BUILDING BETTER CITIES
NEWCASTLE HOUSING DESIGN MANUAL

FOR BBC HOUSING PROJECTS
INNER NEWCASTLE AREA

Prepared for

THE HOUSING IMPLEMENTATION COMMITTEE
OF HONEYSUCKLE & ENVIRONS
AREA STRATEGY COMMITTEE
BUILDING BETTER CITIES PROGRAM

by

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Better Cities

Borrower	Date	Borrower	Date

Building better cities Newcastle housing design manual : prepared for the Housing Implementation Committee of Honeysuckle & Environs Area Strategy Committee, Building Better Cities Program
/ by Suters Architects Snell.
1995

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PREFACE

THE BBC PROGRAM

The way cities exist and grow is causing enormous stress on the Earth's ecosystems. Initiatives are being taken world wide to improve the quality of life for all. The Building Better Cities Program (BBC) is one such initiative that aims at improving the quality of Australian cities.

The program sets out to challenge traditional thought on planning and management of urban development.

The program in New South Wales will be achieved by joint funding from Commonwealth and State Governments in four area strategies over four years. These include initiating strategic urban change, encouraging ecologically sustainable development (ESD) and microeconomic reform and improving urban environments and making cities more livable.

To help achieve these goals in Newcastle the BBC Housing Implementation Committee (HIC) has requested that an urban housing design manual be prepared to give direction to the development of all BBC Housing projects in inner Newcastle.

This Design Manual is an innovative attempt to influence the design of urban housing in a number of key ways. ESD design principles relating to the efficient use of energy and the management of water resources are included as mainstream design considerations. The need to provide quality, appropriately located child playspace areas is addressed in a separate design guideline. The application of which will help encourage families back into the inner city. A special section on Accessibility and Adaptable Housing is provided in recognition that all members of society should have equal access to facilities, that Australia's population is aging and the proportion of disabled people is increasing. Housing design should reflect these trends to enable wider community access to available housing resources.

Finally it is envisaged that the Manual could have broader application than just BBC housing projects. Builders, Developers and Architects are encouraged to use the Manual to ensure "best practice" design principles are incorporated in all new housing developments in Newcastle, not just BBC housing projects.

EXPLANATION

OBJECTIVES

The Building Better Cities Program aims to develop housing in inner Newcastle (see map) which incorporates innovative affordable design solutions and principles of ecological sustainability. This design manual has been prepared to help achieve this goal.

Specifically the scope and purpose of the design manual is to:

- Provide urban housing design principles and guidelines appropriate to inner Newcastle which give practical direction to the implementation of broader more generalised guidelines contained in documents such as AMCORD Urban.
- Provide principles and guidelines which are user friendly, giving clear reference and checklists which Development Managers, Builder and HIC members can use to develop and asses design proposals.
- Provide principles and guidelines which apply ESD principles to the total design and construction process.
- Provide principles which will promote the design and construction of urban housing which is affordable, environmentally friendly, attractive and enjoyable to live in.

In an effort to encourage innovation, care has been taken not to make the various design principles and guidelines overly prescriptive. It is recognised that each site will have its own unique set of features and constraints. It will be the designer's task to apply the principles and guidelines in an innovative manner to achieve the best possible design solutions for individual sites.

The Manual will also serve as an educational tool, helping to create a better understanding and awareness of ESD and related urban housing design principles.

LEGAL STATUS AND BACKGROUND MATERIAL

The Manual distils and/or summarises relevant design principles and directions contained in AMCORD Urban, the BBC Inner Newcastle Housing Strategy, the new draft Lower Hunter Urban Housing Development Control Plan ("Triple R" Program) and other relevant information and reports (see Bibliography).

The Manual does not however have any statutory or legal status. Designers, developers, builders, etc would still need to liaise with Council officers regarding design innovations which may depart from accepted Council standards or codes. Such discussions should occur as early as possible in the design process, to avoid unnecessary project approval delays. Also reference should still be made to relevant regulations and standards such as Building Code of Australia.

RELATIONSHIP TO THE BBC INNER NEWCASTLE HOUSING STRATEGY

The Inner Newcastle Housing Strategy provides a background context to this Manual. The principles which guided the developments of the Strategy are:

- intensification of residential development compatible with the environment, including recommended changes to Council's planning codes;
- new urban forms (particularly at Honeysuckle) to be related to Inner Newcastle as well as incorporating principles of ecological sustainability;
- needs based allocation of subsidies and explicit accounting of subsidies;
- long term housing affordability benefits;
- consideration of equity and social justice implications;
- an integrated planning approach by the various agencies and stockholders.

This Manual has been prepared in response to these principles and relates specifically to the Strategy Area.

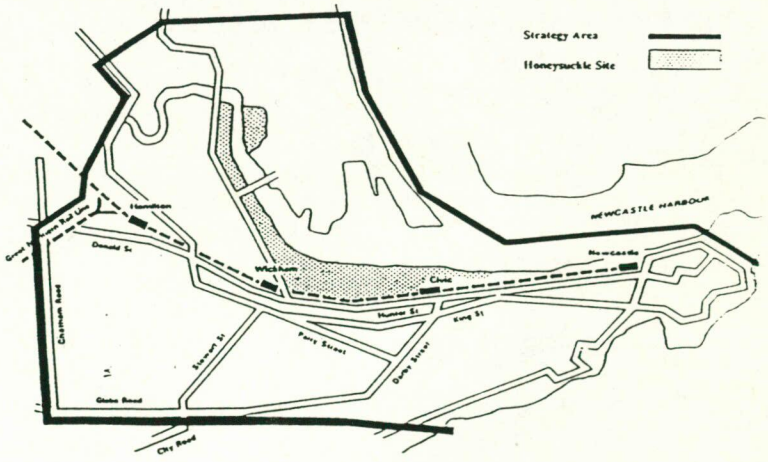


FIGURE 1
MAP OF INNER NEWCASTLE AREA

ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Ecological Sustainable development is defined as "Development that uses, conserves and enhances the community's resources so that ecological processes, on which life now and in the future relies, can be increased."

The National Strategy for Ecologically Sustainable Development December 1992

ESD is a system in which ecological processes in nature are balanced and sustainable. It is a process itself which incorporates conservation strategies into all development so that there can be a sustainable balance between environmental and economic objectives.

Urban housing is an inherently valuable response to sustainable development objectives, by virtue of its more compact building forms, contribution to more efficient use of public transport and containment of urban sprawl. Through innovation it can offer further energy savings more efficient use of other infrastructures, promotion of biodiversity and urban diversity and ultimately improved quality of environment.

FUTURE DIRECTIONS

Whilst the guidelines contained in this manual currently apply to BBC inner Newcastle housing projects only, it is envisaged that the principles (particularly ESD) could be applied to all developments in and around the Newcastle area. Newcastle City Council is undertaking action to achieve this goal.

In November 1994, Newcastle City Council committed itself to the development of a comprehensive energy efficiency policy in support of the National Greenhouse Strategy and National Strategy for Ecologically Sustainable Development.

This policy will address promoting ESD housing design for the city.

Council will consider the ESD Design principles contained in these BBC housing guidelines, and investigate appropriate Council planning and policy frameworks to promote the construction of energy efficient and environmentally sensitive housing in Newcastle.

ABBREVIATIONS

BBC: Joint State and Federal Building Better Cities programme

DoH: NSW Department of Housing

DoP: NSW Department of Planning

ESD: Ecologically Sustainable Development

HEDC: Hunter Economic Development Council

HIC: Housing Implementation Committee

HVRF: Hunter Valley Research Foundation

HWC: Hunter Water Corporation

NCC: Newcastle City Council

UCB: Urban Consolidation Budget
(Funds from the BBC programme for housing)

DCP: Development Control Plan

NEWCASTLE AN HISTORIC OVERVIEW

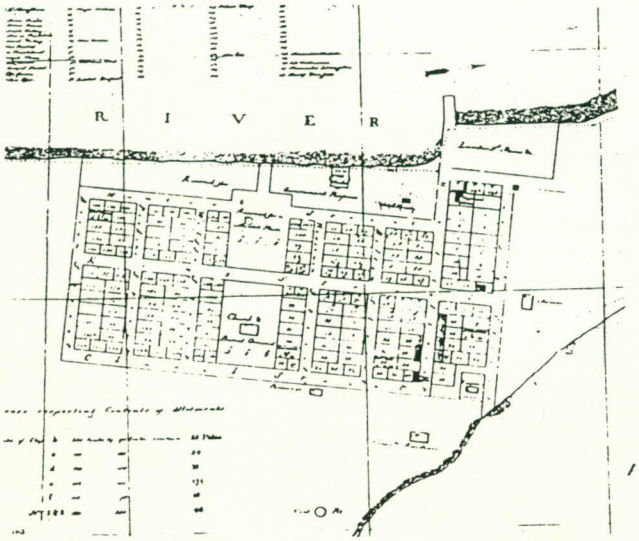


FIGURE 1
NEWCASTLE C. 1822

The foundations of modern Newcastle as a region for coal mining, manufacturing and agriculture with a secure deep water port were now started.
Figure 1 shows an early CBD street grid emerging.

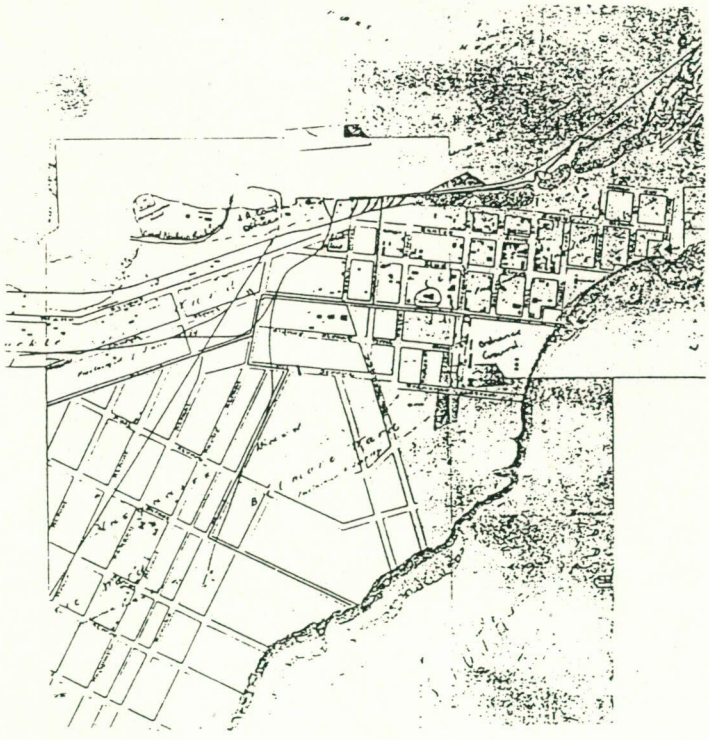


FIGURE 2
NEWCASTLE IN 1857

Newcastle expanded as a shipping port with the introduction of the railways at this time. Mining also developed and the miners lived locally to their workplace. This is a proposed objective of the future urban villages. (Refer to GLOSSARY).

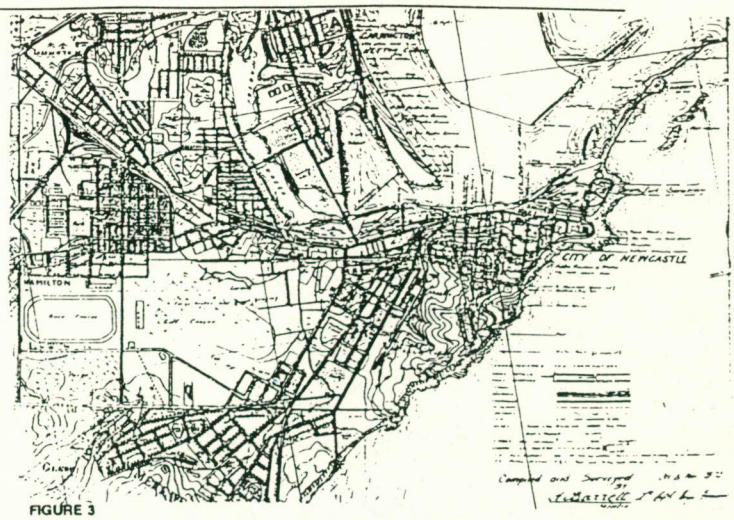


FIGURE 3
NEWCASTLE IN 1910

Newcastle had become one of Australia's major port-cities by 1910. Street grid patterns and orientations had expanded along with railways. Many of the City's most substantial structures had been built. Many suburbs developed as estates which contain a consistent range of buildings in the Federation or subsequent styles.

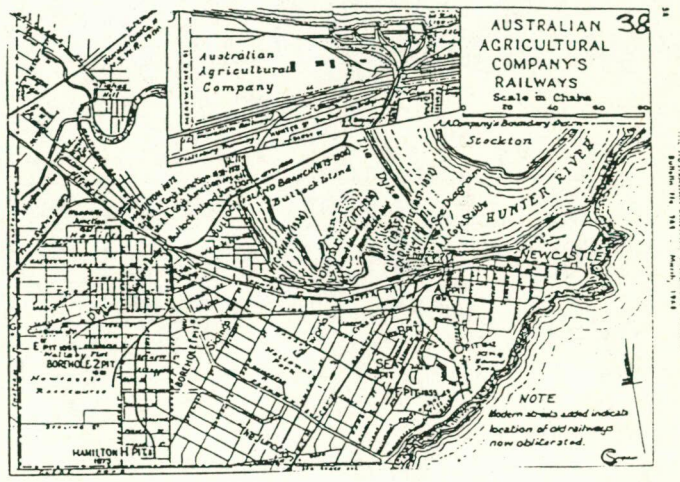


FIGURE 4
NEWCASTLE IN 1968

In the latter half of this century however, development has generally been slow, with the city centre and other business districts remaining mostly free of large scale redevelopment, while the residential suburbs have continued to expand through surrounding areas of what had been farmland or bushland. Those new buildings that have appeared are, with a few notable exceptions, compatible in terms of height and mass with the earlier buildings.

Thus Newcastle remains basically a Victorian city, while also retaining its original plan form, and many structures from earlier periods back to the convict settlement.

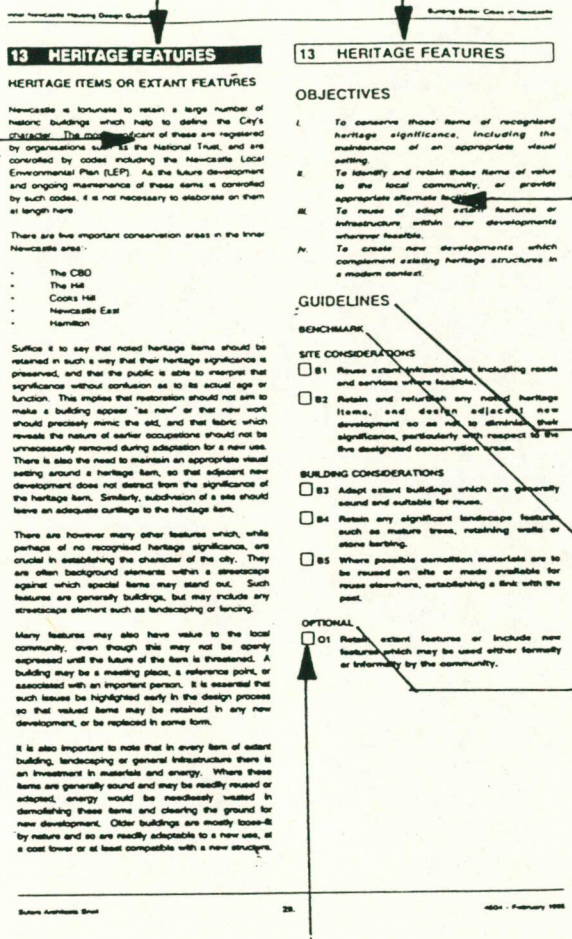
Newcastle is a major Australian city and its historic fabric makes a significant contribution to its uniqueness. Any new development should pay particular regard to the City's heritage and designated historic precincts. (Refer 13 HERITAGE FEATURES).

HOW TO USE THIS MANUAL

Considerable work has gone into making this Manual as user friendly as possible. The diagram below is your guide to the use of this Manual.

SUBJECT HEADINGS
under the main heading of DESIGN PRINCIPLES are loosely ordered from broader issues dealing with site and context down to building detail.

INFORMATION SECTION
is an explanation of Principles and Strategies applying to OBJECTIVES AND GUIDELINES. It is recommended that the applicant read these section thoroughly.



13 HERITAGE FEATURES

HERITAGE ITEMS OR EXTANT FEATURES

Newcastle is fortunate to retain a large number of historic buildings which help to define the City's character. The most significant of these are registered by organisations such as the National Trust, and are controlled by codes including the Newcastle Local Environmental Plan (LEP). As the future development and ongoing maintenance of these items is controlled by such codes, it is not necessary to elaborate on them at length here.

There are five important conservation areas in the Inner Newcastle area :-

- The CBD
- The Hill
- Cooks Hill
- Newcastle East
- Hamilton

Suffice it to say that noted heritage items should be retained in such a way that their heritage significance is preserved, and that the public is able to interpret that significance without confusion as to its actual age or function. This implies that restoration should not aim to make a building appear "as new" or that new work should precisely mimic the old, and that fabric which reveals the nature of earlier occupations should not be unnecessarily removed during adaptation for a new use. There is also the need to maintain an appropriate visual setting around a heritage item, so that adjacent new development does not detract from the significance of the heritage item. Similarly, subdivision of a site should leave an adequate curtilage to the heritage item.

There are however many other features which, while perhaps of no recognised heritage significance, are crucial in establishing the character of the city. They are often background elements within a streetscape against which special items may stand out. Such features are generally buildings, but may include any streetscape element such as landscaping or fencing.

Many features may also have value to the local community, even though this may not be openly expressed until the future of the item is threatened. A building may be a meeting place, a reference point, or associated with an important person. It is essential that such issues be highlighted early in the design process so that valued items may be retained in any new development, or be replaced in some form.

It is also important to note that in every item of extant building, landscaping or general infrastructure there is an investment in materials and energy. Where these items are generally sound and may be readily reused or adapted, energy would be needlessly wasted in demolishing these items and clearing the ground for new development. Older buildings are mostly loose-fit by nature and so are readily adaptable to a new use, at a cost lower or at least compatible with a new structure.

13 HERITAGE FEATURES

OBJECTIVES

i. To conserve those items of recognised heritage significance, including the maintenance of an appropriate visual setting.

ii. To identify and retain those items of value to the local community, or provide appropriate alternate features.

iii. To reuse or adapt extant features or infrastructure within new developments wherever feasible.

iv. To create new developments which complement existing heritage structures in a modern context.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ B1 Reuse extant infrastructure, including roads and services where feasible.

☐ B2 Retain and refurbish any noted heritage items, and design adjacent new development so as not to diminish their significance, particularly with respect to the five designated conservation areas.

BUILDING CONSIDERATIONS

☐ B3 Adopt extant buildings which are generally sound and suitable for reuse.

☐ B4 Retain any significant landscape features such as mature trees, retaining walls or stone kerbing.

☐ B5 Where possible demolition materials are to be reused on site or made available for reuse elsewhere, establishing a link with the past.

OPTIONAL

☐ O1 Retain extant features or include new features which may be used either formally or informally by the community.

Suters Architects Snell 29. 4504 - February 1995

OBJECTIVES
states the aims of the provisions contained within the GUIDELINES. Their purpose is to demonstrate to the applicant the intent of the subject area.

GUIDELINES
are separated into two main sections - BENCHMARK AND OPTIONAL

BENCHMARK
These guidelines must be complied with.

OPTIONAL
These guidelines are a recommended option if achievable.

The GUIDELINES are further divided into two sections:

SITE CONSIDERATIONS
are matters concerning the site and the broader context of urban design.

BUILDING CONSIDERATIONS
are detailed matters dealing with the building(s).

Each guideline is numbered and given a box so that the applicant can use it as a checklist during the various stages of the development from firstly site selection to construction completion.

DESIGN PRINCIPLES

1 SITE SELECTION

The selection of a site for any particular project will naturally be dependent on the project's requirements. While individual detached or semi-detached dwellings may be accommodated on virtually any available allotment within a residential area, cluster developments of townhouses will require larger allotments or the consolidation of adjacent allotments.

The relationship of the site to the broader urban infrastructure is an important consideration. Higher density developments may place demands on services, such as water, sewerage, gas and power supplies, beyond existing capacities. Expensive augmentation works may be required. Where augmentation costs are particularly great, there may be a cost advantage in utilising on-site measures for providing power or managing waste products.

Proximity to established transportation corridors should be carefully considered when selecting a site. Ready access to public transport corridors encourages its use rather than reliance on private motor vehicles. High density housing developement is very appropriate for such well located sites. This helps to minimise car parking and road congestion in the locality. (Refer to APPENDIX iv).

Particular user groups will also have specific requirements. Students or low-income groups will require ready access to public transport. Family groups will require ready access to schools and recreation areas. Bicycle or pedestrian paths through a site may be suitable for access to nearby facilities.

Consideration should also be given to previous usages of the site. An important issue in this regard is potential existence of toxic waste and/or other contamination. Early investigations would need to be made to determine the type and extent of contamination and its impact on future development. Assessment should also be made of the risks involved with disturbance of contamination and the implications for its safe removal and off-site disposal.

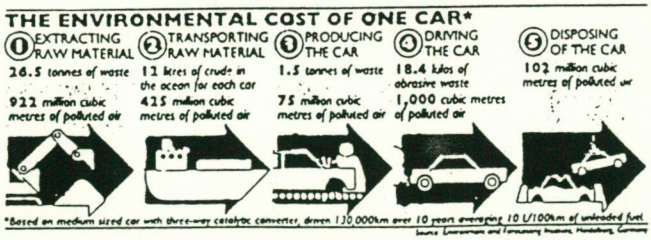


FIGURE 1
THE ENVIRONMENTAL COST OF ONE CAR

1 SITE SELECTION

OBJECTIVES

i. To ensure the demands that new developments place on existing urban infrastructure may be accommodated without unnecessary augmentation.

ii. To utilise sites with ready access to public transport to their capacity

iii. To decrease the need for general reliance on private motor vehicles.

iv. To encourage the use of bicycle and pedestrian movements.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1 Where existing services require augmentation for new development alternate on-site facilities are to be utilised where feasible.**

☐ **B2 Site selection should have regard to the proximity of public transport (Refer appendix iv map).**

☐ **B3 Consider potential to include pedestrian and bicycle paths through large sites to provide ready access to nearby facilities and potential to link to existing pedestrian and bicycle paths.**

☐ **B4 Investigate whether the site has been contaminated by any previous usage.**

Refer 2 SITE ANALYSIS
APPENDIX iv

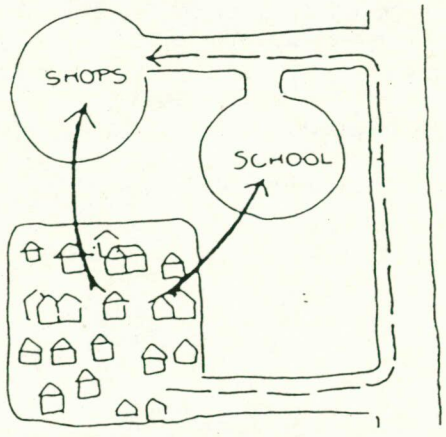


FIGURE 2
PROVIDE DIRECT PEDESTRIAN PATHS TO ACTIVITY CENTRES, AVOID CROSSING MAJOR ROADS, AND MAKE PATHS MORE DIRECT THAN VEHICULAR ACCESS

2 SITE ANALYSIS

A well prepared site analysis is particularly crucial in the design of urban housing and in achieving ecologically sustainable development. Site features requiring consideration are:-

- topography (ground formation)
- orientation (location of true north)
- prevailing winds
- existing structures
- vegetation
- views
- access
- drainage
- services
- type and extent of any contamination.
- any other features

Opportunities and constraints outside the site need also be noted and assessed:-

- condition and usage of neighbouring sites
- overlooking (potential privacy problems)
- overshadowing (either from without or within)
- view retention
- building bulk
- landscaping and screening at boundaries
- street character and context
- street grid pattern (relating back to orientation)

The street character and context may help determine site layout, landscaping and building alignment among other issues. The site analysis should assess the urban design characteristics and highlight any potentialities of the site in terms of:-

- existing and potential landmarks
- impact on views and view corridors
- sites which have a special character as edges of districts or precincts
- special characteristics of corner sites

Refer also to APPENDIX xi

There are groups whose interests need to be considered in any development:-

- The occupants (of the site)
- The neighbours
- The community
- The environment as a whole

2 SITE ANALYSIS

OBJECTIVES

i. ***To ensure design response is appropriate to the site and its context and that it addresses issues relating to ESD.***

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1** **Submit a prepared site analysis both in written and drawing form at the time of Development Application that addresses items listed in Section 4.2.**

☐ **B2** **Submit a statement of environmental effects with regard to the proposed development, demonstrating how it successfully addresses the guidelines set out in the various sections of this document.**

Refer APPENDIX xi

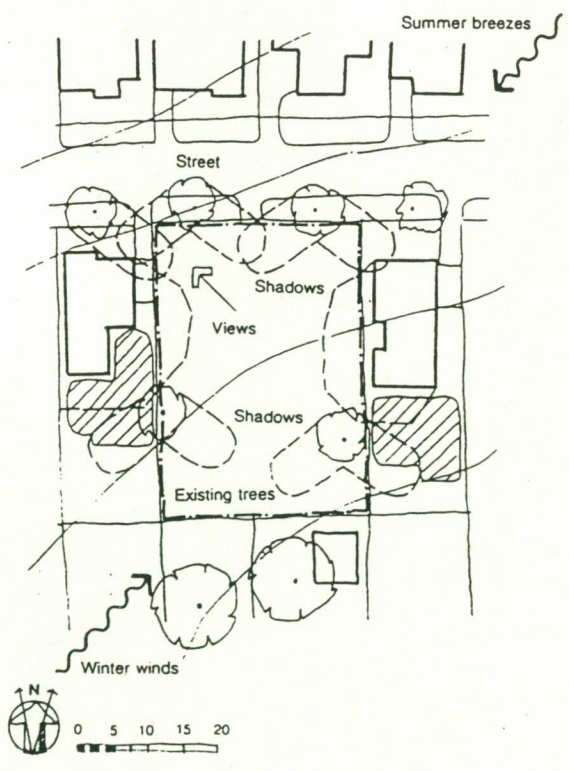


FIGURE 1
TYPICAL SITE ANALYSIS DRAWING

3 SITE DENSITY

One of the key objectives of the Inner Newcastle Housing Strategy is to increase the density of housing within the Strategy Area which in turn aids the achievement of a number of positive ESD outcomes

- Containment of urban sprawl thereby conserving existing ecosystems outside the City fringe.
- More compact building envelopes reducing consumption of materials and running costs.
- More efficient use of public transport.
- The establishment of Urban Villages.

Sites within a 400 m radius of major public transport routes are preferable for higher density developments or where access to public transport is particularly required. (Refer to APPENDIX iv).

In general terms Newcastle's CBD and inner suburbs are suitable for intensified residential development.

OBJECTIVES

i. ***To increase housing density within the Inner Newcastle Area.***

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1** **The minimum density for any development should be 35 dwellings/hectare.**

☐ **B2** **Increased density close to nodes of public transport and commercial centres is preferred, liaise with Newcastle City Council.**

☐ **B3** **Liaise with relevant authorities regarding service infrastructure. Where services are inadequate, investigate with the relevant authority the feasibility of providing on-site alternative services or pay a monetary contribution (as negotiated) toward amplification of existing services.**

Refer APPENDIX iv

4 SETBACKS AND BULK

The siting and bulk of a building are key factors in determining the character of a development. They are also important in ensuring adequate provision for visual and acoustic privacy, solar access and daylighting, as dealt with elsewhere in these guidelines.

