



smart&sustainable
HOMES



Smart and Sustainable Homes

Design Objectives



Queensland Government
Department of **Public Works**

Smart and Sustainable Homes Design Objectives

Queensland Department of Public Works
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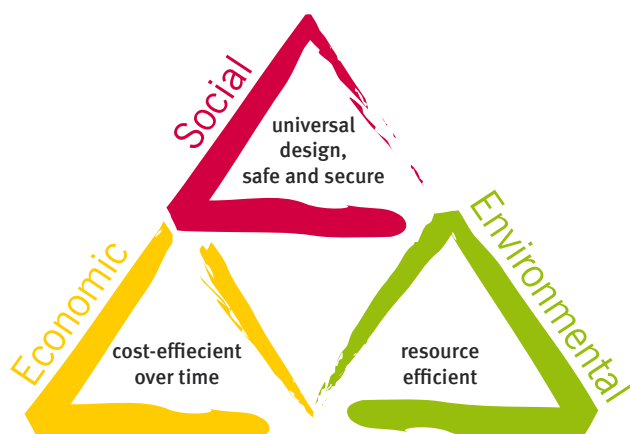
1 Introduction

The Smart and Sustainable Homes Design Objectives (Design Objectives) outline good practice in designing, planning, building, maintaining and renovating homes to make them more socially, environmentally and economically sustainable. This is otherwise known as the ‘triple bottom line’ approach to sustainability.

The Design Objectives have been developed in response to the demand for housing that better meets people’s needs and responds to Queensland’s four climate zones (refer map page 4). A sustainably designed home reduces its environmental and social impacts whilst saving money on the cost of living over the life of the house.

The aim of the Design Objectives is to increase the supply of sustainable housing in the private sector. At the same time, the Smart and Sustainable Homes program is seen as a means of providing leadership on good-practice for more sustainable housing to the residential housing design and construction industry.

Making a home smart and sustainable means the occupant can move around more easily, feel safer, save money and use resources like energy and water more efficiently. A home that is designed to the Smart and Sustainable Homes’ principles will meet a family’s needs through all stages of their lives.



The ‘triple bottom line’ approach to sustainability

1.1 What is sustainability?

Ecologically sustainable development (or sustainability) is defined as development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends¹. The five key principles from the Foundation of Sustainability are:

- **Integration**—the effective integration of environmental, social and economic considerations in decision making.
- **Community involvement**—recognition that sustainability cannot be achieved, nor significant progress made toward it, without the support and involvement of the whole community.
- **Precautionary behaviour**—where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- **Equity within and between generations**—fairness and equal access to opportunities both in our lifetimes as well as for future generations.
- **Continual improvement**—the declining environmental situation means there is an imperative to take immediate action to become more sustainable and to make continual improvement.

Sustainability is a very broad, all encompassing concept that has implications for every aspect of society, including people of all ages and abilities. However, the concept does not need to be difficult to resolve if the triple bottom line approach is considered and applied.

Homes that incorporate sustainable design features will derive numerous ongoing benefits, including enhanced value.

¹ National Strategy for Ecologically Sustainable Development (1992)

1.2 Purpose of the Design Objectives

The Design Objectives have been developed primarily for the building designer of detached dwellings in Queensland. However, the intent of these objectives and performance requirements are also applicable to dwellings in other parts of Australia as well as to attached housing types.

The purpose of the Design Objectives is to:

1. Provide design assistance to building designers and to new or existing homeowners, as well as strategies to design and build homes that are more comfortable to live in, are suited for a diverse range of people, have less impact on the environment and are cost effective to maintain and run. It is intended that this document be utilised by clients and designers to incorporate sustainable measures into the process of designing their home from the earliest stage of the design process. It is at the early stages of the design process that the greatest difference can be made, for the least financial cost to the building works.
2. Provide a tool to measure the sustainability of the home's design. Within the different categories of the Design Objectives, there are 'Essential' criteria which must be addressed and 'Desirable' criteria which, if met, will further increase the level of sustainability.

The Design Objectives provide a framework of goals for sustainable housing with examples of acceptable solutions and briefly explain the sustainability element for each objective. These can be applied to either new housing or renovation of existing housing.

1.3 Outline of the Design Objectives

The Design Objectives set out a range of triple bottom line sustainability goals. Each criterion within the Design Objectives addresses one or more of these sustainability goals.

The criteria within the checklist are grouped into categories by building element as follows:

- site and landscape
- dwelling access
- general design
- building materials and finishes
- plumbing and drainage
- electrical and lighting
- kitchen design
- bathroom/toilet design
- bedroom design
- laundry design
- outdoor living area design
- garage and shed design.

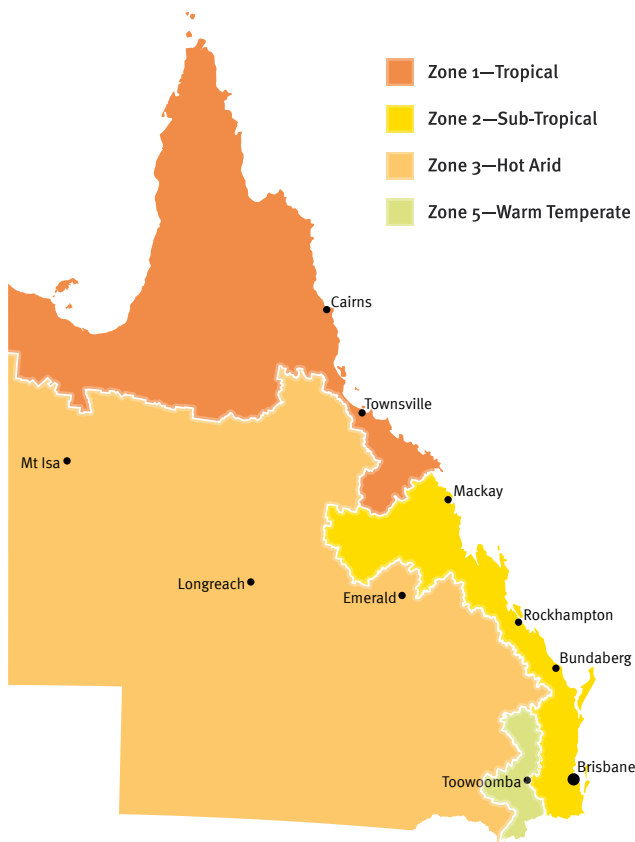
For each criterion within these categories the following information is provided:

- **Objective**—outlines the actual design objective; in other words, this is what will be achieved if the performance requirements are met.
- **Requirements**—what must be achieved for the objective to be met. In some cases this is a prescriptive measure and in other cases it is a performance based requirement.
- **Sustainability goals**—the main means of relating each criterion back to the overall goals of the triple bottom line of sustainability i.e. environmental, social and economic. The designer/homeowner can see which sustainability aspect they are addressing and attempt to ensure a balanced consideration of all aspects in the overall home design.



1.4 Geographical scope of the Design Objectives

The Design Objectives take into consideration the four climate zones in Queensland: Zone 1—Tropical, Zone 2—Sub-Tropical, Zone 3—Hot Arid, and Zone 5—Warm Temperate, as defined in the Building Code of Australia. Refer to the map below for geographic areas of Queensland's climate zones. (Note: Zone 4 does not exist in Queensland).



Climate zone classifications for council areas are also subject to periodic review by the Australian Building Codes Board and may alter with updated information. For further information go to www.abcb.gov.au.

1.5 Other related publications

- Smart and Sustainable Homes fact sheets, including 'sun path diagrams', www.smarthousing.qld.gov.au (Department of Public Works)
- Designing for Climate — series of information brochures, www.smarthousing.qld.gov.au/publications (Department of Public Works)
- Case studies, www.smarthousing.qld.gov.au (Department of Public Works)
- Your Home Technical Manual, www.yourhome.gov.au (Australian Greenhouse Office)
- Your Home Buyers Guide, www.yourhome.gov.au (Australian Greenhouse Office)
- Building Code of Australia, www.abcb.gov.au (Australian Building Codes Board)
- Welcome — Design Ideas for Accessible Homes www.buildingcommission.com.au (Building Commission Victoria, 2002)
- Healthy Homes — A guide to indoor air quality in the home for buyers, builders and renovators www.nphp.gov.au/enhealth (Commonwealth Department of Health and Aging)

1.6 Display Homes

Queensland's Smart and Sustainable Homes program is a key vehicle demonstrating the design features and benefits of the Smart Housing Design Objectives (version 1). Several display homes have been designed, constructed and promoted around Queensland in partnership with housing industry stakeholders and councils. For more information about the program and the locations of the display homes visit www.sustainable-homes.org.au.



2 Sustainability goals

Designing a more sustainable home will help to achieve environmental, social and economic benefits for the household, neighbourhood and the broader community. Hence the aim for the designer and home owner should be to gain a balance across all of the sustainability goals listed in this section.

The three fundamental aspects of the triple bottom line approach are broken down into a series of more clearly defined goals. The individual criterion within the Design Objectives is related back to these sustainability goals that each criterion helps to achieve.

At the end of the Design Objectives there is a checklist that allows the user to assess the overall performance of the home design and review the balance of the environmental, social and economic issues addressed by the home.



Environmental sustainability

Environmentally sustainable homes minimise the impact on the environment by incorporating features such as rainwater tanks, energy efficient hot water systems and passive solar design for the local climate. The design of a home for environmental sustainability needs to address, but is not limited to, the following:

Energy

The design of the home maximises the use of natural energy and minimises the need for non-renewable energy. The home includes passive solar design features such as house orientation, ventilation, insulation and shading, appropriate use of building materials and fixtures and fittings, to ensure higher energy efficiency and help the environment by reducing household carbon emissions. The home has energy efficient appliances.

Water

The design of the home and outdoor areas, including its fixtures, fittings and appliances, saves water.

Materials and waste

The design and construction of the home considers the efficient use of building materials, minimises waste and uses recycled materials where possible. Construction aims to minimise environmental impact, e.g. run-off to waterways. It takes future needs into consideration so that it minimises the requirement for modifications and consequent material wastage.

Site impact and biodiversity

The site of the home and the landscaping considers the natural features of the site, including topography, the local climate, native flora and fauna, and natural and cultural features. Design considers retaining existing vegetation, including trees. The landscaping requires minimum maintenance and water, inhibits soil erosion and minimises storm water contamination and damage.





Social sustainability

Socially sustainable homes are designed with all people in mind. Features such as flexibility, comfort, access, safety and security are addressed so that homes accommodate the changing needs of occupants and guests. The design of a home for social sustainability needs to address, but is not limited to, the following:

Human comfort

The home provides an internal environment that is thermally, visually and acoustically comfortable.

Human health

A healthy home reduces hazards to human health within the home (e.g. the presence of toxic chemicals, mould, etc) and promotes natural lighting and ventilation.

Safety

The design minimises the possibility of falls, driveway run-overs, burns and poisoning and enhances the ability to supervise children in outdoor play areas. The likelihood of injuries occurring in and around the home for people of all ages is reduced.

Security

The home uses designs, fixtures and fittings to reduce crime and protect the home from malicious intruders. It enables informal surveillance of the yard, street, and neighbouring properties.

Universal design

The home is versatile and comfortable for a diverse range of people and at different stages of their lives. It is easy to move around the home, and the operation of fittings and fixtures caters for people of all ages and abilities. The home is easily accessed by occupants, visitors and emergency services, etc.

Sense of community

The home contributes to an improved community identity by enhancing the urban fabric of the neighbourhood and promoting opportunities for neighbourhood interaction through appropriate design.



Economic sustainability

Economically sustainable homes are more cost-efficient over time. They feature smart design and use low-maintenance materials and appliances with high water and energy-star ratings to reduce the ongoing costs of running the home. Natural heating and cooling can be achieved by considering orientation, ventilation, insulation, shading and materials. The design of a home for economic sustainability needs to address, but is not limited to:

Initial costs

The design of the home considers the size of the dwelling to reduce the cost of construction. The costs of building materials are calculated on their capital costs as well as their potential ongoing savings and cost effectiveness. The design considers standard sized products and the use of recycled, readily available and local building materials.

Maintenance costs

Selection of building materials considers the long-term maintenance expenses. The design includes durable and low maintenance materials.

Running costs

The home utilises alternative energy sources (e.g. solar and gas) and uses energy and water efficient appliances. Effective passive design reduces the need for artificial lighting and climate control.

Future modification costs

The design minimises the need for future modifications to cater for the occupants' changing requirements, which reduces long term costs.

Community costs

The design of the home works to minimise the costs to the broader community, for example, utility and transport costs, provision of medical and emergency services, as well as fitting in with the context of the neighbourhood.



3 Building elements

3.1 Site and landscape

This section contains criteria relating to the site selection, siting, landscaping, planting and pest protection of the dwelling.

The first step to good home design is choosing the right location for the occupants' lifestyle and budget. The choice of site can have a significant impact on the environment, social networks and cost of living. There are benefits of living in an established community, near to work, close to shops, public transport and other amenities. These benefits include reduced travelling time and dependence on car travel and the occupants will have more leisure time and enjoy a better lifestyle.

Correct solar orientation of the home increases the energy efficiency, making it more comfortable to live in and cheaper to run. The home should take full advantage of sun paths throughout the year as well as the slope, breezes, views, existing vegetation and other unique site characteristics.

