Guidance for Flood Risk Analysis and Mapping

Flood Risk Report

February 2018

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). 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/viewRecord.do?id=2206.

Table of Revisions

Affected Section or Subsection	Date	Description
All Sections	February 2018	Aligned with change in Standards making Flood Risk Report (FRR) optional and providing more flexibility in how to provide a narrative report about flood risk.

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1.0 Overview

The primary goal of the Flood Risk Report (FRR) is to provide information to communities and other stakeholders within the project area that will help them understand the concepts of flood risk, opportunities that exist to reduce that risk, and an overview of the specific types of data that are available that will help them in these efforts. The FRR is intended to be tailored to the Flood Risk Project so that it only includes applicable information and does not include information that does not apply to the project. It is also intended to read in non-technical terms to better communicate concepts and results to non-technical stakeholders.

The FRR is an optional product. While optional, it is encouraged to deliver some type of product that promotes flood risk awareness and action. This guidance provides some ideas on types of FRR and the flexibility in delivering the product. This guidance seeks to provide consistency in FRR product development when it is seen to be of value and purchased by the region. Variations from these guidelines are acceptable to support community needs for alternative tools to support outreach, hazard mitigation planning, or actions to reduce risk.

2.0 Flood Risk Report Considerations

The Flood Risk Report is an optional Flood Risk Product. When a narrative of the flood risk within the project area is determined to be needed by the FEMA Region, the format and output of that narrative may take on a variety of forms. Although the traditional FRR previously required since the inception of the flood risk products is an option, there are other known best practices that can effectively produce the same impact for a community as the Flood Risk Map (FRM) and FRR together.

The Flood Risk Report can be produced in a variety of ways with flexibility in what the final output is. The traditional FRR can be produced for the entire project area, or for a specific community. A streamlined version of an FRR can be produced, using a fact sheet which includes the appropriate mitigation strategies and educational resources made specific to each community, plus the flood risk tables found in section 3 of the traditional FRR and other pertinent, community-specific flood risk data. There are also options for digital delivery using an ESRI Story Map that will pull data from the Flood Risk Database (FRD) and provide the content of the traditional FRR and FRM. These products are suggestions, and other products meeting the community's needs are acceptable.

Any type and format of FRR developed should be produced to provide information critical to awareness and decision-making regarding a community's flood risk. This should include the flood risk tables of the traditional FRR especially those in Section 3, as well as other related programmatic data and messaging. This additional data may be related to building sciences, other hazards that may have an impact on flood risk, and other unique flood risk attributes of the community and project geography. Whether a report, a Story Map or fact sheet style product is created, there should be broad thought put into the best flood risk information to provide to a community based on their needs.

The number one consideration in choosing the type and format of FRR to produce is supporting the communities in conducting outreach, mitigation planning and mitigation action. Additionally,

FEMA and the Mapping Partner should consider the following when determining the content and format of the FRR:

- Technical capability and staff of communities: Communities with dedicated GIS staff experienced in the use of GIS for analysis within the community are more likely to want to use a tool, like the ESRI Story Map or other digital alternative, than a static report.
- Amount and Intensity of areas of mitigation interest / flooding issues: In very floodprone and populated areas, it can become overwhelming to read an extensive narrative. Identifying a more user-friendly tool may help engage communities regarding potential areas of mitigation interest. If the data is overwhelming, a streamlined fact sheet may also provide value since it will be specific to the community and can be made straightforward.
- Amount of data and images available to include: If the communities and stakeholders have a lot of images and data that support the analysis and information, using an ESRI Story Map or other alternative FRR type will allow those to be displayed in an easy to understand way.
- Variability in flood risk between communities: When there is great variability between communities in a flood risk project with respect to the extents of flood risk or mitigation alternatives, some of the smaller communities may feel 'lost' in a larger report focused on their neighbors. A tool that allows each community to quickly search for their own information may increase awareness of flood risk and potential mitigation actions. Also, community-specific fact sheets may be valuable in this scenario.
- Anticipated ownership after project completion: If the communities in a project area are engaged in the project and will likely be undertaking mitigation action and planning – or continuing to work with the flood risk products (FRPs) beyond the project duration – a static report may not provide the tools they need continue to progress with their own risk mitigation programs. The ESRI Story Map or other digital alternatives may provide more value and allow the communities to make updates or add information as they complete their own mitigation projects.
- Sophistication and involvement in the Mitigation Planning process: Communities that are heavily engaged in their mitigation planning processes may look to the FRR for additional planning support. Having the flexibility to adjust the format and content of the FRR to support their mitigation planning will be beneficial. Use of the fact sheets and data may support this process as well.
- Existing building code: Communities that have a modern building code can be provided more messaging and resources on how to leverage them in mitigation action and how those codes increase public safety. Those with less modern building codes can be provided messaging and resources promoting the adoption of modern codes.