Design features that establish visual character include:

- overall height.
- height at or near the boundaries.
- setbacks from the boundaries.
- effect of sloping sites on the apparent mass.
- distribution of building mass across the site.

For development within established areas, the setbacks and massing should be consistent with surrounding structures. This includes consistency of eaves and ridge lines, number of storeys, and setbacks from the front and side boundaries. Where full consistency is not possible due to demands for increased densities or otherwise, reduced setbacks and increased heights towards the rear of the site, may be allowed. This will ensure that the impact on the streetscape is minimised, and the amenity of adjacent dwellings is not diminished.

In newly developed areas, there is the opportunity to establish guidelines for building mass based more closely on the need for acoustic and visual privacy, solar access and daylighting, as discussed elsewhere in the guidelines.

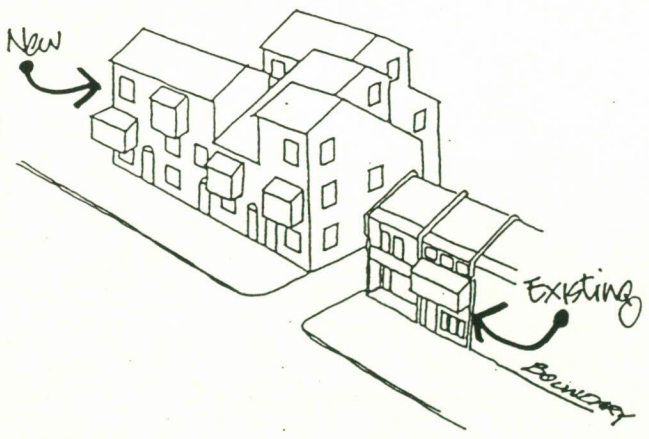


FIGURE 1
INFILL DEVELOPMENT SHOWING MINIMAL SETBACK CONSISTENT WITH ADJACENT STRUCTURES

The apparent size of a structure may be reduced by:

- the effect of a sloping site.
- the use of internal mezzanine or split levels.
- inclusion of attic or basement spaces.

4 SETBACKS AND BULK

OBJECTIVES

i. To locate and mass buildings on a site so as to be consistent with the existing streetscape, or establish an appropriate and attractive new character.

ii. To provide for the requirements of acoustic and visual privacy, solar access and daylighting.

iii. To permit flexibility in building setbacks and heights so as to provide for optimum use of the available space.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1** **Walls are to be sited, and to be of such length and height, that there is no significant loss of amenity to adjacent dwellings and land.**

☐ **B2** **In established areas, the setback from the front boundary should be consistent with adjacent structures, and may be up to 25% less.**

BUILDING CONSIDERATIONS

☐ **B3** **In established areas, the height of a structure should be consistent with adjacent structures.**

OPTIONAL

BUILDING CONSIDERATIONS

☐ **O1** **Setbacks from the front boundary may be averaged across the width of the structure, with a 2 m minimum setback to any part.**

☐ **O2** **The height of a structure may be progressively increased towards the rear of the site in order to reduce visibility and overbearing to the street or adjacent dwellings.**

☐ **O3** **Open carports may be built to the front boundary if appropriate, however enclosed garages should preferably be setback 5-6 m to allow an off-street car standing space.**

Refer 9 PRIVACY
16 PASSIVE DESIGN FEATURES FOR ENERGY EFFICIENCY

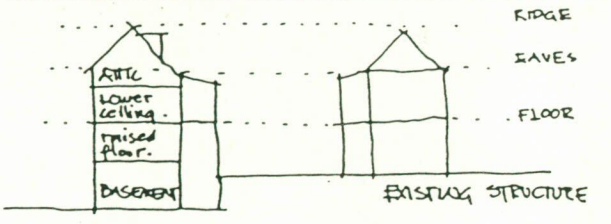


FIGURE 2
MAINTAINING CONSISTENCY OF HEIGHTS AND APPARENT BULK

5 CAR PARKING

The trend to reduce car parking provision for urban housing is still meeting resistance from the market. However, a reduction of on-site car parking is to be encouraged in view of the general aims of ESD to minimise use of non-renewable resources and increase patronage of other modes of transport. From the view point of aesthetics, care should also be taken to ensure that car parking does not dominate the local environment.

While on-site car parking for residents is quantified in the guidelines liaison with Newcastle City Council may result in car parking requirements being further relaxed, for Shoptop developments and where developments have good proximity to public transport.

It is certainly expected that on-site visitor parking be minimised. Careful consideration should be given to the appropriate treatment of both on-site parking and public street parking catering for spill-over. Liaison with Council will be necessary in this regard.

The option of off-site car parking would need to take into consideration the street's capacity to accommodate extra parking both safely and efficiently. The same aims would need to be applied to any newly designed internal street.

Many older subdivisions such as Hamilton South and The Junction have wider streets allowing provision of increased off-site parking. Consideration should be given to the potential for existing community facilities, in close proximity to developments, to provide out-of-hours off-site car parking.

Traffic calming measures and landscaped areas should be incorporated to narrow the carriageway and reduce the dominance of the car and car parking within the development. These measure will help to provide a more pedestrian and cyclist friendly environment.

The location and layout of car parking will obviously influence the cost of the project. So too would any option to provide covered parking. These sorts of alternatives may significantly affect the cost-effectiveness of the development. Further, one may need to weigh up the advantages of flexibility of the fully enclosed garage as car storage (extending vehicle's life), domestic workshop, children's wet weather play space or future house extension as a habitable room.

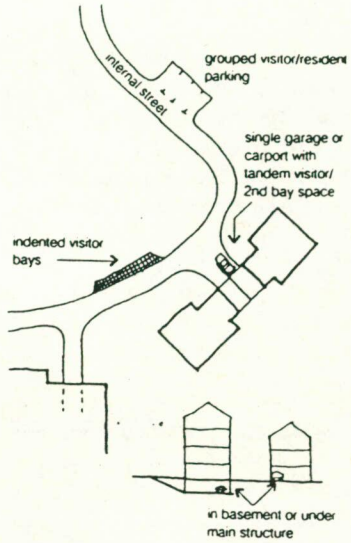


FIGURE 1
PARKING METHODS

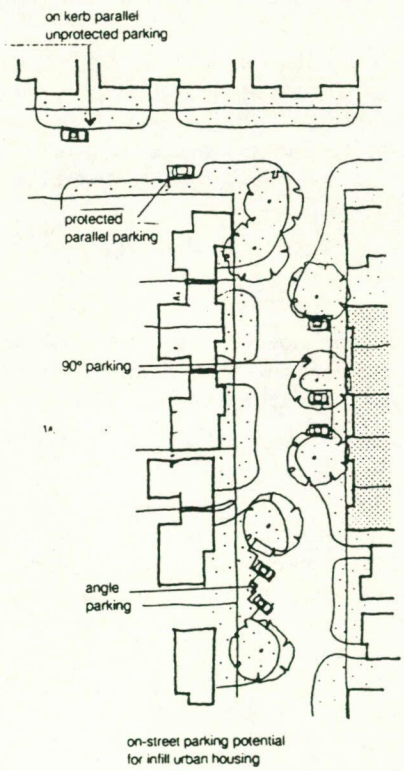


FIGURE 2
STREET PARKING INCORPORATING TRAFFIC CALMING STRATEGIES

5 CAR PARKING

OBJECTIVES

i. To provide convenient and safe parking for residents and visitors whilst reducing car dependency by making other forms of transport more amenable.

ii To ensure a cost-effective balance between on-site and off-site car parking.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ B1 Provide resident parking spaces as follows:-

within 800 metres of public transport
1 space/dwelling
over 800 metres of public transport
2 spaces/dwelling

Note: These are maximum carparking requirements and should be determined in conjunction with B2.

☐ B2 Liaise with Newcastle City Council regarding further relaxation of car parking requirements, particularly when good access to public transport exists or where there is potential for alternative convenient street parking.

☐ B3 Provide aged disabled resident parking spaces as follows:

1 space/5 dwellings

☐ B4 Size of car spaces shall be 5.5 metres long x 2.6 metres wide and not less than 2.9 metres for disabled or end bays.

☐ B5 Provide resident parking in close proximity to dwelling.

☐ B6 Provide visitor and supplementary car parking either as indented bays off the internal access street or stacked behind resident car spaces. Where stacked behind resident car spaces, there is to be no encroachment on footpaths or cycleways. Provide visitor parking at the rate of 0.25 cars/dwelling and in conjunction with B2.

☐ B7 Provide bicycle racks at the rate of 2 per dwelling evenly distributed throughout the development.

☐ B8 All hard stand paving to be of a permeable nature as set down in LANDSCAPING.

OPTIONAL

SITE CONSIDERATIONS

☐ O1 Provide covered car spaces for resident parking.

☐ O2 Provide some lockable bicycle enclosures evenly distributed throughout at the rate of 1/5 dwellings.

Refer 11 LANDSCAPE

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6 OPEN SPACE

COMMUNAL OPEN SPACE - PRIVATE OPEN SPACE

The open space system should provide opportunities for:-

- greenspace
- amenity
- bioreserve
- active and passive recreation
- shared cycleway/walkway

Public open space may only become an issue with large infill developments and, while their spaces must be seen to be available to the general community, their design should ensure the privacy and security of residents.

Where possible communal open space should form a large part of any of the proposed developments under these Guidelines, in an attempt to promote the concept of urban village. However, private open space still serves important purposes for accommodating clothes drying, vegetable gardens, outdoor dining, secure play and the like.

Where possible Communal open space should have the potential to act as casual meeting places for residents, thereby reinforcing the sense of community and belonging. This could be achieved by strategic planting, use of outdoor furniture and/or demarkation of spaces into a hierarchy.

The open space areas are also an opportunity to retain existing landscape features which would save on infrastructure costs and help present and promote the neighbourhood. Existing mature trees for example, give scale, setting and desirable shade and shelter. While providing a valuable service to the visual environment, the retention of landscape elements would also enhance the ecological values of the area:

Links to other reserves and community facilities within the area can be provided by either:-

- "Greenways" combining landscape design with pedestrian and bicycle access.
- a network of broad roadside nature strips
- a sequence of "pocket parks".

These should offer an attractive and viable alternative to motorised transport wherever possible. Refer also to CIRCULATION PATTERNS.

The design of open space should promote biodiversity, in keeping with the principles of ESD. Reuse, retention and reintroduction of local native plant species which will encourage the return of bird and animal life.

Open space stormwater design is discussed in WATER RESOURCES MANAGEMENT AND LANDSCAPE sections.

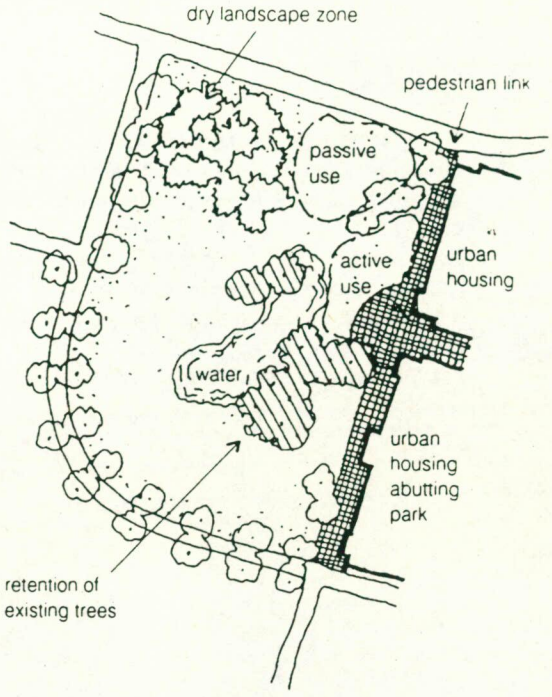


FIGURE 1
OPEN SPACE MAY CATER FOR DIFFERING ACTIVITIES

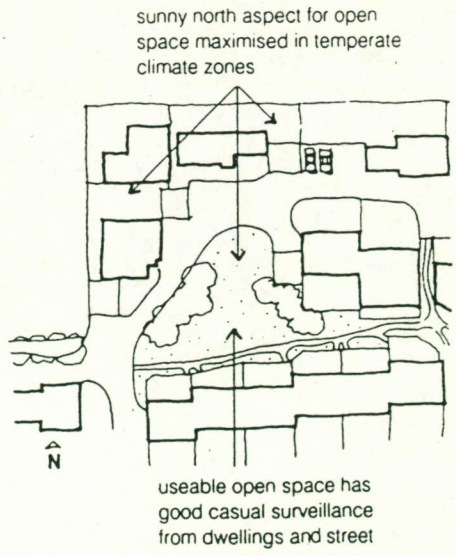


FIGURE 2
AN EXAMPLE OF USEABLE COMMUNAL OPEN SPACE OFFERING AN OUTLOOK FOR DWELLINGS

6 OPEN SPACE

OBJECTIVES

i. To ensure that sufficient communal open space is provided in convenient locations and of a quality to meet the needs of the community.

ii. To create an integrated open space network (public, communal and private) which links focal points, areas of interest and local parks, whilst enhancing ecological processes and biodiversity.

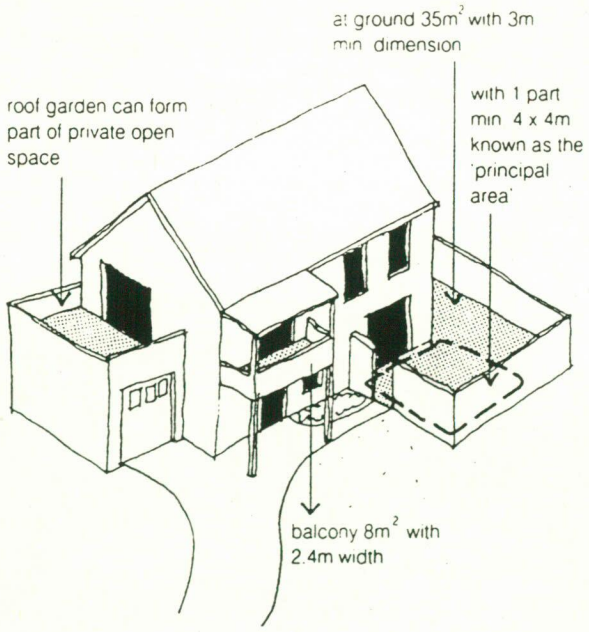


FIGURE 3
OPTIONS FOR PRIVATE OPEN SPACE

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1** **Promote the multi-functional role of Communal space and its joint usage with other community facilities.**

☐ **B2** **Usable open space should be provided on the basis of 35m²/dwelling and in accordance with the Lower Hunter Urban Housing DCP Conditions.**
For smaller or larger dwellings, space should be provided on a pro-rata basis.

☐ **B3** **Private open space should afford privacy and appropriate security both from and to other private open spaces and dwellings.**

☐ **B4** **Communal open spaces should be linked to provide pedestrian/bicycle circulation space separate from vehicular routes.**

☐ **B5** **The relationship between the functions of communal open space and adjoining private open space must be appropriate in terms of noise, privacy, etc.**

☐ **B6** **Retain any landscape features deemed significant to enrich the quality or amenity of the space both ecologically and environmentally.**

☐ **B7** **Minimise open space maintenance costs particularly by reducing the extent of lawns.**

☐ **B8** **Specify plant species native to the locale.**

☐ **B9** **Design planting to 'flow' in the direction of any drainage corridor.**

☐ **B10** **Communal open space should take account of the on-site playing needs of children.**

☐ **B11** **Communal open space should facilitate casual surveillance of neighbouring property.**

☐ **B12** **The design and linkage of open space should promote biodiversity.**

BUILDING CONSIDERATIONS

☐ **B13** **Balconies should be a minimum 8m² with a minimum 2.4m width.**

Refer 7 CIRCULATION PATTERNS
11 LANDSCAPE
18 WATER RESOURCES MANAGEMENT

7 CIRCULATION PATTERNS

In keeping with the ESD concept of urban village, it is important to develop a sense of place and community by creating a pedestrian and cyclist oriented environment. Footpaths should not only facilitate circulation within the site but also offer the potential for linking to other development sites, commercial and community facilities and various types of open space.

Pedestrian/bicycle links should be made attractive by:-

- incorporating pocket parks with rest areas and features of visual interest;
- allowing visual links along the pathway network offering a sense of orientation and destination;
- allowing view corridors to features considered significant;
- strategic planting for shelter and security;
- installation of furniture;
- appropriate ergonomic and anthropometric design for disabled access;
- providing the appropriate level of lighting for safety and security;
- ensuring an harmonious coexistence between humans and other flora and fauna.

Where pedestrians, cyclists and motor vehicles must share facilities, then the communal street should be designed to be as pedestrian friendly as possible by:-

- introducing speed reduction techniques;
- differentiating the internal street through changes of paving material, widening footpaths and eliminating kerbs;
- introducing planting and adding street furniture.

The quality of open space is further discussed under OPEN SPACE.

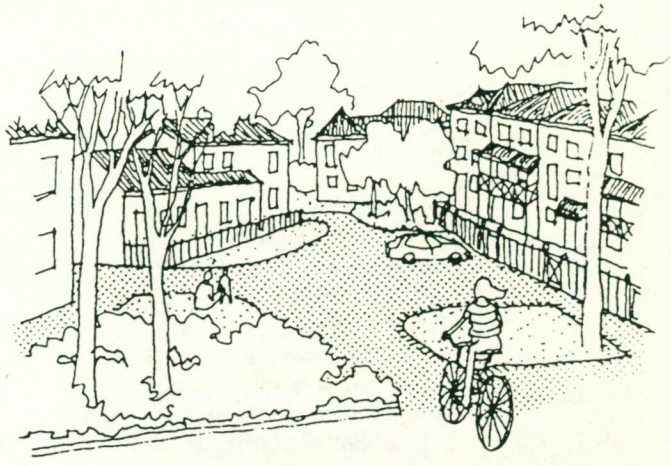


FIGURE 2
STREET DESIGN SHOULD INCORPORATE TRAFFIC, ENVIRONMENT AND STREETSCAPE ISSUES TO MAKE STREETS 'PLACES'

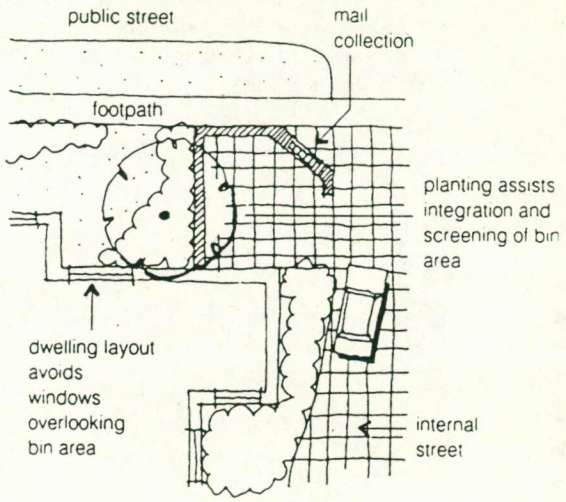


FIGURE 3
MAIL AND GARBAGE COLLECTION AREAS, WHERE PROVIDED, TO BE INTEGRATED WITH BUILDING DESIGN AND LANDSCAPE

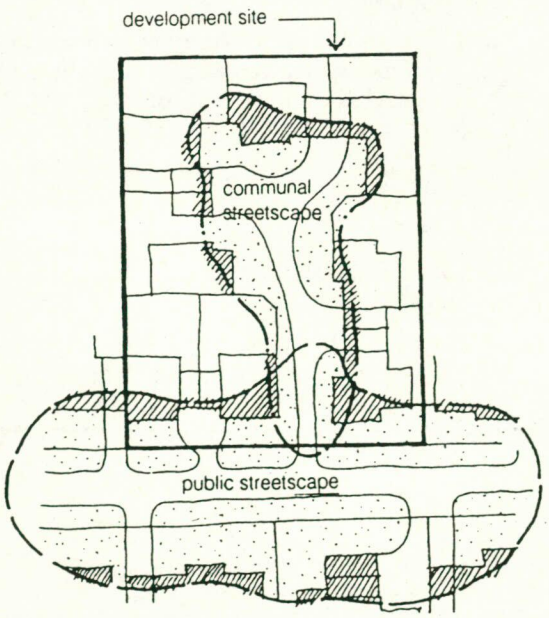


FIGURE 1
STREETSCAPES MAY BE CATEGORISED AS PUBLIC OR COMMUNAL WITH COMMUNAL STREETSCAPES BEING INTERNAL TO THE SITE

FIGURE 4
CONSIDER EASE OF USE OF FACILITIES

7 CIRCULATION PATTERNS

OBJECTIVES

i. Link respective circulation routes in a safe convenient and attractive way.

ii. To ensure site facilities, such as garbage bin enclosures, recycling bins, mail boxes, clothes drying areas and external storage facilities (when provided) are designed to be conveniently reached and visually attractive, to blend in with the development and street character and to require minimal maintenance.

iii. To ensure there are minimal conflicts between pedestrians, cyclists, cars and flora and fauna.

iv. Allow bicycle/pedestrian access between residences, schools, commercial areas and community facilities so as to discourage use of motor transport.

NOTES

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

- ☐ **B1** The design should facilitate ease of use of streets and access ways by pedestrians, in particular by the disabled, the aged and children.
- ☐ **B2** The design features of each type of residential street convey a street's primary function and encourage appropriate driver behaviour.
- ☐ **B3** Driveways and/or communal streets should be paved in materials other than concrete. (Refer also LANDSCAPE).
- ☐ **B4** Footpaths or combined footpath/cycleways which provide access for the disabled should be finished in concrete. (Refer also ACCESSIBILITY - ADAPTABLE HOUSING).
- ☐ **B5** Where possible allow for potential bicycle/ pedestrian links to other future or existing developments or community facilities.
- ☐ **B6** Provide site facilities in accordance with Objective ii.
- ☐ **B7** Crossfall should be allowed for on street pavements that are between 0.025 and 0.040m (fall) per 1.4m (width).
- ☐ **B8** The longitudinal gradient should not exceed 20%. (Refer also ACCESSIBILITY - ADAPTABLE HOUSING).
- ☐ **B10** The horizontal and vertical alignments and cross-fall reflect physical land characteristics, while satisfying safety criteria.
- ☐ **B11** The drainage function of the carriageway and/or street reserve is satisfied by the cross-section profile of the total street reserve.
- ☐ **B12** Ensure that the design of all circulation routes offer a level of attractiveness to users.

Refer 6 OPEN SPACE
11 LANDSCAPE
ACCESSIBILITY - ADAPTABLE HOUSING

8 CHILDRENS PLAY AREAS

Childhood play and its quality are crucial for development and learning. Its occurrence is dependent on motivation and inspiration. Fulfilling play is achieved by provision of a wide range of stimuli which extends children's thinking to the broadest definition of learning.

Outdoor play offers a unique experience which needs very careful handling and management in urban housing development because of limitations or actual space availability. The way space is actually arranged can input on

- behaviour
- concentration
- nature of play

The successful playground will suggest rather than dictate the child's response and usage.

The key elements of playground design are:

- Size
- Scale
- Natural Features
- Differentiation of areas
- Complexity
- Ease of Access
- Possible indoor/outdoor transitions
- Sensory stimulation
- Structures
- Drainage
- Shape
- Playscape
- Planting
- Play Units
- Flexibility
- Allowance for supervision
- Climatic protection
- Spatial experience
- Safety
- Construction and maintenance

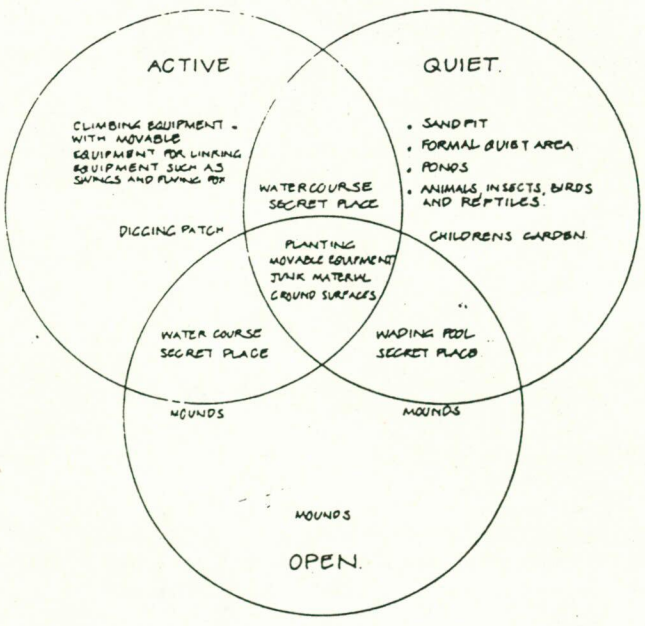


FIGURE 1
PLAYSPACE ACTIVITIES AND THEIR RELATIONSHIP

8 CHILDRENS PLAY AREAS

OBJECTIVES

i. To provide a range of physical, social and mental stimuli yet draw balance between the sense of challenge, entertainment and safety considerations for any structure or part of a facility.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

- ☐ **B1** Provide children's play facilities in accordance with the likely demand associated with the development.
- ☐ **B2** Provide opportunities for both solitary and group play.
- ☐ **B3** Provide seating and shelter for adults supervising.
- ☐ **B4** All materials and components to be low maintenance, affording a safe and attractive condition at all times.
- ☐ **B5** Materials and equipment should be consistent with the character of the development and sympathetic with their surroundings.
- ☐ **B6** Secondhand and recycled materials should be used for play facilities where possible.
- ☐ **B7** Integrate play spaces into communal areas allowing surveillance and supervision from Kitchen and Living areas.

9 PRIVACY

Increases in dwelling density reduces the designer's ability to use appreciable amounts of space as buffers between different households. Private areas can be created by design of physical barriers such as walls, floors, ceilings, fences and/or landscaping. Privacy, both within the dwelling and externally, might also be achieved by judicious design and locations of doors and windows.

Adequate visual and acoustic privacy is critical to the well being of all residents and is always considered a very high priority by the community.

Minimise direct views to neighbours or screen appropriately. (FIGURE 1).

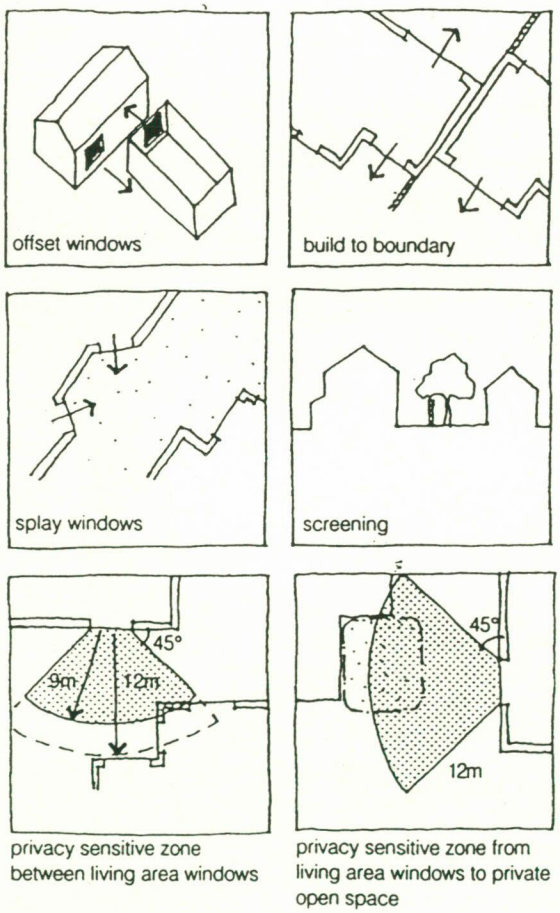


FIGURE 1
SITE CONSIDERATIONS

Screening may allow a reduction in distance separation whilst improving the level of privacy (FIGURE 3).

