



Optimum Design

Terrible as they were, last year's hurricanes Katrina and her sisters Rita and Wilma are once again far from isolated reminders that the world's weather is showing repeated signs of excess. Closer to home in 2005, localized torrential rain and massive flooding followed months of searing heat and drought in much of Europe. Even a fine summer must always be seen alongside the widespread flooding problems that habitually affect many parts of the UK.

PPG23 Government guidelines now combine with existing planning restrictions to place the maximum pressure yet on UK developers and contractors of new construction sites – and to make arriving at the most cost effective solution in stormwater attenuation a truly key issue.

There are three main options in terms of method and material now being specified in the construction industry: (1) corrugated steel

holding pipes and tanks, (2) polyethylene pipes and tanks, and (3) pipe-fed cell systems. Although each have their proponents, it is fair to say that the first type, made of helically wound galvanized steel sections in a wide range of diameters, has proved the most cost effective and flexible underground solution, being unlimited by size and shape to offer an infinite variety of layouts.

Another question to consider is whether the manufacturer is equipped to provide a full design solution for the project. Certainly, consultants and specifiers with experience in this field may well have the skills to arrive at the optimum solution. So rapid has been the rise in importance of stormwater attenuation systems that a sizeable minority of project engineers have had no experience of incorporating them, in which case the availability of such a service is not to be underestimated.

Conditions and construction methods are just two of the many factors affecting a correct choice, says Dave Loveridge at Tubosider UK.

Method of construction also has a strong bearing on the potential to inspect and maintain a system. The leading large tank systems have the advantage of being not only fully pre-fabricated with access shafts, ladders, inlet and outlet connections all installed, but also being accessible for routine inspection – a fundamental requirement with many authorities.

Whatever the extent of their experience, specifiers seeking to arrive at the most cost effective solution, will need to base their calculations on nine potential parameters.

- volume of storage required – say 550 cubic metres
- gravity or pumped system – say gravity
- if gravity, the depths available – say 4 metres
- if pumped, the maximum desired depth – not applicable here
- site constraints (the plan area

- available) – say 42 x 15 metres
- loading criteria – Highways Agency standards
- design life required – say 60 years
- allowable discharge – say 11 litres/second
- environmental classification – say non-aggressive for stormwater

With a wide range of pipe sizes (0.3m to 3.6m diameter) and stormwater tank sizes (from 0.6m diameter) manufactured in thicknesses from 1.5mm to 3.5mm, solutions can be tailor made to match any project. Using the above as an example, the first task is to determine the steel thickness needed to accommodate the height of cover, loading criteria, design life and environmental classification – in this case 1.5mm.

With a volume of storage of 550 cubic metres and an available area of 42 x 15 metres, the best available solution using a 1.8m diameter tank (giving an end area of 2.54 sq m) would be $550/2.545 = 216.110$ linear metres, designed as a manifold of five parallel tanks.

Galvanised steel pipes and tanks possess a design life of 50-60 years in non-aggressive environments, with a polymer secondary coating also available to gives an additional BBA certified 50 years' lifetime in aggressive environments. Furthermore, their gasketed joints are fully tested and WRc approved to sewers for adoption standards or watertightness.

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