In Queensland, many people spend much of their lives outside their home either in the garden or on verandahs. It is therefore important to attempt to maximise the potential of outdoor living areas and the siting and landscaping are the fundamental aspects to achieving this.

A key principle in siting a home is to minimise the amount of site disturbance and maintaining the site's natural topography. This includes the disturbance of the soil (from cut and fill) and the removal of vegetation. Designs, therefore, should aim for minimal site clearance, retain significant habitat trees, and rehabilitate disturbed areas with saved topsoil and salvaged native plant species.

It is recommended that new plants brought in for landscaping, should be non-invasive and non-toxic indigenous species that will require less water and energy to maintain throughout their life. The landscaping also has a role to play in ensuring security, and privacy and can contribute to the successful passive design of the home.

Site and landscape

Essential

Objective 1

Site conditions are assessed for a passively designed home to be constructed

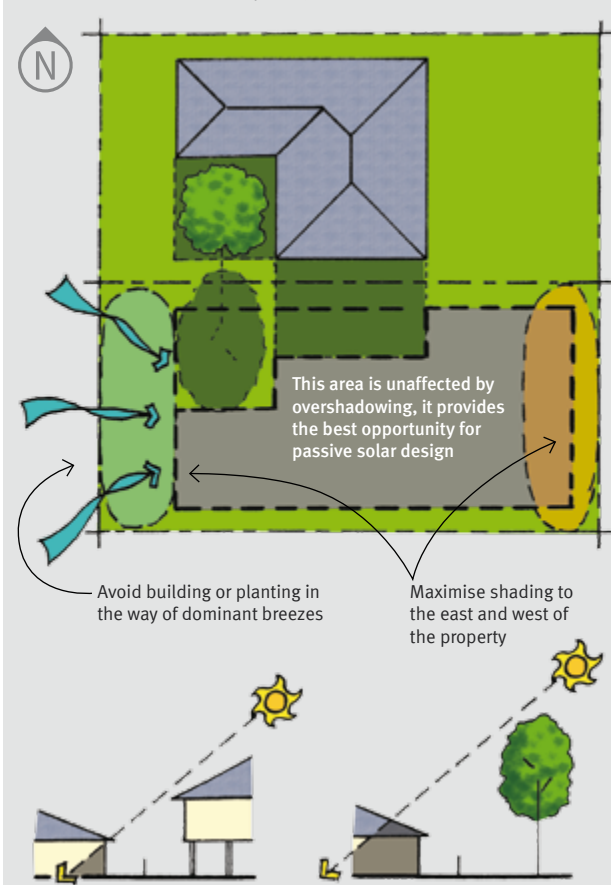
Requirements

- The site has the following characteristics:
- good solar access so that the house can be designed to minimise summer sun intrusion and maximise winter sun (where appropriate to location)
 - assessing potential overshadowing by neighbouring buildings and/or trees on northern aspects in southern Queensland and southern aspects in northern Queensland
 - maximum shading on eastern and western walls
 - access to cooling breezes in summer conditions
 - minimal potential for noise intrusion from surroundings.

Sustainability goals

- | | |
|-----------------|---------------|
| ● Environmental | Energy |
| ● Social | Human health |
| ● Economic | Running costs |

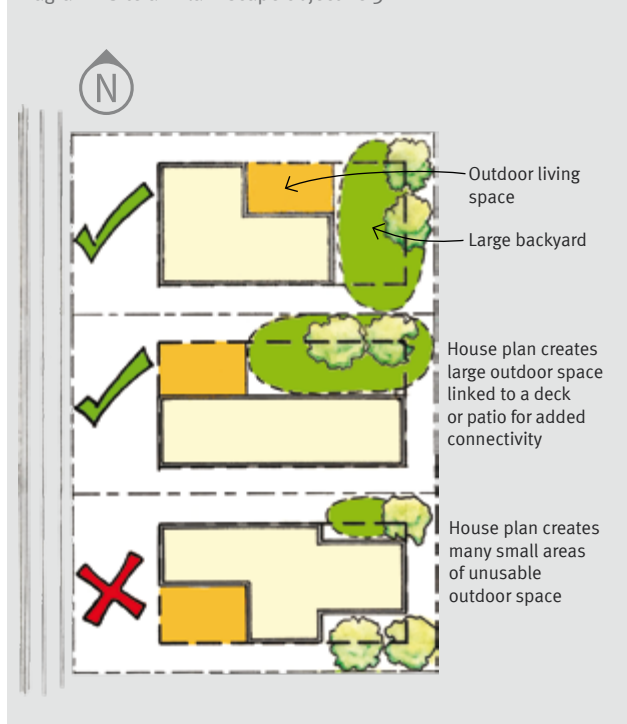
Diagram—Site and landscape objective 1



Site and landscape		Essential
Objective 2	The loss of biodiversity is minimised	
Requirements	House siting and landscaping provides an adequate buffer and gives consideration to: • vegetation of significant value (e.g. a council Vegetation Protection Order) • good quality agricultural land • wetlands.	
Sustainability goals	Environmental	Site impact
	Social	-
	Economic	-

Site and landscape		Essential
Objective 3	The design of the home, and the landscaping, uses the land efficiently	
Requirements	• The area available for outdoor living spaces is maximised. • The design accommodates north-facing daytime outdoor living spaces.	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	Initial costs

Diagram—Site and landscape objective 3



Site and landscape		Essential
Objective 4	Soil degradation (and need for fertilisers), sediment run off, and storm water runoff has been reduced	
Requirements	• Soft landscaping accounts for a minimum of 30% of the site area. • The landscape design reduces storm water runoff from the site through permeable paving, pebble paths, infiltration trenches, soak wells, lawn, garden areas, swales and the like.	
Sustainability goals	Environmental	Site impact
	Social	Human health
	Economic	Community costs

Site and landscape		Essential
Objective 5	The home does not significantly reduce privacy, views or daylight to adjacent dwellings	
Requirements	• Living spaces that would have a clear view into the private internal or external spaces of adjacent dwellings are screened to maintain privacy for neighbours. • The home does not limit daylight and solar access to internal or external living spaces of adjacent dwellings. • The home designed does not unreasonably block significant prime views of adjacent dwellings.	
Sustainability goals	Environmental	Energy
	Social	Sense of community
	Economic	Community costs

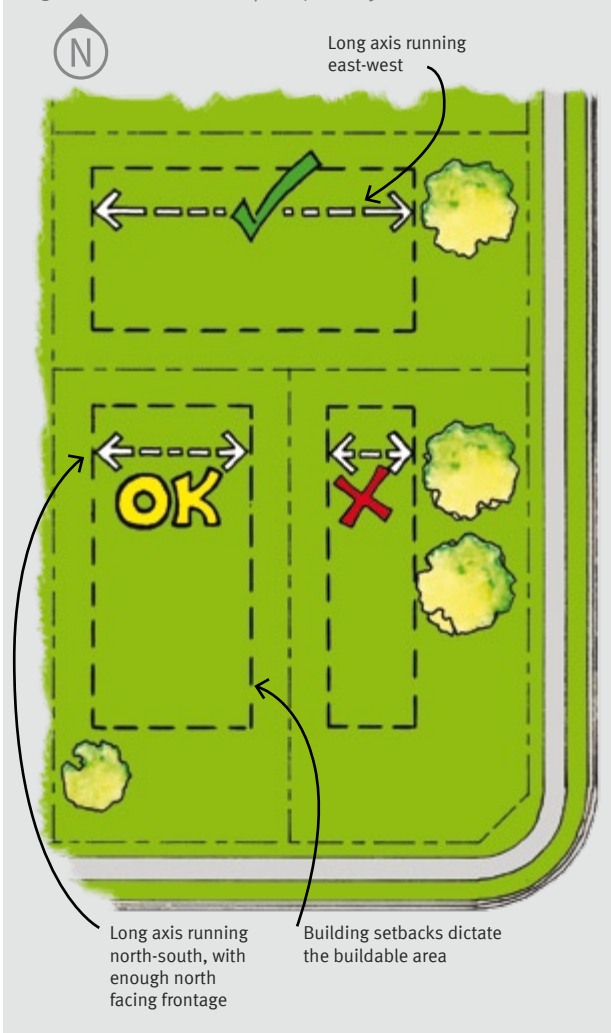
Site and landscape		Essential
Objective 6	Landscaping reduces the need for water, chemical and energy inputs	
Requirements	Use plants that: • are native to the local area • are appropriate to the soil conditions • have low watering needs. Group plants with similar needs together.	
Sustainability goals	Environmental	Energy Water Site impact
	Social	Human health
	Economic	Running costs

Site and landscape		Essential
Objective 7	Creating a secure home and neighbourhood	
Requirements	Use planting that: • promotes the security of property by clearly defining ownership and boundaries • does not obstruct views from living areas of the dwelling to public areas/street and the access to the dwelling. Planting and landscape structures are designed not to conceal: • points of entry to the home • access to potential points of entry, including climbable structures adjacent to a multi-storey home.	
Sustainability goals	Environmental	-
	Social	Security Sense of community
	Economic	Community costs

Site and landscape		Essential
Objective 8	Consider all natural hazards	
Requirements	Investigate the extent to which the site may be exposed to natural hazards (e.g. flood, bushfires, landslide, storm or storm surge) and design to mitigate their impact.	
Sustainability goals	Environmental	Site impact
	Social	Safety
	Economic	Community costs

Site and landscape		Desirable
Objective 9	Site orientation and dimensions are suitable for a passively designed home	
Requirements	The site has a long access running east-west and is wide enough to accommodate north facing living spaces without overshadowing by neighbouring properties.	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running costs

Diagram—Site and landscape objective 9

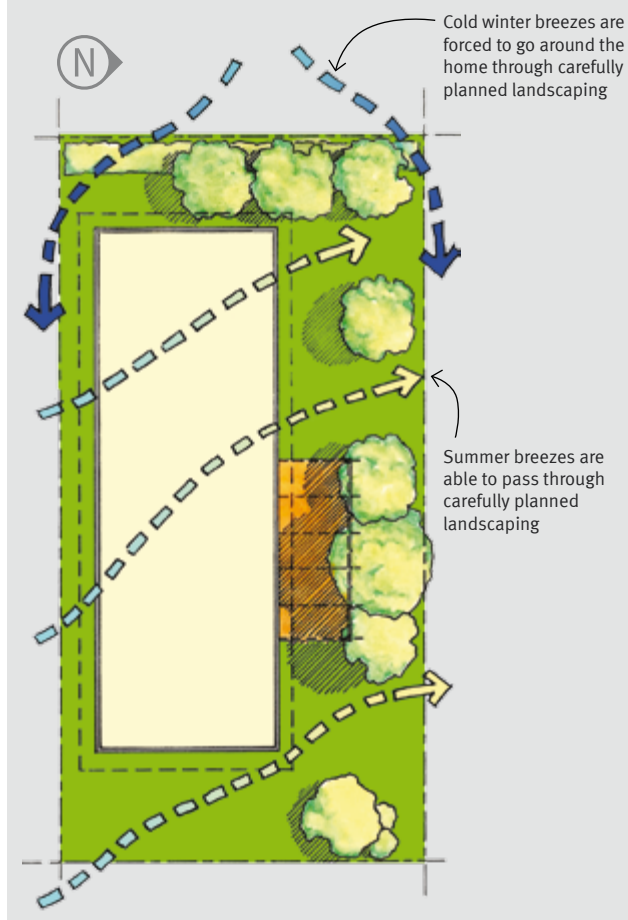


Site and landscape		Desirable
Objective 10	The site needs minimal change to accommodate the home	
Requirements	Give preference to sites that: • are flat or gently sloping in order to minimise cut and fill excavation (any cut and fill must be stabilised and revegetated as soon as possible) • do not require removal of large amounts of vegetation, especially deep rooted trees • avoid alteration of watercourses and drainage patterns.	
Sustainability goals	Environmental	Site impact
	Social	-
	Economic	Initial costs



Site and landscape		Desirable
Objective 11	Landscaping contributes to the passive design of the home	
Requirements	The landscaping: • provides daylight access to windows whilst providing shading for living areas in the dwelling in summer. • provides sunlight shading for rooms on western aspect • encourages cooling summer breezes through the home • provides protection from cold winds in winter • doesn't obstruct solar access for solar hot water panels when matured • doesn't create unintended obstruction of daylight access to skylights when matured.	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running costs

Diagram—Site and landscape objective 11



Site and landscape		Desirable
Objective 12	The choice of site will assist in reducing car usage	
Requirements	The location is: • less than 800m from a train station or 400m from a bus stop • less than 800m from a local shopping centre/facilities.	
Sustainability goals	Environmental	Energy
	Social	Sense of community
	Economic	Community costs

Site and landscape		Desirable
Objective 13	Maintaining privacy for the home	
Requirements	Where oversight into the home from neighbouring properties and or public places, may occur, the landscaping (or other building elements) provides screening for appropriate privacy.	
Sustainability goals	Environmental	-
	Social	Security Sense of community
	Economic	Community costs

Site and landscape		Desirable
Objective 14	Termite protection does not pollute the soil around the home	
Requirements	Termite barriers made from granite or stainless steel or other non-chemical system.	
Sustainability goals	Environmental	Site impact
	Social	Human health
	Economic	Maintenance costs

