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Prepared in cooperation with City of Hopkinsville, Kentucky, Community Development Services

Flood-Inundation Maps for an 8.9-Mile Reach of the South Fork Little River at Hopkinsville, Kentucky

Pamphlet to accompany

Scientific Investigations Map 3242

U.S. Department of the Interior
U.S. Geological Survey

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Contents

Figures

Tables

Sheets

[Sheets and additional materials are available online at http://pubs.usgs.gov/sim/2007/3242/.]

1–13. Flood-inundation map for Hopkinsville, Kentucky corresponding to a stage of feet (noted below) and an elevations in feet (NAVD 88) at U.S. Geological Survey Streamgage Number 03437495 South Fork Little River at Highway 68 By-Pass—

1. 10.00 Feet and an elevation of 530.00 feet
2. 11.00 Feet and an elevation of 531.00 feet
3. 12.00 Feet and an elevation of 532.00 feet
4. 13.00 Feet and an elevation of 533.00 feet
5. 14.00 Feet and an elevation of 534.00 feet
6. 15.00 Feet and an elevation of 535.00 feet
7. 16.00 Feet and an elevation of 536.00 feet
8. 17.00 Feet and an elevation of 537.00 feet
9. 18.00 Feet and an elevation of 538.00 feet
10. 19.00 Feet and an elevation of 539.00 feet
11. 20.00 Feet and an elevation of 540.00 feet
12. 21.00 Feet and an elevation of 541.00 feet
13. 21.50 Feet and an elevation of 541.50 feet

Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
	Hydraulic gradient	
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Flood-Inundation Maps for an 8.9-Mile Reach of the South Fork Little River at Hopkinsville, Kentucky

By Jeremiah G. Lant

Abstract

Digital flood-inundation maps for an 8.9-mile reach of South Fork Little River at Hopkinsville, Kentucky, were created by the U.S. Geological Survey (USGS) in cooperation with the City of Hopkinsville Community Development Services. The inundation maps, which can be accessed through the USGS Flood Inundation Mapping Science Web site at *http://water.usgs.gov/osw/flood_inundation/,* depict estimates of the areal extent and depth of flooding corresponding to selected water levels (stages) at the USGS streamgage at South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky (station no. 03437495). Current conditions for the USGS streamgage may be obtained online at the USGS National Water Information System site (*http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=03437495*). In addition, the information has been provided to the National Weather Service (NWS) for incorporation into their Advanced Hydrologic Prediction Service flood warning system (*http:/water.weather.gov/ahps/*). The NWS forecasts flood hydrographs at many places that are often co-located at USGS streamgages. The forecasted peak-stage information, also available on the Internet, may be used in conjunction with the maps developed in this study to show predicted areas of flood inundation.

In this study, flood profiles were computed for the South Fork Little River reach by using HEC-RAS, a one-dimensional step-backwater model developed by the U.S. Army Corps of Engineers. The hydraulic model was calibrated by using the most current (2012) stage-discharge relation at the South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky, streamgage and measurements collected during recent flood events. The calibrated model was then used to calculate 13 water-surface profiles for a sequence of flood stages, most at 1-foot intervals, referenced to the streamgage datum and ranging from a stage near bankfull to the estimated elevation of the 1.0-percent annual exceedance probability flood at the streamgage. To delineate the flooded area at each interval flood stage, the simulated water-surface profiles were combined with a Digital Elevation Model (DEM) of the study area by using Geographic Information System (GIS) software. The DEM consisted of bare-earth elevations within the study area and was derived from a Light Detection And Ranging (LiDAR) dataset having a 3.28-foot horizontal resolution.

These flood-inundation maps, along with online information regarding current stages from USGS streamgage and forecasted stages from the NWS, provide emergency management and local residents with critical information for flood response activities such as evacuations, road closures, and post-flood recovery efforts.

Introduction

The City of Hopkinsville, Kentucky, is an urban community with an estimated population of 31,577 (U.S. Census Bureau, 2010). Hopkinsville is the largest incorporated city in Christian County, Kentucky. Christian County has experienced 18 major flood events within the last 100 years, most notably in March 1997, when major flooding caused over $75 million in damages and destroyed more than 450 homes (City of Hopkinsville, 2012). The majority of flood damages have occurred along the North Fork Little River and the South Fork Little River, which both flow through the city. Flood plains within Hopkinsville are moderately developed and contain a mix of rural, residential, and commercial buildings.

