

WHITE PAPER

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EXECUTIVE SUMMARY WHITE PAPER

Managing Stormwater Runoff and The Real Benefits to the Community and Environment

This white paper will cover how to manage stormwater runoff and discuss the benefits that stormwater management has on the environment and the community at large. In doing so, the paper offers a detailed account of what stormwater is and the major consequences of stormwater when left unmanaged.

The paper aims to outline the two key parts to the management of stormwater. The paper considers the reality of a potential water shortage and focuses on education as a method for water conservation, to secure water long term.

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Managing Stormwater Runoff, And the Benefits to The Community and Environment

What exactly is stormwater?

Stormwater is water that originates from rainfall but does not soak into the ground, it is rain that runs off the rooves of buildings, houses and hardstand areas. It then enters the stormwater drainage system in urban areas and natural water courses in non-urban areas and can significantly increase the amount and intensity of runoff water.

The rainfall that does not soak into the ground becomes surface runoff. This presents three main challenges:

1. Large volumes, along with the timing of runoff water, can lead to **flooding**
2. Stormwater infrastructure needs to be designed and built to **meet maximum flows** from major rainfall events which may only occur once every 10 to 50 years
3. Runoff water can carry dirt and potential **contaminants**, polluting streams, rivers lakes and oceans.

Stormwater does not necessarily need to be negative, especially if managed in the correct way. To the contrary, as the population continues to grow in Australia and the world, the demand for clean water exceeds the availability of supply. Stormwater, if managed and harvested correctly, can in fact be an efficient water supply option.

Why is it important to manage Stormwater?

The importance of stormwater management is not a new concept. In fact, it has been around for centuries. The Greeks developed water supply systems and engineering in Crete that dates back more than 4,500 years, when the early Minoans recognised the important issues related to water supply (Dialynas and Angelakis, 2011).

Water security is of growing and critical importance for the sustainability of a healthy population, according to Koutsoyannis, et al. (2008). Unfortunately, due to climate change and drought in Australia, there are many areas which are short of water. In these areas, the development of an effective water resources management program is essential. Instead of being

seen as a problem to be dealt with and disposed of quickly, stormwater is now recognised as a valuable resource that can help to manage our water resources more sustainably (Department of Environment and Conservation, NSW, 2006).

Two major effects of Stormwater

Stormwater Runoff

Urbanisation creates large increases in water runoff. In a non-urbanised environment in Australia approximately 12% of rainfall finds its way to surface streams. In urban environments, 90% of rainfall finds its way to stormwater systems and surface streams. This is due to hard surfaces such as concrete yards, roofs, and other water-resistant materials. Thus, the concern of stormwater management is becoming more apparent with the increasing density of our towns and cities, as well as hardstand areas in industrial sites.

Stormwater Pollution

Traditionally stormwater has received little treatment and the only management has been to direct it to natural waterways which then lead to rivers, lakes and/or beaches. This method of managing stormwater leads to increased pollution of waterways through organic matter and other pollutants such as chemicals, micro-organisms, suspended solids and fertilisers entering the waterway system.

The result is an increased cost to the community, both from a capital perspective with larger stormwater infrastructure required, increased insurance premiums and from an environmental perspective the flood impacts are other effects are increased with higher stormwater runoff. Changing community attitudes have resulted in demands for cleaner and better management of our water resources.

As a result of these effects, two main objectives become apparent to aid in the successful management of stormwater. These are; to expand the use of runoff water that is added to the water supply and the reduction in pollution.

Two Key Parts to Management of Stormwater Management - Detention and Retention

There are two important parts to managing stormwater; *detention* and *retention*. These two parts aim to accomplish reduced peak stormwater flows and improved flood management, re-use and ground infiltration, stormwater quality improvement for surface and ground waters, improve microclimate benefits and reduce heat island effects through enhanced streetscapes, landscaping and increased urban greening.

Detention

Detention of stormwater aims to manage peak flows and discharge rates. To mitigate flooding and overloading of downstream systems, detention tanks, rain gardens, pervious pavements and other suitable techniques can be used to allow for dissipation of peak discharge and infiltration into tanks, and other storage resources. This slows the rate of runoff discharged from the site to the street drainage systems, and results in increased impervious areas that occur with the construction of buildings and hardstand areas.

Retention

Retention of stormwater for re-use, reduces the reliance on mains water and contributes to the management of discharge rates by collection in water tanks (above or below ground) to allow its re-use. This involves the on-site storage of stormwater during a rain event that can be held for re-use as required, for things such as the garden, toilet, laundry and or a hot water service or for industrial use or wash down areas.

How we can manage stormwater and improve Australia's water supply?

A key to rain harvesting is the use of water tanks

The Australian Governments, state associations and communities are recognising the urgent importance of stormwater harvesting and reuse. The NSW Government have already provided over \$4 million for pilot projects, resulting in up to 13 million litres of water being saved annually (Department of Environment and Conservation, NSW, 2006).

