



PHOTO: LYNDA WILSON

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# Building a composting toilet

*In TOB 141, we featured Steve Howard's earthen compound design dwelling. Steve shares the details of the construction of the composting toilet with us.*

BY STEVE HOWARD

The toilet was the first structure built on the block. In fact, it was the first building project I had ever done. As it was to act as the site toilet as soon as possible, some things were rushed and there were plenty of mistakes made along the way.

## Council approval

The plans for the composting toilet were submitted at the same time as the overall dwelling plans. While happy with the plans and that I knew how to operate it safely, the councils concern was with ongoing upkeep of the system, in the event that I sold the property. I suggested that I create a user manual for the system, a copy of which would be kept by council. This satisfied their concerns on that matter, and construction could go ahead.

However, this was back in 2001, and restrictions may have tightened since then.

## Pit construction

The pit was built first – I wired together the reinforcing mesh for the slab, the sides and roof of the pit, then poured the slab with concrete mixed in a barrow. The ferroconcrete sides required a few layers of cement/sand plaster – hessian and old chook wire were first stapled to the reinforcing mesh, and the bolts to hold the access panels were also wired in beforehand. The ferroconcreteing was tedious and I would definitely use concrete blocks if I were to do it again. The whole effect is

a bit bulgy, so at least it matches in with the earth walls of the other buildings. Cement slurry was later applied to the outside of the pit for aesthetic reasons, as each batch of plaster dried to a different colour.

## Structural framework

I dug the holes for the stirrups, on which the cypress poles sit, next. Somehow I managed to get one of the holes in the wrong spot, so the whole building is askew. I still don't know how I managed that, but it created some interesting angles for eaves etc! The five main poles were each almost 3.5m high and about 250 mm in diameter, making them the heaviest objects that I had to manoeuvre in the whole building process to date – approx 100 kg. Each pole had to be raised on its stirrup,

plumbed, marked out, lowered, drilled, raised again and plumbed again. This was all done single handedly, which is where lots of clamps and patience were required. A water level was then used to mark the final level for each pole, which was then cut using a chainsaw whilst standing on top of a ladder – I was very glad when that was over!!

The floor is marine ply laid on cypress bearers and joists, which progressed fairly easily once the out of square poles had been allowed for. The roof is stick built from cypress. The door is hand made from cypress and the fixed windows have cypress frames/jamb, which I glazed myself. The roof is covered in Zincolume. The toilet boxes are built of plywood, covering a cypress frame. The plywood is built up with papier-mâché under the toilet seat, providing a tight seal for the standard



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*A couple of mates helped with the balustrade – on the left is Monty who came over from England for three weeks just to help me build!*



Left: Seat is usually left down to help create a seal. The condensation tube returns moisture to the pit. Bucket contains chaff. Top right: Removing the access panel (left pit) exposes the baffle & aeration pipes (right pit). Rest: the toilet at various stages of construction.

plastic toilet seat. A plastic lining joins the toilet seats down to the pit.

### Papier-mâché walls

After the roof was up I nailed old chook wire to the frame and used hoop iron to brace the structure. I then started using a cement slurry/newspaper papier-mâché that I had tested successfully on the horizontal – but it failed miserably and I eventually ripped it off. This is the only bit of the buildings that I have had to demolish and redo.

I then started using newspaper and *Bondcrete* for the papier-mâché and that worked well initially, although it was still very time consuming. This remained untreated, but after about a year sitting in the sun the *Bondcrete* contracted, causing gaps beside the poles. This dragged the jamb from the bottom of one of the windows, cracking the glass. The walls were eventually covered in *Zincalume* externally. The internal walls had hessian tacked on, which was petrified with several coats of limewash and then painted.

### Finishing touches

The flues are made from 100 mm PVC pipe and joiners, with clear plastic tube used to drain condensation from the flue to prevent it re-entering the pit. Whether this is necessary is debatable, as during the hot, dry summers we experience around here, I sometimes have to add water to the pit to keep the moisture level high enough. The flues were painted black above the roof to help airflow.

The stairs were then made from concrete blocks over a concrete slab, with preformed concrete riser/treads. The balustrade is cypress posts concreted in the ground, with the corrugated *Zincalume* infill.

