KLINE Homes

Designing your perfect home

Your guide to building a house

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About the Authour

Graydon Kline is a builder with more than 22 years' experience in home construction and renovation. He is highly active in the Gold Coast market where he has undertaken a broad range of work from entry-level homes for investors and first-home buyers to luxury homes in some of the Gold Coast's most desirable locations. Graydon has tapped into his extensive knowledge of the construction industry to put together The Pitfalls of Building as a tool for owner-builders or those looking to build their home but don't know where to start. He is passionate about the industry but hates seeing homebuyers taken for a ride by the complex array of rules and regulations that now govern the building sector.

Designing to suit our subtropical climate

Building a home using good passive design principles which can save energy, water and money is fundamentally about understanding and responding to the climatic.

South East Queensland and northern NSW is located within a sub-tropical climate zone where the main characteristics include:

- Highly humid with a degree of dry season;
- High temperatures year round with mild winters;
- Minimal seasonal temperature variation; and
- The lowest diurnal (day/night) temperature range.
- Higher than average rainfall.

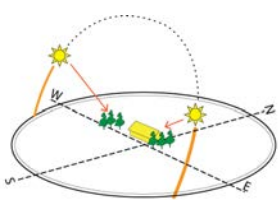
If you are building, buying or renovating, there are a number of simple measures you can implement to create a more comfortable home that has less impact on the environment, more economical to run, healthier to live in and adaptable to your changing needs.

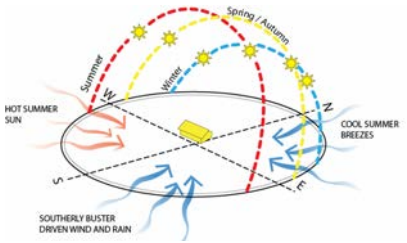
With this temperate sub-tropical climate, well designed houses should only require a limited amount of heating and cooling. During the preliminary design stage of your house consider the following:

- **The north side** is warmer in winter and the best place for rooms you use a lot, like living areas, outdoor rooms and decks.
- **The west side** gets hot in the afternoon and is best for rooms you don't use often, like bathrooms, garages and laundries.
- **The south side** is the coolest zone and good for bedrooms, as well as rooms you don't use often, but can also a good place to seek refuge from the sun during summer months.
- **The east side** gets morning sun and is good for breakfast rooms, kitchens and bedrooms.

It is equally important to design for cross ventilation to flush out the heat generated during the day. The heat load from unshaded sunlight into buildings during the hotter months can be a problem.

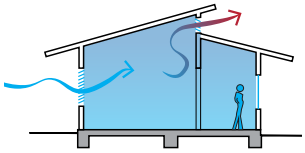
Climate and orientation



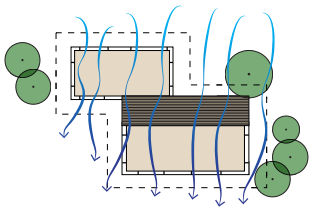


Solar Access and Orientation - A northern orientation for living areas and outdoor spaces is generally the best for our climatic zone. From sunrise to 9am and from 3pm to sunset the sun is lower in the sky. House design should acknowledge and shade potential high heat loads from the south east during summer mornings and south west during summer afternoons.

Cross ventilation

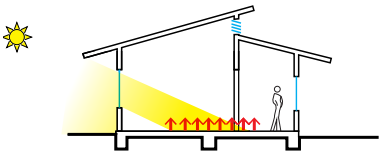


Ventilation - Higher level windows or ceiling cavity will create stack ventilation which allows hot air to continually escape and be replaced by cooler air.

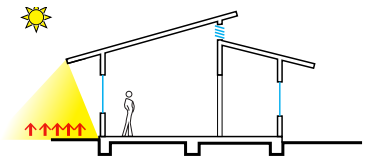


Building Shape and Orientation - Narrow spaces promote better air circulation. Design spaces and window placements that will pick up prevailing breezes and promote cross ventilation.

Thermal mass and shading

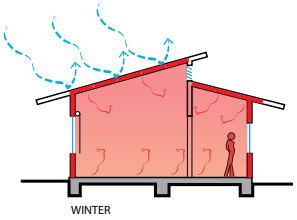


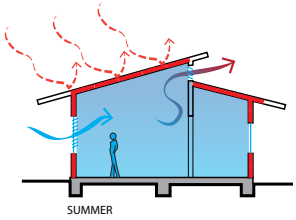
In winter - solar access should be maximised to improve heat gain from the lower northerly sun path. Floors and walls made of higher mass (brick, concrete, tiles) material will store heat during the day which will be released at night to warm the house.



