RAIN STORAGE GUTTERS

The Achievement

Australian cities and towns need new strategies to counter local flooding, due to urban consolidation and increased pollution of streams and coastal waters. They also need to redress problems with adequate fresh water supply. The rain storage gutter system addresses these problems from two angles. First, it reduces reticulated water usage by substituting rainwater for purposes such as toilet flushing. Second, overflow water during heavy or sustained rainfall infiltrates the soil, replenishing the water table and slowing the passage of water to urban waterways.

The Gladesville Road Community Centre is a case study that illustrates storage gutter use. Storage gutters connected to toilet tanks have reduced the mains water demand by 26%. In addition, because rain overflow is directed by a stormwater diffuser into the garden soil, 100% of the rain that falls on the roof is used on-site, except under very severe storm conditions. Independent costing of the gutter system has confirmed that these savings can be achieved at a cost between 5% and 27% less than the installation of traditional guttering plus an equivalent-sized rainwater tank.

The Innovation

Rainsaver Pty Limited is a small one family company with 5 staff, which holds patents in seventeen countries (including USA) for rain storage roof gutters. Patent searches indicate that the storage gutters are unique, and it appears there are no direct competitors for the “collection and storage of water in a container at the drip line of roofs”. Frank Smith, the inventor, developed it after observing the need to better manage rainwater when living with a young family on tank water in the Nowra district of New South Wales. After analyzing patterns of rainfall statistics from the Bureau of Meteorology, he developed an oversized gutter that replaces a water tank and uses all rainwater that falls on a roof. Instead of downpipes feeding into the street drainage system, the overflow from the storage gutters is returned to the soil through infiltration.

Storage gutters come in three sizes: a small model (15 liters/meter) suitable for retrofit projects; a medium model (25 l/m) for new houses, and a large version (48 l/m) for heavy demand situations. The gutters are made from folded steel colorbond sheet; however, there are plans to have them roll-formed to reduce manufacturing costs. This plan has been aided by a close relationship with the steel supplier. Gutters are fitted with lids and leaf guards for easy maintenance. Medium and large gutters are fixed to roof trusses with purpose-designed internal steel brackets. Lengths are joined with rivets and silicone sealed. The gutters are then coated internally for improved water tightness.

Rainsaver and its franchisees usually install the gutters. The installers provide plugs at suitable points for plumbers to connect the gutters to toilet tanks or other outlets. Overflow holes are situated where excess water can flow directly into garden beds. Alternatively, the gutters are connected to a diffuser system that transfers the water to areas of the garden with suitable soil porosity and permeability.

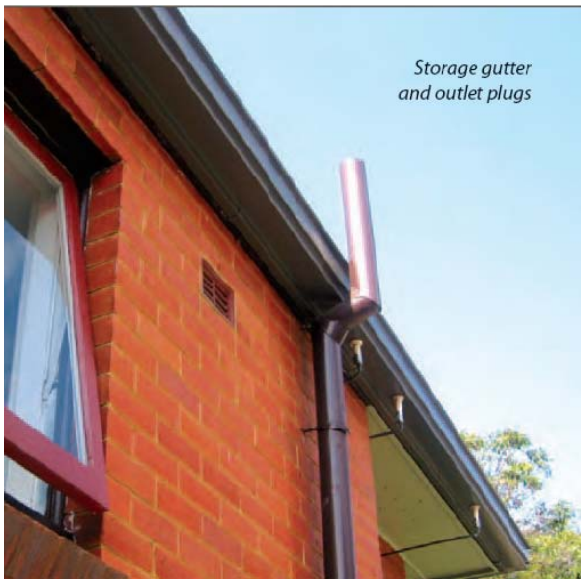
Site characteristics are assessed before the installation, and the infiltration area needed for the roof catchment is calculated. In times of low rainfall or high usage, storage gutters can be recharged from the mains water supply if they are connected to a toilet or washing machine. The Gladesville Road Community Centre project demonstrates that water storage gutters are capable of replacing existing roof gutters, downpipes and rainwater tanks. They also reduce the need for stormwater retention systems. They do this while returning moisture to the soil to aid vegetation growth and replenishing the water table.

The Benefits

Savings in mains water usage achieved by storage gutters depend on (1) rainfall amount, distribution, and intensity; (2) water use by building occupants; and (3) roof collection area. Assuming a 200 m² building with average occupancy levels, Professor John Argue of the Urban Water Resources Centre at the University of South Australia estimates that water storage gutters can save between 30% and 60% of mains water usage, depending on gutter size and location, each year over the life of the gutters (estimated to be a minimum of 15 years). Water stored in the gutters is gravity fed to toilet tanks. Gutters can also act as an emergency water supply for the householder if a water main is broken. It is possible to fit an activated carbon filter to the gutter outlet and feed a filtered drinking water tap. In a bushfire, storage gutters can provide emergency water supply for fire fighting, and they can be used to create a curtain of water around a building under threat from bushfire.

As an integral part of the roof plumbing system, storage gutters are less aesthetically intrusive than rainwater tanks and pumps. They require no ground space on a restricted site and they collect 100% of the water falling on the roof, as opposed to water tanks, which commonly only collect from the roof plane facing the side where the tank is located. Storage gutters can reduce rainstorm stormwater runoff up to 85%. Most installations, including the one at Gladesville Road Community Centre, have natural onsite infiltration of excess stormwater from the roof. There is no need for a separate detention tank and little need for downpipes. As a consequence there is less water flowing into the street gutter system, which makes storage gutters an effective mitigation measure against urban flooding. Storage gutters reduce costly stormwater drainage systems typical of suburban subdivisions.
Building owner benefit from reduced consumption of mains water resulting in lower bills, little maintenance and longer gutter life due to leaf guard system, less need to water the garden. Community benefits include lower demand for reticulated water leading to less pressure to build new dams and less need for piped street drainage and area retention systems, which reduces costs of developing land for housing, and greatly reduced cost of stormwater management and flood mitigation. Environmental benefits include a more natural level of water infiltration into the soil, replenishing urban water tables, and reduced nuisance flooding and erosion from storm high speed run-off.


Cutaway section
of medium sized
storage gutter


Storage gutter
and outlet plugs


Storage gutter and
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