MANAGEMENT OF ABOVE GROUND DATA FOR PARTIALLY SEPARATE SEWERAGE SYSTEMS

The Wallingford procedure may be applied to all storm sewerage, but where more than one system serves an area, the above ground data requires adjustment to give the correct volume of run-off. As an example, this note illustrates the measures required for partially separate systems.

Relevant Assumptions of WASSP

To calculate the volume of run-off WASSP assumes that;

(a) There is only one storm sewerage system serving the area and all paved and roof surfaces are formally connected to it, as for a fully separated system.

(b) The total area required in the Sewer System Data (SSD) file does not extend beyond that served by the system. The boundary is defined in the Manuals.

(c) The surface run-off sub model allows for variations in catchment characteristics and antecedent conditions. In extreme conditions the likely contribution from pervious surfaces is accounted for.

(d) The percentage run-off (PR) is calculated as an average for the catchment as a whole.

The Problem

The problem lies with the calculation of PR from aquation 7.3 in Volume 1. This is unique to the catchment and can only be used with the above assumptions. The values of SOIL and UCWI are a direct input into the Program Control Data (PCD) file. The Percentage Impervious Area (PIMP) however, is derived by WASSP from the percentages of paved and roof in the SSD file. Thus, if only a proportion of the paved and roof surfaces are connected to the study system, and the definition for Total Area adhered to, WASSP will derive a value for PIMP which is too low. Although PR applies strictly to the Total Area, within WASSP, the volume of run-off is generated from derivatives of PR for the three surface types and their actual areas. It is therefore necessary to preserve the true value of PIMP as well as accurate values for paved and roof areas in the SSD file.

Solution 1

For development drained on the partially separated principle, highways and front roofs are connected to the storm sewerage system and rear roofs and yards connected to the foul system. Some typical areas for a 20 Ha development are; 4 Ha of paved and roof to the storm system and 1 Ha of paved and roof to the foul system. This gives an overall PIMP of 25%.

Therefore to preserve the true value of PIMP, the Total Area which is input to the SSD file should be factored by the proportion of paved and roof area which is connected to the study system i.e.

runoff from pervious surfaces (since $PR_{pav} > 70\%$) led to substantial overprediction of runoff; calibration factor K of 0.6 was required to be applied to the PIMP value to achieve comparable catchment PR values

(ii) a 0.35 ha area containing two terraces of housing and a car parking area (Fig.7), with impermeable surface runoff coefficient 0.75 and DEPSTOG = 1.2 m (Fig. 6); WASSP predictions of RC vary with adopted values of PIMP and P

Catchment Boundary	PIMP	PR_{pav}	Rainfall 6 mm RC_{pav}	12 mm RC_{pav}
—·—·	38	69	0.76	0.73
———	32	66	0.73	0.70
— — —	26	62	0.68	0.66

According to the selection of PIMP and calibrating rainfall, the factor K would vary here from 0.99 to 1.14.

It is suggested that information be exchanged through WaPUG concerning:
a) observed values of RC_{pav} (b) any required calibration factor K and the calibration rainfall P where WASSP-SIM data is adjusted (c) catchment layout, surfacing materials and quality, age etc which may affect RC_{pav}, the proportional losses during runoff. Is RC_{pav} reasonably constant on a catchment? (cf Fig. 1,5 &6).

FIG. 4

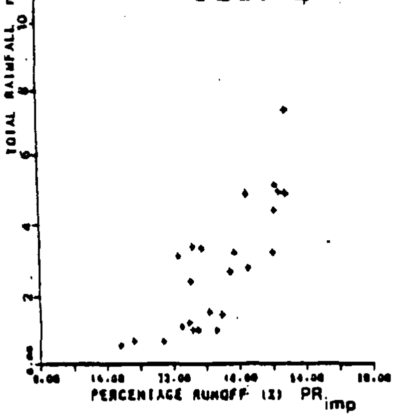

FIG. 5

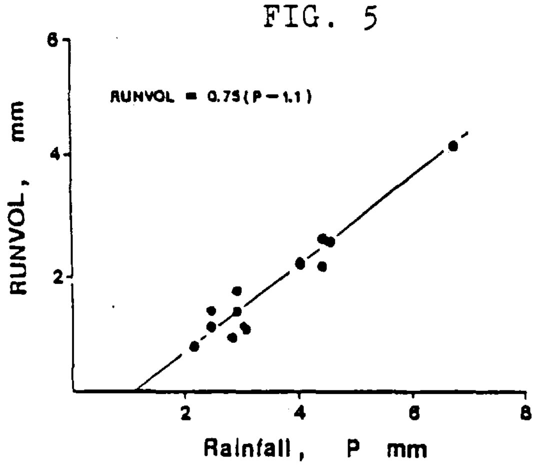

FIG. 6

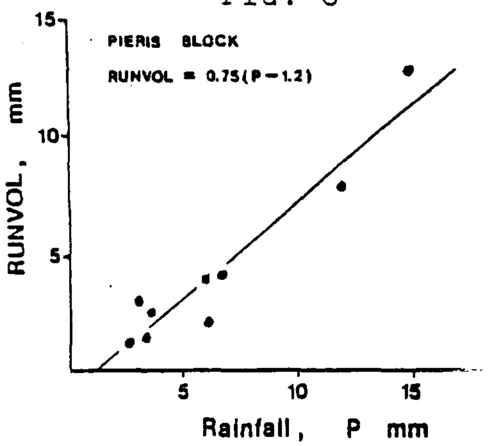

FIG. 7