



The Handbook

Making Sense of Sustainable Building



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The Handbook

Together with Ergon Energy, Stockland presents – **The Handbook**.

The Handbook will help you make the right choices when designing your new home.

Simple choices you make today will affect how well your home copes with the Townsville climate and will have a significant impact on the ongoing energy and water costs of your new home.

The Handbook provides advice on the choices that will help you make your new home the best it can be.

How it works

The Handbook is divided into four easy-to-read sections:

Climate Sense

a guide to designing for our unique climate

Energy Sense

a guide to designing an energy smart home

Water Sense

a guide to designing a water smart home

Nature Sense

a guide to designing a nature sense garden

Making Sense of it all




As household costs rise, the need to live more sustainably has never been greater. The good news is that there are many ways you can save on your household electricity and water bills. The most effective way to ensure you minimise the impact of these cost increases is to choose an energy efficient home design.

Already, there are rules in place to increase home energy and water efficiency. All new homes must have a six-star rating or better. Water saving shower heads and water taps are mandatory and appliances such as air conditioners must now meet higher energy efficiency standards.

The Handbook will inform you of a range of choices available to increase your home's efficiency.

Some of the choices you make may cost extra – but weigh those decisions against savings down the track. People are becoming more aware of the long term cost of energy inefficient designs and this could affect your property's value in the future.

“The choices you make today will not only affect your future cost of living and home value but also the way you use and enjoy your home. We encourage you to think about this as you plan your new home.”



Stockland and Ergon Energy recommend a number of simple things you can do when you decide on your new home:

Orient your home correctly

Simply orientating your living areas and having cross ventilation to capture the summer breezes can reduce your reliance on air conditioning. Also, locating your main living areas on the north-eastern side of the home will minimise the impact of the hot afternoon sun.

Choose light colours

These reflect the sun, while dark colours absorb its heat. Just place your hand on a dark coloured car in summer at midday and then do the same on a white car and you will feel the difference. The same goes for choosing the roof and wall colours of your house. You may think dark colours look better but they will cause higher temperatures inside your home.

Ventilate and insulate your roof

If not properly ventilated or insulated your roof can act as one big heater, trapping the heat of the day in your house for longer. In Townsville's summer it can be like sleeping with a blanket on top of you.

Choose solar hot water

Yes it costs more up front, but consider future savings – if electricity prices continue to rise will the extra expense be worth it? The sun's power is free.

Connect to the Off Peak Tariff

Did you know Tariff 33 (off peak) costs 40% less than Tariff 11? Connect your hot water system or your solar hot water booster to Tariff 33. If you have a pool, you can also connect the pump to Tariff 33.

Include water saving features

Reducing outdoor water use cuts overall consumption significantly. Incorporate a grey water reuse facility in your new home, choose water wise plants for your garden, and cover your pool when it's not in use.

Landscape properly

Getting landscaping right pays dividends. Correctly locating shade trees, constructing a garden to create a cool zone around your outdoor areas, or using landscaping to shade your western wall can have huge impacts on the liveability of your house. Planting the right plants now and planning your garden for the future can provide more than just an enhancement to the street appeal of your house; it can cool your home as well.

Our Challenging Climate

Townsville has a dry tropical climate dominated by two distinct seasons – “the wet” and “the dry”. Designing your home with the climate in mind will make it much more comfortable to live in. Firstly, you need to know a few things about the climate.

Townsville's Climate

	Wet Season	Dry Season
When	November to April	May to October
Day time	Hot, muggy	Sunny, mild to warm
Day temperatures	29-31°C	25-29°C
Night time	Fairly hot and muggy	Cool
Night temperatures	20-24°C	13-18°C
Rainfall	Most of the annual average of 1143mm falls in the wet and can occur as short heavy downpours or as weeks of constant rain	Very little or none at all
Humidity	Exceeds 65% - uncomfortable	Lower than 65% – comfortable
Breeze	North-easterly afternoon sea breeze	Cooling south-easterlies
Cyclones	Occur (but not often)	Do not occur

Climate Sense



In Townsville's hot humid climate, the priorities are to minimise solar radiation and capture air movement, with openness and shading the dominant characteristics of the building. Climate-responsive design features can be included into the design of your home to create a comfortable living environment and reduce your reliance on air conditioning.

Most of the lots at North Shore are oriented either directly north-south or east-west. It is important that you understand which way your lot runs so that you can usefully apply the information in this handbook.

