

# Guidance for Flood Risk Analysis and Mapping

## Versioning

November 2015



**FEMA**

Requirements for the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) Program are specified separately by statute, regulation, or FEMA policy (primarily the Standards for Flood Risk Analysis and Mapping). This document provides guidance to support the requirements and recommends approaches for effective and efficient implementation. Alternate approaches that comply with all requirements are acceptable.

For more information, please visit the FEMA Guidelines and Standards for Flood Risk Analysis and Mapping webpage ([www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping](http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping)). Copies of the Standards for Flood Risk Analysis and Mapping policy, related guidance, technical references, and other information about the guidelines and standards development process are all available here. You can also search directly by document title at [www.fema.gov/library](http://www.fema.gov/library).

## Document History

Affected Section or Subsection	Date	Revision Description
First Publication	November 2015	Initial version of new transformed guidance. The content was derived from the <u>Guidelines and Specifications for Flood Hazard Mapping Partners</u> , <u>Procedure Memoranda</u> , and/or <u>Operating Guidance</u> documents. It has been reorganized and is being published separately from the standards.

## Table of Contents

1.0	Versioning Background.....	1
2.0	Implementation Summary .....	1
3.0	Affected Products .....	2
4.0	Version Number System .....	2
4.1	Version Number .....	2
4.2	Version Number Change.....	4
4.3	Approval Process.....	4
5.0	Guidelines and Standards Maintenance.....	5
6.0	Production Implementation .....	5
6.1	Documents that Affect Change .....	5
6.2	Printed Products .....	6
6.3	Databases .....	6
7.0	Quality Review.....	6

## List of Figures

Figure 1:	Risk MAP Version System Vision.....	3
Figure 2:	Risk MAP Version System Numerical Example.....	3

## 1.0 Versioning Background

FEMA's flood hazard mapping program has undergone dramatic positive change by implementing new digital mapping standards and scientific methodologies. In the course of continuously updating our mapping inventory through prioritization of need, we have a mapping stock covering a wide spectrum of standards and it can be difficult for the end user to easily understand the standards employed during development of a specific product by simply relying on the printed date of a map or report.

As products age, the problem is further compounded when the specification for the customer's product has been revised several times, therefore making it difficult to understand the standards that govern a specific product. FEMA's production workflows are also affected during the quality review process. Products are submitted to FEMA for review that may have been contracted under one specification but a newer specification may have revised FEMA's quality review process creating incongruence between the contracted work and the quality workflow. Lastly, FEMA does not have the ability to query the national data inventory for a specific specification to provide answers about the standards used to create the nation's flood hazard mapping inventory.

To solve these issues, FEMA is implementing the Risk MAP Versioning System to be applied to FEMA's Guidelines and Standards for Flood Risk Analysis as well as most of the products, such as the digital Flood Insurance Rate Map (FIRM) paper map, Geographic Information System (GIS) databases, Flood Insurance Study (FIS) reports, and the like.

## 2.0 Implementation Summary

Each product receiving a Risk MAP version number (VN) will include the VN on the following permutations of the product: printed, digital version of the printed, database, and metadata. The version number refers to changes in specifications and not to how many updates have occurred to the specific product, therefore it does not replace a product's publication date or map number suffix. The VN is a four point number (e.g. 1.2.3.4) and is placed on the printed product and in its database. The VN for a study will reference the guidelines and specification to which the product was developed, not necessarily be the highest number available for each digit of the VN. Each point in the number represents a technical focus area:

- Major Programmatic Emphasis, e.g. Map Mod, Risk MAP.
- FIRM Database, including the paper product derivatives from the database which contain regulatory mapping information such as flood zones, flood elevations, and levees.
- Engineering and other standards, including the paper product derivatives from the FIS which contains regulatory profiles, discharges, reports, and flood hazard models.
- Flood Risk components, formerly Non-Regulatory Products, which contain Flood Risk maps, data, documents, as well as administrative information.

When FEMA's specifications change either by Standards, Technical Reference, Guidance Document, or some other significant event, the appropriate point number in the VN is advanced. Certain triggers are defined that advance the VN, restrict the VN from changing too frequently, and allow the FEMA Guidance and Standards Team to advance the VN as deemed necessary. VN changes will be communicated on the FEMA Guidelines and Standards Maintenance web

page by posting all available version numbers and a summarization of the changes to specification that caused the VN change. Additionally, changes will be necessary to the Mapping Information Platform (MIP) so that the Quality Review workflow may properly reference the correct specification. Detailed implementation for each of FEMA’s products can be found in that product’s governing documentation.