Prior to this study, Hopkinsville officials relied on several information sources (all of which are available on the Internet) to make decisions on how to best alert the public and mitigate flood damages. One source is the September 17, 2008, Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) for Christian County and Incorporated Areas (Federal Emergency Management Agency, 2008). A second source of information consists of two USGS streamgages that lie within the city limits of Hopkinsville: South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky (station no. 03437495), and South Fork Little River at Hopkinsville, Kentucky (station no. 03437500), from which current and historical water levels (stage) can be obtained. A third source is the National Weather Service forecast of peak stage at the USGS Highway 68 By-Pass streamgage (station no. 03437495) through the Advanced Hydrologic Prediction Service (AHPS) Web site (NWS forecast point HLBK2). Although current USGS stage and NWS forecasted stage

information is particularly useful for residents in the immediate vicinity of a streamgage, it is of limited use to residents farther upstream or downstream because the water-surface elevation is not constant along the entire stream channel. Also, FEMA, State emergency management mitigation teams, and property owners typically lack information related to water depth at locations other than near a USGS streamgage or a NWS flood-forecast point.

Purpose and Scope

The purpose of this report is to describe the development of a series of estimated flood-inundation maps for the South Fork Little River near Hopkinsville, Kentucky. The flood-inundation maps and other useful flood information are available on the USGS Flood Inundation Mapping Science Web site (*http://water.usgs.gov/osw/flood_inundation/*) and on the NWS AHPS Web site (*http://water.weather.gov/ahps/*). Through these online applications, Internet users can select estimated inundation maps that correspond to various flood stages that occur at a USGS streamgage or an NWS forecast point.

The scope of the study was limited to the South Fork Little River reach bounded by the U.S. Highway 68 By-Pass, on the east by the section known locally as Dr. Martin Luther King Jr. Way and on the south by the section known locally as Eagle Way (fig. 1). To develop flood-inundation maps, a hydraulic model of the South Fork Little River reach was built to provide water-surface profiles for various flood stages. The following steps were taken to construct the water-surface profiles: (1) examination of current and historical data from streamgages on the South Fork Little River (table 1); (2) collection of hydrologic and steady-flow data; (3) collection of topographic data, geometric data (for structures/bridges), and bathymetric data throughout the study reach; (4) determination of energy-loss factors (roughness coefficients) in the stream channel and flood plain; (5) model calibration and evaluation, and (6) computation of water-surface profiles by means of HEC-RAS, the U.S. Army Corps of Engineers' hydraulic modeling software (U.S. Army Corps of Engineers, 2010).

Flood-inundation maps were produced from the results of the modeled water-surface profiles. Production of estimated flood-inundation maps corresponding to targeted water-surface elevations was completed by using HEC-GeoRas, a software tool from the U.S. Army Corps of Engineers. HEC-GeoRas is a tool used for processing geospatial data in ArcGIS, a Geographic Information System (U.S. Army Corps of Engineers, 2009). The NWS AHPS Web site links USGS real-time streamgage information and NWS forecasted peak stage to facilitate the online display of user-selected flood-inundation maps.

Methods used are generally cited from previously published reports. If techniques varied significantly from previously documented methods because of local hydrologic conditions or available data, they are described in detail in this report. Maps were produced for water levels referenced to the water-surface elevation (stage) at station 03437495 and ranging from near bankfull (10 ft; 530 ft above NAVD 88) to the elevation of the 1.0-percent annual exceedance probability flood at the streamgage (21.5 ft; 541.5 ft above NAVD 88).

Study Area Description

The South Fork Little River is in southwestern Kentucky in what is locally called the Mississippi Plateau or Pennyrile Region. The drainage area ranges from 35.9 mi2 at station 03437495 (upstream extent of the study reach) to 49 mi^2 at the downstream extent of the study reach. The headwaters originate in unincorporated Christian County, and the river generally flows southwestward before entering the city limits. There is no major tributary to the South Fork Little River that joins the main stem as it flows through Hopkinsville, but there are two minor tributaries, South Fork Little River Tributary and Rock Bridge Branch, that join the main stem approximately 4 and 5 mi, respectively, south of Hopkinsville and outside the study reach. The basin terrain changes gradually from steep to gently rolling hills northeast of the city to gently rolling hills to flat southwest of the city. The study reach is approximately 8.9 mi long, has an average top-of-bank channel width of about 50 ft, and has an average channel slope of 4 ft/mi. The

Table 1. USGS streamgage information for study basin, South Fork Little River, Kentucky.

