Floodplain Services Available
from the Illinois State Water Survey

by JOHN P. LARDNER, JAMES L. ALEXANDER, and MICHAEL L. TERSTRIEP
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by John P. Lardner, James L Alexander, and Michael L. Terstriep

INTRODUCTION

A floodplain is defined as that land adjacent to a body of water which acts or may act hereafter as an additional channel and storage space to hold excess streamflows caused by heavy rains and/or melting snow. Encroachment on floodplains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. Improper construction in floodplains results in property damages averaging in excess of 100 million dollars annually in Illinois.

In this country, we have responded to floods through two programs: 1) disaster relief and 2) flood control. Disaster relief is a program that responds to tragedy after it has occurred. Billions of dollars have been spent on this program. While no one denies its necessity, it does not solve our flooding problems.

Through federal flood control programs, we have built levees, reservoirs, and flood walls at a cost of 7 billion dollars since these programs started. However, these structural safety measures, and the false sense of security they provide, have often attracted more development in the floodplain which has led to more homes and more businesses being damaged by floods every year. The average annual damages from flooding continues to increase each year nationally.

The National Flood Insurance Program (NFIP) was created by Congress in 1968 to provide a non-structural approach to floodplain management. The program is administered by the Federal Emergency Management Agency, Office of Federal Insurance and Hazard Mitigation (FEMA/FIHM). The NFIP provides federally subsidized flood insurance to participating communities and requires them to enact ordinances controlling development in the floodplain. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For regulatory and flood insurance purposes, the concept of a floodway is used as a tool to assist local communities in this aspect of floodplain management.

Under the floodway concept, the area occupied by the 100-year flood (1% probability event) is divided into a floodway and floodway fringe. The floodway is composed of the channel of a stream plus any adjacent floodplain area that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increase in flood height. The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. According to Illinois State Floodplain Construction Rules and Regulations, the floodway fringe consists of the portion of the floodplain that could be completely obstructed without significantly increasing the water surface elevation of the 100-year flood. Preservation of the floodway will enable people owning or buying property in the floodplain to insure against flood losses at a reasonable cost. With more careful management of the floodplain, new construction permitted there by local governments will better withstand flooding. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in figure 1.

In addition to the National Flood Insurance Program, the Illinois Revised Statutes (1973, Chapter 19, Section 52-78) authorized the Department of Transportation to define floodplain and to establish a permit procedure for regulating construction within such defined flood areas. The purpose of this regulation is to protect the public health, safety, and general welfare by restricting floodplain development and uses which increase flood damage potential elsewhere. This is achieved by prohibiting damaging or potentially damaging increases in flood stage or velocity caused by alterations in or encroachments upon the regulatory floodplain.

Executive Order Number 8, issued by Governor
Walker on October 1, 1973, established the Governor's Task Force on Flood Control to coordinate all flood control activities in the state until a permanent solution could be found and implemented. The Executive Order acknowledged that after years of patchwork solutions to flooding, the state needed an organized, effective plan to cope with flood damage problems. It was specified that the Task Force recommend a plan that would result in the coordination of policy making and execution of flood control projects in the state. The primary objective was to develop a program that was realistic and workable, and that could be immediately implemented.

To assist in coordination of flood control activities in the state, the Task Force recognized the need for a comprehensive local assistance program interacting with a repository of flood control studies, floodplain information studies, and flood insurance studies. The efforts of the Illinois Division of Water Resources (IDWR) and the Illinois State Water Survey (ISWS) were combined to introduce such a program.

As more and more communities enrolled in the National Flood Insurance Program, the need for coordination of floodplain studies at the state level grew. Although the administration of the state floodplain regulations and most local assistance related to floodplains have been provided by the IDWR, certain other services are provided directly by the ISWS. These services include: 1) a repository of all available floodplain information, 2) coordination of 100-year discharges through a review and certification procedure, and 3) participation in a state review of floodplain studies and the determination of "best available elevation data" for local floodplain regulation.

It is the purpose of this publication to describe these ISWS services and the means by which they are made available to the public.
FLOODPLAIN INFORMATION REPOSITORY

Before beginning a floodplain study of any type, an engineer must determine what previous studies have been made in the area of interest and be aware of the outcome of those studies. This is not only a matter of good practice, it is required by FEMA/FIHM of its Flood Insurance Study (FIS) contractors. The purpose of the Floodplain Information Repository is to provide a one-call source of information that will meet the requirements of FEMA/FIHM and save the many days of engineering time normally spent searching for such background reports. Obviously the repository function needs the cooperation of all agencies and engineers in providing the reports and information that make up the repository.

The Floodplain Information Repository is a surface water report library kept by the ISWS. These reports, currently numbering over 300, have been submitted by various private, state, and federal agencies. Bibliographic information and applicable keywords have been extracted from each report and entered into a computerized data base. As reports are received by the ISWS, they are processed and entered into the system. The system includes 1) copies of actual surface water reports (if available), 2) a data retrieval computer program, and 3) Data Entry Forms (DEF).

