

## Natural Designer Homes

### Project- Ecology

#### Energy Management

Purpose – To reduce operational energy consumption through passive solar design elements, appropriate construction methods for the climate, appropriate ventilation and the selection of energy efficient fittings and appliances.

Achieved by-

- 1.1 The building has been designed & built in accordance with local BASIX requirements, going above and beyond specifications.
- 1.2 The home has been designed to take advantage of natural lighting and passive solar heating throughout the year. All living areas & bedrooms have been orientated to control and benefit from solar access.
- 1.3 Solar absorption has been limited during the summer months through the use of wide eaves and patio areas to shade the windows. All windows have been thermally improved with low emissivity (low E) glass.
- 1.4 The building has been designed to take advantage of prevailing breeze paths to provide natural ventilation. No mechanical ventilation has been used other than the wet areas.
- 1.5 The building has been designed to incorporate room zoning to eliminate heat loss during the cooler months. The living area can be closed off from the rest of the home.
- 1.6 All internal and external doors & windows have been sealed to minimise heat/ cool losses.
- 1.7 Electric boost evacuative tube solar hot water heating has been connected through a timer switch at the meter box. This allows the hot water boost times to be managed in a way that best suits the occupants of the home.
- 1.8 All lighting is low energy usage LED fixtures, with florescent lights in the garage. Minimal general lighting has been used with task & mood lighting incorporated. No dimmers have been used as these can create a dirty power source which is unhealthy for the occupants.
- 1.9 All electrical wires have been run in a central trunk in the ceiling above the hallway to minimise the electro magnetic fields of the home. No power points behind beds to minimise the electrical currents directly effecting occupants.
- 1.10 Stand by switch enables occupants to turn off all stand by power when not in use, thus leading to a large energy saving.
- 1.11 2.4 KW solar energy system above garage roof.
- 1.12 Clothesline has been positioned on the northern side of the building to maximise the drying potential of the sun.
- 1.13 All fixed electrical appliances have been selected for their energy efficiency. Where appliances require energy and water consumption such as the dishwasher and washing machine, care has been taken to select on energy star ratings as well as WELS water ratings.
- 1.14 Ceiling fans have been installed to all living areas & bedrooms to eliminate the need for air conditioners. Fans are also reversible so they can be used to move the warm air down in winter.
- 1.15 Pelmetts have been installed to all windows & doors to minimise the heat losses in the cooler months. This also reduces the heat ingress in summer months.
- 1.16 Sun block blinds have been used in living areas & bedrooms to control solar access in summer months, eliminating the need for air conditioners. They also act to control heat loss during the cooler months.
- 1.17 Extensive use of skylights so as to minimise the need for artificial lighting. These are double glazed (low E) with argon filled.
- 1.18 Thermal mass has been incorporated through the used of honed concrete internally. This eliminates the need for mechanical heating in the cooler months.
- 1.19 Lightweight external claddings have been incorporated to reduce heat build up, appropriate to the climatic conditions.

- 1.20 Insulation has been used throughout the home. All external & internal walls have been insulated, along with all ceiling and floor spaces. Anti-con roof blanket has been used under the roofing metal.

### **Water Management**

Purpose- to reduce water consumption through the selection of water efficient fittings and fixtures and installation of alternative water supplies.

- 1.1 All toilets have a 4 star WELS rating to limit potable water consumption.
- 1.2 All taps have a 5 star WELS rating. Taps have been used over mixers in all areas beside the kitchen in order to separate hot and cold water supply. Kitchen has been fitted with a mixer which combines hot/cold water supply and a water filter in the one fitting. It achieves a 5 star WELS rating- producing a flow of 6 litres per minute.
- 1.3 All shower heads achieve a 3 star WELS rating with a flow rate of 9 litres per minute.
- 1.4 20,000 litre underground concrete rainwater tank services all outdoor taps/ laundry tap & toilets. All roof water is directed to the water tank.
- 1.5 Watertank supply pipes have underground first flush diverter.
- 1.6 Rainbank water diversion system installed to control water harvesting.
- 1.7 Hot water recirculation system installed to reduce hot water wait time and limit loss of cold water.
- 1.8 Swimming pool is topped via tank water.
- 1.9 Atlantis turf cell installed to driveway area. This acts as drainage for the driveway and to limit rain water run off into sewer.
- 1.10 Natural mineral pool system chosen over a salt water chlorinator so pool water can be used on the garden- as well as having health benefits for the occupants.

### **Indoor Air Quality**

Purpose - selection and use of materials and building products which can assist in creating a healthy home environment for future occupants.