Overlooking problems become more critical with increased density due to multiple floor levels (FIGURE 2).

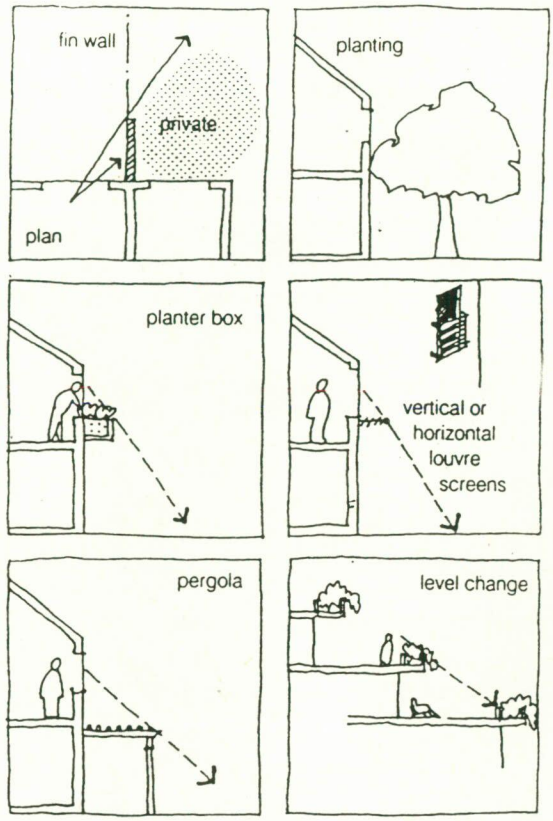


FIGURE 2
MINIMISING OVERLOOK

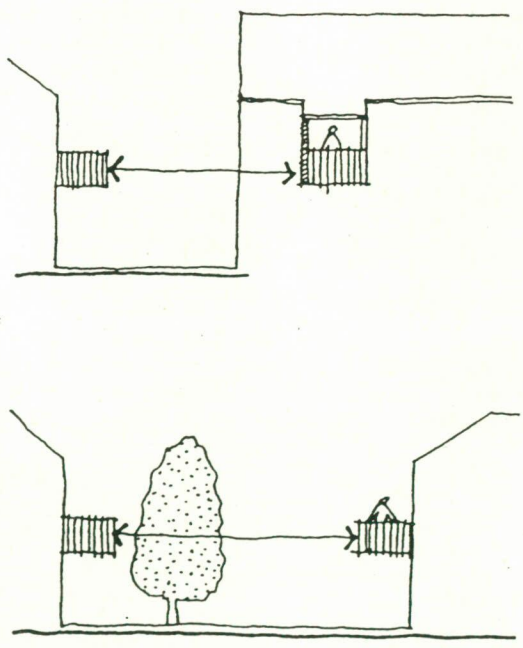
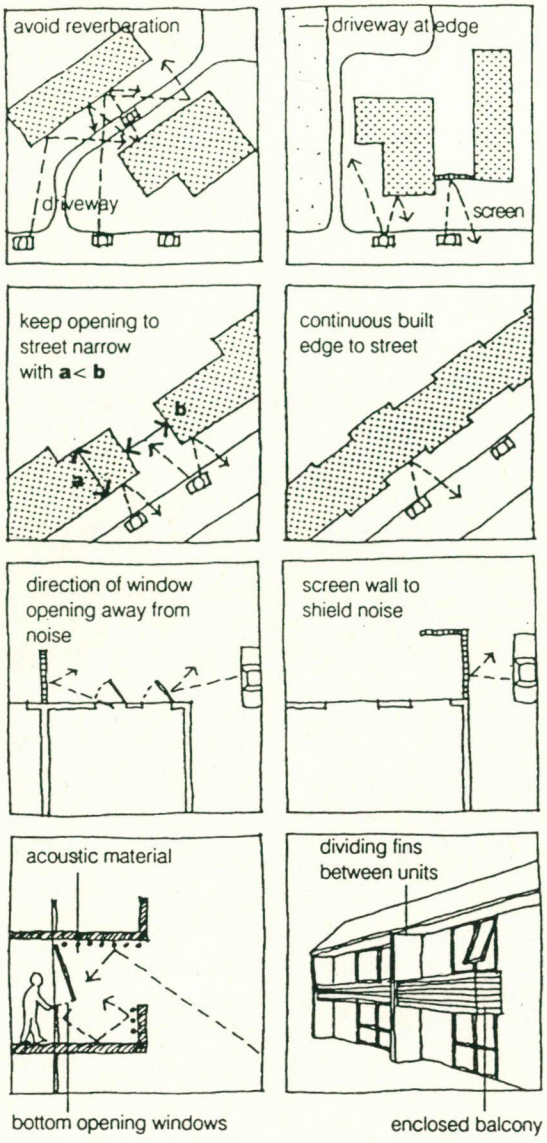


FIGURE 3
SCREENING IDEAS

Noise can be transmitted both through the air and through structures and acoustic privacy is not as easily achieved as visual privacy at short distances (FIGURE 4).



ACHIEVING ACOUSTIC PRIVACY

Building layout should locate garages away from bathrooms and bedrooms of adjacent dwellings.

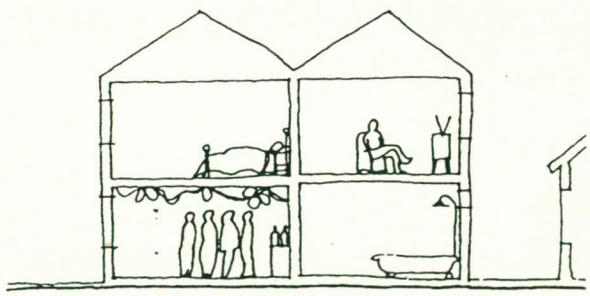


FIGURE 5
BUILDING DESIGN

Design of functional layout and building envelope is also critical to acoustic privacy.

9 PRIVACY

OBJECTIVES

i. To balance the need for more intensive urban housing with the attainment of a level of privacy considered acceptable.

ii. To site and design building(s) to meet projected user requirements for visual and acoustic privacy and to protect the visual and acoustic privacy of nearby buildings and private open space.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ B1 **A minimum 9m separation should be provided between the windows of habitable rooms of facing dwellings that abut a public or communal street. This distance should be increased to 12m for windows above first-floor level.**

☐ B2 **Direct views between living area windows of adjacent dwellings should be screened or obscured where:**
- **ground and first-floor windows are within an area described by taking a 9m radius from any part of the window of an adjacent dwelling. An area so defined is described as a 'privacy sensitive zone'.**
- **other floor windows are within a privacy sensitive zone described by a 12m radius.**

(Refer to FIGURE 1)

☐ B3 **Direct views from living rooms of dwellings into the principal areas of private open space of other dwellings should be screened or obscured within a privacy sensitive zone described by a 12m radius. (Refer to FIGURE 1)**

☐ B4 **Direct views described in B2 and B3 may be obscured by one of the following measures:**
- **1.8m high solid fences or walls between ground floor level windows or between a dwelling and open space where the slope is below 10%.**
- **screening that has a maximum area of 25% openings is permanently fixed and is made of durable materials; or**
- **landscape screening either by existing dense vegetation or new planting that can achieve a 75% screening effectiveness within three years.**

☐ **B5 Site layouts should ensure parking areas, streets and shared driveways have a line of sight separation of a least 3m from bedroom windows.**

BUILDING CONSIDERATIONS

☐ **B6 Openings of adjacent dwellings should be separated by a distance of at least 3m.**

☐ **B7 Shared walls and floors between dwellings should be constructed to limit noise transmission.**

Refer 10 SECURITY
14 ACOUSTICS

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10 SECURITY

Security is important. It provides protection for people and their property. It also helps to minimise personal anxiety.

Security and the sense of security are particularly important to aged and disabled residents who are often vulnerable. Newcastle and inner Newcastle in particular has a high proportion of aged persons. High numbers of disabled people also reside in the Inner Newcastle Area. (REFER APPENDIX ii).

It is envisaged that a greater sense of security can emerge from the community planning associated with the development of urban villages. Thus lessening the need for costly active management, alarm and technical security systems. At the more micro level and by virtue of its increased population density, urban housing has the potential, through appropriate design, to facilitate a sense of security.

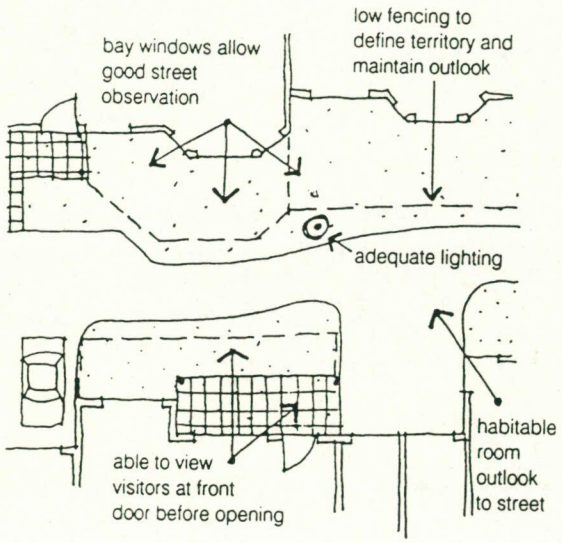

FIGURE 1
DESIGNING FOR SECURITY

10 SECURITY

OBJECTIVES

i. To provide adequate personal and property security for residents.

ii. To create a sense of territory at the boundaries between private and communal public space.

iii. To heighten the sense of security through facilitating social interaction.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1 Lighting should be provided to all pedestrian paths between public and shared areas, parking areas and building entries.**

☐ **B2 Site planning should ensure that landscaping and fencing do not reduce the safety of residents and are placed in such a way as to minimise screening near security risk areas such as doors and windows.**

☐ **B3 Pedestrian site access and car parking should be clearly defined, appropriately lit, visible to others and provide direct access to buildings from areas likely to be used at night.**

☐ **B4 Buildings should be designed to minimise access between roofs, balconies and windows of adjoining dwellings.**

BUILDING CONSIDERATIONS

☐ **B5 Buildings that are adjacent to public or communal streets or public space would have at least one habitable room's window with an outlook to that area.**

☐ **B6 Building design should allow visitors who approach the front door to be seen without residents needing to open the door.**

☐ **B7 Shared entries to other than high-rise buildings should serve a maximum of twelve dwellings.**

☐ **B8 Shared entry lobbies should be able to be locked.**

Refer APPENDIX ii
9 PRIVACY

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11 LANDSCAPE

Appropriate landscape design is an integral component to good urban housing design and the achievement of ESD objectives. Landscape should be thought of, not only in terms of vegetation but also paving, outdoor structures, furniture and water elements.

It is important that there be mutual respect between landscape and building design. Whilst designers may concern themselves primarily with public and communal open space, consideration needs to be given to treatment of private open space allowing residents an opportunity to participate in its design. This will help personalise the space.

Landscape design should satisfy a number of functions:-

- Creation or enhancement of character.
- Facilitating movement through circulation patterns ensuring legibility and safety.
- Improving or maintaining environmental integrity.
- Defining spaces.

Because of the broad nature of landscape design, specific issues or matters are dealt with under relevant subject headings. (See Reference Box page 27)

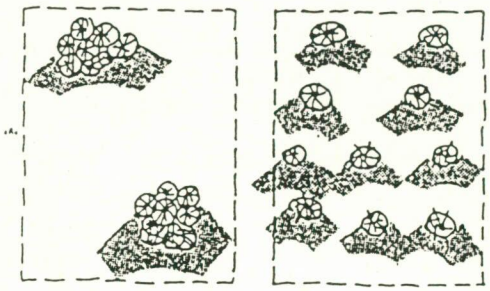


FIGURE 1
PROTECT SOLAR ACCESS. PRESERVE TREES IN GROUPS RATHER THAN INDIVIDUALLY.

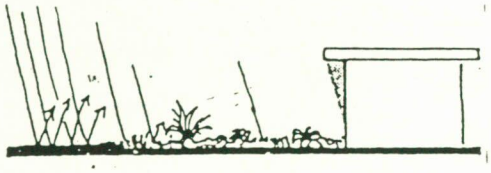


FIGURE 2
PROVIDE LOW VEGETATION TO REDUCE REFLECTION OF SOLAR ENERGY FROM NEARBY PAVING.

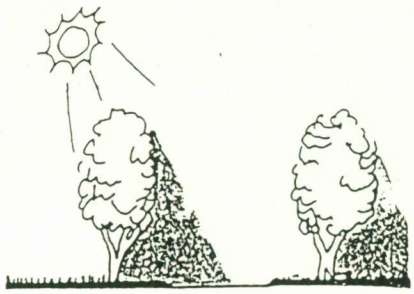
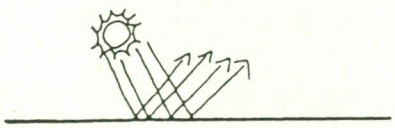


FIGURE 3
SHADE PAVEMENT TO MINIMISE HEAT ABSORPTION.

COURSE PARK SURFACES ABSORB



LIGHT, SMOOTH SURFACES REFLECT.

FIGURE 4
REDUCE GLARE AND REFLECTION.

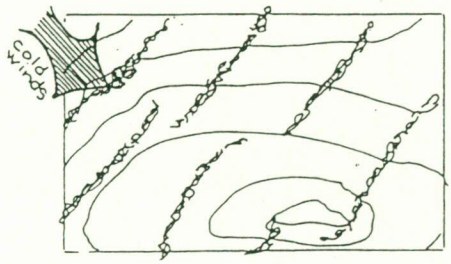


FIGURE 5
BAFFLE WINDS WITH LINEAR ARRANGEMENTS OF VEGETATION

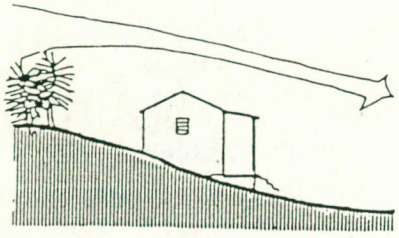


FIGURE 6
PROTECT FROM UNFAVOURABLE WINDS. TAKE ADVANTAGE OF TOPOGRAPHY FOR INCREASED SHELTER AREA

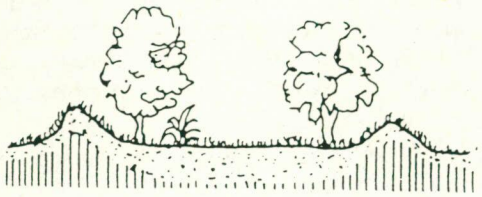


FIGURE 7
RETENTION BASINS CAN BE PARTLY PLANTED OUT FOR IMPROVED ABSORPTION.

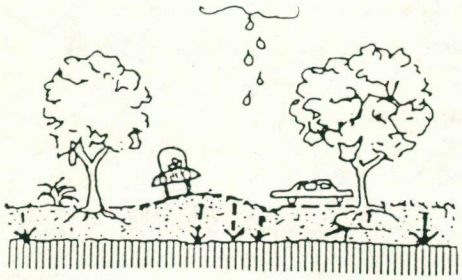


FIGURE 8
PLANT OUT SIDES OF STREETS AND USE PERMEABLE SURFACES TO REDUCE RUNOFF.

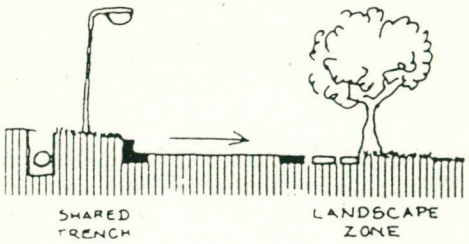


FIGURE 9
DIVERT RUNS TO LANDSCAPING WITH APPROPRIATE DRAINAGE TECHNIQUES.

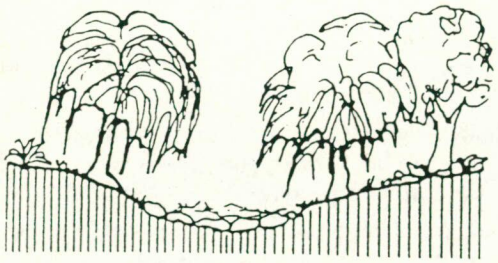


FIGURE 10

DO NOT CLEAR ALONG EXISTING NATURAL DRAINAGE LINES. VEGETATION WILL:

- REDUCE RUNOFF
- REDUCE VELOCITY OF RUNOFF
- STABILISE BANK REDUCING EROSION

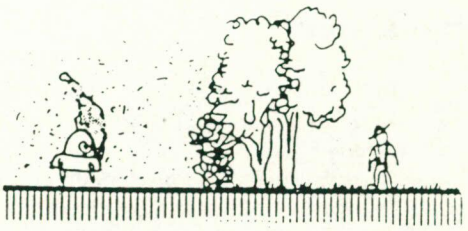


FIGURE 11
REDUCE POLLUTION. PLANTS WILL HELP ABSORB CIRCULATING GASES COLLECTING DUST AND CLEANING THE AIR.

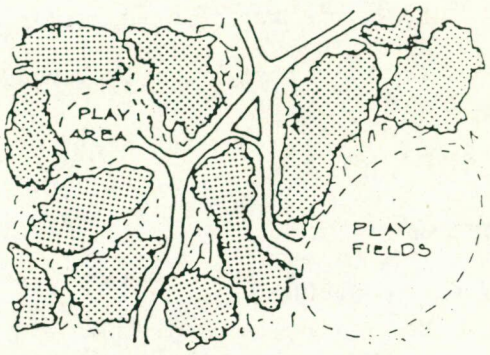


FIGURE 12
LINK ACTIVITIES WITH GREENSPACE.

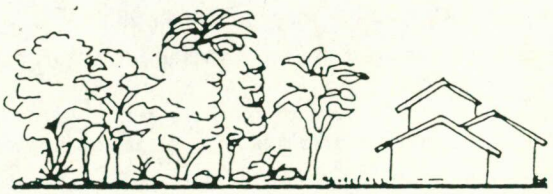


FIGURE 13
PRESERVE GOOD STANDS OF TREES.

11 LANDSCAPE

OBJECTIVES

i. To conserve, restore and re-establish natural ecosystems and maintain biodiversity.

ii. To aid stabilisation of climatic conditions.

iii. To improve air quality and urban climate by increasing planting.

iv. To reduce runoff thereby maintaining the natural water table and minimising pollution.

v. To design planting areas appropriate to natural habitats.

vi. To link habitats so as to promote bio-diversity.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ B1 Use (native) deciduous trees with large canopies, climbers and shrubs on the northern side of building.

☐ B2 Shade west and east aspect with planting.

☐ B3 Use ferneries, planted pergolas and vines near the dwelling to assist the cooling effect of air entering dwellings.

☐ B4 Promote low-maintenance design of landscaping by:-
- use of appropriate mulches.
- minimisation of lawns requiring mowing.

☐ B5 Provide planting to funnel & deflect north-easterly summer breezes into the dwelling and to protect against southerly and westerly winter winds.

☐ B6 Conserve existing drainage line vegetation wherever possible.

☐ B7 Provide full survey showing species list and plant maturity at submission of DA.

☐ B8 Retain and protect existing vegetation where appropriate.

☐ B9 Provide landscaping to screen development fringe and frame desirable views.

☐ B10 The landscape design should minimise safety and security risk, allowing casual surveillance of properties.

☐ B11 Provide vegetation, earth mounding and screening to control noise.

☐ B12 Use measures to control dust while performing construction, outdoor works and stockpiling soils etc.

☐ B13 Provide permeable paving surfaces in lieu of concrete or bitumen (footpaths excepted) to allow return of water to water table.
(Refer also to ADAPTABILITY - ACCESSIBLE HOUSING)

☐ B14 Design replanting scheme using species tolerant to local conditions of climate and soil.

☐ B15 Use all three components of the vegetation structure; groundcover, shrubs and trees.

☐ B16 Demonstrate a respect for site context, such as streetscape character, natural landform, existing vegetation, views, land capability, availability of water and drainage.

☐ B17 Create a special sense of place and distinctiveness.

☐ B18 Create variety of character of site based on changes of functional emphasis.

☐ B19 Promote companion planting.

☐ B20 Choose plants which are long living.

☐ B21 Ensure maximum plan and overall landscape diversity within the context of local environment including, for example, water elements of varying scale and character, landmark plan sculptures of an educational interactive kind, interpretive conservation related areas and other.

☐ B22 Heritage landscapes should be identified, preserved, protected and conserved in accordance with nationally accepted principles.

☐ B23 Links to the existing open space network be included as an integral part of the new development.

☐ B24 A planting policy be included as an integral part of the site planning process. The policy should relate to public, commercial and private open space.

☐ B25 Control and plan clearings for development to avoid causing unnecessary visual and environmental impacts.

☐ B26 Where possible stormwater from drainage and swales should be diverted onto landscape beds.

☐ B27 Use only second hand, recycled and plantation timber for tree stakes, edging and other structures.

☐ B28 Ensure that the quantity of any biological material harvested is managed to ensure a sustainable resource remains.

☐ **B29 Submit drawings and reports outlining full landscape design for the development.**

☐ **B30 All topsoil to be reused or recycled.**

☐ **B31 Landscape design should comply with requirements set down in NCC Draft DCP 33**

Refer
- 2 SITE ANALYSIS
- 6 OPEN SPACE
- 7 CIRCULATION PATTERNS
- 8 CHILDRENS PLAY AREAS
- 9 PRIVACY
- 10 SECURITY
- 12 STREETSCAPE
- 13 HERITAGE FEATURES
- 16 PASSIVE DESIGN FEATURES
- 17 ACTIVE DESIGN FEATURES
- 18 WATER RESOURCES MANAGEMENT

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12 STREETSCAPE

STREETSCAPES AND LOCALITIES

Streets are most commonly thought of as only traffic corridors, however they are also the principle public face of a locality and the place for much person to person contact. As such the streetscape is crucial in establishing and maintaining the character of a locality.

All visible components are part of a streetscape. This includes buildings, landscaping and fences, roads and footpaths, street furniture and signage. In some areas the streetscape will have a highly consistent quality, with all buildings of a similar scale and materials as well as function, while others may contain a diverse range of building styles and forms. Even where there in no obvious character it is likely that at least some features are common. Many parts of Newcastle do exhibit a cohesive quality, due largely to their original development as villages, over relatively short time periods. Some areas are formally recognised for this quality, such as the East End, Hamilton East and the Hill.

There are usually some shared community expectations about development within any particular locality, as the character of the locality may have been a chief attraction for people choosing to live or work there in the first place. As a general rule, those parts of a building that address the street or other public space should be sympathetic to their surroundings. The entrance to the building should be prominently sited. The building frontage should face the street and should be an integral part of the streetscape rather than concealed behind walls or lesser structures.

Where streets are completely internal to the site, they may be referred to as communal streetscapes rather than public streetscapes. A communal streetscape may be either a continuation of the public streetscape, or have its own unique character.

The overall principle should be one of consolidation of the character of a locality. The first reference point should be the immediate streetscape within which the development is placed. If this does not exhibit a cohesive character, then surrounding streets may provide the necessary reference points for establishing broader local characteristics. Obviously the more cohesive the locality the more readily an appropriate architectural character is defined.

Any individual feature should be subservient to the streetscape as a whole, whether in established or new areas. Buildings should be designed as landmark structures only where this is warranted by their location - eg; corner site or focal point, or function - eg; public meeting place or a general store in a residential street. To be subservient does not however imply that the building should be bland and without detail, but rather that the detail should not overpower that of surrounding buildings in terms of building mass, materials and detailing.

12 STREETSCAPE

OBJECTIVES

i. To identify the architectural character of a locality and design infill development to consolidate that character.

ii. To establish an appropriate architectural characters where no cohesive local character exists.

iii. To provide attractive streetscapes which reinforce the functions of a street and enhance the amenity of buildings or public spaces.

iv. To consolidate the character of a locality with regard to the built form, landscape and environmental conditions prevailing.

v. To ensure the public face of new developments is of a standard and style compatible with local expectations.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1 Street, building and landscape design should enhance attractive streetscapes be sympathetic to the existing character of a locality, or establish attractive and appropriate streetscapes in new areas.**

☐ **B2 The streetscape should reflect the functions and characteristics of the street type, and be designed to encourage pedestrian access and to support or establish a sense of place and street identity.**

☐ **B3 The frontage of buildings should address the street, and should form an integral part of the streetscape rather than being concealed by other features.**

☐ **B4 Information should be submitted that demonstrates how infill development fits within established streetscapes.**

BUILDING CONSIDERATIONS

☐ **B5 Buildings should be detailed in such a way that individual dwellings are readily identified, and have a prominent entrance.**

13 HERITAGE FEATURES

HERITAGE ITEMS OR EXTANT FEATURES

Newcastle is fortunate to retain a large number of historic buildings which help to define the City's character. The most significant of these are registered by organisations such as the National Trust, and are controlled by codes including the Newcastle Local Environmental Plan (LEP). Which identifies five important conservation areas in the Inner Newcastle area:

- The CBD
- The Hill
- Cooks Hill
- Newcastle East
- Hamilton

As the future development and ongoing maintenance of these items and areas is controlled by such codes, it is not necessary to elaborate on them at length here.

Suffice it to say that noted heritage items should be retained in such a way that their heritage significance is preserved, and that the public is able to interpret that significance without confusion as to its actual age or function. This implies that restoration should not aim to make a building appear "as new" or that new work should precisely mimic the old, and that fabric which reveals the nature of earlier occupations should not be unnecessarily removed during adaptation for a new use. There is also the need to maintain an appropriate visual setting around a heritage item, so that adjacent new development does not detract from the significance of the heritage item. Similarly, subdivision of a site should leave an adequate curtilage to the heritage item.

There are however many other features which, while perhaps of no recognised heritage significance, are crucial in establishing the character of the city. They are often background elements within a streetscape against which special items may stand out. Such features are generally buildings, but may include any streetscape element such as landscaping or fencing.

Many features may also have value to the local community, even though this may not be openly expressed until the future of the item is threatened. A building may be a meeting place, a reference point, or associated with an important person. It is essential that such issues be highlighted early in the design process so that valued items may be retained in any new development, or be replaced in some form.

It is also important to note that in every item of extant building, landscaping or general infrastructure there is an investment in materials and energy. Where these items are generally sound and may be readily reused or adapted, energy would be needlessly wasted in demolishing these items and clearing the ground for new development. Older buildings are mostly loose-fit by nature and so are readily adaptable to a new use, at a cost lower or at least compatible with a new structure.

13 HERITAGE FEATURES

OBJECTIVES

i. To conserve those items of recognised heritage significance, including the maintenance of an appropriate visual setting.

ii. To identify and retain those items of value to the local community, or provide appropriate alternate facilities.

iii. To reuse or adapt extant features or infrastructure within new developments wherever feasible.

iv. To create new developments which complement existing heritage structures in a modern context.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1 Reuse extant infrastructure including roads and services where feasible.**

☐ **B2 Retain and refurbish any noted heritage items, and design adjacent new development so as not to diminish their significance, particularly with respect to the five designated conservation areas.**

BUILDING CONSIDERATIONS

☐ **B3 Adapt extant buildings which are generally sound and suitable for reuse.**

☐ **B4 Retain any significant landscape features such as mature trees, retaining walls or stone kerbing.**

☐ **B5 Where possible demolition materials are to be reused on site or made available for reuse elsewhere, establishing a link with the past.**

OPTIONAL

☐ **O1 Retain extant features or include new features which may be used either formally or informally by the community.**

14 ACOUSTICS

Major external sources of noise are:-

- vehicular traffic
- mowers
- active recreation
- garbage collections

Noise between units and common areas and units comes from:-

- parties
- use of appliances
- loudly played sound equipment or television
- closing of garage doors

While the Inner Newcastle Area has the benefit of being well served by public transport, conflict between siting urban housing near transport and the problems of inherent traffic noise will need addressing.