Data Entry

Data entry begins with the filling out of a DEF (figure 2). If a report is not physically available to the ISWS, the authoring agency or company will be requested to fill out the form. Submitted reports will be reviewed and the DEF will be filled out by the ISWS. The first page (figure 2) contains the basic bibliographic information for the report and is self explanatory. Item 8 on this page refers to the total number of individual streams or tributaries included in the study. Detailed information and an identification number for each of the streams studied are entered on page two of the form.

Stream Names

Because of an increasing problem with the designation of previously unnamed tributary streams, the ISWS has adopted a procedure designed to provide more consistency in such names. As opposed to assigning a letter or number designation as a stream name, this procedure uses cultural features as well as legal descriptions taken from U.S. Geological Survey (USGS) Quadrangle Maps.

Streams having a name that appears on a USGS quad map will not be affected. A stream not having a name on a USGS quad map will require a legal description of its confluence with the next named stream whose name does appear on a USGS quad map, and a name is then assigned through the following steps.

1) A sincere effort is made to determine if there is a name in common use. This would probably include contacting local officials and residents of the area.
2) If no common name is found, the appropriate USGS quad map is consulted to select a cultural feature. (If available, the 7½ minute quad map is preferable.) In this selection, the permanence of the feature is con-
DATA ENTRY FORM
SURFACE WATER REPOSITORY

1) FOR SWS USE ONLY
   A) I.D. NUMBER
   B) DATE

2) TITLE OF REPORT

3) AUTHOR OR AGENCY (CHECK ONE)
   ( ) DOWR - DIVISION OF WATER RESOURCES
   ( ) SWS - STATE WATER SURVEY
   ( ) USGS - UNITED STATES GEOLOGICAL SURVEY
   ( ) SCS - SOIL CONSERVATION SERVICE
   ( ) CCOE - CHICAGO CORPS OF ENGINEERS
   ( ) RCCE - ROCK ISLAND CORPS OF ENGINEERS
   ( ) LCCE - LOUISVILLE CORPS OF ENGINEERS
   ( ) SCOE - ST. LOUIS CORPS OF ENGINEERS
   ( ) MCCE - MEMPHIS CORPS OF ENGINEERS
   ( ) NIIPC - NORTHEASTERN ILLINOIS PLANNING COMMISSION
   ( ) MSD - CHICAGO METROPOLITAN SANITARY DISTRICT
   ( ) SWPC - SOUTHWESTERN ILLINOIS PLANNING COMMISSION
   ( ) CONS - CONSULTANTS; SPECIFY

   ( ) OTHER; SPECIFY

4) TYPE OF REPORT (CHECK ONE)
   ( ) FIS - FLOOD INSURANCE STUDY
   ( ) REG - REGULATORY STUDY
   ( ) REC - RECONNAISSANCE STUDY
   ( ) SPS - STRATEGIC PLANNING STUDY
   ( ) PPS - PROJECT PLANNING STUDY
   ( ) FEA - FEASIBILITY STUDY
   ( ) FHA - FLOOD HAZARD ANALYSIS
   ( ) FWP - FLOOD MANAGEMENT PLANS
   ( ) WWP - WATERSHED WORK PLANS
   ( ) FCS - FLOOD CONTROL STUDY
   ( ) FPI - FLOOD PLAIN INFORMATION STUDY

   ( ) OTHER; SPECIFY

5) YEAR OF ISSUE

6) LOCATION OF REPORT
   ( ) SWS

   ( ) AVAILABLE THROUGH CONTRIBUTING AGENCY

7) CERTIFIED DISCHARGES
   ( ) YES   ( ) NO

8) NUMBER OF STREAMS AND TRIBUTARIES STUDIED
   (Enter Stream Data on Reverse)

FIGURE 2
considered. For instance, a cemetery is a relatively permanent feature and would be preferred over a golf course.

3) The next consideration is the uniqueness of the feature. For example, it would be inappropriate to have a River Road Tributary to the Des Plaines River since there are numerous small tributaries to the Des Plaines that flow under River Road.

4) The final consideration is the proximity of the feature to the mouth of the tributary. In the event there are no outstanding features in the area, a street or other minor feature near the mouth of the tributary is used. In any case, points 2 and 3 are kept in mind.

The USGS hydrologic unit numbering system has been adopted to facilitate the location of streams into predetermined basins (page 2, item 3 on the DEF). A narrative description of the study limits is provided in item 4 on the DEF. Other items of the form are self-explanatory with the exception of the priority ranking.

Priority Ranking

A numerical ranking is assigned to each study containing elevation data for the 100-year flood. This ranking is an attempt to objectively select the "best available elevation data" for regulatory purposes, since some studies are prepared by more detailed methods and are more closely reviewed than others. The categories beginning with the most reliable are as follows:

1) State-Certified Data

Two types of study data qualify for this ranking. Each is based on detailed cross-sectional information and a backwater analysis; has undergone extensive review by federal, state, and local officials; and has been presented to the community in a public meeting.

