

Surf Coast Sustainable Design Book



Towards sustainable design excellence

OCTOBER 2010



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- Craig Wall, Home Beautiful
- Dianna Snape
- Emma Cross
- Ferne Millen
- Peter Glenane
- Shannon McGrath
- Sharyn Cairns
- Parsons Brinckerhoff
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Editing by Andi Lawson

Graphic Design assistance by Courtney Young

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Let us inspire you to design a home that is beautiful, integrates ecologically sustainable design features, is comfortable to live in all year round, saves you on energy and water bills and fits in with the Surf Coast environment, whether it is on the coast, in town, in the bush or in the rural hinterland

- Libby Coker, Mayor.



Introduction

The **Surf Coast Sustainable Design Book** has been prepared to promote design excellence and ecologically sustainable design across the Shire.

This book is intended to inspire landowners, builders and designers/architects to design homes that are site responsive, environmentally friendly and aesthetically pleasing. It encourages high quality building and landscape design that reflects the environmental and landscape values of the Surf Coast Shire and the lifestyle qualities that have attracted the many permanent residents, holidaymakers and visitors to the area.

Whether you are building in a new subdivision in Torquay or Winchelsea, in an established area in Anglesea, Aireys Inlet or Lorne, on a rural property or on a bush block, this book inspires you to creatively think about:

- **The Surf Coast Environment** – understanding your local environment.
- **Your Site** – understanding your site and identifying opportunities and constraints.
- **Your Design** – designing a sustainable home that responds to your site and the local environment.

The book contains many images that are used to showcase predominantly local examples of well designed, site responsive, sustainable homes or to communicate certain elements of design (e.g. passive solar design, materials, lightweight structures). The book is not a prescriptive set of guidelines and is not intended to replace legislative planning and building controls, but rather seeks to complement these to produce quality outcomes. Its purpose is to stimulate ideas and discussion about how you can achieve sustainable design excellence on your site.



Design Excellence

Surf Coast Shire encourages design excellence, as it understands the importance of high quality built environments to the standard of living and future sustainability of the Shire.

Achieving design excellence is about responding to the distinct characteristics of an area and taking advantage of the site's opportunities. A well designed home provides functional, durable and quality living spaces that make the best use of your site's assets such as views, vegetation and orientation. A well designed property is a valuable asset that will stand the test of time.

Design excellence is not about subjective aesthetic style but rather about creating places with character and environmental considerations. Places where people are proud to live.

Design excellence is about:

- Creating a distinctive character that reflects the architectural style and echoes the unique characteristics of the locality, setting it apart from other areas.
- Design that is influenced by the local environment, landscape, climate, culture and history of the area.
- Buildings that exude individuality, but blend harmoniously into the landscape and enhance the quality of the streetscape.
- Sympathetic architecture and design that support a sense of local pride and identity.



- A. Coastal aesthetic in urban locale
- B. Natural materials in bush setting
- C. Low building profile in rural landscape

Environmentally sustainable design

Sustainability is an intrinsic part of design excellence. We use the earth's resources when we build and live in our home and environmentally sustainable design (ESD) means minimising our impact on the environment through the responsible use of natural resources, energy, water and waste and through the sympathetic siting, size and design of our house.

A sustainable development will contribute to a higher quality of life by making effective use of natural resources and protecting the environment. It will provide you with a home that is comfortable all year round, will increase the value of your home and will save you money on operating costs. Your energy and water bills will be slashed, while at the same time you will be doing your bit for the environment.

This design book presents you with some relatively easy ways to meet or exceed the minimum energy rating requirement and make your home much more comfortable and less susceptible to imminent water and energy cost increases and shortages.

While we all need to use some energy in order to create a liveable and comfortable home, most Australian homes use far more energy than they need. Space heating and cooling is by far the major energy user in the average home.

Significant savings can be made by designing homes to reduce space heating and cooling costs. This can be achieved by considering the following features in building design:

- **Orientation** – design your house to maximise solar access available on site.
- **Glazing and Shading** – position windows to include winter sun and shade windows to exclude summer sun.
- **Insulation** – insulate ceilings, walls and floors as much as possible to retain heat in winter and exclude excessive summer heat.
- **Ventilation** – design for cross ventilation to make use of natural cooling breezes.
- **Air leakage** – minimise unwanted air leakage by sealing gaps in walls, floors and ceilings.



A. Harmony with landscape through siting and design
B. Natural materials, indigenous landscaping, rainwater reuse

C. Renewable energy source
D. On site water supply

The value of sustainable design

Sustainable design is not just for 'greenies' and sustainable houses don't have to look any different or cost more than conventional houses. In fact, many of the homes built in the Surf Coast Shire adopt some of the ESD principles. Think of large eaves and pergolas to provide shade and large openings and decks to take advantage of cooling sea breezes.

Good and sustainable design adds value to your home. This view is supported by statistics from a study of US home builders which found that over 80% of home seekers prefer to buy homes that incorporate sustainable or energy efficient features. Of those buyers, half are willing to pay 11%-25% more for environmentally friendly homes (James Hardie Smarter Green Book, 2007).

This trend towards consumer driven sustainability is also taking hold in Australia and the Surf Coast.

Energy efficiency has become an integral part of home design and increasing numbers of homeowners are looking for ways to make their homes more energy efficient. At the same time homebuyers are also looking for energy efficient homes. Energy efficiency and sustainable design features are becoming major selling points, according to Robert LaRocca from the Real Estate Institute of Victoria, and add value to a home (In Nadia Salemm, Green house effects, MX 4 February 2010). Natural light, solar panels and hot water systems, watertanks connected to toilets, use of recycled and renewable materials, and functional, waterwise gardens that can heat and cool a house are becoming must have items for environmentally conscious house hunters, as opposed to airconditioners and swimming pools. Even if you are not a greenie, ESD features will make your home more comfortable, healthier and cheaper to run, which is critical in a time of climate change and rising energy and water costs.



Implementing sustainable design projects

Increasing numbers of builders, building designers and architects have highly developed skills in the area of sustainable housing solutions. Many examples now exist in the Surf Coast Shire to demonstrate that the application of this knowledge can deliver effective results that need not cost more, as long as the solutions are factored in at the early planning stages.

Designing good high performance houses at cost effective levels is not hard if the basic thermal principles are understood, says BDAV President Tim Adams of F2 Design, which specialises in energy efficient and sustainable design. The greatest gains are made in planning and orienting your home appropriately and working with the climate and existing landscape. Your influence on creating a sustainable home will be greater with a custom design. However, even when you choose a project home from a volume builder, there are little things you can look at to improve the environmental performance (and thus running costs and comfort) of the house, such as correct orientation and window placement, slight floor plan changes (can you swap the floor plan around?) and inclusion of eaves or other shading elements.

Many builders have a watertank or solar hot water system as standard inclusions. If you can, choose both. And also, only choose a house as big as you need. Big is not always better.



Australian households produce more than 20% of Australia's total greenhouse gas emissions – a major cause of climate change – each year from the energy we use to heat, cool, light and run our homes. (Your Home Technical Manual, www.yourhome.gov.au)



Size matters

The average floor area of newly constructed homes in Australia has increased, while at the same time the average lot and family size have decreased. The demand for larger houses is primarily driven by the desire for more space. But big is not always beautiful. Each square metre will cost more to light, heat and cool, takes up more of the earth's resources and increases your environmental footprint. Large houses on small lots threaten the valued character of the Surf Coast. They tend to be visually dominant and have minimal areas for the retention and planting of vegetation. As a result buildings dominate landscapes and streetscapes, whereas unobtrusive buildings screened by vegetation are the so highly valued characteristics of most townships.

Choosing an appropriate size for your home is the most important step in controlling its economic and environmental cost. Only build as big as you need, with a focus on quality rather than quantity. It makes good sense to think carefully about the space you need.

Some points to consider are:

- Do you really need a separate room that is devoted to a large screen television?
- Will you use a formal dining or living area?
- Do you need more than one bathroom? Would a well designed two-way bathroom suffice?
- How much garage space do you need? Do you want to devote 20% of your house to your car?

Reducing the total floor area of your home will significantly reduce building material costs. These costs can be reallocated to upgrade other parts of your building project, such as more functional and aesthetically pleasing designs, finishes, inclusions, green technologies and landscaping.



Smarter design

There is a growing trend amongst designers and architects to design smarter, smaller, affordable sustainable homes. Recent innovations show that big is not always better and that a stylish and sustainable home does not have to come with a huge price tag. Small and affordable no longer means cheap and ugly.

There are several ways to design a house that is smaller, more affordable and sustainable. It all comes down to smart design and clever choices. Consider the following:

- Choose a small lot. Land cost is on average equal to house cost. With ever increasing land prices the easiest way to tackle land cost is to choose a smaller lot size.
- Choose a compact design with a small building footprint. Even on a small lot this will give you enough space for a decent backyard.
- Choose lightweight construction materials and techniques. This minimises expensive earthworks and the need for reinforced concrete slabs. Lightweight construction also makes it easier to build double storey.
- Choose efficient, cost-effective construction techniques and systems. This saves time, the number of trades needed on the job, and limits waste from building materials. Choose simple to install products and products with correct measurements prepared off-site to reduce waste and transport.
- Design with your future in mind. Plan for expansion later when your needs and budget change. Include options to grow (or shrink) without having to move house as you go through the stages of life. Some builders offer houses that can be built in stages. The first stage includes a one or two bedroom studio home that in a later stage can be easily expanded to become a full-size three or four bedroom family home. Modular style houses are a latest trend that afford flexible solutions to modern living requirements.
- Include adaptable, multi-purpose rooms and innovative space saving ideas (e.g. study nook under stairs or room dividers that can create extra rooms when needed) to save on floor area.
- Open, light filled areas create a sense of space. Extra space can be borrowed from outside through large windows and seamless integration of indoor and outdoor areas.

Clever design and construction and the efficient use of space can provide affordable, livable and environmentally sustainable solutions without having to compromise on quality and lifestyle. This becomes more paramount with ever increasing property prices and decreasing lot sizes.

Further information

www.smarter-small-homes.com.au

The Smarter Small Home, James Hardie, 2010.

The Smarter Construction Book, James Hardie, 2008.



Prefabricated homes by Modscape.

The local environment is a great source of inspiration for your design, whether it is the open rural plains, coastal cliffs or the centre of town.



Our Local Environment

The key to sustainable design excellence is understanding your local environment prior to designing and building your home. The local environment is a great source of inspiration for your design, whether it is the open rural plains, coastal cliffs or the centre of town. Existing colour palettes in the landscape can help you select external colours and local climatic conditions, such as wind direction, can inform the placement and layout of your building, as well as the most appropriate materials to use in its construction.

Be inspired by your surroundings and consider:

- Climate (e.g. prevailing winds, temperature).
- Salt and wind impact on building materials.
- Sensitive ecological environments.
- Native vegetation.
- Significant landscapes and views.
- Neighbourhood and streetscape character.
- Rural/farming environments.
- Environmental hazards (e.g. wildfire risk, landslip, flooding, salinity).

The unique environmental conditions offer a vibrancy and individuality to development in the Surf Coast Shire that are often lacking in metropolitan and suburban areas. Reflecting the specific conditions will ensure a design that is site responsive and evokes a sense of place.