3.2 Dwelling access

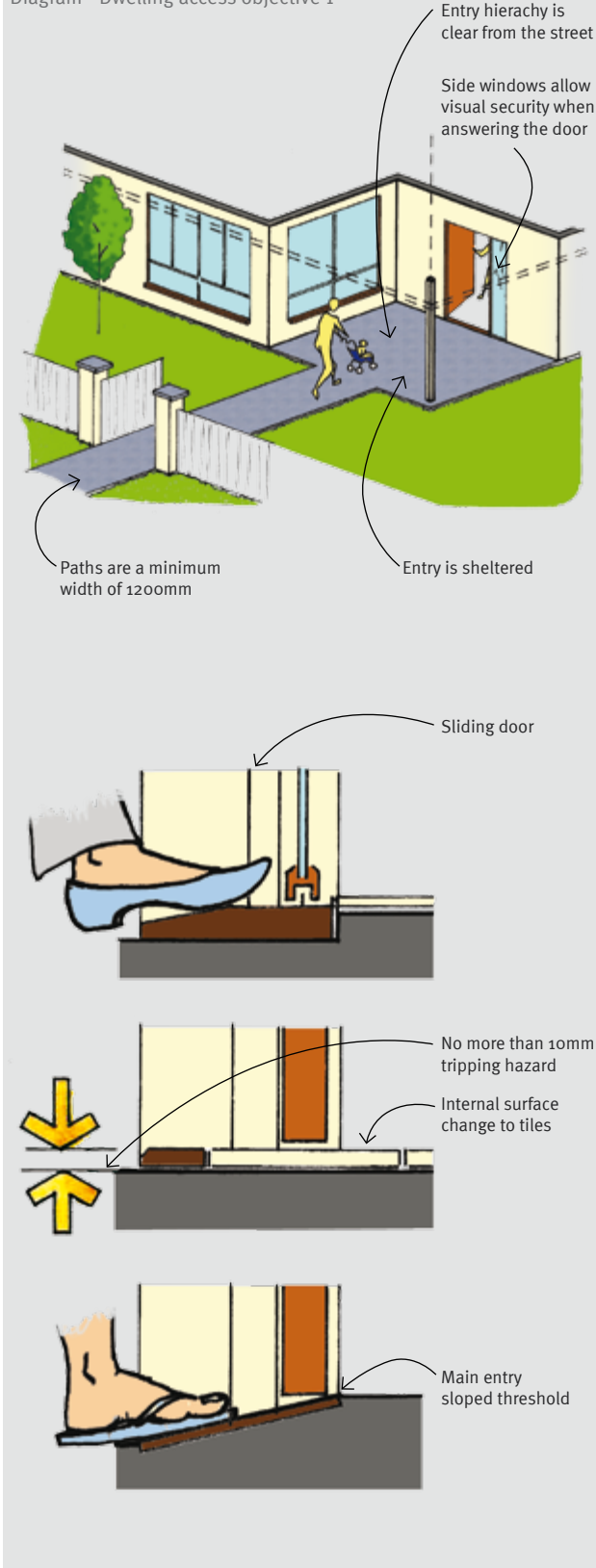
This section contains criteria relating to the access to the dwelling by owners, visitors, emergency services and the prevention of illegal or uninvited access to the dwelling.

The means of access to the home is a critical part of a socially sustainable dwelling. Access to the dwelling should be safe and it should be possible for persons of all ages and abilities to arrive and enter whether they are the owner or a visitor. Visual identification of the dwelling by visitors is a key aspect of the arrival process, hence a clear and legible approach, as well as clear numbering of the dwelling is important.

On the other hand it is important to be able to identify unwanted visitors to the dwelling. The dwelling must be secure against illegal access and as part of this, the visual identification of visitors before they enter the dwelling (day and night) is an important aspect of the design of the dwelling.

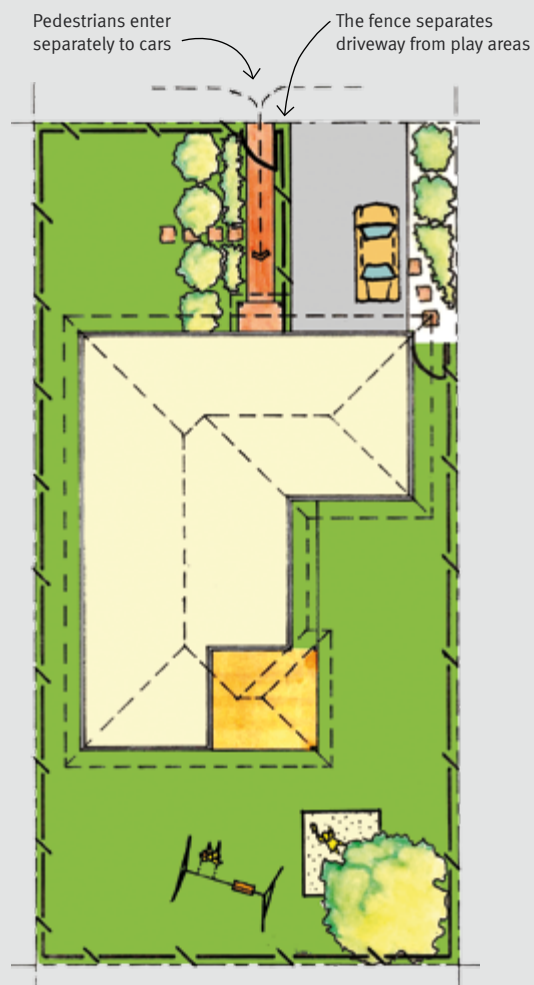
Dwelling access		Essential
Objective 1	Access to the main entry of the home from the street is easy for all occupants and visitors	
Requirements	There is a clear path (accessible path) of travel from the street or car parking area, to the home that features: • level thresholds (with no more than 10mm tripping hazard) • paths are minimum width of 1200mm • external door (often the main entrance door), gates and other external openings along the accessible path are a minimum of 920mm width allowing a clear opening of 850mm wide (refer to general dwelling design on page 14 for requirements in and around the dwelling). • lever door handles at 900mm – 1100mm above floor level • a maximum gradient of 1:8 for an accessible path over short distances up to 1520mm • a maximum gradient over longer distances of 1:14 with landings at 7 metre intervals • an even, hard wearing, slip resistant surface with a maximum cross fall of 1:40 • appropriate area lighting for path identification and navigation.	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	Future modifications

Diagram—Dwelling access objective 1



Dwelling access		Essential
Objective 2	The risk of children being run over by vehicles is minimised	
Requirements	• Vehicular access is separated from pedestrian access and children's play areas by child resistant barriers (e.g. self-closing, self-latching gates and doors). • Pedestrian access to the dwelling is not via the driveway.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	Community costs

Diagram—Dwelling access objective 2



Dwelling access		Essential
Objective 3	The property and its entry point are easily identified	
Requirements	• Property lines and private areas are defined by plants, paving, screens or fences. • There is direct access for visitors to the entrance and not to private areas. • The entry to the home is clearly identifiable and visible (day and night) from the street.	
Sustainability goals	Environmental	-
	Social	Safety Security
	Economic	-

Dwelling access		Essential
Objective 4	Emergency Services can easily find a dwelling when required	
Requirements	The dwelling number can easily be seen from the street during the day and night on either the house or mailbox. The number: • contrasts (in colour and grey scale) against its background • is big enough to see from the street • has a simple style and is preferably reflective. Consider painting the number on the kerb for maximum visibility.	
Sustainability goals	Environmental	-
	Social	Safety Security
	Economic	-



Easy to read numbers enable emergency services to find the house quickly (Sustainable Home Redlands)

Dwelling access		Essential
Objective 5	The home is secured from illegal entry	
Requirements	This requirement relates to all doors and windows that can be reached from the ground level, without using a ladder. Doors: - external doors, including doors linking the garage to the house, are of solid core, are fitted with security grilles or a double cylinder deadlock - glass panels within one metre of the door are either strengthened (using security film) or have laminated security glass panels - provide a security system that allows ventilation, such as a screen door, that is fitted with triple locks and triple hinges - the garage vehicular access door lock is constructed to resist forced entry - sliding panel-type doors are not able to be lifted from their tracks. (Refer to general dwelling design for requirements relating to emergency egress from the home, p14) Windows: - are fitted with a security system, such as security grilles or a locking system that will enable the window to be locked in partially opened position.	
Sustainability goals	Environmental	-
	Social	Security
	Economic	Running costs Community costs

Dwelling access		Essential
Objective 6	Visitors outside the home can be clearly identified	
Requirements	- The front door is fitted with a peephole which provides a 180° field of vision. - There are laminated safety glass panels within or adjacent to the door. - An energy efficient sensor light is positioned to illuminate the entrance to the home, including the pathways in such a way that does not cause a disabling glare which may make identification difficult.	
Sustainability goals	Environmental	-
	Social	Security
	Economic	-



Safety glass panels beside the front door enable residents to visually identify visitors (Sustainable Home Hervey Bay)



3.3 General dwelling design

This section relates to aspects of the house design that are not confined to any one area of the dwelling. This section contains criteria relating to general accessibility and safety issues, emergency egress, storage, passive design and overall household energy consumption.

Once inside the home, accessibility around the home is a key aspect of design for future flexibility. Added to this is the design of details around the home such as handles for ease of access to storage and opening doors.

There are numerous hazards around the home. Sharp corners, stairs, balconies, high windows, ceiling fans and household chemicals are all common causes of injury around the home and these issues are addressed by criteria in this section. Adequacy of storage in all areas of the dwelling is another safety issue. Falls are much more likely to occur in the home if the home is poorly designed and/or cluttered with items because of a lack of storage space.

A well designed home should be suited to its climate and should significantly reduce the need for added artificial heating and cooling, particularly in the highly populated sub-tropical areas of Southeast Queensland. Fundamental passive design strategies are orientation, natural ventilation, shading, insulation and use of appropriate building materials, fixtures and fittings. Integrating these design responses for climate will result in other benefits such as improved daylighting and indoor air quality. These issues are addressed by criteria in this section.

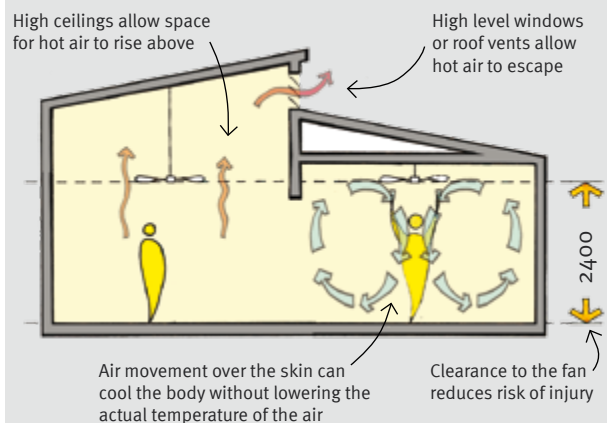
General dwelling design		Essential
Objective 1	People can quickly leave the home in the case of an emergency	
Requirements	For swift evacuation of the home, ensure that: • there is a choice of internal escape paths, such as doors and windows • all security screens that form part of an escape path can be opened from the inside, without a key • all window locks are keyed alike • all door locks are keyed alike • doors have lever handles.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

General dwelling design

Essential

Objective 2	Potential for safe and efficient active cooling within the home is maximised	
Requirements	Ceilings are high enough (recommended 2700mm for flat ceilings): • to encourage high level ventilation of rising hot air • for all living areas, bedrooms, kitchen and rooms with ceiling fans to have clearance of at least 2400mm to the underside of the fan blade from the floor.	
Sustainability goals	Environmental	Energy
	Social	Safety Human health
	Economic	Running costs

Diagram—General dwelling design objective 2



General dwelling design

Essential

Objective 3	The risk of a child falling from a window is minimised	
Requirements	Windows with sills less than 1000mm above the floor level have either: • security screens, or • openings less than 125mm, such as louvres. Windows that are likely to have climbable furniture (such as a bed, sofa, or table) beneath or adjacent to it have either: • one of the above two items, or • a sill height at least 1000mm higher than the item of furniture.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

General dwelling design

Essential

Objective 4 **Movement through the home is easy and safe for people of all ages and abilities****Requirements**

Accessible paths (minimum 1200mm width measured to wall linings) service the:

- main living areas
- kitchen
- at least one toilet and bathroom, including the shower
- at least one bedroom
- outdoor rubbish storage
- undercover car parking
- outdoor clothes drying
- outdoor living space
- letter box.

All internal doors:

- are a minimum 870mm wide
- allow a minimum clear opening of 820mm, free of any obstruction such as the thickness of the door leaf and door stops (refer to dwelling access objective 1 page 11 for information on external doors and openings).

Internal and external thresholds:

- are ideally level, or
- have no more than 10mm tripping hazard. If thresholds have a greater variation than 10mm they are:
 - clearly visible by the use of contrasting colours
 - protected by non-slip edging.