Certified Flood Insurance Study Data (FIS)

These FIS elevation data are the result of a detailed stream analysis, performed under FEMA/FIHM guidelines. Data include flood boundary and floodway maps; 10-, 50-, 100-, and 500-year flood profiles and water surface elevations; and flood insurance rate information.

IDOT-DWR Regulatory Data

These profiles and maps are prepared for floodplain regulations administered by IDOT-DWR. Orthophoto maps depicting the 100-year floodway and floodplain, and 100-year flood profiles including IDOT-DWR Regulatory Flood Protection Elevations (1 foot above 100-year flood elevations) are provided.

2) Detailed 100-year Study Data Prepared for a Federal or State Agency

These elevation data are prepared with detailed cross-sectional information and a backwater analysis by or for a federal or state agency but have not been certified by IDOT-DWR. Profiles and maps delineating the 100-year floodway and/or floodplain are provided for the study area. Investigations of this nature may serve as the basis for IDOT-DWR regulatory floodplain maps and profiles. Studies providing information of this nature are: uncertified (detailed) Flood Insurance Studies, draft (detailed) River Basin Studies, U.S. Army Corps of Engineers Floodplain Information Reports, Reconnaissance Studies, etc.

3) Detailed 100-year Study Data Prepared by Consultants

This category comprises data extracted from locally and privately financed studies. Elevations are based on detailed cross-sectional data and a backwater analysis. A 100-year profile of the study area is provided.

4) Adjusted Flood of Record

Elevations are derived from field observations and/or historical flood elevations. The water surface elevations are then adjusted to reflect the 100-year frequency. A backwater analysis is not required.

5) Flood of Record

Elevation data correspond to high water marks observed during most severe storms remembered by the community. This type of report makes no attempt to compute the 100-year flood.

If the repository has no studies for a stream, the requestor will be advised to try one of two other sources, given below:

6) IDOT Bridge Computations

IDOT-DWR permits are required for the construction of bridges over streams draining 10 or more square miles in rural areas, and 1 or more square miles in urban or urbanizing areas. Since July 1976, DWR has included in their permit review procedure, the determination of the 100-year frequency discharge and water surface elevation. Discharge estimates are made by the State Standard Method (see page 9), with water surface elevations computed by use of a normal depth solution of Manning's equation, or by various backwater models if the situation warrants it.

Although the review procedure is generally regarded to be approximate, the information generated may
be the best information available in the vicinity of the bridge. Such information is available for almost every bridge built in the last 20 years. Requests for this information should be directed to:

Illinois Department of Transportation  
Division of Water Resources  
Floodplain Management Section  
2300 South Dirksen Parkway  
Springfield, IL 62764  
Phone: (217)782-3862

7) Depth and Frequency of Floods in Illinois

This publication, prepared by the U.S. Geological Survey (USGS), presents a method for estimating flood depths of the 2-, 5-, 10-, 25-, 50-, and 100-year frequencies at ungaged sites in Illinois. Equations to predict depth of water above channel bottom for these frequency floods were developed with the 2-year flood used as the descriptive variable. The 2-year flood is estimated by using the publication Technique for Estimating the Magnitude and Frequency of Floods in Illinois. This technique is used to estimate floods of selected frequencies for unregulated rural streams in Illinois with drainage areas ranging from 0.02 to 10,000 square miles. The variables drainage area, slope, rainfall intensity, and an areal factor are used in the estimating equations to determine flood peaks. Together, these two publications enable one to estimate flood depths of various recurrence intervals for streams in Illinois.

This method is intended mostly for planners, designers, and consultants who need a quick estimate of flood depths for preliminary design, provisional floodplain zoning, or a starting point for more detailed hydrologic studies. It is not proposed to replace more complete hydrologic studies where greater accuracy or precision is needed. These reports present examples of application and discuss limitations of its use. Both reports are available from:

U.S. Geological Survey  
605 North Neil Street  
P.O.; Box 1026  
Champaign, IL 61820

Access to the Repository

A data retrieval system can provide only the kind of information originally entered into it. A review of the contents of the DEF, therefore, will indicate the kind of information available from the Floodplain Information Repository. The information available in the repository can be provided in the form of computer printouts for specific counties, hydrologic unit numbers, agencies, stream names, dates, or in some cases, for combinations of these. The service is available to anyone without charge. Requests for information should be addressed to:

Floodplain Information Repository  
Illinois State Water Survey  
P.O. Box 232  
Urbana, IL 61801  
Phone: (217)333-0447

Actual reports available in the repository may be examined at the ISWS.

DISCHARGE COORDINATION

The need for review and coordination of discharges computed in floodplain studies was officially recognized in guidelines issued by the Governor’s Task Force on Flood Control in March 1975. Since the 100-year flood has been designated the base flood for regulatory use, it is particularly important that 100-year discharges be consistent with those computed in study of contiguous streams as well as with regional variations in magnitude. The ISWS is responsible for reviewing and coordinating 100-year discharges. Participation in this program as well as the methods used in the program and the eventual certification of 100-year discharges are described below.