### 3.0 Affected Products

FEMA produces a wide range of products including maps, databases, reports, and letters. Not every product will be affected by the Risk MAP Versioning System because not all products have a specification lineage that is critical to the end user’s effective application of the product.

Table 1, shown below, summarizes the FEMA products that are affected by the Risk Map Versioning System. It also denotes which technical focus area applies to the product thereby indicating which VN point applies to the product. The list is not comprehensive and could be outdated quickly as FEMA specifications change. Any product with a specification lineage that is not already governed by the FEMA Document Control Manual will be affected by this implementation plan. A product’s detailed specification will contain the procedure for implementing the Versioning System for that product.

**Table 1: Example FEMA products affected by the Risk MAP Versioning System**

Product	Focus Area
Flood Insurance Rate Map (FIRM) Cartographic Map and Database	FIRM Database
Engineering and Modeling Database	Engineering and Other Standards
Flood Risk Database	Flood Risk component
Flood Insurance Study	Engineering and Other Standards
Flood Hazard Profiles	Engineering and Other Standards
Distribution and Communication Letters	Flood Risk component
Letters of Map Change (MT1 & MT2)	Engineering and Other Standards
Discovery Products	Flood Risk component

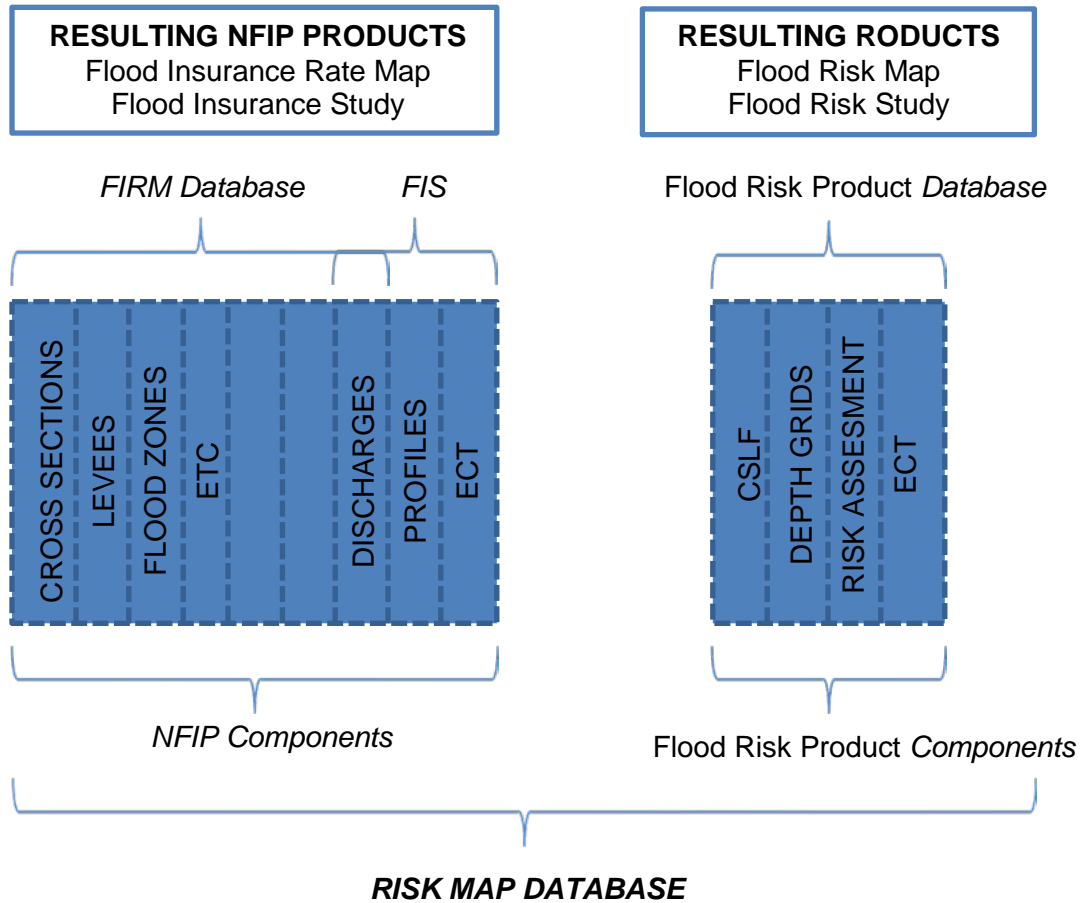
## 4.0 Version Number System

### 4.1 Version Number

To demonstrate the Risk MAP Versioning System vision, refer to Figure 1 below. The table separates National Flood Insurance Program (NFIP) regulatory products from Flood Risk components within the Risk MAP Program. In the NFIP regulatory component, separate FIRM (Mapping) and FIS (Science & Engineering) components are identified because their specifications are frequently updated but do not necessarily impact the other’s use. As noted in the table, a change in any of the components, and thus any of the standards that affect those

components, may trigger a version number change. The Risk MAP Versioning System vision uses the 4-point numbering system as a way to capture incremental changes to regulatory and Flood Risk components.