3.0 Flood Risk Report Production & Delivery

As discussed in Section 2.0, the Flood Risk Report has flexibility in how it can be produced and delivered. Production of a narrative of the flood risk may take a variety of forms, and whatever is selected should be in the best interest of the users, and be able to be produced and delivered cost-efficiently.

If a traditional FRR is to be produced, a FRR template is provided by FEMA as guidance (available at www.fema.gov/media-library/assets/documents/32786?id=7577). Within the template, there is both standard text that does not need to change from project to project, and variable text that should change depending on the specifics of the project. Details on using this template and producing a typical FRR are contained in Appendix A of this Guidance. As the FRR is an optional product, there is flexibility in using this template and freedom to customize the FRR to the needs of the communities and other stakeholders.

For delivery of the traditional FRR to the local communities, a Portable Document Format (PDF) should be digitally converted from the native word processing electronic file. The table of contents should be hyperlinked to applicable sections of the document, and the PDF should contain bookmarks for each section heading in the table of contents. If a product is developed that is not a typical narrative document – such as an ESRI Story Map – then the delivery shall be in the useful format in which it is produced.

4.0 Uses in Outreach, Collaboration, and Flood Risk Communication

The primary goal of the Flood Risk Report is to provide information to communities and other stakeholders within the project area that will help them understand the concepts of flood risk, opportunities that exist to reduce that risk, and an overview of the specific types of data that are available that will help them in these efforts. The Flood Risk Report used in combination with the Flood Risk Map is a good tool for the community and elected officials to use for outreach, and to raise the general level of awareness of local flood risk.

If the FRR is developed to aid in community outreach and flood risk, it must be more than just a leave-behind. Its true value is realized when meaningful discussions take place with local decision makers and its content is used to help move identified mitigation opportunities into the agendas of community outreach sessions and planning meetings.

When building code information and products are to be incorporated into the FRR product, the following sources should be considered to better inform and collaborate with communities and stakeholders:

- FEMA Building Sciences Publications (various flood mitigation topics)
- Building Code Resources (such as Flood Resistant Provisions of ICC)
- Mitigation Best Practices (MAT Reports, Best Practice Stories, Case Studies)
- Technical Bulletins
- Factsheets & Flyers (for public outreach)
- Relevant EMI Training Offers

Additional information is provided on the potential uses of the FRR and all FRPs in the Stakeholder Engagement series of Guidance documents.

Appendix A: Traditional Flood Risk Report Guidance

This Appendix provides guidance specific to the layout and features of a traditional FRR. The guidance contained in the main body of this document is applicable for all products, including this traditional watershed FRR. This Appendix contains additional details that apply only to this printed/pdf FRR product.

A. Report Cover

The title on the report cover should describe the project area beginning with the name of the Flood Risk Project area, which may be a sub-basin or specific area. If this is a watershed project, the Hydrologic Unit Code (HUC)-8 sub-basin name and code should be entered. The naming convention should agree with the Watershed Boundary Dataset (WBD) for compatibility as future watersheds are developed (e.g., Lower North Canadian River (11100302)). The picture on the cover may be changed if another photo would be more appropriate for the study area.

The FRR report cover page is two-sided; it includes the standard cover with title block on the front and the Project Area Community List table on the back to list the names of all jurisdictions included in the Flood Risk Project as shown in Figure 1, including the unincorporated area of a county if applicable. If there are less than eight (8) jurisdictions included, they may also be listed on the cover. If more than seven (7) jurisdictions are included, the name of the Flood Risk Project area should be listed on the front and the individual jurisdictions listed individually on the back of the cover page.