Submitting Discharges

Individuals or agencies computing 100-year discharges for any use in any hydrologic or hydraulic study are asked to submit their findings along with supporting data to the ISWS for review and possible certification. FEMA/FIHM requires all FIS contractors to submit 100-year discharges of certification. A form such as that shown in figure 3 will be provided by the ISWS for this purpose. One form is required for each discharge submitted. It is suggested that except for very small tributaries, enough point discharges be submitted to establish a discharge curve for the reach of the stream being studied.
FIGURE 3

FLOODPLAIN REPOSITORY DISCHARGE REVIEW FORM

AGENCY OR FIRM _________________________________ DATE ____________

SUBMITTED BY _______________________________ PHONE ____________

ADDRESS ___________________________________________ ZIP __________

STUDY NAME _______________________________________

1. LOCATION OF POINT OF INTEREST
   NAME OF STREAM _______________________________________
   QUADRANGLE NAME ___________________________ COUNTY _________
   1/4 SECTION, TWP & RANGE _______________________
   IDENTIFYING LANDMARK, ROAD CROSSING, CONFLUENCE, ETC. ________

2. DRAINAGE AREA ABOVE POINT OF INTEREST ______________________ sq mi

3. DISTANCE FROM POINT OF INTEREST TO WATERSHED DIVIDE MEASURED ALONG THE STREAM
   CHANNEL ________________________________ ft

4. ELEVATION OF STREAM BED 10% AND 85% OF THE DISTANCE FROM THE POINT OF INTEREST TO THE
   BASIN DIVIDE AS MEASURED IN ITEM 3
   __________________________________________ ft msl @ 10% _____________ ft msl @ 85%

5. DRAINAGE AREA IMPERVIOUSNESS (if)
   PRESENT CONDITIONS ________________________ % OF DRAINAGE AREA
   FUTURE CONDITIONS (if applicable) ______________ % OF DRAINAGE AREA
   YEAR AND SOURCE OF DATA USED TO ESTIMATE % IMPERVIOUSNESS ______________________

6. DISCHARGES SUBMITTED FOR APPROVAL
   RETURN PERIOD (YEARS) CHARGE (cfs)
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

FLOODPLAIN REPOSITORY
ILLINOIS STATE WATER SURVEY
RETURN COMPLETED FORM TO: Box 232, Urbana, Illinois, 61801 PHONE: (217)-333-0447

FIGURE 3
No restrictions are placed on the methodologies used to determine 100-year discharges. Engineers are encouraged to use methods with which they are most familiar and in which they have a high degree of confidence.

**Coordination and Certification Procedure**

After receiving a completed discharge submittal form, the ISWS follows the procedure outlined in figure 4. In general, the ISWS compares the submittals with those currently found in their files. If previously submitted discharges have been certified for the stream, the ISWS will recommend to IDWR that the previously certified value be used. IDWR will then notify the submitter of the approved 100-year discharge to be used. If the submitter wishes to appeal these values, a resolution meeting will be held with officials of the ISWS and IDWR, as well as the submitter, in attendance. When appropriate, the mutually acceptable 100-year discharge will replace the previously certified value.

If no previously submitted discharge has been certified for the stream, the submitted discharge will be compared with that computed by the State Standard Method (SSM described below). If found to be within an acceptable range, the submitted discharge will be recommended to DWR for certification. If not found to be within an acceptable range, the ISWS will recommend to DWR that the discharge computed by the State Standard Method be certified.

The now certified discharge will then be supplied to anyone doing floodplain studies in that basin in the future. No other discharge will be acceptable to the state in that location until it is clearly demonstrated that the certified discharge should be modified.

**State Standard Method (SSM)**

The SSM consists of a series of objective techniques based on observed streamflow data that enable the user to determine a 100-year discharge at any point in the state of Illinois. The SSM is not assumed to be more reliable than other methods, but rather is used to generate consistent 100-year discharges which may be used as a standard of comparison on a statewide basis. The primary tool used in the SSM was developed by Curtis.\(^6\)

It consists of a set of regression equations for the 100-year as well as other frequency discharges. Provisions are made for adjusting the regression equations when a stream gage record is available in the basin or in a similar basin nearby. The methodology utilizes Log Pearson Type III distributions and is consistent with guidelines of the Water Resources Council.\(^8\)

The method presented by Curtis is not applicable to rapidly developing watersheds in northeastern Illinois. In order to provide a truly statewide procedure, Allen and Bejeck developed regression equations similar to those by Curtis for the northeastern portion of the state.\(^9\) These equations are used to estimate the magnitude and frequency of floods in the urban environment of northeastern Illinois, and for estimating the probable changes in flood characteristics that may be expected to accompany progressive urbanization. They are similar to the Curtis equations except that percent imperviousness (an urbanization factor) is used. This report is also available from the U.S. Geological Survey. Information on 100-year discharges for major rivers in the state is available from the Floodplain Information Repository described in the previous section.

