LOCAL PLANNING SCHEME NO. 10

LOCAL PLANNING POLICY NO. 2 - ENERGY EFFICIENT DESIGN

1.0 OPERATION OF THIS PLANNING POLICY

(a) This planning policy has been prepared in accordance with Part 2 of the Town Planning Amendment Regulations 1999.

(b) This policy does not bind the Council in respect of any application for planning approval but the Council will have due regard to the provision of the policy and the objectives which the policy is designed to achieve before making its determination.

(c) If a provision in this policy is inconsistent with the:

(i) Building Code of Australia, then the higher provision shall prevail.

(ii) Residential Design Codes this Policy shall prevail in respect of Development at the higher density.

(d) This policy applies only to split density coded land as designated on the gazetted Scheme map.

(e) This policy may also be used by landowners wishing to construct energy efficient dwellings.

2.0 PURPOSE OF THIS POLICY

The purpose of this policy is to:

1. Clearly outline the criteria Council regards as having energy efficient benefits in the design of residential dwellings.

2. To provide a basis to encourage those building Residential Dwellings in Bassendean to design energy efficient building(s).

3. State the design standards Council will have regard to when considering higher densities on land zoned with split density code under its Town Planning Scheme.

3.0 APPLICATION OF THE POLICY

This policy shall be applicable where to all land where split density codes prevail and the application for the highest density code is being considered by Council.

4.0 BACKGROUND

4.1 Energy Efficient Design Principals

There are several advantages to living in an energy efficient home – saving money on energy costs being the most obvious. Other benefits include reducing the impact on the environment through the decreased use of fossil fuels, the increased comfort of effective natural lighting and ventilation and the improved resale value of dwellings due to lower power bills they create.

The principal means to ensure energy efficiency is to design dwellings to suit the local climate. By taking advantage of free natural warmth from the winter sun and cooling from breezes, it will reduce the costly use of fossil fuel energy for heating and cooling. Careful building design can easily achieve internal temperatures 5°C warmer in winter and 10°C degrees cooler in summer than in typical, poorly designed homes in the southwest.

Any style of home can be designed for energy efficiency, to ensure savings on future energy costs, and to assist the environment. The main features of energy efficient housing relate to:

- Building orientation
- Internal room layout
- Window placement, sizing and shading
- Use of insulation
- Ventilation
- Draught proofing
- Use of heat absorbing building materials
- Landscaping
- Use of energy efficient appliances.

Most features such as improved layout, appropriate window placement and sensible garden design, will make little difference to initial building cost. Although insulating a house will add initially to construction costs, the savings in energy and carbon emissions will make for a positive return over the life of the building. It would be false economy to do otherwise.

4.2 Project Homes –vs- Individual Designs

While it is easier to incorporate energy efficiency features if dwellings are designed specifically to a particular lot of land, Council recognises that this could significantly add to the cost of construction. However, in some cases this is unavoidable and economic cost does not justify a relaxation of this policy where higher density codes are being sought by applicants.

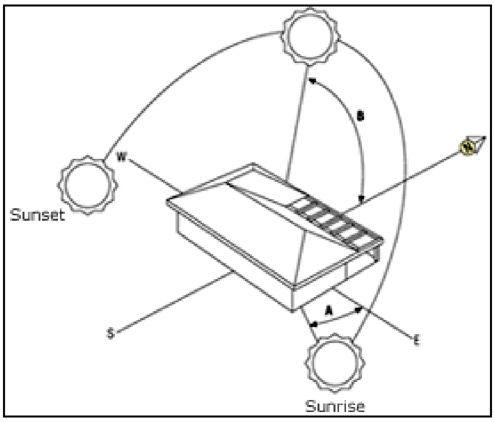
Nevertheless there are excellent opportunities to meet basic energy efficient principals even with a standard project house. There are many standard house designs available which would allow good energy efficiency, provided they are built facing the right direction. A minor modifications such as moving or reducing the size of windows or relocating the carport, along with good insulation, may be all that's needed to reduce unnecessary and expensive energy use and act to noticeably create increased internal comfort levels.

5.0 POLICY PROVISIONS

5.1 Orientation

One of the major principles of energy efficient building design is to allow the sun's heat into a building in winter while excluding it during the long hot days of summer. This can be achieved because the angle of the sun changes from season to season.
In summer the sun rises earlier, south of due east and climbs high in the sky before setting south of due west. Major summer heat gain occurs through the roof and through the east and west windows and walls of the home. In winter the sun rises later, north of due east and stays low in the northern sky before setting north of due west. North facing windows and walls receive maximum winter sun and warmth.