There are two very important aspects of our climate that you need to consider when designing your home; the direction of cooling summer breezes and the daily path of the sun.

Cooling breezes

North Shore experiences a prevailing, north-easterly afternoon sea breeze during summer. The north-east breezes are particularly important for cooling the home during the hot and humid summer months.

Sun movement

At Townsville's latitude, the sun in mid-summer rises about 20 degrees south of east, moves almost overhead at midday and sets about 20 degrees south of west (Figure 1, left hand side). This directs the worst of the heat on the south-eastern, southern and south-western aspects of the house for several hours in mornings and afternoons.

By mid-winter, the sun has moved to the northern sky. It then rises about 20 degrees north of east, moves to about 50 degrees above the horizon at midday and sets about 20 degrees north of west. Winter warmth therefore falls mainly on the north-eastern, northern and north-western aspects through the day (Figure 1, right hand side).

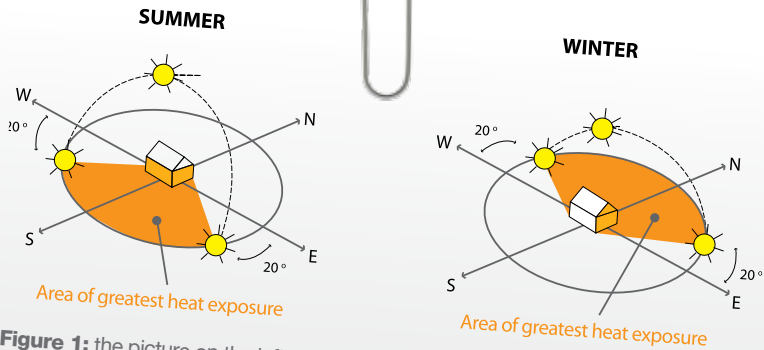


Figure 1: the picture on the left shows the daily path of the sun in the summer and the picture on the right shows its path in the winter.

Positioning your home

You can position your home to take advantage of passive cooling on all North Shore allotments regardless of their size, shape and orientation.

TIP

Make sure you get the orientation right. Otherwise, your new home's overall efficiency will be limited, even if all other energy-efficient and sustainable criteria are met.

Your home layout should consider the following:

- Position your home as close as possible to the southern and western boundaries of your block. This will leave the northern and eastern sides for gardens and outdoor living. These areas are cooler in summer.
- Place garages, laundries and bathrooms (rooms where the least amount of time is spent) on the hot southern or western side and living areas on the cooler northern or eastern side.
- Try not to locate large windows on the western side of your home.

FACT

When sunlight passes through glass into your home it is absorbed by building materials and furnishings, which then re-radiate heat. The heat becomes 'trapped', just like in a greenhouse, resulting in higher temperatures indoors compared to outdoors.

- Position your main living areas and bedrooms to catch the cool north-east breezes in summer and design for cross ventilation – it will ensure you draw the breeze into your home.

Shading your home

Shading the building and outdoor spaces will reduce the temperature inside your home. You can use artificial shading (such as awnings and full length verandas) and natural shading (plants and shrubs strategically placed), or combine them (pergolas with vine cover or green walls).

Consider:

- Wide patios to provide shade to the internal rooms
- Shading western and southern walls
- Making sure your roof eaves are at least 600mm wide (900mm is better)

FACT

During the middle of the day when the sun is at its highest a roof eave of 900mm will provide 100% shading of walls.

Building materials and construction

You need to consider the thermal property of your building materials – the extent to which they absorb and hold heat and transfer it into your home. To reduce the heat that your home absorbs, choose materials that:

- release unwanted heat quickly once the sun has gone and the temperature has begun to cool down – e.g. lightweight wall materials such as timber and fibro-cement sheeting.
- keep out the heat during the day by using appropriate insulation and light colours for roofs and external walls.

Concrete block walls exposed to the sun can hold significant heat then release it in the home during the night. However, if block walls are shaded throughout the hottest parts of the day they remain cool and can have a cooling effect.

Areas of thermal mass adjacent to the house such as driveways and nearby roads will re-radiate heat and add to the heat load on your home if not properly shaded.

The roof

The roof is the largest surface area in the home and is exposed to the sun all day. Inevitably it will get hot.

Consider:

- Light colours (white is best) reflect heat and keep it out of your home. Dark colours absorb heat.