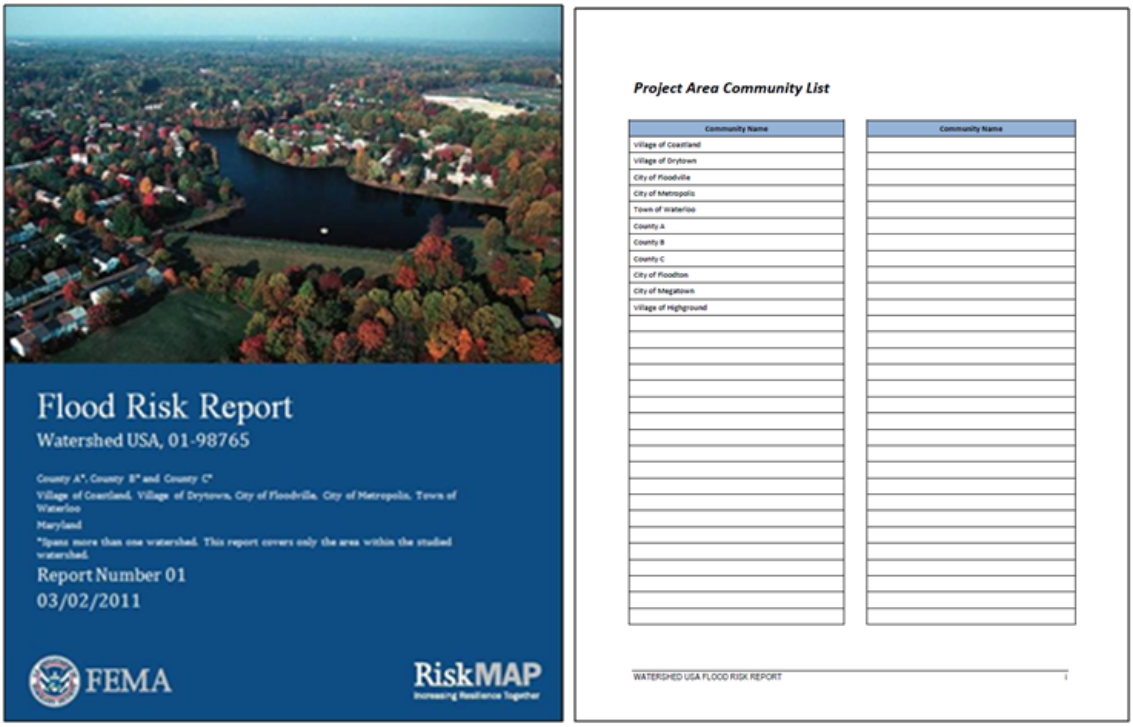

Figure 1: Flood Risk Report Cover

It is suggested to list the independent cities and incorporated jurisdictions within the project area in alphabetical order, followed by the list of counties (as applicable) within the project area in alphabetical order. However, this can be customized as needed. For example, in some areas, it may be more appropriate to organize the list by county, with the communities within each county alphabetized underneath each county, and then to follow with the next county in alphabetical order and its communities, and so on. In the case of a watershed FRR, if a county or corporate area spans more than one sub-basin, place an asterisk after the name of the county or corporate area to indicate any communities that are only partially covered by the project area and do not include full community-wide results.

Because of the nature of watershed projects, the counties and communities within a watershed that are receiving new studies may receive their regulatory product updates at different times. As such, the FRR may be delivered several times throughout a project's lifetime (e.g., as each county's regulatory products become preliminary). Each time the FRR is delivered for the project area, increment the report number, by a single integer beginning with 001. Update the report date to reflect the date of delivery of the FRR.

B. Preface

The Preface is used to introduce the Mapping Partner to the FRR. Instructions to the Mapping Partner for using the template are included in bold italicized text. These instructions should be deleted upon completion of the FRR.