Application of the SSM involves a number of decisions which depend on the availability of gage data in the vicinity of the area in question. Figure 5 depicts this decision-making process which leads to the proper solution of the SSM. Where reliable gage data exist within the basin in question or in a similar basin, the procedure is weighted to this gage. The longer the gage record, the more weight it carries. When gage data are available, the 100-year discharge under review is expected to be within plus or minus 25% of the SSM. If no reliable gage data exist, the submitted value may vary by 50%.
The ISWS also provides a comprehensive "Local Assistance" program and participates in the "State Review Procedure" for flood insurance and other regulatory floodplain studies. These programs are designed to assist local officials of communities in the National Flood Insurance Program (NFIP) who are seeking technical information related to the NFIP.

**Review Request**

A community needing assistance should obtain a Review Request Form (figure 6) from the ISWS. The form requires the community to indicate that the study involved was prepared to meet the requirements of the National Flood Insurance Program. One or more of the following specific services must also be requested:

1) A review of the study to determine if the base flood elevation (1% probability event) data are appropriate for regulatory use (as required by Sections 1910.3 (b) (3) and (4) of the NFIP Rules and Regulations, see Appendix A). The request should state whether the study would include the best base flood elevation data available in the State Repository.

2) A review of the study to determine if the floodway or encroachment computations meet DWR floodway
LOCAL FLOODPLAIN STUDY REVIEW REQUEST FORM

I General Data

Requesting Community

City __________________ State __________ Zip __________
Contact __________________ Phone __________________

Study Entitled

Preparing Engineering Firm

City __________________ State __________ Zip __________
Contact __________________ Phone __________________

Stream or Body of Water Affected

Downstream Limit of Study ____________ 1/2, Section ____________ Township ____________.
Range ____________, of the ____________ P.M., ____________ County.

Limit of Study

Status of Community in National Flood Insurance Program

(not participating, emergency program, or regular program)

II Specific Request

The Illinois State Water Survey is hereby requested to assist this community in the review of floodplain study data that have been prepared to meet the requirements of the National Flood Insurance Program (NFIP). Our request is as follows: (check appropriate box)

( ) Review the study to determine if the base flood elevation (1% probability event) data is appropriate for regulatory use (as required by Sections 1910.3 (b) (3) and (4) of the NFIP Rules and Regulations). Please state if the study would include the best base flood elevation data available to the State Repository.

( ) Review the study to determine if the floodway or encroachment computations meet DNRP floodway standards and therefore are appropriate for regulatory use in Illinois (as required by Sections 1910.3 (b) (4) and 1910.3 (c) (10)).

( ) Review the study to see if it is sufficient for use in appealing the following described data prepared by or for the Federal Insurance Administration. If it is sufficient, we intend to use your response in an appeal to be submitted in accordance with Parts 1917 or 1920 of the NFIP Rules and Regulations. State data and type of map or study being appealed:

III Enclosures

( ) Two copies of the completed "Discharge Review Forms" or if previously submitted, list discharges used in study.

( ) Two copies of the completed study, including:
1) Previously completed or ongoing studies which provide floodplain and/or floodway data for areas adjacent to or for the study area.
2) Location maps showing limit of study.
3) Discharge determination calculations.
4) Backwater computations.
5) Flood and streambed profiles for study reach.
6) Topographic maps showing:
   a) the delineated floodplain and/or floodway
   b) locations of surveyed cross sections used in analysis
   (cross sections must be related to NGVD datum)

( ) If any of the above noted items are not enclosed, explain why:

FIGURE 6
standards and therefore are appropriate for regulatory use in Illinois (as required by Sections 1910.3 (b) (4) and 1910.3 (c) (10), NFIP Rules and Regulations).

3) A review of the study to see if it is sufficient for use in appealing the described data prepared by or for the Federal Insurance Administration. If it is sufficient, the review can be part of the response in an appeal to be submitted in accordance with Parts 1917 or 1920 of the NFIP Rules and Regulations. The request should state data and type of map or study being appealed.

The following information will also be required on the request form.

a) General data
   Requesting community
   Title of study
   Author
   Stream(s) studied
   Legal description of downstream limit of study
   Narrative description of limits of study
   Community’s status in NFIP

b) Enclosures
   Two copies of report
   Discharge submittal forms
   Study data
   Mapping

**Local Assistance**

Upon receiving a written request by a community meeting the above requirements, the ISWS will review flood insurance and other regulatory floodplain studies. This review is limited to:

1) Analyzing the discharges used in the study in accordance with the "State Standard Method." Recommendations for certification will be submitted to DWR’s Chief Floodplain Management Engineer.

2) Determining if a study’s profiles and/or floodways are:
   a) Based on surveyed cross sections, bridge geometry and stream geometry, and related to National Geodetic Vertical Datum (NGVD)
   b) Consistent with adjacent certified profiles and/or floodways where such data exist
   c) Established by backwater computations using accepted engineering techniques
   d) Certified by a Registered Professional Engineer of the State of Illinois

It should be noted that the accuracy of calculations, appropriateness of assumptions, and application of methodology are the responsibility of the engineers submitting the study, and are not covered by this review.

