

Sanctuary

MODERN GREEN HOMES

ISSUE
56

SUSTAINABLE HOUSE
DAY SPECIAL

DEEP DIVES: Building & design | Retrofitting
Building materials | Climate resilient design

Best and fairest
Australia's eco homes on show



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PLUS

Flood-resilient design genius
Tiles from recycled glass and fabric
Targeted retrofits for comfort
Urban homesteading trailblazers



**An Earthworker-Reclaim heat pump
hot water system worth \$5,000
from the Earthworker Energy
Manufacturing Cooperative**

Offer open to Australian residents. Details page 80

CLIMATE RESILIENT HOMES

Building sustainably means considering future resilience in a world in which our climate is already changing. As our summers become hotter and we face fires, floods, cyclones and drought, we need to be conscious of designing homes that will continue to be comfortable havens.

Week 4 of the Sustainable House Day program will feature two expert webinars on building for climate resilience. First, on Tuesday 12 October we'll hear about how to collect and store water, as well as ways to reduce your water usage. Then on Thursday 14 October, we'll look at the future of heating and cooling our homes in our changing climate.

**Sustainable
House Day**

See the full program at
sustainablehouseday.com



High water haven

LOCATION Chelmer, QLD • WORDS Emma Scragg • PHOTOGRAPHY Scott Burrows

Stealing a march on the next Brisbane flood event, the renovation and downstairs fitout of Marion and Daniel’s Queenslander incorporates innovative flood-resilient design features.

In Brisbane’s great flood of 2011, first-time homeowners Marion Battig Franks and Daniel Franks watched the waters lap their driveway while their neighbour’s place flooded. After the waters receded, they helped clean up the sludge and disintegration left behind. Meanwhile, their friend of more than 20 years, architect James Davidson of JDA Co., was motivated by the devastation and waste to establish the Brisbane branch of Emergency Architects and develop new ways to build and retrofit more flood-resilient homes.

Traditional ‘Queenslander’ houses are elevated to capture breezes and handle floods, but the most common flood solution today is to raise them even higher. This approach can mean losing connection with the garden, and while potential new living spaces underneath can offer a cool retreat in summer and are great for people with mobility issues,

they can still be a liability in a flood. Standard cavity walls, softwood framing, plasterboard linings and floor coverings to downstairs spaces soak up polluted water and disintegrate or harbour mould before they can dry out. James saw another way: “Just letting the floodwaters in and then letting them out again”. In flood-resilient home adaptations, polished concrete floors, single-skin walls, hardwood framing and thresholds flush with the floor enable inundated spaces to be simply hosed out and left to dry, allowing families to move back in within a few days. “This approach also avoids the huge waste generated by the need to strip and replace waterlogged traditional materials,” he says.

At what is now Marion and Daniel’s house, a neighbour remembers being able to moor his ‘tinny’ to their front verandah in the 1974 flood, and they know that one day it will happen again. Despite this, they love the high ceilings and solid timber construction of their 1920s Queenslander and its proximity to cycle paths and the train. The couple are committed to sustainable living and when it was time to extend for their family of five, they decided to stay and make their house more flood-resilient, with James’ help.



At a glance

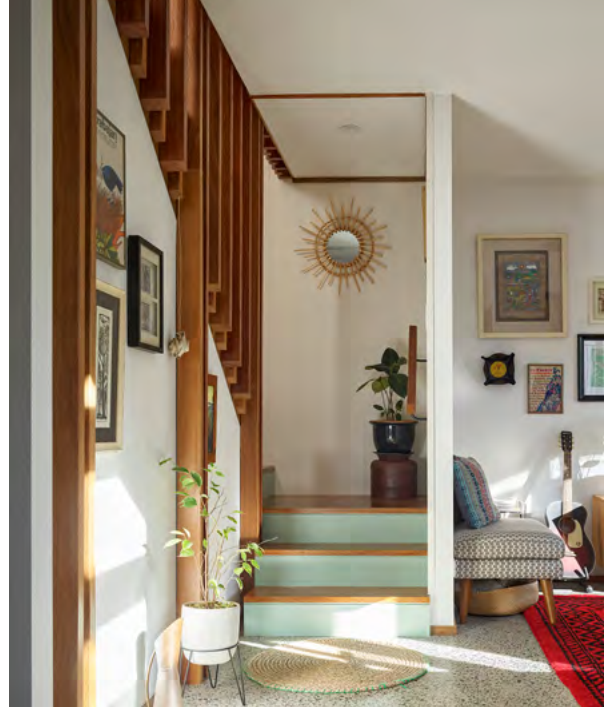
- Undercroft fitout and modest living room extension for a growing family
- Water-resistant materials and design features for quick recovery after inundation
- 7.37kW solar PV system with battery backup and two separate circuits for flood resilience