A. Urban
B. Bush

C. Coastal
D. Rural

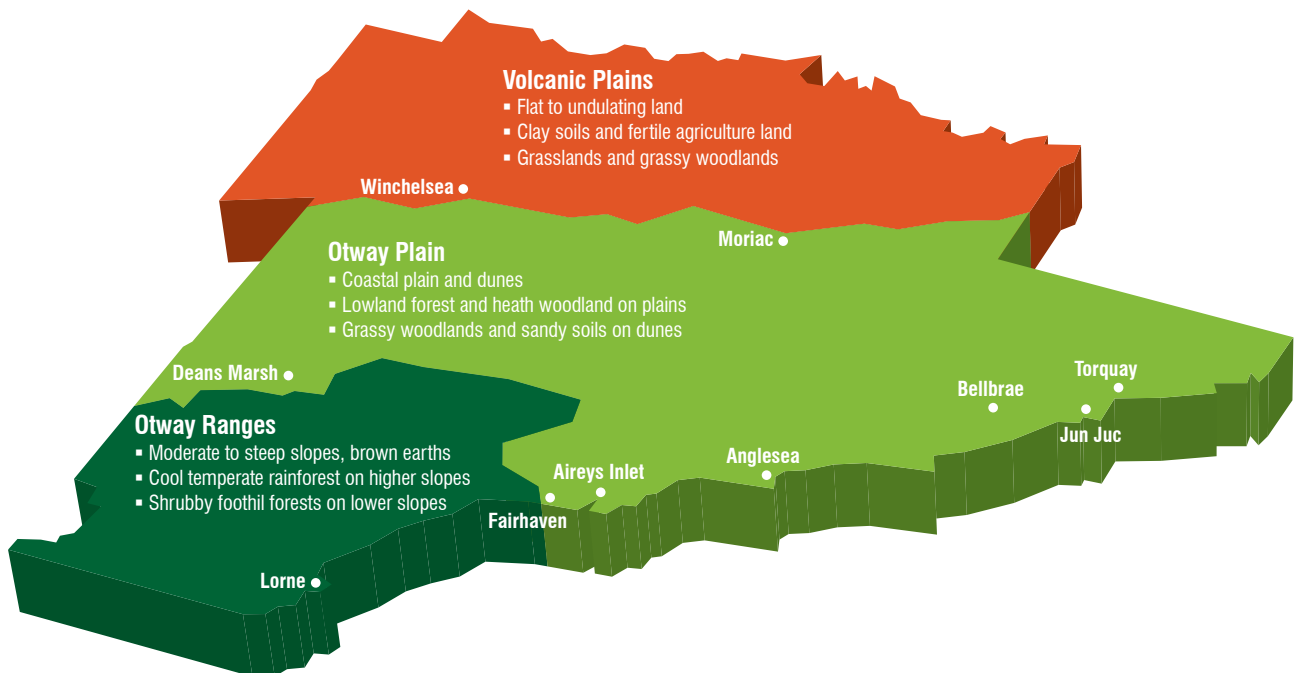
Natural environment

Landscapes

Surf Coast Shire is an environmentally diverse and visually spectacular municipality. With its stunning coastline and beaches, scenic rainforests and undulating rural hinterland, Surf Coast Shire is a highly desirable place to live and is one of the tourist draw cards of Australia. Its landscape and habitats include the rugged coastal cliffs interspersed by beaches and small inlets along the Great Ocean Road, long stretches of open beach and sand dunes beyond Torquay, the steep forested slopes of the Otway Ranges, the open heathland on coastal plains, rich undulating farmlands and the expansive flat open rural landscape of the Volcanic Plains.

Climate

Surf Coast Shire is in a mild temperate zone with definite seasons of summer, winter, autumn and spring. Winters are generally mild to cool and have low humidity, often with coastal winds and driven rain. Summers are usually hot or very hot with moderate humidity and high bushfire risk. Autumn and spring are generally the most comfortable seasons, however the location of Surf Coast Shire in southwest Victoria means the weather is highly changeable and you can experience the typical 'four seasons in one day'.



Landscape zones in the Surf Coast Shire.

Settlement patterns

Settlement patterns across the Shire are diverse and include:

- Large rural allotments with scattered dwellings.
- Low density, rural residential living on one acre blocks or larger, often in a bush, rural or coastal setting.
- Typical township blocks of 500-1000m² with single dwellings or dual occupancy.
- Forms of medium and higher density development on lots of less than 350m² in town centres and close to facilities.

“An uncompromisingly new building which nevertheless keeps to the scale of the street façade, [can show] architectural good manners”

*- Professor George Seddon,
A Sense of Place, 1972.*

Understanding where you are on the Surf Coast will help you design a house that fits in with the surrounding area and is adaptable to the local conditions. That charming rural cottage near Deans Marsh may look nice, but would be out of character if built in one of the coastal townships. Likewise, a modern beach house would be out of place in Winchelsea.



Surf Coast 'Transect' showing a range of settlement patterns across the Shire.

Surf Coast town character

Surf Coast Shire has eight distinct townships: Bellbrae, Winchelsea, Moriac, Deans Marsh, Lorne, Aireys Inlet/Fairhaven, Anglesea and Torquay/Jan Juc. Each town has a keen sense of community and identity, with a strong desire to protect and nurture its environment and unique sense of place.

Torquay and Winchelsea are the designated urban growth centres and are characterised by a mix of low and medium-high density settlement patterns. Torquay is known for its vibrant beach character, while the historic rural town of Winchelsea has a strong agricultural base and heritage buildings.

Lorne is nestled between the Great Otway National Park and the sea and is characterised by a mix of modern and heritage buildings and a landscape dominated by a blue gum canopy offering filtered views to the sea.

The smaller coastal towns of Anglesea and Aireys Inlet offer both seaside and bushland experiences and are characterised by a low building density and a distinctive non-suburban coastal environment.

The hinterland villages of Deans Marsh, Bellbrae and Moriac contain areas of scenic rural land and are characterised by a rural low density settlement pattern comprised of larger land parcels, and forested and grassland landscapes.



Top row: Contemporary urban design in Torquay
Middle row: Lightweight houses nestled in vegetation in Anglesea and Aireys Inlet/Fairhaven
Bottom row: Heritage buildings in the rural towns of Moriac and Winchelsea



Valued characteristics of the towns include:

- A variety of coastal, bush, rural and urban settings.
- A mix of low and medium density development.
- Boundary setbacks that provide a sense of space and sufficient area for landscaping around buildings.
- Streetscapes dominated by vegetation with recessive, unobtrusive houses.
- Low profile building heights.
- Classic 'Australian' older beach style homes and modern lightweight coastal designs.
- Low, open or no front fencing.
- Informal, often unpaved, driveways and recessive garages.
- Natural materials.
- Vibrant beach colours in town centres.
- Natural or subdued colours in residential or sensitive rural and coastal landscape areas.
- Filtered or full views to the ocean and other landscape features.
- Tall gums providing canopy cover.

Council has prepared neighbourhood character studies for Anglesea, Aireys Inlet to Eastern View, Lorne and Torquay/Jan Juc. These studies provide you with a detailed description of the existing and preferred character of each town.



Top row: Sense of space around buildings
Middle row: Modern beach homes
Bottom row: Natural colours and materials

Designing in a coastal environment

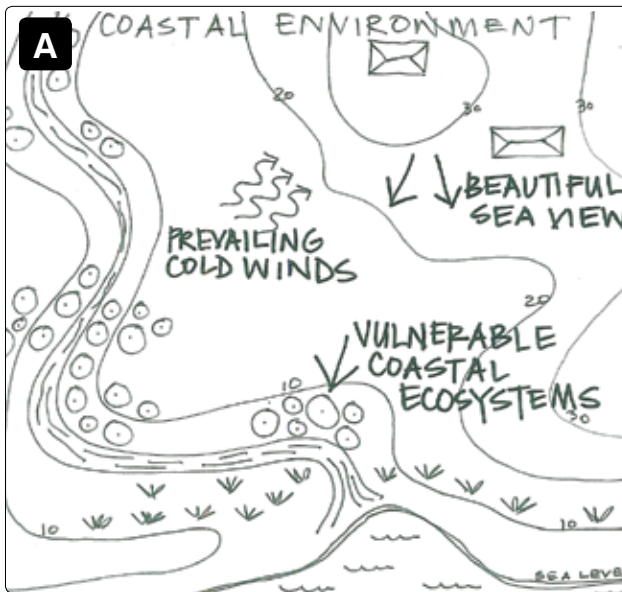
The Surf Coast environment has some sensitive coastal ecosystems.

The coastal environment is influenced by wind, sun, salt and rain.

The coastal environment conditions include:

- Greater exposure to winds and inclement weather.
- Cooling sea breezes.
- Salt, wind and sand impacts on buildings and gardens.
- Beautiful views of the ocean, coastline, distant landforms and forested hinterland.
- Vulnerable coastal ecosystems requiring protection of marine and land biodiversity.
- Coastal values and hazards – sensitive coastal landforms and possible erosion.
- Climate change impacts - rising sea levels, storm severity, flooding.
- Severe bushfire risk.

See page 46 for further details about 'coastal' design.



A. Coastal environment conditions
B. Coastal township (Aireys Inlet-Fairhaven)

C. Coastal view
D. Coastal vegetation

Designing in a bush environment

The Surf Coast environment has large extents of native vegetation that make attractive, but also sensitive living environments.

The bush environment conditions include:

- A feeling of seclusion and connectedness with nature.
- Beautiful forest views or distant ocean views, depending on location.
- High biodiversity values and sensitive ecosystems and landforms.
- Environmental hazards such as erosion and land slip.
- Severe bushfire risk.

See page 52 for further details about 'bush' design.



- A.** Bush environment
- B.** Coastal-bush landscape at Bells Beach
- C.** The green hues of Eucalyptus leaves

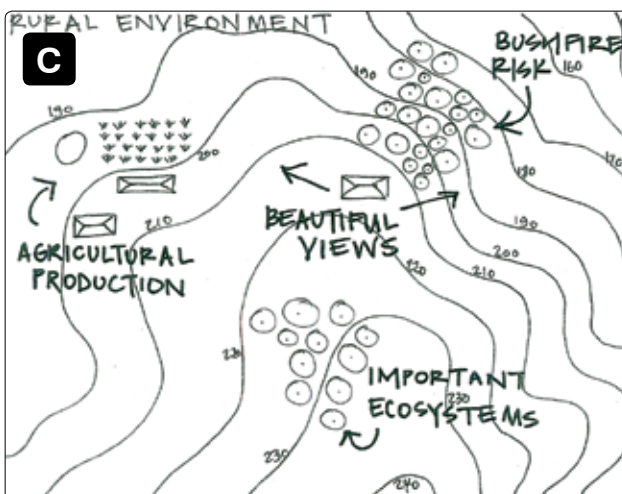
Designing in a rural environment

Building in a rural location requires consideration of adjacent land uses and impacts from the natural environment. Rural areas are valued for their open views, calming sounds, sense of isolation, and wind driven smells, but be aware that farming areas are also working areas with noise, dust and odour, and not always the pleasant, tranquil environments that some people may expect when trying to escape city life.

The rural hinterland environment conditions include:

- Beautiful rural landscape and forest views.
- Severe bushfire risk.
- Proximity to agricultural activities such as cropping and animal husbandry.
- Susceptibility to frosts.
- Important and often fragmented ecosystems or threatened species.
- Lack of infrastructure and services.

See page 58 for further details about 'rural' design.



A. Rural surroundings
B. Rural hinterland (Deans Marsh)

C. Rural environment conditions
D. Living colours

Designing in an urban environment

Urban environments provide vital places for community, business, residents and civic functions. The often eclectic nature of urban environments gives more flexibility in terms of building style and materials, but respecting neighbourhood character is a key requirement. This does not mean slavishly replicating what is already there. It is about keeping to the scale and rhythm of the streetscape and interpreting distinctive elements that give a neighbourhood its valued character.

Urban housing should reflect upon common themes that include:

- Buildings that are sympathetic to the neighbourhood character and fit into the streetscape.
- Buildings that face the street promoting an active address and 'eyes' on the street.
- Design that incorporates green spaces, low or open fencing and recessive garages.
- Increasing opportunities for medium density and mixed uses within town and neighbourhood activity centres to encourage travel by foot, safety and housing diversity.

See page 62 for further details about 'urban' design.



A. Coastal landscaping to soften built form
B. Coastal-urban area (Torquay)
C. Active street frontages in town centre

Consider the physical characteristics of your site and how that influences your design in terms of layout, building placement and orientation.



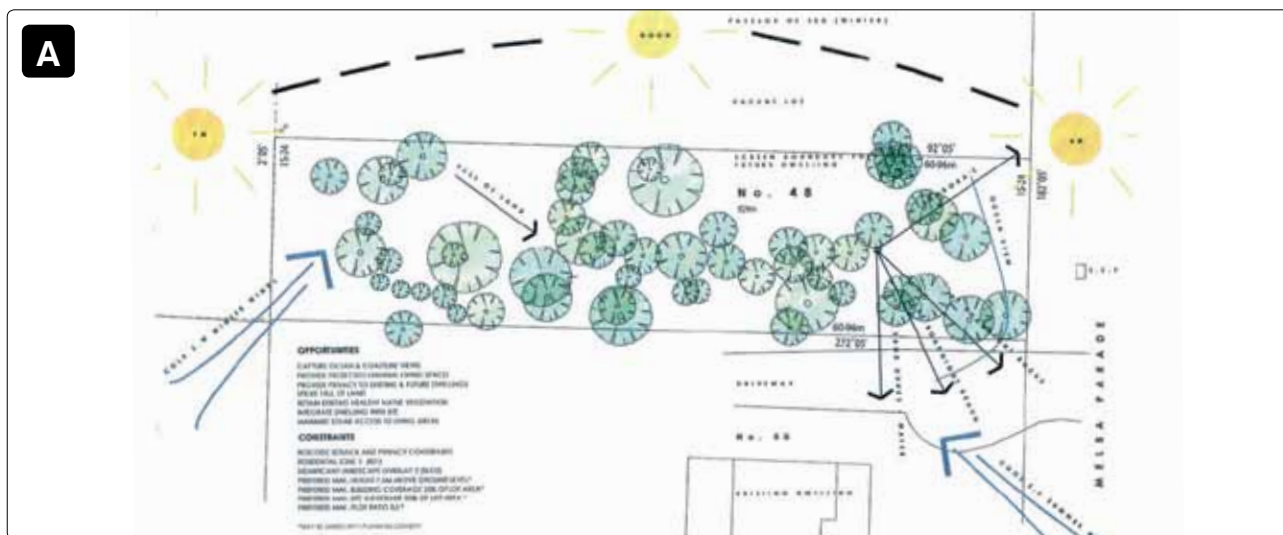
Your Site

Each site is unique. It is important to consider the physical characteristics of your site and how that influences your design in terms of layout, building placement and orientation.

