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# Experimental granny flat

## *Practising straw bale construction*

BY KURT PICCARDI

We purchased our two hectare block in Ransome over 10 years ago with the goal of creating a natural oasis close to Moreton Bay on the outskirts of Brisbane. We subsequently subdivided the block, sold the half with the house on it and began the adventure of creating our oasis and owner built home.

The property has a different microclimate to Brisbane, with slightly cooler summers due to the bay breezes but it can also be 5 degrees colder in winter with an average of 5–7 days frost a year. This we did not realise until we moved in; we have had temperatures of 0 degrees. The block is in an area with large properties and council bushland to the rear, which supports koala habitat.

The design of the property has changed many times over the years, much to the frustration of my wife, but that's the joy of being married to an architect. We have had a long term interest in permaculture design and from this stemmed an interest in alternate building materials and particularly straw bale. I undertook a permaculture design certificate course and did a straw bale building workshop at Huff 'n' Puff Strawbale Constructions – highly recommended if you are contemplating this style of construction. These were done before we started planning our house and gardens.

### **Lifestyle choice**

We wanted our house to suit our lifestyle and philosophy but were criticised by many people for not worrying about saleability. But we just wanted a house that reflected us and what we believed in. I also saw it as important research for my architecture

business; if you design straw bale and natural houses for other people what better way to understand the materials than to do it for yourself?

We had visited a few straw bale houses and were very impressed by the quietness and relaxed feel you had when you were in them. We liked straw bales as they are a waste product with little off gassing and when you render them with a lime render the walls are actually sucking in carbon dioxide.

We also wanted the buildings to be compact on the site and of a small scale to make it easier to build. We kept them to single level as you only need minimal scaffold and it is easier to keep the straw bale walls dry. This has also allowed us to construct one building after the other as funds, time and energy became available. Unfortunately, these don't necessarily coincide.

The first thing we needed was a shed; this was to store all our stuff and to live in if required. As we needed it quickly and we were both working, we handed this over to a builder to construct. The small extra cost to have it built was well worth the money spent as we could rest up until the house building started.

Luckily, when we sold the house on the other half of the block we managed to rent it back from the new owners for a year which gave us time to get all our approvals and build somewhere for us to live. (We were not overly excited about living in an unlined steel shed with two young boys and a cold winter on the way).

We saw the 'granny flat' as a kind of experimentation building. As we had never built anything like this before we wanted to try a few different things to see if they would work when we built

the main house. For this reason we only used straw for two of the walls, the other walls are timber framed with radial sawn weatherboards. The need to build quickly also influenced this decision as we had heard that rendering straw can be a slow process when doing it yourself.

### **Friendly help**

The first problem we encountered was finding a local engineer to design the structural specifications for a granny flat using straw bales. We were let down by two engineers who were keen to do straw bale but were very slow to get anything to us. We finally found an engineer in New South Wales who gave us a design very quickly. Here is where we encountered problems with the bureaucracy. As he was not classified as a competent person in Queensland, we needed to get him certified up here. This should have been a quick and easy exercise but it ended up taking over four months. We were well and truly behind the eight ball to get our granny flat completed. Once this was done though, we had no problems getting council approval. As we use private certifiers in Queensland, it is easy to find one that is comfortable with straw bale construction as long as a structural engineer certifies the design.

This delay was a blessing in disguise as we missed having to build in the summer and our actual start date was autumn, the perfect time to build in Brisbane; warm days, cool nights and normally very little rain – until you start building that is. We think that swinging a hammer must be the same as a rain dance as it always seems to come just as you start.



1. The north and east facing timber framed walls feature radial sawn weatherboards.
2. A ladder provides ready access to the loft, located in the double height space.
3. Functional, well ventilated living area, with lots of light and under 70m<sup>2</sup>.
4. Three layers of lime render were used on the straw bale walls - the first included fibreglass mesh.
5. The load bearing straw bale western wall contrasts in both colour and texture with the timber cladding on the other walls.