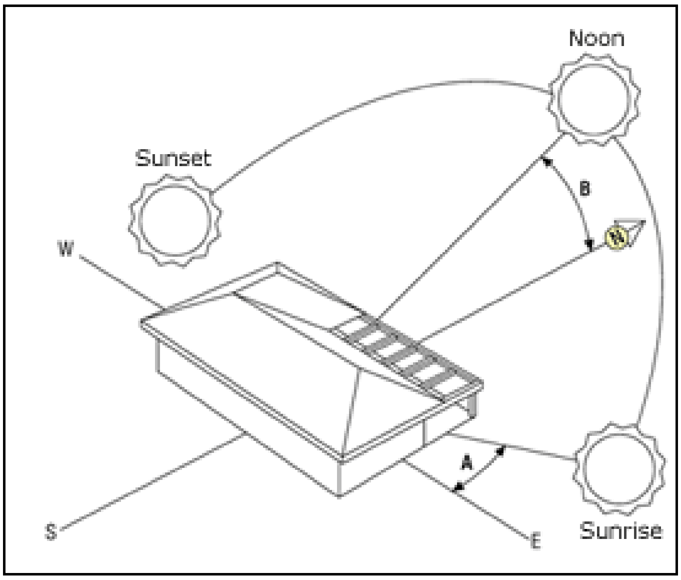
The Sun's Movement during summer (Dec)



Legend:

	Horizontal Rise /Set Angle (A)	Noon Altitude (B)
Perth	28.5° south	80.7°

The Sun's Movement during winter (Jun)

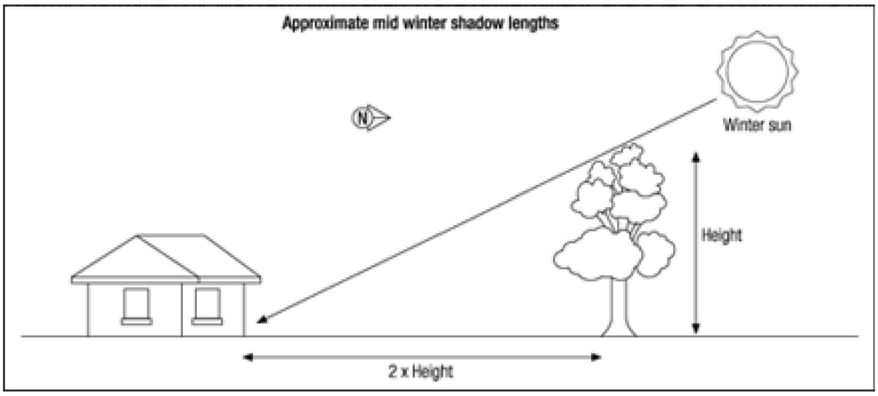


Legend:

	Horizontal Rise/ Set Angle (A)	Noon Altitude (B)
Perth	27.8° south	34.2°

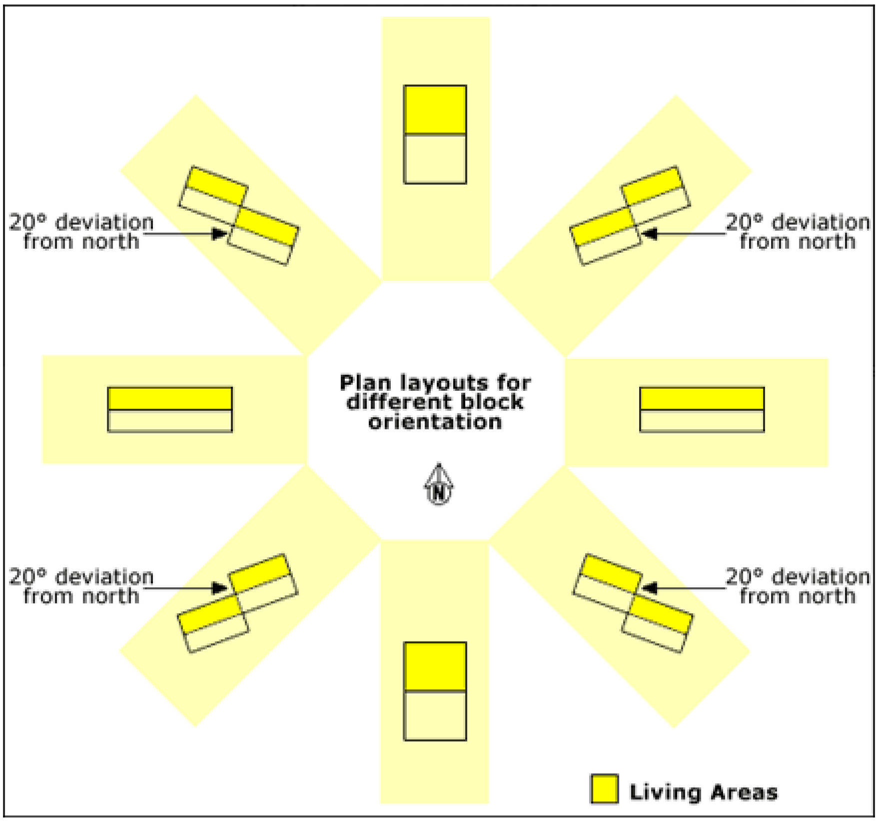
For residential development, it is recommended that land which permits the living areas of the dwelling to face north, be free of obstructions such as buildings or evergreen trees on this side of the home. Orientation is the key factor in achieving energy efficient design. While items such as pergolas, shutters and insulation can often be retro-fitted at a relatively low cost, the orientation of a building is often set in `concrete' and if poorly orientated it is virtually impossible to correct.

