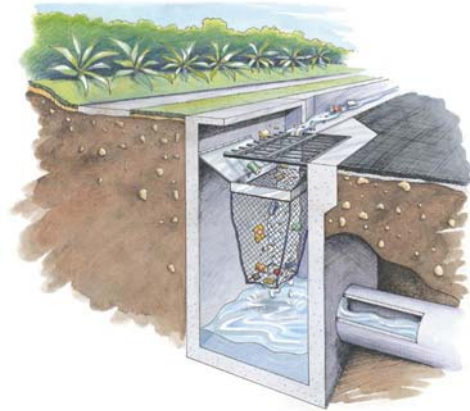


INTEGRATION OF ECOSOL AT-SOURCE RSF 100 SOLID POLLUTANT FILTERS WITH THE MUSIC CATCHMENT PACKAGE

INTRODUCTION TO MUSIC

MUSIC is an acronym for Modelling Software for Urban Stormwater Improvement Conceptualisation. It is a product of the Cooperative Research Centre for Catchment Hydrology and the licensor is Monash University (www.toolkit.net.au).

MUSIC provides a user-friendly interface to allow complex stormwater management scenarios to be quickly and efficiently created and the results to be viewed using a range of graphical and tabular formats. This reduces the uncertainty surrounding the planning of stormwater management strategies, and may generate substantial cost-savings.



PURPOSE

MUSIC is designed to simulate urban stormwater systems operating at a range of temporal and spatial scales for catchments from 0.01 km² to 100km² and modelling time steps ranging from six minutes to 24 hours to match the catchment scale.

TARGET USER GROUP

MUSIC is designed for urban stormwater engineers, planners, policy staff, consultants as well as state, regional, and local government authorities.

APPLICATION OF MUSIC TO MODELLING AT-SOURCE SOLID POLLUTANT FILTERS

Double clicking a GPT icon within MUSIC produces a popup window that requires the following data to be input:

- 1) low flow bypass;
- 2) high flow bypass; and
- 3) piecewise-linear user-definable transfer functions for the At-source Solid Pollutant Filter (also commonly referred to as a litter basket), performance in capturing Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP), and Total Nitrogen (TN).

In each case the independent variable is input concentration (mg/l or kg/Ml) and the dependent variable is the output concentration.

The At-source Solid Pollutant Filter inputs are independent of the flow rate, except that there are underflow and overflow limits. Flow below the underflow limit, and flow above the overflow limit, passes through with no change of concentration.

IMPORTANT CONSIDERATIONS FOR MUSIC USERS

The validity of the predictions is only as good as the validity of the input data. All at-source solid pollutant filter performance predictions are subject to uncertainty owing to the stochastic nature of environmental processes, with quantities varying chaotically with time and location. The difficulty in making repeatable measurements is illustrated in the wide range of published test results.

This is not surprising considering that there can be significant differences, for example, in the:

- catchment type and hydrology;
- weather conditions and events during the testing period;
- sampling regimes – frequency, timing, and location;
- composition of pollutant load;
- nutrient transport mechanisms;
- level of bonding of nutrients to suspended solids
- degradation of accumulated pollutants;
- suspended solid particle size distribution (PSD); and the
- size and state of the unit (i.e. how well it has been cleaned and maintained).

Consequently, when comparing different at-source solid pollutant filters it is important to understand that the results may have been derived in conditions that may vary significantly. While abundant data exists on the material removed from at-source solid pollutant filters during cleanout, it is recognised in the literature that experimental difficulties generally preclude meaningful results relating this captured material to the catchment pollutant export. There is no industry-wide standard for determining the input values required by MUSIC.

CAPTURE EFFICIENCY OF NUTRIENTS (TP AND TN)

At-source solid pollutant filters capture solids including attached nutrients. Solids capture is measured in terms of TSS capture efficiency. It follows then that at-source solid pollutant filters with the same TSS performance will remove the same level of nutrients as long as all other conditions are the same.

The Ecosol **RSF 100** Solid Pollutant Filter, when fitted with a standard 200-micron filter bag, is predicted to have the same nutrient capture performance as the 200-micron at-source solid pollutant filters noted in the referenced document below. This study estimates that the devices were removing, "... 65% TSS, 40% total phosphorous, 21% total nitrogen, and nearly 100% gross pollutants ...".

It was noted that the nutrient removal was higher than that obtained by in-line GPTs because the accumulated sediment was stored dry rather than wet, eliminating the release of nutrients in soluble form and because it was hypothesised that nutrient-laden particles become finer as they progress down the catchment and are, therefore, more easily captured closer to the point of source.

**RECOMMENDATIONS FOR MUSIC INPUT VALUES FOR THE RANGE OF ECOSOL RSF 100
SOLID POLLUTANT FILTERS**

ECOSOL RSF 100 SOLID POLLUTANT FILTER (with 200 micron bag)		
Item	Capture Efficiency (CE)	Input Values
Low flow by-pass	-	0
High flow by-pass	By-passing is not dependent on flow rate but occurs when the basket is full - flow is limited only by the receiving pipe work	
Gross Pollutants (GP)	Typically 98%	(0,0) and (1000,20) ^{1,2}
	Worst case 95%	(0,0) and (1000,50) ^{1,2}
Total Suspended Solids (TSS)	65%	(0,0) and (1000,350) ^{1,3}
Total Phosphorous (TP)	40%	(0,0) and (1000, 600) ^{1,3}
Total Nitrogen (TN)	21%	(0,0) and (1000, 780) ^{1,3}

¹ The value 1000 is arbitrary, to ensure that the full input range is encompassed. E.g. (100,x) would suffice if the concentration never exceeds 100

² Urban Water Resources Centre UniSA (Argue & Pezzaniti) Final Report dated 04/12/96 "Evaluation of RSF 100 Gross Pollutant Trap Stage 2"

³ See explanatory text in this document

Reference

M Hannah and I Hiles "CONTAMINANT INVESTIGATION AT BLACKBUTT CREEK FOR KU-RING-GAI COUNCIL" - Ingal Environmental Services