FACT

Recent studies have shown that a light coloured roof can have approximately 30% lower heat gain than a dark roof.

- Steel roof sheeting, such as corrugated iron, loses heat quickly as soon as the sun stops shining on it.

FACT

Roof tiles slowly absorb heat during the day and then slowly re-radiate it into the home at night. If you choose tiles, make sure to use reflective foil to reduce the slow release of heat into your house overnight.

The roof space

Poorly ventilated roof spaces get hot and in turn super-heat the air in the roof space.

Ask your builder how your roof space will be ventilated. Options include eave vents, ridge vents, mechanical ventilation, and whirlybird style vents. There is even a solar powered roof vent system available whereby a small solar panel powers a fan that sucks the hot air out of the roof space.

FACT

Poorly ventilated roof spaces get incredibly hot and can reach up to 70°C. When the sun hits the roof it transfers heat down and super-heats the trapped air in the roof space.

Insulation

Insulation is one of the most important factors in helping reduce the amount of heat entering the home and also helps seal cool air in. A well-designed insulation system will often pay for itself in electricity savings in as little as two to three years.

There are two types of insulation; reflective and bulk.

Reflective insulation reflects heat away from a surface, preventing 95% of infrared “radiant” heat from entering the space below.

Bulk insulation reduces the amount of heat transferred into the home. It works by resisting the amount of “conducted” heat flow between the hotter air in the roof space and the cooler air inside the home.

In Townsville’s hot humid climate, bulk insulation on the ceiling sheet combined with good ventilation of the roof space is a good solution.

Outdoor living

One of the great advantages of the Townsville climate is that we can spend a lot of time outdoors and most homes have an outdoor living area.

When locating your outdoor areas, consider:

- The best locations for outdoor living areas are on the north and north-east sides of the house. These areas get the prevailing breezes making them the coolest spaces in summer and are least affected by the low-angled sun in the hot afternoons.
- East and south-east locations are also good areas for outdoor living spaces as they receive direct breezes and will be fully shaded in the afternoons. You should think about shading these spaces from the low, early morning sun.
- Outdoor living areas on the western side of a property will receive the worst of the afternoon sun, however, verandas and patios on the western side of your home will shade the internal living areas and reduce the inside temperature.

**TIP**

Why not consider two outdoor living areas – one located away from the western sun and one in the path of the western sun that will shade your internal rooms.

When designing outdoor living areas, consider:

- a high ceiling will create a cooler environment for you and your family by promoting a feeling of airiness, allowing the hot air to rise and cool air to circulate. For this to occur, the ceilings (or underside of roofs) of outdoor living areas should be at least 2.7 metres high.
- stacking slider doors which retract onto each other (leaving as much of the wall space open as possible) are a good solution for indoor living areas adjoining outdoor spaces.
- use ceiling fans in your patio area to circulate air on still days.
- natural shade is important. Why not plant a shade tree or garden close by?

**FACT**

Water features and swimming pools located in the path of prevailing, north-east breezes can help cool your home. As air moves over a body of water this increases the rate of evaporation and results in a cooler air temperature.

**Energy
Sense**



According to a recent survey of Ergon Energy customers, air conditioners, refrigerators and hot water heaters are the three biggest users of electricity in the average household in North Queensland.

There are a number of ways to reduce electricity bills. Let's look at how.

Hot water

Traditional electric hot water systems use a lot of energy and have been phased out in new homes. Today you can choose between a solar hot water system, a heat pump or a gas system.

To choose the system that is best for you, first estimate your hot water needs. This is usually based on the number of people that will live in your house. You can also estimate this based on the number of bedrooms you are building.

- **Solar hot water** – Solar hot water systems cost virtually nothing to run. Occasionally, when solar radiation is low, you may need to use the booster function on your system. Make sure you connect the booster to Tariff 33. That way, when you do run your booster you will save 40% for every kilowatt of electricity that you use.
- **Heat pumps** – Heat pumps are a low cost way of generating hot water, using about one third of the energy of a standard electric hot water system. Make sure you connect your system to Tariff 33 to save that 40%.
- **Gas hot water** – Most gas hot water systems heat the water as you need it. So unlike other hot water systems they do not store water and try and keep it hot. If you are looking at also getting gas cooking then this may be the choice for you.