**Figure 1: Risk MAP Version System Vision**



**Figure 2: Risk MAP Version System Numerical Example**

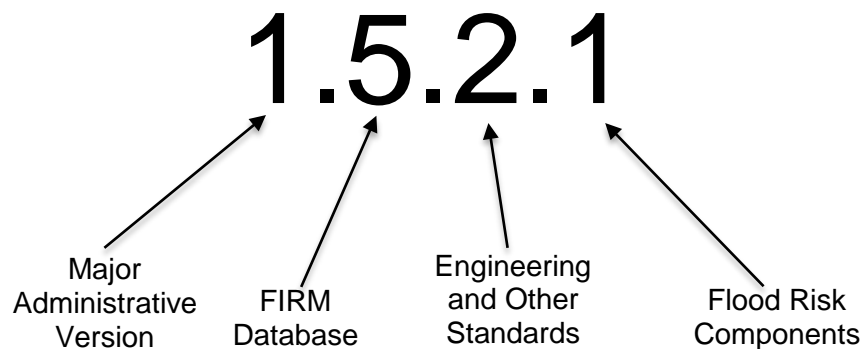


Figure 2 represents an example of the implementation of the 4-point number to represent the Risk MAP Versioning System vision. In the example, “1” represents the first major version of

Risk MAP (which is an administrative function not controlled by specific product standards); “5” represents the fifth version of the FIRM Database; “2” represents the second version of the Engineering and other standards and the last “1” represents the first version of the Flood Risk components.

## **4.2 Version Number Change**

Refer to Table 1 which defines the DFIRM Database, Engineering and Other Standards, and Flood Risk components that could trigger an increment in the specific point number. A change in the published guidance or standard may trigger a version number increment. The following types of changes may trigger a VN change: an NFIP or Flood Risk database specification change is published and made available for mapping partner access; guidance that is new or supersedes existing guidance is published and includes documentation that can be referenced; or a change is made that alters the Risk MAP process, product, or standard.

If published specifications or guidance simply clarify existing documentation and process, a version number increment is not necessarily implemented. Draft specification changes could also trigger a version number increment if the draft specification is substantial enough that work may be performed according to that draft and the quality review process would adhere to that draft. The decision to increment the version number for draft specifications is made by the FEMA Guidance and Standards Team on a case-by-case basis. FEMA, not the Mapping Partner, will increment the specification numbers and publish them on FEMA’s Guidelines and Standards Maintenance web page.

A change to the FEMA Technical Reference may necessitate an increment to the version number because that document is only modified to change database, mapping, reporting, analysis, science, engineering, process, or procedure and therefore by definition requires the version number to be incremented. An example of a change that would necessitate an increment to a digit of a version number would be adding or removing fields from a database schema, however adding or removing domains would not. Guidance Documents do not necessarily increment the version number and will be decided on a case-by-case basis by the FEMA Guidance and Standards Team.

Individual point numbers can be incremented sequentially without reset because each point number is independent of one another. Therefore when the example number above, 1.5.2.1, is incremented for the DFIRM database, the number would change to 1.6.2.1 and not 1.6.0.0. For administrative changes that define major shifts in the program, the regulatory and Flood Risk components point numbers may be reset to zero in conjunction with an administrative increment. For example, at the transition between Map Mod and Risk MAP, the administrative number may have been chosen to be incremented while resetting the remaining point numbers to zero to mark the major shift in program focus.

Similar to other email list servers maintained by FEMA, Mapping Partners can subscribe to the Risk MAP Version email list server to be made aware of version changes.

## **4.3 Approval Process**

FEMA’s Guidelines and Standards (G&S) team will receive recommendations for an increment in version numbers from advisory bodies such as the Regulatory Products team and the Flood Risk components team. Once FEMA’s G&S team has reviewed the recommendations and approved an increment in the version numbers for any of the digits, information will be posted on FEMA’s Guidelines and Standards Maintenance web page and included during an upcoming



G&S update training. Increments in version numbers will only occur with the G&S 6 month cycle updates.