In summer - protect your home from heat gain from low angle sunlight on the eastern and western walls by designing deep eaves, vertical shading, screens or blinds and integrating landscape and shade trees. Ensure good ventilation to mitigate the effects of thermal mass during summer months.

Insulation





Insulation - Wall, floor and roof insulation enables a more stable internal temperature both during the summer (keeping heat out) and winter (keeping heat in).

Source: Smart & Sustainable Homes' Designing for Queenslands Climate'

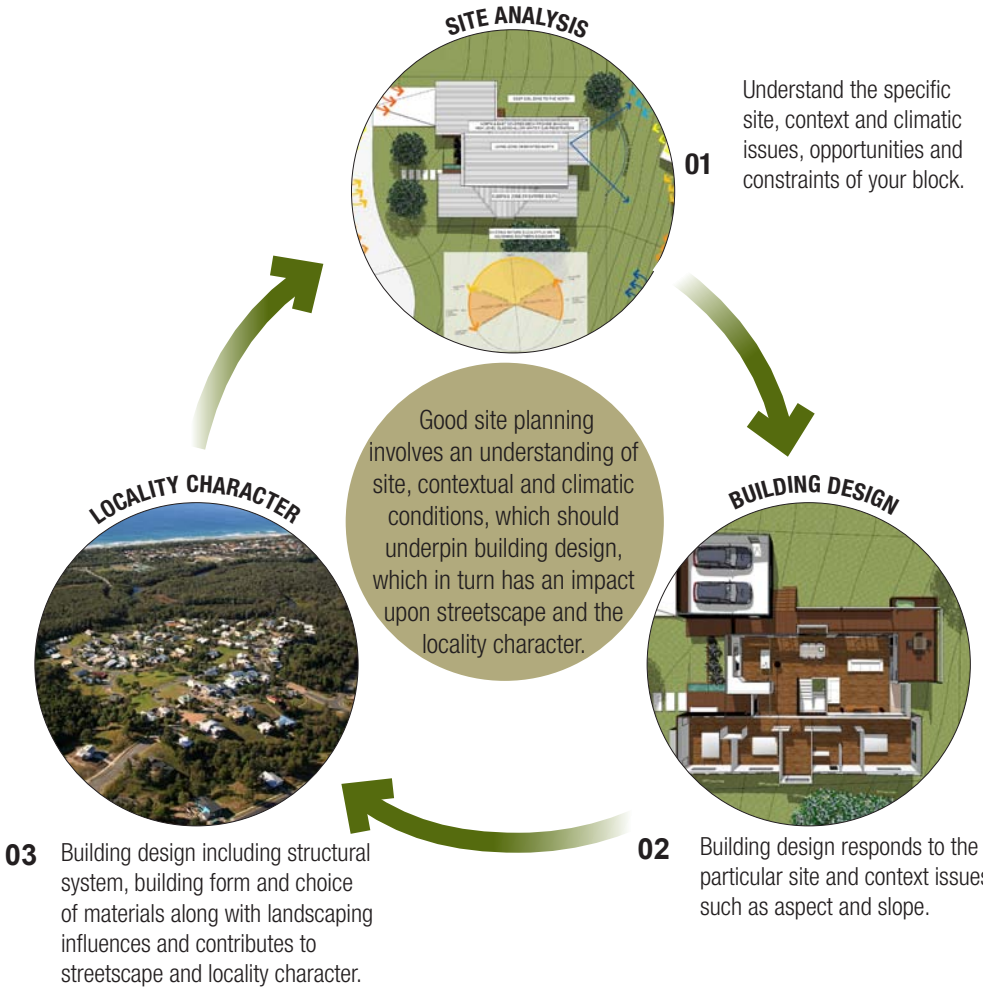
Understanding your site

South East Queensland and northern NSW have some fantastic attributes including a mild subtropical climate and ready access to world heritage rainforest and beautiful coastal and hinterland areas making it an attractive place to live. In many ways it is this landscape and climatic context that underpins the reason so many people are drawn to the area.

Development that is designed within this context enhances the sense of place, reinforces the undulating and vegetated local character and improves the quality of the environment for housing, the occupants and the wider community.

Understanding your site and making informed decisions about how your house design, living space location and deck areas relate to elements such as the sun path and prevailing breezes is an important part of the design process.