Air conditioning

Air conditioning is expensive and has a large carbon footprint. If you design your home to incorporate the suggestions in the “Climate Sense” section of this handbook, cooling your house in summer will be much more manageable and economical.

It is a good idea to use fans and open windows to cool down your home wherever possible. This will go a long way to reducing your reliance on air conditioning.

When you are using air conditioning, having the fans on will distribute the cool air and reduce the amount of time your air conditioner will need to run.

Fans need to be positioned to take advantage of ventilation from the prevailing breezes. Also, fans should be located in parts of a room where the main activities go on, for example, where people sit to watch TV or listen to music.

Higher ceilings and the right choice of windows (casement windows and louvres are best) will also help keep your house cool. As air heats, it rises, so if casement windows or louvres are located close to the ceiling this will assist hot air to escape from the house on summer days.

Another way to help keep your new home cool is to include a breezeway in its design. A breezeway is an architectural feature similar to a corridor that allows the passage of a cooling breeze. It could be as simple as a roof connecting two structures (such as the main house and a detached garage or shed) or it could be closed in with lattice work on either side.

FACT

On average, a ceiling fan uses 80 watts of energy; about the same as a typical old style incandescent light bulb. Air conditioners use much more energy than this. So turn on your fans first – they may be all you need.



Note the position of the fan and use of louvres in the room above.

Even with ceiling fans and natural ventilation, high temperatures combined with high humidity can make the Townsville summer very uncomfortable. This is when you will be reaching for the air conditioner controller. You can ensure you get the best effect from your air conditioner by designing your interior areas to allow them to be partitioned off. This will contain the cool air for longer.

All new air conditioners must meet a minimum tested average Energy Efficiency Ratio (EER). For best long-term results, choose a unit with the highest efficiency.



Sliding doors partition the living space

Lighting

New houses, townhouses and units must have:

either

energy efficient globes installed to a minimum of 80% of the total fixed light fittings, including attached garages, balconies and decks

or

lights which do not exceed the following maximums:

- 5W per square metre for fixed lights inside the house
- 4W per square metre for outside living verandas and decks
- 3W per square metre for garages

Energy efficient lights include:

- Compact fluorescent tubes (CFLs), which use about one quarter of the energy that incandescent lights use.
- LED lights, which use about half the energy of CFLs.

Other lighting types include:

- Incandescent bulbs, which are the old-style lights that are being phased out. They are the cheapest to buy, but the most expensive to run.
- Halogen lights, which are popular but consume a lot of energy. Consider using infrared coated (IRC) halogens instead.

Light type	Energy sense	Consider these factors
Incandescent	Being phased out	
CFL	Good choice	Limited options for dimming
LED	Even better choice	Best option where halogens are generally used, should last 10 plus years and they don't heat up
Halogens	Expensive to run, transformer is a guzzler and they get hot	Ceiling mounted halogens will heat up the roof space
IRC Halogens	Better halogen option	Infra-red coating (IRC) means they use almost half the energy of traditional halogens

Making sense of energy star ratings

When buying new appliances for your home, it makes sense to check the star ratings. Generally the higher the number of stars on an appliance the more efficient (less energy) it needs to function at normal performance. The kilowatt-hours used by the appliance will also be on the label. By comparing this measure between appliances, you can assess which will use the lowest amount of energy.

Fridges

The refrigerator is the single biggest power consumer in some households. Refrigerators and freezers typically make up over 20% of total residential electricity consumption.

There is a large difference in energy consumption between the best and worst models for many types of refrigerators. In some cases, the best models use only half the energy of a similar, less efficient model.

Decide on the size, type and features you want; don't buy something that's too big for your needs. If you're not keeping a fridge at least two thirds full or a freezer at least three quarters full, it's probably too big and wasting energy.

Washing machines

The standard energy labelling test for clothes washers specifies a warm wash so the majority of the energy shown on the label is for heating the water. Choose a model that has low water consumption and choose the cold wash option when possible – this saves both energy and water!

Televisions

Televisions are now amongst the largest users of electricity in some households. In the extreme, a large plasma TV can use more energy over the course of a year than a family-sized fridge, or more than your dishwasher, clothes washer and dryer combined!

The most energy efficient televisions are LEDs, they cost 20% less to run than LCDs. The worst performers are plasma televisions, using more than twice the energy of LEDs.