## **5.0 Guidelines and Standards Maintenance**

The Guidelines and Standards Maintenance web page summarizes all changes that warrant a version number increment. This web page will be revised each time the version number is changed and to document any additional change to Guidelines and Standards that occur during each six month maintenance cycle. Each change will be summarized in sufficient form for the customer to understand the nature of the before and after state of the change with reference to the full document containing the guideline or standard.

The web page provides two tables, one for the numbers available for each digit of the version number and one with possible version scenarios. The maintenance cycle update each change was adopted will be included. Each digit of a version number will be added to the document in sequence and previous version number change entries will not be deleted from the web page. In this manner, the Risk MAP ID Tables on the Guidelines and Standards Maintenance web page will track version changes since the inception of the Versioning System.

The party responsible for the change that triggers a version increment will also be responsible for supplying the necessary text for the Risk MAP ID Tables. The Risk MAP ID Tables and the Diary of revisions are to be published by FEMA and available through the FEMA Library.

## **6.0 Production Implementation**

Many of FEMA's products are affected by the Version System but there are some products excluded from this process. FEMA's products that are not based on guidelines or standards for science, engineering, mapping, data structure, and so forth are excluded. For example, the Geospatial Data Coordination Guide is published in the FEMA Library and downloaded from the MIP and governs how FEMA interacts and cooperates with other Federal agencies for geospatial data collection. This document does not define a standard for regulatory data nor for Flood Risk components but is rather a guideline for proper communication. Therefore this document would not require versioning under this system.

Ideally, all data produced for a single Risk MAP project would comply with the same Risk MAP version number. But in practice, due to the length and type of a Risk MAP project, Cooperating Technical Partner interests, and other factors yet to be identified, it is feasible that products within the project could be produced to different standards reflected in different version numbers. It is conceivable that in the elapsed time between a floodplain study submission, flood map creation, and Risk MAP product development, the guidelines and standards could change during each of those project phases and thus the product version could change within the project.

Each product receiving the VN will include the VN on the following permutations of the product: printed, digital version of the printed, database, and metadata.

### **6.1 Documents that Affect Change**

All documents that implement a change to FEMA's policies, procedures, standards, guidelines, and products are included as Documents that Affect Change. These documents include but are not limited to Technical Reference and Guidance Documents. Documents published by FEMA that are used to clarify a subject but that do not change aspects of the program or products are not considered Documents that Affect Change.

## 6.2 Printed Products

Printed products include but are not limited to the following: FIS; Flood Hazard Profiles (profiles); FIRM; Letters of Map Change; metadata; Discovery maps and reports; flood risk map; and flood risk report. Correspondence is governed by the FEMA Document Control Manual. All of these products are made available to customers across the country for a multitude of purposes and each is produced to a set of guidelines and standards that are continuously updated. Thus all of the printed products must reference a Risk MAP version number, enabling the customer to reference the specific standard to which their product was created.

Each of the printed products must include the version number that represents the standards applied to the creation of the product. The version number shall be identified as “This FEMA product was produced to comply with Risk MAP Version x.x.x.x” in the notes or marginalia section of maps and in the standards or similar section of documents. Specific placement and language for the Risk MAP version number for each of the printed products can be found in the product’s governing documentation.

## 6.3 Databases

The storage of the version number in FEMA’s databases is critical to the success of the versioning system. In a single database, especially in a national FEMA database such as the National Flood Hazard Layer (NFHL), it is possible for separate data layers and individual database records to be produced to different versions. Therefore the field VERSION will be added to each data layer in each database. This practice will also ensure the version number is transferred to a customer when less than a complete database is transferred from one user to another.

The VERSION field will be added as a text field, 11 characters in length to each layer in FEMA’s databases. The field will contain the 4-point version number representing the specifications by which the data should be measured. Since the current Risk MAP version number can change as frequently as monthly, no VERSION domain will be established in the individual database specifications, but FEMA’s quality review tools may utilize the acceptable version numbers for each digit.

Database specifications for products described in [FEMA’s Guidelines and Standards for Flood Hazard Mapping Partners](#), [FIRM Database Technical Reference](#), [Flood Risk Database Technical Reference](#), and [Data Capture Technical Reference](#) are affected by the addition of the VERSION field as well as the NFHL database.

## 7.0 Quality Review

FEMA’s extensive Quality Review (QR) system comprises both an automated system and a manual system operated by expert staff. The DFIRM Validation Tool (DVT) is one of those automated systems and will include a quality check for a valid Risk MAP version number. Another check to determine if the correct version number was entered may be performed manually by the QR staff or automatically through the MIP DVT.