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FLOOD RESILIENCE
SPECIAL

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WATER WISE

Flood-resilient design in action



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WATER WORKS: Flood-resilient design in action

WORDS Rebecca Gross



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Fairfield Flood House, retrofitted in response to Brisbane's 2011 floods, was the catalyst for architecture practice JDA Co.'s specialisation in flood-resilient design. Image: Mindi Cooke

Based in flood-prone Brisbane, the team at architecture practice JDA Co. are experts in designing and retrofitting homes to better handle increasingly common flood events. Rebecca Gross spoke with the practice's Libby Ba-Pe, who explained the basics of flood-resilient design and shared the great work being done as part of an extensive housing retrofit program in Brisbane.

The record-breaking floodwaters that inundated much of Brisbane in February and March 2022 damaged an estimated 15,000 properties, with many more households losing belongings and requiring extensive cleanups. While it is near impossible to flood-proof a home, making a house more flood-resilient will aid a quick recovery in such situations and minimise loss and damage.

JDA Co. is an architecture firm with expertise in designing, adapting and retrofitting houses to better cope with floods. "Flood-resilient design is about being able to prepare for and live through a flood event and to recover quickly, with as little

waste as possible,” says Libby Ba-Pe, architect and associate at JDA Co. “It enables homeowners to store belongings safely prior to a flood event, and to easily clean, repair and move back in with minimal long-term disruption.”

STRATEGIES FOR FLOOD-RESILIENT DESIGN

Elevating the habitable spaces of a house above the Defined Flood Level (DFL) is one of the most effective strategies for flood resilience. However, this obviously isn’t always possible. And, as Brisbane experienced this year, what happens when the flood level exceeds the DFL? In both cases, other flood-resilient design measures should be implemented.

There are two design strategies for flood resilience: wetproofing and dryproofing. Wetproofing allows water to flow through the house, and dryproofing keeps water out with flood barriers. While dryproofing seems the most intuitive approach, it can be a double-edged sword. Dryproofing may stop water coming inside, but this can be more detrimental as high water levels and water pressure can damage property and cause issues with the house or surroundings. “If you put up walls or barriers to prevent water from flowing, it will make it worse for everyone around you. It also gives a false sense of security. If flood levels are higher than expected, the barriers don’t protect the property and there might not be other precautions in place,” Libby explains. Barriers can also make it harder to drain water that does get in.

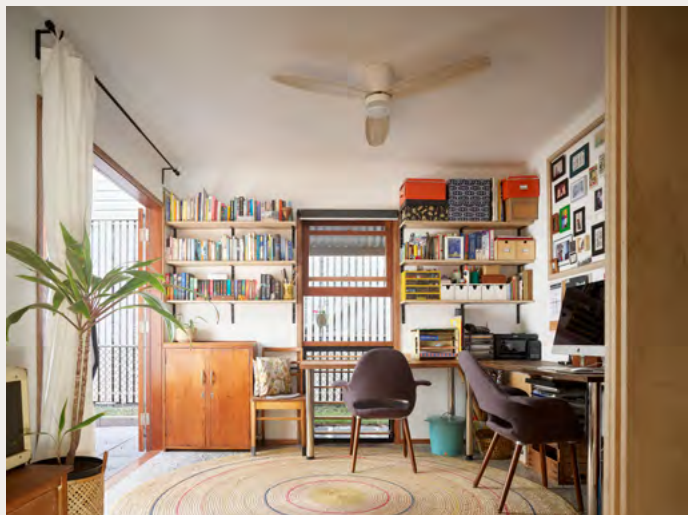
Instead, wetproofing is often the more effective strategy, with the treatment of internal and external spaces enabling water to flow quickly and easily in and, importantly, out of a house without causing significant damage or long-lasting

effects. This approach considers the materials and construction of a house or apartment, as well as the placement of storage, furniture, appliances and power points. The goal is to eliminate cavities where water and muck can pool and seep into the structure of the house, and to raise belongings and electrical circuits to where they won’t be affected by water.