A site analysis plan will assist in understanding the opportunities and constraints of the site and in selecting or designing a house that responds to the site and the local characteristics. Similarly, how your house presents to the wider streetscape has the potential to build upon and enhance local character.



Planning your house layout

Once you understand your sites characteristics, opportunities and constraints through a site analysis process with Kline Homes "green smart" qualified builder, we can use this information to make decisions about the overall layout and design of your house.

A home designed to respond to site conditions can optimise lifestyle, improve energy efficiency and protect the quality of the natural environment. Carefully consider the relationship between the floor plan and the site, whether building or buying.

Look out for designs and houses that:

- Have a strong and welcoming street address,
- Have a good flow between spaces with rooms generally divided into zones of living, sleeping, utility with living spaces generally orientated north;
- Have a strong relationship between indoor and outdoor spaces which connect directly to yard space;
- Have good window placement which facilitates cross ventilation, view and sunlight access into internal spaces.

Good house design which responds well to a site:

- Significantly improves thermal comfort;
- Reduces or eliminates heating and cooling bills;
- Reduces greenhouse gas emissions from heating, cooling, mechanical ventilation and lighting;
- maximises the use of outdoor living areas;
- allows access to warm winter sun and cooling summer breezes;
- takes advantage of views, and
- retains (or establishes) the shade shelter and greenery of trees and landscaping.

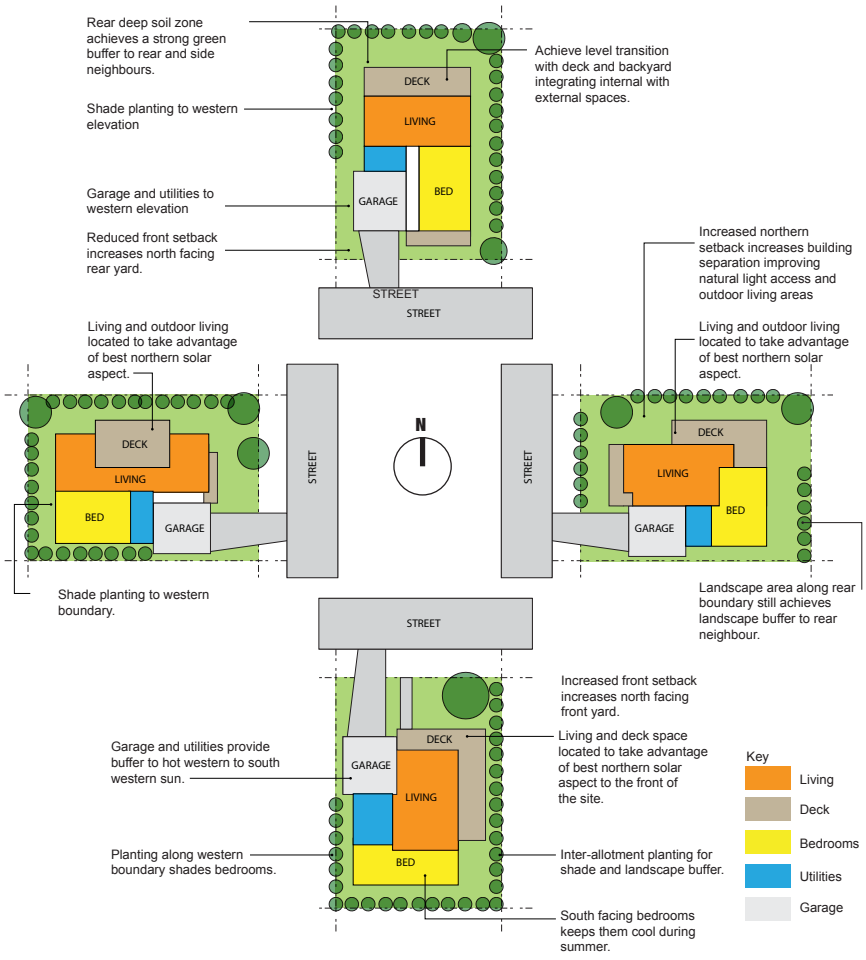
Adaptability

Good house design also builds in the ability of your house to grow and adapt as your needs change. An adaptable house is one which is able to respond effectively to changing household needs without requiring costly intensive alterations.

Think about how your needs might change over time or the different ways in which the rooms in your house can be used for different purposes. Think about including wider corridor and door way widths as well as unobstructed circulation space around your home which makes it easier for everyone to move around.

Site planning principles

Well oriented living spaces with a good indoor outdoor relationship.