Large urban housing developments will generate their own significant noise. It will be important to address this in terms of its effect, not only on residents, but also the local flora and fauna which, as part of ESD aims to encourage cohabitation of human's with fauna without conflict in an effort to promote biodiversity.

Consideration needs to be given to separating noisy from quiet areas for internal room layout of units. Bedrooms should be away from external noise sources and adjacent to quiet areas in adjoining units (FIGURE 1).

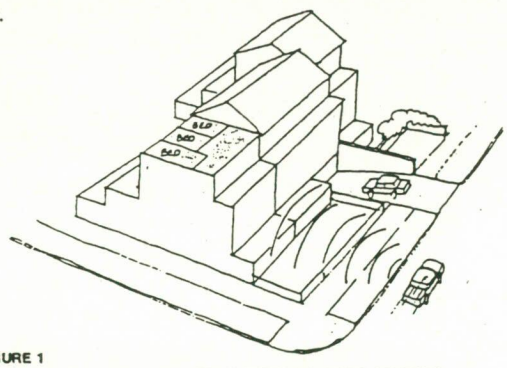


FIGURE 1
LOCATE QUIET AREAS AWAY FROM EXTERNAL NOISE SOURCES.

Fences or mounding can help considerably to minimise noise problems. Appropriate vegetation can also help to mask noise. (FIGURES 2 AND 3).

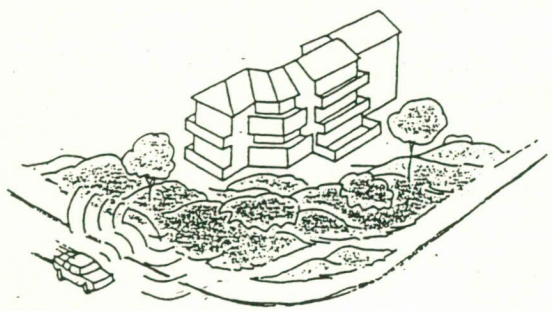


FIGURE 2
USING MOUNDING AND VEGETATION TO MASK NOISE AND PROVIDE A DEGREE OF PRIVACY.

Issues of privacy and street design are dealt with in the appropriate section.

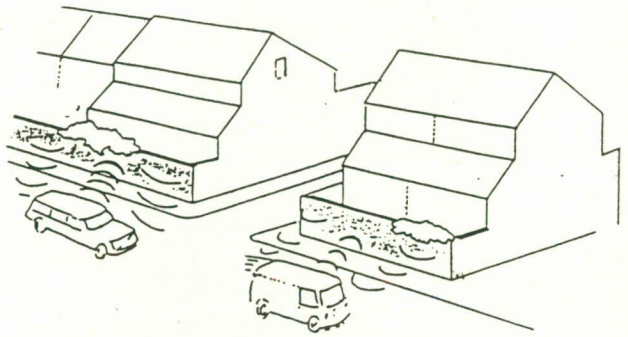


FIGURE 3
USING FENCES TO MASK NOISE AND PROVIDE PRIVACY.

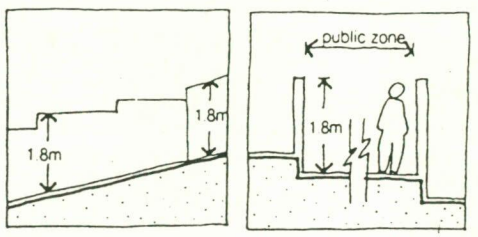


FIGURE 4
FENCE HEIGHT DETERMINED IN RELATION TO PEDESTRIAN IN PUBLIC ZONE

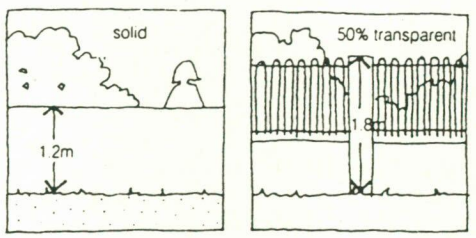


FIGURE 5
THE USE OF LOW WALLS AND SEMI-TRANSPARENT FENCES ENCOURAGED IN PREFERENCE TO HIGH SOLID WALLS

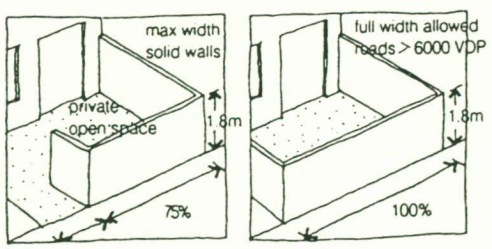


FIGURE 6
FENCE WIDTH AT FRONTAGE RELATED TO TRAFFIC CONDITIONS AND LOCATION OF PRIVATE OPEN SPACE

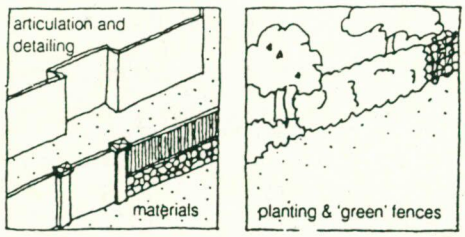


FIGURE 7
PROVIDE VISUAL INTEREST AND INTEGRATE WITH LANDSCAPE

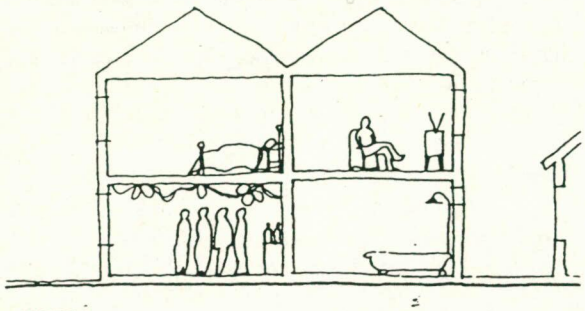


FIGURE 8
CONSIDER INTERNAL PLANNING IN RELATION TO ACOUSTICS

14 ACOUSTICS

OBJECTIVES

i. To minimise sound transmission to an acceptable level by siting, building design and landscape design.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1** **Where external acoustic treatment such as screen fencing, earth mounding and vegetation is required, then it should be in keeping with the scale, detailing and materials used elsewhere in the streetscape.**

☐ **B2** **Heights of fences should be kept to a minimum whilst achieving acoustic separation.**

☐ **B3** **Dwellings adjacent to high levels of uncontrollable external noise should be designed to minimise the entry of that noise.**

☐ **B4** **Site layout should separate active recreational areas, parking areas, vehicle accessways and service equipment areas from bedrooms of dwellings.**

☐ **B5** **Mechanical plant or equipment should be designed and located to minimise noise nuisance.**

BUILDING CONSIDERATIONS

☐ **B6** **Provide construction with minimum STC rating of**

- **45 for walls and floors**
  50 for a sole - occupancy wall between utility rooms in one unit and habitable rooms in the other with satisfactory insulation against impact sound.

Refer 9 PRIVACY

15 ENERGY EFFICIENCY

ENERGY EFFICIENT DESIGN GENERALLY

An objective of ESD is to exploit renewable sources of energy (eg. solar) in favour of traditional non-renewable sources to achieve acceptable comfort levels within the household.

Renewable and continuing energy sources which have minimal environmental impact include:-

- Solar
- Wind
- Tidal
- Water

Non-renewable energy sources which have significant environmental impact are as shown (FIGURE 1).

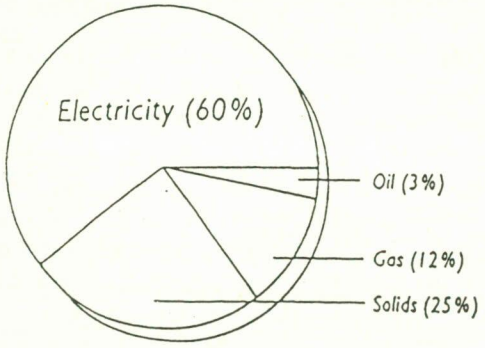


FIGURE 1
APPROXIMATE DOMESTIC ENERGY USE NSW 1989

Electricity is extremely inefficient in primary energy consumption and has a significant detrimental impact on the environment through its coal-fired production. Where renewable energy is uneconomical or impractical, then gas is the preferred energy source due to its higher efficiency over other non-renewables.

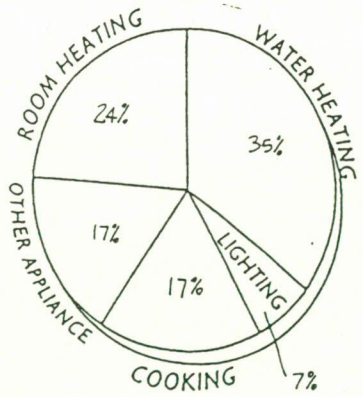


FIGURE 2
AVERAGE HOUSEHOLD ENERGY USAGE BY SECTOR

The proportions of energy usage shown in FIGURE 2 can be drastically altered by instigating energy efficient design principles.

The energy efficient house can under optimum circumstances:-

- Eliminate completely the need for active room heating.
- Replace energy used for hot water from primarily non-renewable (ie. electricity, gas) to renewable source (i.e. solar).

The energy efficient house can, under all circumstances.

- Have gas (or solar) cooking appliances
- Reduce considerably, the energy consumption of appliances by installing only the most efficient (under the star rating scheme)
- Reduce energy consumption of lighting by choosing more efficient fittings and lamps.

An objective of ESD is to halt global warming and ozone depletion. Global warming is being caused by over - production of greenhouse (infra-red absorbing) gases such as carbon dioxide. Carbon dioxide is a by-product of burning coal to produce electricity. Figure 3 shows how electricity, a traditional energy source is by far the greatest contributor to the production of carbon dioxide.

	CO_2 rate by fuel fuel		existing NSW average (b)
	kg/GJ	energy GJ/yr	CO_2 kg/yr
electricity	267	24.6	6568
bimass (a)	96	(9.8)	(941)
gas	56	4.2	235
oil	69	1.7	117
coal	90	0.4	36
solar	0		
total		30.9	6956

FIGURE 3
ESTIMATED ENERGY USE FROM NON-RENEWABLE (FOSSIL) FUELS AND CARBON DIOXIDE EMISSIONS FOR A TYPICAL HOUSEHOLD

Despite Australia's 1.3% contribution to total global production of carbon dioxide from fossil fuel emission, it has the fifth highest per capita emission rate. This demonstrates an alarming rate requiring a reversal in attitude. The residential sector contributes 12.4% of carbon dioxide emissions. By incorporating energy efficient design principles in all housing developments these emissions could be significantly reduced.

NOTES

15 ENERGY EFFICIENCY

OBJECTIVES

i. Promote energy efficient housing to assist in developing ecologically sustainable residential environments.

ii. Reduce household use of non-renewable resources and encourage use of renewable energy in its running.

iii. Minimise energy input into maintenance cost of the building.

iv. Maximise the life cycle of the building to reduce energy costs in demolition, reconstruction and recycling.

v. Minimise energy input into site preparation through appropriate design

GUIDELINES

BENCHMARK

SITE AND BUILDING CONSIDERATIONS

☐ **B1 Employ passive solar design guidelines as a first priority**

☐ **B2 Employ active solar design guidelines as a supplement where passive systems are not achievable.**

OPTIONAL
SITE AND BUILDING CONSIDERATIONS

☐ **O1 Explore alternative renewable energy systems or principles for possible use.**

16 PASSIVE DESIGN FEATURES FOR ENERGY EFFICIENCY

Passive solar energy systems combine solar energy with local climate features to achieve acceptable thermal and daylight comfort in the building.

The building envelope becomes a storage and transfer medium which, under optimum circumstances, requires minimal additional mechanical equipment to aid in achieving the required level of comfort. The system outlined in this section is the direct-gain passive system.

Orientation

Orientation of the dwelling relative to the path of the sun is critical to passive solar designs.

A dwelling with its long axis orientated east-west can be shaded from summer sun by overhanging eaves and warmed by deeply penetrating winter sun (FIGURE 1).

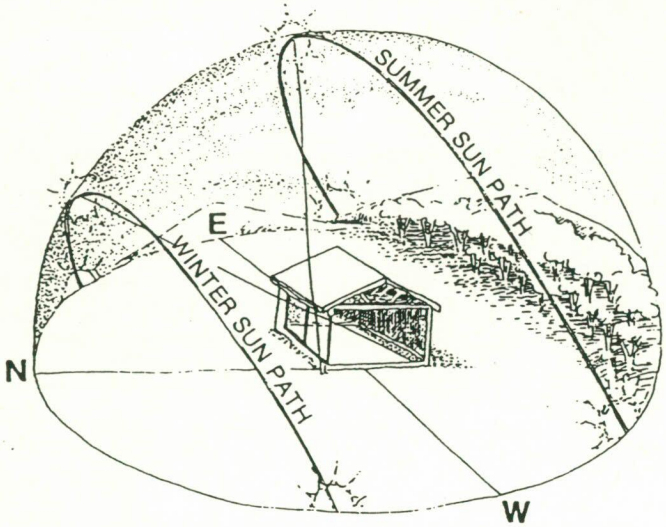


FIGURE 1
SEASONAL PATHS OF THE SUN AND BUILDING ORIENTATION

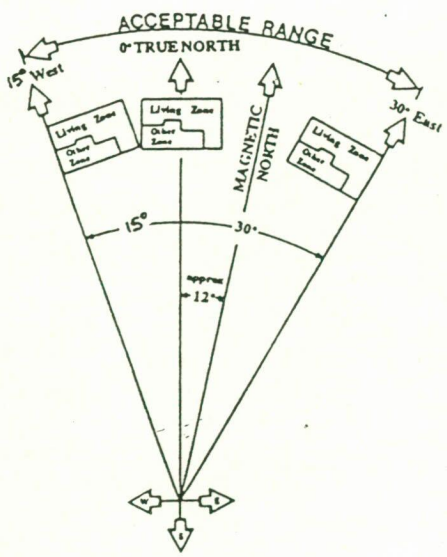


FIGURE 2
ACCEPTABLE ORIENTATIONS FOR PASSIVE SOLAR DESIGN

The plan shape and orientation of internal functional spaces are derived from aiming to achieve maximum solar access to living areas by placement on the north aspect (FIGURE 3).

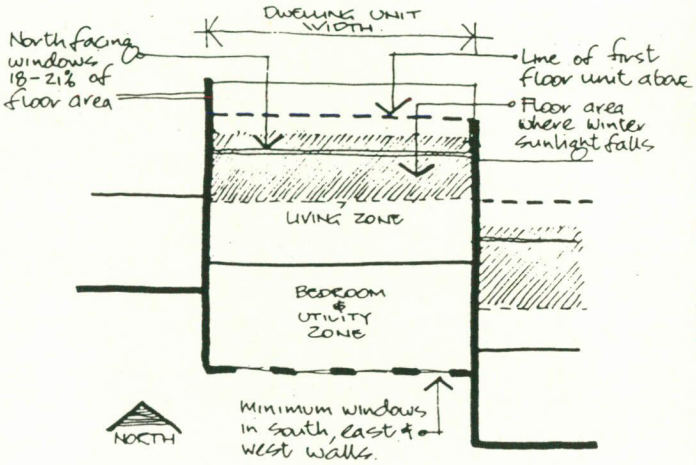


FIGURE 3
ARRANGEMENT OF FUNCTIONAL SPACES

The plan shown in FIGURE 3 exemplifies an efficient arrangement but should not be viewed as being prescriptive. Variations to this arrangement are possible with only minimal effect on performance. The important principles are:-

- avoiding easterly and westerly aspects
- glazing facing north to be 18% - 21% of total floor area.
- double glazing to southerly aspect.

Approximately 50% of all sites in Newcastle have the optimum North - South major aspect. The remaining sites (Refer APPENDIX iii), because of their East - West aspects demand careful design consideration to ensure the optimum potential solar benefit is achieved.

Overshadowing

Solar access is critical to passive solar design. Overshadowing of either the subject building or neighbouring buildings is to be minimised.

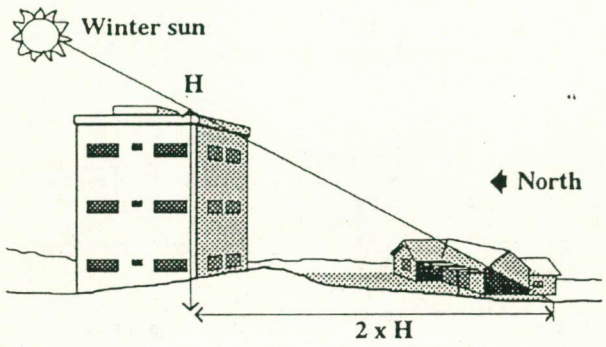


FIGURE 4
SHADOWS CAST AT THEIR LONGEST MID - WINTER JUNE 21

Daylighting

Optimising natural light access reduces the amount of energy used to run artificial lighting.

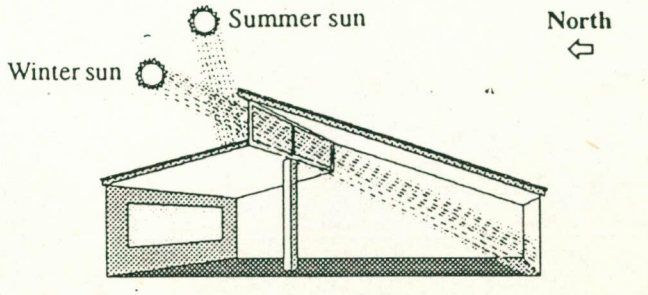


FIGURE 5
HIGHLIGHT WINDOW FACING NORTH WITH SHADING AND CURTAINS USING INTERNAL

Limiting the internal depth of the dwelling allows efficient use of natural light and cross ventilation.

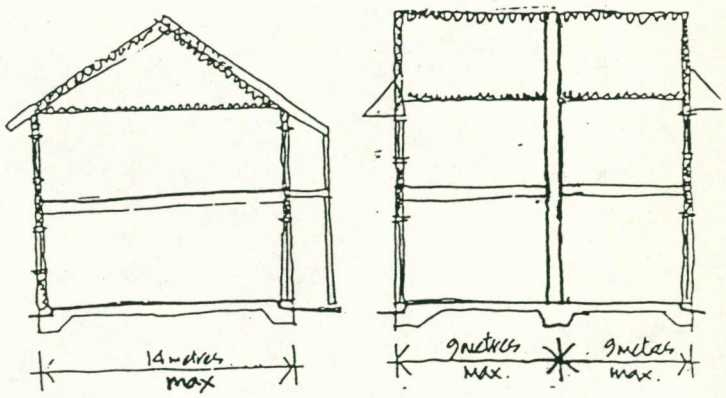


FIGURE 6
MAXIMUM EFFICIENT INTERNAL PLAN DEPTHS

Sunshading

It is more efficient to prevent solar energy from reaching glazed areas (when not required during summer) than trying to correct heat loads caused by solar heat transmission through the glass (FIGURE 5).

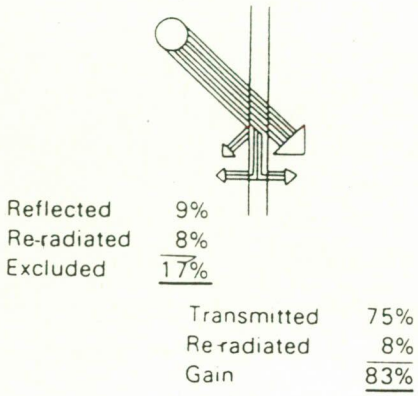
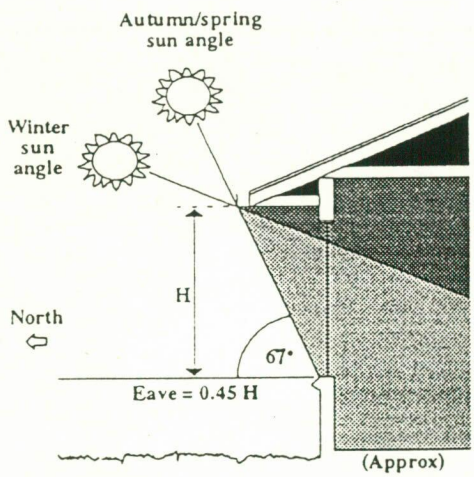


FIGURE 7
SOLAR RADIATION TRANSMISSION THROUGH GLASS



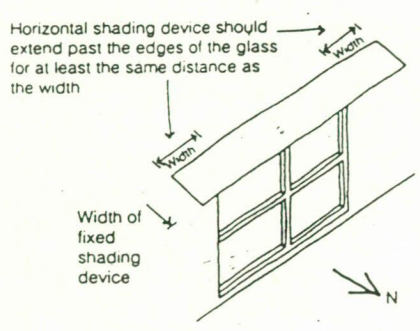
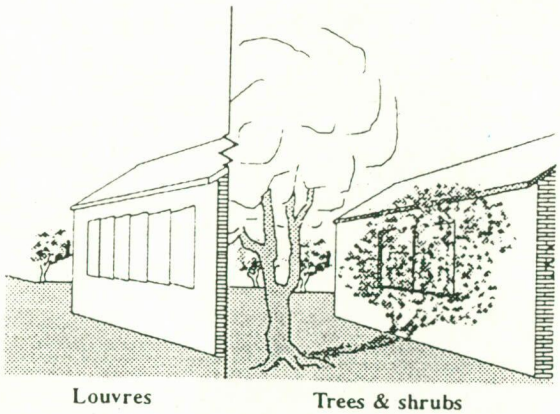


FIGURE 8
SHADING OF NORTH FACING WINDOWS



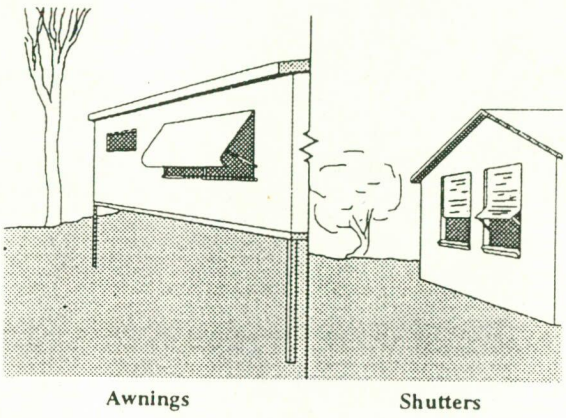


FIGURE 9
SHADING DEVICES FOR WINDOWS FACING EAST

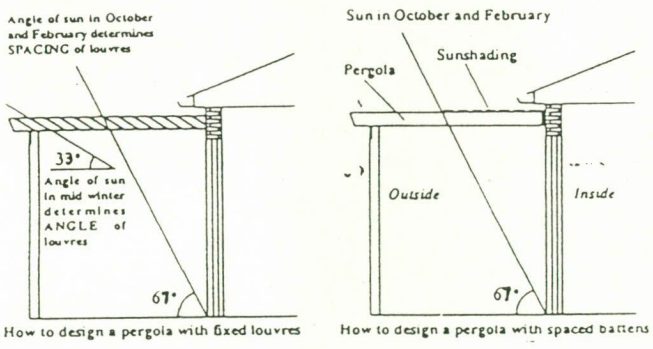


FIGURE 10
CONTROLLING NORTH SUN USING PERGOLAS

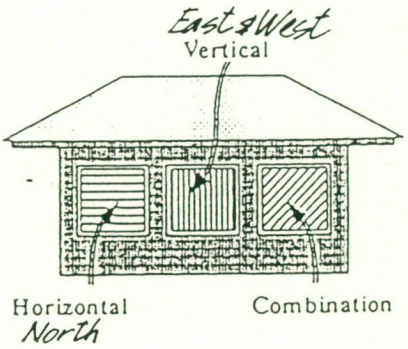


FIGURE 11
DIFFERENT APPLICATIONS FOR LOUVRES AS SHADING DEVICES

Thermal Mass

Concrete floor slabs and internal brick walls absorb winter solar energy and summer ambient room warmth. Designs should endeavour to exploit the beneficial thermal mass associated with these materials.

Finishes:

Floor - tiles, brick, stone etc.
Walls - Cement render, tiles.

Insulating finishes like carpet, vinyl, cork, plasterboard must be avoided.

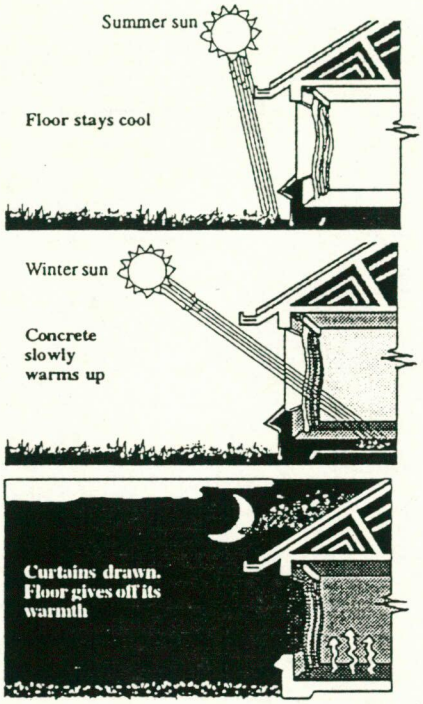


FIGURE 12
USING CONCRETE SLAB-ON-GROUND AS A HEAT STORE

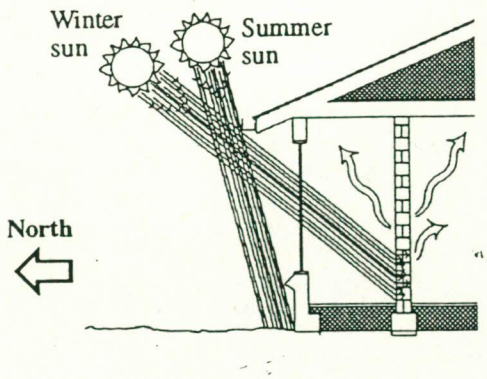


FIGURE 13
USING INTERNAL WALL AS A HEAT STORE

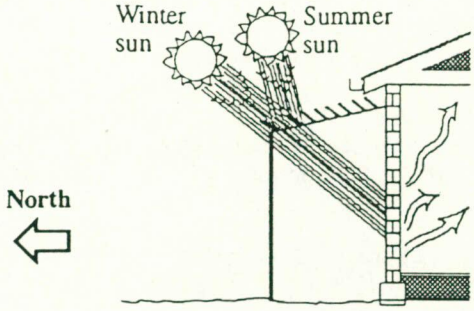


FIGURE 14
ADDING A SHADED GLASSHOUSE FOR HEAT STORAGE

Thermal Insulation

Building components and materials transmit applied heat to varying degrees. The process of reducing the rate of heat flow is called **thermal insulation.**

The value given to the insulating qualities of a material is its **resistance or 'R' value** (Refer to GLOSSARY). The greater the R value the less heat will pass through the insulating material.

Examples of bulk insulation are:
- Fibreglass Batts or Matting
- Mineral Wool
- Natural Wool
- Cellulose Fibre
- Expanded Polystyrene (EPS)
- Autoclaved aerated concrete blocks (AAC)
- Lightweight concrete with EPS aggregates

Examples of reflective insulation are:-
- Reflective foil laminate
- RFL (double or single sided)

Examples of composite insulation materials are:-
- Reflective foil bats
- Fibreglass with bond FR

Insulation can be used effectively to improve energy efficiency by either preventing heat loss or heat gain. **Insulation will not improve the heat storage capacity (thermal mass) of the building envelope.** (Refer to APPENDIX vii).