[mi^2, square miles; ft, feet; NAVD 88, North American Vertical Datum of 1988]

Station name	Station number	Drainage area (mi^2)	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)	Period of record	Maximum recorded stage at streamgage (ft above NAVD 88) and date
South Fork Little River at Hwy.68 By-Pass	03437495	35.9	36°50′58″ N.	87°25′44″ W.	Oct. 2009 to current year (2012)	19.95 ft (539.95 ft) May 3, 2011.
South Fork Little River at Hopkinsville, Kentucky	03437500	46.5	36°50′22″ N.	87°28′53″ W.	Oct. 1949 to Sept.1973; Jan. 1998 to current year (2012)	18.83 ft (538.83 ft) Aug. 30, 2005.

Projection: Lambert Conformal Conic
State Plane Coordinate System, Kentucky, FIPS, 1600
North American Datum of 1983 (NAD83)
Orthophotography from National Agriculture Imagery Program, 2006

Figure 1. Location of study reach for the South Fork Little River at Hopkinsville, Kentucky, and location of USGS streamgages. The National Weather Service forecast point (HLBK2) is at the USGS streamgage at Highway 68 By-Pass at Hopkinsville, Kentucky (station no. 03437495).

basin is still undergoing suburban and urban development; population increased 4.9 percent (from 30,089 to 31,577) between 2000 and 2010 (U.S. Census Bureau, 2010). The main channel within the study reach has seven major road crossings or other structures that lie within the channel or the adjacent flood plain.

Previous Studies

The current FIS for Christian County (Federal Emergency Management Agency, 2008) was completed by the U.S. Army Corps of Engineers (USACE) Nashville District and AMEC Earth & Environmental Inc. in 2007. The FIS provided information on water-surface profiles and associated flood plain maps for the South Fork Little River at 1.0- and 0.2-percent annual exceedance probabilities. The estimated peak discharge for flooding at the 1.0-percent annual exceedance probability on the South Fork Little River near South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky (station no. 03437495), as shown in table 2 for the study reach, is from the FEMA FIS (2008). The City of Hopkinsville provided the hydraulic model used in the FIS, which contained bathymetric and structure datasets for most of the study area.

Constructing Water-Surface Profiles

The water-surface profiles used to produce the 13 flood-inundation maps in this study were computed by using HEC-RAS, version 4.1.0 (U.S. Army Corps of Engineers, 2010). HEC-RAS simulates the flow of water through open channels and computes water-surface profiles. HEC-RAS is a one-dimensional step-backwater model for simulation of water-surface profiles with steady-state (gradually varied) or unsteady-state flow computation options. The HEC-RAS analysis for this study was done by using the steady-state flow computation option.

Hydrologic and Steady-Flow Data

The study-area hydrologic network consists of two USGS streamgages (fig. 1; table 1). The streamgage on South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky (station no. 03437495) has a continuous record of measured stage (water level) and computed streamflow. The streamgage on South Fork Little River at Hopkinsville, Kentucky (station no. 03437500) has a discontinuous record of computed streamflow (Table 1.); however, the streamgage has a continuous record of measured stage from 1998 to the present (2012). All measured stages and corresponding water-surface elevations are referenced to North American Vertical Datum of 1988 (NAVD 88). The USGS streamgages within the study reach are equipped with satellite radio transmitters that allow data to be transmitted in near real time. Flow and stage data for a particular streamgage can be accessed online from the USGS at *http://waterdata.usgs.gov/in/nwis/current/?type=flow.* Both streamgages are also equipped with recording tipping-bucket rain gages.

Steady-flow data necessary for the hydraulic model consisted of flow regime, boundary conditions (either known water-surface elevation associated with a discharge measurement, critical depth, normal depth, or streamgage rating-curve value), and peak-discharge information. The hydraulic model developed contains a normal depth boundary condition using an average channel slope within the study domain. The steady-flow data for the study reach were obtained from the FIS, field measurements of streamflow made at station 03437495, and the most current (2012) stage-discharge relation at station 03437495.