Opening for Sustainable House Day 2021. For more:

sustainablehouseday.com/chelmer-flood-house



Marion and Daniel built a flood-resilient undercroft below their house, with four new rooms and a bathroom. “The approach is one of generating innovative sustainable adaptation solutions while respecting the Queenslander’s traditional character,” says architect James. “Timber housing is amazing; it’s so forgiving and adaptable.”



Upstairs, the living room was extended slightly as part of the renovation and a balcony now provides a lovely view of the garden. Existing leadlight windows were restored.



The materials used in the downstairs fitout were chosen to minimise damage in the case of flood: the floor is concrete, wall linings are fibre cement sheet and wall framing, window frames and trims are hardwood. The furniture is generally able to be moved upstairs in times of flood, and essential documents are stored upstairs.



↑

Rather than seeking to keep floodwaters out, James's approach to flood-resilient design is to ensure water that enters the house won't damage the materials and can be flushed out quickly to allow the structure to dry out and the family to move back in. "By 'building better before' a flood event rather than rectifying damage once a house has been flooded, we can significantly reduce the waste materials sent to landfill," he says.

Daniel and Marion were accustomed to living in small homes in Brisbane and Europe and despite having three boys by the time they renovated, they increased the footprint by just 20 square metres. The upstairs was reconfigured only slightly, with the new living room pushing out toward the backyard to capture northern sun. Wide folding doors open onto a metre-wide balcony, efficiently converting the living room into an outdoor living space. Downstairs features bedrooms, bathroom, laundry, rumpus and a home office.

Demolition was minimal, with as much as possible recycled. Kitchen cabinets were reused for wardrobe and laundry storage and the appliances reinstated in the new kitchen. Demolished timbers and the original tin roof were converted into a characterful garden

shed ("The only new thing is the roofing screws," says Daniel) and other garden structures. The fall of the land was reworked to manage overland flow, with additional drainage and paved areas in salvaged and new bluestone paving, a lower embodied energy solution than concrete pavers.

Daniel and Marion were "committed to pushing the boundaries," says James, experimenting with innovative sustainable materials and construction methods and thus contributing to JDA Co.'s industry-leading expertise in this area which will help others build back better in the future. Daniel lobbied local concrete suppliers Wagners for seven years to enable the use of a geopolymers concrete polished slab for the first time on a residential project, avoiding the high carbon emissions of

standard Portland cement concrete. "It is made with a cementitious fly ash waste from coal-fired power and iron ore slag – also a waste product – mixed with a binder and aggregate to make a slab," he explains. His email to the builder Tom Yabsley accepting all risk gave some reassurance and the concrete grinders learned on the job.

To achieve satisfactory energy ratings downstairs while still meeting the brief for flood resilience, James and Tom developed an insulated external wall free of cavities where water could become trapped. Exposed hardwood studs were used, with clear-finished hardwood shiplap cladding (set vertically to drain better) with sealed joints and 30-millimetre-thick closed-cell extruded polystyrene insulation behind. Internal walls are of waterproofed Hebel

block, and sills are flush with the floor to allow easy hosing out after a flood. All walls downstairs are lined internally with fibre cement to give the appearance of familiar plasterboard, with hardwood trims. The goal with all of JDA Co.'s 'flood houses' is to encourage broad community uptake by ensuring they look no different to a normal home, and Marion and Daniel's is no exception. "You have to put the architectural ego aside," says James. "It's well built, it looks great. Nobody would know it's doing a different job."