Objects cast a shadow southwards approximately twice their height in mid-winter, and it is therefore essential that sufficient allowance is made between tall objects and the north side of a dwelling to ensure that winter solar access is maintained.



The ideal lot layout is one with the rear courtyard/garden facing north.

However, there are a number of ways of varying the design of a house and its interior layout to optimise solar orientation.



To achieve the design goal of optimal energy efficiency, an effective rule of thumb for a house in the southwest is to have north and south facing walls 1.5 to 2.0 times the length of east and west facing walls. This allows reasonable access to the winter sun from the north of the home, while reducing the exposure of walls and windows to early morning and late afternoon sun on the east and west sides of the home.

True north is the ideal orientation for windows. However, if the eaves are designed correctly, windows oriented between approximately 20° east or west of north still allow good solar penetration in winter while excluding most of the direct summer sun.

5.2 Internal Room Layout

Indoor living and entertaining areas should be oriented on the north side of the home where possible, with other rooms to the south. This will create warm and bright living areas in winter since north facing windows and walls receive maximum winter sun. The south side of a house receives a small amount of direct sun in summer, and therefore by locating bedrooms to the south, will be more comfortable for sleeping in summer.

Rooms should be grouped with similar uses together to create zones and doors be used to separate these zones. This type of design is more energy efficient than open plan living because you can close off rooms which are cooled or heated from those that are not.

It is recommended that the kitchen, laundry and bathrooms be grouped together in order to minimise the need for long hot water pipes. This will reduce the amount of heat lost from the pipes.

5.3 Windows and Shading

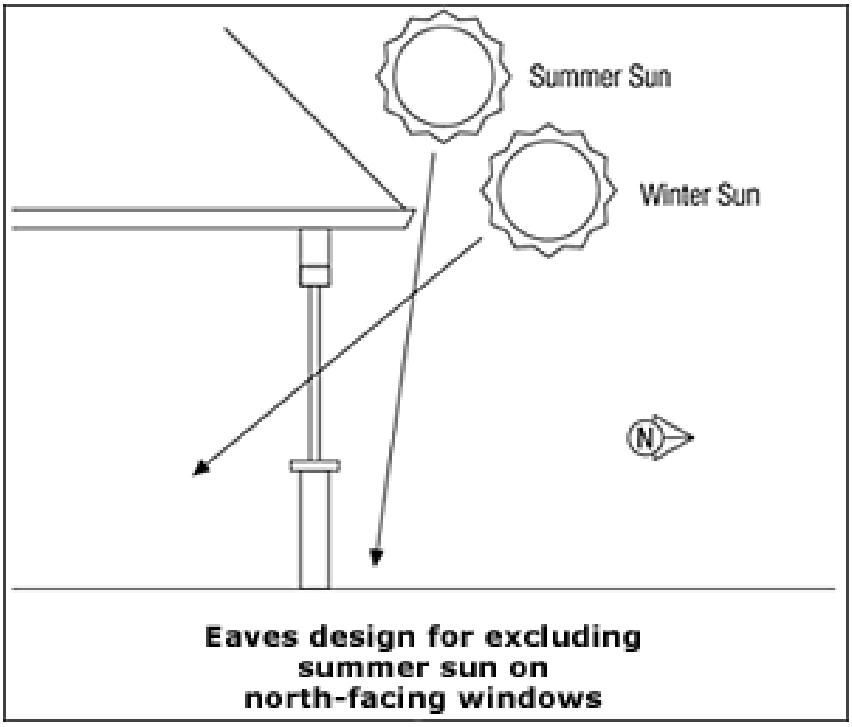
Appropriate window placement, sizing and shading are key elements to energy efficient design. Windows can act as solar collectors trapping heat from the sun, which is useful in winter but not in summer. They ventilate during summer, funnelling cool late afternoon and night time breezes to remove heat accumulated during the day and are an important source of light.