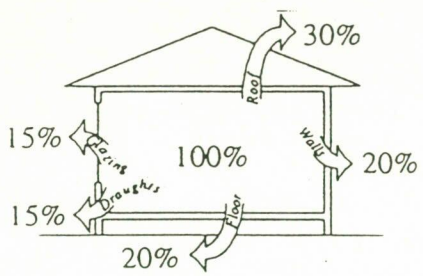


FIGURE 15
HEAT LOSSES FROM UNINSULATED BRICK VENEER HOUSE

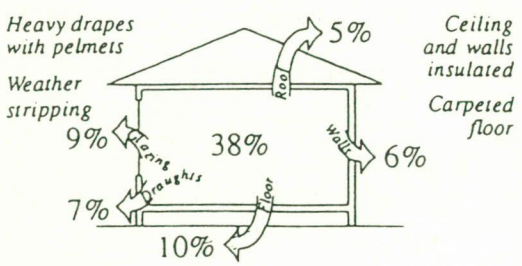


FIGURE 16
HEAT LOSSES FROM FULLY INSULATED BRICK VENEER HOUSE (Relative to heat losses from the uninsulated house)

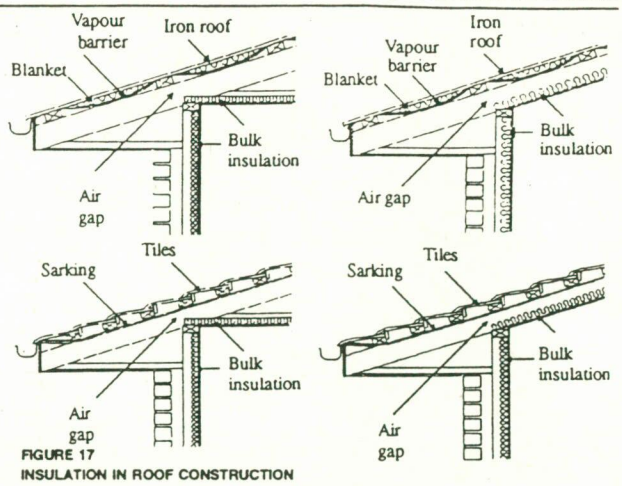
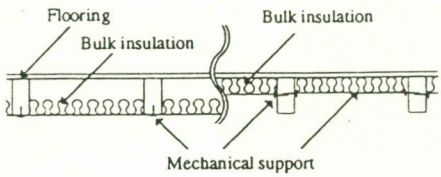
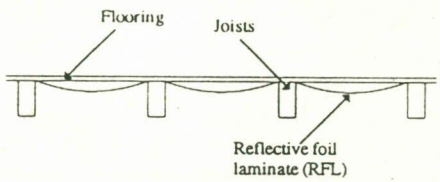


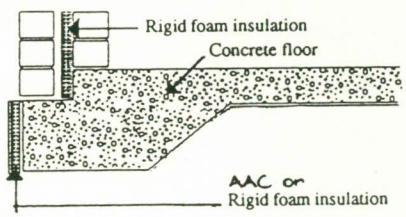
FIGURE 17
INSULATION IN ROOF CONSTRUCTION



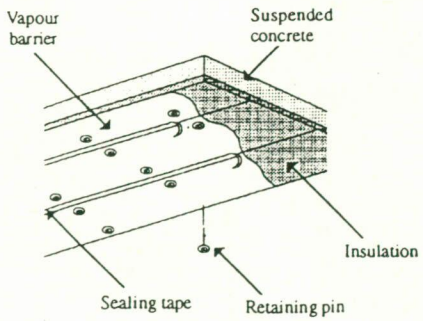
TIMBER FLOOR



TIMBER FLOOR

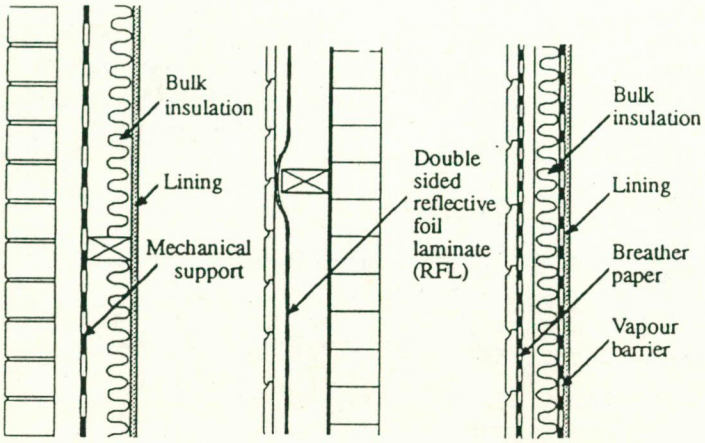


CONCRETE SLAB-ON-GROUND



SUSPENDED CONCRETE FLOOR

FIGURE 18
INSULATION IN FLOOR CONSTRUCTION



1 *CSR Hebel* Smooth Render
2 *CSR Hebel* AAC Blocks
3 *CSR Hebel* Hebel External Render

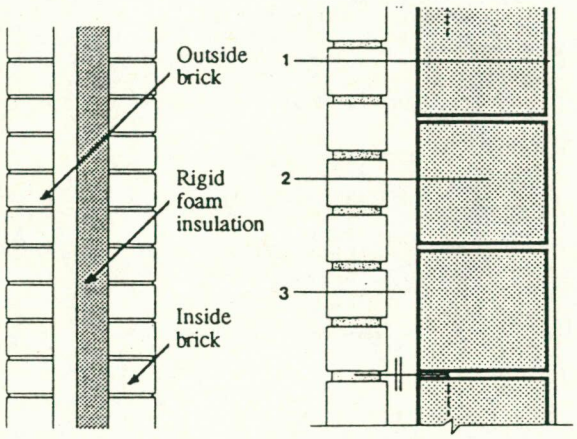


FIGURE 19
INSULATION IN WALL CONSTRUCTION

Some points to check for best results:-

- there should be no gaps or holes in the insulation
- check the minimum R value required for the particular type of construction
- place insulation closest to heat source. Note: that for certain wall constructions and in all roof space, there needs to be two layers of insulation - one closest to the interior (for winter) and one closest to the exterior (for summer).

Ventilation

Ventilation involves the controlling of air movement throughout the building to overcome potential problems of thermal discomfort. It like any of the other techniques used in a passive system needs careful consideration and adjustment so that the optimum comfort level is achieved for the inhabitants.

Methods for controlling ventilation are:

- taking advantage of prevailing winds by strategic location of openings and landscaping
- stack effect
- forced ventilation

Favourable prevailing winds in Newcastle are:

- North - easterly sea breezes in summer (depending on coastal proximity)
- Southerly breezes in summer

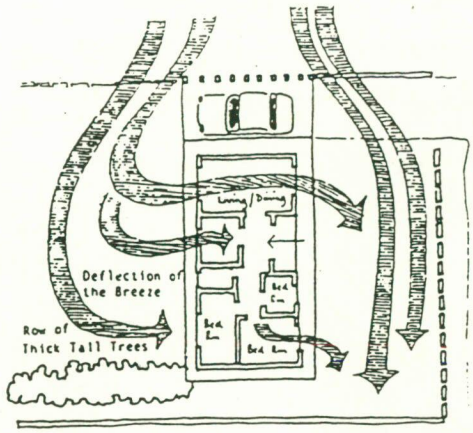
Summer westerlies are probably the most difficult winds to deal with due to their hot, dry quality and sheer ability to permeate. It is at these times and during severe cold conditions that air locks to entry doors are useful in maintaining a consistent level of comfort within. However it can be said that the cost - effectiveness of providing special air - locks may not be justified because of the frequency of days when these conditions occur. Nevertheless, innovative planning may allow rooms such as laundries to incidentally become air-locks.

The orientation of an opening can deviate by up to 60° from the wind direction without reducing ventilation efficiency.

Air speed is the cooling component of ventilation and it is important to know how to achieve the most effective cross ventilation for comfort. Maximum air speed is achieved by having upwind openings open to about 50% of the area of downwind openings.

Small, low opening on the windward side and large high openings on the down-wind side for good cross-ventilation.

FIGURE 20.
CROSS VENTILATION



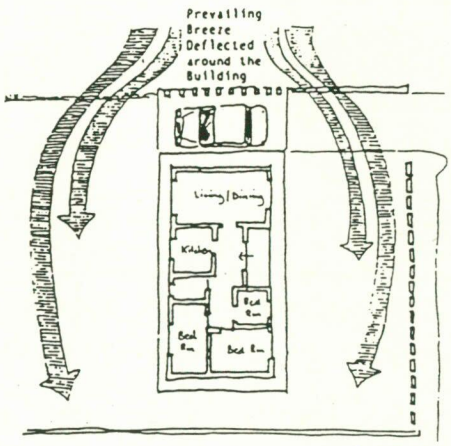
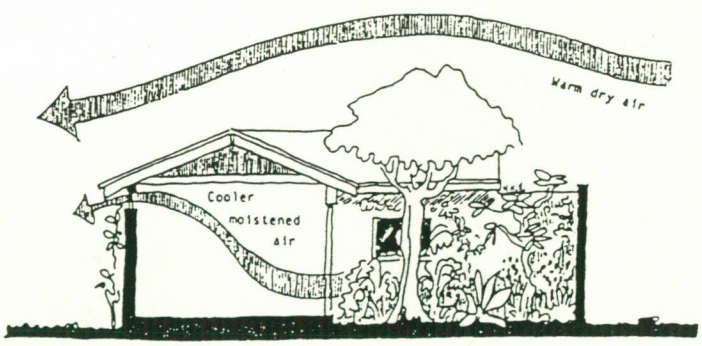


FIGURE 21.
CONTROLLING BREEZES BY DEFLECTION



Courtyard with dense planting

FIGURE 22
RELYING ON PLANT TRANSPIRATION FOR EVAPORATIVE COOLING OF BREEZES

Some ventilation is recommended during winter months particularly when gas heaters are in use.

Forced ventilation will be dealt with under ACTIVE DESIGN FEATURES.

16 PASSIVE DESIGN FEATURES FOR ENERGY EFFICIENCY

OBJECTIVES

i. To facilitate passive solar design wherever possible as a first priority.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ B1 Building(s) should be sited within the preferred orientation shown in Figures 1 and 2 where possible.

☐ B2 Glazing to living areas that face north to receive not less than three hours of sunlight between 9am and 3pm on June 21.

☐ B3 Provide external clothes drying facilities.

BUILDING CONSIDERATIONS

☐ B4 Dwellings should have most of the living area facing north.

☐ B5 The area of glazing facing north should be in the order of 18 - 21% of total floor area.

☐ B6 Living area floors receiving northern sun should have a thermal mass equivalent to at least reinforced concrete slab and walls equivalent to at least extruded brickwork. Floor finishes to these areas should be tile, brick pavers or the equivalent.

☐ B7 Building(s) should have glazing appropriately shaded to avoid summer heat load and allow optimum entry of winter sun.

☐ B8 Where orientation of the dwelling falls outside the preferred range then design of sunshading should prevent exposure of glazing to excessive sun (Refer to FIGURES 7, 9 and APPENDIX v).

☐ B9 Optimise the use of natural lighting where possible. Single aspect dwellings should be a maximum 9 metres deep and dual aspect 14 metres.

☐ B10 The minimum additional thermal insulation levels to be provided expressed as 'R' values are:-

- Roof 2.0
- Walls 1.0
- Floor 1.5 (suspended floors only)

This level of insulation is to be used except where construction materials or components embody a total R value equal to the Standard (Refer to APPENDIX vii).

☐ B11 Windows are to be fitted with boxed pelmets and lined curtains.

☐ B12 All windows and doors should be well sealed to prevent draughts.

☐ B13 All windows and doors should be located to take optimum advantage of prevailing winds for cross ventilation.

☐ B14 Provide a manual explaining how to efficiently operate the system.

☐ B15 Any large areas of glazing which are unavoidably orientated in the range (anticlockwise) from due west to south east should be double glazed.

OPTIONAL

BUILDING CONSIDERATIONS

☐ O1 Alternative passive solar design systems may be used provided they can be shown to be at least as efficient as the direct-gain system.

☐ O2 Take advantage of the hot/cool air differentials. eg. The Stack Effect.

☐ O3 Use light colours for external building materials, but avoid problems of glare.

☐ O4 Provide air locks at all entries to the dwelling.

Refer 11 LANDSCAPE

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17 ACTIVE DESIGN FEATURES FOR ENERGY EFFICIENCY

ACTIVE SOLAR DESIGN AND OTHER SYSTEMS

There are number of active solar energy systems that can work in conjunction with a passive system to further improve the energy efficiency of the dwelling. These active systems are also useful in making existing buildings more energy efficient.

Solar Hot Water Systems

A solar hot water system comprises one or more solar collectors which are connected to a hot water storage tank. The solar collectors are mounted on the roof to take advantage of the solar energy which is absorbed by the collector.

The resulting heat warms the water circulating through the collector, and the heated water is passed to the storage tank subsequent use.

The storage tank can be fitted with gas or electric booster to maintain the desired water temperature during periods of low or nil solar access.

No shade should be falling on the collector(s) during 70% of the day. Ensure that any deciduous trees will not shade the collectors in spring and summer.

The average household (2 adults, 2 children) meeting the above requirements, would need about 4 square metres of collector area and a tank with a capacity of 300 litres (60 gallons). This will provide about 1.5 days supply of hot water.

Where the roof does not face approximately North, or the roof area or angle is not within required limits or where shading occurs, a framework allowing the collector to be angled correctly, may be required.

The location of these units on the roof will require careful consideration because of there visual impact.

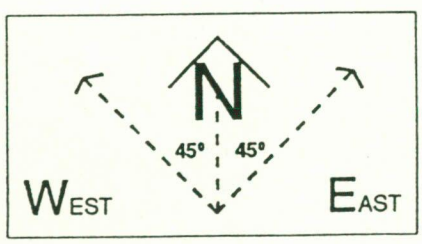


FIGURE 1
OPTIMUM ORIENTATION RANGE FOR SOLAR COLLECTOR

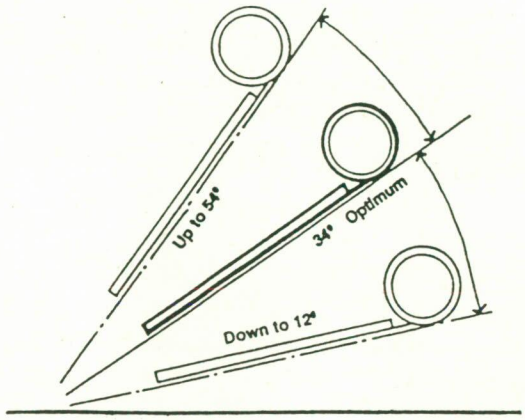


FIGURE 2
OPTIMUM ELEVATION RANGE OF SOLAR COLLECTOR

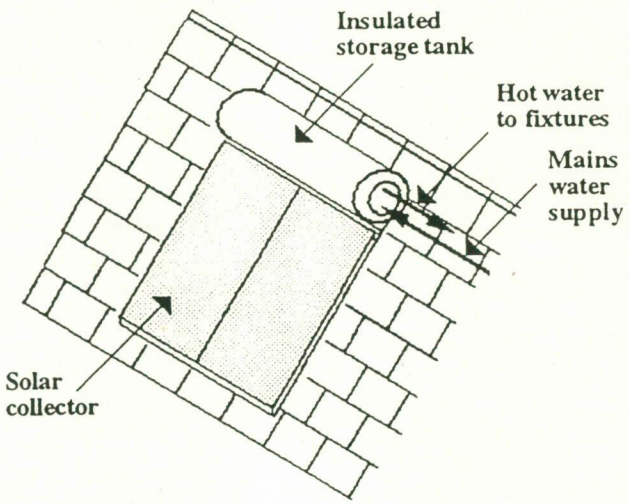


FIGURE 3
CLOSE-COUPLED, MAINS PRESSURE THERMOSIPHON SYSTEM

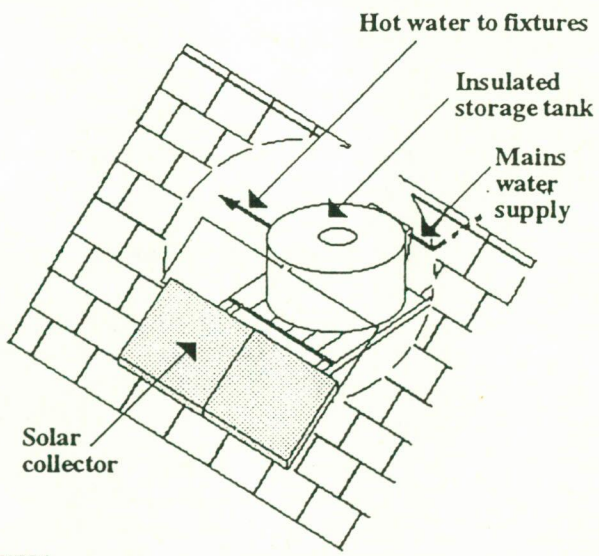


FIGURE 4
REMOTE, GRAVITY FEED THERMOSIPHON SYSTEM

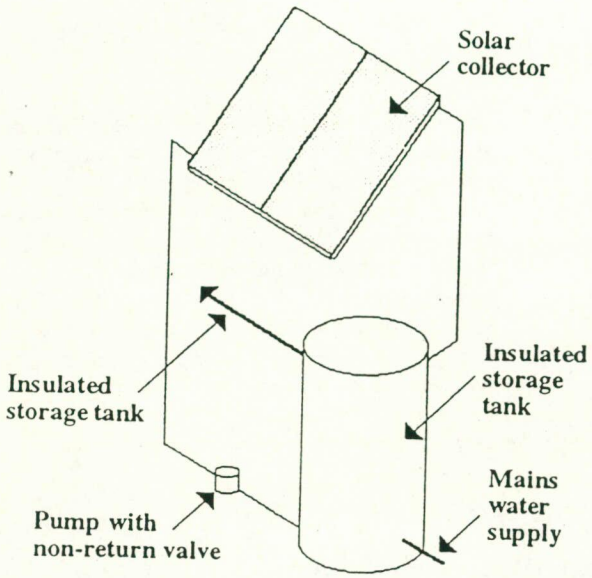


FIGURE 5
REMOTE, MAINS PRESSURE PUMPED SYSTEM

Space Heating and Cooling

The purpose of space heating is to achieve thermal comfort which is not otherwise achievable by more efficient methods. This issue may arise should a development involve recycling of existing buildings or where the local character of an area might be compromised by the design of a full passive solar dwelling.

Consideration could be given to the geothermal system illustrated in FIGURE 6 to provide space heating and cooling.

In winter, water circulating through a "loop" of underground pipe absorbs heat from the earth and carries it to the geothermal unit which extracts the heat, compresses it to a higher temperature and distributes it throughout your home. In summer, the unit extracts heat from you home and transfers it back the circulating water in the underground loop system, where it is dissipated into the collar earth. In many locations, well water can be utilised directly, replacing the closed loop system.

Geothermal systems are extremely energy efficient since they only use electricity to power the pump, compressor and fan. These components transfer heat rather than produce it. As a result, geothermal systems use far less electricity than air-to-air heat pumps and they don't burn fuel like furnaces. In fact, they typically deliver about 3-4 times more energy than they consume. This system can also be used to provide heat for a hot water system.

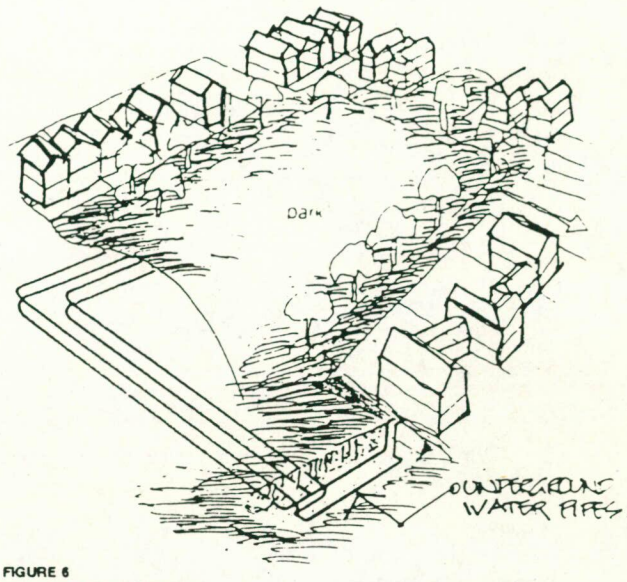


FIGURE 6
THE GEOTHERMAL SYSTEM

Forced Ventilation

The stack effect (refer GLOSSARY) can be assisted by the addition of wind driven turbine roof ventilators which are standard proprietary items. These will serve to draw hot air from rooms via the roof with little extra building cost.

Consideration would need to be given to sealing off ducting during cooler weather so as to not cause leakage of wanted warm air.

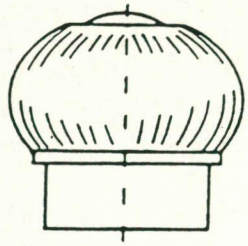


FIGURE 7
WIND DRIVEN TURBINE IN ROOF

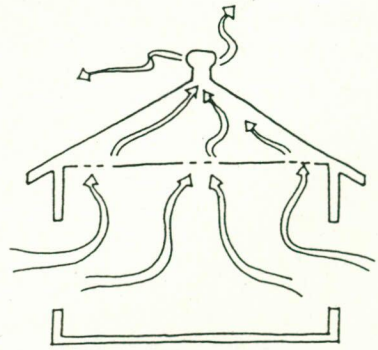


FIGURE 8
EFFECT OF ROOF TURBINE

Ceiling fans take advantage of air speed as a cooling component and can be reversible to circulate warmth during winter.

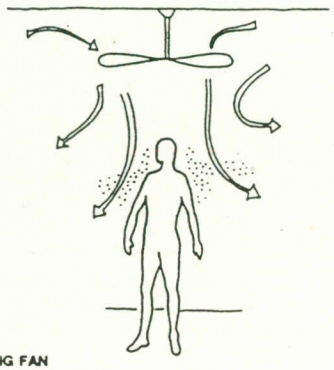


FIGURE 9
THE CEILING FAN

Power Generation

Local power generation is now a possibility by either solar collection cell (photo voltaic) or wind turbine generation. The cost effectiveness of these systems may need further investigation.

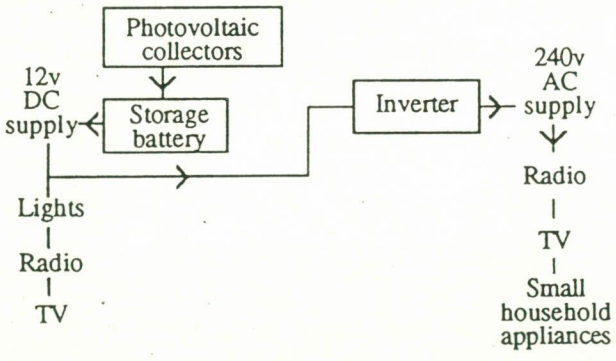


FIGURE 10
TYPICAL PHOTOVOLTAIC ASSEMBLY FOR A HOUSE

17 ACTIVE DESIGN FEATURES FOR ENERGY EFFICIENCY

OBJECTIVES

i. To exploit active solar design to optimise overall energy efficiency of passive and active systems within the dwelling.

ii. To minimise use of fossil fuels in active systems.

iii. To minimise maintenance requirements for active systems.

iv. To prioritise selection of non-renewable energy sources on the basis of efficiency and environmental impact.

GUIDELINES

BENCHMARK

BUILDING CONSIDERATIONS

☐ **B1** **Select appropriate lighting for each task. External lighting should be solar powered and activated by time switching or movement detectors where not required continuously.**

☐ **B2** **Wherever possible solar or heat pump hot water units should be provided to each dwelling.**

☐ **B3** **Provide natural gas connection (where available) and use gas in preference to electricity.**

☐ **B4** **Provide appliances with a minimum 3 star efficiency rating.**

SITE CONSIDERATIONS

☐ **B5** **Provide efficient light fittings.**

☐ **B6** **Provide solar powered pumps where pumps are required.**

☐ **B7** **Provide manuals for efficient operation of all systems.**

OPTIONAL

BUILDING CONSIDERATIONS

☐ **O1** **Provide ceiling fans where appropriate.**

☐ **O2** **Provide gas heater bayonet fittings where appropriate.**

☐ **O3** **Provide roof-mounted wind turbine ventilators to assist warm/cool air displacement where appropriate.**

18 WATER RESOURCES MANAGEMENT

Water Consumption

Water is one of our most precious resources for survival of the ecosystem. It is a very finite resource and therefore requires careful usage and conservation where possible. Damming rivers to sustain our current levels of usage is threatening the very ecosystems we are trying to protect.

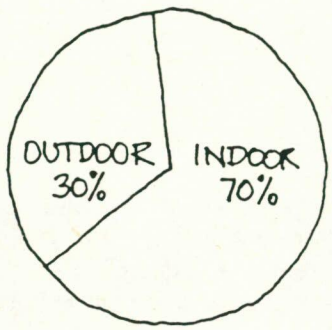


FIGURE 1
DOMESTIC WATER USE IN NEWCASTLE

Harvesting of roof water helps reduce demand on town water supplies. This water can be used for watering gardens. Newcastle has a relatively high annual rainfall (REFER APPENDIX X) giving plentiful water supply for garden use.

A drip irrigation system will save from 15% - 30% water consumption over hose watering of plants.

Sewage

Domestic sewage is an ideal source of nutrient - rich, chemically uncontaminated sludge which is recyclable. 99% of sewage that leaves the household is water, also a recyclable resource.

An enormous stress has been put on our waterways by pumping primary and secondary sewage directly into the sea. Hunter Water Corporation is developing policies for recycling sewage sludge. There are many domestic scale local sewage treatment systems being developed which have potential for urban housing. Under the BBC programme, there is merit in having a number of pilot developments using such systems. Toilet waste is 99% water. By installing a proprietary dry composting toilet, both water is saved and sewage is being recycled.

Stormwater Drainage Systems

The Hunter Water Board and Newcastle City Council have, for a long time, recognised the need to detain stormwater runoff due to peak overload of the system. This is now being extended to include a Total Catchment Management Plan which has the following environmental benefits:-

- Reduced pollution of waterways
  - Chemicals are filtered through soil and wet detention systems before returning to the water table.
  - Silt is trapped by detention systems.
- Reduced runoff
  - Permeable paving allows recharge of water table thereby reducing build-up of salts.

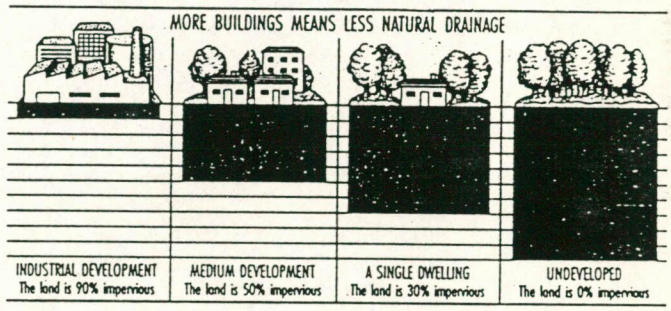


FIGURE 2
REDUCTION IN WATER TABLE DUE TO IMPERVIOUS PAVING

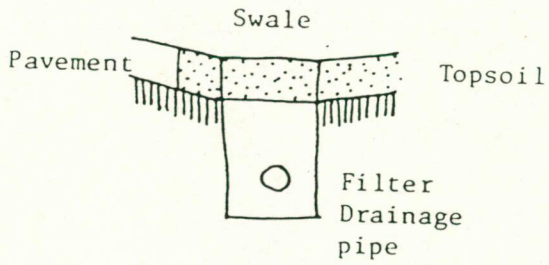


FIGURE 3
SWALE DRAINAGE WILL HELP CONTRIBUTE TO GROUND WATER RECHARGE

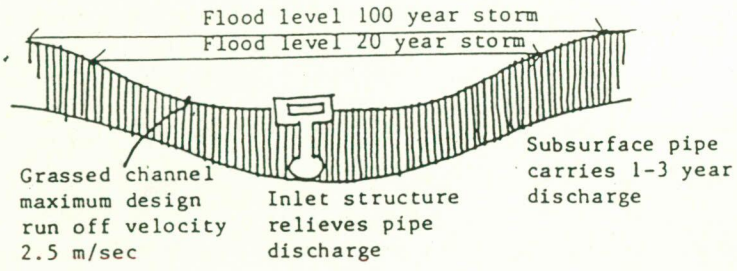


FIGURE 4
SUBSURFACE PIPE WITH GRASSED FLOODWAY

Generally

The concept of the urban village and its self-sufficiency in terms of services, should allow infrastructure to grow in parallel with urban density. With this intent, one would expect that future augmentation costs could be made site focussed whereby the user or developer could directly pay for and organise on-site infrastructure.

