

C H A P T E R 1

Introduction

HEC-GeoRAS is a package of ARC/INFO macros specifically designed to view and manipulate geospatial data for use in the Hydrologic Engineering Center's River Analysis System (HEC-RAS). The graphical user interface allows users with minimal GIS experience to create a HEC-RAS import file containing geometric attribute data from an existing digital terrain model (DTM). Water surface profile data exported from HEC-RAS simulations may also be viewed using HEC-GeoRAS. The HEC-GeoRAS macros are written in the arc macro language (AML) and require the ARC/INFO program with the TIN extension.

The current version creates an HEC-RAS import file containing river, reach and station identifiers; cross section cut lines, cross section surface lines; cross section bank stations, and downstream reach lengths for the left overbank, main channel, and right overbank. Roughness coefficients and hydraulic structure data are not written to the import file.

Chapter 1 discusses the intended use of HEC-GeoRAS and provides an overview of this manual.

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Intended Application of HEC-GeoRAS

The intended use of HEC-GeoRAS is to create a import file of geometric attribute data for use in HEC-RAS and to view water surface profile data exported from RAS. The import file is created from geometric attributes extracted from an existing DTM. The current version of HEC-GeoRAS requires a DTM represented by a triangulated irregular network (TIN).

Geometric data is extracted from the DTM by intersecting a series of line coverages referred to, herein, as RAS Coverages. The RAS Coverages are created to represent the geometric attributes required to develop a HEC-RAS model: cross section geometry and stationing, bank stations, and reach lengths.

After the geometric data file has been imported into RAS, the geometric data set must be completed before performing hydraulic computations. Results from RAS simulations may be written to a data exchange file. The exported water surface profile data may then be imported back to HEC-GeoRAS for spatial analysis. Inundation mapping options are provided to view the inundation extent and flow depth.

Overview of Requirements

HEC-GeoRAS provides a graphical user interface that allows users with limited geographic information systems (GIS) experience to create, edit, and view geometric attribute data for use with HEC-RAS. Knowledge of ARC/INFO, ARCEDIT, and ARCPLOT is advantageous, but not necessary. Users, however, should have experience modeling with HEC-RAS and have a thorough understanding of river hydraulics to properly construct the necessary coverages.

Hardware and Software Requirements

HEC-GeoRAS is a package of macros written in AML for use in ARC/INFO. ARC/INFO Version 7.1 or higher may be run from the UNIX operating system or Windows NT. The TIN feature of ARC/INFO is also necessary to use HEC-GeoRAS. ARC/INFO is supported by the Environmental Systems Research Institute (1998).

Data Requirements

At this time, HEC-GeoRAS requires a DTM in the form of a triangulated irregular network (TIN). The DTM must be a continuous surface that includes the bottom of the river channel and includes all of the floodplain to be modeled. Because all cross-section data will be extracted from the DTM, only high resolution DTMs should be considered for hydraulic modeling. HEC-GeoRAS does not build a TIN or provide tools for building a TIN.

Overview of the User Interface

The interface for HEC-GeoRAS is divided into three user environments: project management, preprocessing, and postprocessing. The project manager allows the user to maintain projects and provides access to the pre- and postprocessing windows. Preprocessing options include windows for creating a Contour Coverage from a DTM, creating and editing RAS Coverages, and creating the HEC-RAS Import File. Postprocessing windows allow the user to read in a HEC-RAS Export File, select water surface profiles data to analyze, and view the extent and depth of inundation for selected profiles.

User's Manual Overview

This manual provides detailed instruction for using HEC-GeoRAS to create an import file for performing hydraulic modeling with HEC-RAS and viewing exported water surface profile data from RAS simulations. The manual is organized as follows:

- Chapter 1-2 provides an overview of HEC-GeoRAS, as well as instructions for getting started.
- Chapter 3 provides a detailed overview of HEC-GeoRAS.
- Chapter 4 discusses the project manager in detail.
- Chapter 5 describes RAS preprocessing requirements and detailed instruction for developing a HEC-RAS Import File
- Chapter 6 describes RAS postprocessing options for importing the HEC-RAS Export File and viewing water surface profile data.
- Chapter 7 provides an example application of HEC-GeoRAS.
- Appendix A contains a list of references.
- Appendix B contains a sample import file and export file.