A balance needs to be struck between controlling the sun's access and allowing adequate cross ventilation from breezes, as well as allowing natural light to enter.

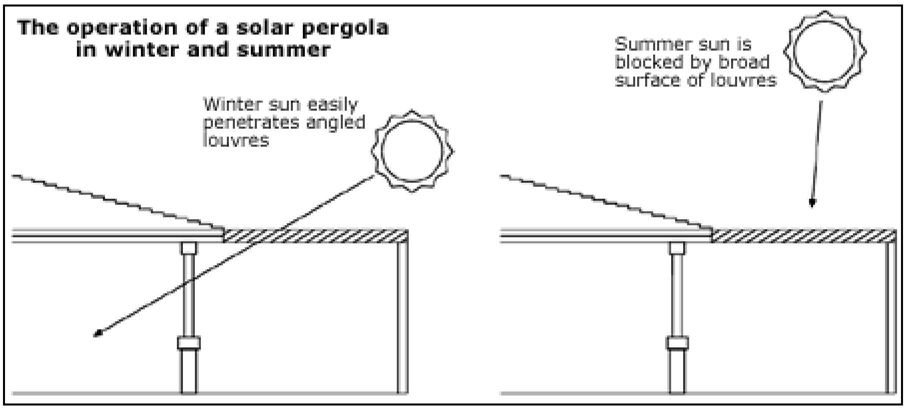
5.4 North Facing Windows

It is recommended that around a third to a half of the north face of the dwelling be glass, as it is very effective at trapping winter warmth and can be easily shaded from summer sun with correctly designed eaves.

To calculate the overhang needed, multiply the distance from the eaves-line down to the bottom of the window by 0.7. This will ensure the glass is adequately shaded from September until March. For cooler regions, multiplying by 0.4 will provide suitable shade from October until February.



Deciduous trees and shrubs or creepers growing on an open pergola on the north face of a home can also provide window shading in summer, while allowing the sun through to warm your home once they've lost their leaves in winter. Alternatively, a solar pergola is designed to achieve the same result.



It is important that shading devices, whether in the form of eaves, pergolas or appropriate landscaping, do not block the sun's access to the interior of your home during winter.

5.5 East and West Facing Windows

East and west facing windows can provide unwanted solar heat gain during the summer months and therefore, if excessive, can contribute significantly to an inefficient house design.

To minimise heat gain during the summer months, a house should be designed with the majority of rooms facing either east or west being non habitable i.e. either laundries or garages etc and that the areas of windows are kept to the absolute minimum.

External shading devices provide some protection from the summer sun, with complete protection achieved only with full vertical screening, such as outside blinds or shutters. This is due to the fact that the angle of sun will be close to horizontal early in the morning (east) and in the late afternoon (west), and only vertical screening can block the sun at these angles. Deciduous trees or vines growing on a trellis can also provide shading during summer.

5.6 South Facing Windows

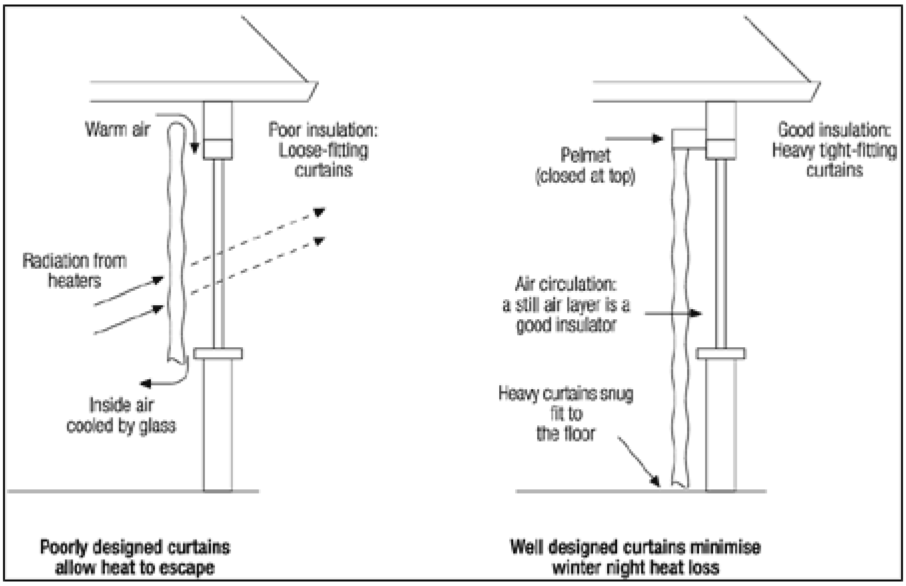
South facing windows receive no direct sun in winter but will receive a few hours of morning and afternoon sun in summer months. For this reason, they lose heat in winter and gain some undesirable heat in summer. South facing windows should be large enough to allow good ventilation and light to enter the home without losing too much heat in winter.