Choosing your building materials

Your choice of building materials not only has an influence on the visual appearance of your house which influences the streetscape character, but will have a significant impact on the thermal performance and running costs of your building. Building design should respond to the local climatic zone (Zone 2 under Building Code of Australia).

Finishes and building materials chosen should be appropriate to the local climatic conditions, solar orientation and the site specific aspects of your site.

Careful selection of materials and the way in which they are combined can significantly improve the comfort level of your home by improving the energy efficiency as well as the visual appearance of your home. Aim to use a mix of materials which provide depth and layering to your buildings elevation and avoid using only one material.

For example, masonry materials such as brick have a high thermal mass. This means it retains much of the heat it gains through the day, releasing it slowly at night time. Whilst this is good during winter months, your house will require good ventilation during summer months to assist in releasing that heat. Without adequate ventilation in an all masonry house, it may be necessary to rely heavily on air conditioning during summer months.

Material life cycle and building maintenance

Consideration should also be given to the lifecycle of materials and the longevity and maintenance requirements of particular materials to a given location.

For example, some metals will rust and corrode very quickly within a coastal context. Similarly hardwoods which are exposed to the elements (salt, sea, sun and wind) will require regular maintenance to avoid cracking and disintegration.

From an environmental point of view, the embodied energy of a material as a result of its production is also an important consideration, as is its ability to be recycled or reused.

Finishes and materials should be appropriate to the local climatic conditions, solar orientation and site specific aspect, opportunities and constraints. Suitable materials include:

- Timber, weatherboards, plywood, fibre cement sheeting, custom orb, mini orb;
- Face brick and rendered concrete block (or foam) should not to be used as the only material;
- Walls of masonry, stone or brick are permissible where it adds to the detailing of an elevation or forms the lower level of a two storey building.

Bark Design

Colours should:

- be complimentary to the natural landscape;
- consist of natural native palette;
- be resultant of the natural inherent colours of the materials e.g.) timber, stone, metal;
- consider reflectivity and glare to neighbouring properties.
- consider heat absorption with darker colours generally absorbing and lighter colours reflecting.

Crisilis Architects

Building materials and structural systems are intrinsically linked. The structural system (eg. slab on ground, post and beam etc) should be closely suited to the sloping nature of your site to reduce construction costs, expensive earthworks, retaining walls and the amount of cut and fill. Construction type should be appropriate to degree of slope where a hybrid of slab on ground and suspended post and beam combinations can minimise cut and fill. Reduce impacts of cut and fill and site retaining walls with landscaping.

Sloping sites

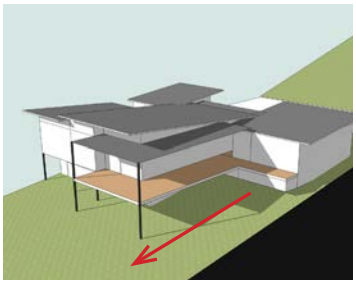
Sloping sites offer unique opportunities including great views, access to cooling breezes and often result in more interesting building forms where the design accommodates the slope. They do however require more design consideration than a flat block to balance house design, excavation and potential amenity impacts on neighbouring properties.

The key to reducing increased construction costs inherent with sloping sites is minimising the amount of cut and fill and engineered retaining walls. This is achieved by adapting a house design suited for your sloping site rather than trying to significantly alter the site through earthworks to 'fit' a predetermined house design.

Although some cut and fill on sloping sites is unavoidable, the visual, structural and drainage impacts can be mitigated by designing the house to step with the landscape and minimise the need for extensive excavation. It is important that as part of your initial site analysis process, the slope of the site is carefully considered along with other considerations such as sun aspect, prevailing breezes and best vantage and viewpoints from your house to make the most of your sloping block.