After a thorough site and context analysis, you will be able to start designing your house and consider in more detail matters such as siting and orientation, passive solar design, building materials and colours, roof form, feature elements and ESD technologies.

Look at:

- Slope and soil type.
- Orientation and shape of your site.
- Path of the sun, solar access and shading.
- Prevailing winds and rainfall.
- Site microclimate.
- Hydrology (drainage, water flows).
- Existing vegetation (native and introduced) and wildlife habitats.
- Historical/cultural artifacts.
- Views to and from the site.
- Exposed areas (e.g. cliffs, open plains).
- Sheltered areas (e.g. valleys, dense vegetation).
- Available services (gas, electricity, water, sewer) and easements.
- Buildings on adjoining properties.
- Surrounding natural features and vegetation.
- Surrounding buildings and preferred character and other features of the neighbourhood or area.



A. Example of a site analysis (Seeley Architects)

B. Site responsive design through minimal site disturbance and retention of vegetation

C. Taking in the coastal landscape and maximising solar access

Good design can contribute to buildings that are in harmony with their surroundings.



Your Design

Good design can contribute to buildings that are in harmony with their surroundings, whether located on the coast, in the bush or in a rural or urban environment. Elements such as the location of the house on a block, size of the house, amount of vegetation removal, material choices and level of cut and fill can all be adjusted to minimise the impact on the environment and surrounding area when designing your home.

This section of the Sustainable Design Book takes you through various design elements. They should not be considered in isolation, as the combination of elements will need to work together to create a total well designed package.



These houses in Torquay adopt a contemporary coastal aesthetic consistent with the town's preferred character and sit well in the streetscape.

Limit your impact

Minimise site disturbance

Design your house to respond to the natural topography of the site and minimise the use of excavation and fill. This saves energy and money, preserves natural drainage patterns and prevents soil erosion. Excessive excavation can disturb groundwater zones and the root systems of native vegetation. Design or choose a plan or construction system that suits the slope and minimises excavation.

With lightweight construction on sloping and difficult sites you will be able to save significant costs on earthworks, retaining walls and reinforced concrete. A raised floor system still gives you the option of a concrete floor for thermal mass.

Planning for the layout of your services such as power, plumbing and telecommunications allows you to dig once and limit disturbance of your site.

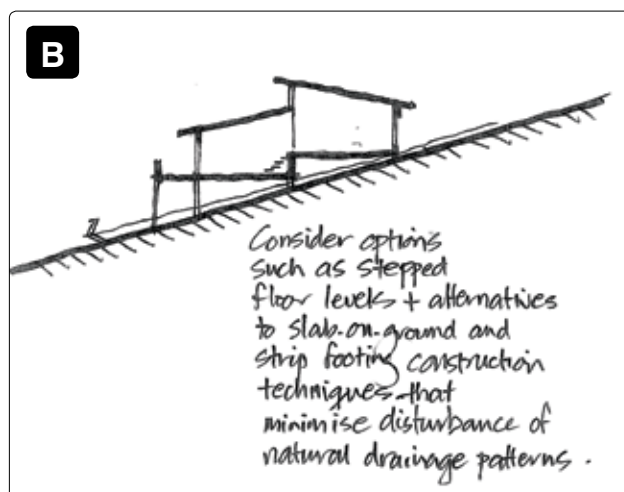
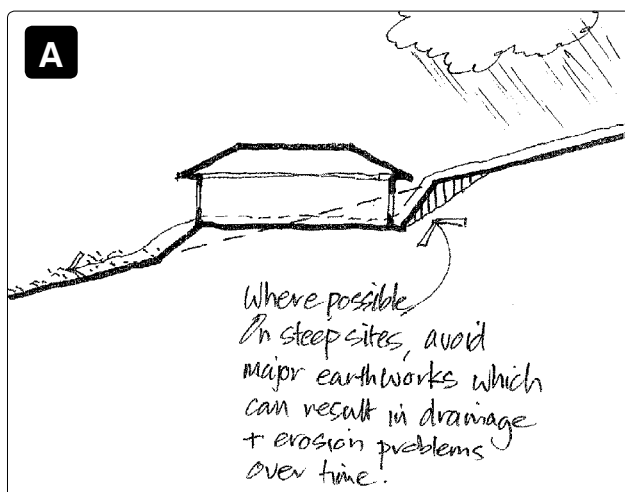
Minimise loss of vegetation

Follow the following three steps when considering removal of native vegetation on your property:

1. What can you do to avoid removal?
2. If you can not avoid removal, minimise the amount that you need to remove through careful siting and design.
3. Replace the vegetation that you remove with native plantings elsewhere on your site.

Screw piles

A screw pile is a deep foundation that is screwed into the ground. The benefit of using pile foundations over slab foundations is that they are generally quicker to install, require less soil to be removed, minimise site disturbance, and do not need any concrete or termite treatment.



A. and B. Avoid excessive cut/fill

C. and D. Buildings sit lightly on the sloping sites to minimise excavation

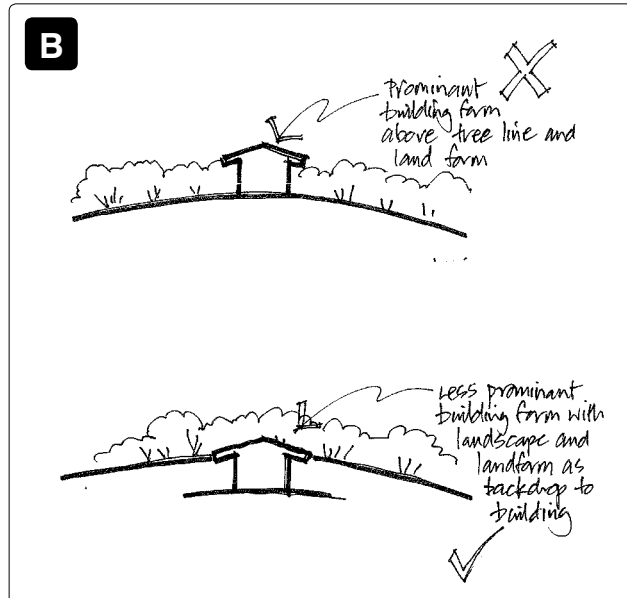
Minimise the visual impact

Without careful design and site choice, buildings have the potential to impact upon areas of high landscape value or on scenic vistas. This can be by protruding above a ridgeline or the tree canopy for example, or by being visually dominant due to the building's size or the use of highly visible colours and materials.

Consider the view of your new building from key locations such as the beachfront, main roads or public parks. Think about the height and size of your house, the use of colours and materials, the position on your block and the use of vegetation to screen your house and nestle it into the site.

Also consider the impact of your house on the neighbourhood character, streetscape and neighbouring properties. What is the effect of your house on your neighbour's solar access, visual and acoustic privacy and views? Be innovative and adventurous but remain sympathetic to the neighbourhood. You can minimise your home's visual impact by choosing:

- Appropriate materials and external colours sympathetic to the surroundings.
- An architectural style sympathetic to the neighbourhood.
- Appropriate bulk, height and form.
- Appropriate setbacks from boundaries and sufficient space around and between buildings.
- Vegetation that screens your house and blends it into the environment or streetscape.



A. Consider future development on adjoining properties
B. Sympathetic building placement in sensitive landscapes

C. Harmony with surrounding environment
D. Low profile building heights in line with land form

Designing for climate

Passive design

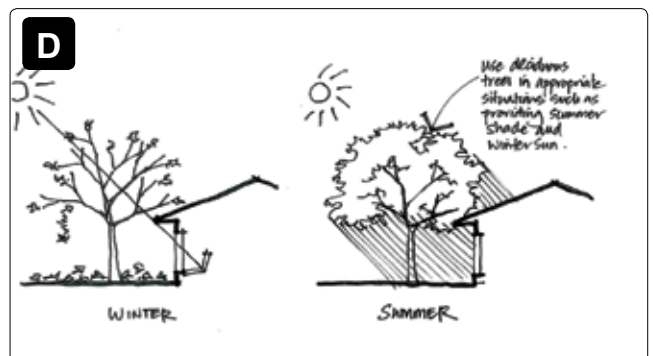
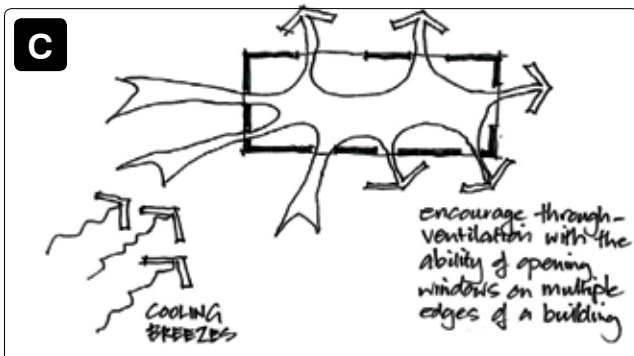
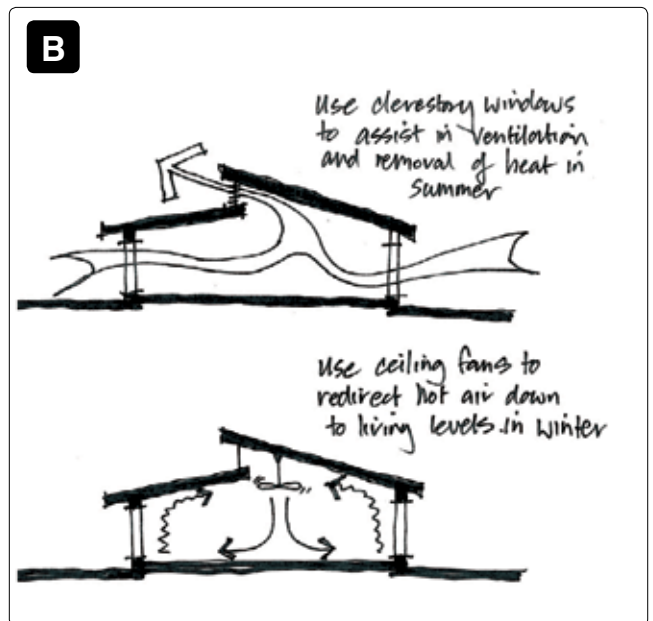
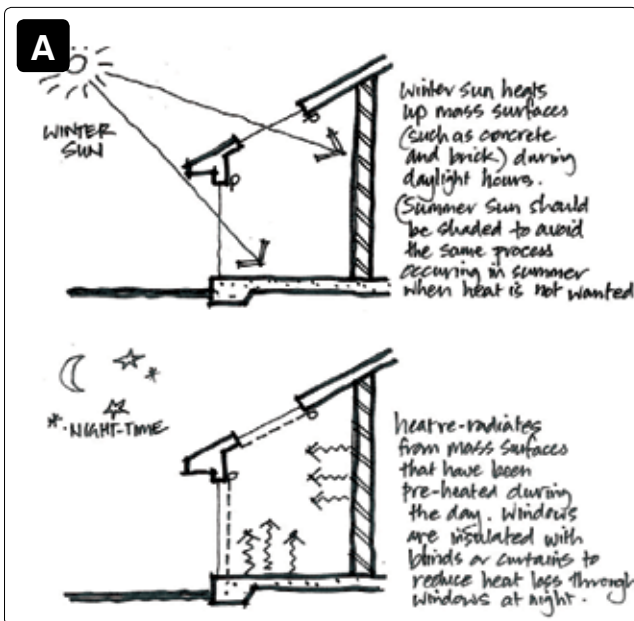
Understanding the microclimate at your site, including the sun's movement, prevailing winds and weather extremes, will help you design a building that harnesses or works around these conditions for optimal comfort, durability and energy efficiency.

