passage for pedestrians, cyclists and vehicles.
- Essential footpaths should be well lit, with lighting that is consistent along the path and at a higher level shining down, not at eye level which prevents pedestrians from seeing beyond the lighting. Bollards with integral lighting should be avoided.
- Lighting should generally be at a height that prevents access and tampering.
- Where lighting is provided at a lower level, vandal-proof fittings must be used.
- Lighting alone will not make places safer, so should be combined with other design measures to maximise safety, such as designing houses to face public spaces and parks.
- If a place is designed to be used at night, lighting levels should permit users to recognise and identify a face 15 metres away.

- Security lighting should be considered for all accessible ground level areas including laneways. This should be movement and sound activated and directed downward.
- Lighting in car parking areas should illuminate the car bays as well as the pedestrian paths to and from cars. The light should be consistent, very bright and should not create pools of darkness.

Achieve consistent and appropriate levels of lighting in residential areas, commercial areas and community facilities.

- All lighting should be directed downwards to avoid light pollution. Only in rare circumstances such as the illumination of landmark buildings or memorials, should light be directed upwards.
- Bulb strength of no greater than 120 watts is recommended as stronger light produces deep shadows which can reduce surveillance.
- Where areas in parks and open spaces are unlikely to be used, consider not lighting these as unlit open areas are not attractive to vandals. Balance this against the possibility of other non-desirable activities.
- In commercial areas lighting levels should be higher than surrounding areas. Consider the use of surveillance equipment in vulnerable areas where "natural surveillance" is not possible or unlikely, such as in service areas and loading bays.

Make places understandable and safe through clear signage, which assists in easy "way-finding".

- Signage can assist in making places legible.
- Emergency exits should be clear with signs well placed and easy to read and understand, and illuminated at night.
- Symbols, maps and diagrams should be utilised to assist those who use other languages to understand signage.
- Wheelchair access should be signed if routes are not immediately apparent to facilitate access for all potential users.

Lighting should be used to assist in making places legible and improving way-finding at night.

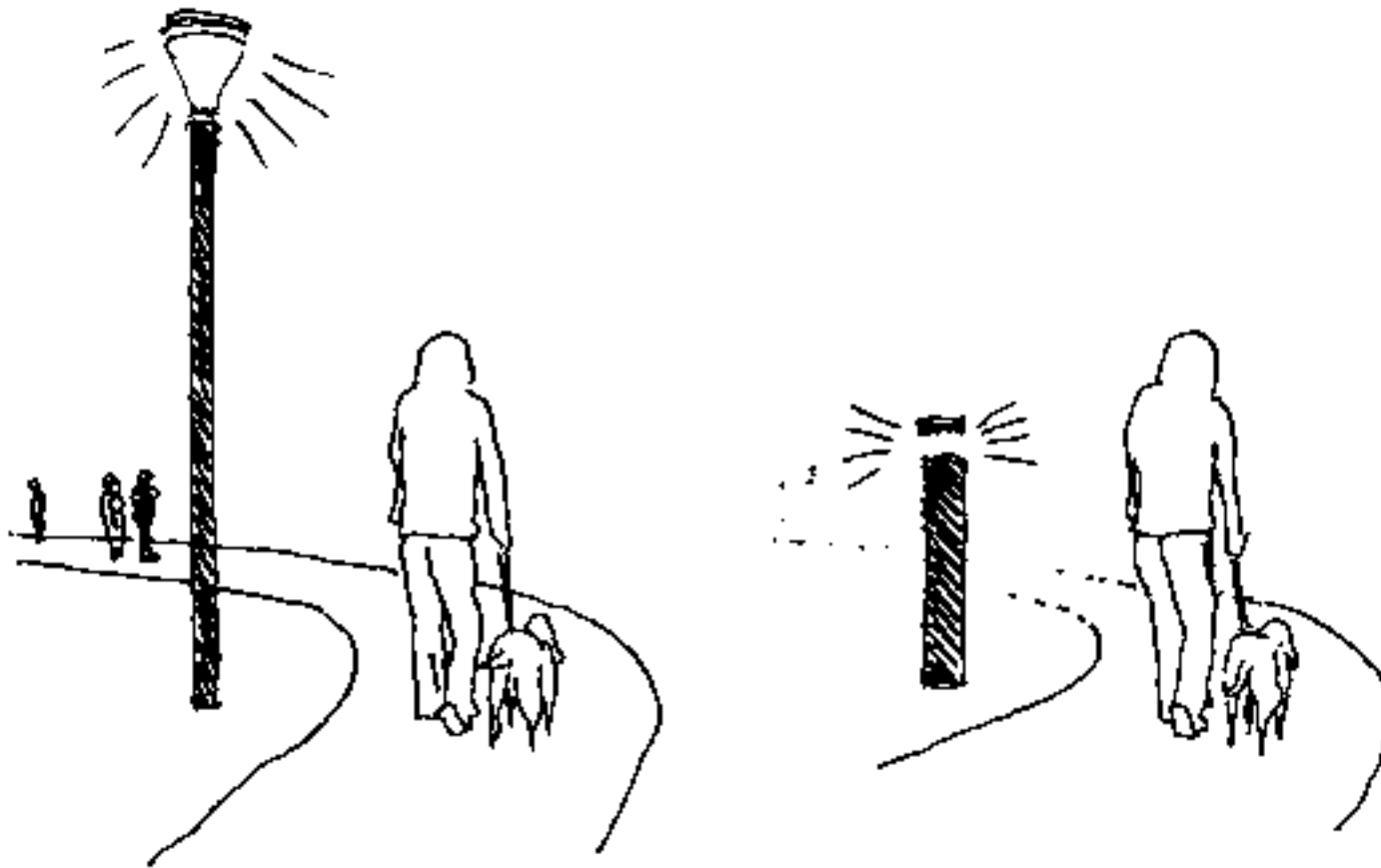- Lighting should be used to maintain and support sightlines.