To construct a flood-inundation map of the 1.0-percent annual exceedance probability flood along the South Fork Little River, flow data from the FIS for Christian County (Federal Emergency Management Agency, 2008) and recent (2010) topographic data were used. The flow data from the FIS for Christian County were derived by using a hydrologic model developed by the U.S. Army Corps of Engineers Nashville District (Federal Emergency Management Agency, 2008).

Topographic/Bathymetric Data

LiDAR data near Hopkinsville were furnished by the Kentucky Energy and Environment Cabinet (Carey Johnson, Kentucky Energy and Environment Cabinet, written commun., 2012). LiDAR provides high-resolution topographic data for models and other applications. The LiDAR data used in the study had a horizontal resolution of 3.28 ft and a vertical accuracy of 0.30 ft and were used to create a Digital Elevation Model dataset of the study area. The LiDAR data were collected and postprocessed by Aero-Metric, Inc. (2010).

River bathymetry and structure data in and along the South Fork Little River were furnished by the City of Hopkinsville (D. Herndon, City of Hopskinsville Community Services and Planning, written commun., 2012). Most of the bathymetric and structure datasets within the study area originated from the FIS for Christian County (Federal Emergency Management Agency, 2008). The FIS datasets included channel and structure surveys of the South Fork Little River within the mapped river reach (fig. 1), excluding the bridge on the Highway 68 By-Pass. The City of Hopkinsville conducted surveys of the bridge on Highway 68 By-Pass and of the South Fork Little River approximately 500 ft downstream and upstream from the bridge (D. Herndon, City of Hopskinsville Community Services and Planning, written commun., 2012). The structure datasets were checked and validated with the City of Hopkinsville (D. Herndon, City of Hopskinsville Community Services and Planning, written commun., 2012)

to ensure that no newly built structures were within the study area.

HEC-GeoRAS and ArcGIS were used to extract flood plain elevations from the LiDAR-derived DEM at selected cross sections along the South Fork Little River for use in the HEC-RAS model. The flood plain elevations were merged with the river-bathymetry and structure datasets during the development of the HEC-RAS model.

Energy-Loss Factors

USGS field observations and photographs, along with high-resolution aerial photographs furnished by the City of Hopkinsville (D.Herndon, City of Hopskinsville Community Services and Planning, written commun., 2012), were used to select initial (precalibration) channel and flood plain friction coefficients. These friction coefficients, commonly called Manning's roughness coefficients or Manning's n values, account for energy (friction) loss in model calculations. The final Manning's n values used ranged from 0.04 to 0.065 for the main channel and 0.1 to 0.15 for the overbank areas; these values were selected according to the channel and flood plain characteristics described by Chow (1959). The main channel, especially in the upstream study area domain, and overbank areas throughout the entire study area domain are highly vegetated.

Model Calibration and Performance

The hydraulic model was calibrated to the most current stage-discharge relation at station 03437495 (South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky). The hydraulic model was also calibrated to measurements collected during flood events on June 21, November 21, and December 5, 2011. Station 03437500 (South Fork Little River at Hopkinsville, Kentucky) was used as an additional calibration point for each flood event. These flood events cover a range of calculated peak discharges at station 03437495: for June 21, a peak discharge of 659 ft^3/s at a measured stage of 11.92 ft; for November 21, a peak discharge of 1,270 ft^3/s at a measured stage of 15.17 ft; and for December 5, a peak discharge of 2,100 ft^3/s at a measured stage of 17.89 ft. Model calibration was accomplished by adjusting Manning's n values until the results of the hydraulic computations closely agreed with the known flood discharge and stage values; Manning's n values were also verified to fall within realistic bounds, as described by Chow (1959). Differences between measured and simulated water levels for specified flows from the established stage-discharge relation were less than 0.5 ft. Differences between measured and simulated water levels for models calibrated to flood events were less than 1 ft (table 3). These calibration results demonstrate that the model is capable of simulating accurate water levels over a wide range of flows in the basin.

Table 2. 1.0-percent annual exceedance probability peak-discharge estimate and drainage area on the South Fork Little River (from Federal Emergency Management Agency, 2008).

[mi^2, square miles; ft^3/s, cubic feet per second]

	Drainage area (mi^2)	Discharge estimate (ft^3/s)
700 feet downstream from USGS streamgage South Fork Little River at Highway 68 By-Pass	35.9	9,870

Table 3. Comparison of hydraulic-model output and flood events June 21, November 21, and December 5, 2011, South Fork Little River, Kentucky.