This means making the most of solar access, which provides a natural heating and light source in the winter months, and exposure to cooling breezes in summer, which are predominantly from the southwest or southeast on the Surf Coast.

A correctly sited home, good floor plan and clever placement of windows that takes these factors into account will reduce the need for you to rely on mechanical air conditioning and heating systems and will save you – and the earth – significant costs.

Things to consider:

- Building placement and orientation for optimal solar access, cooling breezes and protection from hot and cold winds.
- Insulation, double glazing, drapes/blinds and draught sealing to minimise heat loss through ceiling, floor, windows and doors.
- High windows (clerestory windows) and operable skylights to ventilate hot air.
- Shade elements (eaves, verandahs, awnings, overhangs, shade sails, adjustable blinds), particularly on the east and west side to avoid excessive heat gain.
- Materials with good thermal mass (see definitions on page 75), such as a concrete floor and internal brick wall.
- Fans instead of air conditioner units and windows that can be opened for cross ventilation.
- Planting that provides shade, directs breezes towards openings or blocks cold or hot winds.



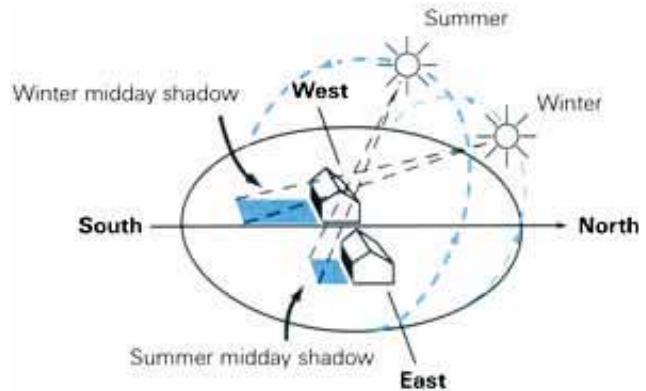
A. Thermal mass
B. Clerestory cooling

C. Through ventilation
D. Deciduous trees

Zoning

Zoning your internal floor plan can make the most of passive solar energy. The general rule of thumb is:

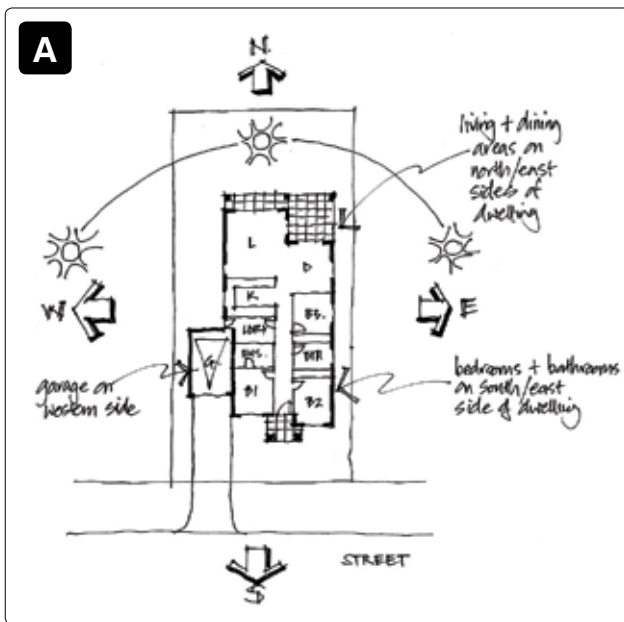
- North (bright sun exposure) is good for living/day use areas (lounge, dining and children's areas).
- South (minimal sun exposure) is good for utilities (garages, toilets, laundries, storage).
- East (morning sunlight) is good for kitchens and bedrooms to make the most of morning sunlight.
- West (harsh afternoon sun) is good for utilities (garages, toilets, laundries, storage).



Put simply, passive solar design is about keeping summer sun out and letting winter sun in.

It is the least expensive way to heat your home. It is free heating direct from the sun.

Careful solar design and zoning combined with external shade elements and materials with good thermal mass can provide you with a home that is comfortable all year round (Your Home Technical Manual).



A. Zoning maximising solar access to living areas
B. Northern orientation and shading elements

C. Window and door openings for cross ventilation
D. North-facing living and outdoor areas with sun protection

Roof forms

The shape of your roof is an important design element. The roof form can define the style and appearance of your building and the energy efficiency options. It can be varied between skillion, curved and flat for contemporary design, or high pitched or gabled for traditional design.

Roof forms are also a functional element that can capture water and solar energy. Consider the orientation and angle for roofs to enable these energy and water efficiencies.

Tip - There is a simple formula for working out how much water your roof will collect. Basically, 1mm of rain on 1 m² of roof equals 1 litre of water. So for example, if you have a roof of 50m² and you get a downfall of 12mm, then $50 \times 12 = 600$ litres of water will be collected.



Variety of roof forms: low pitched, skillion, curved, flat, gabled, high pitched

Textures and colours

Colours that reflect the diverse natural environment, extending from the coast, to native bush and farmland are an integral part of the Surf Coast identity.

You can find inspiration for colours in many places such as the rich orange of exposed cliffs at dawn and dusk, yellow sandy beaches, cool ocean blues, natural earth hues and eucalypt greens and greys, as well as the buildings next door and the vibrant streetscapes in towns.

Colours that reflect the natural environment of an area will limit visual intrusion in sensitive landscape areas.

Also consider the environmental credentials of external finishes, such as durable external materials/ paints and paints that are low in volatile organic compounds (VOC). Conventional paints contain petroleum based solvents that release solvent fumes into the atmosphere and can trigger breathing problems in some people.



Top row: subdued natural colours
Middle row: vibrant beachy colours
Bottom row: subdued natural colours

Materials

Your choice of materials affects the aesthetics of a building as well as its thermal performance. Materials also have an environmental impact through the use of resources, energy used for production and transportation, and waste creation. Whatever your vision is for your home, look for materials which meet aesthetic needs and are environmentally sustainable.

Things to consider are:

- Lightweight materials and the clever use of a mix of external materials and finishes can help reduce the bulk of buildings and provide architectural interest.
- Heavyweight interior materials (e.g. concrete floors and interior brick walls) have good thermal mass qualities. They absorb and retain heat from the sun during the day and slowly release this heat in the evening, when the house is cooler. If your house is designed for passive solar gain, these materials will absorb the sun's heat to warm the building and will help stabilise its internal temperature.
- When building in a coastal environment, choose materials that are resistant to the coastal elements of salt, wind and sand.
- Recycled materials can reduce the embodied energy used to create building products and can sit well within sensitive landscapes. Consider concrete with recycled aggregate and cement substitutes, recycled steel or recycled timber.
- Double or triple glazed windows provide insulation from both hot and cold conditions. Tinted or toned windows may limit the warmth from winter sun and can distort and discolour views.
- Denser hardwood timbers are durable options that fit with the Surf Coast characteristics. Spotted gum and Silvertop Ash for example have the ability to fade to grey and be in true harmony with the surrounding landscape and natural vegetation. These timbers should be sourced from a local supplier committed to sustainable practices.



Photo by Peter Glenane

- Aluminium can be highly durable, especially when coated or anodised. Given its high embodied energy, source this product carefully.
- Alternative building practices (such as straw bale and rammed earth construction) that reduce the use of non-renewable materials and offer excellent thermal mass qualities can be introduced with conventional building techniques.
- Look for insulation products that contain recycled content or renewable materials. Avoid fibreglass products and insulation products that contain harmful or non-biodegradable materials. Reduced impact insulation products include cellulose insulation (made from recycled newspaper), polyester (100% recyclable), wool and straw bales (renewable and biodegradable material).
- Consider the fire resistance of materials. External materials must comply with the construction requirements of Australian Standard 3959-2009 for the determined Bushfire Attack Level (BAL).

It is a misconception to believe that lightweight construction will compromise the energy efficiency of a house. Although a slab on ground is generally the most effective measure for thermal performance, an elevated floor, using screw in piers in place of typical concrete footings for example, reduces the need for excavation, requires less materials, less transport and less tradesmen, and thus provides significant cost and time savings, but still offers options to include a concrete floor for thermal mass. A heavyweight house that has not been well designed to capture solar energy will feel colder and perform worse. The balanced use of internal and external materials along with appropriate orientation, glazing, insulation and shading will create a home that meets or even exceeds the minimum energy efficiency rating.



This and previous page: selection of materials inspired by local context.

Designing for all ages and abilities

Australia's population is aging, and the Surf Coast Shire is no different. In fact, towns like Anglesea and Lorne have an above average proportion of residents over 60 years of age, being popular retirement destinations.

Truly sustainable design goes beyond green features. By incorporating design features suitable for occupants of all ages and abilities, homes are not only environmentally sustainable but also socially sustainable. As people get older, many want to stay living in their own homes and be part of the community for as long as possible.

Planning ahead when choosing a new house can ensure it is appropriate for your future needs. It is critical to identify those design features that should be built in up-front, to avoid difficult and expensive modifications at a later stage as residents age or become less mobile. This may mean designing a single storey home, or including a bedroom and bathroom next to the living areas on the ground floor of a two-storey house. Other features include slightly wider corridors and door openings, larger bathrooms, lower window sills, and seamless integration of indoor and outdoor areas.

The Surf Coast Shire Access Guidelines for Developers has useful information to assist with your building or development.

Further information

Access Guidelines for Developers, Surf Coast Shire.

Universal Housing Guidelines, Landcom.

Australian Standards for Adaptable Housing and for Access and Mobility, www.abcb.gov.au.



A. A direct and level path from the street frontage to the front door makes access easier.

B. Single level living is the most accessible for people with limited mobility.

C. A bathroom designed for all access does not have to look institutional and can be contemporary and stylish as any other. The hobless shower and low vanities provide easy access for wheelchair users.

Feature elements

Use of protective building elements and appendages, such as eaves, pergolas, verandahs and screens are effective and relatively inexpensive building elements that contribute to the thermal performance, comfort and aesthetics of a house. They provide shade, shelter and protection from weather extremes, break up building bulk and can be an eye-catching design feature.

Many homes are built without eaves to save as little as \$2,500. Builders may then add an air conditioner to counteract the overheating effects of the sun. This environmental burden can easily be avoided (Your Home Technical Manual, www.yourhome.gov.au).



A & C. Shading devices integrated into the design of the house.
B. Well designed pergola providing shade and adding to the aesthetic appeal of this beach house.

D. Wide eaves providing shade to windows.
E. Wide eaves with exposed rafters reinforce the natural aesthetic of the house.

Garages and driveways

Double width garages forward of the dwelling façade tend to be visually dominant in the streetscape and limit 'eyes on the street'. Recessive garages that are setback behind the dwelling façade or are integrated into the design of the house are less prominent and result in more attractive streetscapes.

There are several design options to reduce the visual impact of a garage. Some options are:

- The garage set back behind the dwelling façade.
- Construction of a single garage instead of a double garage. A single garage makes significantly less impact on the front façade of the house than a double one. It also allows a narrower driveway and a larger area for soft landscaping.
- Construction of a carport instead of a garage. A carport is an open structure and if well designed will have less visual impact.

- The garage rotated from the street. The area in front of the garage can be landscaped to screen the garage.
- First floor or deck overhangs can make a garage look visually recessive.
- Design features to break up the bulk of a garage, such as pergolas.
- Garage designs that are complementary in form, materials and colours to the design of the dwelling.
- Lowered or sunken parking areas.

Reducing the width of the driveway at the street, using natural looking colours and materials such as exposed aggregate concrete or gravel, and incorporating landscaping around parts of the driveway will further soften the visual effect of car parking areas and driveways.



Examples of techniques to create a recessive garage.

Bringing the outdoors in

The natural environment and spectacular coastal, bush and rural views of the Surf Coast Shire invite an active outdoor lifestyle. Our outdoor spaces are an extension of our home and an intrinsic feature in the Surf Coast and across Australia. Well connected indoor and outdoor living spaces add to the overall amenity and health of your home.

Think about opportunities to capture views, open up your living areas and maximise outdoor rooms. What views can you take advantage of from your site? Orientate your windows and indoor/outdoor living areas to take advantage of them.

The best views in the Surf Coast are generally to the south. This can sometimes be in conflict with passive solar design principles for maximising northern windows and living spaces.