Fig 36. The appropriate height of lighting. Lighting which is too low prevents seeing beyond the light, making people uncertain when they walk.

burglary
The act of breaking into houses, shops, etc. to steal.

communal entrances
A single entrance to a multiple number of units or flats.

community safety
The level of actual and perceived safety existing in any community. This is measurable and usually expressed as a "rate of crime". Crime levels in any community can be reduced through, among other things, good design, providing alternative activity and employment opportunities.

connectivity
This term is used in conjunction with Space Syntax analysis and refers to the number of lines of sight that connect directly to a particular line of sight.

curvilinear
Street and subdivision patterns using rounded or curved patterns. This tends to shorten visual axes and make places less legible, as people are easily disoriented as they move through the streets.

"desk-top" inquiry
Research or inquiry using published information only.

"end grain"
"End grain" is achieved at the end of blocks, when lots are oriented to the short street at the end of the block. See Fig 18.

evidence-based research
Research or inquiry based on observed phenomena, rather than a theoretical approach. In the City of Gosnells *SafeCity* Initiative this involved analysis of the actual incidents of crime in that location.

fragmented
Street patterns where the visual axes have been broken up or shortened. This reduces the potential for greater integration.

frontage development
Development such as houses or shops where the front façade, including the front doors, face the street.

global integration
A Space Syntax measure that forecasts movement potential and ultimately vulnerability to certain types of crime, including burglary.

grade separation
When various street functions such as pedestrian and vehicular movement are separated by "grade" or level. This includes pedestrian bridges and pedestrian underpasses.

hierarchical street patterns
Street patterns designed so that local roads only connect to major neighbourhood roads, which in turn only connect to arterials. In this pattern local roads have poor connection to other local roads and result in a concentration rather than a dispersal of traffic.

integration
The spatial and functional linking of areas of development and their inhabitants. Integrated areas form a coherent whole, which generally is greater than the sum of the parts.

intelligibility
The quality or degree to which an area is easily understood, and therefore able to be easily used by locals and visitors.

isolation
The physical and functional separation of individuals, households or areas to the extent that they have few relationships with each other.

landforms
The natural features of the earth's surface.

legibility
The degree of legibility in any area or development indicates the ease with which visitors are able to see, understand and "use" the area or development. A "legible" layout is one that visitors and residents find easy to move through and use.

local economy
The local economy relates to job opportunities in any community for the potential uptake by people who live in that community. In Western Australia, more and more "service sector" jobs are required locally to provide local people with local job opportunities.

local and global relations
Distinction is drawn between immediate or "local" relationships, and wider or "global" relationships.

natural surveillance
Surveillance provided by ordinary local people as they go about their daily activities.

passive surveillance
Surveillance provided by ordinary people as they go about their daily activities.

pedestrian movement
People on foot or in wheelchairs or similar aids to movement.

permeable layout
A layout which allows for frequent access routes through an area.

public access ways
Dedicated pedestrian paths which link cul-de-sacs.

SafeCity **Initiative**
An initiative launched by the City of Gosnells in 1998 to address community concerns about safety following comprehensive community consultation. The *SafeCity* Initiative includes a wide range of measures and programmes to address the reality and perception of community safety.

secondary exposure
Where a property has exposure to public space on more than one side, for example on corner lots.

segregation
Segregation is said to exist where areas of urban development are set apart from each other by design.

sightlines
Lines of direct sight.

Space Syntax
A set of techniques for urban analysis developed by University College London. (See page 8.)

spatial axes
Each space in a city, be it a road, park or square, has one or several imaginary lines of orientation. When used in the context of the Space Syntax techniques, the longest straightest spatial axes are used to determine the relationships between spaces.

stealing
The illegal and unauthorised removal of other people"s possessions.

sub-area
For the purposes of the Space Syntax study, neighbourhoods were broken up into a number of sub-areas which were established by examining their degree of segregation.

targeted security patrols
The opposite of random security patrols, these are patrols which are linked to problem areas in any city or area.

traffic calming
The use of structures or devices which modify vehicular traffic behaviour and generally slow down traffic.

vehicular cul-de-sacs
Streets which are cul-de-sacs or discontinuous for vehicles. They may be continuous for pedestrians through the use of public access ways.

visual axes
The axis or straight line formed from a direct line of sight.

way-finding
The art or skill of finding one's way through an area or neighbourhood.

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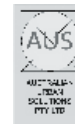
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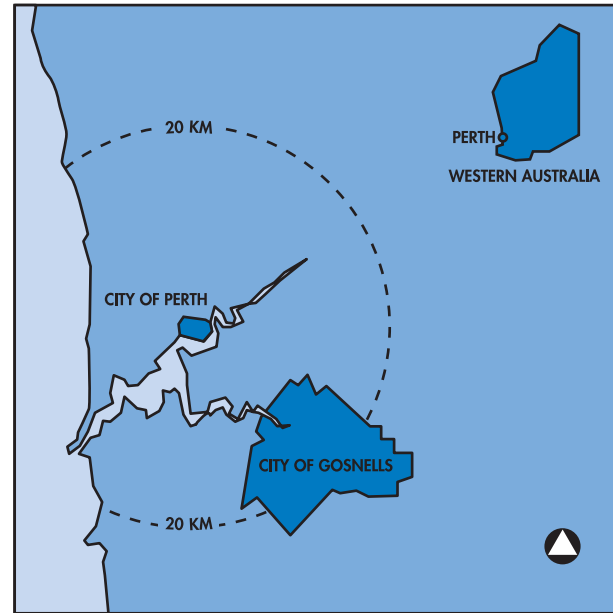
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