Upon completion of the review, the ISWS will respond with a form letter designed to answer the specific questions posed above and to be used in the appeal of flood insurance maps. The letter is reproduced in figure 7. For convenience the appealing procedure is provided in Appendix B.

**REFERENCES**


Dear Sir:

In compliance with a cooperative agreement between the Illinois State Water Survey and the Illinois Division of Water Resources (DWR) dated November 15, 1978, the Floodplain Study titled: ____________________________ has been reviewed for the following items:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>n/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
</tbody>
</table>

(1) The study is based on discharges that have been or will be recommended to DWR for certification.

(2) Generated profiles and/or floodways were:
   a) Based on surveyed cross sections, bridge geometry and stream geometry, and related to NGVD datum.
   b) Found to be consistent with adjacent certified profiles and/or floodways where such data exist.
   c) Established by backwater computations using accepted engineering techniques.
   d) Certified by a Registered Professional Engineer of the State of Illinois.

It should be noted that the accuracy of calculations, appropriateness of assumptions, and application of methodology are the responsibility of the engineers submitting the study, and are not covered by this review.

Based on the review of the above items, the following conclusions are made:

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>n/a</th>
</tr>
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<tr>
<td>( )</td>
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<td>( )</td>
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</tbody>
</table>

(1) Base flood elevations (1% probability event) provided in this study are appropriate for local floodplain regulations as required by Sections 1910.3 (b) (3) and (4) of the National Flood Insurance Program Rules and Regulations.

(2) The base flood elevations will be filed in the State Floodplain Data Repository as the "best available elevation data" and will be made available for others to use. The study's data will continue to be identified as "best available data" unless new information to the contrary is submitted to us. Should this study lose its designation as being "best available data" your agency will be notified.

(3) The floodway or encroachment computations are appropriate for and should be used for local floodplain regulations as required by Sections 1910.3 (b) (4) and 1910.3 (c) (10).

(4) The proposed floodway or encroachment boundaries are not appropriate for regulatory use because they would permit damaging or potentially damaging increases in flood stage or velocity.

(5) The study uses methods and data sufficient to appeal: ____________________________

You are welcome to use this letter in your appeal. An instruction sheet on "Appealing Flood Insurance Maps" is enclosed.

Questions relating to this review should be addressed to John P. Lardner, (217) 535-0447. Questions related to floodplain regulations or the National Flood Insurance Program should be addressed to DWR's Local Floodplain Programs Section (312) 793-3864.

Sincerely yours,

ILLINOIS STATE WATER SURVEY

FIGURE 7
APPENDIX A. RULES AND REGULATIONS - NFIP

§ 1910.3 Flood plain management criteria for flood-prone areas.

The Administrator will provide the data needed to determine flood plain management regulations shall be based. If the Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review and reasonably utilize data available from other Federal, State or other sources providing receipt of data from the Administrator. However, when special flood hazard area designations and water surface elevations have been furnished by the Administrator, they shall apply. The symbols defining such special flood hazard designations are set forth in § 1914.3 of this subchapter. In all cases the minimum requirements governing the adequacy of the flood plain management regulations for flood-prone areas adopted by a particular community depend on the amount of technical data formally provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has not defined the special flood hazard areas within a community, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall:

(1) Require permits for all proposed construction or other development in the community, including the placement of mobile homes, so that it may determine whether such construction or other development is proposed within flood-prone areas;

(2) Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1344;

(3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements (including the placement of prefabricated buildings and mobile homes) shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure, (ii) be constructed with materials and utility equipment resistant to flood damage, and (iii) be constructed by methods and practices that minimize flood damage; and

(c) When the Administrator has defined the special flood hazard areas within a community, the community shall:

(1) Require permits for all proposed construction or other development including the placement of mobile homes, within Zone A on the community’s FHBM;

(2) Require the application of the standards in paragraphs (a), (2), (3), (4), and (5) of this section to development within Zone A on the community’s FHBM;

(3) Require that all subdivision proposals and other proposed new developments greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data; (4) Obtain, review, and reasonably utilize any base flood elevation data available from a Federal, State, or other source, until such other data has been provided by the Administrator, as criteria for requiring that (i) all new construction and substantial improvements of residential structures within Zones A-30 on the community’s FHBM, (i) over-the-top ties be provided at each of the four corners of the mobile home, (ii) the home with five additional ties per side at intermediate points and mobile homes less than 50 feet long requiring one additional tie per side; (ii) frame ties be provided at each corner of the home with five additional ties per side at intermediate points and mobile homes less than 50 feet long requiring one additional tie per side; (iii) components of the anchoring system be capable of carrying a force of 4,800 pounds and (iv) any portion of the mobile home be similarly anchored;

(9) Require that an evacuation plan indicating alternate vehicular access and escape routes be filed with appropriate Disaster Preparedness Authorities for mobile home parks and mobile home subdivisions located within Zone A on the community’s FHBM.