To ensure a sustainable outcome think about how your southern openings can improve cross ventilation of your home through well sited openings on the north side. North facing highlight or clerestory windows over living spaces can be used to allow solar penetration.

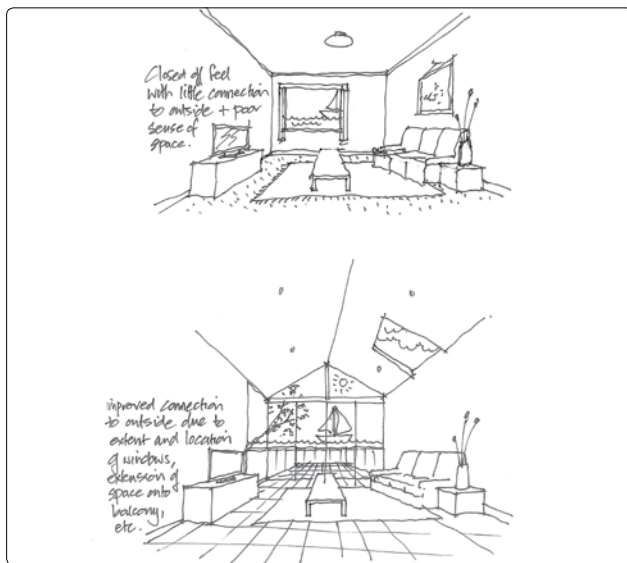


Photo by Shannon McGrath

Making the most of your views, outdoor living and access to natural light.



Photo by Dianna Snape

Your Design

ESD technologies

ESD or green technologies improve the comfort, running costs and value of your home and reduce the impact on the environment. You need to consider the benefit and functional performance of these elements as well as the visual appearance and influence on your design. ESD elements should be integrated into your design early on rather than later. Sensitive location of solar panels and water tanks for example can be seamlessly integrated into the design of your house to reduce visual clutter or to enhance a design feature.

Grid-connected **solar (photo-voltaic) panels** can provide ongoing benefits to your home. While solar panels can be expensive up front, they can provide the opportunity to generate your own electricity and to receive credit rather than bills from your electricity supplier. When designing your house you will need to consider the orientation and angle of your roof and available roof space to install solar panels. Solar panels produce most power when they are pointed directly at the sun and receive maximum sunlight from 9am to 3pm in mid-winter.

A **solar hot water system** can provide up to 80% of your hot water needs. These systems consist principally of a heater panel and a water tank connected to a booster system that can be mounted on the roof or located at ground level.

Solar thermal heating and cooling units use solar energy to ventilate, heat and/or cool a home and can also improve indoor air quality by reducing humidity, moisture build up and mould.

Geothermal heat pump technology uses the thermal mass of the earth for both heating and cooling by offsetting the difference between the temperature outside the house and the temperature you want inside the house. For instance, a liquid can be circulated through an underground loop pipe to absorb heat from the earth during the winter and dissipate heat from the house during the summer.

Domestic wind turbines can provide renewable energy day and night all year round, provided there is enough uninterrupted wind. This technology is just emerging for homeowners in Australia and should become more widely available in the near future. The success of wind turbines in an urban setting is marginal and they may be more suitable in a low density or rural environment.

Greywater is water from sources such as washing machines, showers and basins. Greywater can be reused for garden irrigation and toilet flushing and makes use of water we would otherwise waste daily. Greywater systems range from simple diverter devices, which divert untreated greywater from the washing machine direct to the garden and do not require a permit, to more complex systems that collect, treat and store greywater. These treatment systems require approval by the EPA and Council and must be installed by a licensed plumber.



Green dollar symbol www.propertyoz.com.au

Going solar and saving money

Rainwater tanks come in all shapes, sizes and materials and can be located to make the most efficient use of space on your site. Choosing the best water tank for your situation will help you to preserve one of our most precious resources and reduce your water bill. Tanks may be located under structural elements of a house such as a decked patio, recessed to the rear of the property, collected in a slimline water tank, or located underground. Rainwater can be used to flush toilets, for use in the washing machine and hot water service, to top up swimming pools, to water the garden and for bushfire protection. When designing your house you will need to give consideration to the size and shape of your roof and how rainwater can be captured.

The Victorian and Commonwealth governments offer various rebates for renewable energy and water reuse technologies. Visit www.ourwater.vic.gov.au or www.environment.gov.au for further information.



Wattworks Pty Ltd



Photo by Peter Glenane

A. and B. Water tanks can be designed as an integral feature of the overall house and garden design.
C. Greywater system

D. Capturing solar energy in public park
E. Rural home featuring solar hot water and rainwater harvesting.

Landscaping and Gardens

Gardens are special places to spend time in and to look out to. Gardens and landscaped areas can improve the look, energy efficiency and health of a building and can integrate your home with the surrounding environment. Increasing the amount of green space on your site and reducing the amount of hard paved surfaces increases rainwater infiltration into the soil. Trees and shrubs can provide shade and protect you from cold winds, or alternatively direct cooling breezes into your house.

When planning your landscaping area or garden consider the context of where you are (your local environment and site conditions) and how you want the space to function (your needs). The surrounding natural environment provides you with great sources of inspiration for colours, plant types and layout of your garden.

Indigenous Planting

Indigenous and native plants are hardy and require less watering than most exotic species. They also provide important habitat for local native animals and add to the character of the area.

Surf Coast Shire has indigenous planting guides for urban and rural areas available. In addition to this, local nurseries should be able to assist you with selecting indigenous plants for your area.

Environmental weeds

Avoid using plants that have the potential to escape gardens and invade areas of natural vegetation. Surf Coast Shire has a booklet that helps you identify environmental weeds and information on controlling them. It can be found online or by contacting Council.

Food production

Growing edible plants in your yard is a great way to incorporate sustainable elements into your landscaping and provides a source of nutritious food for your household.



Shading and cooling your house with your garden

The use of deciduous trees and vines, such as fruit trees and grape vines, on the north side of buildings is a great way to provide for summer shade and winter sun. Use evergreen trees and vines for permanent shading on the western side of your site. Evergreen trees, shrubs and vines also make good screening devices. This is a good, natural alternative where solid fencing is discouraged and in sensitive natural environments.

Species selection and location must consider potential fire hazard. In fire prone areas minimise vegetation close to the house, in particular overhanging tree branches and shrubs.

Attracting native animals to your garden can add extra colour and interest. It can assist pest control by attracting insect predators and contribute to keeping native animal populations viable by providing a pathway for them to commute between bushland areas. All you have to do is provide your garden visitors with food, water and shelter.

Many traditional turf lawns are often high water users and can look unsightly during water restrictions.

They can also be invasive species that can escape into bushland and destroy native habitat and flora. To combat these problems avoid using invasive species such as Kikuyu, and ask your local turf suppliers about drought tolerant traditional lawn varieties.

If you are looking for an attractive lawn alternative, consider the use of native grasses – one of the most successful native grasses for creating the look of a traditional lawn is Weeping Grass (*Microlaena stipoides*). It can be mown regularly and will grow well in a wide range of soils. Weeping Grass does not cope well with heavy traffic or dog urine, but is excellent for a front lawn. If you like clumps of tussocky grasses then Kangaroo Grass (*Themeda triandra*), Wallaby Grass (*Austrodanthonia* spp.) and Tussock Grass (*Poa* spp.) are great alternatives. (Source: Sustainable Gardening in the City of Whittlesea, 2006)



Achieving a Sustainable Outcome

This section brings together some of the principles of sustainable design to help you create a home that is liveable and comfortable all year round, saves on heating and cooling costs, and reduces the impact on the environment.

Designing for energy efficiency

- ✓ Optimise passive solar orientation for natural light and heating.
- ✓ Maximise passive cooling opportunities, such as cross ventilation and shading.
- ✓ Apply floor plan zoning.
- ✓ Incorporate thermal mass (e.g. concrete floor or reverse brick veneer) for storing and slowly releasing heat.
- ✓ Apply insulation in floors, ceilings and walls.
- ✓ Use double glazing or high performing glass.
- ✓ Avoid air leakage by sealing gaps in walls, floors, ceilings, door and window frames, vents.
- ✓ Use energy efficient appliances and lighting.
- ✓ Optimise opportunities to use renewable energy sources and incorporate renewable energy technologies wherever possible, such as solar panels, solar hot water systems, wind power.

Saving water

- ✓ Install a rainwater tank connected to toilets, laundry and garden.
- ✓ Install a greywater reuse system.
- ✓ Use water efficient appliances.

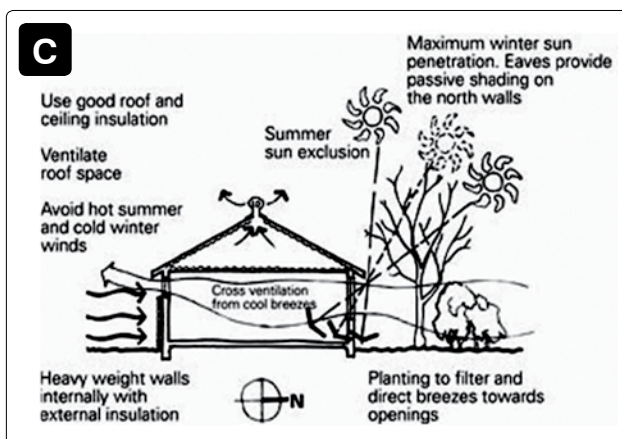
Creating a high quality indoor environment

- ✓ Maximise access to natural light and ventilation.
- ✓ Integrate indoor living areas with outdoor spaces.
- ✓ Use materials and paints with no or low volatile organic compounds (VOC's).

Choosing building materials

- ✓ Use materials from sustainable, renewable sources or recycled/recyclable materials.
- ✓ Select materials with low embodied energy.
- ✓ Design for long life and adaptability, using durable, low-maintenance materials.
- ✓ Avoid building a bigger house than is needed to save materials and energy.
- ✓ Consider renovating and reusing existing building fabric and materials rather than demolishing and rebuilding.
- ✓ Use locally sourced materials (including materials salvaged on-site) to reduce transport.
- ✓ Reuse materials from the demolition of existing buildings and minimise construction waste going to land fill.

- A. Passive solar design, renewable energy and native garden
- B. Designing for sun and shade
- C. Principles of energy efficiency
- D. Louvre highlight windows let sun and light in and hot air out





Creating low maintenance, sustainable gardens

- ✓ Incorporate the use of indigenous, drought tolerant species.
- ✓ Use mulch to reduce water usage, improve soil health and suppress weed growth.
- ✓ Maximise permeable areas and minimise lawn areas that require frequent watering.
- ✓ Use deciduous trees and vines to shade windows from summer sun, while allowing winter sun access.
- ✓ Use vegetation to provide windbreaks and direct cooling breezes.
- ✓ Set up a compost bin and establish a worm farm.
- ✓ Grow your own organic food (fruit trees, herbs, vegetables), watered by a rainwater tank or greywater system.



Preserving the natural features of a site

- ✓ Avoid or minimise removal of native vegetation.
- ✓ Minimise excavation and fill and soil compaction.
- ✓ Avoid disturbance of natural water flows.

These are just a few solutions to reduce your environmental footprint. Green technologies, building products and sustainable living options are constantly evolving. To keep track of latest innovations consult an accredited professional or check ESD related websites (see list of useful web links on page 77) and publications (e.g. Sanctuary Magazine and ReNew Magazine both published by the Alternative Technology Association).



Quick Facts

Energy efficient downlights

There is no reason to keep using energy hungry halogen downlights. There are several energy efficient downlights on the market - fluorescent and LED - that are a good environmentally friendly alternative.

“R” value

The R-value listed for a given insulation product indicates the level of thermal resistance that product provides against the transmission of thermal energy, or heat. Generally, the higher the R-value, the more your walls and ceilings will resist heat flow and help to keep your home warm in winter and cool in summer. As a guide, aim for R2.0 or above for wall insulation and R3.0 and above for ceiling insulation.



- A. Producing your own food
- B. Natural materials and coastal landscaping
- C. Minimal site disturbance
- D. Passive solar orientation and durable materials



In each environment aesthetics should be married with sustainability to achieve true sustainable design excellence.

Designing for different environments



The previous sections of this Design Book have given you a general understanding of the various environments in the Surf Coast Shire, helped you assess your site and have given you elements to consider when designing your home. Now it comes down to putting it all together and designing a house that fits into its location.

The following section illustrates four different character types that reflect the different environments within the Surf Coast Shire, in recognition of its diversity.