FACT

If you use the highest star ratings for all your new appliances you could save, on average, over \$350 per year.¹

1. Based on 2011 Tariff 11 electricity prices and an average household appliance package including dryer, washing machine, combined fridge freezer, dishwasher and 42" television.
For more information go to <http://www.energyrating.gov.au>

Generate your own power

Installing solar power generation in your new home makes energy sense. You minimise future energy costs and you may be able to earn money from the extra electricity you put back into the grid.

You will need to check with your installer on the latest rebates for solar photovoltaic panels.

If you choose solar power, it's wise to ensure the house and roof is constructed to maximise the amount of sun that reaches the solar photovoltaic (PV) panels.

PV panels capture the sun's energy as direct current (DC). This is then converted to AC power by an inverter. It is critical your installer contacts Ergon Energy to get the necessary approvals prior to installing your system.

The energy that your PV panels produce is sent back to the electricity grid. At the end of each quarter, your electricity bill will calculate how much energy your panels have generated and then subtract what you have used. If you have used less than you generated you will be paid for the excess power you have supplied.



Water Sense



There are strong connections between water and electricity:

- Most of Townsville's electricity comes from coal-fired power stations which use an enormous amount of water to generate electricity.
- Water is pumped to your new home using electricity.
- Making clean drinking water is energy intensive.

You can reduce your water consumption by installing a water tank for rainwater, or a grey water system, or both. The water you get from either of these systems can be used to water your garden in the dry season.

You can also reduce your water consumption (and save on your energy bills at the same time!) by installing water efficient washing machines and dishwashers.

Reusing grey water

Wastewater from baths, showers, basins, laundries and kitchens is called grey water.

Reusing grey water on the garden can significantly reduce water demand for an average home. As well as reducing pressure on drinking water supplies, using grey water has other benefits:

- Lower fertiliser use
- Improved groundwater maintenance
- Reclamation of nutrients
- Reduced demand on electricity used to supply drinking water

A typical Australian house generates an average of 100 litres per person per day of grey water that is suitable for watering gardens. At this rate,

over a week a four-person household will generate enough grey water to irrigate 100m² of garden.

To reuse grey water, you will need to install a grey water diversion device and subsurface irrigation. You may also need to install surge tanks and/or pressure pumps if there is insufficient elevation. The diversion device consists of a manual switch and coarse filter which a licensed plumber connects to the waste plumbing of the laundry basin, bath etc. The facility must be installed externally to allow easy access for maintenance.

Council approval is required to install a grey water reuse facility in a new home. Also, it must be installed by a licensed plumber. There are a range of suitable grey water systems on the Queensland Government's approved list. For information about how to get approval, visit the Townsville City Council website.

TIPS

- Prefer garden-friendly cleaning products. This will keep your garden green and healthy.
- Maintain your grey water reuse facilities. This can be as simple as changing or cleaning a filter in the diverter device or pump.
- Ensure the grey water application area is undisturbed and preserved in its approved form.



Pools

If you are putting in a pool you will be able to take advantage of the cooling effect of air passing over the water, so locate your outdoor living next to the pool.

Pool pumps consume a lot of energy. Make sure you talk to your pool installer about putting your pool pump on Tariff 33. This way, the electricity you use will cost about 40% less.

An alternative is to install a 5 star rated pump, these use much less energy than traditional pumping systems. Ergon Energy is currently offering customers \$350 cash back to install their pool pumps on Tariff 33 and \$250 cash back for customers purchasing a 5 star rated pool pump.

Try to keep the water level of your pool halfway up the skimmer opening. Overfilling the pool stops the skimmer working efficiently and wastes water. You should also make sure you install the correct size pool pump. Check with a pool equipment supplier to ensure the pump is the correct size for your pool.

A pool cover is a clever way to reduce evaporation and the need to regularly top up your pool's water level. Without a cover, most of the water in your pool can evaporate over a year.

Water wise gardens

There are several ways in which you can reduce the amount of water that your garden needs:

- Use grey water.
- Choose water wise plants – many native plants and introduced plants cope well with minimal watering during the dry winter months.
- Apply deep mulch to your garden – this improves the soil and reduces water loss through evaporation.
- Improve the quality of the soil – choose a suitable soil improver that makes the soil retain moisture better.
- Consider a drip irrigation system. It will cut wastage by making sure the water goes only where you need it.
- When deciding on a lawn type, go for a slow growing, water saving variety. They have deep roots for drought tolerance and they don't need mowing as much as other varieties.

