the WATER & CARBON group

Narrogin WWTP (1ML/D) Upgrade Trickling Filter and Wetland

Narrogin WWTP – New Plastic Media Trickling Filter

Water Corporation is the principal supplier of water, wastewater and drainage services throughout Western Australia, with an asset base of over $15 billion dollars incorporating over 100 wastewater treatment plants.

PROJECT SUMMARY

The Water and Carbon Group was awarded the design and construct contract to upgrade the Narrogin WWTP with a 300m^3 plastic media trickling filter and a 20,000m^2 high density constructed wetland. When completed in 2016, the Narrogin WWTP became one of the lowest energy sewage treatment plants operating in the country. Energy consumption is 50% lower than many equivalent performing activated sludge plants. Total energy savings of over 150,000KWh have been realised.

Over 150,000 KWh per year saved

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"Bringing sustainable, ecologically-focused innovation to the global wastewater industry"

BACKGROUND

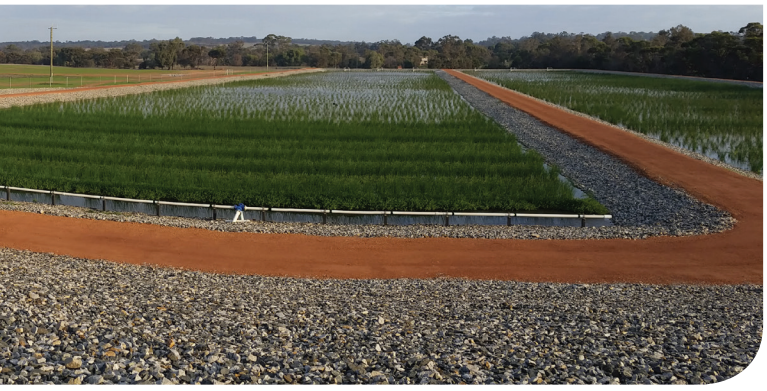
Narrogin is a town of approximately 4,500 people, located in the Western Australian wheat-belt, 2.5hrs southeast of Perth. The original WWTP for the town comprised two aerated primary ponds, 3 stone media trickling filters (total volume 70m^3) and 2 clarifiers. In summer months, effluent from the WWTP is used to irrigate some of Narrogin's parks and gardens, whilst in winter months it is released to the local Narrogin brook.

Two main challenges faced the Narrogin WWTP.

1. The original 1970's stone media trickling filters were blocked, substantially reducing performance.
2. The WA Department of Environment Regulations required higher levels of treatment to reduce nutrient load to the Narrogin Brook.

In 2014, Water Corporation commissioned the Water and Carbon Group to commence work to upgrade the Narrogin WWTP with a Trickling Filter and Wetland. The upgrade is designed to meet stringent nutrient discharge requirements of TN=5.8mg/L and TP = 2mg/L.

2ha wetland under construction – pre planting



2ha partially established wetland

Installation of media in Trickling Filter

50% less energy usage

SOLUTION

The solution involved a two stage treatment package. The first stage included demolishing and removal of the three existing stone media Trickling Filters and their replacement with a single 'NEW CONCEPT' Trickling Filter with a media depth of 3.6m

Utilising patented innovative HDPE technologies in the filter media we achieved a microbial reactive area of over 42000m^2 within this filter. There was no requirement for energy hungry aeration blowers (passive aeration provided sufficient airflow), and whilst this provided cost savings in energy consumption it also had the added benefit of reducing the noise levels on site. The hydraulically actuated influent dispersal arm provided equal dispersal of the influent across the media ensuring that the whole of the 42000m^2 of filter media was utilised to achieve efficient nitrification and BOD reduction.

The second stage of this design incorporated a 2Ha constructed wetland area planted with a range of native aquatic plants. Nutrients, particulates and organic matter were removed through the action of biofilms associated with these plants, prior to discharge into the Narrogin brook.

The final result of this system was a Passive WWTP that provided significant energy savings (50%) along with ecological benefits to the surrounding environment, whilst meeting the stringent discharge requirements imposed by the EPA.

OUTCOMES

The Narrogin WWTP upgrade is a demonstration of how Water Utilities can achieve high performance upgrades to existing treatment plants by using plastic media trickling filters and constructed wetlands. The Narrogin WWTP offers an example to the Australian water industry of new ways to employ modern versions of traditional technologies.

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