C. Table of Contents

The Table of Contents lists the sections and subsections included in the FRR. Italicized text is used to denote sections that correspond to enhanced Flood Risk datasets or type of project area. The Table of Contents in the template is setup for auto-population; therefore, the Mapping Partner should auto-populate upon completion of the product by selecting "Update Field" within the Table of Contents right-click menu.

For the Flood Risk Analysis Results presented in Section 3.2 of the FRR, the name of the Flood Risk Project area should include the sub-basin name and code for watershed projects (e.g., Lower North Canadian River [11100302]). The community and tribal entity summaries in Section 3.3 of the FRR should be updated with their respective names and be listed in alphabetical order. The county summaries should be listed in ascending alphabetical order by name following the community and tribal areas. A numerical sub-heading should be entered for each community summary heading, beginning with 3.3.# for the first corporate area summary and advancing the number after the decimal for each subsequent listing until the last county summary entry is reached (e.g., 3.3.1 Community A, 3.3.2 Community B, etc.)

D. General Content & Format

Much of the report is standard language and does not require updating, although it can be updated if deemed appropriate or applicable to the project area. The FRR template contains boilerplate language that will not need to be changed from study to study; this along with sections, tables and figures in the template should be included in the FRR unless it is shown in italics (see Figure

2). The Mapping Partner is responsible for changing community specific data and assuring that the community flood risk is discernible throughout the prepared report.

Language that is shown in italics in the template denotes text that should either be removed (because it does not apply to the specific Flood Risk Project) or kept and changed to non-italics. When the Mapping Partner removes large sections of non-applicable text, they should be careful to ensure that photographs and captions in the margins are re-positioned as needed and the graphic is kept nearby to the relevant section.

The FRR is not intended to present visualizations of all the data housed in the Flood Risk Database, but may include screen shots of some of the FRD data if determined to be valuable to the messages being communicated in the FRR. Although not required, the information and photographs in the sidebars may be changed as necessary.

The footer should be updated with the project area name and status of report (i.e., draft versus final).

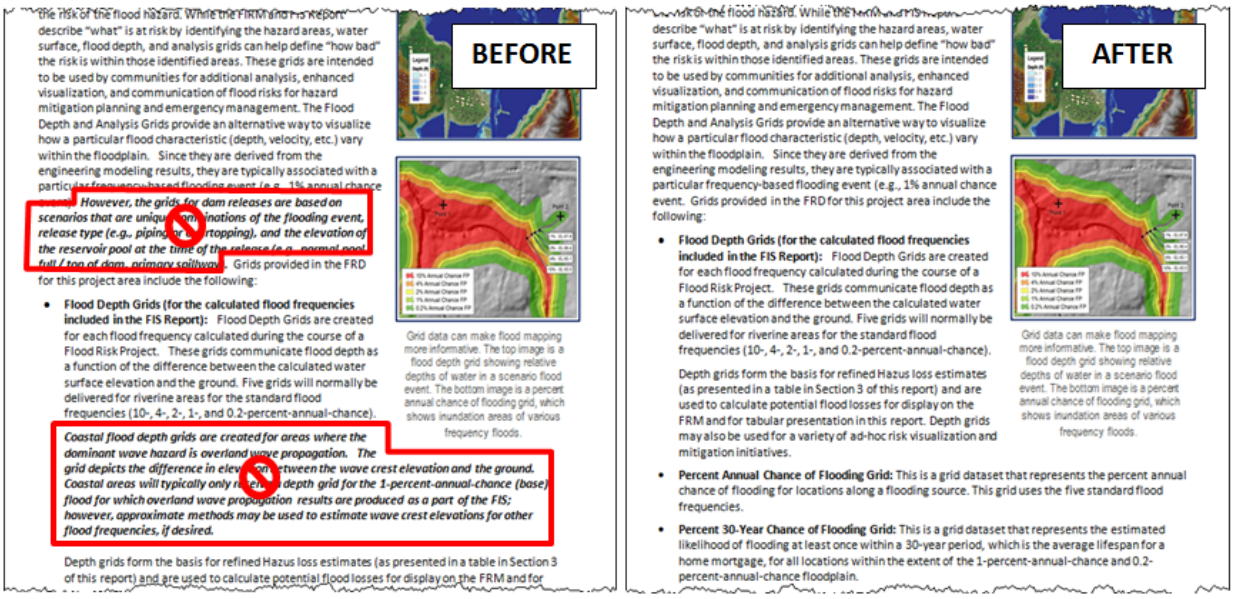

Figure 2: Removal of Non-Applicable Italicized Content from Final FRR

Information obtained from web pages should cite the link to at least the top web page (www.fema.gov/library/viewRecord.do?id=2206). Avoid referencing specific links and only use more general links; this will decrease the occurrence of links becoming nonfunctional over time.

