

Chapter 1 Introduction

1-1. Purpose

This manual describes methods for evaluating flood-runoff characteristics of watersheds. Guidance is provided in selecting and applying such methods to support the various investigations required for U.S. Army Corps of Engineers (USACE) civil works activities. The manual references publications that contain the theoretical basis of the methods and detailed information on their use.

1-2. Applicability

This manual applies to HQUSACE elements, major subordinate commands, districts, laboratories, and field operating activities having civil works responsibilities.

1-3. References

References are listed in Appendix A.

1-4. Scope and Organization

a. The manual is organized into four parts. The first, *Problem Definition and Selection of Methodology*, describes the products of flood-runoff analysis and the types of investigation for which these products are required. Aspects of flood hydrology are discussed, including physical processes, data availability, and broad approaches to analysis. Guidance in formulating study procedures is provided, which includes criteria for method selection and recommended content for a hydrologic engineering management plan (HEMP). The reporting of study results is the focus of the last chapter in Part I.

b. Part II, *Hydrologic Analysis*, provides information on techniques for simulating various components of the hydrologic cycle, including rainfall, snow, infiltration (loss), surface and subsurface runoff, and flow in channels and reservoirs. Multisubbasin modeling and design storm definition are discussed.

c. Part III, *Methods for Flood-Runoff Analysis*, addresses the application of simplified techniques, frequency analysis of streamflow data, precipitation-runoff simulation of storm events, and period-of-record precipitation-runoff simulation. Data requirements and calibration/verification of simulation models are considered.

d. Part IV, *Engineering Applications*, deals with several issues associated with the application of methods from Part III. The processing of data can be time-consuming and costly; techniques for efficient data handling are addressed. The lack of historical streamflow data is the source of much difficulty and uncertainty in flood-runoff analysis. Aspects of dealing with “ungauged” basins are discussed. Issues associated with the development of frequency-based estimates are covered, including the concept of calibration to “known” frequency information. Various aspects of modeling land use change, as well as the effects of reservoir and other projects, are discussed. Finally, three examples illustrate some of the principles presented in this manual.

e. Following Part IV, Appendices A and B provide references, a generic HEMP, and a set of example applications.

1-5. Relationship to Other Guidance

This engineer manual (EM) relies on references and/or technical information in several other guidance documents. Some of those documents are part of this current guidance effort and others are older documents. The most relevant documents are EM 1110-2-1416, *River Hydraulics*, EM 1110-2-1415, *Hydrologic Frequency Analysis*, and EM 1110-2-1413, *Hydrologic Analysis of Interior Areas*. These documents provide the basic technical background for study procedures closely related to flood-runoff analysis or information for how the results of flood studies are used in project analyses. Specific references to these and other EM's are made throughout this document.