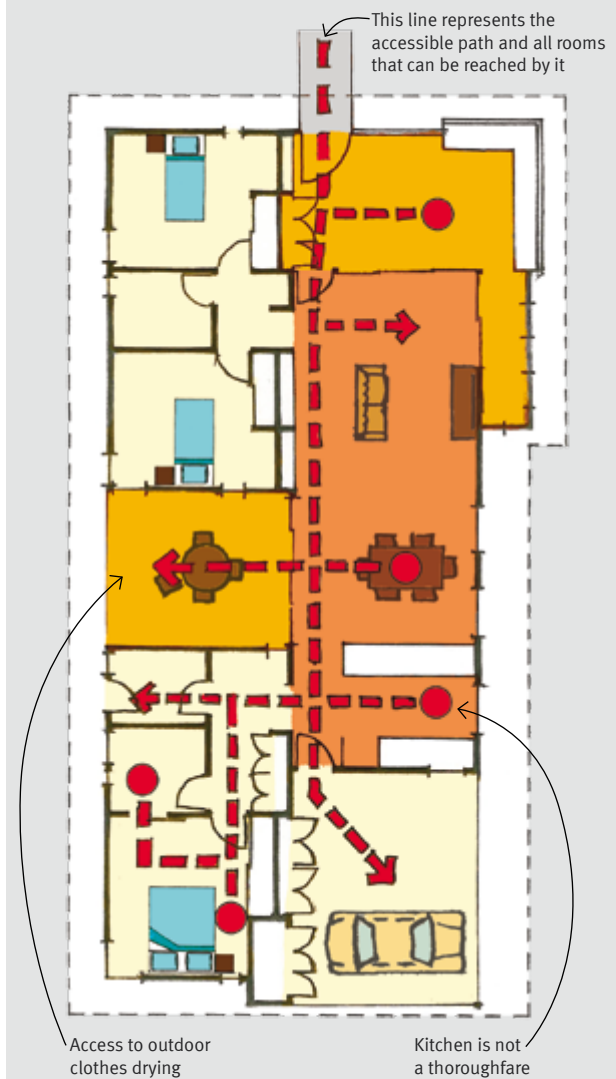
Sliding door thresholds:

- should not exceed 1:8 gradient
- are to be a low profile type installed such that the top of the channel is flush with the finished internal floor level (for external sliding doors).

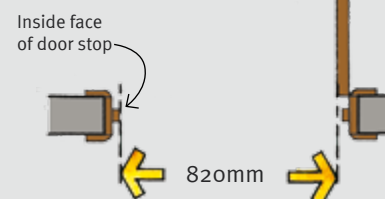
Sustainability goals

● Environmental	-
● Social	Safety Universal design
● Economic	Future modifications

Diagram—General dwelling design objective 4

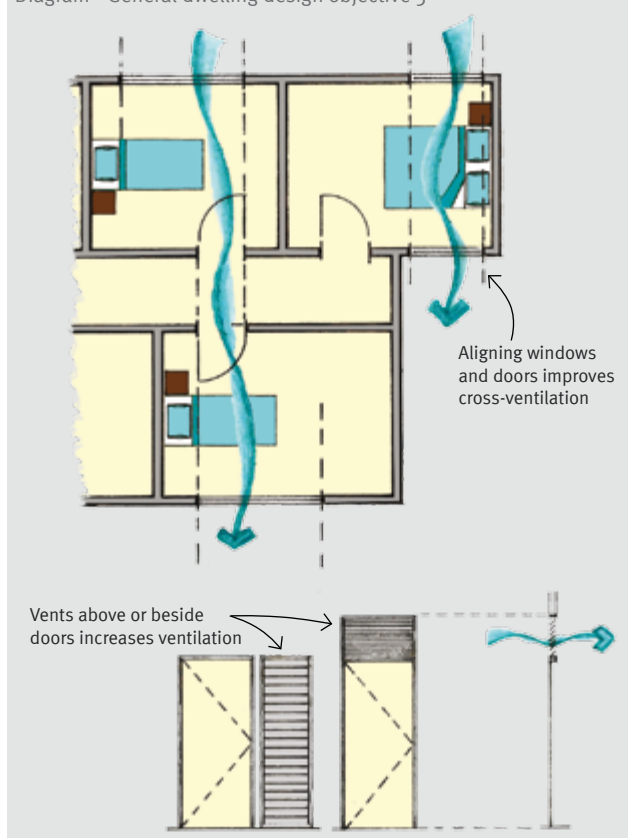


Clear opening of a door is from the inside of the door leaf to the inside face of the opposite door stop.



General dwelling design		Essential
Objective 5	Provide maximum potential for natural ventilation to minimise the need for artificial cooling	
Requirements	• All living rooms and bedrooms have a minimum of two openings (windows or doors) to the outside of the dwelling, or where this is not possible: - louvres on internal doors to allow ventilation between rooms, and/or - ventilated panels (fanlights) placed above selected door openings. • Windows and doors are aligned to encourage maximum ventilation through the home. • Windows and doors are fitted with insect screens to provide protection from insects while still allowing breezes. • Door catches are fitted on all internal doors to allow them to remain open. • Latches are located for ease of reach (i.e. 900mm–1100mm above floor level).	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running costs

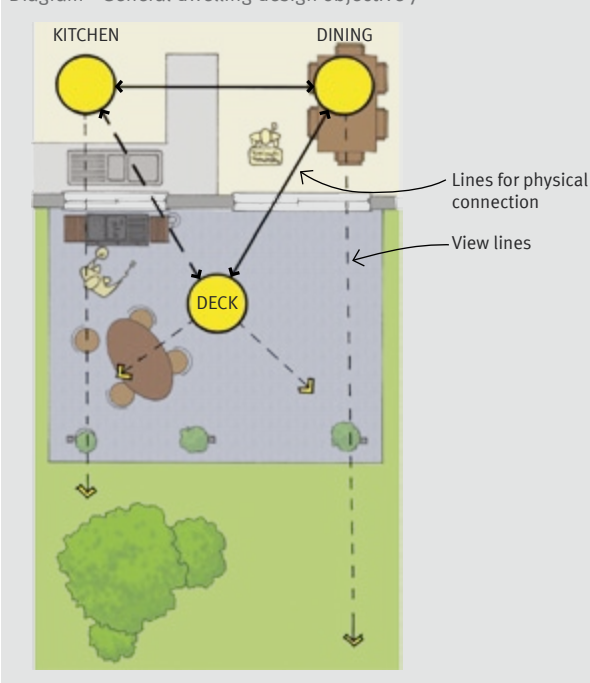
Diagram—General dwelling design objective 5



General dwelling design		Essential
Objective 6	The risk of injuries on stairs is reduced	
Requirements	The stairway is well-lit by natural and artificial light, and does not create shadows or glare. Short flights of stairs are provided or long flights (such as over a full storey) are divided into shorter sections by providing landings. The stairs: • do not have open risers (on internal stairs only) • are straight (are not spiral, have no winders, tapered or curved treads) and are built in accordance with the Building Code of Australia • have a reduced-slip surface • have a contrasting, non-slip nosing to each tread • have clear approach spaces of 1200mmx1200mm at the top and bottom of the stairs. Lights are: • positioned to eliminate shadows from the entire stairway • controlled by two-way switches at the top and the bottom of the stairs. Handrails are positioned on both sides of the stairs to assist people with visual and physical impairment to safely locate and use the stairs. The handrails: • have a smooth surface • run continuously along the full length of the staircase and around intermediate landings • continue 300mm beyond the top riser • continue one tread width past the bottom step and then extend a further 300mm horizontally where there is a continuous wall (the hand rail should not extend into open circulation space).	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	-

General dwelling design		Essential
Objective 7	The dwelling facilitates indoor and outdoor living	
Requirements	There is both a direct visual and physical relationship via an accessible path, between the internal and external living areas and play areas.	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	-

Diagram—General dwelling design objective 7



General dwelling design		Essential
Objective 8	Balconies are designed to be safe for children	
Requirements	Balconies are designed: • in accordance with the Building Code of Australia's 'non-climbable' balustrade requirements to prevent small children being able to climb over them • not allow loose objects to fall through • not allow heavy objects (such as pot plants) to be placed on them in case they fall.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

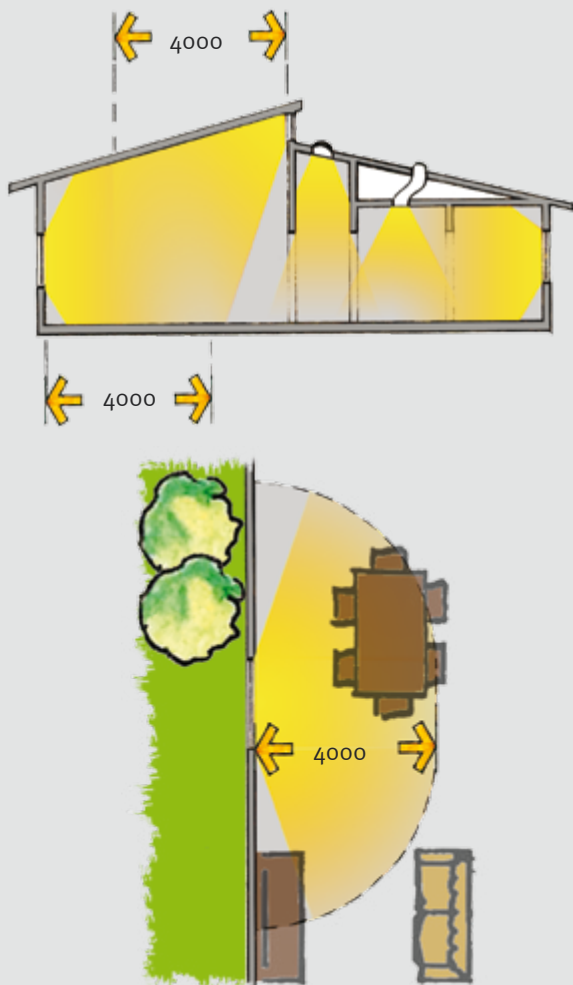
General dwelling design		Essential
Objective 9	There is adequate storage space	
Requirements	Storage is provided in each bedroom, kitchen, bathroom and laundry and features: • a broom cupboard, which may be included in one of the above rooms • height adjustable shelving located out of corners for ease of access • cupboard hinges which swing 170° • adequate lighting. The laundry and kitchen are both fitted with a minimum of one lockable cabinet, inaccessible to children and fitted with magnetic, child-resistant latches, for the safe storage of: • kitchen detergents and cleaning agents • medicines • laundry detergents and cleaning agents.	
Sustainability goals	Environmental	-
	Social	Universal design Safety
	Economic	Future modifications Community costs

General dwelling design		Essential
Objective 10	Reduce energy consumption for drying clothes	
Requirements	The dwelling has external clothes drying areas or an area with a fixed clothesline that: • receives sunlight (direct or filtered) for a period of the day throughout the year • is open to breezes. Consider installing a drying cupboard that uses the excess of a constant source of heat, such as a refrigerator or a hot water tank.	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs



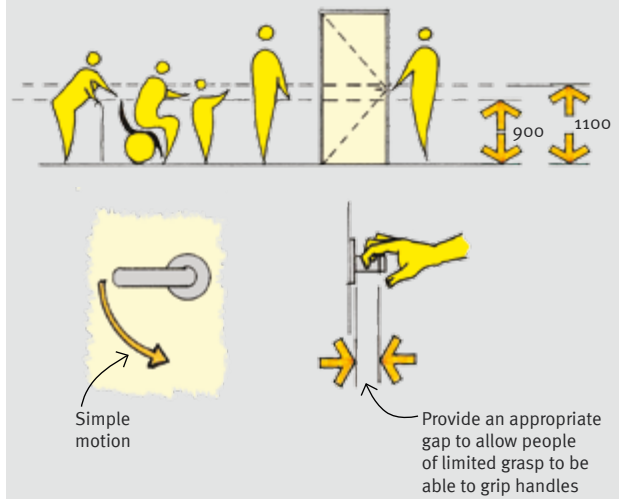
General dwelling design		Essential
Objective 11	Maximise natural daylight to minimise the need for artificial lighting	
Requirements	- No point within the house should be further than 4m away from a source of daylight, which is provided without solar glare issues; typically this would be a window, but skylights, light tubes or clerestory windows could be used in deeper areas of a dwelling, and multi-storey voids including stair wells. - Daylight is best delivered to a space from more than one direction.	
Sustainability goals	Environmental	Energy
	Social	Safety
	Economic	Running costs

Diagram—General dwelling design objective 11



General dwelling design		Essential
Objective 12	People of all ages and abilities can easily and safely open and close doors, cupboards and drawers	
Requirements	- All internal swing doors have lever door handles affixed between 900mm and 1100mm above the finished floor level. - D-shape or bow-shape handles are fitted to all drawers and cupboard doors. - All drawers are on runners and fitted with stops.	
Sustainability goals	Environmental	-
	Social	Universal design Safety
	Economic	Future modifications

Diagram—General dwelling design objective 12



General dwelling design		Essential
Objective 13	Injury from sharp corners is minimised	
Requirements	Exposed edges of all benches (for example, in the kitchen, bathroom and laundry) are rounded or truncated.	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	-