- 6. Roof mounted solar hot water with electric boost – part of the living lightly plan.
- 7. Kitchen layout works really well despite its modest size.
- 8. Not your average store-bought letterbox and front fence!
- 9-10. The chook shed was constructed with the left over bits from the build.

Far left: The granny flat in various stages of construction: plywood platform floor; hardwood ladder frame bottom filled with gravel; straw bales installed; walls are a mixture of stud frame and load bearing straw bale; rendering externally and internally.

We designed the granny flat so that when all the buildings on the site are completed people can stay there and be private from the main house. This necessitated orientating it to the east but we have still managed to get a northerly aspect for the living areas. It was to be functional, well ventilated, with lots of light and due to it being a secondary dwelling, under 70m<sup>2</sup>. We achieved this by maximising the living area and having a second bedroom in the loft. This has created a 'Tardis effect;' when seen from the front it is quite low but it opens out to a double height space.

As my father, also Kurt, is a semi-retired builder he helped us out a lot and we didn't have to jump through all the owner building hoops that we normally would have had to do. We also received a lot of help from my father-in-law John during the building process and we could not have completed it without their help.

## Construction basics

The granny flat is built on galvanised steel stumps with a hardwood framed floor. We decided to create a work platform out of plywood to allow us to build a lot easier and safer. As we were going to put some type of hardwood timber floorboard over the top, this worked very well as we didn't have to worry about damaging the floor.

We wanted to minimise waste so we chose to use radial sawn weatherboards as cladding. Unfortunately these were not available locally so we had to source them from Radial Timber Sales in Victoria. They were sustainably harvested and the company has a strong environmental policy. The boards were cheaper than if we bought new or second-hand ones locally. We specified semi wobbly logs to give the natural effect but still make them easy to put up. When using these logs we found it best to cut the ends off and then lay the complete log out on the ground. This allowed us to easily maintain the correct pattern and discard unsuitable planks. The secret to getting them looking correct and level is to make a mark at each end that is level and let the middle of the log do what it wants.

We used load bearing straw bale construction on one side of the roof. The bales are supported on a recycled hardwood ladder frame bottom, filled



with gravel, and tied together using threaded rod which was also used for compression of the top plate. As we needed the rods for wind tie-downs anyway, we thought it was easier to keep using them throughout.

We had a plastic rain shield to cover the top of the bales, which we dropped down every night or when it rained. This it did as soon as the bales were stacked up. The rain shield worked well except at the top. There were gaps where the tie down rods went through the top plate and water got in and tracked down the bales. We had to pull a few bales out of the wall. We managed to remove all the wet straw and rebuild. The plan for the main house is to build a roof first so we have a dry area to store and work with the straw. The bale walls will then be infill rather than load bearing.

We rendered the bales with three layers of lime render as the soil on our block was not suitable.

The lime was very easy to use as it was very consistent and we had made the lime putty when we started building. We added fibreglass mesh after the first layer to hold it all together. My father rendered and I mixed and it was hard work. The wall has been standing now for nearly three years and there are no cracks, even with the whole place shaking when the washing machine goes into the spin cycle!

## Material choices

All the timber windows were sourced from second-hand and demolition yards at a large cost saving. We managed to get a few matching ones, which was a bonus. As some of the windows and our sliding door were of a large size we were required to get a glazing certificate. For us to get this the glass needed to be safety glass. As the budget was coming to an end we went for the cheaper option of putting a safety film on instead of changing the glass.

We bought hardwood floorboards at an auction only to find out when we unpacked them that they had grooves in them. They were not floorboards but hardwood tongue and groove lining boards. After the shock we decided to use them for the eaves linings and as an entry feature. We were not too concerned as they only cost 70c a metre

We ended up putting in a bamboo floor, which we have found to be a bit on the soft side as it scratches easily. It is solid bamboo so can be sanded back and resealed in the future. The floor went down when the weather had already heated up and we needed four people to lay it as the glue we were using was setting very quickly.