Vertical elements such as external screening or landscaping in conjunction with internal blinds will be most effective at shading south facing windows, since the majority of this sun is at low angle. Basic ‘eaves overhang’ in combination with internal window treatments will also assist solar control to south facing windows. In mid summer the sun can fall on an unshaded southern façade for approximately 4 hours in the morning and 4 hours again in the afternoon. For the more northerly latitudes (eg, Geraldton) provision of shading to south facing windows is even more important. This is because at this latitude there can be an additional 45 minutes of mid summer sun falling on the south face of a building, morning and afternoon.

5.7 Internal Window Treatments

While external window treatments are the best way to reduce summer heat gain, internal window treatments are most important for reducing winter heat loss. A window can lose heat five to ten times faster than an equivalent area of wall. This heat loss can be minimised by keeping warm air inside the room away from cold windows.

Closed curtains can be effective insulators and should be made from a heavy fabric with insulating backing for maximum effectiveness. They need to be long enough to reach the floor and should include a closed pelmet. The pelmet is an integral part of the curtain as it reduces air circulation and consequent heat loss through the window glass during winter and heat leakage into the home during summer when the curtains are drawn.



5.8 Skylights

Skylights can reduce your daytime lighting needs. However, a typical Perth home consumes approximately six times as much energy for heating and cooling than for lighting, and heat can be lost from your home through skylights on winter nights and gained during hot days. To reduce this problem, position your skylight so it is shaded in summer or consider buying one with special glazing that minimises heat transfer and can be closed at night. Non-vented ducted skylights lose less heat in winter, as the air trapped in the duct acts as a thermal buffer.

5.9 Tinted Glass and Reflective Films

Tinted glass and reflective films absorb and reflect heat, keeping your home cooler. However, be aware that using them reduces the amount of light and heat entering rooms in winter as well as in summer. During summer the glass itself becomes hot as it absorbs energy, which will cause some heat to be radiated into the room. These products may be useful where large areas of east and west glazing are unavoidable due to design reasons. However, tints and films will generally not reduce heat gain as much as external shading.

5.10 Double glazing

Two panes of glass separated by at least 10 mm can reduce winter heat loss but is generally only cost effective in situations with high heating requirements. Double glazing can also reduce conductive summer heat gain. However, when exposed to sun double glazed windows will still allow significant heat transfer, which means that full shading is still required.

5.11 Other window products

Windows are also available with other features, such as special coatings on the glass, which can offer improvements in thermal performance.

Insulation acts as a barrier to heat flow. It can make your home more comfortable by reducing the amount of warmth escaping in winter and reducing the amount of heat entering in summer. By insulating you can significantly reduce your heating and cooling bills and help to reduce greenhouse gas emissions.

In an uninsulated house most heat is lost or gained through the ceiling and roof – this is the most important part of the home to insulate. Insulating external walls can bring further benefits. Sealing air gaps will also help.

Opening and closing windows and window coverings at appropriate times to control air flows and heat transfer will also increase your comfort levels. This is particularly important in summer to prevent your house overheating. If you allow too much direct summer sun into your home through windows then insulation may act to keep the home warmer for a longer period of time.