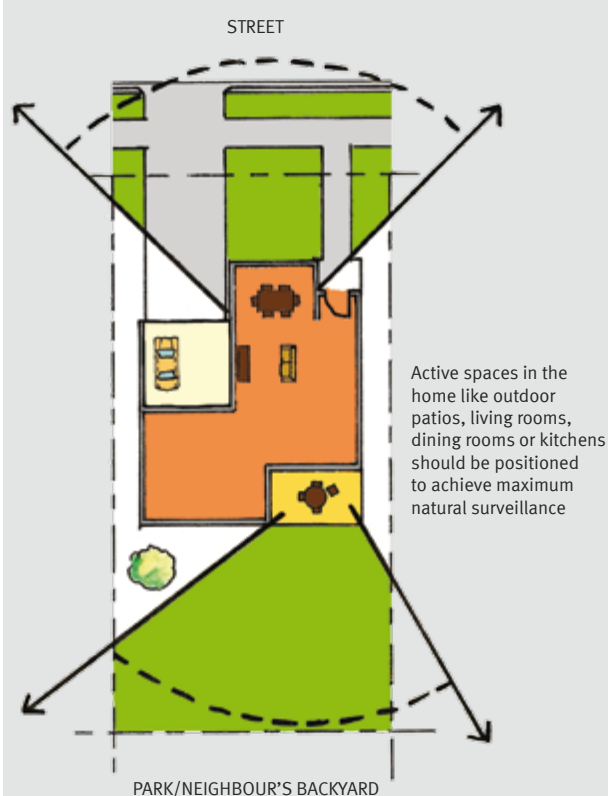


General dwelling design		Essential
Objective 14	The dwelling design provides a comfortable internal environment to reduce the need for artificial heating and cooling	
Requirements	Minimum 5 star energy rated house can be achieved either through 'deemed to satisfy' (DTS) provisions or by using approved software packages. AccuRate, BERSPro and FirstRates are approved 2nd generation software products suitable for providing a house's energy rating for Queensland's climate. Note: BCA energy efficiency requirements are also applied, where practical, to house extensions that require a building development application.	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running cost

General dwelling design		Desirable
Objective 15	The structural integrity of the home is maintained	
Requirements	The design of the home facilitates longevity and low maintenance through considerations such as: - external garden taps either located away from the footings of the home or have hard-paved, well-drained areas built underneath - rainwater box gutters are avoided or designed appropriately when they are necessary - rainwater gutters are protected from leaf litter - site drainage systems (e.g. for cut and fill sites) are well designed to minimise erosion and sediment - gardens are kept away from external walls - retaining walls do not impede natural run-off - house designed to allow appropriate distance from retained trees i.e. to avoid root damage or damage from falling branches.	
Sustainability goals	Environmental	-
	Social	Safety Human comfort Human health
	Economic	Maintenance costs

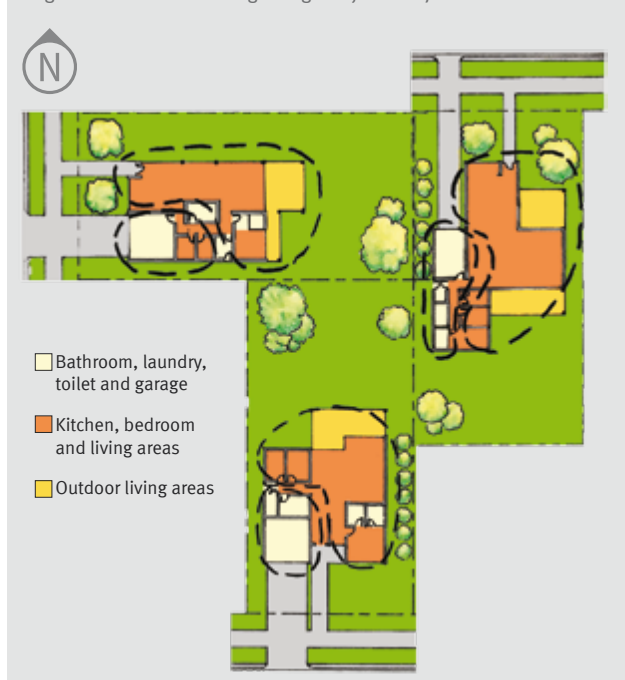
General dwelling design		Desirable
Objective 16	Casual surveillance of the street and other adjoining public land is encouraged	
Requirements	There is a clear line of sight from the kitchen and or living areas to the street and/ or public land adjoining the property.	
Sustainability goals	Environmental	-
	Social	Sense of community Security Safety
	Economic	-

Diagram—General dwelling design objective 16



General dwelling design		Desirable
Objective 17	Zoning for passive design	
Requirements	Where possible, living rooms, kitchen and bedrooms are positioned to the north and east, and bathrooms, laundry, and garage are positioned to the south and west.	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running costs

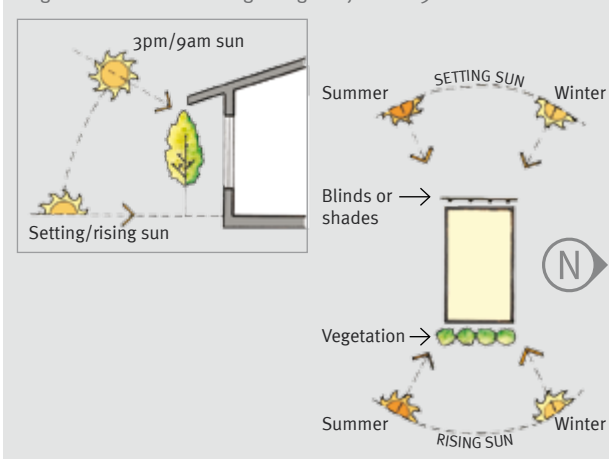
Diagram—General dwelling design objective 17



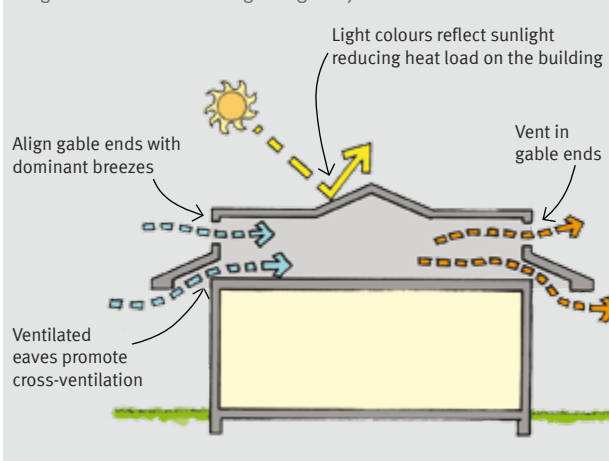
General dwelling design		Desirable
Objective 18	Roof design aids in controlling heat flow into dwelling reducing the need for artificial cooling	
Requirements	The dwelling should have: - a light-coloured roof to deflect heat from entering the home - roof-ridge vents, eave (slot) vents and vents fitted to soffits and gable ends of the roof to allow a cross flow of air through the roof cavity.	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running cost

General dwelling design		Desirable
Objective 19	Shading and window treatment for prevention of unwanted heat gain and reduction of glare	
Requirements	- Shading is provided to windows and glazed doors to prevent the direct incidence of low angled solar radiation into living spaces. This could be in the form of vegetation, fixed or adjustable shading or blinds. - Windows that have most sun exposure, especially those on the northern and western aspects, have treated glazing, such as tints or 'low-e' glass. Refer to sunpath diagrams on www.smarthousing.qld.gov.au	
Sustainability goals	Environmental	Energy
	Social	Human comfort
	Economic	Running costs

Diagram—General dwelling design objective 19



Diagram—General dwelling design objective 18



3.4 Building materials and finishes

This section covers issues relating to building materials, their potential wastage and their effects on the quality of the indoor environment of the dwelling. It is important not to oversize a house as this will lead to excessive material use in construction, but more importantly will lead to excessive energy consumption for the heating, cooling and lighting of the house over its life.

There are a number of strategies that can be used to minimise material waste from the construction process, including the use of standard sized materials and elements, modular design, prefabrication, and the implementation of a waste management plan. Waste reduction during the occupation of the home through recycling should be facilitated by the dwelling design.

Many modern building materials contain chemicals (often called Volatile Organic Compounds or VOCs) that are harmful to human health. In many cases these chemicals can be released into the environment once the materials are in place within the building. A key strategy for creating a high quality indoor environment is to minimise the materials used that create indoor air pollutants. Paints and stains, glues and adhesives, composite timber products, and flooring products such as carpets are all prime sources of chemical emissions in the home. An additional strategy is to provide a well ventilated home to promote fresh air.

Designing and detailing a dwelling for longevity and low maintenance requirements is another key strategy for reducing material usage and wastage over the life of the dwelling.

Building materials and finishes		Essential
Objective 1	Achieving an optimally sized dwelling for the owner to minimise material usage and waste	
Requirements	A smaller, well-designed home meets the needs of the owners and occupiers throughout all stages of their life. Consider: • number of bedrooms needed • dual and triple-purpose rooms • undercover outdoor primary living spaces that are a natural part of the home design.	
Sustainability goals	Environmental	Materials and waste Energy
	Social	Universal design
	Economic	Initial costs Running costs

Building materials and finishes		Essential
Objective 2	On-site construction waste is minimised	
Requirements	The owner, builder and designer work together to: • design the home using standard material and product sizes • re-use existing building materials and recycled products • develop and implement a waste management plan (approved by the local council or relevant authority).	
Sustainability goals	Environmental	Materials and waste
	Social	-
	Economic	Community costs

Building materials and finishes		Essential
Objective 3	Use of safe insulation material	
Requirements	Insulation material is non-toxic and does not create indoor air pollutants in the dwelling.	
Sustainability goals	Environmental	Materials and waste
	Social	Human health
	Economic	-

Building materials and finishes		Essential
Objective 4	The impact of construction materials over their whole life cycle is considered	
Requirements	Construction materials and products are selected based on balancing the following environmental criteria: • ability to be recycled • sustainable sources • low embodied energy (the energy used in their manufacture and transport) • low pollution from manufacturing • low transport costs • minimal environmental impact • durability and minimal maintenance • non-hazardous • locally available • eco-labelling or certification.	
Sustainability goals	Environmental	Materials and waste Energy
	Social	Human health
	Economic	Community costs



Building materials and finishes		Essential
Objective 5	Household waste is reduced	
Requirements	Facility for easy recycling of household waste is provided in a central location within the dwelling. This could include separate containers for organic waste, recyclable waste and non-recyclable waste with fitted lid to prevent pest and vermin access.	
Sustainability goals	Environmental	Materials and waste
	Social	-
	Economic	Community costs

Building materials and finishes		Essential
Objective 6	The risk of rapidly spreading fire, and toxic gas release during a fire, is reduced	
Requirements	Use non-combustible and low formaldehyde content materials within the dwelling (e.g. E1 or Eo rated MDF, plywood and particleboard, if these products are used) and use low VOC paints.	
Sustainability goals	Environmental	Materials and waste
	Social	Safety Human health
	Economic	Community costs

Building materials and finishes		Essential
Objective 7	Finishing products contribute to good indoor air quality	
Requirements	Allow for good ventilation both during construction and after occupancy. Select finishing materials that: • have been pre-dried • are quick drying • use water as the solvent, and/or • are classed as zero or low VOC (volatile organic compound).	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	-

Building materials and finishes		Essential
Objective 8	Composite timber products contribute to good indoor air quality	
Requirements	• Composite timber products used within the dwelling are rated at a minimum of E1—this includes MDF and particle board. • Plywood used within the dwelling has 'A' bond glues (low VOC's).	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	Initial costs

Building materials and finishes		Desirable
Objective 9	Flooring products contribute to good indoor air quality	
Requirements	Utilise the following flooring products: • linoleum or cork glued with natural rubber latex • sisal, coir or jute flooring • hard finished flooring such as ceramic tiles • timber finished with plant based hard oils or waxes • jute or recycled textile underlay.	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	-

Building materials and finishes		Desirable
Objective 10	Flooring products are safe and durable	
Requirements	Ensure the flooring is: • slip resistant and non-reflective • hard-wearing and easy to clean.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	Maintenance costs



3.5 Plumbing and drainage

This section covers issues relating to plumbing and drainage systems that are not specific to any one space within the dwelling. For example water efficient appliances are covered here as they occur in laundry, kitchen and bathrooms, but toilet accessibility is covered under bathrooms, as toilets only occur in those rooms or separately.

Water is emerging to be as big an issue or perhaps even bigger than greenhouse gas emissions in the Australian context (not withstanding that the two may be part of the same issue). The reduction in consumption of mains supplied water in the household is a critical goal of sustainable housing in Queensland. To this end, strategies such as rainwater capture and re-use, grey water systems, water efficient appliances, and composting toilets are all considered in this section.

Household reductions in consumption of municipal water and reductions in inputs to sewage and stormwater systems will, in turn, ease the stress on community infrastructure potentially saving millions of dollars of public funding by delaying or eliminating the need for new infrastructure.

Water usage also affects energy consumption through the supply of hot water. The efficiency of the hot water system and supply to points of use is a source of major reductions in household energy consumption.