Let’s start with materials. Non-porous and water-resistant materials are used widely in flood-resilient design as they aren’t damaged by getting wet and can be easily cleaned. To this end, a polished concrete slab on ground is the most resilient floor, followed by a tiled floor with suitable waterproof grout. While concrete and tiles might not seem the most sustainable choices, they will reduce the need for replacement should they be repeatedly flooded. “Using materials that last a long time and withstand multiple inundations without having to be replaced is the main sustainability angle in flood resilience,” says Libby. “There is also the long-term cost benefit of not having to replace them over and over, and not having to put in an insurance claim every time it floods.”

Installing a water-resistant wall lining (such as fibre cement sheet) and water-resistant skirtings (tiles, for example) to above the flood level will help protect walls and enable a flooded space to be hosed out. Other resilient options include hardwood vertical cladding, polycarbonate, and marine grade plywood that is painted and sealed on all edges. MDF, plasterboard, softwoods, cork, vinyl and carpet should be avoided, as they will need to be replaced if waterlogged. Rigid closed-cell insulation (rather than loose-fill or standard bulk insulation) is also a water-resistant choice.

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At JDA Co.’s Chelmer Flood House, the newly fitted out lower level features polished concrete floors, single-skin walls, a proprietary hardwood cavity-free wall system, hardwood trims and thresholds flush with the floor to enable flooded spaces to be hosed out and left to dry. Read more about this renovation project in *Sanctuary* 56. Images: Scott Burrows





↑ Water-resilient materials were used extensively downstairs at the Fairfield Flood House and storage placed high on the walls. The kitchen joinery is a stainless steel frame and bench with removeable timber cabinets underneath so they can be shifted ahead of a flood. Images: Mindi Cooke

When it comes to construction, eliminating cavities from walls, floors, doors, cabinetry and under stairs will help water to flow in and out unimpeded. If they can't be avoided, ensure any nooks and crannies can be easily accessed for cleaning, drying and ventilating after a flood event.

A single skin wall or core-filled block wall will have no internal cavities, and a paint or render finish will add a further water-resistant layer. Solid-core (rather than the common hollow-core) doors are also free of internal cavities for water to collect, and lip-free (or flush-floor) doorways eliminate nooks that can obstruct water flow and collect mud. Large door and window openings at ground level will help water to flow through quickly, as will open stairs with a removeable bottom riser.

There are various options for water-resistant kitchen and bathroom cabinetry, such as Tricoya (a durable acetylated timber MDF product) with a two-pack finish for doors and recyclable polyethylene board products for carcasses. Removable kickboards make it easier to clean underneath. In bathrooms, wall-mounted vanities and freestanding baths are a good idea. "You want water to keep moving around, and to have nowhere for muck to settle and build up and then cause health issues," says Libby.

Mould can set in very quickly after a flood if a space isn't cleaned and ventilated properly. Preventive measures include using mould- and mildew-resistant paint and providing wall vents. "Hardwood is good for resisting mould, but paint helps make it even more resilient," says Libby. "We also drill holes at the bottom of stud walls so water can escape, and install wall vents above the flood level to facilitate ventilation through the cavity."

Being able to move furniture and belongings to higher ground will help save them during a flood, and having appliances and electrical equipment such as washers and dryers, air conditioner condensers, hot water units and meter boards raised to above the flood level will reduce loss and damage and keep utilities functioning. Installing power and data points high on the wall and having separate circuits for downstairs and upstairs in a multi-storey house is also a great idea. "If something trips downstairs, there will still be power upstairs," says Libby.

FLOOD RESILIENT HOMES PROGRAM

While it is highly effective to consider flood resilience at the outset of designing and building a house, many of the strategies discussed above can also be employed as retrofits in existing homes to make it quicker and easier to recover from a flood event. Brisbane City Council's Flood Resilient Homes Program, delivered in partnership with Brisbane Sustainability Agency and JDA Co., is helping homeowners retrofit their houses for greater flood resilience. Launched in 2018, the program is the first of its kind and proving to be extremely successful. "The program offers a high level of customer service, as we're helping to increase flood resilience on a house-by-house level," Libby explains.