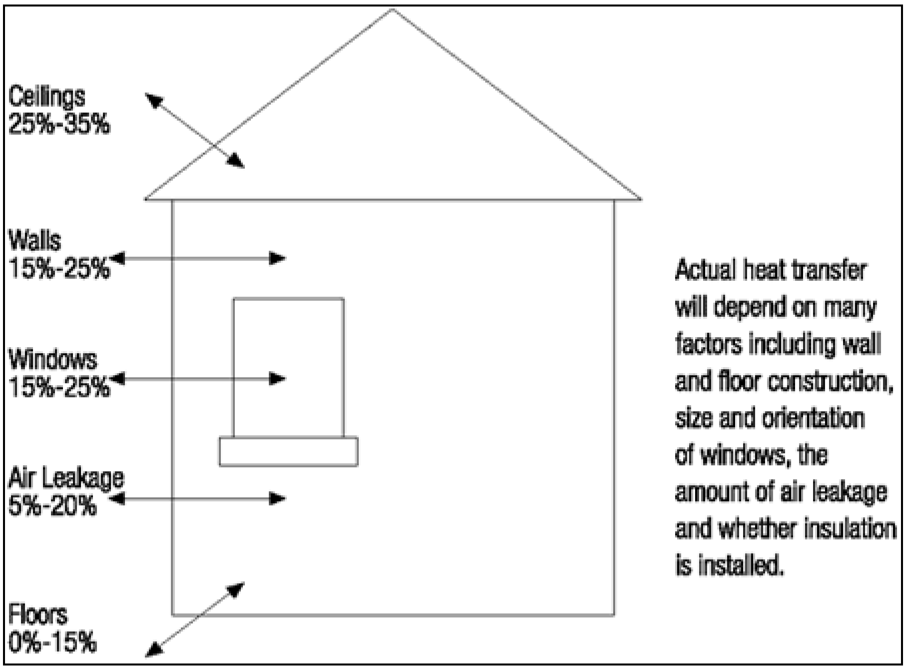
5.12 Insulation Works

The two main types of insulation are bulk insulation and reflective insulation.

Bulk insulation works by trapping small cells or layers of air within the insulating material. Many pockets of still air are very effective at retarding heat transfer.

Reflective insulation works by reflecting significant proportions of light and heat. Some reflective foils can be used both as a vapour barrier and to reduce heat transfer.

Typical Areas of Heat Transfer



5.13 Construction Materials

Building materials make a significant difference to the performance and comfort of dwellings. Dense materials such as brick, stone, concrete and rammed earth heat up and cool down slowly – they have what is called a high 'thermal mass'. Lightweight materials such as weatherboard and fibre cement allow the home to heat up and cool down quickly. These materials have a low thermal mass.

Thermal mass is simply the ability of a material to store heat. A 200 square metre home in the south west with good solar access to the north needs about 20 cubic metres of concrete and 20 to 30 cubic metres of internal brick or equivalent depending on your location (30 cubic metres for Perth) to adequately store winter daytime warmth and gradually release it at night.

Thermal mass is most beneficial in homes which have good solar access to north facing windows. If solar access is limited, large amounts of thermal mass can increase a dwellings heating requirements during winter.

During summer, thermal mass will act to keep your home cooler during the day, provided the dwelling is ventilated overnight. The aim is to allow the night air to cool down the mass inside your home, resulting in more comfortable conditions the next day.

5.14 Masonry Walls

Double brick walls heat up slowly and stay warm for long periods. This is an advantage during short periods of hot weather, but can make your home uncomfortable over extended hot spells. Insulating double brick walls will add to initial costs, but will help to prevent heat transfer to the interior of the home during summer and help to retain heat during winter.

Brick veneer walls consist of a single external layer of brickwork, with a lined stud frame inside. These walls have less thermal mass than double brick walls and therefore respond more quickly to temperature changes. Homes with brick veneer walls are better at cooling down during extended periods of hot weather – making conditions more comfortable at night during summer. Brick veneer walls are also easier to insulate.

Reverse brick veneer walls have the brickwork inside and lightweight frame and cladding outside. This has the advantage of providing the thermal mass on the inside of your home which will retain any heating used in winter. Conversely the external lightweight cladding (weatherboards etc) will not absorb and store summer heat in the same way as masonry wall are know to do.

With both double brick and brick veneer walls (or any type of wall for that matter), it is important to ventilate your home in summer once the temperature outside becomes cooler than the temperature inside.

This will help cool your home down and make conditions more comfortable. Retained night time coolness achieved through ventilation can also keep your home cooler during the day.

5.15 Lightweight Walls

Weatherboard, fibre cement and other lightweight walls get hot quickly in the sun, but also cool down quickly once shaded and after sunset. During winter, they lose heat far more quickly than brick walls. The thermal performance of lightweight walls will improve significantly with insulation, which is cheaper and easier to install at the building stage.

5.16 Floors

Concrete floors store heat from the sun shining through northern windows in winter and return some of that heat during the evening. Laying dark tiles where the low angle winter sun hits the floor will maximise the absorption of heat to be re-radiated. It is important that this thermal mass is not exposed to direct solar energy during summer, as this can lead to uncomfortably warm internal conditions.

Timber floors do not have the high thermal mass of concrete floors. This means that a home with a timber floor will lose far more heat than one with a concrete floor. For homes on stumps which are open at the sides, it is recommended that insulation be installed to the underside of all exposed floorboards. Another solution is to fully enclose the area between the ground and the floor with a solid material like brick, but this will not be as effective as using insulation. An enclosed space under the floor will also require some permanent ventilation to control subfloor dampness.