Plumbing and drainage		Essential
Objective 1	The hot water system is energy efficient	
Requirements	The hot water system is either a: • solar system (electric gas boosted) or heat pump with a minimum of 24 Renewable Energy Certificates (RECs), or • gas system (instantaneous or storage) with a 5 star AGA energy rating (supply either from reticulated natural gas or bottles LPG).	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs

Plumbing and drainage		Essential
Objective 2	Hot water supply is efficient	
Requirements	• Hot water pipes are insulated. • The hot water system is located as close as possible to the areas where hot water is needed. • Wet areas in the dwelling are grouped close to each other.	
Sustainability goals	Environmental	Energy Water
	Social	-
	Economic	Running costs Community costs

Diagram—Objective 2



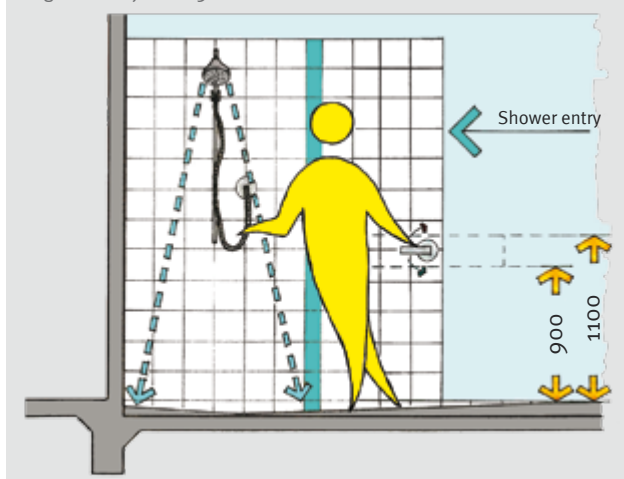
Plumbing and drainage		Essential
Objective 3	Plumbing fittings can be used easily by people of all ages and abilities	
Requirements	All taps are either half-turn lever taps or a lever mixer style.	
Sustainability goals	Environmental	-
	Social	Universal design
	Economic	Future modifications



Plumbing and drainage		Essential
Objective 4	Plumbing fittings efficiently use hot and cold water	
Requirements	- All internal water taps have a minimum 4 star Water Efficiency Labelling and Standards (WELS) rating. - There are separate taps for hot and cold water, or - mixer taps automatically return to the cold water position after being turned off or only provide cold water in the middle position. - Toilets have a certified minimum 4 star WELS rating. - All whitegood appliances (washing machine, dishwasher, etc) are minimum 4 star WELS rated).	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running cost Community costs

Plumbing and drainage		Essential
Objective 5	The risk of scalding is minimised	
Requirements	- Shower taps are located in a convenient location and away from the water outlet. - A tempering device is installed on the hot water system to deliver heated water at a temperature of no more than 50°C.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

Diagram—Objective 5



Plumbing and drainage		Essential
Objective 6	Consumption of mains water supply is reduced	
Requirements	A water tank, to collect rainwater from the roofs of the dwelling, garage and any storage shed, is installed that: - has at least 3,000 litre capacity for small lots and 5,000 litres for larger lots - has a first flush device, mesh strainer and is mosquito proofed - is connected for use in the gardens, all toilets and the cold water outlet in the laundry. The tank will need mains back-up connection through either a trickle or top-up system or an automatic switching device. Note: Check with local government as regulations apply and vary.	
Sustainability goals	Environmental	Water
	Social	-
	Economic	Running costs Community costs

Plumbing and drainage		Desirable
Objective 7	Reduce water usage and waste going to sewer	
Requirements	- Install a grey water storage and reuse system (e.g. water from basins, shower, washing machines) - Consider installing a composting toilet. Note: Check with local government as regulations apply and vary.	
Sustainability goals	Environmental	Water
	Social	-
	Economic	Community costs



Grey water storage and reuse systems help to reduce water usage (Sustainable Home Hervey Bay)

3.6 Electrical, lighting and gas

This section covers energy consumption, safety and universal design issues associated with the delivery, use of electricity, gas and lighting in and around the home. As per the plumbing and drainage section, the strategies covered here relate to systems that are not specific to one area of the home.

A major factor in the energy consumption of a household is the operational efficiency of the appliances and lighting. High efficiency is one of the key strategies required in these Design Objectives.

The source of energy is also a key factor in its sustainability. Natural gas as a source of energy for cooking is a more sustainable solution than electricity supplied from a coal fired power station. Furthermore, the sustainable production of electricity on site, such as by photovoltaic cells, connected to a net billing arrangement with the provider (commonly referred to as 'feed-in' tariff), is an excellent way to reduce household greenhouse gas emissions.

Electrical, lighting and gas		Essential
Objective 1	Maintenance of light fittings can be achieved safely	
Requirements	Where light fittings require access by a stepladder, the ground under the fitting is flat and stable.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

Electrical, lighting and gas		Essential
Objective 2	Electrical appliances are energy efficient	
Requirements	All appliances have a minimum energy performance rating of 4 stars (dishwashers, refrigerators, washing machines, dryers, air conditioners).	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs

Electrical, lighting and gas		Essential
Objective 3	Stoves and ovens are safe to use	
Requirements	- All gas appliances and range hoods have a flue to the outside. - Gas cook top (if used) has an emergency cut-out switch installed. - The wall oven (if fitted) is securely mounted. - An anti-tilt bracket or iron-stove lock is fitted to upright stoves and ovens (ideally the oven could have side opening door and the mid-shelf of oven in line with the bench height).	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

Electrical, lighting and gas		Essential
Objective 4	Electrical layout maximises the safety of using electrical appliances	
Requirements	Install sufficient power points located with regard to likely furniture and appliance arrangements. If the mains power switch(es) is located externally to the home, a padlock is fitted (contact your electricity provider for details of appropriate locks).	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	Future modifications

Electrical, lighting and gas		Essential
Objective 5	Reduce the likelihood of electrical items coming into contact with water	
Requirements	- Install a shelf above the vanity unit, with power points, to hold electrical items such as a hair dryer and electric shaver. - Position a fixed light (or lights) near the vanity mirror to provide adequate illumination for shaving, make-up etc, so that portable lamps are not required.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-



Electrical, lighting and gas		Essential
Objective 6	Occupants can use light and power switches and telephone outlets easily	
Requirements	- Large rocker-type light switches are used throughout the home. - Switches are positioned between 900mm and 1110mm above the finished floor level. - Power points and telephone outlets are positioned at least 600mm from the finished floor level and at least 500mm out from the corners of rooms.	
Sustainability goals	Environmental	-
	Social	Universal design
	Economic	Future modifications

Electrical, lighting and gas		Essential
Objective 7	Artificial lighting, both inside and outside, is energy efficient	
Requirements	The installed lighting is predominantly fluorescent tubes or compact fluorescent lights for ambient lighting.	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs

Electrical, lighting and gas		Desirable
Objective 8	Artificial lighting, both inside and outside, adds to the safety and quality of the home	
Requirements	The installed lighting: - is consistent throughout the home - is sufficient for work surfaces, such as kitchen benches, bathroom vanities and reading positions (e.g. lounges) - enables perception of changes of levels in entrances, paths and steps - is available and has switches in all accessible areas, including hallways and store rooms - is directed or diffused to avoid glare where required.	
Sustainability goals	Environmental	-
	Social	Safety Human comfort
	Economic	-

Electrical, lighting and gas		Desirable
Objective 9	Stoves and ovens are energy efficient	
Requirements	- The cook top uses natural gas (where possible). - The oven is either gas or fan-forced electric.	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs

Electrical, lighting and gas		Desirable
Objective 10	Climate control systems contribute to good indoor air quality	
Requirements	Where climate control systems are installed they are minimally sufficient for their area 'fit for purpose', and are either: - reverse cycle air conditioning; or - natural gas with a flue to the outside of the home	
Sustainability goals	Environmental	Energy
	Social	Human health
	Economic	Running costs

Electrical, lighting and gas		Desirable
Objective 11	Produce electricity on-site by sustainable means	
Requirements	Install a minimum 1kW minimum PV system in a position where it has relatively unobstructed solar access throughout the entire year. Other forms of on-site power production such as wind or micro-hydro would also qualify—consult local government for necessary approvals.	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs



3.7 Kitchen design

The safety and universal design of the kitchen are the key focus of criteria in this section. The kitchen is often described as the hub of the dwelling as there is often a large amount of activity, in and around the kitchen. It is also the space of the dwelling that contains the most potential hazards. The following strategies increase safety in the kitchen: ensure the kitchen is not a thoroughfare, locate ovens and stoves away from cupboard ends, doors and windows and provide adequate bench space.

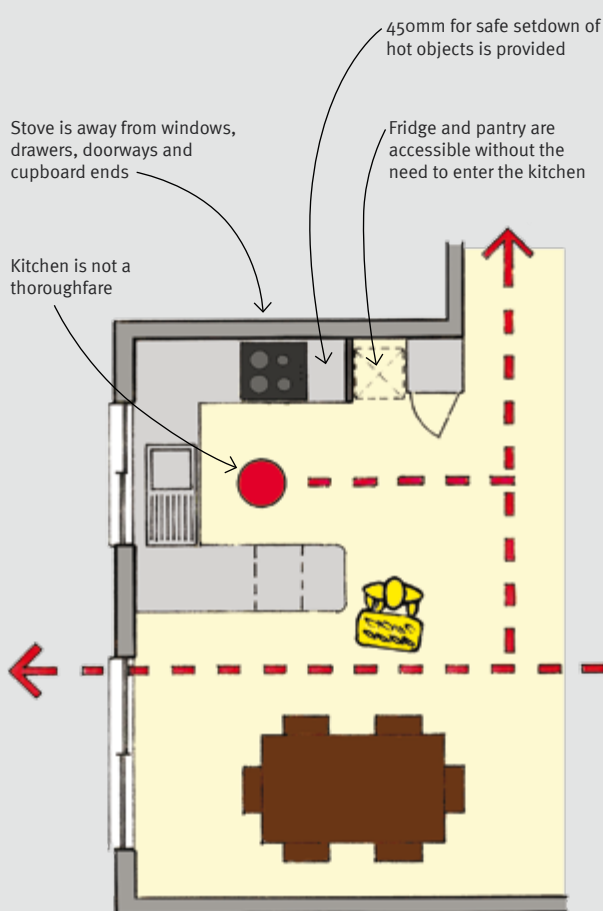
In recognition of the kitchen as the hub of the dwelling it is a useful strategy to provide for such a role through the provision of 'social' space within or in close proximity to the kitchen. However, this space must not interrupt and create hazards within the functional areas of the kitchen.

After hot water systems and air conditioning, the refrigerator consumes the most energy of any appliance in the typical Queensland household. Good ventilation around the refrigeration coils is the key strategy to reducing refrigerator energy consumption.

Kitchen design		Essential
Objective 1	People of all abilities can safely and efficiently use the kitchen	
Requirements	- There is an approach clearance of 1550mm minimum in front of all benches, storage and appliances. - Cupboard internals feature: - height adjustable shelving - a sink bowl depth of ideally no more than 150mm.	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	-

Kitchen design		Essential
Objective 2	Injuries in the working area of the kitchen are minimised	
Requirements	The kitchen's design ensures that: - it does not double as primary thoroughfare - the location of ovens and stove tops is away from cupboard ends, drawers, doorways and windows. To allow safe handling of hot and heavy items, kitchen bench tops: - are heat resistant and continuous - have set-down spaces of a minimum of 450mm width beside the oven/cook top, microwave oven and sink.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

Diagram—Objective 2

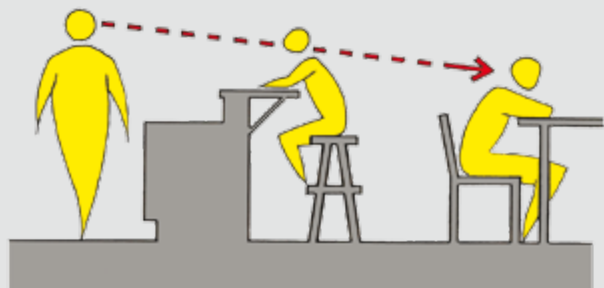


Kitchen design		Desirable
Objective 3	The refrigerator is operated efficiently using minimum energy	
Requirements	The refrigerator should: • have the highest energy star rating • is in a ventilated position, away from sources of heat. The refrigerator cavity has: • a flue to the outside (either through a wall or the ceiling) to allow heat to escape • floor vents.	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs

Kitchen design		Desirable
Objective 4	Social and family activities may occur safely in close proximity to the functional areas of the kitchen	
Requirements	Provision is made for social and family activities (such as homework, casual dining or entertaining guests) to occur within close visual and hearing proximity of the kitchen. This may be via: • a breakfast bench type arrangement • an adjoining dining room.	
Sustainability goals	Environmental	-
	Social	Sense of community
	Economic	-

Diagram—Objective 4

Members of the family or guests can interact during cooking activities without being in the kitchen.



