

BIOTRICKLING FILTERS REDUCE ODOUR CONTROL COSTS AT WOODMAN POINT WWTP

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Introduction

The Woodman Point WWTP is the largest wastewater treatment plant in Western Australia, serving a population of 600,000. The plant currently treats 120 ML/d and has a rated hydraulic capacity of 160 ML/d. Odour control was installed in 2002 as part of the plant upgrade to full secondary treatment. However, subsequent odour modelling and community surveys showed that additional odour control was needed to improve community acceptance of the plant.

Odour Control Programme

W2W Alliance developed a programme to upgrade odour control at Woodman Point in three stages.

Stage 1 (2009) odour control improvements include covering SBR bioselectors, upgrading containment and increasing extraction rates in sludge processing, decommissioning existing scrubbers, and constructing a new odour control system with a 50m discharge stack.

Stage 1 improvements also incorporate a sludge amplification component which includes a new ferric chloride dosing system and new high temperature flares to reduce odour emissions.

Stage 1 odour control improvements cost about \$52.5 million and are expected to reduce odour by over 50 percent.

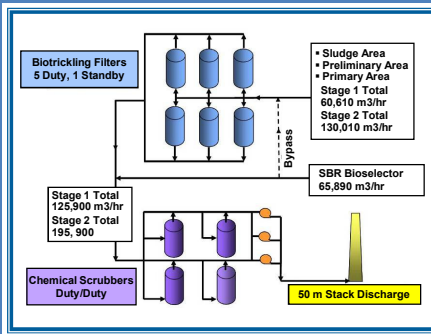
Stage 2 (2012) improves the effectiveness of odour control at the plant inlet and primary works by increasing the air extraction rates under the covers.

Stage 3 (2015) further reduces odour emissions by covering the aerated sections of the secondary treatment (SBR), if required. Stage 3 also provides additional secondary treatment capacity needed to treat wastewater while the covers are being installed.

Odour Control System Design

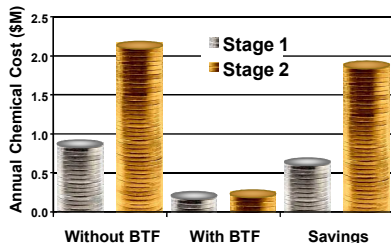
A technology assessment found that biotrickling filters were the most economical means of treating the design H₂S concentrations of 144 ppm average and 230 ppm peak. Biotrickling filters are very efficient at H₂S removal, but other odorous compounds may not be completely removed, so chemical scrubbers are used for polishing. The chemical scrubbers operate at low cost because the H₂S load is significantly reduced by the biotrickling filters. Two stages of chemical scrubbers were designed to reduce chemical consumption and allow for one scrubber to be removed from operation for maintenance, with treatment maintained by the remaining units.

The odour control system incorporates six Bioway biotrickling filters (five duty, one standby) to treat air from preliminary, primary, and sludge areas. Two stages of chemical scrubbers by Environmental Group Ltd. were installed to treat foul air from the SBRs and the treated exhaust from the biotrickling filters. The chemical scrubbers were oversized to treat the future Stage 2 air flow of 195,900 m³/hr.



Low strength SBR air was routed directly to the chemical scrubbers, which reduced biotrickling filter capital costs without undue increase in chemical use.

Biotrickling Filter/Chemical Scrubber Odour Control Works at Woodman Point WWTP



Annual Chemical Consumption With and Without Biotrickling Filters and Net Annual Savings

Performance Testing

After completion of Stage 1 a detailed emissions measurement, odour modelling, and ground-truthing program will be undertaken.

Economic and Sustainability Benefits

An evaluation was conducted to determine the annual chemical cost savings by using biotrickling filters upstream of the chemical scrubbers. For Stage 1, the annual chemical savings is **\$660,000**. For Stage 2 the annual savings is even greater at **\$1,906,000**.

In addition to the chemical savings, maintenance requirements for the chemical scrubbers are decreased at the lower loads due to less frequent media cleaning.

Sustainability was enhanced by using reclaimed effluent for the biotrickling filter plant. The system will require an estimated 330 ML per year which would have otherwise been potable water.

The biotrickling filter/chemical scrubber system at the Woodman Point WWTP represents international best practice odour control at a substantial cost to ensure that local residents are not unduly impacted by odour.