The four character types are:

- A. Coast**
- B. Bush**
- C. Rural**
- D. Urban**

The images are presented for illustrative purposes to show how different environments trigger a different response in terms of building design.

Being guided by your particular site context will ensure your design evokes a true sense of place, is site responsive and fits in with the surrounding area. It goes without saying that in each environment aesthetics should be married with sustainability to achieve true sustainable design excellence.

Coast



The essence of coastal design is a built form that responds to the natural coastal setting, taking its inspiration for architectural style, colours and materials from the surrounding landscape and local character.

Coastal Character

Buildings should be sensitive to coastal ecosystems and landscapes and can draw inspiration from the rich variety of coastal landscapes and vegetation for form, colours and materials to create a coastal aesthetic that blends harmoniously into the surrounding environment. Development should respect local coastal culture and the character of coastal towns.

Coastal design elements include:

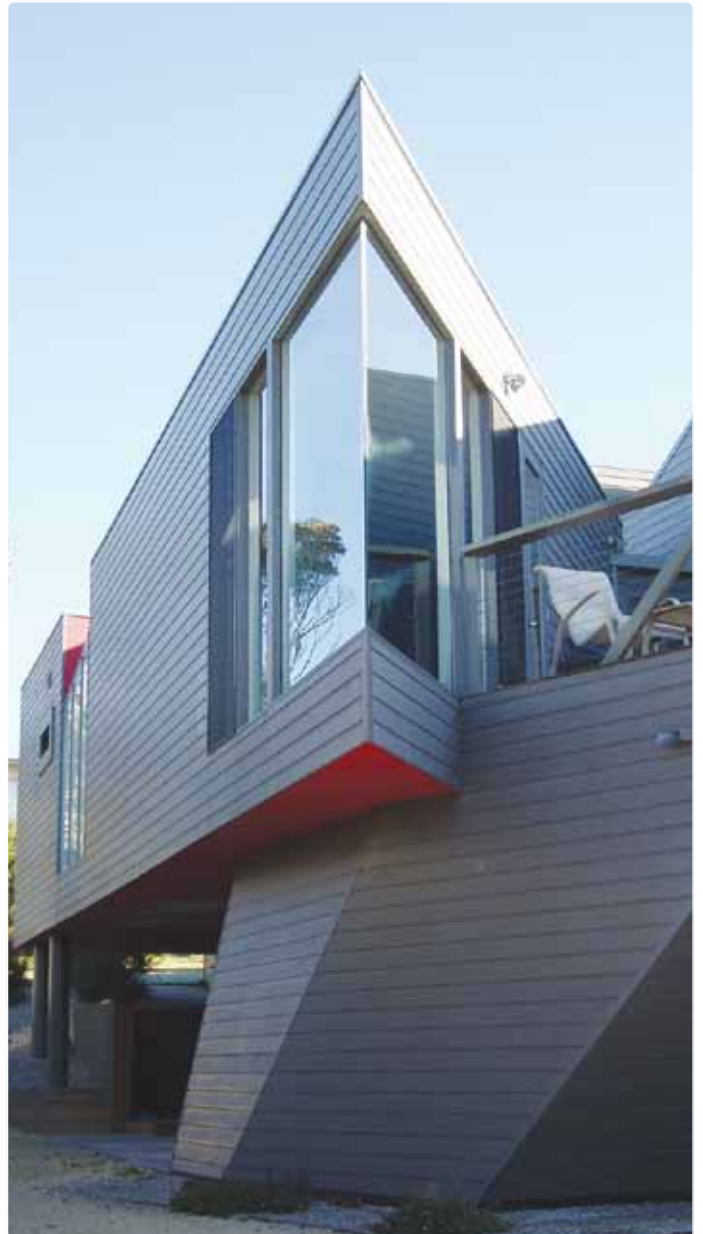
- Wide eave overhangs, verandahs, pergolas and decks to play with the elements of sun and shade.
- Indoor-outdoor living embracing the coastal setting, with protected outdoor areas for exposed sites responding to season and weather.

- Natural colours inspired by the ocean, beach, cliffs, dunes and coastal vegetation.
- External materials that have a lightweight appearance, such as weatherboard, corrugated iron and fibre cement sheet.
- Skillion, curved and flat roofs for a contemporary look and skillion and low pitched for a traditional design.
- Window and door openings to take advantage of coastal views, but with appropriate shading and passive solar principles in mind.
- Light footings and split level construction on sloping sites to minimise site disturbance.
- Indigenous landscaping complementary to the coastal landscape setting.
- Balancing the desire to maximise views with the need for passive solar design.



A. Taking advantage of coastal views
B. Coastal landscaping

C. Outdoor living
D. Adopting a coastal lifestyle



Coastal Character

These houses combine contemporary design with a mix of 'coastal' materials and forms.



This 'eco' home in Anglesea is nestled into the tree canopy, treading lightly on the earth and making the most of passive and active solar design. The natural material and colour schedule reflect the local adage of "where bush meets sea"



Coastal Character

Revival of the old beach shack

Victoria's coastal regions are losing the architectural type of the traditional holiday shack, according to John Wardle Architect. Development over the past decades fuelled by increasing demand and rebuilding after the Ash Wednesday fires has seen the rudimentary beach shacks replaced by a suburban style of architecture that more closely mirrors affluence and the demands for comfort and amenity.

The traditional beach shack epitomises a coastal lifestyle. It embodies the love of the beach and recognises the cultural heritage of the area. Old shacks provide a great foundation for transformation into a modern coastal home, yet retaining the integrity and fabric of the original building. Transformation of the old, dark, poorly insulated, uncomfortable shack that heats up like a hot box in summer and is ice cold in winter can provide you with a light-filled, energy efficient, comfortable all year coastal getaway or permanent home.

With clever design a simple fibro shack can emerge from alterations and additions as a modern beach house.

New homes can draw inspiration from the traditional beach shack. Common elements are modest, understated proportions, simple, clean architectural lines, low pitched skillion roofs, lightweight cladding, light or neutral colours, expansive deck areas, and of course room to hang out a wetsuit and surfboard to dry.





This house perched above the sand dunes at Anglesea is inspired by the traditional holiday shack and in the economy of its planning, its materials and its sitting retains the memory of the type (John Wardle Architects).

Coastal Character

Bush



A natural aesthetic is all about designing a home that blends harmoniously with the natural environment through a conscious choice of colours and materials and sympathetic siting, with minimal impact on the natural surrounds.

Bush Character

Buildings should be sensitive to and in harmony with the natural bush surroundings and can draw inspiration from the richness and diversity of landforms and vegetation for form, colours and materials to create a natural aesthetic. Development should minimise disturbance of native vegetation, soil and water flows and incorporate appropriate fire risk category construction techniques.

Bush design elements include:

- Sensitive siting and layout designed to avoid vegetation removal.
- Wide eaves, verandahs, pergolas and decks that bring the outside in.
- Merging indoor and outdoor living areas allowing interaction with the natural environment.
- Natural and subdued colours inspired by the local geology and native vegetation, allowing development to blend in with the natural surroundings.
- External materials that have a lightweight and natural appearance, such as timber, steel, natural stone. The extensive use of natural finish timber cladding emphasises a natural aesthetic and allows a house to blend with the native vegetation.
- Use of non-combustible materials and other fire protection measures in areas of high wildfire risk.
- Skillion, flat or curved roofs for a contemporary look and low pitched or gabled for a traditional design.
- Window and door openings to take advantage of bush views and interaction with the environment, but with appropriate shading and passive solar principles in mind.
- Lightweight construction to minimise soil and vegetation disturbance to preserve the site's natural state.
- Strong vertical lines and elevated construction mimicking tall canopy trees. Or low profile building heights and horizontal lines in areas with a low tree canopy.
- Indigenous landscaping complementary to the natural setting, with a focus on the retention of existing vegetation.

- A.** Optimising the outlook to the natural surroundings
B. Roof form is a crossover of roof and verandah
C. Contemporary design with subdued colour palette
D. Marriage of old and new for this renovated home



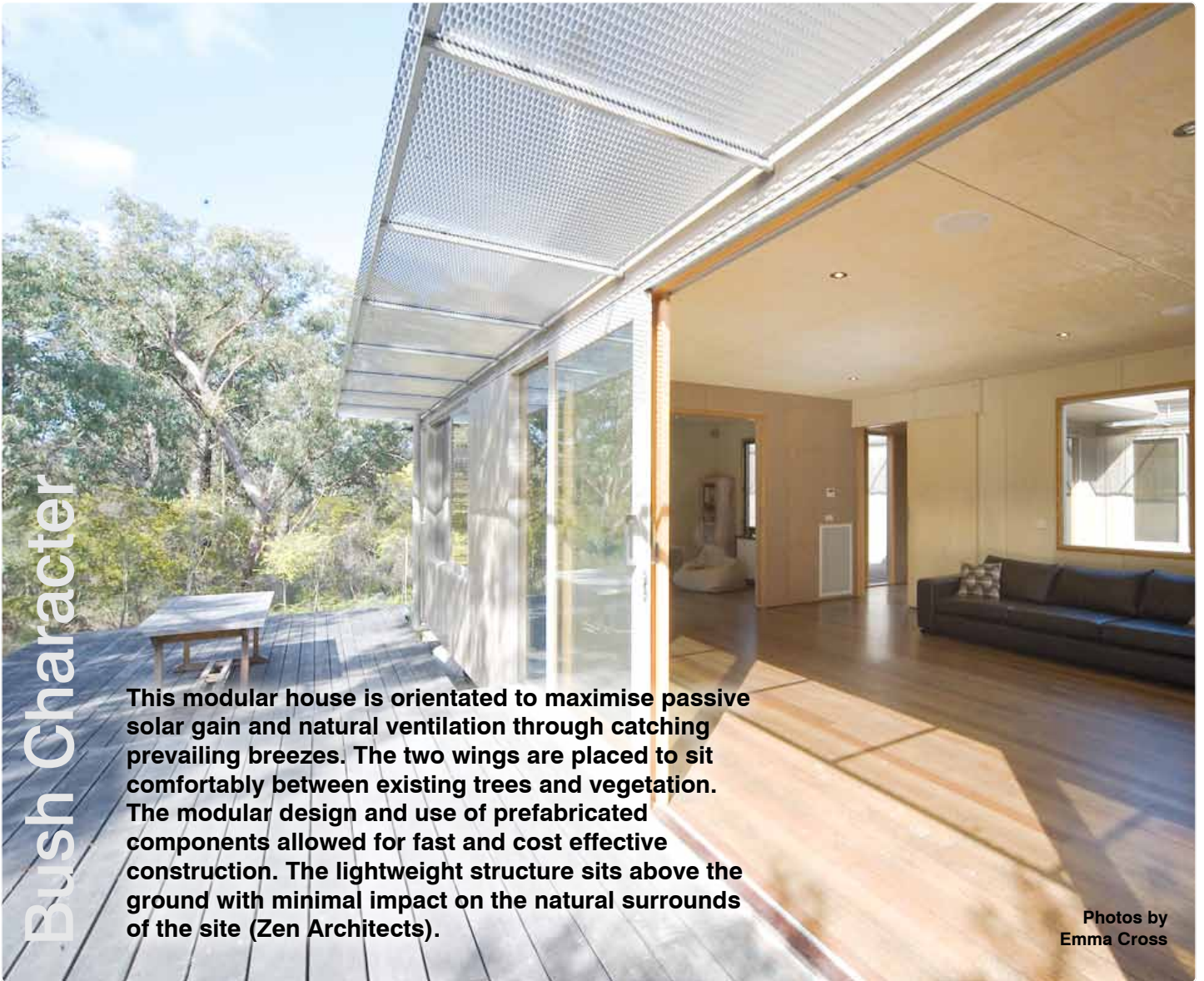


A. Openness between properties (no solid fencing)
B. Minimising site disturbance through lightweight construction
C. Site responsive materials and colours
D. Passive solar principles

E. Low profile building height sitting below the tree canopy
F. Treading lightly on the earth
G. Horizontal profile in an area with a low tree canopy



Bush Character



Bush Character

This modular house is orientated to maximise passive solar gain and natural ventilation through catching prevailing breezes. The two wings are placed to sit comfortably between existing trees and vegetation. The modular design and use of prefabricated components allowed for fast and cost effective construction. The lightweight structure sits above the ground with minimal impact on the natural surrounds of the site (Zen Architects).

Photos by Emma Cross



Building in bushfire prone areas

Large areas in the Surf Coast Shire are prone to high or extreme wildfire risk. The Ash Wednesday fires of 1983 are still engraved in the memory of many, and the 2009 Black Saturday bushfire tragedy reminded us once more that the danger is real.