The inside of the pit was finished off with a few coats of *Bondcrete* for waterproofing and a couple of coats of black paint (so you cannot see as much when you look into the pit down the toilet). The aeration pipes were formed by splitting 90mm PVC pipe lengthwise – they are attached at one end to a bent nail which is attached to an offcut of plywood liquid-nailed to the ferroconcrete walls. The other ends fit into holes cut in the fibre cement baffles. The access panels are also made from fibre cement, with ventilation panels formed by 10mm wire mesh over flywire (to keep insects and mice out of the pit).

A few friends assisted with the final stages – thanks to Keith for the guttering and eaves, and to Monty and Peter for helping with the balustrade.

### Hindsight

The building of the composting toilet basically went ahead according to the plans with the following exceptions:

- the walls were changed from wattle and daub, due to my concerns about movement of the structure in the wind, and were initially constructed from papier-mâché
- the *Bondcrete* contracted in the sun after about a year; the walls were then covered externally with corrugated iron, and internally with petrified hessian
- the toilet chutes are rectangular rather than round for ease of construction
- the ventilation flues were moved slightly to one side to avoid the ridge in the roof







- I should have placed the light lower on the walls, thereby keeping the pit in shadow – it currently shines down into the pit
- the handrail on the stairs and balcony was filled in with corrugated iron to satisfy building regulations – and I like the look too, which is a bonus!

Overall I would say the toilet looks very good from the outside, and its height and different method of construction adds interest to the compound. However, if I were to build it again I would make the pit, and possibly the walls of the toilet room, of concrete blocks for ease of construction. Although I like the look and ease of the corrugated iron walls, it would be more stable as one structure, rather than one building perched delicately on top of the pit. ■

### What I would do differently

1. As I mentioned, I would make the whole structure from concrete blocks.
2. I would put a side access panel for placing food scraps in without having to enter the toilet.
3. The front face of each toilet box would slope back in under the seat towards the floor, making it easier to get off the seat.

## Composting Toilet Manual

*This is an extract of some of the information provided in the 'user manual.' The full manual can be downloaded from The Owner Builder website ([www.theownerbuilder.com.au](http://www.theownerbuilder.com.au) > Extracts > #142 Composting Toilet).*

### How does it Work?

The composting toilet works by taking human waste and other organic wastes and providing an environment in which bacteria, fungi and worms can decompose them as quickly and completely as possible, with minimal side effects. It is important to realise that the toilet is a living process. Most of the wastes are converted into carbon dioxide, water vapour and other gases, which are expelled through the flue, leaving behind the compost that is only a small fraction of the original volume of the wastes deposited. In many ways the compost pit is like a slow burning fire, with the compost like the ash left over after the wood has been converted to smoke.

### Won't emptying the pit be disgusting?

When we imagine the pit we think of a wet mixture of faeces and toilet paper, smelling of ammonia, just like a pit toilet. However, after the pit has aged for a year the compost that results is dry and crumbly with a slightly sweet earthy smell, just like ordinary compost. There is no faeces, toilet paper or any other waste visible.

### What can go into the toilet?

Basically anything that the bacteria, fungi and worms can eat, and which won't kill them, can be added to the pile. This is basically anything that was once alive. The most common additions to the pile are: faeces, urine, toilet paper, straw, sawdust, shredded newspaper, grass clippings, kitchen scraps, leaves, garden waste, meat, dust, lint, kitty litter, disposable nappies (with plastic backing removed), sanitary pads, tampons, cold ashes, twigs, hair. It is important to note that faeces should only contribute about 20-25% of the material being added to the pile.

### What cannot go into the toilet?

- Urine from anyone on antibiotics or the pill.
- Non-organic substances such as glass, metal and plastic, as the bacteria, fungi and worms cannot eat them.
- Chemicals, antiseptic and antibiotics that will kill the bacteria, fungi and worms.
- Leaves or sawdust containing natural hormones or resins that stunt growth eg. pine, eucalyptus and cypress.
- Large quantities of liquid that will drown the bacteria, fungi and worms.
- Large quantities of paper or print that can contain toxic dyes.
- Large quantities of grass clippings that will compact and become impervious.
- Large quantities of any one material, as they will take a long time to decompose.
- Hot material such as cigarette butts and hot ashes as they may cause a fire.

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