PLANNING SCHEME POLICIES
POLICY 5

ENERGY CONSERVATION (DESIGN FOR CLIMATE)

Gold Coast City Council

POLICY 5: ENERGY CONSERVATION (DESIGN FOR CLIMATE)

CHAPTER 1 PURPOSE

The purpose of this Policy is to facilitate an increase in the energy efficiency of buildings and subdivisions by achieving thermal comfort in living, working and public spaces by ecologically sustainable means. Incorporation of energy efficiency principles in areas such as lot and street layout and building siting, design and construction will result in a climatically responsive built form and a reduction in the amount of energy used for heating and cooling. This policy will facilitate a reduction in greenhouse gas emissions arising from energy consumption, in accordance with the Kyoto Protocol and Council's commitment to the Cities for Climate Protection program.

CHAPTER 2 APPLICATION

This Policy applies to development being any Building Work indicated as self assessable, code assessable or impact assessable in the Table of Development of the domain or Local Area Plan (LAP) in which the development is proposed to occur.

CHAPTER 3 SUBDIVISION AND SITING

1.0 PRINCIPLES

A subdivision layout that maximises opportunities for solar access and the use of cooling breezes to each lot can enable individual dwellings to be located so that they are more comfortable and energy efficient. Good subdivision design can enable lots to be used to their full potential and allow dwellings to achieve acceptable levels of ventilation and indoor temperatures at comparably lower cost.

Good subdivision design can be achieved by a consideration of a combination of site factors including:

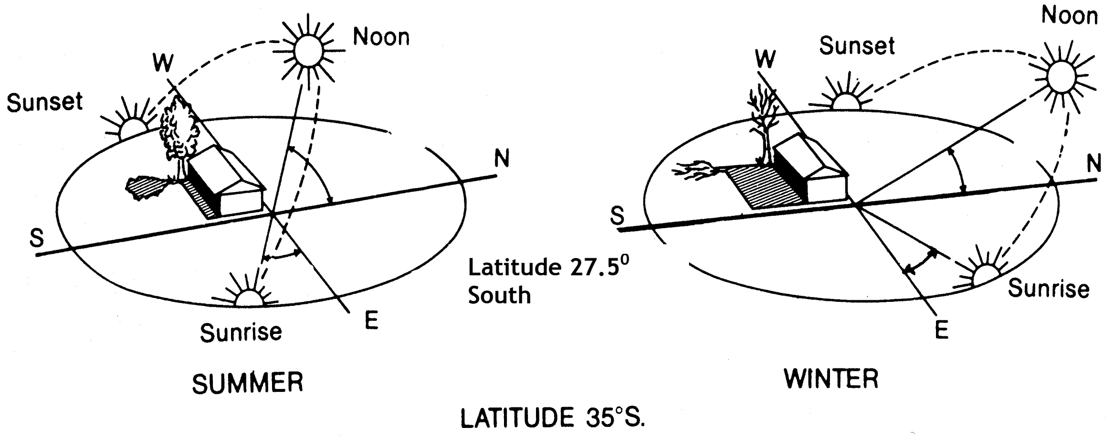
- the shape, size, and orientation of lots;
- prevailing winter and summer breezes;
- interaction with the streetscape and open space;
- transport requirements;
- position of house on block, setbacks and indicative building heights; and
- existing vegetation, landscaping, and slope.

The following guidelines incorporate the above factors and should be used to assist in achieving good subdivision design.