As bushfire risk grows, so does the need for good design. By using sound architectural design principles, your home can appropriately respond to the environment and at the same time minimise the threat of being lost to a bushfire. The combination of a home's design, orientation on the site, the landscape and the building materials all play a role in determining whether the house can withstand a bushfire.

The Bushfire Design Guide (2005) published by Archicentre, the advisory service of the Royal Australian Institute of Architects (RAIA), provides useful advice for the design of a house in a bushfire-prone area. As a starting point it stresses the following:

- **Site Selection:** The building should be sited to minimise the risk, and this may include ensuring that there is enough cleared land between the house and the bush, or avoiding steep hillsides where the intensity of the fire can double for each 10 degrees of slope.
- **Landscaping:** There are a number of landscaping features able to slow the momentum of a bushfire, for example water bodies (e.g. dams and swimming pools), irrigated or green summer crops, orchards, vegetable gardens or tennis courts. Wind breaks and barriers may be created with certain tree species classified as bushfire-resistant.
- **Design Development:** Good design attempts to protect the house and its inhabitants from the five major dangers in a bushfire, namely wind, ember attack, radiant heat, direct flame and smoke. This can be achieved by integrating principles such as simple rooflines, uncomplicated layouts, window protection, inbuilt water storage, fire-resistant materials (where necessary) and sprinkler systems.

Each new building must now be assessed against the Bushfire Attack Level (BAL) under the Building Code of Australia (BCA) and Australian Standard AS3959-2009. The standard specifies the construction requirements for buildings in bushfire prone areas to reduce the risk of ignition from a bushfire while the fire front passes.

Construction requirements vary depending on the BAL specified for a property following a site assessment. There are five levels of BAL - from low to extreme - that require specific construction requirements for floors, external doors and windows, roofing, eaves, fascias, verandahs and decks, gutters and downpipes.

Further information

Australian Standard AS 3959-2009, Construction of buildings in bushfire prone areas, Standards Australia.
Building Code of Australia (BCA) 2010, Australian Building Codes Board.
Building in Bushfire Prone Areas, CSIRO and Standards Australia, 2003.
Bushfire Design Guide, Archicentre Limited, 2005.
Country Fire Authority, www.cfa.vic.gov.au.



Rural

A rural home adopts a natural palette of materials and textures and flows with the rolling contours of the land, blending the home harmoniously with the rural landscape, yet giving it a robustness to withstand the sometimes harsh conditions of the natural environment.



Rural Character

Buildings should be sensitive to the rural landscape setting and can draw inspiration from the rural and natural environment for form, colours and materials to create a rural aesthetic.

Rural design elements include:

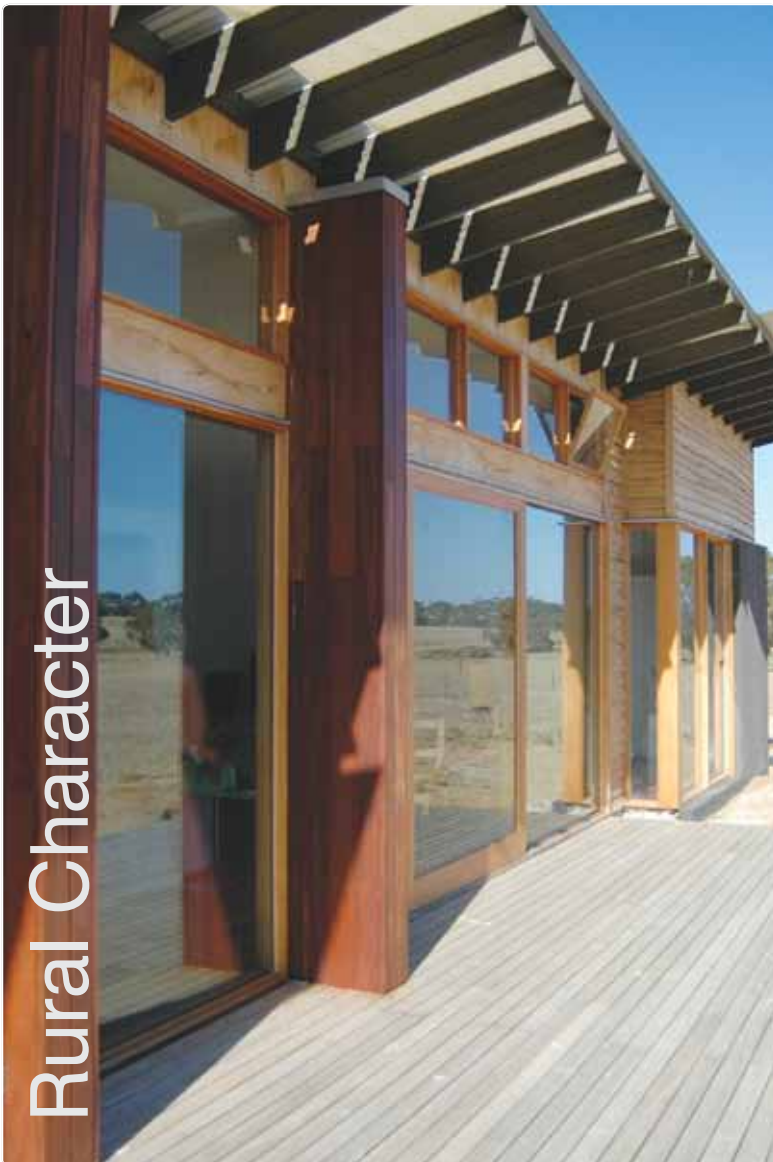
- Large verandahs and decks embracing the wide open landscape and natural setting.
- Natural colours inspired by the surrounding bushland vegetation, soil, crops and pasture.
- Robust materials such as timber, steel, stone, strawbale and rammed earth.
- Flat and skillion roofs for a contemporary look and pitched or gabled for a traditional design.

- Window and door openings to take advantage of rural vistas, but with appropriate protection, shading and passive solar principles in mind.
- Light footings to minimise site disturbance in sensitive areas and on sloping sites.
- Indigenous landscaping complementary to the rural landscape setting.
- Self-sufficiency in terms of water supply, energy generation and wastewater disposal/reuse.



A. Contemporary rural cottage
B. Zincalume cladding reflecting a rural aesthetic

C. Taking advantage of rural vistas
D. Colours and materials that blend in with the rural landscape



This rural home in Gherang integrates functional sustainability with aesthetics. It adopts a natural palette of materials and textures that blends the home harmoniously with its rural surroundings. The roof arrangement enables easy water collection and the 35° slope of the rear section is ideal for mounting solar panels (Tim Adams, F2 Design).



Rural Character



Photo by
Peter Glenane

Photo by
Craig Wall



Photo by
Peter Glenane

Rural Character

Expressing a rural vernacular through colours, materials and landscape orientation

Development in an urban area takes its inspiration from the local vibe and can express an eclectic mix of colours, materials and form, reflecting the diversity and vibrancy of the urban landscape, but always respecting the preferred neighbourhood character.

Urban



Urban Character

Buildings should be respectful of the neighbourhood and streetscape character and can draw inspiration from the diversity and vibrancy of the urban environment for form, colours and materials to create a design that evokes a sense of place. Development in the coastal towns such as Torquay should embrace a coastal character, whereas development in Winchelsea is expected to have a more rural flavour.

Urban design elements include:

- Eaves, verandahs, pergolas, porches and decks that add amenity and interest to a building.
- Colours inspired by the surrounding urban environment or nearby natural features such as the ocean, beach, cliffs or vegetation.

- A varied mix of external materials that provide texture and interest, such as painted or stained timber boarding in vertical or horizontal profiles, corrugated iron, aluminium, fibre cement sheet, face or rendered brick and blockwork, natural stone, rendered foamboard, timber panels with expressed joints or timber covered battens. A balanced combination of lightweight cladding with more heavy materials such as brickwork and stone can result in a contemporary marriage of textures and materials.
- Skillion, curved and flat roofs for a contemporary look and low pitched or gabled for a traditional design.
- Window and door openings that take advantage of available views and allow for surveillance of public areas, but with appropriate shading and passive solar principles in mind.



A. to E. Simple geometric forms, shade structures and a variety of materials are combined here to create houses that sit comfortably in the street.



- A. Low pitched roof echoes the old beach shack form
- B. Northern orientation with shading elements
- C. Front balcony allowing observation of the street
- D. Active frontage and open fencing onto reserve
- E. Responding to local culture
- F. Sun shade devices can be used for parapet walls
- G. Recessive garage and articulated façade

- Adequate space around and between dwellings. Providing adequate setbacks is important to reduce building bulk, maintain privacy and solar access, and provide ample space for landscaped gardens and stormwater infiltration. It also allows views to trees and sky beyond from the street.
- Indigenous, water-sensitive landscaping complementary to the natural landscape setting. Larger trees in the backyard that can be seen from the street add a significant landscape quality to the street as well as to the garden.
- Service areas and facilities, such as bin storage, clothes lines, air conditioning units, water tanks and hot water systems, concealed from view from the street and considered carefully within the overall house and garden design.
- Recessive garages and driveways that reduce the visual prominence of garages within the streetscape.
- An active front façade with entries, windows and balconies that address the street. Entries should be clearly visible from the street and covered for weather protection. Generous front verandahs and entry porches can be considered for additional outdoor living areas, which also provide opportunities for residents to engage with passers-by. Houses on corner lots or backing onto an open space reserve should address both frontages.
- Low, open or no front fences to complement the open feel and allow surveillance of the streetscape.



A. Contemporary form, natural colours and materials
B. Clearly defined entry with canopy for weather protection

C. Contemporary beach house with integrated garage
D. Recessive garage and retention of trees along driveway

Medium density housing

Medium density housing is development that is at a higher density (30 or 40 dwellings per hectare) than standard suburban subdivisions (usually around 8-10 dwellings per hectare) and generally located within town centres with good access to services.

Medium density housing in the Surf Coast Shire is generally comprised of one, two or three storey townhouse or apartment style developments.

Medium density development is an efficient use of land and can greatly reduce the need to consume greenfield land beyond existing town boundaries. It can deliver many benefits to individuals as well as sustainable outcomes for our local environment, including:

- Diversity in housing choice to match changing household structures (i.e. smaller house sizes, apartment living) and allow ageing in place.
- Walkable communities with good access to services (reducing the need for travel by car).
- Low maintenance living (i.e. smaller gardens and outdoor spaces).



- A. Multi-storey accommodation
- B. Coastal townhouse development with recessive driveway
- C. Residential golf links development
- D. Urban villas
- E. Medium density townhouse development



- Cost effective and energy efficient infrastructure provision (including reticulated services and transport) and less land consumption.
- Energy efficient design through shared walls and compact building forms.

The design of medium density housing requires specific attention to scale, amenity and car parking. Preferred design characteristics are:

- A variety of materials, colours and façade treatments to break up building bulk and create individuality and interest.
- Recessed upper levels to reduce building bulk and minimise amenity impacts on adjoining properties and public areas.
- Sufficient spacing around buildings and along driveways to provide soft landscaping.
- North-facing courtyards and decks for outdoor recreational needs and entertainment.
- Energy efficient design with good solar access.
- Recessive garages or rear lane access to limit the visual prominence of garages within the streetscape.
- No, low or open style front fences to maintain the openness of the streetscape.

When designed well, semi-detached houses and three of four dwelling 'Manor Homes' (a collection of homes combined into one building) can blend easily into relatively low density residential areas without significantly affecting the character of the neighbourhood. They can be of a similar scale and character as typical detached family houses. Care needs to be taken in the design and location of these house types. They may work best where situated on a corner lot or where they are designed with rear access. This helps to reduce the visual impact of the garages when the homes are viewed from the street.



A. Inclusion of lightweight elements to break up bulk
B. Example of contemporary townhouse development
C. Upper levels stepped in to reduce building bulk
D. Varied façade treatment

case studies

Local Case Study 1

Peter Winkler

Site responsiveness in a rural setting

The rural site slopes south to north toward a creek located off the property. Rather than creating a flat area to build upon through excavation, the dwelling is both nestled into the existing topography and floating above it, wrapping around the site's contours and opening to natural ground level at various access points. The clients desired a house which felt warm and sheltered in winter, while also open and light filled through summer.