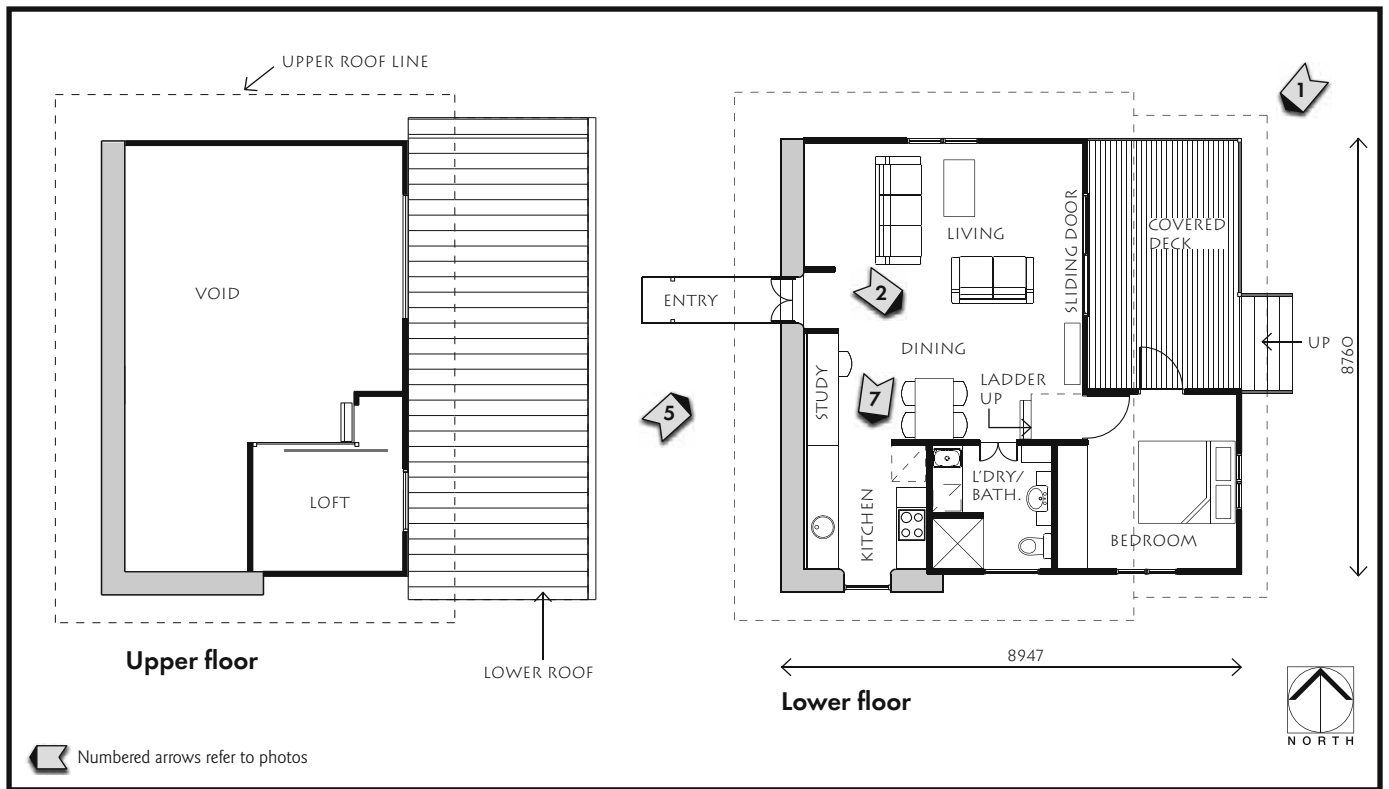
Plasterboard was chosen for internal walls due to price and ease of installation. We tried a lightweight foam board for the ceiling but had problems with the cardboard breaking through the fixings. We will be using *ECOply* for the house.