Daniel and Marion didn't want air conditioning so design for cross ventilation, aided by ceiling fans on muggy days, makes the house comfortable. "When you go downstairs in summer, it's lovely and cool," says Marion. The house is powered by grid-connected solar with a 10 kilowatt-hour battery

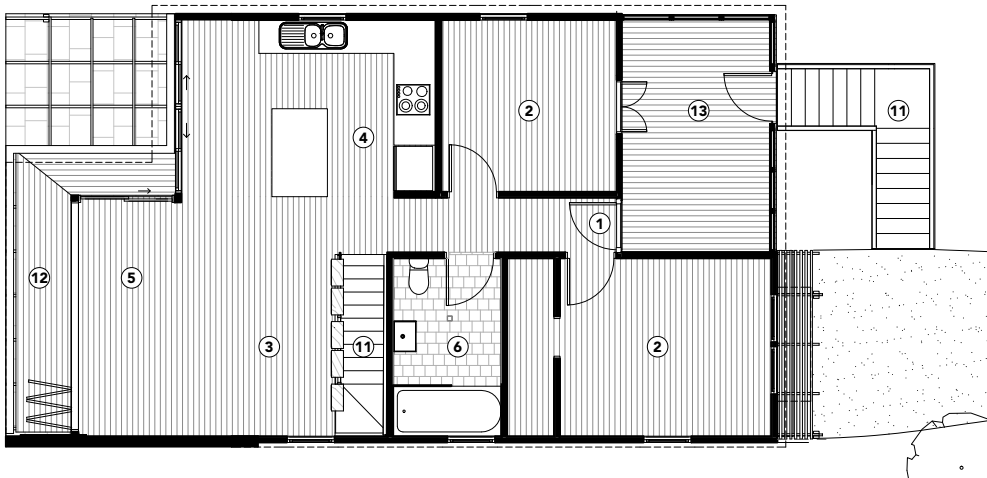
sufficient to supply essential lights and the fridge in grid outages; as part of the flood resilience, upstairs and downstairs run on separate circuits so if downstairs becomes inundated the electricity can be shut off there and continue running upstairs.

The outcome of Daniel and Marion's project is a reflection of the happy shared experience with builder and architect, with the family revelling in their reimagined, elegant, light-filled home. "It's not all about utility," says James, despite all the technical details and decisions. The home respects its heritage with old and new clearly expressed, and the interiors reflect Marion's impeccable sense of style. The couple didn't notice any significant extra cost for the flood-resilient design, which brings the added benefits of peace of mind and a 40 per cent reduction in their insurance premium. 🏡

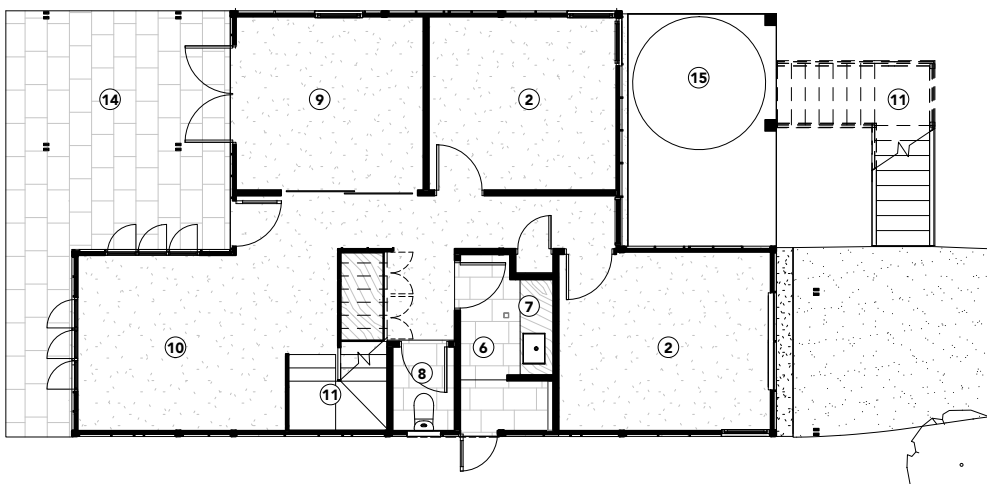


↑ The external walls downstairs have been designed to eliminate cavities within where water could accumulate, using hardwood framing and cladding with extruded polystyrene insulation.

