

Aura Apartments: A Case Study for Reviewing the BCC Response to the Brisbane Flood Event

36 Units in Ferry Road, West End near Riverside Park



Cleaning the mud outside Aura Apartments on 14/01/11 at 12.04 pm

Aura Apartments were flooded in the January 2011 Brisbane floods up to approximately 0.5 metres above the ground floor level at RL5.9, badly damaging the building, furniture and contents of the common rooms, swimming pool, and four ground floor apartments.

With over \$400,000 damage (including the walls and contents of ground floor units), the government regulations highlight the inadequacies of the code in relation to flooding. This document explains the impact of existing planning regulations in a flood affected area; the non-effectiveness of flood prevention and stormwater infrastructure in West End; and some thoughts on the reasons for flooding in West End around Riverside Drive.



Damaged walls in the Aura foyer



Pile of damaged contents from Aura



Car and contents submerged in Aura basement

Impact of Existing Planning Regulations in a flood-affected area

- The ground floor was built at RL5.9, a level approved under the existing regulations. This was inadequate for Aura as water rose up to around 6.4 metres in our building and street in the January 2011 floods. This implies a design Q100 flood level of RL5.4. This level was far too low in Riverside South, West End and may even have been below the 1974 flood.
- A Q100 standard is not appropriate in this area if it relates to a level of rainfall intensity occurring in the local area rather than a riverine flood caused by intense rainfall in the upper Brisbane valley.



Taken from Unit 32 at Aura on 12/01/11 at 5.13 pm looking towards the city



View of the carpark entrance with water still rising at 1.19 pm on 12/01/11



Carpark entrance with a mud line showing the height of the water

Impact of Existing Planning Regulations in a flood-affected area

- The building has two basement car parks. It took 1 day to remove water from the first carpark, but another 7 days to empty the second carpark. Regulations need to stipulate building designs with access holes that make it easier to pump water out of second basements.
- The building's normal de-watering system consists of a sump below the floor of Basement 2 with electric sump pumps under automatic level control. The power controls to the sump pumps are on the wall in Basement 2. Any basement de-watering fails when power is lost or when the control panel is flooded. Council should require such control panels to be above the design flood level and require buildings to have backup power in case of power outages.



De-watering pump controls in Basement 2



Pumping out the mud from the sump pumps on 29/01/11



Pump truck needed to pump out Basement 2

Impact of Existing Planning Regulations in a flood-affected area

- The Council approved building plans for grills for ventilation into the B1 carpark. These grills are well below the ground floor level of the building, and below the design Q100 flood level.



Vents at the back of Aura with the sunken garden below ground level



Close up of vents where water spilled into the B1 carpark basement



Stairs from ground floor leading to back garden with vents where water spilled into B1 carpark



Basement 1 vents where water entered carpark



Basement 1 vents where water entered carpark



Basement 1 vents where water entered carpark



Inside view of one set of vents where water entered Basement 1 carpark

Impact of Existing Planning Regulations in a flood-affected area

- The lift motors and controls are located in the Basement 2, so they were badly affected by flood water and they are very expensive to replace, costing over \$40,000. In Aura there is room for the lift to be placed at the top of the lift shaft, but relocating the motor and controls is very expensive at over \$250,000. Council regulations requiring lift motors and controls to be put above flood water levels would have saved residents in Aura many thousands of dollars.



Aura lift doors on Basement 2 with controls on the right



Aura lift control panel beside the lift in Basement 2 positioned at the lowest point in the building



Lift well in Aura in Basement 2 with the main lift motor behind the yellow door in the wall near the fire extinguisher

Impact of Existing Planning Regulations in a flood-affected area

- The control panel for the CO₂ ventilation system is located in Basement 1, so this was another expensive service to replace. Repairs will cost over \$20,000. Not all parts of this system can be relocated, but the control panel could be. However, retrofitting this panel is expensive. The Council could require developers of buildings in flood-prone areas to put the control panel above flood levels.



CO₂ Panel controls in Basement 1 beside the lift shaft



Metal ducts in the roof are part of the CO₂ control system



Part of the CO₂ monitoring system

Impact of Existing Planning Regulations in a flood-affected area

- The Council approved the location of fire services below the RL5.9 level required for the ground floor. That resulted in the sprinkler system, the pumps and control board being badly affected by the flood waters and these will cost over \$27,000 to replace.