Newcastle Authorities are amenable to these strategies.

18 WATER RESOURCES MANAGEMENT

OBJECTIVES

i. Reduce overall current rates of domestic water consumption.
ii. Minimise wastage of water by reusing, recycling and harvesting water.
iii. Reduce demand on potable water.
iv. Reduce impact and demand on service and utility infrastructure.
v. Improve total catchment management.
vi. Reduce likelihood of polluting waterways and causing erosion of topsoil.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ B1 **Divert stormwater run off into landscaped areas and detain water elsewhere.**

☐ B2 **Provide permeable paving to reduce runoff and allow water to return more readily to the local soil.**

☐ B3 **Provide plant species which require minimal water.**

☐ B4 **Provide a drip irrigation system to all landscaping connected to roof water storage tank.**

☐ B5 **Provide car wash facilities with absorption trench drainage.**

BUILDING CONSIDERATIONS

☐ B6 **Provide water-efficient shower roses and/or flow-restricting devices.**

☐ B7 **Provide water efficient washing machines, dishwashers and toilets, etc.**

OPTIONAL

SITE CONSIDERATIONS

☐ O1 **Provide grey water recycling and reticulation for reuse on landscaping to authorities' approval.**

BUILDING CONSIDERATIONS

☐ O2 **Retain and treat surface stormwater runoff for irrigation.**

☐ O3 **Provide sewage recycling system to authorities' approval.**

☐ O4 **Provide taps with low-maintenance valve mechanisms eg ceramic disk.**

Refer APPENDIX x

19 SOLID WASTE

SOLID WASTE MANAGEMENT

Newcastle City Council's current objective for solid waste management is to reduce all landfill disposal by 50% by 1999 and 100% by 2010.

The strategies for achieving this will involve kerbside solid waste collection and delivery to Summerhill transfer station for sorting and recycling. This solid waste will exclude any compost waste.

Source separation of all solids has proven to be the most energy efficient method for recycling. This method could be proposed as a pilot scheme. It would involve design of storage and pick-up facilities within a development.

48% of all household solid waste in Newcastle is suitable for composting. All putrescibles should be composted for local garden usage. It would be expected that one compost bin should be provided per dwelling.

Recycling of sewage is discussed in the WATER RESOURCES MANAGEMENT.

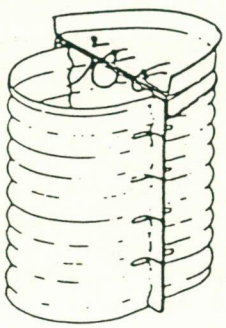


FIGURE 1
PROPRIETARY COMPOST BIND MADE FROM RECYCLED PLASTIC

FIGURE 2
ACCELERATED COMPOST BIN

19 SOLID WASTE

OBJECTIVES

i. Reduce the amount of landfill dumping which encroaches on valuable ecosystems.

ii. Save energy costs associated with recycling by reusing resources where possible.

iii. Recycle all solids - at least.

iv. Minimise construction waste.

GUIDELINES

BENCHMARK

SITE CONSIDERATIONS

☐ **B1** **Provide source separation bin facilities during construction for steel, aluminium, glass bricks, concrete and rubble (for reuse as fill), cardboard and paper, etc.**

☐ **B2** **Provide waste storage to suit partitioned 120 litre bin (minimum 1 per dwelling) with easy access to street for kerbside pickup.**

☐ **B3** **Provide composting facilities to each individual dwelling.**

BUILDING CONSIDERATIONS

☐ **B4** **Order materials and components to minimise wastage or offcuts during construction.**

☐ **B5** **Demolition materials to be reused or recycled on site or elsewhere. (Refer also HERITAGE FEATURES).**

☐ **B6** **Construction waste should be source separated and recycled/reused wherever possible.**

OPTIONAL

☐ **O1** **Provide facilities for source separation of recyclables/reuseables with convenient access for private vehicle loading.**

20 MATERIALS AND LIFE CYCLE COSTS

Life cycle assessment (LCA) has been devised to help us more effectively understand and reduce the environmental impact of human activity. LCA is a method of assessing the environmental consequences associated with release of a product (eg building product(s)) or service system (eg. Regulations, Management).

Methods for LCA assessment are still being developed and it is expected to cover technical quantitative and qualitative processes which demonstrate the environmental consequences of: -

- raw material acquisition
- pollutant emissions
- waste generation

In a more specific sense we must minimise the negative environmental effects of:-

- the building design (refer other subject areas in this manual)
- the choice of materials and components
- the choice of method of construction
- the construction process

Strategies must be incorporated to monitor the building's performance through its life usage and where possible, make adjustments to its characteristics to optimise performance both environmentally and otherwise. In other words, under ESD the approach to life cycle assessment recognises a process for weighting and balancing the short and long term environmental costs during design, construction, usage, demolition and disposal and/or reuse.

The primary objective is to ensure the building remains standing and is used for as long as possible, provided its life is not in itself causing avoidable environmental harm. This objective is achievable by adopting the "loose fit" principle, which allows flexibility of future building usage through careful design.

The methods involved in LCA can be further researched under Draft Australian/New Zealand Standard - Life Cycle Principles DR 94442.

When choosing materials or components to be used in buildings there are a number of factors that need considering in terms of ESD.

- Consider -
  The energy Input into the materials
  The energy input for its initial production and throughout its lifecycle.

- Consider -
  The lifecycle of the material from original processing through to it destruction, disposal, recycling or reuse.

- Consider -
  The reuse of building materials (which should always take priority over recycling because of its higher energy costs).

- Sustainability
  Use plantation timbers rather than rainforest timbers.

  Do not use a material that may be consuming other non-renewable resources or materials in its processing or production.

  Minimise the usage of non-renewable materials.

- Toxicity
  Consider whether a material may cause harm to the environment or humans during any part of its lifecycle - from extraction/harvesting → manufacture → installation → use → reuse. (Reuse may involve the harmful decay or breakdown of a material).

- Wastage
  Use standardised modules of materials to minimise wastage in off-cuts etc.

  Avoid, if possible, products with excessive packages (It is sometimes effective to give feedback tot he manufacturer so tha packaging may be redesigned or deleted completely).

- Reuse
  Maximise the reuse of materials.
  Consider the lifecycle of materials in terms of their useability/reuseability/recycleability and the impact, for example, polluting potential, the material may have on the environment.

20 MATERIALS AND LIFE CYCLE COSTS

OBJECTIVES

i. All materials and components should have minimal negative and building processes impact on the environment.

ii. Use materials with low energy input requirements.

iii. Use materials produced in a sustainable way.

iv. Use materials which do not present toxic danger.

v. Use materials which minimise consumption and wastage.

vi. Choose materials taking account of their reuseability/recycleability potential.

vii. Maximise the reuse of demolition materials.

GUIDELINES

BENCHMARK

BUILDING CONSIDERATIONS

☐ B1 Consider recycling existing buildings wherever possible.

☐ B2 Facilitate adaptability of building design for future recycling/reuse.

☐ B3 Plantation timbers must be used instead of rainforest timbers. (Refer to Appendix ix)

☐ B4 Avoid the use of materials with high maintenance factors.

☐ B5 Use proprietary mechanical termite proofing such as stainless steel mesh or crushed granite basecourse in lieu of organochlorin chemical treatment for slab.

☐ B6 Use only organic approved pesticides for all other pest treatment.

☐ B7 Use only water-based paint products.

☐ B8 PVC and PCR products are to be minimised.

☐ B9 Avoid the use of products and materials with wasteful and/or excessive packaging.

☐ B10 Particleboard and medium density fibreboard to be used, must not have levels of formaldehyde emissions which exceed the General E1 standard. eg CSR Wood Panel Products comply.

☐ B11 New wire cut bricks are to be used in preference to pressed bricks wherever possible.

☐ B12 Use locally produced materials and components where possible.

☐ B13 Explore the potential to use manufacturing by-products (eg slag) from local industry.

☐ B14 Explore the potential to use alternative efficient building construction methods and/or components.

☐ B15 Crush demolished concrete and reuse as rubble basecourse where possible.

NOTES

21 MATERIALS AND DETAILS SYMPATHETIC TO THEIR SURROUNDINGS

During the period 1880-1940 when the bulk of the existing building stock in Newcastle was constructed, the range of materials available was limited and there was also usually one perceived design style. This is demonstrated by the old pattern books, which gave details of a range of buildings which may be constructed within a given style. However the range of materials available today is immense, and their is the lack of any one perceived design style.

Most locality's that have a cohesive character do so because of the consistent palette of materials used. Red brick walls with terracotta tile or slate roofs dominate Federation suburbs like Hamilton, weatherboard walls and corrugated steel roofs in workers villages like Wickham. Even in later periods there is usually some consistency, such as the pale brick walls with glazed roof tiles of post-war estates like Nickson Street, Bar Beach. The insertion of different materials into these localities destroys their cohesive character. The principle should be to use similar materials to those existing in the locality, or at least materials which do not clash with them.

Similarly the detailing of buildings should be sympathetic to the locality. Elements of adjacent structures need not be reproduced precisely, and they should not be mimicked or applied out of context. The form of individual elements is usually due to both practical and aesthetic considerations. Where they are applied for purely aesthetic reasons materials and energy are unnecessarily wasted, and the element may well appear out of place.

On larger sites where there is the potential to create a completely separate internal character to the development, the buildings facing the public street may be constructed to be compatible with their surroundings, while those facing the internal communal space may be quite different.

The choice of materials and detailing is also affected by the need for energy efficiency, maintenance requirements and the like, and these requirements may clash with a locality's existing character. Innovation is required to overcome any such conflicts. Reverse brick veneer is an accepted construction technique for energy efficiency, and so would be suitable in a locality of weatherboard houses. If however masonry walls were required in the same area, they might be of a light colour in sympathy with the usual white or cream painted weatherboards, rather than using a dark red or brown face brick. Painted or lime washed render may be appropriate. Consistency with the locality may still be achieved by the building mass, proportions, roof pitch and material.

21 MATERIALS AND DETAILS SYMPATHETIC TO THEIR SURROUNDINGS

OBJECTIVES

i. To consolidate the character of a locality by sympathetic detailing in terms of proportion, form, materials and colour.

ii. To encourage contemporary detailing of buildings, unless reproduction of traditional detailing is justified for heritage reasons.

iii. To avoid the mimicking of traditional detailing in inappropriate contexts.

iv. To ensure all features are designed to fulfil both practical and aesthetic functions.

v. To permit flexibility in the choice of materials to meet the practical requirements of energy efficiency, construction and maintenance costs.

GUIDELINES

BENCHMARK

BUILDING CONSIDERATIONS

☐ **B1** **Undertake a brief analysis of the detailing, materials and colours of the locality during schematic design of new developments.**

☐ **B2** **Design public facades with sympathetic but contemporary detailing unless traditional detailing is justified for heritage reasons.**

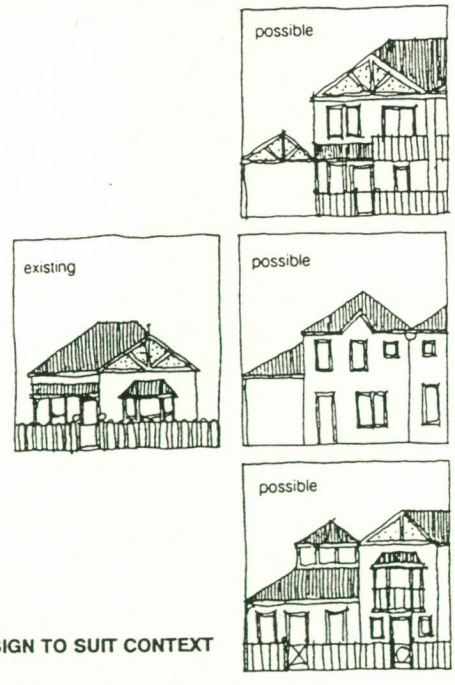


FIGURE 1
DWELLING DESIGN TO SUIT CONTEXT

Refer 12 STREETSCAPE
13 HERITAGE FEATURES

ACCESSIBILITY - ADAPTABLE HOUSING

ACCESSIBILITY - ADAPTABLE HOUSING

There are a number of factors governing the importance of providing access for people with disabilities:

- any member of society should have equal access to all facilities as a basic human right.
- the proportion of disabled people has increased (Australia wide) from 13% in 1981 to 18% in 1993.
- disability increases with age, and our population is aging.
  20% of Australia's population was over 55 (1991)
  26% of Newcastle population was over 55 (1991)

Further detailed evidence relating to the Inner Newcastle Area reflects these trends and reinforces the importance of providing access for the disabled. (Refer to Appendix xi)

It is therefore timely to offer housing which is barrier free or accessible, otherwise termed "Adaptable Design." The key principles are as follows:-

- Adaptable housing design is designing for the good of all users.
- Adaptable housing should be possible at relatively little extra initial costs.
- The concept will provide a safe house.
- Adaptable housing sustains existing community and family networks by allowing people to stay in their houses for a longer part of their life.
- The adaptable house design is able to be modified for people with any level of disability.
- The concept works toward economy of life - cycle of construction in offering "loose-fit" flexibility - an ESD philosophy.

The Inner Newcastle Area offers enormous potential in providing for this portion of the housing demand. Other than for a small area of Newcastle, The Hill and Newcastle East all areas are predominantly flat. The entire area is also well serviced by public transport (Refer to APPENDIX iv).

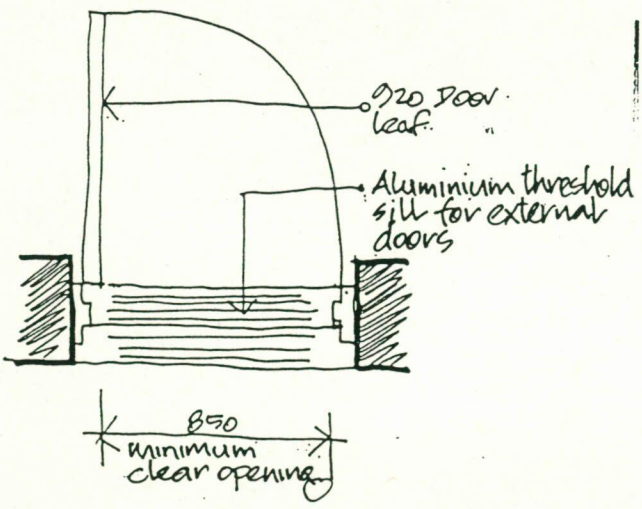


FIGURE 1
MINIMUM DOOR WIDTH

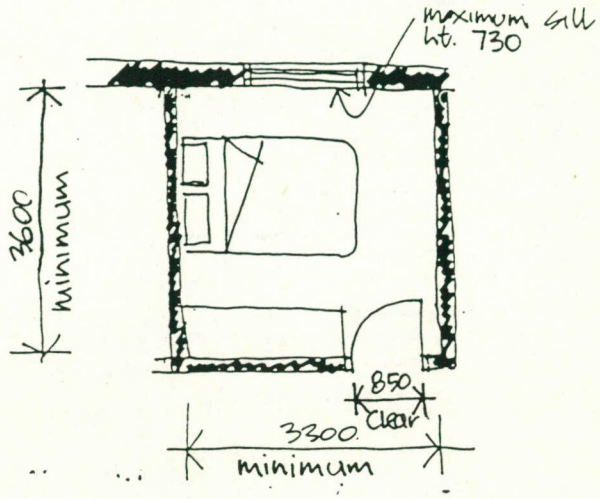


FIGURE 2
MAIN BEDROOM SIZE

The main bedroom should have minimum dimensions of 3600 x 3300 and all other bedrooms to be minimum 9m² in area.

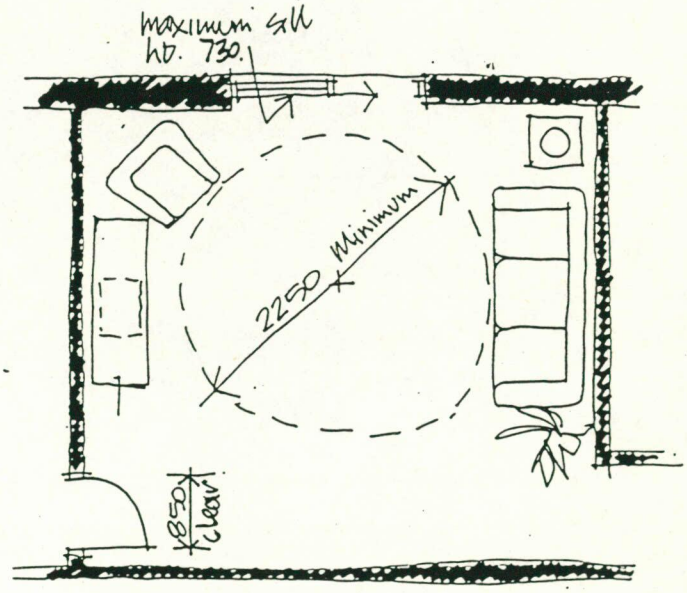


FIGURE 3
MINIMUM CIRCULATION SPACE FOR LIVING AREAS

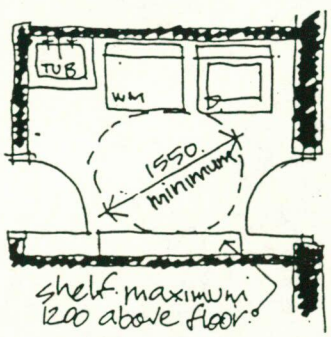


FIGURE 4
MINIMUM CIRCULATION SPACE FOR LAUNDRY

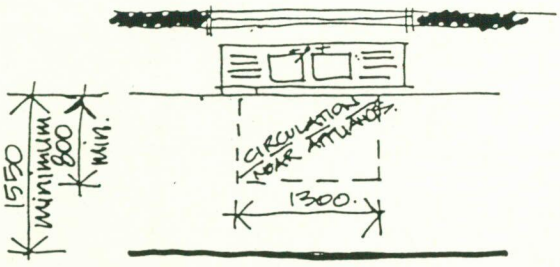


FIGURE 5
MINIMUM CIRCULATION SPACE FOR KITCHEN

A space of 1300 x 800 should be allowed in front of all kitchen appliances and fixtures.

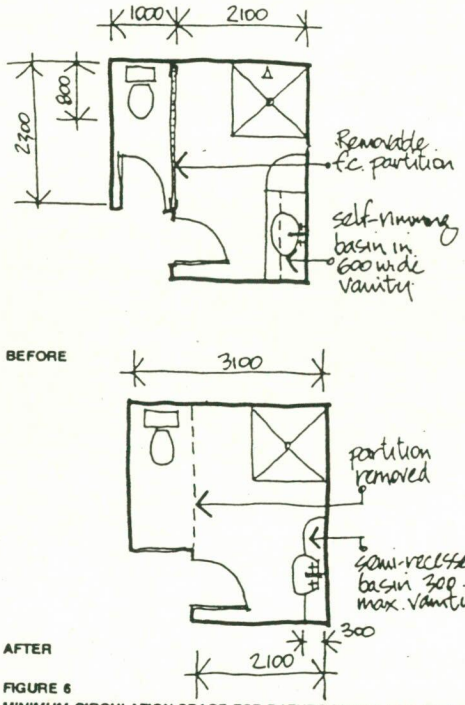


FIGURE 6
MINIMUM CIRCULATION SPACE FOR BATHROOM/WC AND FUTURE ADAPTABILITY

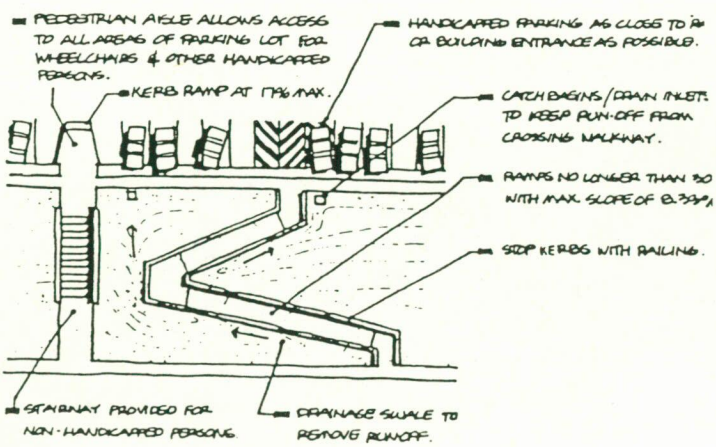


FIGURE 7
RAMP AND STAIR ACCESS

5.0 ACCESSIBILITY - ADAPTABLE HOUSING

OBJECTIVES

i. The housing be designed and constructed or altered in a way which satisfies the performance requirements for adaptable housing.

ii. That housing is designed in such a way that later alterations to suit individual requirements will be achievable without undue expenses.

iii. That housing be designed in such a way that it will easily adapt to suit the widest possible range of lifetime needs. This will include the needs of people with physical disability (including people who use wheelchairs, people with disabilities who are ambulant, and people with manipulatory disabilities); people with sensory disability (vision,hearing) and people with intellectual disability.

GUIDELINES

BENCHMARK

BUILDING CONSIDERATIONS

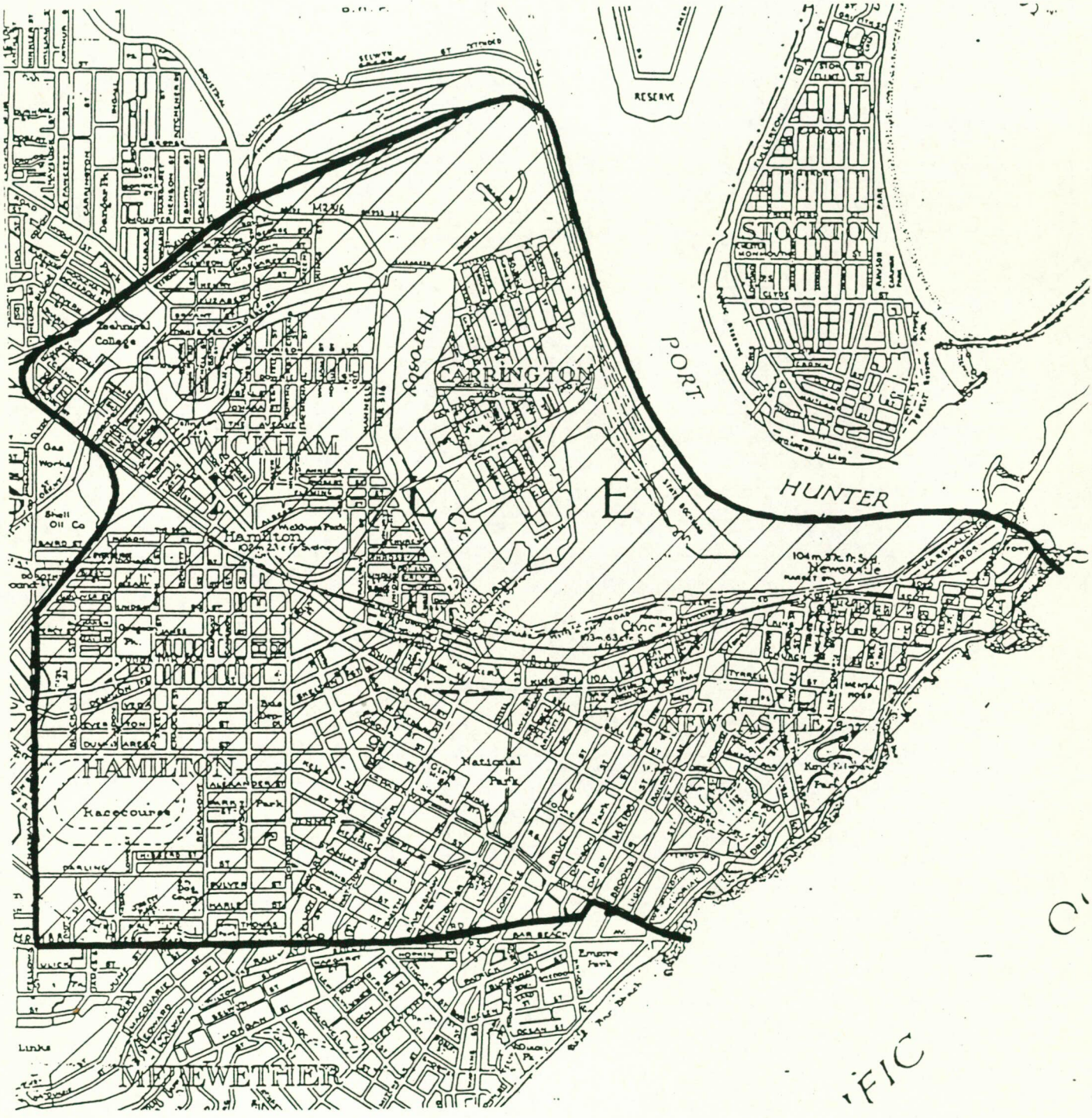
- ☐ **B1 The Housing Implementation Committee will determine exact percentages to be included in particular developments. (Refer to AUSTRALIAN DRAFT STANDARD 1428)**
- ☐ **B2 Provide drawings showing the housing unit in its pre-adaptation and post adaptation stages with a description of how the adaptation is to be provided.**
- ☐ **B3 All pedestrian footpaths should be concrete with a non-slip finish.**
- ☐ **B4 Immediate areas of open space outside units including all of private open space should be accessible.**
- ☐ **B5 Communal facilities should be centrally located within the development.**
- ☐ **B6 Ramp access to public street should be provided (Refer FIGURE 7).**
- ☐ **B7 The design of designated housing must comply with Australian Draft Standard 1428.5 Part 5.**

