Australian Government
Bureau of Meteorology

# Design rainfall estimates

Design rainfall estimates are used in the design of infrastructure including gutters, roofs, culverts, stormwater drains, flood mitigation levees, retarding basins and dams. The new design rainfalls ensure that Australia is better equipped to manage flood risk.

## What are design rainfalls?

Design rainfalls are based on the statistical analysis of historical rainfall data to determine the design rainfall depth (mm) or design intensity (mm/hr) corresponding to selected durations and frequencies.

## Why are they important?

Design rainfalls are used by engineers to determine the flood capacity and water level to meet required levels of safety. They are also integral to large dam spillway adequacy assessments undertaken to determine the flood magnitude that existing dams can safely withstand. Design rainfalls are used to assign a probability to an observed rainfall event and to make decisions about flood warnings and emergency management.

Stormwater drain

## What's new?

The new design rainfalls are provided for three sets of frequencies:

- **Very frequent** design rainfalls for probabilities from 2 exceedances per year (EY) to 12 EY which are used in water sensitive urban design and some stormwater design.
- **Frequent and infrequent** design rainfalls which cover the range of probabilities from 1 EY to 1% Annual Exceedance Probability (AEP). These are also known as Intensity-Frequency-Duration (IFD) design rainfalls.
- **Rare** design rainfalls for probabilities less frequent than 1% AEP (from 1-in-100 to 1-in-2000), which are used in the design of bridges and the spillway adequacy assessment of existing dams.

Design rainfalls are used in conjunction with Geoscience Australia's *Australian Rainfall and Runoff–A Guide to Flood Estimation* (**http://arr.ga.gov.au/**).

## How were the new design rainfalls estimated?

The new design rainfalls are based on the Bureau's rainfall database along with data from rainfall recording networks operated by the many urban water utilities across the country, such as Melbourne Water and Water NSW. This provided nearly 30 years' additional rainfall data and data from 2300 extra rainfall stations. The combined database has been homogenised using extensive and rigorous quality control procedures.

The data were analysed using statistical techniques, such as: the Generalised Extreme Value distribution, which has been fitted using the technique of L-moments for the rainfall frequency analysis; Bayesian Generalised Least Squares Regression for deriving sub-daily rainfall statistics from daily rainfall values; GIS-based methods for gridding data; and an 'index rainfall procedure' for regionalisation of point data. Adopting these techniques provides more accurate design rainfall estimates for Australia than were previously available.

## Who can use design rainfalls?

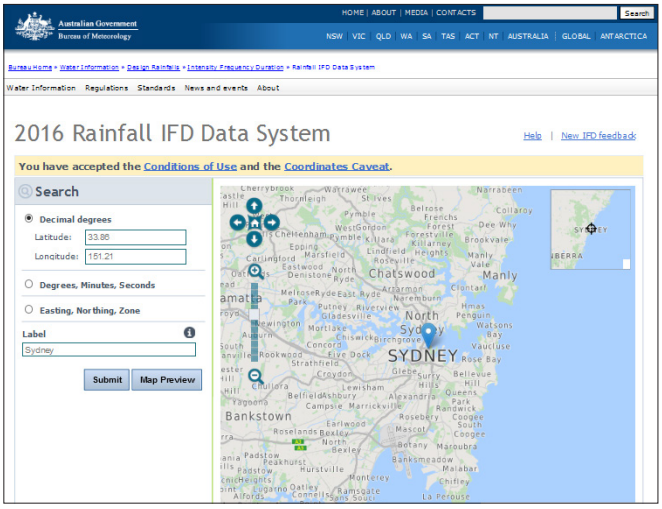
Design rainfalls will be used primarily by engineers, hydrologists and planners but will also be of interest to the insurance industry, emergency management personnel, and the general public. The new design rainfalls are available from the Bureau's website, which provides users with a 'one stop shop' for the range of frequencies from very frequent to rare. They can be obtained for any point in Australia by entering the latitude and longitude. Design rainfalls are provided both as a table (which can be downloaded as a .csv file) and as a chart (which can be downloaded as a .jpg file).

Culvert (Janice Green)

## What is the Bureau's role?

The new design rainfalls have been derived as part of a larger suite of design flood estimation inputs that have been revised for the 2016 edition of *Australian Rainfall and Runoff – A Guide to Flood Estimation.*

The Bureau's Improving Water Information Programme is building a comprehensive and reliable picture of Australia's water resources to support policy and planning as part of its water information role and responsibilities under the *Water Act 2007*.




Screenshot of the Rainfall IFD Data System

## FIND OUT MORE

For more information visit **www.bom.gov.au/water/designRainfalls/ifd/** or contact **IFDRevision@bom.gov.au**

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