Date	USGS streamgage (station number)	Peak water-surface elevation (ft)	Model water-surface elevation (ft)	Elevation difference (ft)
June 21, 2011	03437495	531.94	531.92	-0.02
	03437500	526.30	526.27	-0.03
November 21, 2011	03437495	535.17	535.19	+0.02
	03437500	528.21	529.15	+0.94
December 5, 2011	03437495	537.89	538.14	+0.25
	03437500	532.39	532.42	+0.03

Development of Water-Surface Profiles

Profiles were developed for 12 stages at 1-ft intervals between 10 ft and 21 ft and 1 stage at the 1.0-percent annual exceedance probability flood as referenced to station 03437495. Discharges corresponding to the various stages were obtained from the most current stage-discharge relation (rating number 2.0) at station 03437495 (South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky).

Discharges for all profiles (table 4) were selected with the assumption that, within the 8.9-mi study reach, there are no significant inflows. The calibration results of the two flood events revealed that no significant flow increases downstream from USGS station 03437495 needed to be added to the model as had been added in the FIS (table 2); the FIS model, however, was not calibrated to recent flood events. The discharges were estimated to be uniform and steady throughout the study reach. The water-surface elevation and the corresponding discharge estimate used for the 1.0-percent annual exceedance probability flood along the South Fork Little River were obtained from the FIS for Christian County (Federal Emergency Management Agency, 2008).

Inundation Mapping

Flood-inundation maps were created for a river reach near Hopkinsville, Kentucky, by using two USGS streamgage sites, one of which, station 03437495 (South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky) is an NWS flood-forecast point. The inundation maps were created in a GIS by combining the water-surface profiles from the hydraulic model and the DEM data. The DEM data were derived from 3.28-ft horizontal resolution LiDAR data with a vertical accuracy of 0.30 ft, obtained from Aero-Metric, Inc. (2010). Estimated flood-inundation datasets for each simulated water-surface profile were developed with HEC-GeoRAS software (U.S. Army Corps of Engineers, 2009). HEC-GeoRAS is a set of procedures, tools, and utilities for processing geospatial data in ArcGIS by use of a graphical user interface. The interface allows the preparation of geometric data for import into HEC-RAS and processes simulation results exported from HEC-RAS (U.S. Army Corps of Engineers, 2010). The datasets produced by using HEC-GeoRAS included flood-inundation polygons and water depth grids. The procedure used to create the datasets for each simulated water-surface profile included creating a bounding polygon that defined the analysis extent for mapping the inundation. Then, surfaces containing the water-surface elevation for each simulated water-surface profile were created using the analysis extent. Lastly, the DEM was subtracted from each surface containing the water-surface elevation for each simulated water-surface profile, resulting in the final water depth grids. The water depth grids were then converted to the final flood-inundation polygons representing the inundation extent. The HEC-GeoRAS results were modified to ensure a hydraulically reasonable transition of the boundary between modeled cross sections relative to the contour data for the land surface (Whitehead and Ostheimer, 2009). The maps show estimated flood-inundated areas overlaid on high-resolution, georeferenced aerial photographs of the study area for each water-surface profile generated by the hydraulic model.

South Fork Little River, Kentucky, Flood-Inundation Maps on the Internet

The flood-inundation maps and current study documentation are available online at the U.S. Geological Survey Publications Warehouse (*http://pubs.usgs.gov/sim/2012/3242*). Also, a Flood Inundation Mapping Science website has been established to provide a portal for USGS flood-inundation study information to the public at *http://water.usgs.gov/osw/flood_inundation/*. That web portal has a link (*http://wim.usgs.gov/FIMI/FloodInundationMapper.html*) to interactive online map libraries that can be downloaded in several commonly-used electronic file formats. In the latter link, each stream reach displayed contains further links to NWISWeb graphs of the current stage and streamflow at USGS station 03437495 to which the inundation maps are referenced. A link also is

Table 4. Stages (elevations), with corresponding discharge estimates at USGS station 03437495 (South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky) for selected simulated water-surface profiles.