Refer AUSTRALIAN DRAFT STANDARD 1428.5 PART 5

APPENDICES

CONTENTS

INNER NEWCASTLE HOUSING STRATEGY AREA



INNER NEWCASTLE SUBURBS : DEMOGRAPHIC PROFILES IN 1991

	CBD	Carr-ington	Cooks Hill	Hamil-ton	Hamil-ton E.	Hamil-ton S.	Isling-ton (a)	Mere-weather	Stock-ton	The Hill	Tighes Hill	Inner Newc.	Newc. SSD	Hunter SSD
TOTAL PERSONS	2647	1480	2692	4352	3254	2737	3378	6260	4780	2910	1590	25040	427930	513765
Aged 15+ (%)	91.4	81.8	87.1	87.1	81.0	82.0	83.7	85.9	83.0	36.4	83.3	85.1	77.9	77.6
Aged 60+ (%)	20.4	22.6	18.8	25.1	22.1	27.9	21	24.2	24.1	17.3	19.6	21.9	17.9	18.1
Females (%)	44.9	50.1	51.5	50.2	52.9	55.4	48.7	52.1	51.0	49.8	48.4	50.3	50.6	50.4
Australian born (%)	78.2	90.7	83.7	76.6	87.5	85.1	83.2	88.4	91.0	83.0	81.9	82.7	88.2	88.7
Employed persons (%)	42.4	25.5	48.6	38.8	41.7	26.6	31.0	45.7	30.2	48.2	35.1	38.3	39.1	39.1
Unemployed (%)	18.5	35.1	12.9	18.1	10.4	21.8	30.7	10.9	15.2	13.3	20.2	18.7	12.0	11.8
TOTAL HOUSEHOLDS	940	624	1228	1841	1284	1257	1361	2825	1633	1360	632	10646	150182	180194
One person (%)	42.0	28.7	34.6	32.7	39.7	40.6	28.4	36.1	27.8	40.5	27.2	34.0	20.0	20.0
Two persons (%)	34.6	34.3	39.4	37.4	31.0	31.7	35.6	37.2	32.3	35.4	35.6	35.0	31.9	32.2
Three+ persons (%)	23.4	37.0	26.0	29.9	29.3	27.8	35.9	26.7	39.9	24.1	37.2	31.0	48.1	47.9
Income $0-16,000 (%)	37.4	46.3	35.0	37.2	30.3	58.3	41.7	34.2	38.2	31.5	35.9	39.0	29.6	29.8
Income $0-20,000 (%)	45.1	56.6	41.7	46.7	37.0	66.3	52.8	41.9	48.2	40.3	47.0	47.7	38.2	38.7
No motor vehicle (%)	36.7	39.9	29.0	30.7	20.1	46.0	33.7	23.6	26.2	25.5	26.9	31.6	14.3	13.6
TOTAL DWELLINGS	1122	682	1454	2089	1377	1352	1546	3194	1781	1587	698	10517	148867	177863
Separate houses (%)	9	71.8	32.7	70.6	84.2	39.6	82.7	50.8	79.3	30.2	87	57.2	86.1	85.9
Other houses (%)	38.2	20.2	31.6	7.4	2.9	8.4	8.7	9.7	4.7	7.4	1	12.9	3.9	3.9
Flats (%)	44.7	4.8	32.6	18.5	12.2	51	5.2	38.7	12.2	60.9	7.7	27.4	7.2	7.0
Other (%)	8.1	3.7	3.1	3.5	0.7	1	3.4	0.8	3.8	1.5	4.3	2.5	2.8	3.1
Unoccupied (%)	11.8	9.1	12.9	9.1	6.5	4.7	10.6	8.9	8.0	9.9	8.0	10.6	9.0	11.2
One bedroom (%)	20.7	5.1	10.7	11.3	4.7	23.4	3.8	11.9	8.4	20.4	6.2	13.7	5.7	5.5
Two bedrooms (%)	34.4	44.6	43.7	37.4	27.1	35.5	38.0	42.0	31.3	34.4	36.7	40.2	25.2	24.6
Three+ bedrooms (%)	44.9	50.3	45.7	51.2	68.2	41.1	58.3	46.2	60.4	45.2	57.1	46.0	69.2	69.9
Owned (%)	17.1	45.0	23.0	39.2	51.2	23.0	39.1	37.6	43.9	24.1	39.0	37.3	46.6	46.4
Being purchased (%)	9.6	10.6	13.3	13.5	19.2	8.0	14.6	13.7	17.4	9.8	17.5	14.6	25.4	24.6
Rented government (%)	15.2	4.7	13.0	3.0	3.6	52.0	3.2	7.8	9.4	14.6	0.4	14.3	7.5	7.3
Rented private (%0	34.3	23.9	29.8	28.6	14.5	7.5	26.9	26.9	13.7	35.9	28.4	29.1	14.6	15.0
Other/Not stated (%)	23.8	15.8	20.9	15.0	11.5	8.7	16.2	14.0	15.6	15.6	14.8	4.7	6.0	6.7

Note: (a) includes Wickham

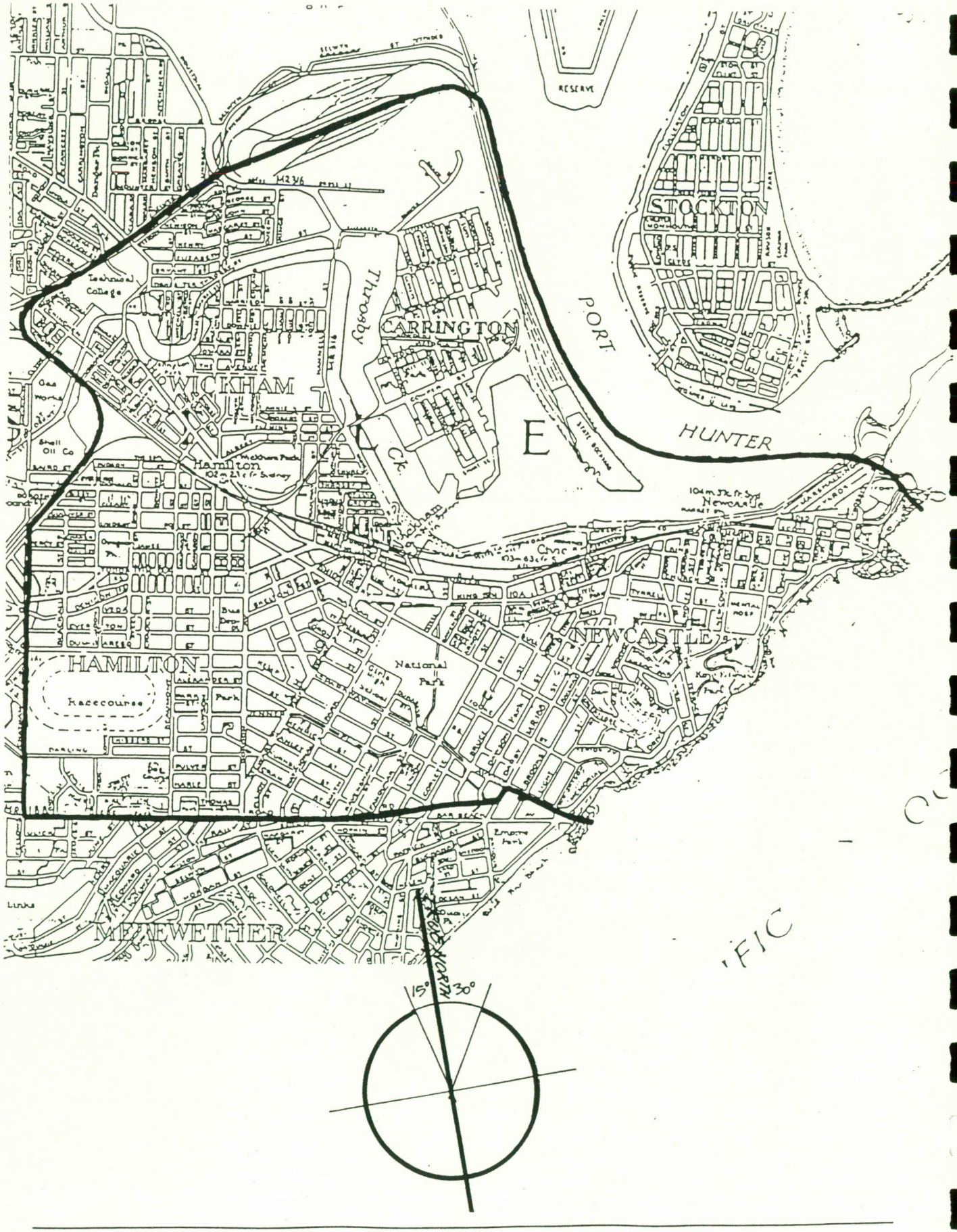
The Population and Housing

The population of the Lower Hunter has risen significantly in recent years, but growth is not uniform throughout the region. Much of the growth has been attributed to retired households moving into the area, and an increasing amount is likely to flow from Sydney with government policy being to alleviate the demands on an increasingly overcrowded city.

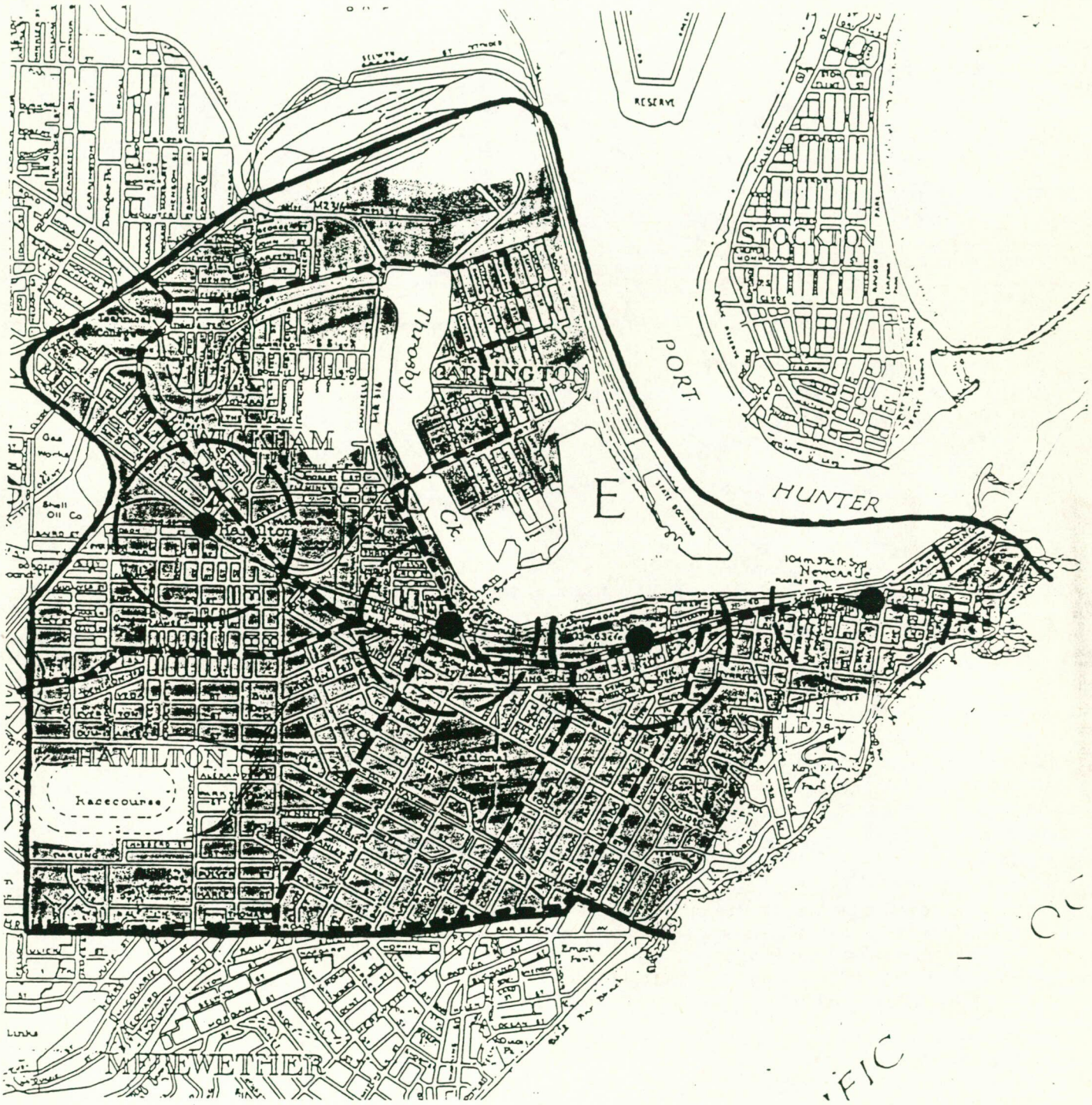
Over the last 20 years however, the population of the Newcastle local government area has decreased significantly, although the 1991 census has revealed a reversal of this trend, and one which is likely to continue. It is forecast that there will be a demand for approximately 3,000 - 5,000 additional dwellings in Inner Newcastle over the next 20 years

Inner Newcastle has been marked by an inflow of young people in the 15-24 age group, with a large student population in particular. At the same time people in the 30-39 age group have left the area in considerable numbers. One factor arising from this trend has been the declining average occupancy rate, falling from almost 3 people per dwelling in 1971 to 2.21 people in 1991. The nature of the accommodation provided has however seen fewer 1 bedroom units and an increase in 2 or more bedroom units.

STREET GRID ORIENTATIONS

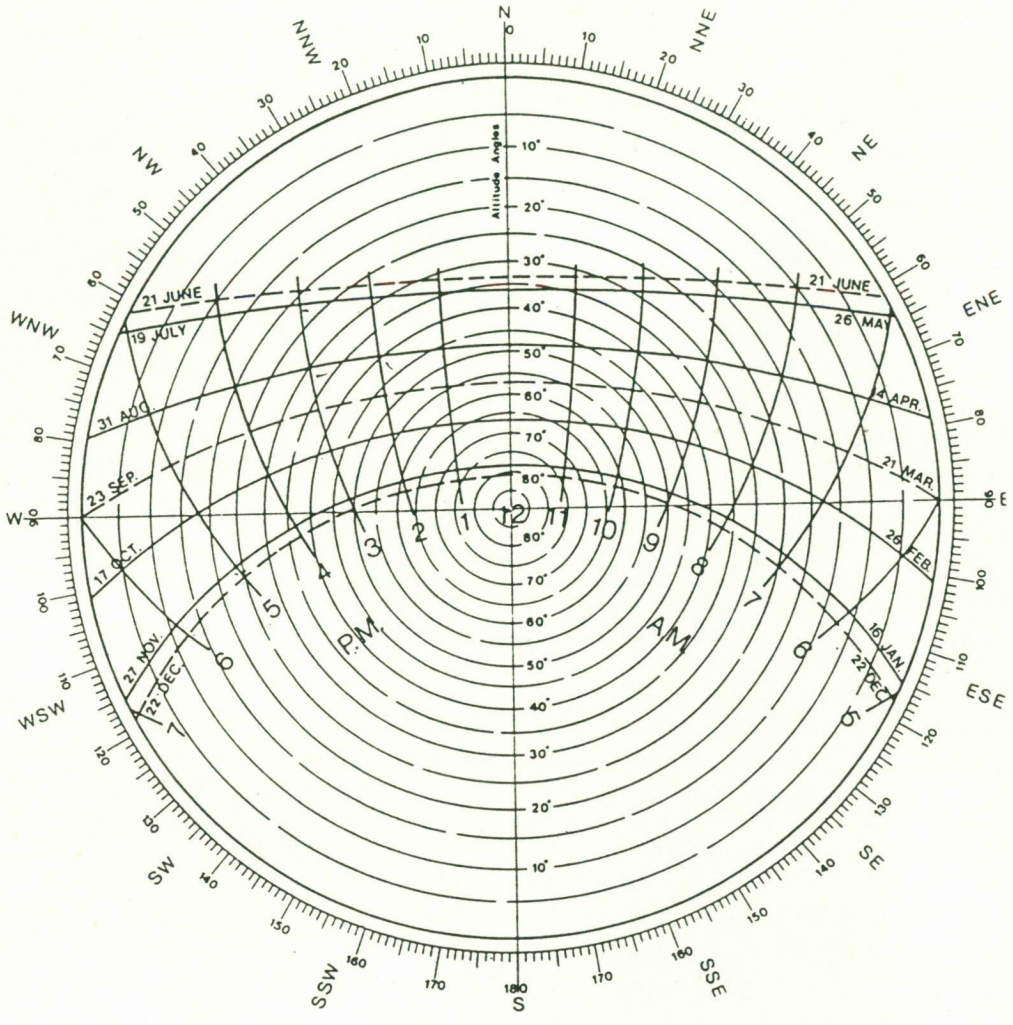


PUBLIC TRANSPORT ROUTES



400 metre zone

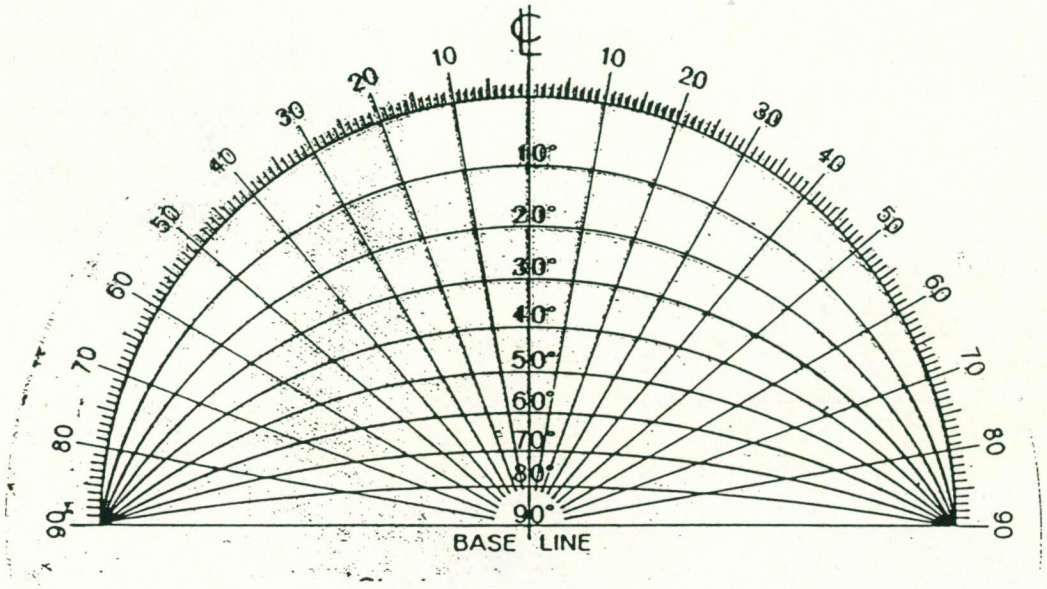
SUN PATH DIAGRAM FOR NEWCASTLE



Newcastle - Latitude 32.5° south

The centre of the diagram represents the observer's position. The heavy curved lines represent the sun's path for selected dates and latitudes, and are crossed by lines indicating hours. To find the sun's position for the required conditions select the point where the appropriate lines intersect. The sun's altitude (in degrees above the horizontal plane) is shown by the relation of this point to the concentric circular lines within the diagram. The direction of the sun's rays is shown by a line drawn through this point from the outer graduated circle towards the centre.

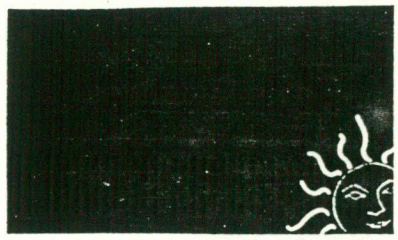
SHADOW-ANGLE PROTRACTOR

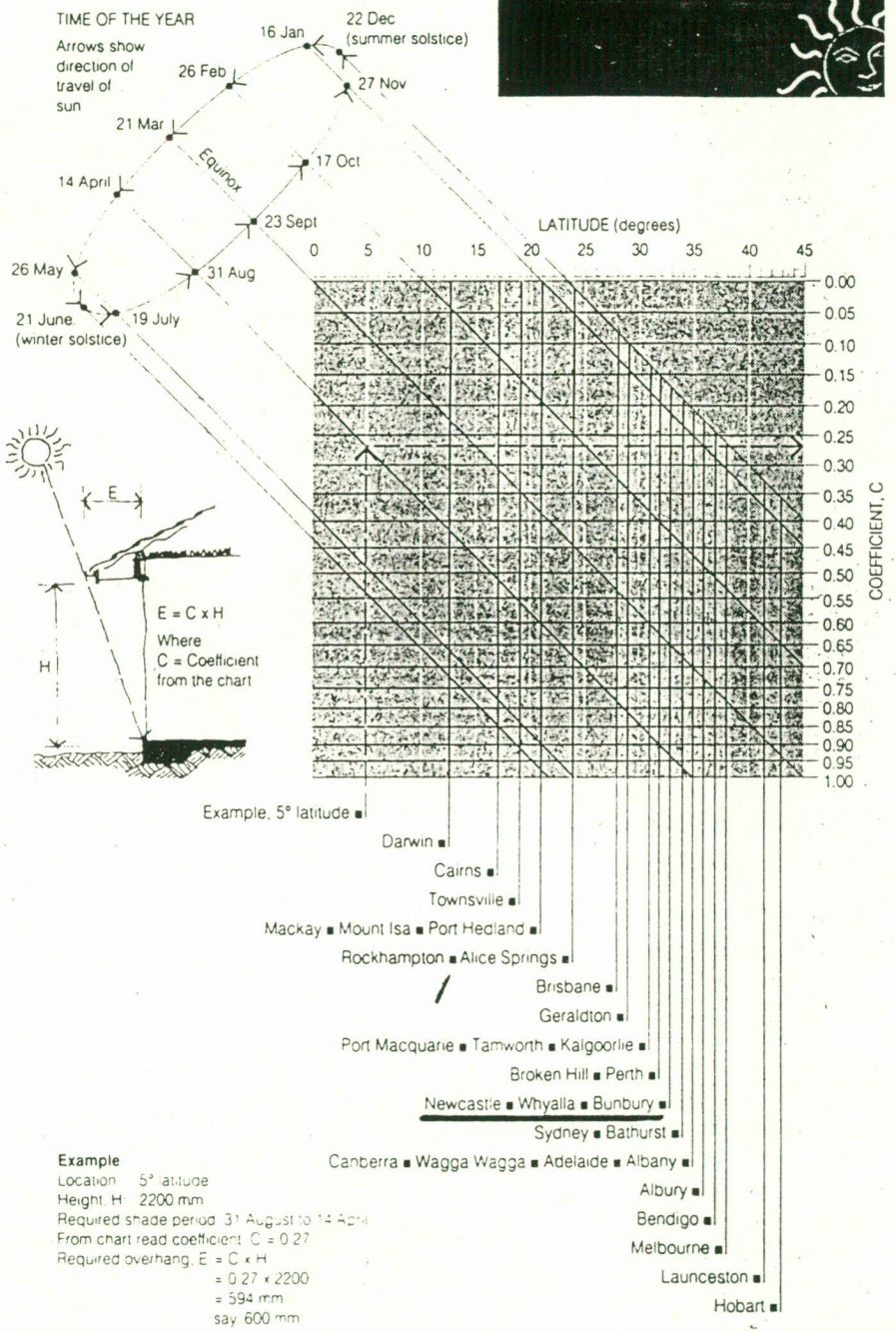


The shadow angles for a given wall are found by placing transparency of the protractor over a solar chart, with centres coinciding and the base line oriented to represent the wall. The point on the chart is found for the selected position of the sun. The graduations on the radial and curved lines through this point show respectively the horizontal and vertical angles that the sun's rays make with a line perpendicular to the wall.

Courtesy of SUNSHINE AND SHADE IN AUSTRALIA BY R.O. Philips

AWNING DESIGN CHART FOR NORTHERLY ASPECTS





Courtesy of ENERGY SAVING USING PASSIVE SOLAR DESIGN by The Cement and Concrete Association of Australia 1994.

U-VALUES FOR VARIOUS CONSTRUCTIONS

	U value W/m² degC Winter	Summer
PITCHED TILED ROOF (with 12mm plasterboard flat ceiling fixed to underside of ceiling joists)		
No insulation	4.18	1.35
With RFL only under tiles	1.06	0.64
With R2.0 bulk insulation only above ceiling	0.45	0.36
With RFL under tiles and R2.0 insulation above ceiling	0.34	0.28
METAL DECK ROOF (12mm plasterboard ceiling fixed to battens on underside of rafters)		
No insulation	2.66	2.05
With RFL only over rafters	1.38	0.49
With RFL over rafters plus RFL over ceiling battens	1.38	0.49
With R2.0 bulk insulation only above ceiling	0.42	0.40
With R2.0 bulk insulation on RFL between rafters (air space above ceiling)	0.37	0.32
With R2.0 bulk insulation on RFL over rafters	0.39	0.26
CONCRETE ROOF		
Concrete slab 100mm	4.55	3.79
Concrete slab 150mm	3.94	3.34
100mm slab with R1.5 bulk insulation and 12mm plasterboard directly under slab	0.56	0.54
150mm slab with R1.5 bulk insulation and 12mm plasterboard directly under slab	0.55	0.53
100mm slab with R1.5 bulk insulation and 12mm plasterboard suspended below slab with 100mm air space	0.51	0.49
12mm plasterboard suspended below slab with 100mm air space	0.51	0.48
TIMBER FLOORS (with 20mm floorboards on joists and bearers on piers)		
No insulation or floor coverings	2.16	2.83
With carpet and underfelt only	1.24	1.43
With RFL only dished over joists	0.78	1.63
With RFL dished over joists plus carpet and underfelt	0.60	1.04
CONCRETE SLAB FLOORS		
125mm slab on ground	0.68	0.68
125mm suspended slab	2.43	3.32
125mm suspended slab with carpet and underfelt	1.32	1.54

	U value W/m² degC (not seasonally dependant)

	U value W/m² degC Winter	Summer
BRICK VENEER WALLS (with 12mm plasterboard lining)		
No insulation	1.95	
With RFL only on back of plasterboard	1.23	
With RFL only on outside face of studs	0.77	
With R1.5 bulk insulation only behind plasterboard	0.50	
With R1.5 bulk insulation behind plasterboard and RFL on outside face of studs	0.35	
CAVITY BRICK WALLS		
With 15mm plaster internally	1.75	
Without plaster but with 30mm extruded polystyrene in cavity	0.64	
FRAMED WALLS (With 12mm weatherboards and 12mm plasterboard lining)		
No insulation	1.98	
With RFL only on back of plasterboard	1.25	
With RFL only dished in 50mm behind plasterboard	0.75	
With R1.5 bulk insulation only behind plasterboard	0.50	
With R2.0 bulk insulation only behind plasterboard	0.40	

Courtesy of ENERGY EFFICIENT HOUSING IN NSW •
Ballinger, Prasad and Cassell 1992

U-value is the reciprocal of R-value

$$U = \frac{1}{R\ (Total)}$$

This appendix gives the user a comparative indication of the rate of heat flow for different types of construction. For definitions of U and R - values refer to GLOSSARY.

Additional thermal insulation levels are stipulated under PASSIVE DESIGN FEATURES FOR ENERGY EFFICIENCY Guideline B10 with the respective R-value performance rating.

Where construction materials being considered, embody the equivalent total R-value the Australian Standard 2627 - 1993 should be referred to

FUEL	HEATER TYPE [1]	TARIFF TYPE	ENERGY RATING [4]	TOTAL APPLIANCE EFFICIENCY[5]	ANNUAL ENERGY CONSUMPTION	ANNUAL RUNNING COST $[10]
NATURAL GAS	STORAGE	ECONOMY DOMESTIC [3]	****	66%	21004 MJ [9] 5834 kWh	189 (260)
	STORAGE	ECONOMY DOMESTIC [3]	*	49%	28291 MJ [9] 7859 kWh	254 (325)
	CONTINUOUS FLOW (Large capacity)	ECONOMY DOMESTIC [3]	******	79%	17548 MJ [9] 4874 kWh	158 (229)
	CONTINUOUS FLOW (Small capacity)	GENERAL DOMESTIC [2]	***	60%	23105 MJ [9] 6418 kWh	293 (329)
ELECTRICITY	STORAGE	OFF PEAK 1	N.A.	70%	5501 kWh	205
	STORAGE	OFF PEAK 2	N.A.	75%	5134 kWh	347
	STORAGE	DOMESTIC CONTINUOUS SUPPLY	N.A.	80%	4813 kWh	493 (532)
	INSTANTANEOUS	DOMESTIC CONTINUOUS SUPPLY	N.A.	100%	3851 kWh	395 (434)
SOLAR (ELECTRIC BOOST) [8]	STORAGE	OFF PEAK 2	N.A.	75% [7]	1540 kWh	104
	STORAGE	DOMESTIC CONTINUOUS SUPPLY	N.A.	80% [7]	1444 kWh	148 (187)
SOLAR [8] (GAS BOOST)	STORAGE	GENERAL DOMESTIC	*****	66% [7]	6301 MJ 1750 kWh	80 (116)
HEAT PUMP	STORAGE	OFF PEAK 2	N.A.	COP 3 [6] 225%	1711 kWh	116

Courtesy of COMPARATIVE HOT WATER COSTS by
The Energy Information Centre, Sydney 1994

TIMBER SPECIES LISTS

RECOMMENDED PLANTATION TIMBERS

Leichhardt Council **recommends the use of the following plantation timbers** in Australia. These are mainly pine species, often referred to as softwoods;

Caribbean Pine	(Pinus caribaea) from Queensland and New South Wales.
Hemlock	(Tsuga heterophylla) from North America
Hoop Pine	(Araucaria cunninghamii) from Queensland and New South Wales
Oregon	(Pseudotsuga menziesii) from North America and New Zealand
Radiata Pine	(Pinus radiata) from Australia, New Zealand, Fiji & Chile
Slash Pine	(Pinus elliottii) from Queensland, New South Wales and New Zealand
Poplar	(Populus sp.)