1.1 Local Conditions

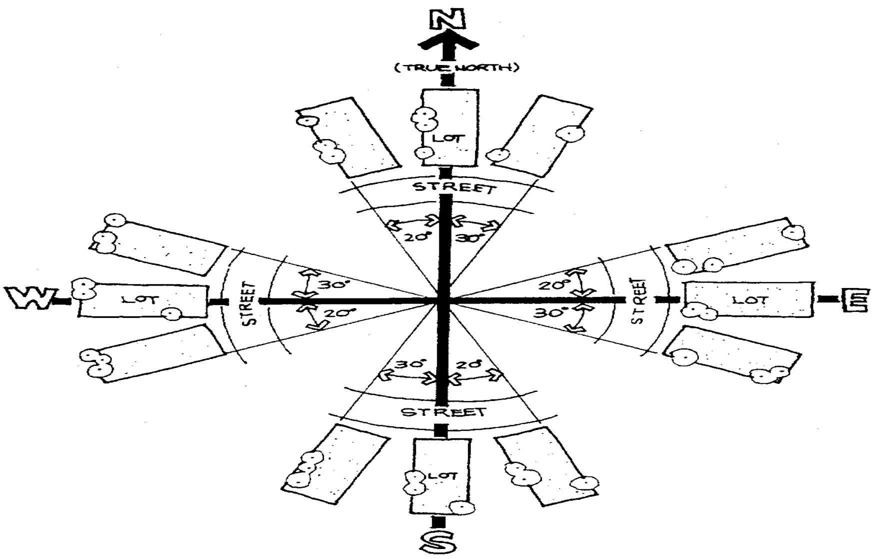
The Gold Coast City is best described as experiencing a humid climate with moderate temperatures and a concentration of rainfall in the warmer half of the year. The Gold Coast City has a subtropical climate, meaning it has a combination of characteristics of both tropical and temperate climates. The temperature ranges from mild to warm and varies from the coast to the hinterland. Prevailing breezes on the Gold Coast City in summer are typically south to south east in the morning and north east to south east in the afternoon. In winter, prevailing breezes are typically from the south to south west in the morning and south east to west in the afternoon. In the summer, the sun rises so that it is slightly south of east. From there it climbs to be nearly overhead at midday. It then sets slightly to the south of west. In the winter, the sun rises to the north of east and travels low in the northern sky to set to the north of west.

Therefore, any shadows cast by buildings or trees will be longer in winter than in summer. North facing surfaces provide opportunities for excluding sunlight from reaching walls and windows in summer and allowing sunlight to heat walls and penetrate windows in winter. If solar access is not constrained, dwellings can be designed to maximise the use of sunlight for heating in winter.



1.2 Guidelines

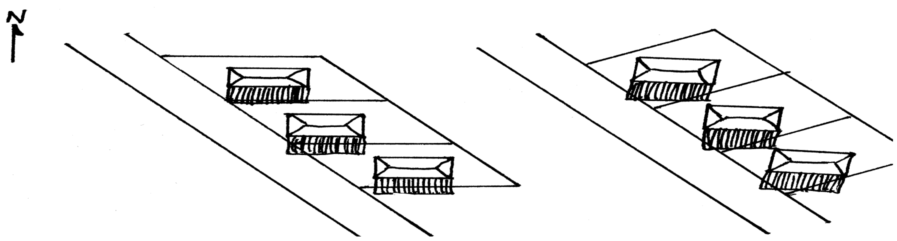
1.2.1 Desirable Orientation Range for Street and Lot Layout



Preferred orientation of lots in a subdivision that creates opportunities for solar access.
Source Amcord 1995

The desirable orientation range incorporates the following:

a) Ensure that the street layout and the lot layout do not restrict cooling summer breezes.
b) Align streets east-west and north-south, wherever possible, to maximise opportunities for winter solar access.
c) Aim for north-south streets and lots to be within 20^0 west and 30^0 east of north.
d) Aim for east-west streets and lots to be within 30^0 south and 20^0 north of true east.
e) Locate as many long lot boundaries as possible within the preferred orientation range.
f) Most houses are built parallel to long lot boundaries. Therefore, if lots lie outside the preferred lot orientation range, building envelopes must be provided so that dwellings achieve the desired orientation.
g) Where streets are within the preferred orientation range, use rectangular lots.
h) Where streets are not within the preferred orientation range, use skewed lots.