(c) When the Administrator has provided a notice of final base flood elevations within Zones A-30 on the community’s FIRM and, if appropriate, has designated A0 zones A99 and unnumbered A zones on the community’s FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:

(1) Require the standards of paragraph (b) of this section within all A-30 zones unnumbered A zones and A0 zones, on the community’s FIRM;

(2) Require that all new construction and substantial improvements of nonresidential structures within Zones A-30 on the community’s FIRM have the lowest floor (including basement) elevated to or above the base flood level if the base flood level, or the community is granted an exception by the Administrator for the allowance of basements and/or storm cellars in accordance with § 1910.6(b) (3)(b) and (4);

(3) Require that all new construction and substantial improvements of nonresidential structures within Zones A-30 on the community’s firm (i) have the lowest floor (including basement) elevated to or above the base flood level, or, (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

(4) Provide that where floodproofing is utilized for a particular structure in accordance with paragraphs (c) (3) and (c) (8) of this section or (b)(3) of § 1910-
APPENDIX A. (Concluded)

6 either (i) a registered professional engineer or architect shall certify that the floodproofing methods are adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the base flood, and a record of such certificates indicating the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained with the official designated by the community under § 1909.22(a) (9) (iii); or, (ii) a certified copy of a local regulation containing detailed floodproofing specifications which satisfy the watertight performance standards of paragraph (c) (3) of this section or (b) (3) of § 1910.6 shall be submitted to the Administrator for approval;

(5) Require within Zones Al-30 on the community's FIRM for new mobile home parks and mobile home subdivisions, for expanding existing mobile home parks and mobile home subdivisions, and for existing mobile home parks and mobile home subdivisions where the repair, re-construction or improvement of the streets, utilities and pads equals or exceeds 50% of the value of the streets, utilities and pads before the repair, re-construction or improvement has commenced, that (i) stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be at or above the base flood level, (ii) adequate surface drainage and access for a hauler are provided, and (iii) in the instance of elevation on pilings, lots are large enough to permit steps, pilings foundations are placed in stable soil no more than ten feet apart, and reinforcement is provided for pilings more than six feet above the ground level;

(6) Require for all mobile homes to be placed within Zones Al-30 on the community's FIRM, but not into a mobile home park or mobile home subdivision that (i) stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be at or above the base flood level, (ii) adequate surface drainage and access for a hauler are provided, and (iii) in the instance of elevation on pilings, lots are large enough to permit steps, pilings foundations are placed in stable soil no more than 10 feet apart, and reinforcement is provided for pilings more than six feet above ground level;

(7) Require within any A0 zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the crown of the nearest street to or above the depth number specified on the community's FIRM;

(8) Require within any A0 zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the crown of the nearest street to or above the depth number specified on the FIRM, or (ii) together with attendant utility and sanitary facilities be completely floodproofed to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

(9) Require within any A99 zones on a community's FIRM the standards of paragraphs (a) (1) thru (a) (4) (i) and (b) (5) thru (b) (9) of this section;

(10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones Al-30 on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

(d) When the Administrator has provided a notice of final base flood elevations within Zones Al-30 on the community's FIRM and, if appropriate, has designated A0 zones A99 zones and un-numbered A zones on the community's FIRM, and has provided data from which the community shall designate its regulatory floodway, the community shall:

   (1) Meet the requirements of paragraphs (c) (1) through (c) (9) of this section;

   (2) Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;

   (3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway that would result in any increase in flood levels within the community during the occurrence of the base flood discharge;

   (4) Prohibit the placement of any mobile homes, except in an existing mobile home park or mobile home subdivision, within the adopted regulatory floodway.

(e) When the Administrator has provided a notice of final base flood elevations within Zones Al-30 on the community's FIRM and, if appropriate, has designated A0 zones, A99 zones and un-numbered A zones on the community's FIRM, Zone V1-30 (coastal high hazard area), the community shall:

   (1) Meet the requirements of paragraphs (c) (1) through (c) (10) of this section;

   (2) For the purpose of the determination of applicable flood insurance risk premium rates within Zone V1-30 on a community's FIRM, (i) obtain the elevation (in relation to mean sea level) of the lowest structural floor (excluding basement) of all new or substantially improved structures, and whether or not floodproofed; (ii) obtain, if the structure has been floodproofed, the elevation (in relation to mean sea level) to which the structure was floodproofed, and (iii) maintain a record of all such information with the official designated by the community under § 1909.22(a) (9) (iii)

   (3) Provide that all new construction within Zones V1-30 on the community's FIRM is located landward of the reach of mean high tide;

   (4) Provide (i) that all new construction and substantial improvements within Zones V1-30 on the community's FIRM are elevated on adequately anchored pilings or columns, and securely anchored to such piles or columns so that the lowest portion of the structural members of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level and (ii) that a registered professional engineer or architect certify that the structure is securely anchored to adequately anchored pilings or columns in order to withstand velocity waters and hurricane wave wash;

   (5) Provide that all new construction and substantial improvements within Zones V1-30 on the community's FIRM have the space below the lowest floor free of obstructions or be constructed with "breakaway walls" intended to collapse under stress without jeopardizing the structural support of the structure so that the impact on the structure by normally high tides or wind-driven water is minimized. Such temporarily enclosed space shall not be used for human habitation;

   (6) Prohibit the use of fill for structural support of buildings within Zones V1-30 on the community's FIRM;

   (7) Prohibit the placement of mobile homes, except in existing mobile home parks and mobile home subdivisions, within Zones V1-30 on the community's FIRM.