If the Flood Risk Project includes coastal areas or flooding sources affected by levees and/or dams, additional language about coastal-, levee-, and dam-specific flood risk datasets should be included within Section 2. The FRR template contains boilerplate text that may be included in these situations.

E. Section-Specific Guidance

Guidance on the preparation of content for Sections 1 through 7 of the FRR is as follows:

E.1 Section 1 – Introduction

The intent of Section 1 is to provide the reader with an overview of flood risk concepts, how the FRR can be used to support various stakeholders, and additional information on other resources that can provide additional help with flood risk awareness and communication activities. All the text in Section 1 is boilerplate and does not need to be revised.

E.2 Section 2 – Risk Analysis

Section 2 provides an explanation of how flood risk analyses are performed, an overview of each of the various non-regulatory flood risk datasets, and how they can be used to communicate flood risk and help communities identify mitigation opportunities. For each subsection in Section 2, the information and text for datasets that have not been produced for the Flood Risk Project area should generally be removed, although as with the rest of the FRR, it is acceptable to include that information if it would benefit communities and other stakeholders within the project area.

For the Estimated Flood Loss Information section (2.2.3), much of the text in the FRR template is written with the assumption that Hazus was used to perform the flood risk assessments. This text can be customized or modified as necessary to be more relevant to the project approach if other methods were employed.

As part of the Flood Risk Project, it is possible that additional flood risk datasets may have been produced for which no predefined language exists in the FRR template. If these datasets have been added into the Flood Risk Database, they should be explained in Section 2 of the FRR. Section 2.2 of the FRR should contain a subsection (2.2.x) for each unique type of flood risk data. Therefore, if, for example, a riverine erosion risk dataset had been produced and incorporated into the FRD, a 2.2.x subsection titled “Erosion Risk”, or similar, should be added. Information regarding what the dataset represents, how it was determined, and how it can be used to help communicate risk should be included within that subsection. Graphics and/or pictures can also be added as needed. If a non-standard coastal flood risk dataset had been included in the FRD, its additional information should be added beneath Section 2.2.5, “Coastal-Specific Datasets”, providing similar descriptions of the data.

E.3 Section 3 – Flood Risk Analysis Results

The majority of the customizable text in the FRR is found within Section 3. Guidance for its subsections is as follows:

E.3.1 Section 3.1 – Flood Risk Map

If a typical Flood Risk Map (FRM) is produced, it should be inserted in this section and be kept on a full 8½” x 11” page by itself. If another approach is used to create a visualization of flood risk, then it should be described, and some representative images used in this section. A blank page should be inserted in the document to maintain an even number of pages in the section, resulting in the map on one separate 2-sided page.

E.3.2 Section 3.2 – Flood Risk Project Area Summary

Section 3.2 provides a summary of the overall project area, in text and table format. If the project area is not a watershed, an adequate description should be provided to help the reader understand the geographic extents of the project area. If the project area is a watershed, the naming convention should agree with the Watershed Boundary Dataset (WBD) source data for compatibility as sub-basins are modified (e.g., Lower North Canadian River [11100302]).

If Section 3.2 results in an odd number of pages, a blank page should be inserted in the document in order to maintain an even number of pages in the section. This allows Section 3.3 to start on a right-hand page when printed 2-sided.

E.3.2.1 Section 3.2.1 – Flood Risk Project Overview

As a general note for all tables in the Flood Risk Report, there are certain formatting requirements that must be met to comply with the Section 508 Amendment to the Rehabilitation Act of 1973. Section 508 addresses accessibility to information for people with disabilities. Specifically, all tables must contain a header row that describes the content of each column, and can most easily avoid compliance errors by using the same number of columns in each row, and rows in each column (i.e., table cells should not be merged). These rules should be considered if table formatting is customized for a particular Flood Risk Report.