RECOMMENDED AUSTRALIAN REGROWTH TIMBERS

Leichhardt Council **recommends the use of regrowth native timbers,** often referred to a 'hardwoods' including:

Blackbutt	(Eucalyptus pilularis)
Spotted Gum	(Eucalyptus maculata)
Cypress Pine	(Callitris sp)
Sydney Blue Gum	(Eucalyptus saligna)
Flooded Gum	(Eucalyptus grandis)
Manna Gum	(Eucalyptus viminalis)
Jarrah	(Eucalyptus marginata)
Silvertop/ Stringybark	(Eucalyptus laevopinlea)
Red Ironbark	(Eucalyptus sideroylon)

RECYCLED TIMBERS

Leichhardt Council **recommends** the use of recycled timbers.

USES FOR RECOMMENDED TIMBERS

Leichhardt Council **recommends the use of the following sustainable timbers** as alternatives to rainforest and old growth forests;

Framing and General Construction

Radiata Pine (F5 & F7)
Laminated Veneer Lumber (LVL)
Plantation Grown Oregon
Cypress Pine
Australian regrowth timbers e.g. Blackbutt, Red Ironbark
Composite timber products e.g. glue laminated beams
Recycled timber

Concrete Formwork

A large percentage of formply used in Australia is made from tropical timber. Use only formply made from plantation pine - Radiata, Slash and Hoop Pine. Reuse formply whenever possible and do not specify a higher grade than what is required.

Inground Uses

Recycled Australian timbers
Australian regrowth timbers
CCA treated radiata Pine (pressure impregnated)

Cladding

Treated plantation pine
Australian regrowth timber
Durable recycled timber
Treated Exterior grade plywood

Window and Door Frames

Treated plantation pines
Cypress pines
Poplar
Recycled timber
Australian regrowth forest timbers

Flooring

Plantation Pines
Cypress Pine
Particle board
Australian regrowth timbers

Fencing, Exposed Decking & Stairs

Durable recycled timber
Australian regrowth forest hardwoods

Continued over....

NOTE:
These lists are being constantly upgraded. The source and/or availability of certain species may change **monthly.**

USES FOR RECOMMENDED TIMBERS (CON'D)

Furniture, Joinery, Shelving & Benchtops

Plantation Pines (Radiata, Hoop)
Poplar
Plantation Oregon
Camphor Laurel
Particleboard
Recycled Timber
Medium Density Fibreboard
Australian regrowth timbers (Blackbutt, Spotted, Gum, Sydney Blue Gum, Rose Gum)
Jacaranda, Citrus, Silley Oak, Lillypilly, Turpentine

Panelling & Lining

Hoop Pine
Poplar
Spotted Gum
Hardboard (Masonite)
Pine veneer plywood

Internal Stairs

Recycled timber
Plantation Pines (not for treads)
Australian regrowth timber

Doors & Frames

Plantation Oregon
Hoop or clear Radiata Pine
Recycled doors or timber

Decorative Veneer

Plantation Pines
Camphor Laurel
Australian regrowth forest timber

- **HOOP PINE is a rainforest timber grown in plantations - check its source.**
- **OREGON or Douglas fir is often cut from old growth forests in North America. The majority of Oregon in Australia is from New Zealand plantations.**

AUSTRALIAN NATIVE RAINFOREST TIMBERS - TO BE AVOIDED

Leichhardt Council does not recommend the use of Australian Native Rainforest timbers which are not grown on plantations.

THE USE OF THE FOLLOWING AUSTRALIAN NATIVE RAINFOREST TIMBERS IS NO RECOMMENDED

Alder
Bean, Black
Beach, Myrtle
Beech, White
Booyong
Brushbox
Butternut, Rose
Bunya Pine
Candlenut
Carabeen
Cedar
Celery - Top Pine
Cheesewood, White
Coachwood
Cudgerie
Huon Pine
Kaurie Pine
King William Pine
Maple
Marare
Oak
Pigeonberry Ash
Queensland Maple
Rosewood
Sassafras
Silky Oak Teak, Australian (Crows Ash) N.B.

Note; This list is a guide only, and is not intended to be comprehensive.

IMPORTED RAINFOREST TIMBERS - TO BE AVOIDED

Most rainforest timber imported into Australia comes from Indonesia, Malaysia, Burma, Papua New Guinea and the Philippines. All timber cut in these countries is cut from virgin Rainforests. There are no plantations yet old enough to provide timber logs.

THE USE OF THE FOLLOWING IMPORTED RAINFOREST TIMBERS IS NOT RECOMMENDED

Timber merchants often group all rainforest timbers using two names - **Maple or Meranti.**
More specifically these timbers are:

Agathis
Alan
Almon
Amboyna Wood
Apitong
Balau
Balsa
Bangtikan
Batu
Baygo
Betis
Borneo Camperwood
Calantas
Camphorwood
GaharuBuaja
Gmelina
Ipil
Iroko
Jelutong
Kalantas
Kapur
Keladin
Kempas
keruing
Ketiau
Koto
Lauan
Lanutan
Mahogany
Mangasinoro
Martim
Mayapis
Mavota
Melawis
Mengkulang
Meranti
Merawan
Merbau
Mersawa
Motoa
Narra
New Guinea Beech
New Guinea Walnut
Nyatoah
QBA Saluk
Pacific Maple
Padauk
Palaquim
Pink Satinwood
Ramin Red Lauan
Rosewood
Selangan Kacha
Seraya
Tanquile
Teak
Vesi

Climate

New South Wales has one of the most diverse climate ranges of any state in Australia. It ranges from cold temperate in south to warm/sub-tropical temperate at its border with Queensland. Moving from the west to the coast, rainfall increases and the juxtaposition of land mass to ocean has a significant bearing on climate. It is important to consider all aspects of local climate in the design of any building.

Newcastle is situated on the north coast of New South Wales, Latitude 32° 55'S. Longitude 151° 47'E. Its climate can be classified as 'coastal temperate' with features as follows for the Inner Newcastle Area.

Temperature

Cool winters
Warm summers
Annual - means temperature between 15 and 20°C
Diurnal range 10°C

Humidity

April to November - moderately high relative humidity
December to March - high

Wind Patterns

Largely influenced by proximity to the sea. During warmer months sea breezes develop during the afternoon (north-easterly) whilst land breezes prevail during the night and early morning.

From mid-winter to early spring, cold to cool westerlies prevail.

Southerlies can eventuate at any time throughout the year.

Rainfall

Total Annual rainfall is 1145mm spread evenly throughout the year with a slight increase during autumn.

Conclusion

The above climate statistics will help determine the building design approach to achieve optimum thermal comfort, primarily implying by passive solar design principles.

The annual mean temperature allows a slightly lesser requirement for R values of insulative particularly in terms of minimising heat loss. (Refer to 4.18 PASSIVE DESIGN FEATURES Guideline B10).

The diurnal range means that during most nights (both summer and winter) the temperature will fall below comfort level (18.3°c). For this reason the thermal mass of floor and walls of the building is essential.

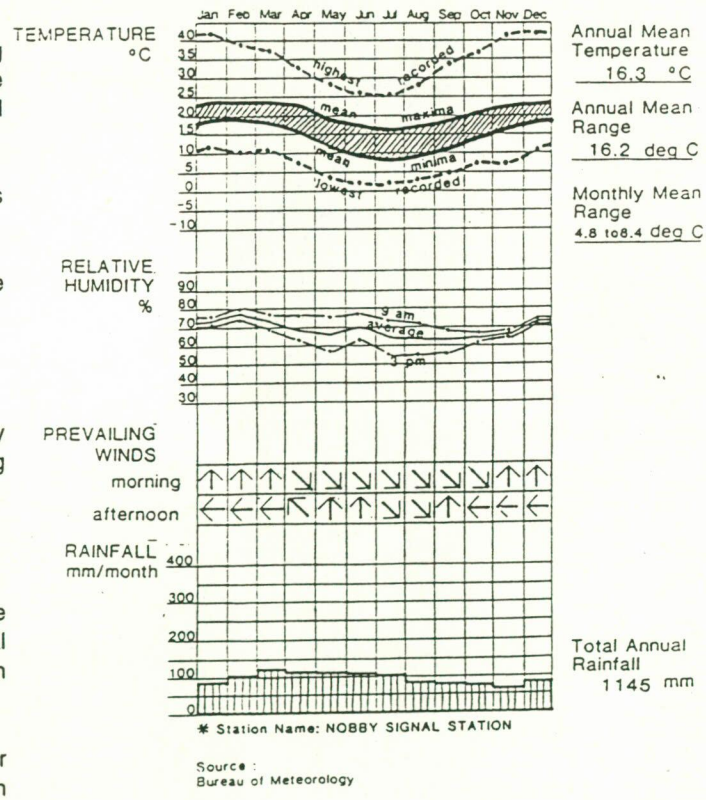
(Refer to PASSIVE DESIGN FEATURES Guidelines B6).

In terms of comfort, relative humidity is more easily handled in the building design than in warm humid or tropical climates. Evaporative cooling methods can be employed. (Refer to PASSIVE DESIGN FEATURES Figure 21).

Many of the coastal areas of Newcastle are able to exploit north-easterly and southerly summer breezes for optimum comfort.

Annual rainfall affords a plentiful supply of rainwater runoff from roofs and paving to be stored and reused for garden irrigation. In terms of passive solar design, further investigation could be made regarding the deployment of water storage in walls and on roof tops. (Refer to THERMAL DESIGN OF BUILDINGS S.V. Sokelay).

CLIMATE GRAPH
Location : NEWCASTLE *
Latitude : 32° 55' S
Longitude : 151° 47' E
Altitude : 32.9 m



* Station Name: NOBBY SIGNAL STATION

Source :
Bureau of Meteorology

PEOPLE WITH PHYSICAL DISABILITIES • DEMOGRAPHIC TRENDS

Access is a basic human right. Any member of our society should have equitable access to a continuum of dwellings, services and facilities in order to participate fully in the community. Similarly, our community and environment should be designed in such a way that allows this to occur. This right is enshrined in the NSW Governments Disability Services Act, which affirms that "Persons with disabilities have the same basic rights as other members of Australian society. They also have the rights needed to ensure that their specific needs are met. Their rights apply irrespective of the nature, origin, type or degree of disability".

The trends of people with disabilities has increased in proportion in recent years. In 1981, 13% of the total population of Australia had a disability, this increased to 18% in 1993. It is difficult to accurately reflect the incidence of disability in Newcastle but a guide would be the numbers of people receiving a disability pension. This benefit is available to people with a physical intellectual or psychiatric impairment of 20% of their ability to function which causes a continuing inability to work for at least two years. This is assessed by a medical practitioner. The proportion of the total Newcastle population receiving these benefits is 3.65% compared to 5.15% in the inner city. There are 2,834 people (5%) on this pension in the Inner City, Hamilton and Industrial Planning Districts, which makes up a slightly larger catchment area than the Inner Newcastle Housing Strategy area.

There is evidence to support the fact that disability increases with age. This is especially relevant to Australia with 20% of its population in 1991 aged over 55. Newcastle has a higher proportion than the national average of aged persons with 26%. High concentrations of this age group were found in Newcastle East and the Hamilton area in particular Hamilton South with 34% of the population over 55 years old. Musculoskeletal and arthritic disorders are deemed to be the most disabling conditions affecting people with disabilities and these conditions are most prevalent in the aged.

The 1983 ABS Survey estimates that there are over 84,000 wheelchair users in Australia, and this, coupled with the fact that there are close to another 500,000 people who use mobility aids of some sort of another, and almost 260,000 people who use hearing aids, is further evidence of the need to provide appropriate dwellings and safe access ways.

NEWCASTLE CITY COUNCIL DEVELOPMENT CONTROL PLAN 30

URBAN DESIGN GUIDELINES CHECKLIST

		Refer	Affected (Y/N)	Complies (Y/N)
	CITY STRUCTURE			
1	Is the site in a gateway location?	2.2		
2	Will a view of an existing landmark be affected?	2.3.1		
3	Does the site have the potential for a new landmark location?	2.3.2		
4	Is the site on the edge of a precinct?	2.4		
5	Is the site in a special area?	2.5		
6	Is the site on a principal route?	2.6		
	CITY FORM			
7	What is the base FSR for the site?	3.2		
8	Will bonus provisions apply?	3.3		
9	Will TDR provisions apply?	3.3.2		
10	What is the upper height ceiling?	3.4		
11	What are the street frontage height limits?	3.5		
12	Will upper storey setbacks be required?	3.6		
13	Does a view corridor cross the site?	3.7		
14	Is this a taller building proposal?	3.8		
	CITY CHARACTER			
15	Is a setback from the street line permitted for this site?	4.2		
16	Is it a corner site?	4.3		
17	What is the pattern of subdivision of adjoining frontages?	4.4		
	Is the proposed envelope design appropriate in terms of:			
18	- tripartite facade composition?	4.5.1		
19	- fenestration design?	4.5.2		
20	- surface texture?	4.5.3		
21	- surface pattern?	4.5.4		
22	- materials?	4.5.5		
23	- colours?	4.5.6		
24	- reflectivity?	4.5.7		
25	- design features?	4.5.8		
26	- skyline?	4.5.9		
27	- awnings?	4.5.10		
28	Is there a heritage item on or near this site?	4.6		
29	Are streetscape design guidelines applicable?	4.7		
30	What is the environmental impact on public space?	4.8		
31	Will the pedestrian network be enhanced?	4.9		

GLOSSARY

GLOSSARY

Absorbent:
The less volatile of the two fluids used in an absorption cooling device.

Absorber:
A solar absorber is any dark (black) device used to collect the sun's energy. Usually it refers to the black flat plate absorber used with solar water heating systems.

Absorption ratio:
The ration of the radiation absorbed by a surface to the total energy falling on the surface, measured as a percentage.

Active system:
A system which is assisted by mechanical or hydraulic means such as fans or pumps.

Affordable Housing:
Housing at costs which can be afforded by the market segment under consideration; see Table 4.1.

Air Changes per Hour:
The number fo times that the entire volume of air within a space is exchanged for fresh air during one hour.

Altitude:
The angular height of the sun above the horizon.

Ambient air temperature:
Surrounding air temperature, for example, air temperature outside a dwelling.

Auxiliary system:
A supplementary heating or cooling system supplied form conventional energy sources and used as a back-up to passive systems.

Azimuth:
The angular distance between true north and the point on the horizon directly below the sun.

Batt:
A non-rigid fibrous insulation mat usually of rectangular cross section, in sizes able to be handled fairly easily.

Blanket:
A non-rigid fibrous insulation mat usually of rectangular cross section, greater than three metres in length.

Bulk thermal insulation:
Materials in the form of batts, blankets, slabs loose fill or foamed in situ.

Cellulose fibre:
Material of a fibrous nature made form wood, paper or vegetable fibres.

Collector, flat plate:
An assembly containing a panel of metal or other suitable material, usually a flat black colour, that absorbs sunlight and converts in into heat. This panel is usually in an insulated box, covered with glass or plastic on the sun side to retard heat loss. In the collector, this heat transfers to a circulating liquid (such as water, oil or antifreeze) in which it is transferred to where it is used immediately or stored for later use.

Collector, solar:
Any device for capturing solar energy.

Comfort zones:
The limits to thermal comfort as defined by any combination of humidity and environmental temperature which gives thermal comfort.

Condensation:
Process of changing a vapour into liquid by extracting heat; the process occurs when the vapour temperature falls below its dew point temperature.

Conductance, thermal:
A measure of the rate of heat flow through a body (frequently per unit area) from one of its bounding surfaces to the other for a unit temperature difference between the two surfaces under steady conditions.

Conduction (thermal):
Transfer of heat from one portion of a medium to another without visible motion or the medium.

Conductivity, thermal:
A measure of the rate of heat flow through unit area and unit thickness of homogeneous material under steady conditions when a unit temperature gradient is maintained in the direction perpendicular to area.

Conductor, thermal:
A material which readily transmits heat by means of conduction.

Convection:
The transfer of heat from one part of a fluid to another by flow of the heated fluid (eg rising hot air).

Cooling coil:
An arrangement of pipe or tubing which transfers heat from the air to the refrigerant or cooling medium within the tube.

Cooling (evaporative):
Heat exchange between air and water spray or wetted surface. The water assumes the wet bulb temperature of the air.

Cooling medium:
Any substances whose temperature is such that it is used, with or without change of state, to lower the temperature of other bodies or substances.

Dehumidification:
(1) condensation of water vapour from air by cooling below the dew point; (2) removal of water vapour from air be chemical or physical methods.

Dehumidifier:
(1) an air cooler or washer used for lowering moisture content of the air passing through it; (2) an absorption or absorption device for removing moisture from air.

Dew point:
Temperature at which gas containing a condensable vapour (eg moist air) becomes saturated and deposits liquid (dew).

Diffuse radiation:
Radiation that has been scattered by particles in the atmosphere, such as air molecules, dust and water vapour.

Direct radiation:
Radiation directly from the sun, as opposed to diffuse sky radiation.

Diurnal temperature range:
Difference between the maximum and minimum temperatures over a 24 hour period.

Double glazing:
A form of glazing which incorporated two panes of glass separated by a vacuum, stationary air or other gas.

Dry bulb temperature:
Temperature of a gas or mixture of gases indicated by an accurate thermometer after correction for radiation.

Efficiency: In solar applications refers to the percentage of the solar energy incident on the face of a solar collector that ends up in use either for water heating or for space heating.

Emissivity:
The capacity of a material to emit radiant energy.

Emittance:
The ratio of the total radiant flux emitted by a body to that emitted by an ideal blackbody at the same temperature.

Energy:
Is defined as the capacity to perform work. All work is a consequence of a change of energy form one form to another.

Environmental temperature:
The environmental temperature combines the effect of air temperature and the mean radiant temperature of surrounding surfaces.

Exfiltration:
Air flow outward through a wall, leaky membrane etc.

Fibreglass insulation:
Insulating material produced from spun molten glass.

Frame construction:
Any type of construction in which the building is supported mainly by a frame, and not mainly by load-bearing walls. Brick veneer houses, steel-framed buildings, and reinforced concrete frame buildings all belong to this type.

Glasshouse effect:
Refers to the characteristic tendency of some transparent materials such as glass to transmit shortwave radiation and block radiation of longer wavelengths, thus allowing the sun's energy to pass into a space (or glasshouse) but blocking the re-radiation energy, causing the space to heat up.

Greenhouse effect:
Refers to the warming of the atmosphere believed to be due to the emission of intra-red absorbing gases from activities such as the burning of fossil fuels.

Heat:
Form of energy that is transferred by virtue of a temperature difference.

Heat exchange:
The process of using two streams of fluid for heating or cooling one or the other.

Heat exchanger:
A device specifically designed to transfer heat between fluids which are not in direct contact.

Heat gain:
An increase in the amount of heat contained in a space, resulting from direct solar radiation and the heat given off by people, lights,equipment, machinery and other sources.

Heat loss:
A decrease in the amount of heat contained in a space, resulting from heat flow through walls, windows, roof and other building envelope components.

Heat pump:
A system designed to remove heat form one medium and transfer it to another medium, cooling the former and heating the latter.

Heat sink:
A component (surface, volume or mass) that will absorb heat. (Heat "sinks" into the heat sink).

Heat transmission:
Heat flow, usually refers to conduction, convection, and radiation combined.

Heating degree day:
An expression of a climatic heating requirement expressed by the difference in degree C below the average outdoor temperature for each day and an established indoor temperature base of 18.3°C. The total number of degree days over the heating season indicated the relative severity of the winter in that area.

Highlight window:
A small window or row of windows high in a wall below the ceiling.

Humidity:
Absolute humidity is the weight of moisture present in a unit volume of air. Relative humidity is the ratio of absolute humidity to the amount of moisture which the same mass and volume of air could hold at a given temperature.

Infiltration:
The uncontrolled movement of outdoor air into the interior of a building through cracks around windows and doors or in walls, roofs and floors.

Inner Newcastle:
The area bound by Glebe Road, Chatham Road, The Great Northern Railway, The Industrial Railway, The Hunter River and the Tasman Sea.

Insulation:
Thermal. A material having a relatively high resistance to heat flow and used principally to retard heat flow.

Joule:
Is the international standard (SI) unit for energy and it is denoted by the symbol "J". The joule is very small unit, 3.6 million of them are equal to 1 kilowatt hour.

Kilowatt hour (kWh):
Is the unit that is used for measuring the quantity of energy consumed per hour. For example, if a 1000 watt (single bar) electric radiator is switched on for one hour it will consume 2kWh of electrical energy; the same amount of energy would be required to light a 100 watt lamp for 10 hours. The unit of electrical energy that is recorded on domestic electricity meters is in kilowatt hours.

Macroclimate:
The general climate of a substantial part of the country or a region.

Mean radiant temperature (MRT):
A measure of the average temperature of surrounding surfaces such as walls and ceilings.

Microclimate:
The physical state of an atmosphere close to a very small area of a region.

Mineral wool:
Fibres normally made form molten glass, rock or slag, commonly supplied in the form of a batt, blanket or loose fill. See also rock wool.

Night sky radiation:
Radiation of stored heat from the earth and structures under cool clear night sky conditions. The clear night sky acts as a heat sink if the air is cooler than the surrounding elements.

Non-renewable fuels:
Fuels which are derived from fossil remains such as coal, oil, or gas and are not capable of being replenished. Although wood is used as a fuel in some cases, and timber is relatively slow compared with the rate at which it is consumed.

Passive system:
A system of exploiting natural elements in a building to modify the indoor climate without using special equipment. For example, the low angle of the winter sun can be allowed to enter through a window to heat up a room while in summer the sun, because it is directly overhead, can be readily excluded.

Payback period:
The time taken to recoup by savings in running costs the extra capital investment in an energy efficient system over and above the capital cost of a conventional system.

Photovoltaic cell:
A cell in which the flow of electric current is activated by the sun's energy, particularly that part of the spectrum corresponding to visible light and extending into the infrared waveband.

Power:
Is the rate at which work is done or the rate at which energy is consumed.

Primary energy:
Is derived form a source that has not undergone any processing that alters its nature before it is converted into useful energy. Oil or coal (although refined or modified) are not changed before they are used as a fuel for combustion. The heat from an oil or natural gas fire is a primary source of energy.

R-value:
Thermal resistance of a material to the passage of heat. The higher the R-valve, the greater the resistance to heat flow.

Radiation:
The direct transport of energy through space by means of electromagnetic waves. A process by which heat may be transferred from a source to a receiver without heating the intervening medium, or without the existence of a material medium.

Reflectance:
The ration or percentage of the amount of light reflected by a surface to the amount incident. The remainder that is not reflected is either absorbed by the material or transmitted through it.

Reflective foil laminate:
A type of reflective insulation defined in AS 1903 as a flexible sheet material, supplied in roll form. Note: Reflective foil laminate usually comprises two outer layers of aluminium foil, forming an integral part of the composite sheet material.

Reflective insulation:
Thermal insulation having one or more surfaces of high reflection factor and low emission factor for low temperature (longwave) radiation. I.E. thermal radiation encountered within buildings.

- Reflective insulation reduces radiant heat transfer across airspace in a structure, and should therefore be used in conjunction with airspace.
- Reflective insulation should not be confused with "solar reflective materials" which are intended to reflect short wavelength radiation (solar radiation).

Relative humidity:
The ratio of the quantity of water vapour actually present in the air to that present at the same temperature in a water saturated atmosphere. It is commonly expressed as a percentage.

Renewable fuels:
Are those that can be used without any loss to the supply. These include solar energy (in all forms including wind and ocean waves which are derived from the effects of heat from the sun), plants that grow rapidly and in large quantities (still largely in experimental stages).

Rock wool:
Mineral wool produced from molten rock, or similar inorganic materials.

Roof space:
The space between a ceiling and roof covering.

Sarking:
A pliable membrane designed to collect and discharge any water that may penetrate a roof covering or wall cladding.

Secondary energy:
Is derived from a primary source but it arrives at its point of use in a different form. Oil or coal (primary sources) are often used to created heat which is used to create steam to drive turbines that generate electricity. The electricity is wired to houses where it is converted back into heat or used to derive an appliance. Electricity is a secondary source of energy. Gas made form coal is a secondary source of energy.

Skylight:
A clear or translucent panel set into a roof to admit daylight into a building.

Solar heat gain:
The amount of the sun's energy that enters a building can be measured in units represented by solar heat gain factor. This is a measure of the amount of the sun's energy that is transmitted through a sheet of 3 millimetre thick glass.

Stack effect:
The tendency of air or gas in a duct or other vertical passage to rise when heated due to its lower density in comparison with that of the surrounding air or gas. In buildings, the tendency toward displacement (caused by the difference in temperature) of internal heated air by unheated outside air due to the difference in density of the outside and inside air.

Steering committee:
Housing Sub-committee of the Honeysuckle and Environs Area Strategy Committee.

Strategy area:
Same area as Inner Newcastle, See 1.1

Sun position:
- Altitude: the angular distance above the horizon in the vertical plane.
- Azimuth: the angular distance east or west of true north in the horizontal plane.
- Meridian: the sun reaches its greatest altitude each day at solar noon when it crosses the meridian of the place where the observer is standing.

Temperature:
Is defined as the degree or intensity of heat of a body or atmosphere. The basic unit for measuring temperature value is the degree Celsius (°C). Temperature interval is measured in degrees Kelvin denoted by the international standards (SI) symbol K.

Thermal isolation:
The ability to isolate a body from the thermal effects of the climate.

Thermal mass:
The heat storage capacity of a given assembly or system. Concrete floors and adobe walls are examples of high thermal mass.

Thermal transmission:
The amount of heat flowing per unit time under conditions prevailing at that time, measured in Watts.

Thermosyphon:
The circulation of a liquid which occurs when a warmer, less dense fluid rises and is displaced by denser, cooler fluid.

Urban Village:
Urban villages are essentially pedestrian scale, medium to high density, mixed use concentrations of urban development served by efficient public transport and often derived from traditional town centre planning principles. An appropriate example of an urban village is Glebe in Sydney. The urban village concept places a high value on the importance of human interaction and sense of community by providing places and activities for local interchange.

U-value (co-efficient of heat transfer):
A figure determined by experiment for a certain situation which tells how many watts per hour will pass through one square metre of a building component, such as a wall, when the temperature difference of the air between both sides of the component. The greater the U-value, the greater the rate of heat flow.

Vapour:
A gas, particularly one near to equilibrium with the liquid phase of the substance and which does not follow the gas laws.

Vapour barrier:
A component used to restrict the transmission of vapour (general water vapour).

Ventilation:
The process of supply or removing air by natural or mechanical means to or from any space. Such air may or may not have been conditioned.

Watt:
Is the international standard (SI) unit for power and it is denoted by the symbol 'W'. One watt represents one joule per second.

Wet bulb temperature:
Recorded by a thermometer whose bulb is sheathed by a wetted wick. The bulb is cooled by evaporation of moisture from the wick, the rate of which depends on the vapour pressure in the surrounding air.

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The BEAT is a working party of the Housing Implementation Committee. Its main role is to provide input to and review housing projects designs during the early stages of the project development process. It has been responsible for providing input to and overseeing the development of this housing design manual.

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The HIC is a Sub-Committee of the BBC Honeysuckle and Environs Area Strategy Co-ordinating Committee. The HIC is responsible for implementing the BBC Inner Newcastle Housing Strategy, the establishment of an affordable housing management entity, and overseeing the expenditure of the urban consolidation budget.

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