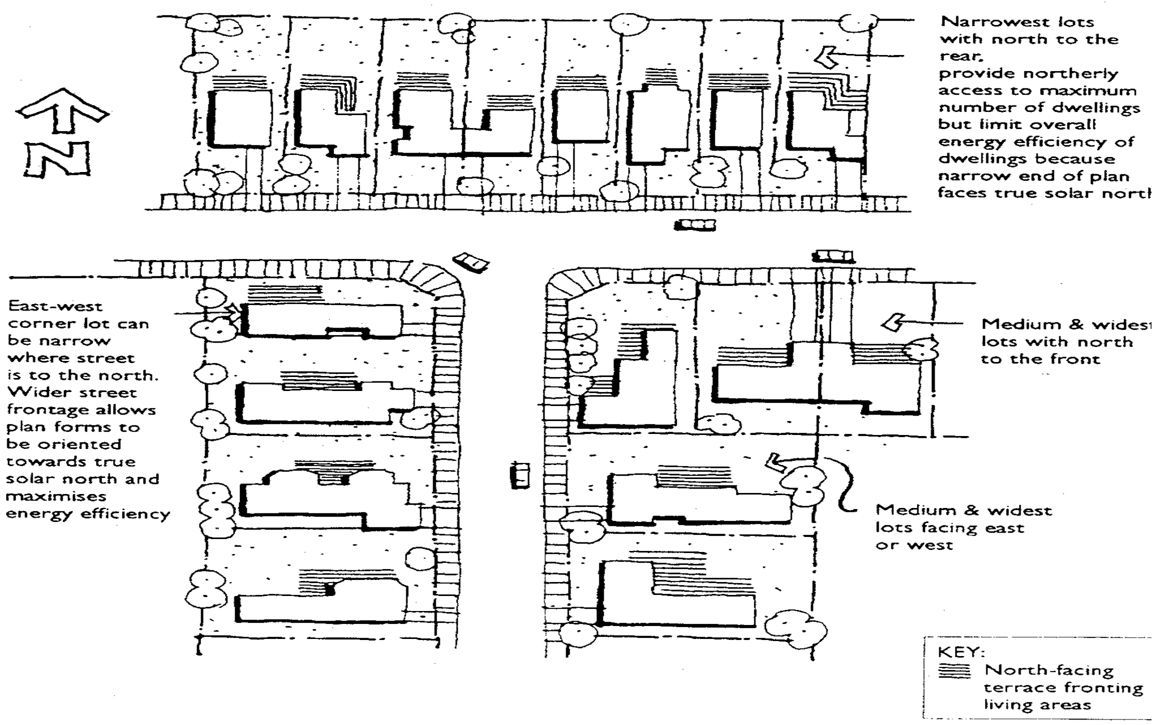


Streets outside desired orientation range – skewed lots preferred to skewed building envelopes.

1.2.2 Building Setbacks

- To aid builders, designers and home buyers make the best use of the sun, building setbacks show the preferred setback line or a building envelope for each lot on the subdivision plan.
- Subdivision design should include measures such as variable setbacks and zero lot lines as a means of maximising solar access and opportunities to capture breezes, especially with small or narrow lots.
- As building height increases, setbacks should be progressively increased in order to reduce bulk and overshadowing and to maintain adequate daylight and sunlight.

1.2.3 Lot Width



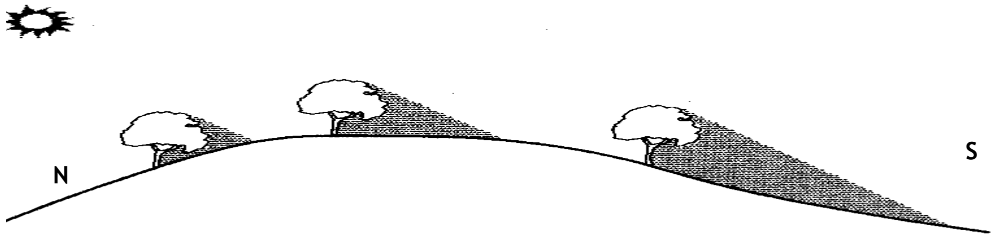
- Small lots of east-west orientation may need to be wider to reduce overshadowing.
- If two storey dwellings are restricted, east-west lots can be narrower.
- East-west lots can be narrower if there is a road or open space to the north (eg. a corner lot).