- 1.1 Natural ventilation has been maximised to living areas and bedrooms. Louvres have been used extensively to direct the air flow and allow use in all weather conditions.
- 1.2 All joinery elements are formaldehyde free and contain no VOCs.
- 1.3 All internal paints and finishes are VOC free.
- 1.4 All external paints are low VOC.
- 1.5 All floor coverings are zero VOC or low VOC.
- 1.6 Shower areas are mechanically vented to the external eaves.
- 1.7 All glues and solvents used are low VOC.
- 1.8 All internal wall & ceiling paint is clay based. The clay paint has zero VOC's and acts as a filter to improve the indoor air quality. It naturally resists the growth of mould which can be an issue in this humid climate.
- 1.9 Cedar has been used in all wet area. Along with the clay paint, this helps to regulate moisture in the air and resist the growth of mould.
- 1.10 Every material which has gone into the home has been scrutinised for VOC's and the best alternative has been selected to improve the air quality for the occupants.
- 1.11 Ducted vacuum system helps to reduce the level of dust particles in the air over a conventional vacuum cleaner.
- 1.12 Hard surface flooring used throughout downstairs with rugs to soften lounge and bedroom areas. Rugs can be placed outside where the UV kills dust mites etc.

## **Materials Selection**

Purpose - selection and use of materials which can assist in reducing the environmental impact of the home during construction and as a finished home.

- 1.1 Majority of building materials have been selected to reduce the energy consumed for transportation to site.
- 1.2 Materials have been selected to reduce the carbon footprint of the building.
- 1.3 Selection of construction materials that require no additional finishes such as honed concrete, low carbon steel for wall cladding, rough sawn cedar for wall cladding, copper external lighting, low carbon steel for garden edging, hardwood timber external stairs, anodised aluminium doors and windows both internally and externally.
- 1.4 FSC certified western red cedar used extensively on external walls.
- 1.5 Physical termite barriers used, exposed concrete.
- 1.6 Eco + carpet made with natural corn sugar has been used as a sound barrier for flooring upstairs. The same carpet has been made into rugs for the downstairs area.
- 1.7 Ezzari tiles for pool and bathrooms- made from 100% recycled glass.
- 1.8 FSC Birch ply for all joinery elements, including ply light shades fitted with LED lamps.

## **Universal Design**

Purpose - the general design and features of the home aimed at ensuring the needs of the occupants, regardless of age or ability can be met now or in the future, through simple adaptations.

1. All living areas are situated on the ground level.
2. Level street access is achievable for wheel chair access.
3. All ground floor internal areas are level & flush.
4. Internal corridors & doors facilitate comfortable and unimpeded movement between spaces.
5. All external concrete has an anti slip finish applied.
6. Internal areas are anti slip surfaces.

## **Landscaping**

Purpose - design and management of outdoor areas around the home.

- 1.1 Gardens have been designed to provide shade during summer months.
- 1.2 Native plants have been used throughout the gardens, minimising the need for additional water, maintenance or any pesticide treatments.
- 1.3 Empire Zoysia turf has been chosen to reduce the amount of mowing required. It is also drought tolerant.
- 1.4 All gardens and lawns have automated irrigation system connected to rainwater tank.
- 1.5 North facing garden area set up for vegetable growing.
- 1.6 Fruit trees have been incorporated into the landscaping areas so as to provide an edible garden free from pesticides.
- 1.7 Trees such as lemon myrtle have been selected for the central courtyard area in order to act as a natural repellent for mosquitos- plus they can be used to flavour cooking.
- 1.8 400 litre Aerobin composting system is situated with waste and recycling bins in a screened section out front.
- 1.9 Fencing consists of timber (which is a requirement from council) as well as natural brush fencing.

## **Stormwater Management**

Purpose – To ensure construction work takes place in a way which minimises the potential or actual removal of soil and sediment from the building site and potentially entering drains and nearby waterways.

- 1.1 No cut and fill has been carried out on the site. The building follows the natural contours of the land, minimising soil erosion.
- 1.2 Sediment control was incorporated extensively during the build to minimise construction sediment running into natural waterways.
- 1.3 Soil & sand stockpiles during construction were barricaded and covered to maximise control of these areas.
- 1.4 Construction waste was captured and removed at regular intervals. Much of the waste was reused in other parts of the building.
- 1.5 All stormwater & roof water was piped directly to stormwater detention tank during construction.
- 1.6 Stormwater is directed into detention tanks, slowly released into the subground.
- 1.7 All exposed areas have been treated with turf to minimise erosion, or otherwise controlled through erosion barriers.

## **Resource Efficient Practices**

Purpose - to ensure construction work is carried out in a way which minimises the potential or actual waste material generated and ensuring appropriate removal from site.

- 1.1 Site bins during construction facilitated the ability to recycle waste materials. Mixed waste materials were discarded in accordance with local regulations.
- 1.2 Contractors are educated during construction of appropriate site bins to be used for waste.
- 1.3 Building design allowed for minimal building waste, eg. room sizes work standard dimensions, materials flow through the home and offcuts from one room may be used in another.
- 1.4 Accurate ordering procedures were in place to minimise excess building materials delivered to site. Although minimal, all unused materials were discarded at the local building materials recycling yard.
- 1.5 Innovative techniques for materials were employed. Eg. Excess steel for wall linings was used to make garden edging, offcuts from internal cedar cladding were used to make bathroom benchtop by joining pieces together, offcuts from external cedar cladding were used to make gates rather than using another resource.
- 1.6 All materials used in the construction have been selected for their ability to be recycled at the end of their long life.