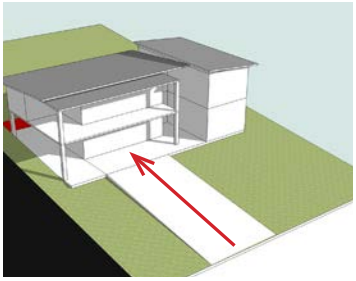
Sloping site rules of thumb

- Get a survey to accurately plot the contours and determine the slope of your block.
- Aim to take up level change in the building design.
- If you have a sloping block, avoid 'off the shelf' designs which have been specifically designed for a flat block.
- Single slab on ground construction are only really appropriate up to a slope incline of 40 or 7% as the cut/fill required becomes excessive (over 1.5m);
- On slopes of 4-120 (up to 1:5) think about stepping two or more slabs or using part slab / part post and beam construction to handle the slope.
- On slopes over 120-180 (1:5-1:3) look at post and beam construction which steps with the site.
- Slopes over 180 (1:3) are difficult sites to build on. Look at suspended or pole construction. This degree of slope can only really be accessed from a downslope configuration. It is generally too difficult to achieve an upslope driveway access.
- Be aware that additional costs on sloping sites can include excavation, retaining walls, scaffolding hire, additional engineering input, insulation under elevated timber floors and general increased labour costs.
- Offset these additional construction costs by reducing the amount of floor area you are building or even stage your development to 'infill the under croft' at a later stage.



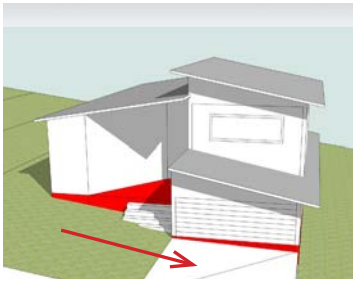
Down slope

- Site falls away from road.
- Conducive to split level design.
- Suits suspended structural systems and hybrid systems combining lower level slab with post and beam to upper level.
- Garage carports easier to build closer to the street.
- Avoid 'going up an extra storey' at the rear which significantly increases the buildings height and bulk from the rear.
- Aim for a level transition off the street level into the elevated living areas.



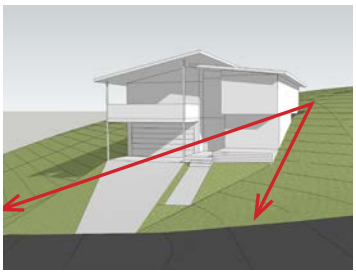
Up slope

- Site rises up from road.
- Generally require more cut allowing for lower level / garage.
- Garage doors and driveways are generally more visually dominant from the street on up slope lots. A projecting balcony over the garage reduces this visual impact.
- Aim for a level transition from elevated living areas to the rear yard.



Side slope

- Site rises/falls away from side boundaries.
- Design the house to generally have the
- garage at lowvvel with living space above.
- Need to avoid site 'benching' and large retaining walls at property boundaries which can lead to overshadowing, overlooking and drainage issues.



Rolling slope

- Site rises/falls in two or more directions.
- Design the house to take up level change within the building design by splitting the house over different floor levels.
- Avoid large unsightly retaining walls outside of the building envelope and landscape batters.

Sloping sites

MATCH BUILDING DESIGN TO SUIT THE SLOPE

FLAT 0-6^0

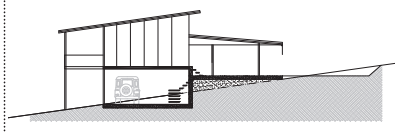
MODERATE 6-12^0

STEEP 14 -18^0

EXTREME < 20^0

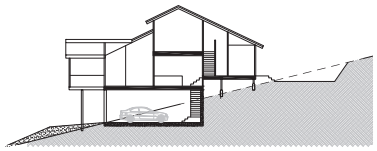
FLAT SITES
Single slab on ground construction (most project homes) are only really appropriate up to a slope incline of 4^0 or 7% as the cut/fill required becomes excessive (over 1.5m). Slopes between 4-6^0 should accommodate some level change within the building footprint.

- ☑ Single slab on ground
- ☑ Split or multiple slab for slopes over 4^0
- ☑ Post and beam



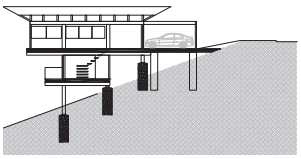
MODERATE SLOPE
On slopes of 6-12^0 (up to 1:5) step two or more slabs or use part slab / part post and beam construction to accommodate the slope.

- ☒ Single slab on ground
- ☑ Split or multiple slab
- ☑ Post and beam



STEEP SLOPE
On slopes over 12^0-18^0 (1:5-1:3) post and beam construction which steps with the site. This may include a lower part level which is a concrete slab.