(8) Prohibit man-made alteration of sand dunes and mangrove stands within Zones V1-30 on the community's FIRM which would increase potential flood damage.
APPENDIX B. APPEAL PROCEDURE

Illinois Department of Transportation
Division of Water Resources

NATIONAL FLOOD INSURANCE PROGRAM

APPEALING FLOOD INSURANCE MAPS

What is an appeal? Flood Hazard Boundary Maps (FHB) and Flood Insurance Rate Maps (FIRM) are intended to show base flood information in a community according to the best data available. An appeal is a formal request to change a map to correct an error, to reflect a change in the flood situation, or to reflect better data. Anyone with enough information to correct a map may submit an appeal. A successful appeal will result in either a new map (for large changes) or a letter of map revision (for changes affecting only a few properties).

Appeal to correct an error: If a map shows streets or corporate limits in the wrong location, sending a new map to the Federal Insurance Administration (FIA) will be adequate. If corporate limits change by annexation, the local government should send FIA a new community map. If a city or village has several annexations each year that do not affect the floodplain, an appeal should be submitted no more than once a year.

Appeal based on better ground elevation data: If a detailed contour map shows errors in the floodplain boundaries, a copy of the more detailed map should be submitted. If the base flood elevation is known, (or has been more accurately computed since the FHB was made), it should be submitted with the appeal. Where the best available maps do not clearly show a property higher than the base flood elevation, a certificate of elevation is needed. The certificate must be sealed by an engineer or surveyor and must show the elevation of the lowest finished grade adjacent to the structure or the lowest floor (including basement), whichever is lower. Buildings with basements below the base flood elevation will not have appeals granted. (Exception: buildings with basements but having the lowest grade above the base flood that are located on the floodplain boundary may have an appeal granted by showing that the boundary lines are inaccurate).

Appeal based on filling in the floodplain: If there has been a substantial amount of new filling adjacent to the floodplain boundaries, a certified "as built" topographic map should be submitted after the filling has been completed. Filling individual building sites that create "islands" in the floodplain is not adequate for appealing a FIRM. It should be noted that filling in the floodplain needs a development permit from the community participating in the National Flood Insurance Program. Such a permit will not be granted unless the community is assured that the fill will bring the building sites up to or above the base flood elevation and will not obstruct the flow of floodwaters.
APPENDIX B. (Concluded)

Appeal based on better flood data: A FIRM is prepared as part of a Flood Insurance Study and reflects the best data available on the base (i.e.: 100 year) flood. Parties challenging a FIRM should review the Flood Insurance Study to see if the challenge is based on better or more accurate study techniques. Copies are available at the city or county engineering, planning, zoning, or building department. A FHBM is based on the best data available to the Federal Insurance Administration. Parties challenging a FHBM should contact those who prepared it to learn its basis. In Illinois call Gannett, Fleming, Corddry and Carpenter, Harrisburg, PA, (717) 238-0451, X375.

Appeal based on new flood works: A map may be changed to reflect new flood protection works built since the map was prepared. Plans for large projects usually include after-project flood maps that can be used to readily amend a map. However, in most cases a map cannot be changed until the project is actually constructed and/or operating. Furthermore, many small projects, such as one or two retention reservoirs or channel improvements will not have enough of an effect on the base flood to warrant a map amendment.

Letter of revision: Appeals affecting only one or two properties need to provide 1) an actual (stamped) copy of the recorded plat map of the property showing official recordation and proper citation; 2) base flood elevation data (information based solely on floods of record or the property's history of flooding is not sufficient); 3) ground elevation data: an accurate map or elevation certificate. (NOTE: topographic maps are normally accurate to within $\frac{1}{2}$ the contour interval). If the appeal is successful, the map will not be changed but the FIA will issue a letter stating that the particular property is not subject to the base flood.

Insurance Rebate: If a flood insurance policy was required to be purchased because a property was shown as flood-prone on a FIRM or FHBM and an appeal successfully removes the building from the base floodplain, then there will be a complete rebate of one year's premium.

Submitting the appeal: All appeals should include a copy of the FIRM or FHBM being challenged. Submit to:

Federal Emergency Management Agency  
Office of Federal Insurance and Hazard Mitigation  
Technical Services Division  
451 Seventh Street, S.W.  
Washington, D.C. 20410  
Attn: T. L. Miller - Room 2130

It will take 2-4 months for FEMA to process the appeal.

For more information: Contact the Division of Water Resources' Local Floodplain Programs Section, Chicago, (312) 793-3864