

The 'Parramatta Infiltration Study'

AUSDRAIN Tank Modules were used in 'John Wearn Reserve, North Rocks', as part of this Study (see below)

A project to study infiltration of stormwater at sites in Western Sydney, in particular the Parramatta region, was proposed for funding to the NSW Stormwater Trust and, following the award of a grant, commenced in early 2000. Soil infiltration (borehole) tests were carried out at four sites considered typical of the region and hydraulic conductivity, kh ; values in the range 2.2 – 7.0 x 10⁻⁸ m/s were recorded. These values indicate soils of very low permeability.

A second series of tests was conducted, this time using 1.0 m square infiltration pits: the results showed permeability 'improvement' of about half an order of magnitude. This outcome – the value of permeability varying (directly) with the size of test installation – has been observed previously in Adelaide. This encouraged the view that the 'full size' installations might operate in an effective hydraulic conductivity regime of around $kh = 1 \times 10^{-7}$ m/s. This would put the soils clearly in the 'low permeability' range and, if validated, would be suitable for appropriate underground OSR technology.

Four 'soakaways' were designed and installed in open space Reserves in mid-late 2000, each 'matched' to the roof area of a nearby Council building. ARI = 5-years was used to design the devices; critical storm duration was taken as $T_c = 2$ hours.

Details of the installations, with their associated roof areas, are as follows:-

- **Pendle Hill Park**, Girraween: contributing roof area – 139 m²:
gravel-filled, $H = 0.5\text{m}$, $b = 4.0\text{m}$, $L = 11.0\text{m}$
- **John Wearn Reserve**, North Rocks: contributing roof area – 170m²:
AUSDRAIN Tank modules, $H = 0.42\text{m}$, $b = 4.0\text{m}$, $L = 5.5\text{m}$.
- **Don Moore Reserve**, North Rocks: contributing roof area – 110m²:
Slotted 300mm diam. Pipes, (8 off) backfilled with gravel, $H = 0.5\text{m}$, $b = 4.0\text{m}$, $L = 6.4\text{m}$
- **Balcombe Heights Reserve**, Baulkham Hills: contributing roof area – 150m²:
Everglas 'jumbo' units (4 off) backfilled with gravel, $H = 0.5\text{m}$, $b = 2.2\text{m}$, $L = 10.3\text{m}$.

Initial tests were conducted on the installations before connecting the roof areas using mains water to fill the trenches. Their 'emptying times' (from full), T , and their effective hydraulic conductivities were found to be:-

- Pendle Hill Park: $T = 13$ days; $kh = 3.2 \times 10^{-7}$ m/s
- **John Wearn Reserve: $T = 5.2$ days; $kh = 2.1 \times 10^{-6}$ m/s (AUSDRAIN Tank modules)**
- Don Moore Reserve: $T = 48$ days; $kh = 1.2 \times 10^{-7}$ m/s
- Balcombe Heights: $T = 11$ days; $kh = 8.0 \times 10^{-7}$ m/s

The roof areas were connected following these tests and the four 'soakaways' set up with continuous water level recorders. It is intended to monitor the performance of the installations for a period of 15 months when a Final Report will be issued. However, the following 'preliminary' findings can be advised:-

1. Effective hydraulic conductivity values of operating installations appear to be about one order of magnitude greater than those obtained using the 'borehole' method of site testing in heavy clays, and about half an order of magnitude greater than values obtained from 'infiltration pit' tests;
2. 'Soakaways' 0.5 m deep constructed in soils of the Parramatta region, even in the most favourable of the heavy clays, will not empty from full in less than 3 days. Depth reduction of 0.3 m may enable this standard to be met, but only in clays at the 'upper end' of the spectrum;
3. Generally for the Parramatta region, practical 'soakaways' receiving roof runoff or stormwater from paved areas cleansed before entry, need additional drainage 'assistance' in order to meet the '3 days' emptying standard. This 'assistance' can be provided and is included as a design procedure in the following section.