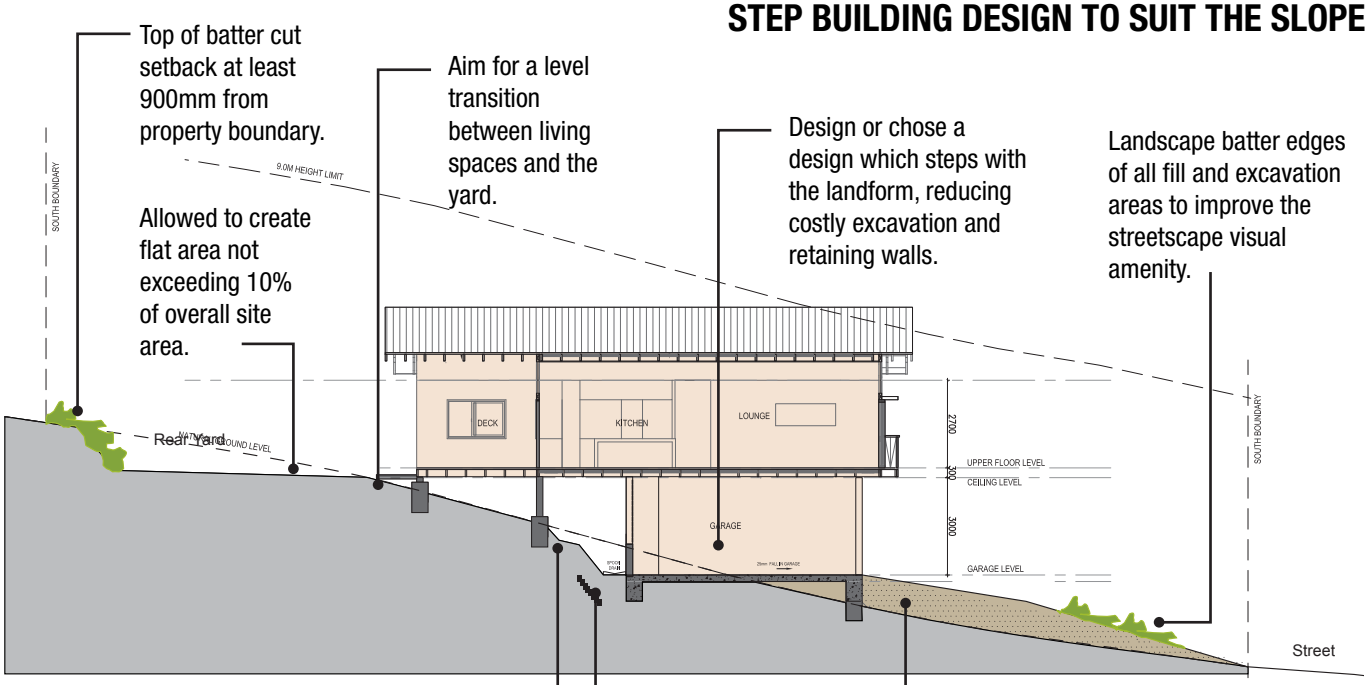
- ☒ Single slab on ground
- ☑ Split or multiple slab
- ☑ Post and beam



EXTREME SLOPE
Slopes over 18^0 (1:3) suspended or pole construction is required. This degree of slope is more suited to a downslope configuration. Driveway access is generally difficult on upslope lots which require large batters/retaining walls and a curving driveway.

- ☒ Single slab on ground
- ☒ Split or multiple slab
- ☑ Post and beam
- ☑ Pole house

STEP BUILDING DESIGN TO SUIT THE SLOPE



Landscaping your site

South East Queensland and Northern NSW lies within a bio-geographic region considered as one of Australia's most diverse in terms of its natural terrain, flora and fauna and includes high conservation significance at the local, regional, national and international level with world heritage listed national parks and national iconic scenic landscapes.

This biological diversity and landscape character are some of the key defining features of this region. This character has been translated to many of the region's best existing residential areas which are characteristically green and well vegetated.

Landscaping on the residential scale has an important role to play in improving environmental conditions such as allowing for storm water and rainwater absorption, providing habitat for native animals and plants, reducing bushfire risk, and helping to regulate and enhance the amenity of a development through such things as sun shading using pergolas and tree plantings.

Landscaping presents greater aesthetic quality and amenity for occupants when designed and integrated within the dwelling. As such, landscaping should not be generated by 'left-over spaces' resulting from building siting but should be integrated as part of the 'whole of site design'.

Landscaping has the ability to soften and integrate your development into the surrounding context.

Landscape design builds on the site and the locality's natural and cultural features to contribute to a building's positive relationship to its context and site. Landscape design should optimise function and usability, privacy and social opportunity, respect for neighbours' amenity and the opportunity to interact with the street.

Site landscaping builds upon and contributes to the landscape scenic quality of the region.