Kitchen design		Desirable
Objective 5	Stoves and ovens are positioned to maximise energy efficiency	
Requirements	• Stoves have a flue to the exterior of the dwelling (not to the ceiling space). • Stoves and ovens are located away from draughts.	
Sustainability goals	Environmental	Energy
	Social	-
	Economic	Running costs



Ensure the kitchen is not a thoroughfare, carefully plan the location of the stove and provide adequate bench space (Research House)

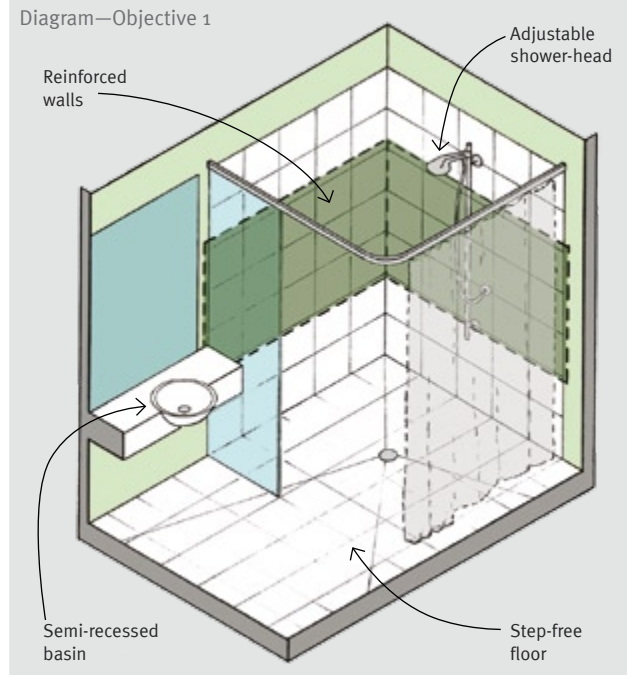


3.8 Bathroom/toilet design

The key issue covered in this section is the safety and universal design of bathrooms and toilets to ensure persons of all abilities, be they homeowners or visitors, can use the facilities adequately. In addition the issue of humidity in bathrooms is addressed. Mould and bacteria growth due to prolonged levels of high humidity is a major cause of allergic reactions. The main strategy to reduce this problem is good ventilation of potentially affected spaces.

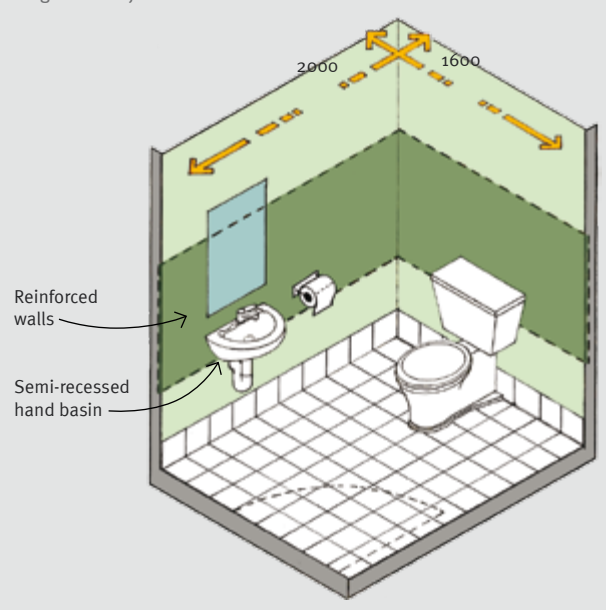
Bathroom/toilet design		Essential
Objective 1	A bathroom can be used by a diverse range of people	
Requirements	There is at least one bathroom that: • can be reached via an accessible path • has a vanity that is either semi-recessed, wall-hung, or a pedestal type (not a drop-in type) • has a step-free shower (without a hob) with an adjustable shower head height • has walls around the shower that are reinforced with 12mm plywood (for potential future installation of grab rails).	
Sustainability goals	Environmental	-
	Social	Universal design
	Economic	Future modifications

Diagram—Objective 1



Bathroom/toilet design		Essential
Objective 2	A toilet can be used by people of all abilities	
Requirements	There is at least one toilet that: • can be reached via an accessible path • has a semi-recessed hand basin • has minimum floor dimensions of 1600mm width and 2000mm length • has two adjacent walls reinforced with 12mm plywood (for potential future installation of grab rails). Note: this toilet area can be incorporated into the accessible bathroom above.	
Sustainability goals	Environmental	-
	Social	Universal design
	Economic	Future modifications

Diagram—Objective 2



Bathroom/toilet design		Essential
Objective 3	The growth of mould and bacteria is inhibited by good ventilation	
Requirements	• There is at least one opening window in each bathroom. • There is an extraction fan in each bathroom and toilet.	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	Maintenance costs

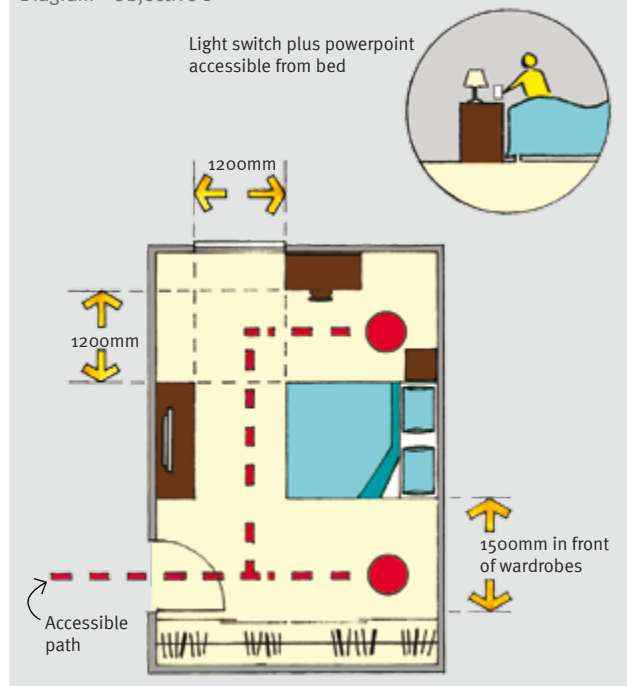


3.9 Bedroom design

The key issue covered in this section is the universal design of at least one bedroom in the home to ensure persons of all abilities can use the dwelling adequately.

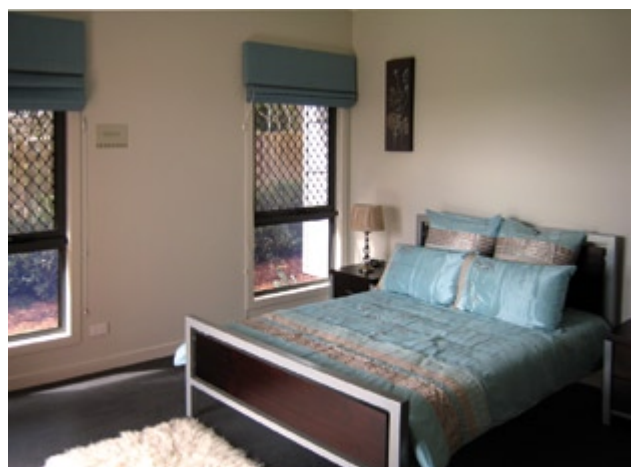
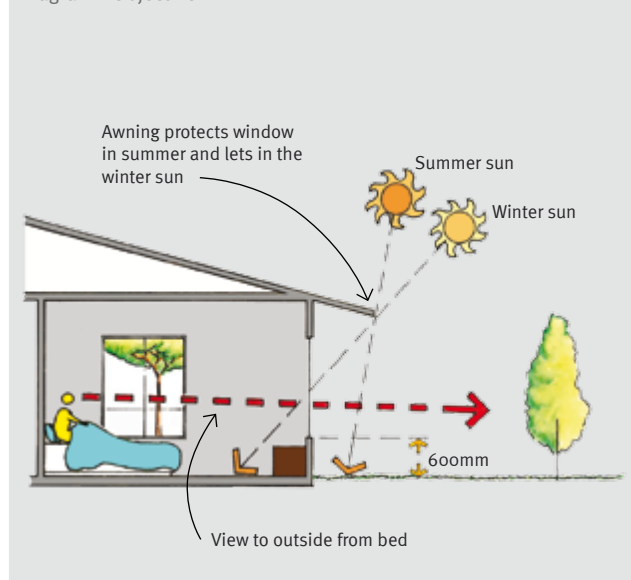
Bedroom design		Essential
Objective 1	The bedrooms can be used by a diverse range of people	
Requirements	There is at least one bedroom that: • can be reached via an accessible path • can accommodate a 1500mm x 2000mm bed • has 1200mm clearance on both sides of the bed • has 1500mm clearance on the third side (usually includes clearance in front of wardrobe) • 1500mm clearance in front of the wardrobe wherever it is located • has at least one light switch for ambient lighting and one power point that can be easily reached from the bed • has a telephone point near a powerpoint suitable for cordless phone connection.	
Sustainability goals	Environmental	-
	Social	Universal design Human comfort
	Economic	Future modifications

Diagram—Objective 1



Bedroom design		Essential
Objective 2	Good visibility to the outside from the bed	
Requirements	• A window is installed in each bedroom, no higher than 600mm from the floor measured from the sill, which allows visual connection to the outside from the bed. • Windows are provided with appropriate shading for the sill height.	
Sustainability goals	Environmental	-
	Social	Universal design Human comfort
	Economic	Future modifications

Diagram—Objective 2



An accessible bedroom features adequate space around the bed and a light and phone within reach from the bed (Sustainable Home Toowoomba)

3.10 Laundry design

The key issue covered in this section is the safety and universal design of the laundry to ensure persons of all abilities can use the space adequately.

Laundry design		Essential
Objective 1	The laundry can be used by a diverse range of people	
Requirements	The laundry: • can be reached via an accessible path • has an accessible outdoor clothes line • has an approach clearance of 1550mm minimum in front of all benches, storage and appliances • taps located for ease of access (e.g. on side wall).	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	Future modifications



Adequate room in front of benches, storage and appliances makes the laundry safer to use (Sustainable Home Hervey Bay)



3.11 Outdoor living area design

Queenslanders spend a lot of their time outside the home and this is to be encouraged, however making the outdoor living spaces safe for users, especially children, is key to their success as useful living spaces.

Providing protection from the sun is a critical undertaking for all users. Play areas for children must be secure and must be free from hazards such as poisonous plants and unsafe water features.

Outdoor living area design		Essential
Objective 1	Sun protection is provided for outdoor areas	
Requirements	- Designated children's play areas, and outdoor entertainment areas, are covered with effective sunshade structures. - Swimming pools (if installed) have at least 50% sunshade provision. - Houses have at least 12m² of covered outdoor living space. - Units have at least 10m² of covered outdoor living space.	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	-

Outdoor living area design		Essential
Objective 2	Outdoor areas are secure for children's play activities	
Requirements	- Play areas are separated from driveways by self-locking gates or other barrier. - A non-climbable fenced area, suitable for small children, has a lockable, self-latching and self-closing gate. - All domestic pools and spas have lockable, self-latching and self-closing gates as well as legally compliant pool fencing. - Outdoor play areas (including pools) can easily be seen from the main indoor and outdoor living areas.	
Sustainability goals	Environmental	-
	Social	Security Safety
	Economic	-

Outdoor living area design		Essential
Objective 3	Outdoor areas are safe for children's play activities	
Requirements	There are no plants in the garden that: - are poisonous or allergenic - have thorns or spikes. All water features, drains and gully traps are: - secured against access by small children - maintained to prevent mosquito breeding.	
Sustainability goals	Environmental	-
	Social	Safety Human health
	Economic	-



3.12 Garage and shed design

The garage forms a key part of the accessible design of the dwelling. For those with limited mobility, travel by car may be the only feasible option. Hence access to and from the dwelling and garage is of particular importance. The internal dimensions of a garage or carport must take into consideration the additional access requirements.

Garages and sheds are places where potentially dangerous equipment and chemicals are kept. Providing secure storage for such items is a key safety consideration for the dwelling.

Garages are also a major source of indoor air pollutants for the home. Car fumes can easily infiltrate the living areas of the dwelling. To reduce this problem, the garage should be divided from the living space.

Ideally, garages should be located on the western side of the house to reduce the heat load from the summer sun.

Garage and shed design		Essential
Objective 1	The garage can be used by a diverse range of people	
Requirements	The garage/carport is easily accessed from the dwelling along an accessible path (the accessible path is covered, but does not have to be enclosed). For a single carport or garage the minimum width of the space is 3.8m.	
Sustainability goals	Environmental	-
	Social	Safety Universal design
	Economic	Future modifications

Garage and shed design		Essential
Objective 2	Exposure to car fumes is minimised	
Requirements	Car accommodation: • is sealed or divided from the living spaces of the home • has good potential for natural ventilation.	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	-

Garage and shed design		Essential
Objective 3	Minimise the risk of injuries with outdoor tools and outdoor chemicals	
Requirements	A lockable place is provided, inaccessible to children and intruders, where gardening equipment, power tools, mower fuels, motor oils, chemicals, paints, garden fertilisers, pesticides and other poisons can be stored, which is also: • naturally ventilated • away from the main living areas of the home.	
Sustainability goals	Environmental	-
	Social	Safety
	Economic	-

Garage and shed design		Desirable
Objective 4	Garage designed for multiple use	
Requirements	Garage space designed and finished to encourage multiple use (i.e. can be opened up to use as entertainment area).	
Sustainability goals	Environmental	-
	Social	Human health
	Economic	-



4 Regulatory requirements

Currently in Queensland a range of basic regulatory requirements apply to housing to promote sustainability in new housing, renovations and at point-of-sale for existing homes.

Under the Building Code of Australia, new housing (Class 1 buildings) in Queensland are required to achieve a minimum 3.5 star energy efficient equivalent rating on the building envelope (i.e. roof, walls and floors). Compliance with this standard can be achieved either through 'deemed to satisfy' (DTS) provisions or by using approved software packages. AccuRate, BERSPro and FirstRate5 are approved 2nd generation software products more suitable for providing a house's energy rating for Queensland's climate.

The Queensland Government is considering raising this requirement to 5 stars in the near future.