1.2.4 Land Uses and Densities

Locate larger lots, non-residential uses or public open space in areas where solar and summer breeze access is difficult to achieve. Concentrate smaller lots on north slopes or adjacent to lightly treed open space.

1.2.5 Slopes

Shadows cast by trees and buildings on north facing slopes are shorter than on other slopes. For this reason, a higher density of dwellings may be achieved on these slopes. Southern slopes may require large allotments to maintain solar access in the winter.



Dwelling density should take account of slope and orientation as it influences shadow length. Source DPIE 1996

1.2.6 Building Height

To ensure that all sites have solar access to the north, building heights should be designed with consideration of the impact of shadows cast over the south boundary of neighbouring lots.

1.2.7 Shading Public Spaces

Shading devices or structures and vegetation must be provided in public spaces. Providing shade will increase user comfort and encourage pedestrian and cyclist activity.

Note: For further reference to shading public spaces, see the guideline Creating Shade at Public Facilities published by the Australian Environmental Institute of Health, Queensland Division.

For further reference on subdivision design for energy efficiency, see the guide to **Site Planning in Australia: Strategies for Energy Efficient Residential Planning** published by the Department of Primary Industries and Energy, Commonwealth of Australia.

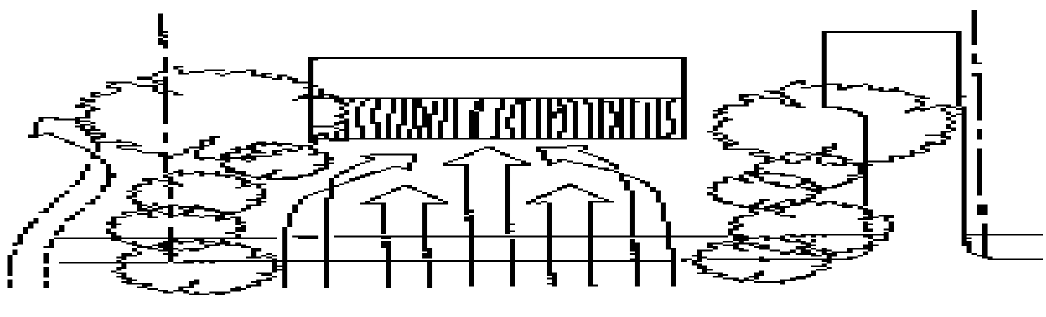
CHAPTER 4 BUILDING DESIGN

1.0 PRINCIPLE

Once the house has been matched to the lot, there are a number of building design considerations that can maximise energy performance and improve comfort.

1.1 Guidelines

1.1.1 Summer



Beneficial breezes can be guided and increased through landscaping. Source DPIE 1996

To minimise heat gain in summer:

- design openings so that cross-ventilation is maximised (eg. Openings opposite each other facilitate uninterrupted breeze paths, and use landscaping to guide and increase breezes through the house;
- uts fans to create the cooling effect of indoor air movement;
- provide covered outdoor living spaces to maximise use of cooling breezes;
- **DESIGN FENCES OF A SEMI-OPEN CONSTRUCTION TO ALLOW BREEZE PENETRATION;**
- use light colours and reflective foil on the roof and walls to reflect solar radiation;
- minimise area of roof lights and windows in the east and west walls;
- use landscaping, eaves and external shading devices, especially on walls to the east and west and on any windows so that they are shaded and breezes are maintained; and
- insulate and use roof space ventilation for improved thermal performance.

1.1.2 Winter

To maximise heat gain and retain heat in winter:

- if solar access is limited, insulate to higher levels and/or use high thermal mass;
- keep glass areas to moderate sizes, use heavy curtains and minimise air leakage through windows and doors; and
- where overshadowing is a problem, a reasonably energy efficient house can still be built. By raising windowsill heights or using clerestory windows, actual solar access can be retained.

1.1.3 Building Materials and Appliances

Building materials, appliances, fittings and energy sources should be selected to minimise energy requirements and greenhouse gas emissions.