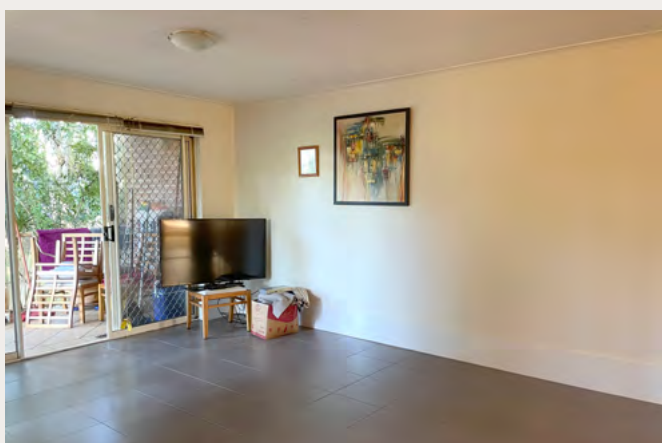
The Flood Resilient Homes Program operates in Brisbane suburbs prone to overland flooding and provides eligible residences with a free in-home assessment followed by recommendations to improve flood resilience. “The program is aimed at houses that are susceptible to 50 per cent annual chance of overland flow flooding,” Libby says. The recommended upgrades are designed by JDA Co. and undertaken by licensed builders, and there is no cost to the property owner. By March this year, 286 homes had been assessed and 144 upgraded.

In 2019, JDA Co. assessed Paddington resident Rusty’s ground floor apartment and made recommendations for upgrades. Rusty had been impacted by floods in 2011 and 2017 and each time it was over a week before he could return home. This year, with the upgrades in place, he was back home the next day.

Plasterboard wall linings were protected with a row of skirting tiles, and solid-core doors and waterproof kitchen and bathroom cabinets installed. Power points were raised as high as possible and the hot water system lifted onto a stand above the flood level. While Rusty did lose some belongings, the cleanup took just one day and was limited to hosing and mopping each room. There was no structural damage or waterlogged materials to replace.

Auchenflower is one the most flood-prone areas in Brisbane, being impacted by both overland and riverine flooding. One resident lost all her belongings in the 2011 floods and it took about a month for her to be able to move back home safely. This year, after having upgrade works done as part of the Flood Resilient Homes Program, she was able to return home in four days.

As with Rusty’s home, the work included new solid-core doors and water-resistant cabinetry. MDF wall linings were



↑ Thanks to retrofitted water-resistant kitchen cabinets and tiled skirtings installed as part of the Flood Resilient Homes Program, Paddington resident Rusty was able to clean out and move back into his flood-affected apartment straight away this time around.



↑ New fibre cement wall linings, solid-core doors and water-resistant kitchen and bathroom cabinetry were key to this flood-prone Auchenflower home’s resilience during this year’s floods.

replaced with a fibre cement alternative, and holes drilled in the bottom plate of hardwood stud walls to allow water to drain quickly. While downstairs services were raised, they could only be raised above overland flood levels, and some appliances were damaged due to the unexpectedly high water level.

JDA Co. has recently assessed some of the program’s properties to see how they fared in this year’s floods. “We have had an overwhelmingly positive response. Many homes were flooded, but residents who were affected said this was by far the easiest post-flood recovery, and that’s even after the highest flood levels they’ve experienced,” says Libby. The success of the program was instrumental in the establishment of a \$741 million Resilient Homes Fund recently announced by the federal and Queensland state governments.

What used to be billed as once-in-a-century flooding is now occurring on a regular basis. With relatively simple upgrades, households can be prepared for increasingly common flood events, minimising loss, cleanup effort and long-term disruption. ③