FIRST FLOOR PLAN



GROUND FLOOR PLAN



LEGEND

- ① Entry
- ② Bedroom
- ③ Living
- ④ Kitchen
- ⑤ Dining
- ⑥ Bathroom
- ⑦ Laundry
- ⑧ Toilet
- ⑨ Study
- ⑩ Rumpus room
- ⑪ Stairs
- ⑫ Balcony
- ⑬ Verandah
- ⑭ Terrace
- ⑮ Water tank

HOUSE SPECIFICATIONS

RENEWABLE ENERGY

- Solahart flat plate solar hot water system with close-coupled 300L tank

RENEWABLE ENERGY

- 7.37kW solar PV system (22 x LG Neon2 335W panels, SolarEdge SE6000 hybrid inverter and SolarEdge P370 optimisers)
- LG Chem RESU 10HV 9.8kWh lithium battery with 'blackout mode' to supply power in a grid outage

WATER SAVING

- 7,000L galvanised water tank for garden use
- Grohe tapware (WELS 5 star) and showerheads (WELS 3 star)

PASSIVE DESIGN, HEATING & COOLING

- Geopolymer polished concrete slab downstairs for thermal mass
- Design for cross ventilation, including louvres down to floor level downstairs
- Awnings to all windows not protected by roof overhang, for summer shading

ACTIVE HEATING & COOLING

- No air conditioning
- DC ceiling fans to all bedrooms and downstairs living rooms
- Blaze B100 efficient wood heater

BUILDING MATERIALS

- Wagners Earth Friendly Concrete (EFC) geopolymer polished concrete slab (first in Australia): concrete binder made of recycled materials; no Portland cement for significantly reduced carbon emissions (a saving in this case of around 6,380kg CO₂ compared to standard concrete, the equivalent of around 3 years of emissions for the average Australian new car)
- Downstairs construction:
 - External wall framing, architraves and skirtings in FSC-certified hardwood
 - Waterproofed Hebel block to internal walls
 - Spotted gum vertical shiplap cladding (FSC-certified) with some Shadowclad Natural Groove infills
 - Fibre cement sheet internal wall lining
 - Solid-core internal doors

- Insulation: Knauf XPS Multi-Use Foam Board closed-cell extruded polystyrene to cavity-free external walls downstairs (R1); Knauf Earthwool 80% recycled glass batts between levels (FloorShield, R2.5) and to upstairs walls (SoundShield, R2.5); Bradford Anticon Bonded Blanket to roof (R1.3); pump-in Cool or Cosy Cellulose to ceiling
- Recycled timber floorboards upstairs
- External pavers: salvaged and new bluestone (lower embodied energy than concrete pavers)

WINDOWS & GLAZING

- FSC-certified timber-framed doors and windows supplied by Darra Joinery
- Timber louvres at ground level to allow water to flow out quickly after a flood event
- Existing leadlight glass windows upstairs retained and restored

LIGHTING

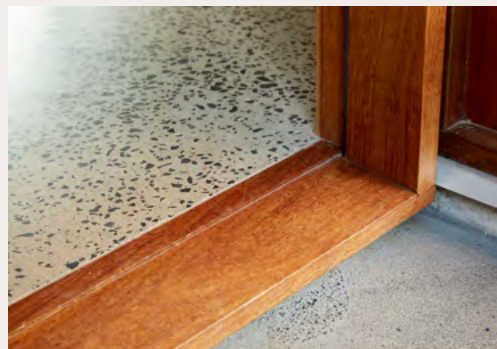
- Haneco LED downlights

PAINTS, FINISHES & FLOOR COVERINGS

- Taubmans Easycoat low-VOC paints

OTHER ESD FEATURES

- Designed for flood resilience (see Insights)
- Locally sourced materials used where possible; materials chosen are a modern take on a Queensland 'tin and timber' palette
- Timber offcuts, pallets, stair treads and old roofing salvaged from the build used for sheds and garden structures



↑
Downstairs, the door sills are flush with the polished concrete floor to allow floodwater to be swept out easily.

DESIGNER

JDA Co.

BUILDER

Tom Yabsley,
Evolved Construction

PROJECT TYPE

Renovation

LOCATION

Chelmer, QLD

COST

Approx \$370,000

SIZE

House 175m²
Land 433m²

INSIGHTS

"The ground floor level has been designed for flood resilience, with a suite of strategies to minimise damage and allow quick recovery after a flood: large door openings, sills flush with the floor and low louvre windows allow for floodwater to be flushed out; concrete floors, hardwood skirting and stairs, raised services and non-cavity walls are also important measures that reduce the likelihood of issues such as mould. It was the first house to be built according to the Flood Resilient Building Guidance for Queensland Homes; in fact the guide was launched from the property."

James Davidson, architect