The following table presents an overview of the Queensland's 'Sustainable Living' requirements and how they apply to different housing types.

Measure	New houses, townhouses, terrace houses	New units	Major renovations
Dual-flush toilets	✓	✓	✓
AAA-rated showerheads	✓	✓	✓
Energy efficient lighting	✓	✓	
Greenhouse-efficient hot water systems	✓		
Water pressure-limiting devices	✓		

A dual-flush toilet is defined as a 3 star cistern (6/3 litre system). AAA-rated shower roses are now the equivalent of 3 star WELS rated (9 litres/minute). Energy efficient lighting is 40% of floor area (outlets), including the garage area.

Fluorescent lights (tubes) or compact fluorescent lights (CFL's) are currently the only acceptable solution for energy efficient lighting.

An energy efficient hot water system can be either solar, gas or heat pump. If mains water pressure exceeds or could exceed 500kPa, a water pressure limiting device is required to be installed so that the maximum operating pressure within the property does not exceed 500kPa (subject to confirmation with council).

New homes in Queensland are required to comply with Water Savings Targets (except in areas where the council has been granted an exemption).

For most new homes this will mean the inclusion of a rainwater tank. For detached houses to achieve the water savings target of 70kL per year, they will need to install a minimum 5000 litre tank. For non-detached houses, such as terrace houses and townhouses, to achieve water savings of 42kL per year, they will need to install a minimum 3000 litre tank. Tanks must also be mosquito proofed.

At point-of-sale for existing homes, smoke alarms and an electrical safety switch are required as mandatory safety items.

If a pool is on the property, it must be fenced and maintained in accordance with the requirements at the time of approval.

All hot water systems installed, including replacement systems, are required to have a tempering device installed (to minimise scalding from hot water).

Check regulations as these may change.



5 Rebates and financial incentives

A number of rebate schemes have been set up to help with the cost of 'greening' specific areas of the home. Availability may vary across local governments. For more information refer to the rebate programs listed below.

Home and Garden WaterWise Rebate Schemes

Queensland-wide. Check with your local council for water rebates.

🖱 www.nrw.qld.gov.au/water/saverscheme/rebate_schemes

☎ 1800 243 585

Solar Hot Water Rebate Program

For replacing electric hot water systems.

🖱 www.greenhouse.gov.au/solarhotwater

☎ 1800 808 571

Renewable Energy Certificates (RECs)

Available usually at point-of-sale for both solar and heat pump hot water systems.

🖱 www.orer.gov.au/recs

☎ 02 6274 2192

Residential Gas Installation Rebate Scheme

For replacing electric hot water systems.

🖱 www.dme.qld.gov.au/energy/gas_rebate.cfm

☎ 07 3247 3254

Solar Homes and Communities Plan

For the installation of solar photovoltaic systems on homes and community use buildings.

🖱 www.greenhouse.gov.au/renewable/pv

☎ 1300 138 122

Some leading financial institutions are beginning to recognise the benefits of sustainable building and offer a range of 'green home loans' as well as 'green product loans' including:

- **Bendigo Bank**
(www.bendigobank.com.au or call 1300 366 666)
- **mecu**
(www.mecu.com.au or call 13 2888)
- **Maleny Credit Union**
(www.malenycu.com.au or call 07 5494 2144)
- **Westpac**
(www.westpac.com.au or call 13 1900).



Smart and Sustainable Homes Design Objectives Checklist

Smart and Sustainable Homes demonstrate good practice in designing, planning and building homes to make them more socially, environmentally and economically sustainable.

This checklist is a summary of the principles and objectives that are detailed in the Smart and Sustainable Homes Design Objectives (Design Objectives) – refer to this document for the requirements to achieve each criterion. If the majority of the items below are met, the home will be more likely to meet the changing needs of the occupants, as well as

make it a more liveable, safe, secure, cost-efficient and environmentally friendly dwelling in which to live.

A minimum of 80% of the Essential criteria need to be met to achieve the requirements of the Design Objectives, as well as a minimum of 20% of the Desirable criteria. There is also scope to provide an alternative to the requirements outlined in the Design Objectives. If an alternative solution is provided, tick the 'Alternative' box, and provide a brief summary at the end of the checklist.

Project Name /Address

Date of Assessment

Name of person completing checklist:

Relationship to home (e.g. owner, builder, architect)

Essential criteria

Essential criteria		Environment				Social					Economic							
		Energy	Water	Materials and waste	Site impact	Human comfort	Human health	Safety	Security	Universal design	Sense of community	Initial costs	Maintenance costs	Running costs	Future Modifications	Community costs	Achieved	Alternative
Criteria	Objective																	
Site and landscape	Relates to site selection, landscaping, planting and pest protection																	
Objective 1	Site conditions are assessed for a passively designed home to be constructed	•					•						•					
Objective 2	The loss of biodiversity is minimised				•													
Objective 3	The design of the home, and landscaping, uses land efficiently						•					•						
Objective 4	Soil degradation (and need for fertilisers), sediment run off and storm water runoff has been reduced				•		•									•		
Objective 5	The home does not significantly reduce privacy or daylight to adjacent dwellings	•									•					•		
Objective 6	Landscaping reduces need for water, chemical and energy inputs	•	•		•		•						•					
Objective 7	Creating a secure home and neighbourhood								•		•					•		
Objective 8	Consider all natural hazards				•			•								•		
Dwelling access	Access by owners, visitors, emergency services and prevention of uninvited access																	
Objective 1	Access to the main entry of the home from the street is easy for all occupants and visitors							•		•					•			
Objective 2	The risk of children being run over by vehicles is minimised							•								•		
Objective 3	The property and its entry point are easily identified							•	•									
Objective 4	Emergency Services can easily find a dwelling when required							•	•									
Objective 5	The home is secured from illegal entry								•				•			•		
Objective 6	Visitors outside the home can be clearly identified								•									



Essential criteria (continued)

Essential criteria (continued)		Environment				Social				Economic								
Criteria	Objective	Energy	Water	Materials and waste	Site impact	Human comfort	Human health	Safety	Security	Universal design	Sense of community	Initial costs	Maintenance costs	Running costs	Future Modifications	Community costs	Achieved	Alternative
General dwelling design	Relates to overall design, safety, access, storage, passive design, etc																	
Objective 1	People can quickly leave the home in the case of an emergency							•										
Objective 2	Potential for safe and efficient active cooling within the home is maximised	•					•	•						•				
Objective 3	The risk of a child falling from a window is minimised							•										
Objective 4	Movement through the home is easy and safe for people of all ages and abilities							•		•					•			
Objective 5	Provide maximum potential for natural ventilation to minimise the need for artificial cooling	•					•							•				
Objective 6	The risk of injuries on stairs is reduced							•		•								
Objective 7	The dwelling facilitates indoor and outdoor living	•					•											
Objective 8	Balconies are designed to be safe for children							•										
Objective 9	There is adequate storage space							•		•					•	•		
Objective 10	Reduce energy consumption for drying clothes	•												•				
Objective 11	Maximise natural daylight to minimise the need for artificial lighting	•						•						•				
Objective 12	People of all ages and abilities can easily and safely open and close doors, cupboards and drawers							•		•					•			
Objective 13	Injury from sharp corners is minimised							•		•								
Objective 14	The dwelling design provides a comfortable internal environment to reduce the need for artificial heating and cooling	•					•							•				
Building materials and finishes	Relates to building materials, finishes, potential waste and quality of indoor environment																	
Objective 1	Achieving an optimally sized dwelling for the owner to minimise material usage and waste	•		•						•		•		•				
Objective 2	On-site construction waste is minimised			•												•		
Objective 3	Use of safe insulation material			•			•											
Objective 4	The impact of construction materials over their whole life cycle is considered	•		•			•									•		
Objective 5	Household waste is reduced			•												•		
Objective 6	The risk of rapidly spreading fire, and toxic gas release during a fire, is reduced			•			•	•								•		
Objective 7	Finishing products contribute to good indoor air quality						•											
Objective 8	Composite timber products contribute to good indoor air quality						•					•						
Plumbing and drainage	Relates to plumbing, drainage systems and water efficiency for the whole dwelling																	
Objective 1	The hot water system is energy efficient	•												•				
Objective 2	Hot water supply is efficient	•	•											•		•		
Objective 3	Plumbing fittings can be used easily by people of all ages and abilities									•					•			
Objective 4	Plumbing fittings efficiently use hot and cold water	•												•		•		
Objective 5	The risk of scalding is minimised							•										
Objective 6	Consumption of mains water supply is reduced		•											•		•		



Essential criteria (continued)

Essential criteria (continued)		Environment			Social				Economic									
		Energy	Water	Materials and waste	Site impact	Human comfort	Human health	Safety	Security	Universal design	Sense of community	Initial costs	Maintenance costs	Running costs	Future Modifications	Community costs	Achieved	Alternative
Criteria	Objective																	
Electrical, lighting and gas	Relates to energy consumption and safety in the dwelling																	
Objective 1	Maintenance of light fittings can be achieved safely							•						•				
Objective 2	Electrical appliances are energy efficient	•												•				
Objective 3	Stoves and ovens are safe to use							•										
Objective 4	Electrical layout maximises the safety of using electrical appliances							•		•					•			
Objective 5	Reduce the likelihood of electrical items coming into contact with water							•										
Objective 6	Occupants can use light and power switches and telephone outlets easily									•					•			
Objective 7	Artificial lighting, both inside and outside, is energy efficient	•												•				
Kitchen design	Relates to water and energy efficiency and safety and universal design																	
Objective 1	People of all abilities can safely and efficiently use the kitchen							•		•								
Objective 2	Injuries in the working area of the kitchen are minimised							•										
Bathroom / toilet design	Relates to the safety and universal design in the bathroom																	
Objective 1	A bathroom can be used by a diverse range of people									•					•			
Objective 2	A toilet can be used by people of all abilities									•					•			
Objective 3	The growth of mould and bacteria is inhibited by good ventilation						•					•						
Bedroom design	Universal design of at least one bedroom in the dwelling																	
Objective 1	The bedrooms can be used by a diverse range of people																	
Objective 2	Good visibility to the outside from the bed									•					•			
Laundry design	Relates to safety and universal design in the laundry																	
Objective 1	The laundry can be used by a diverse range of people							•		•					•			
Outdoor living area design	Relates to making the outdoor living area safe especially for children																	
Objective 1	Sun protection is provided for outdoor areas						•											
Objective 2	Outdoor areas are secure for children's play activities							•	•									
Objective 3	Outdoor areas are safe for children's play activities						•	•										
Garage and shed design	Relates to access and safety of the garage																	
Objective 1	The garage can be used by a diverse range of people							•		•					•			
Objective 2	Exposure to car fumes is minimised						•											
Objective 3	Minimise the risk of injuries with outdoor tools and outdoor chemicals							•										

Criteria	Alternative



Desirable criteria

Desirable criteria		Environment				Social				Economic								
		Energy	Water	Materials and waste	Site impact	Human comfort	Human health	Safety	Security	Universal design	Sense of community	Initial costs	Maintenance costs	Running costs	Future Modifications	Community costs	Achieved	Alternative
Criteria	Objective																	
Site and landscape	Relates to site selection, landscaping, planting and pest protection																	
Objective 9	Site orientation and dimensions are suitable for a passively designed home	•					•							•				
Objective 10	The site needs minimal change to accommodate the home				•							•						
Objective 11	Landscaping contributes to the passive design of the home	•					•							•				
Objective 12	The choice of site will assist in reducing car usage	•									•					•		
Objective 13	Maintaining privacy for the home								•		•					•		
Objective 14	Termite protection does not pollute soil around the home				•		•						•					
General dwelling design	Relates to overall design, safety, access, storage, passive design, etc																	
Objective 15	The structural integrity of the home is maintained					•	•	•					•					
Objective 16	Casual surveillance of the street and adjoining public land is encouraged							•	•		•							
Objective 17	Zoning for passive design	•					•							•				
Objective 18	Roof design aids in controlling heat flow into dwelling reducing the need for artificial cooling	•					•							•				
Objective 19	Shading and window treatment for prevention of unwanted heat gain and reduction of glare	•				•								•				
Building materials and finishes	Relates to building materials, finishes, potential waste and quality of indoor environment																	
Objective 9	Flooring products contribute to good indoor air quality						•											
Objective 10	Flooring products are safe and durable							•						•				
Plumbing and drainage	Relates to plumbing, drainage systems and water efficiency for the whole dwelling																	
Objective 7	Reduce water usage and waste going to sewer		•													•		
Electrical, lighting and gas	Relates to energy consumption and safety in the dwelling																	
Objective 8	Artificial lighting, both inside and outside, adds to the safety and quality of the home					•		•										
Objective 9	Stoves and ovens are energy efficient	•												•				
Objective 10	Climate control systems contribute to good indoor air quality	•					•							•				
Objective 11	Produce electricity on-site by sustainable means	•												•				
Kitchen design	Relates to water and energy efficiency and safety and universal design																	
Objective 3	Refrigerator is operated efficiently using minimum energy	•												•				
Objective 4	Social and family activities may occur safely in close proximity to the functional areas of the kitchen										•							
Objective 5	Stoves and ovens are positioned to maximise energy efficiency	•												•				
Garage and shed design	Relates to access and safety of the garage																	
Objective 4	Garage designed for multiple use						•											

Criteria	Alternative