The building form is derived from a wave refracting around an object. The materials selected and their allocation throughout the building illustrate part of the design methodology to honestly express materials: split-face blockwork, vertical timber spotted gum cladding with penetrative oil finish, exposed concrete internally and externally (hearth-seat) and galvanised steel edge beams. A belief that buildings should stand for at least 50-100 years was also used to inform the material selection, which was in part a reaction against a recent culture to build from materials with a short life cycle.

SUSTAINABLE DESIGN ELEMENTS

- Passive solar orientation - The building is stretched out along an east-west axis with appropriate eave sizing.
- Efficient heating and cooling through 'zoning', enabling the isolation of different rooms.
- Levels stepped down with site contours.
- Building nestled into the site.
- Durable and sustainable materials.

Photography: Ferne Millen



Local Case Study 2

Modscape

Building a modular house

A modular house is a little different from the traditional process of building or buying a house. Modular design and prefabrication (factory-built) can provide adaptable and flexible housing solutions for various accommodation needs.

This Modscape house near Winchelsea is an example of this. It combines contemporary architecture with environmentally sustainable design.

SUSTAINABLE DESIGN ELEMENTS

- Adapting design to local environment.
- Environmentally credible materials such as plantation spotted gum.
- Cross ventilating windows and openings.
- Minimal site disturbance through light footings and no excavation.
- Minimised material waste during factory build.
- Muted tones and materials that weather well with age.
- Double-glazed windows and good insulation.
- Blackwater and greywater systems.
- Solar hot water system.
- 130,000 litre rainwater tank.
- 5-star water efficient taps and showerhead.
- Heat capturing concrete floor.
- Permaculture garden.

Photography: Peter Glenane



Local Case Study 3

Seeley Architects Modern beach house

This house in Anglesea reinforces the core principle that design excellence should be a positive response to the site and surrounds, with a timeless design, form and character making the best use of the site's opportunities and constraints.

The design has been inspired by the site conditions and environment and accommodates the effects of the coastal winds, the passage of the sun, the unique Anglesea vegetation and the topography.

The outcome is a liveable and functional beach house that maximises views to the ocean and distant rural landscape.

Use of rustic materials like recycled timber posts, unpainted weatherboards and limestone blocks with qualities derived from the locality reflects site responsiveness. Landscape treatments also reflect the unique vegetation of the locale, with beach style pathways, stone walls and indigenous vegetation that is low maintenance.

SUSTAINABLE DESIGN ELEMENTS

- Passive solar design with all living rooms and most bedrooms having a northerly aspect.
- The windows facing north are covered with adjustable external venetian blinds.
- Double glazed windows with special 'low e', high performance glass.
- Stormwater is captured on site and used for watering the garden.
- Strategically placed louvres and large opening sliding doors allow cross ventilation depending on the temperature and intensity of the wind.

Photography: Shannon McGrath



Local Case Study 4

Zen Architects

Autonomous and off the grid

This completely autonomous house in Jan Juc was situated where a gum tree had blown over to reveal good access to sunlight in an otherwise very dense and dark canopy. This helped minimise site disturbance. The small footprint of the building was designed to weave between the trees that evolved along a well worn wallaby track.

The client's brief together with the site constraints called for an autonomous building that harvests its own power and water and treats its own waste on site. The house expresses a natural building vernacular and features reclaimed timber, including posts sourced from a local pier. The home is powered by an off the grid, stand alone power system. Excess electricity produced during the day is stored in batteries for use at night or when it is overcast.

SUSTAINABLE DESIGN ELEMENTS

- Passive solar design - all habitable rooms have access to articulated north facing windows for heat gain as well as southern windows for cross ventilation.
- Thermal mass in ground floor concrete slab.
- Thermal mass and insulation in straw bale walls rendered with natural locally sourced mud with low cement content.
- Recycled local timber poles support the roofs and upper floor structure.
- Radially sawn weatherboards cut to minimise waste and detailed to resist bushfire attack.
- Rainwater harvesting in 25,000L water tanks.
- Blackwater and greywater that irrigates the garden.
- Renewable energy through stand-alone 8kw solar photovoltaic array and battery store with bio diesel generator as emergency backup.
- High performance thermal insulation and double glazing.

Photography: Sharyn Cairns



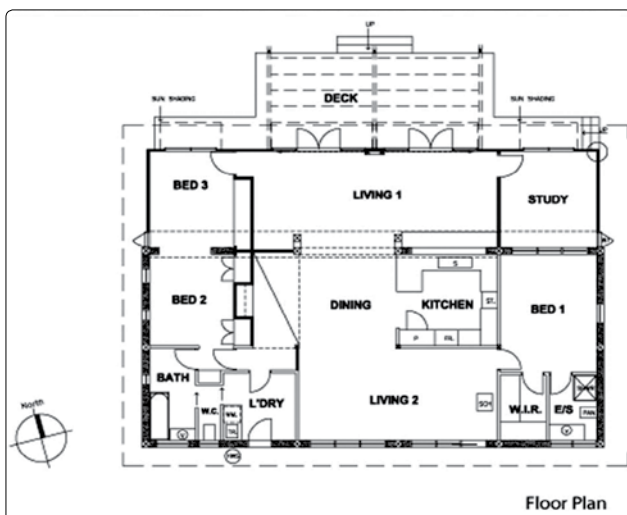
Local Case Study 5

Third Ecology Architects Modifying an existing house

The Brown Residence located at Aireys Inlet is a cost effective transformation of a zero-star, dark and cold house into a light filled, warm and airy 6-star home.

SUSTAINABLE DESIGN ELEMENTS

- 6-star energy efficiency rating.
- Passive solar design principles.
- Thermal mass (concrete slab).
- High performance low 'e' argon gas filled double glazing.
- Use of natural light.
- Solar hot water system.
- Water efficiency.
- Blackwater and greywater processing used for garden irrigation.
- Rainwater tank to provide current garden needs and future household needs.
- Waste water for garden watering via trenches and appropriate landscape plantings.
- Sustainable materials.
- Plantation and sustainably harvested timber.
- Low embodied energy materials by utilising recycled and re-machined materials.
- Low toxicity water-based finishes and paints.



Regional Case Study

Sunpower Design Rural eco home

This self-sufficient rural home on a 1.5 acre property in Birregurra exhibits a strong focus on sustainability. It is 8-star rated and features solar power and hot water, rainwater harvesting, greywater recycling, low energy lighting and low toxicity finishes. The organic forms and sweeping rooflines of the house are in harmony with the sloping site and surrounding landscape, and the use of corrugated steel and natural timber make reference to the distinctive features of the rural area.

The dwelling is 85% self-sufficient over a 12-month period for power, water, heating and cooling, and was designed to flow with the contours of the land, minimising site cut. The solar power system has been mounted on the roof structure and integrated into the house design.

The dwelling is a good example of sustainable building form, demonstrating you can design a functional, practical home that takes into account the landscape context and provides cost-effective solutions.

SUSTAINABLE DESIGN ELEMENTS

- 8-star energy efficiency rating.
- Passive solar design principles.
- Thermal mass (polished concrete floor).
- Solar power (1.98kw) and solar hot water system.
- Two 19,000 litre rainwater tanks for household use.
- Natural colours and 'honest' materials, including natural timber and recycled/reclaimed materials.
- Low toxicity water-based finishes and paints.
- Biolytix waste water treatment system processing black and greywater, which irrigates the garden.
- External façade with integrated shading blinds for sun protection in summer months.

Photography: Judy Sederof, Sunpower Design



Further Information

Dwelling approvals

You may need planning permit approval for your house or development. This will depend on the Zones and Overlays affecting your land.

Rescode (Victoria's residential development guidelines) applies to residential developments across Victoria. Rescode includes objectives and standards for single and multi dwellings and subdivisions that form part of the Surf Coast Planning Scheme and Building Regulations. These requirements are addressed through the planning permit and building permit processes.

If you are going through the process of subdivision you have the opportunity to design the orientation of lots to maximise solar access. Rescode provides standards and objectives on lot design including solar orientation as well as lot size, building envelopes and street orientation.

If you are developing land for multi dwellings (such as apartments or units) you have the opportunity to develop a sustainable design solution that will provide good amenity to individual dwellings and improve the quality of the development. Rescode provides standards and objectives on site layout, building heights and massing and amenity.



Definitions

Sustainable Design	Design that is socially, environmentally and economically responsible.
Passive Solar Design	Design that uses solar energy to heat and light living spaces.
Thermal mass	Any material that has the capacity to store heat from the sun during the day and release it slowly (in the evening when cooler).
Embodied energy	The energy required to extract, manufacture and transport materials.
Renewable materials	Materials that can be replenished by natural processes including timber, bamboo, paper and other plant/organic materials if harvesting is performed in a sustainable manner.

References

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- Surf Coast Planning Scheme, www.dse.vic.gov.au/planningschemes/surfcoast/home.html.
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- The Smarter Design Book, James Hardie Australia Pty Ltd, 2007.
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- The Smarter Construction Book, James Hardie Australia Pty Ltd, 2008.
- The Smarter Small Home, James Hardie Australia Pty Ltd, 2010.
- Delivering Great Places to Live – 20 questions you need to answer, Commission for Architecture and the Built Environment (CABE), 2005 (www.buildingforlife.org).
- Sustainable Homes Guide, City of Whittlesea, 2006.
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- Built Form Guidelines, Landcom, 2008.
- Universal Housing Guidelines, Landcom, 2008.
- Housing Diversity Guide, Landcom, 2009.
- Neighbourhood Character Studies for Torquay/Jan Juc, Anglesea, Aireys Inlet to Eastern View and Lorne, Surf Coast Shire.
- Environmental Weeds – Invaders of our Surf Coast, Second Edition, Surf Coast Shire & ANGAIR, 2002.
- Surf Coast Shire Indigenous Planting Guide, Surf Coast Shire, 2003.
- Access Guidelines for Developers, Surf Coast Shire, 2009.
- Guidelines for Higher Density Residential Development, Department of Sustainability and Environment, 2004.
- Safer Design Guidelines for Victoria, Department of Sustainability and Environment and Crime Prevention Victoria, 2005.
- Australian Standard AS 3959-2009, Construction of buildings in bushfire prone areas, Standards Australia.
- Building Code of Australia (BCA) 2010, Australian Building Codes Board.
- Building in Bushfire Prone Areas, CSIRO and Standards Australia, 2003.
- A Sense of Place: A Response to an Environment, George Seddon, 2004 edition.



Useful web links

The internet is a great source of information. The links below are just a small snapshot of what is available.

Professional institutes and industry groups

- Royal Australian Institute of Architects (RAIA) www.architecture.com.au
- Archicentre www.archicentre.com.au
- Master Builders Association of Victoria www.mbav.com.au
- Building Designers Association of Victoria www.bdav.org.au
- Australian Landscape Industry Association (ALIA) www.landscapingaustralia.com.au
- Master Plumbers and Mechanical Services Association of Australia www.plumber.com.au
- Plumbing Industry Commission www.pic.com.au
- Green Plumbers www.greenplumbers.com.au
- Building Commission www.buildingcommission.com.au
- Green Building Council of Australia www.gbca.org.au
- Housing Industry Association www.greensmart.com.au
- Alternative Technology Association www.ata.org.au
- Save Water www.savewater.com.au

Government organisations

- Department of Climate Change www.climatechange.gov.au
- Sustainability Victoria www.sustainability.vic.gov.au
- Energy Ratings www.energyrating.gov.au
- Green Power www.greenpower.gov.au
- Department of Planning and Community Development (DPCD) www.dpcd.vic.gov.au
- Department of Sustainability and Environment (DSE) www.dse.vic.gov.au
- Water Efficiency www.waterrating.gov.au
- Barwon Water www.barwonwater.vic.gov.au
- Environment Protection Authority www.epa.vic.gov.au
- Country Fire Authority www.cfa.vic.gov.au
- Make Your Home Green www.makeyourhomegreen.vic.gov.au
- Resource Smart www.resourcesmart.vic.gov.au
- Sustainable Homes www.sustainablehomes.vic.gov.au
- Our Water www.ourwater.vic.gov.au
- Bureau of Meteorology www.bom.gov.au
- Office of the Victorian Government Architect www.governmentarchitect.dpc.vic.gov.au
- Planning Maps Online www.land.vic.gov.au

Community organisations

- Sustainability at Home and Beyond www.sahab.com.au
- Surf Coast Energy Group www.sceg.org.au
- Sustainable Gardening Australia www.sgaonline.org.au



Further Information



SURF COAST SHIRE

Address: 25 Grossmans Road, Torquay
Phone: (03) 5261 0600
Email: info@surfcoast.vic.gov.au
Web: www.surfcoast.vic.gov.au