[NAVD 88, North American Vertical Datum of 1988]

Location	Stage, in feet above gage datum (elevation, in feet, NAVD 88) associated with the indicated discharge value, in cubic feet per second												
	10.00 (530.00)	11.00 (531.00)	12.00 (532.00)	13.00 (533.00)	14.00 (534.00)	15.00 (535.00)	16.00 (536.00)	17.00 (537.00)	18.00 (538.00)	19.00 (539.00)	20.00 (540.00)	21.00 (541.00)	21.50 (541.50)
Highway 68 By-Pass	388	515	668	840	1,030	1,240	1,470	1,760	2,150	3,000	5,440	7,800	9,870
Sheet no.	1	2	3	4	5	6	7	8	9	10	11	12	13

provided to the NWS AHPS site (*http:/water.weather.gov/ahps/*) so that the user can obtain applicable information on forecasted peak stage. The estimated flood-inundation maps are displayed in sufficient detail to note the extent of flooding with respect to individual structures so that preparations for flooding and decisions for emergency response can be performed efficiently. Roadways and bridges were closely reviewed and are shown as shaded (inundated and likely impassable) or not shaded (dry and passable) to facilitate emergency planning and use. However, buildings which are shaded do not reflect inundation but denote that bare earth surfaces in the vicinity of the buildings are inundated. When the water depth (as indicated in the Web Mapping Application by holding the cursor over an inundated area) in the vicinity of the building of interest exceeds that building's height, the structure can be considered fully submerged.

Disclaimer for Flood-Inundation Maps

Inundated areas shown should not be used for navigation, regulatory, permitting, or other legal purposes. The USGS provides these maps "as-is" for a quick reference, emergency planning tool but assumes no legal liability or responsibility resulting from the use of this information.

Uncertainties and Limitations for Use of Flood-Inundation Maps

Although the flood-inundation maps represent the boundaries of inundated areas with a distinct line, some uncertainty is associated with these maps. The flood boundaries shown were estimated on the basis of stages (water-surface elevations) and streamflows at selected USGS streamgages. Water-surface elevations along the stream reaches were estimated by steady-state hydraulic modeling, assuming unobstructed flow, and using streamflows and hydrologic conditions anticipated at the USGS streamgage(s). The hydraulic model reflects the land-cover characteristics and any bridge, dam, levee, or other hydraulic structures existing as of August 2012. Unique meteorological factors (timing and distribution of precipitation) may cause actual streamflows along the modeled reach to vary from those assumed during a flood, which may lead to deviations in the water-surface elevations and inundation boundaries shown. Additional areas may be flooded due to unanticipated conditions such as changes in the streambed elevation or roughness, backwater into small tributaries along the study reach, or backwater from localized debris or ice jams. The accuracy of the floodwater extent portrayed on these maps will vary with the accuracy of the DEM used to simulate the land surface.

If this series of flood-inundation maps will be used in conjunction with NWS river forecasts, the user should be aware of additional uncertainties that may be inherent or factored into NWS forecast procedures. The NWS uses forecast models to estimate the quantity and timing of water flowing through selected stream reaches in the United States. These forecast models (1) estimate the amount of runoff generated by precipitation and snowmelt, (2) simulate the movement of floodwater as it proceeds downstream, and (3) predict the flow and stage (water-surface elevation) for the stream at a given location (AHPS forecast point) throughout the forecast period (every 6 hours and 3 to 5 days out in many locations). For more information on AHPS forecasts, please see *http://water.weather.gov/ahps/pcpn_and_river_forecasting.pdf*.

Summary

A series of estimated flood-inundation maps were developed in cooperation with the City of Hopkinsville Community Development Services for the South Fork Little River at Hopkinsville, Kentucky. These maps, available through a USGS Web portal, in conjunction with the real-time stage data from the USGS streamgage 03437495 (South Fork Little River at Highway 68 By-Pass at Hopkinsville, Kentucky) and National Weather Service flood-stage forecasts, will help to guide the general public in taking individual safety precautions and will provide city officials with a tool to efficiently manage emergency flood operations and flood mitigation efforts.

The maps were developed by using the U.S. Army Corps of Engineers' HEC-RAS and HEC-GeoRAS programs to compute water-surface profiles and to delineate estimated flood-inundation areas for selected stream stages. The maps show estimated flood-inundation areas overlaid on high-resolution, georeferenced aerial photographs of the study area for stream stages between 10 ft and 21.5 ft at station 03437495.

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