UK and Ireland Rural Runoff Calculator

The UK and Ireland Rural Runoff Calculator allows the peak runoff rates to be calculated for undeveloped or partially developed catchments.

More information is available on each of the methods supported by the software by clicking the links below.

⚠ Some of the methods may not be available for your region. For more information, refer to the Regionalisation topic.

- ICP SUDS / IH 124 Methods
- ADAS 345 Method
- FEH Method
- ReFH2 Method
- Greenfield Runoff Volume Method
- Growth Curve Editor
- UK and Ireland Region Picker

Introduction & History

Techniques for the derivation of Peak Flows from undeveloped and partly urbanised catchments, also used for the determination of allowable discharge from new developments.

The methods for determining runoff from ungauged catchments have been improved since the first publication of the Flood Studies Report. However they are strewn over many years and several references. The following is a potted history and the background to the methods used by the software.

The Flood Studies Report, Volume 1, Chapters 4 and 6 detail approaches for determining runoff from ungauged catchments. These have been modified in subsequent Flood Studies Supplementary Reports Nos 5, 14 and 16. Ciria Book 14, 1993, takes these modifications into account and provides clear worked examples of the methodologies. These may be used also on partly urbanised catchments.

On small catchments, less than 25km², the IH 124 equation for QBAR (and the equation for the instantaneous time to peak for the unit hydrograph approach) may be used in lieu of those suggested in Ciria Book 14 but otherwise the detailed approach is unchanged.

Comparisons between the FSR and FEH methods are contained in FEH Volumes 3 and 4, 1999. The difficulty in obtaining digitally derived data for small catchments and the relative complexity of developing growth curves using FEH methodology are reasons for the continuing use of the FSR approach in appropriate circumstances on small catchments.

We have also included the ADAS method as it is widely used but it was developed for the design of field drains and uses far less sites than the IH 124 report which included 6 ADAS sites in its 87 small catchments.

In summary therefore the calculation to determine discharge from ungauged catchments may be done using ADAS 345 or IH 124. (Institute of Hydrology Report No. 124 – Flood estimation for small catchments). A third method is also available based on Flood Estimation Handbook data but it is usually used on catchments larger than 20km².

The IH method is based on the Flood Studies Report approach and developed for use on catchments less than 25 km². It yields the Mean Annual Maximum Flood (QBAR). This reference also recommends the use of Ciria Book 14 to generate Growth Factors. These are used to convert QBAR to different return periods for different regions in the UK. This method has therefore been adopted in the software and full tables of return period floods for the regions of the UK and Ireland are used.

The ADAS 345 document does not refer to any return period but yields a “Peak Flood Flow”. However, the ADAS 345 method is a simplified form of a more comprehensive ADAS method within report number 5 which is no longer in print. In Report Number 5 return periods were listed rather than the crop types shown in ADAS 345. Crop types were intended to imply a selected risk category and therefore give a different return period depending on the value of the crop. ADAS has confirmed that selecting “Grass” from the chart you are actually selecting the return period of 2 years. Therefore growth curves can be applied to the 2 year return period event. This in confirmed in the Environment Agency Flood Estimation Guidelines.

A 1 year peak runoff may be converted to a Mean Annual Flood using Table 1 of FSSR No 2, 1977. The Mean Annual Flood may then be converted to other return periods using the method described for IH 124 above. The table of return period flows is only available for “grass” as the dominant crop type.

The Flood Estimation Handbook method yields the Median Annual Maximum Flood (QMED). The software does not cover the FEH method of developing growth curves and engineers must refer to Vol 3 of the FEH handbook to generate flood flows for different return periods. The FEH approach is intended for larger sites and the method cannot be applied to catchments smaller than 50ha (0.5km²).

The statutory authority will advise on the approved method. The National SUDS Working Group, Interim Code of Practice for Sustainable Drainage, published July 2004, recommends the use of IH 124 for all catchments up to 200ha. Above this the engineer must decide whether the IH or FEH method is more applicable to the site. For catchments smaller than 50ha the equivalent runoff from a 50ha site must be calculated using IH124, it is then possible to pro-rata this value to give the peak runoff for the smaller site. In Source Control the engineer can select the “ICP SUDS Input” option and the pro-rata conversion is carried out automatically.

The Highways Agency document HA 106/04 requires the ADAS method to be used for sites of 40ha or less and IH 124 for sites larger than 40ha. Both of these methods are included in Source Control.

These methods are statistically based and yield the peak value of the flood. If the full flow hydrograph is required this must be generated using the rainfall runoff unit hydrographs. However the IH and FEH statistical methods of predicting peak flows may be used to adjust the parameters of the Unit Hydrographs and more information is available on this in FEH Volume 3 chapter 10.2.

Further discussion on the various methods, factors of safety, allowable discharges and the use of gauged data are available on Index Flood and Adjustment for Return Period.

Specify and save user defined Growth Curve for use with ICP SUDS, IH 124 and ADAS 345.