1.1.4 Water Heating

Heating water accounts for around 40% of the energy used in a typical Queensland home. Large energy savings can be made if electric storage hot water systems are replaced with efficient hot water systems such as solar, heat pump and instantaneous gas models. To save energy, individual water heating systems should be positioned close to major points of use and water efficient fittings such as AAA rated shower heads should be used.

2.0 DEVELOPMENT REQUIREMENTS

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
ENERGY EFFICIENT BUILDING	
PC1 The building is residential of Class 1, 2, 4 or 3 (that has a floor area less than 2000m^2) and must be designed to be energy efficient and minimise the need for artificial cooling or heating (anticipated not to exceed 29.2 kWh/m^2/pa or 105MJ/m^2/pa) having regard to: a) the geographical location; b) the function and use of the building; c) the direction of solar radiation; d) the internal environment; and e) minimising heat gain in summer and heat loss in winter.	AS1.1 The building has addressed all of the following elements in its design and construction: Roofs/ceilings have: a) a total thermal resistance to heat flow of not less than **R2.5**;a ventilated roof space (not including roofs over open decks or balconies), where applicable b) The external walls have a total thermal resistance to heat flow of: c) not less than R1.0 for locations with an elevation less than 300 metres AHD; or d) not less than R1.5 for locations with an elevation greater than 300 metres AHD; or e) are constructed from concrete or masonry and are shaded in accordance with Table 1 below. The building location has an elevation greater than

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	300 metres AHD and the elevated or suspended floors (excluding open decks, balconies or patios and intermediate floors) have: a) a total thermal resistance to heat flow outward (down) of not less than R1.5; or b) the space beneath the floor closed in. Solar radiation through external glazing is controlled by at least one of the following: a) a permanently fixed overhang projection in accordance with Table 1; b) a permanent external assembly containing adjustable shading devices or fixed screens with a maximum transparency of 25% transparency; c) the glazed window and door assemblies have a minimum **WERS (Window Energy Rating Scheme developed by the Australasian Window Council Inc.)** rating of 4 stars for cooling. The building is provided with facilities for air movement by at least one of the following: a) external openings equal to a minimum of 10% of the floor area of the room; b) ceiling fans fitted to each bedroom and one other living space. c) The fireplace is fitted with a dampening device. OR AS1.2 A competent person (as defined in the **Standard Building Regulations 1993**), who is suitably qualified (completed the equivalent of at least two courses in Energy Efficient Building Design from a recognised tertiary institution), certifies that the design of the building achieves the performance criteria. OR AS1.3 The building is a Class 1a, 1b, or Class 2 Duplex and a person accredited to use a computerised energy rating system certifies that the building uses a maximum of 105 $MJ/m^2/pa$ or 29.2 $kWh/m^2/pa$, as demonstrated by an energy rating report.
PC2 The building is residential or has a residential component and must provide sufficient clothes drying facilities to reduce the need for mechanical drying.	AS2.1 Each dwelling unit is provided with access to a clothesline that is open to breezes, screened from public view and receives sunlight (filtered or direct) for at least two hours per day.
PC3 The building is non-residential of Class 5 or 6 (that has a GFA of less than $2000m^{2)}$ or of Class 7, 8 or 9 and must be designed to be energy efficient and minimise the need for artificial cooling or heating, having regard to: the geographical location; the function and use of the building; the direction of solar radiation; the internal environment; minimising heat gain in summer and heat loss in winter; that part of the building that is heated or cooled must not consume more than 29.2 $kWh/m^2/pa$ or $105MJ/m^2/pa$ for heating or cooling.	AS3.1 The building has addressed all of the following elements in its design and construction: Roofs/ceilings have: a) a total thermal resistance to heat flow of not less than R2.5; b) a ventilated roof space (not including roofs over open decks or balconies) where applicable. The building is Class 5 or 6 (that has a floor area less than $2,000m^2$) or Class 9 and the non concrete or masonry external walls have a total thermal resistance to heat flow of: a) not less than R1.0 for locations with an elevation less than 300 metres AHD; or

PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
	b) not less than R1.5 for locations with an elevation greater than 300 metres AHD. The building is provided with facilities for air movement by at least one of the following: a) external openings equal to a minimum of 10% of the floor area of the room; b) ceiling fans fitted to occupied areas; c) mechanical heating or cooling devices. The building's mechanically heated or cooled space is capable of being closed off from other naturally ventilated areas of the building. OR AS3.2 A competent person (as defined in the **Standard Building Regulations 1993**), who is suitably qualified (completed the equivalent of at least two courses in Energy Efficient Building Design from a recognised tertiary institution), certifies that the design of the building achieves the performance criteria.
PC4 Buildings of Classes 3, 5 and 6 that are greater than 2,000m^2 in GFA must be designed to be energy efficient and minimise the need for artificial cooling or heating (anticipated not to exceed 147 $kWh/m^2/pa$ or $529.2MJ/m^2/pa$), having regard to: a) the geographical location; b) the function and use and life of the building; c) the direction of solar radiation; d) the internal environment; e) minimising heat gain in summer and heat loss in winter.	AS4.1 The air conditioning plant, where provided, is operated and maintained to achieve an air conditioning efficiency factor equal to or greater than: a) 0.46 for Class 3 Buildings (Residential); b) 0.24. for Class 5 Buildings (Offices); c) 0.6 for Class 6 Buildings (Retail). OR AS4.2 A competent person (as defined in the **Standard Building Regulations 1993**), who is suitably qualified (completed the equivalent of at least two courses in Energy Efficient Building Design from a recognised tertiary institution), certifies that the design of the building achieves the performance criteria.

Table 1: Overhangs for Window and Door Openings to be used in conjunction with figures 1 and 2 below.

DISTANCE TO SILL FROM LOWEST POINT OF OVERHANG (H)[1]	WIDTH OF OVERHANG	
	Sector A (North)	**Sectors B and C (East-West)**
600mm or less	Not less than 300mm	Not less than ½H for all glazed openings
601 to 900mm	Not less than 450mm	
901 to 1200mm	Not less than 600mm	
1201 to 1500mm	Not less than 600mm	
1501 to 1800mm	Not less than 600mm	
1801 to 2100mm	Not less than 600mm	
2101 to 2400mm	Not less than 600mm	
Greater than 2401mm	Not less than 900mm	

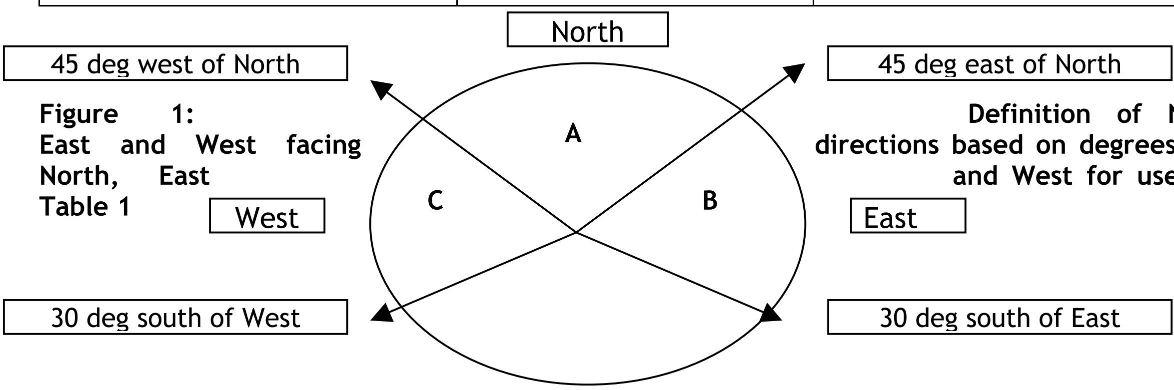


Figure 1: Definition of North, East and West facing directions based on degrees from North, East and West for use with Table 1

Figure 2: Schematic of overhangs and sills relevant to Table 1.