5.17 Colour of External Building Materials

As a general rule, light colours tend to reflect the sun’s heat while darker colours absorb it. You can take advantage of this fact when selecting the colour of your roof and wall materials. In summer, lighter coloured materials will help to keep your home cooler by reflecting heat from the sun. However if your home is properly insulated, which is a much more effective method of controlling heat transfer, the effect of external building colour on your comfort will be greatly reduced.

5.18 Ventilation

Doors and windows should be positioned to achieve cross ventilation in summer. A larger opening on the leeward side of the home will maximise the airflow through rooms. If this has been allowed for in the design of your home, doors and windows opened late on a summer's day will make use of cooling late afternoon and night time breezes to rid your home of heat accumulated during the day.

5.19 Draught Proofing

Air leaks and draughts can add significantly to your heating and cooling bills by allowing cold air into your home during winter and warm air during summer. You can prevent these unwanted leaks by installing draught excluders on the bottom edge of doors and sealing strips around doors and windows.

These are easy to fit and can be purchased from your local hardware store. When draught proofing you should also check for spaces between walls and skirtings and block off any unused fireplaces. Note that homes with heaters that burn a fuel inside are required by law to have fixed ventilation for safety reasons. (NB this is for information only and is generally a requirement under the Building Code of Australia)

5.20 Landscaping Design and Planting Selection

Gardens can provide significant climate modification effects, and have the ability to further enhance or detract from the other factors influencing energy efficient design mentioned above.

For example, deciduous trees or vines which provide shade in summer but allow the winter sun to shine through. When their leaves have dropped they provide an effective and simple option.

Deciduous creepers can keep west facing walls cool on hot summer afternoons. Shrubs or trees to the south can be placed to direct south-westerly sea breezes into and through your home.

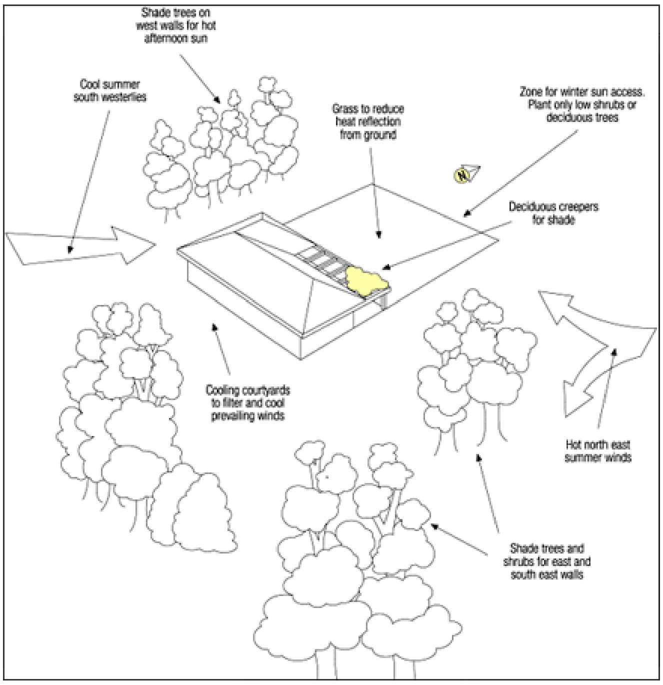
Plantings to the west and north-west can shield houses from winter storms, but close plantings may lead to damage in certain circumstances.

Unshaded paving to the north, east and west of your home should be avoided as it can cause heat to be reflected into windows during summer. Lawns and other ground covers will help reduce this problem.

South facing courtyards with moist cool ferneries will also assist summer cooling.

Overall plant selection should adhere to water wise gardening principals to minimise water usage

The diagram below indicates wind patterns for the Perth region. You should investigate the 'wind regime' particular to your location, to make the most of desirable cooling summer breezes, or to reduce the impact of hot summer or gusty winter winds.



6.0 Assessment Procedure

Under Local Planning Scheme No. 10, the Town is able to permit higher density development in the Split Density Coded residential areas where it can be demonstrated that the design of the dwellings meets specified energy efficiency requirements.

An applicant has two (2) options with respect to satisfactorily addressing this matter as identified below:

Option 1

To ascertain the energy efficiency of the dwelling, Council has assigned a relative value to each of the design criteria listed in the body of this policy.

In order to qualify for the higher density code a score of 70 out of a possible 100 efficiency points is required to establish an acceptable degree of intrinsic energy efficient housing design.