The internal temperature is very stable. The granny flat is orientated to catch the cooling summer bay breezes and we have a ceiling fan to keep us cool. In winter we use a small oil heater when required to take the chill off the air. When it is 1-2 degrees outside in winter the inside temp doesn't drop below 14-15 degrees. We have been very happy with the performance of the straw bale wall, which is on the western side, and the stud walls are well insulated as well.

## Essential services

Our goal one day is to be water and power self sufficient. To this end we have installed two 23,000 litre poly water tanks that catch water from the shed and granny flat. To fill them all we need is one good rain storm and they are overflowing. First flush diverters and leaf guards were installed on all downpipes. These need to be cleaned out regularly due to all the trees and shrubs around the block.

There is now a council requirement for new houses to have a minimum 500 litre water tank connected to the toilet and washing machine. We currently use this water for the garden and drinking water but we are not able to have it plumbed to the house. In Brisbane you are not allowed to plumb tank water to any outlet that could be used for drinking or dishwashing. We have been drinking this water for over two



years now with no ill effects and the taste is far superior to our tap water. Hopefully one day they will change the rules then we can disconnect the water supply. When we construct the main house we will be installing a 46,000 litre underground tank.

Hot water is from a roof-mounted solar system with electrical boost. We had to orientate it to the west so need to use the boost when the weather is overcast in the winter. We expected this to happen and the system on our house will face north.

The block is not connected to a sewer so our wastewater is treated by a *Biolytix* system with the water being used for subsurface irrigation in our food forest. As our water usage is very low, only 90 litres per day for the four of us, not much water makes it to the irrigation area (approx. 250m<sup>2</sup>). The food forest is doing well and we are very wary of the products we use as we know they will end up being eaten by the worms in the system and then used by the fruit trees.

We would have liked to go solar for our power as this was one of our goals, but we could not afford the expense when building our granny flat. We are connected to the grid but when we build the house we will once again investigate solar power.

## Restored energy

We have been very happy with the way the granny flat turned out and would only change a few minor things if we were to build it again; these changes have already been incorporated into the house design. We have learned a great deal about building and are now comfortable using straw bales. Once we moved into the granny flat we sat down and redesigned the main house to make it smaller and simpler to build.

All up the build cost us just under \$1000 a square metre. It is amazing how all the little bits and pieces you buy from the hardware store quickly add up.

We realised how hard it was to build ourselves and how much it takes out of your life. While all our friends were going away on holidays and barbeques, we were slogging away day and night on the flat to try and get it finished. We were completely knackered at the end of it and have needed our two year break to get our energy back, and are now ready to start building again. We have been doing other projects around the yard and are especially proud of our new chook shed, which was constructed with all the left over bits from the granny flat construction.

The overall build took us six months till we could move in. The best advice we can give is to finish as much as

possible before you move in, because once you are in all those little finishing off jobs never get completed. Too many other projects come along to keep you occupied... ■

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### • Huff 'n' Puff Strawbale Constructions

Straw bale constructions and workshops. 02 6927 6027, 0412 116 157, [www.glassford.com.au](http://www.glassford.com.au)

### • Biolytix Water Australia

The BioPod treats household wastewater to secondary standard for sub-surface garden irrigation. 1300 881 472, [www.biolytix.com.au](http://www.biolytix.com.au)

### • ECOply

ECOply structural plywood is a layered panel made from radiata pine veneers from 100% renewable plantation pine 132 321, [www.chhwoodproducts.com.au/ecopoly](http://www.chhwoodproducts.com.au/ecopoly)

### • Radial Timber Sales

Radial sawn timber products, including weatherboards, decking, flooring and screening. 03 9768 2100, [www.radialtimbers.com.au](http://www.radialtimbers.com.au)