For more tips about landscaping to conserve water, check out the next section of **The Handbook** – Nature sense.

TIP

Save water, save money. If you are a dedicated water saver, you may be able to save money on your water bills. Townsville City Council offers a Water Watchers option for residential water charges. This suits homes that consume less than 300 kilolitres of drinking water a year.

Nature Sense



Landscaping

Landscaping should form an integral part of a sustainable home. It can help shade your home from the heat and promote cooling breezes as well as making outdoor living areas more attractive.

The overall landscaping theme for public areas in North Shore aims to recreate and reinforce the character of the natural vegetation of the region. Generally, species native to the local area are being planted.

In your private garden, native species are more likely to grow faster, look healthier, require less maintenance, and more importantly provide for native wildlife.

The Sales Office will have more information for you on specific plant varieties that are suitable for this area.

Landscaping for shade

Facing north:

- On the north-facing side of the house, trees with a high horizontal canopy and exposed trunk teamed with low shrubs and groundcovers are most effective in providing shade and allowing the prevailing north-easterly breezes to cool your house.
- Pergolas are also an effective landscaping device to use on north-facing areas.

Facing east and west:

- On the west and east-facing side of the home, the sun will be low in the sky, penetrating deep into the garden and onto the unprotected walls and windows of the house.
- Landscaping that will offer the best protection will be vertical and dense in form and shape.

- Mixed-height planting composed of tall-growing shrubs together with trees or multi-stemmed palms are also useful for shading west and east-facing areas.
- If space is limited, vertical structures, such as trellises or screens covered with climbers can be just as effective.
- Shade large paved areas such as driveways and parking areas with shade sails, pergolas or shade trees to reduce radiating heat and glare.
- A tree can take up to five years to reach the height needed to provide the required shade. Consider installing a sail or similar structure to provide instant shade while the landscaping becomes established.

Landscaping for breezes

- Plant sparsely, or select species that allow breezes to filter through on the property's north-east areas, where prevailing breezes come from.
- Position swimming pools and water features to the north or north-east (upwind) of your home and shade where possible. Breezes will increase the rate of evaporation over a body of water, resulting in cooler air passing through the garden and house.
- Locate driveways and uncovered car parks (which can get hot) away from the path of the prevailing breeze.
- Locate structures, such as garages, carports, sheds and greenhouses away from the path of prevailing breezes.

FACT

Landscaping correctly can create a cool micro-climate close to the home. This is because plants affect the air temperature and moisture content (humidity) as well as provide shade.

FACT

Plants give cooler shade than artificial shade structures. This is because of the transpiration and evaporation of water from the plant's leaves. The shade associated with transpiration created by vegetation can lower the temperature by an estimated 3-5°C.

For more information

Climate sense

For more information about climate smart design in Townsville, visit www.townsville.qld.gov.au. Use the “Search” function and type in “sustainable housing information kit”. This online resource includes detailed guides on climate-responsive design.

Information on how to design a sustainable home is also available at www.yourhome.gov.au and www.sustainable-homes.org.au.

Energy sense

Go to www.ergon.com.au. Select the “Your home” tab and then click on “Save on your bill”. Check out the “Energy sense” hints and use the energy calculators to work out how much each appliance costs to run.

The energy efficiency of a wide range of household appliances such as air conditioners, washing machines, refrigerators and TVs is rated at www.energyrating.gov.au. This site also lists minimum energy performance standards for products such as hot water heaters and light bulbs.

The national ENERGY STAR program promotes the use of energy efficient electronic equipment at home and in business. For more information, go to www.energystar.gov.au.

Water sense

Visit the council website at www.townsville.qld.gov.au and use the “Search” function. For more information about how you can use grey water in your garden, type in “grey water reuse in Townsville”. For more tips on how to reduce household water consumption, type in “how to save water”.

Nature sense

Visit www.derm.qld.gov.au/waterwise for more information about how to incorporate water saving principles into your gardening. Use the online plant selector to find water efficient plants suited to your location and climate conditions.

Notes





The Handbook

More and more Townsville residents are embracing sustainability into their lifestyles. Never before has it been more important to think about ways to reduce your on-going household costs and future proof the biggest investment you will ever make. That's why we have designed **The Handbook** – it's a guide to help you make sense of sustainability, from the time you make your land purchase until you turn the lights on in your new home. **The Handbook** is full of information and tips to make your new home make sense in every way possible.