In grouped or multiple dwelling developments each individual dwelling must achieve the minimum score in order to be eligible. There is considered to be sufficient scope within the points allocation for a number of design solutions.

The following are the assigned values given to each design element of energy efficiency:

ENERGY EFFICIENT DESIGN POLICY CREDIT POINTS CHECKLIST

PROPOSED DEVELOPMENT:
ADDRESS:

	Design Element	**Credit Pts Available**	**Credit Pts Claimed**	**Comments**
1.	Orientation - longest axis east west.	10		
Explanatory Notes: Orientation of dwelling excluding garage and any associated storage area.				
2.	North facing courtyard (or balcony for upper floor apartments), and main living areas. (12.5 points) Windows to living areas occupying a min 50% of the north facing wall. (12.5 points)	25		

Explanatory Notes: A roof overhang is to be provided beyond the main living area windows which is of a sufficient depth to provide shading to these openings during summer but which does not project to an extent so as to unreasonably block direct solar access during the winter months (e.g. for full height sliding doors, solid roofing is not to extend more than 2.4m beyond the sliding doors).				
3.	Windows to bedrooms minimised in area and south facing. One bedroom window is permitted to face north.	15		
Explanatory Notes: The available points are apportioned between the number of bedrooms that are contained within each respective dwelling. For example, a 3 bedroom dwelling which incorporates two bedrooms each with south facing windows (minimised in area) and a third bedroom with a window facing east or west would achieve a score of 10 points.				
4.	Eastern and western walls are either blank or only have openings to non-habitable utility rooms.	10 (east) 10 (west)		
Explanatory Notes: The Town acknowledges that windows may need to be located on eastern or western facing walls for the purpose of cross ventilation. Where a secondary window to a habitable room is located on an eastern or western wall and is kept beneath 1 square metre in area, points will not be deducted for such windows. Where the only window to a habitable room is located on an eastern or western facing wall, 5 points will be deducted for each opening, irrespective of size. Where a patio or verandah roof projects a minimum of 3m beyond an east or west facing opening to a habitable room, points will not be deducted in relation to that opening.				

5.	60% of all habitable rooms shall be cross ventilated through the provision of windows on walls that have opposing orientations. (i.e. a bedroom with a south facing window and a secondary window of under 1 square metre on a western or eastern facing wall)	10		
Explanatory Notes: Part credit points are not allocated for this criterion. An open plan living / dining / kitchen area is treated as one room.				
6.	The provision of either a solar pergola or solar hot water heating system or photovoltaic solar panel system.	15		
Explanatory Notes: Where a solar pergola is to be provided, it is to be positioned to the northern side of the main windows of the main living area of the dwelling and the louvres are to be fixed and positioned at 34 degrees to north.				
7.	Landscaping design and plant selection to demonstrate compliance with low water use gardening principals.	5		
Explanatory Notes: A landscape plan is to be prepared by a relevant industry professional and is to be submitted in conjunction with the application for development approval.				
	TOTAL	**100**		Require min 70 out of 100 to qualify for higher density code

The applicant is to submit a letter explaining the features provided and the number of credit points claimed.

Any dwellings which are proposed to be retained as a part of any development proposal are to be modified to meet the points required by this Policy.

Where an existing residence either does not comply or cannot be made to comply with the points required by this Policy, the Town shall not grant development approval.

Option 2

As an alternative to achieving the 70 point score from the matrix identified in Option 1, the following requirements shall be met:

(a) Each dwelling which is a part of the application for development approval (irrespective of whether the dwelling is a single house / grouped dwelling multiple dwelling / apartment) shall demonstrate a Nationwide House Energy Rating Scheme (NatHERS) star rating (or other comparable star rating measurement tool which is accredited by the National Construction Code / Building Codes of Australia) which is one star in excess of the current energy efficiency requirement of the Building Codes of Australia that are specified for a class 1A building; (e.g. if NatHERS is used as the assessment tool as at March 2019 *any* proposed dwelling would need to achieve a 7 star rating); and

(b) The NatHERS (or other accredited equivalent) star rating for the dwelling shall be certified by a NatHERS (or other accredited equivalent) energy assessor using the NatHERS (or other accredited equivalent) software and shall be provided at the development application stage; and

(c) Each dwelling shall be provided with a minimum 1.5kw photovoltaic solar panel system; and

(d) Each dwelling shall be provided with a minimum 3000L capacity rainwater tank that is plumbed to either a toilet or laundry within the dwelling; or alternatively an approved grey-water reuse system that collects grey water from the laundry and bathrooms and re-directs it for garden irrigation / ground water recharge.