There are many ways to manage and reduce the negative impacts of stormwater.

These include:

- Water tanks
- Dams and ponds
- Absorption pits
- Bio retention systems

In some cases, there is also a requirement to treat water before it leaves site. This is especially the case when there are contaminants such as chemicals, oil or grease.

One of the most common solutions is the use of water tanks to manage stormwater and ensure it is being harvested and reused safely and correctly.

The University of Newcastle has done extensive research into the benefits of water tanks when it comes to managing stormwater. Modelling the use of water tanks to provide stormwater retention and detention has shown significant reductions in stormwater peak flows. An example of this is in CSIRO's Urban Water Program, which focuses on using tanks to retain and reuse stormwater and as a result, has reduced stormwater export to the distribution system by 20%.

Other studies by the University of Newcastle have shown that by holding stormwater in water tanks can reduce the contamination of the water system by allowing settlement of contaminants such as metals and chemicals.

Further research has also shown that water in rainwater tanks that are used in toilets, garden irrigation and hot water systems can reduce the reliance on mains water by up to 65% (Department of the Environment and Heritage, 2002).

Regulations

The management of stormwater rests mainly with local governments and the regulations around urban design and local water use planning. This presents challenges for anyone building on a site or developing land, as they must understand and comply with the local council requirements.

Regulations around water management and sustainability, including water reuse, are increasing and this is resulting in any new developments, whether they are residential, commercial or industrial, having to plan and comply with tighter rules. One example is that many regions' new industrial sites **must** retain all water runoff from the site and treat or reuse it before it can enter the stormwater system.

For local councils, one of the significant requirements are that stormwater runoff connects to their stormwater drainage system and they have specific requirements about the volume of water as well as the quality of water entering their system.

If you are building or developing new sites/ buildings or upgrading existing sites/ buildings there are many aspects to implementing stormwater management. These include:

- Planning
- Detention and retention of stormwater
- Reuse of stormwater for non-potable applications
- Treatment of water to remove contaminants such as oils and organic material.

One of the key challenges for anyone building on a site or developing land, is to understand and comply with the local council requirements. Unfortunately, each council has its own requirements resulting in each new site or building having different requisites for compliant construction. This is particularly the case with larger sites and buildings.

Stormwater retention, detention and reuse are some of the most crucial strategies to saving on water costs, as 50% of water piped to urban areas is used for lower quality purposes such as watering gardens, toilet flushing and commercial and industrial applications. Water collection or reclamation can reduce potable water demand by up to 50% depending on the specific location and circumstances (Department of the Environment and Heritage, 2002).

Education is a key component to stormwater management

To improve Australia's competitive position, it is necessary to identify and manage Australia's water assets, ensuring efficient and sustainable use of these critical water resources and the provision of adequate water for the environment (Agriculture and Resource Management Council of Australia and New Zealand Australian and New Zealand Environment and Conservation Council, 1996).

Water is an integral part of everyday life – rural, urban and industrial – that should not be taken for granted. Water is used for drinking, washing, cleaning our home and watering our gardens. In rural areas, water is essential for livestock production and a variety of agricultural activities. Water is used to swim in, fish in and sail on. When visiting the beach or swimming in the river or lake with our friends or family we appreciate good quality water. We value it for its usefulness, its recreational benefits and its place in the landscape and the environment. Without water, we could not survive. Luckily, Australia has the capacity to ensure the sustainability of our resources before they run out. It is up to us to make sure that good quality water will be available throughout our country in years to come. To ensure this future, proper stormwater management will be needed.

The key to managing stormwater is to review the tools and methods that are available, and to plan and design the system to meet the needs of a site or building in conjunction with the overall regulations that apply.

Education is a key component to stormwater management and Bushmans recognise that stormwater management is an increasingly important issue across sites all over Australia. For further information on stormwater retention, detention and the use of tanks please visit Bushmans website www.bushmantanks.com.au.

About Bushmans

Bushmans Industrial is Australia's the leading manufacturer of water and industrial tanks. Bushmans is an Australian owned and operated business which manufactures a wide range of stormwater, rainwater tanks, chemical, wastewater and industrial tanks. The tanks are distributed across eastern and central Australia, along with a range of accessories and fittings for industrial applications.

Bushmans have been designing and manufacturing industrial tanks since 1989 with plants in Dalby in Queensland, Orange in New South Wales, Terang in Victoria and Cavan in South Australia. Bushmans has a wide range of industrial tanks which can be designed to meet your specific requirements. Our range is extensive including poly and steel liner water tanks for a range of applications in rural, industrial and urban settings. Bushmans tank sizes range from 720 Litres to 363,000 Litres and includes round, modular, slimline, tall or squat shaped tanks.

At Bushmans Tanks, we pride ourselves in designing and manufacturing the highest quality tanks and with over 30 years of industry experience, we can most certainly find a solution for your applications.

References

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