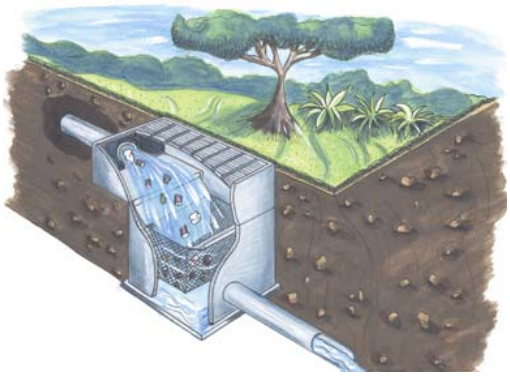
INTEGRATION OF THE ECOSOL IN-LINE/END-OF-LINE RSF 1000 SOLID POLLUTANT FILTERS WITH THE MUSIC CATCHMENT PACKAGE

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 km^2 to 100km^2 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 THE ECOSOL RSF 1000 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 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 In-Line/End-of-Line 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 in-line/end-of-line 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 and in-line/end-of-line solid pollutant filters it is important to understand that the results may have been derived in conditions that vary significantly.

While abundant data exists on the material removed from at-source and in-line/end-of-line 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 GROSS POLLUTANTS

The **RSF 1000** is functionally identical to that of the **RSF 100**, which has been subjected to formal independent testing (Ref 1 below), although it is used in an in-line/end-of-line application compared to the at-source **RSF 100**.

CAPTURE EFFICIENCY OF SUSPENDED SOLIDS

The capture efficiency of particles larger than 3mm is expected to be practically 100%, which is the size of the mesh used. Sieve analysis of samples taken from **RSF 1000** baskets indicates that an average of 84% of captured sediment is smaller than 3mm and an average of 17% is smaller than 75 microns. Evidently, captured material in the basket acts as a fine filter. Formal measurements of sediment collection efficiency have not been carried out for the **RSF 1000** and the recommendations below are provided only for the guidance of MUSIC users. They are based on comparison with **RSF 100** estimates and recognise that, while the **RSF 1000** has a 3mm mesh instead of a 200 micron mesh, the accumulated material acts as a fine filter.

CAPTURE EFFICIENCY OF NUTRIENTS (TP AND TN)

The **RSF 1000 Solid Pollutant Filter** captures nutrients that are attached to solids. Field samples of accumulated sediment from **RSF 1000** baskets average 134 mg/kg TN and 34 mg/kg TP. The wide spread of data is due to the factors listed above. Formal measurements of nutrient collection efficiency have not been carried out for the **RSF 1000** and the recommendations below are provided only for the guidance of MUSIC users. They are based on comparison with **RSF 100** estimates as the unit operates on the same design principles.

RECOMMENDATIONS FOR MUSIC INPUT VALUES FOR THE RANGE OF ECOSOL RSF 1000 SOLID POLLUTANT FILTERS

ECOSOL RSF 1000 SOLID POLLUTANT FILTER (with 3mm mesh basket)		
Item	**Capture Efficiency (CE)**	**Input Values**
Low flow by-pass	-	0
High flow by-pass	Bypassing is not dependent on flow rate but occurs when the basket is full - the 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)	49%	(0,0) and (1000,510)[1,3]
Total Phosphorous (TP)	30%	(0,0) and (1000, 700) [1,3]
Total Nitrogen (TN)	16%	(0,0) and (1000, 840) [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] Argue & Pezzaniti, "Evaluation of RSF 100 Gross Pollutant Trap Stage 2 Final Report" Urban Water Resources Centre, UniSA 4/12/1996

[3] See explanatory text in this document - field data was obtained in Queensland

Reference

1. Argue & Pezzaniti, "EVALUATION OF RSF 100 GROSS POLLUTANT TRAP STAGE 2 FINAL REPORT URBAN WATER RESOURCES CENTRE, UNIVERSITY OF SOUTH AUSTRALIA 4/12/1996