Two rooms either side of refuse room below ground floor beside the carpark entrance housing the fire sprinkler pump (left), the main fire pump and controls (right)



Inside the fire sprinkler system that was damaged by water



Main fire sprinkler and pump damaged by water

Impact of Existing Planning Regulations in a flood-affected area

- The Energex transformers for the Aura and Arriva Apartments located in front of Aura's sister building next door sit at the ground floor level, so it was affected by water inundation and had to be turned off when flood waters began rising. That meant that the pumps in the basements stopped working and residents could no longer live in the buildings, even if they were not directly affected by water. The regulations need to stipulate that vital services, such as energy supplies, should be well above any flood levels.



View showing two of the three buildings (Aura on the right and Arriva on the left) serviced by the Energex transformers



Room on left under tree housing Energex transformer for Arriva & Aura Apartments where water entered



Energex inspecting transformer supplying electricity for Arriva and Aura

Impact of Existing Planning Regulations in a flood-affected area

- The gas-fired water heaters and electric pumps were completely submerged and needed to be replaced. Residents did not have hot water for some time and then a limited service until units could be replaced. Located in the sunken garden, these heaters are well below the ground floor level of RL5.9.



Room housing the water heaters beside the building and well below the building ground floor



Street entrance down some steps at the side of the building leading to the fire stairs halfway along and showing the water heater room (white walls) in the middle



Looking down on the water heaters from the entrance to the fire stairs at ground floor level



Water heaters that were completely submerged and damaged beyond repair



Water heater controls that were completely submerged and damaged by water



Hot water recirculation pump that cost Aura \$450 to replace



Close up of hot water recirculation pump that needed to be replaced

Impact of Existing Planning Regulations in a flood-affected area

- The gas valves in Aura are located in the sunken garden below ground floor level and were completely submerged by water.



Main gas valve sign beside the stairs to the basements



Main gas valve



Looking down on the stairs leading to the carpark basements

Impact of Existing Planning Regulations in a flood-affected area

- The Aura pool was inundated by flood waters, but the pool pumps and controls located under the pool in the B1 carpark were also damaged and repairs will cost around \$3000.



Aura pool 14/01/11 at 12.12 pm



Close up of damaged pool controls in room with door raised on Basement 1



Aura carpark entrance showing room where pool controls are housed in room (left) on Basement 1

Impact of Existing Planning Regulations in a flood-affected area

- The power, fire alarm, video and telephone cabling control panels in Aura are on the ground floor so they were partially affected by water, unlike other multi-storey buildings in the West End, which had more major damage because their control panels were located in basements. The Council should require all buildings to have these control panels above any flood levels.



Video cabling controls located on ground floor



Power control panel inside Aura's foyer where partial damage occurred to the building power distribution.



The main isolator switch on the power board was located at the lowest point on the panel and was the most expensive power component to replace

Effectiveness of Flood Prevention and Stormwater Infrastructure in West End

- The stormwater drain around Aura could not cope with the volume of water and the first inundation occurred from stormwater, which bubbled up through the drain with such force it lifted one of the grates. One resident then fell down into the open hole, which was under water. The Council needs to better design for stormwater runoff in West End.
- This stormwater grate is located on the main emergency exit pathway from the fire stairs. The pathway was flooded to knee level at the time the building was evacuated. This is an unsafe design that should not be allowed by the building code.



One of smaller grates giving access to the stormwater drain around Aura



The large grate giving access to the stormwater drain at the side near the footpath gate on 14/01/11 at 1.04 pm, which can drown a person, if they fell in and could not get out



Aura stormwater drain on 14/01/11 at 2.53 pm showing where water bubbling up has not allowed any mud to settle around the grate

Reasons for Flooding in West End around Riverside Drive

- River water flowed over the bank in places along Riverside Drive and entered buildings and, possibly affected Aura. Instead of requiring developers building beside Riverside Drive to raise the bank, Council allowed the developers of Waters Edge to lower the bank and this was one of the places where river water flowed inland.
- The Council is not fully using substantial funds paid by developers in West End to Council to ensure the main stormwater drainage system is capable of controlling run off.



View of Riverside Drive at 6.33 pm on 11/01/11 showing Waters Edge on the right



Taken from Unit 32 at Aura on 12/01/11 at 5.13 pm looking towards the city



View of water entering Waters Edge on 12/01/11 at 5.08 am