An example of the project overview table is included in Table 1. This table should list all the communities and jurisdictions that are partially or entirely within the project area in alphabetical order, followed by a listing of all counties affected by the project area. The prefixes (e.g., Village of, City of, etc.) of each jurisdiction should not be factored into the alphabetizing order (i.e., Village of Coastland should be listed before City of Floodville). If the Flood Risk Project is not a watershed, the term “Watershed” in the following table should be updated accordingly.

Table 1: Flood Risk Project Overview Table Example

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Village of Coastland	0123465	555	24	0.7	30	Y	4	Y
Village of Drytown	0123475	1,232	10	1.4	15	Y	3	N
City of Metropolis	0124386	12,444	100	8.5	100	Y	10	N
Town of Waterloo	0123468	3,633	100	3.3	100	Y	10	N
A County, Unincorporated	0123471	112,541	44	300	50	Y	2	Y

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
B County, Unincorporated	0123482	66,320	30	205	33	Y	1	Y

Where percentages are calculated, enter percent by whole number but do not include percent symbol. Where applicable, use a comma for numbers over 999 (to separate hundreds from thousands).

If a similar table was created as part of the Discovery Report, this table can simply be updated as needed and included within the FRR.

Specific guidance for each column in Table 1 is contained below, along with the associated field in the FIRM S_Pol_Ar table from which this information can be pulled:

Table 2: Guidance for Project Overview Table

Table Column	Guidance	S_FRD_Pol_Ar Associated Field
Community Name	In ascending order by name, enter the names of each unique community within the project area. After listing the jurisdictions, list all the counties within the project area in ascending order by name. The values in the table for the counties should represent the 'unincorporated' portions of the county.	POL_NAME1
CID	Enter the Community Identification Number that corresponds to each community or jurisdiction listed to the left.	CID
Total Community Population	Enter the total population for the area listed in the first column.	TOT_POP
Percent of Population in Watershed	Calculate the percentage of the jurisdiction's population contained within the project area.	PCT_POP
Total Community Land Area (square miles)	Enter the total land area in square miles for the area listed in the first column.	TOT_LND_AR
Percent of Land Area in Watershed	Calculate the percentage of the jurisdictions land area contained within the project area.	PCT_LND_AR

Table Column	Guidance	S_FRD_Pol_Ar Associated Field
NFIP	Enter a “Y” for each jurisdiction listed in the first column that participates in the National Flood Insurance Program (NFIP). If a jurisdiction is not participating in the NFIP, enter an “N”.	NFIPSTATUS
CRS Rating	Enter the CRS rating that corresponds to each jurisdiction listed in the first column. If the community does not participate in CRS, enter “10”.	CRS_STATUS
Mitigation Plan	Enter a “Y” for each jurisdiction listed in the first column that is covered by a current FEMA approved Hazard Mitigation Plan. If a jurisdiction is not currently covered in a Hazard Mitigation Plan, enter an “N”.	HMP_NAME

E.3.2.2 Section 3.2.2 – Flood Risk Datasets at the Project Level

Most of the information in Section 3.2.2 of the FRR is reported in tabular format. However, it may be necessary or worthwhile to also include reference to specific areas that warrant additional discussion, or simply where it may be valuable to draw the attention of the reader to locations where there is a high potential for mitigation action or opportunities. The FRR is flexible in that the user can add text, images, or figures following the tables themselves to further describe such occurrences. For example, it may be helpful to provide a brief explanation of specific areas within the project where the changes to the regulatory floodplains resulting from the flood study are more significant than others, or where there is a concentration of homes or buildings with high flood depths.

As mentioned previously, if additional flood risk datasets have been produced as part of the Flood Risk Project for which no standard language or summary table examples exist in the FRR template, the results of that data should be adequately discussed in the FRR. Section 3.2.2 of the FRR should be used to summarize the results of any of these additional non-standard flood risk datasets at the project level. It is left to the discretion of the Mapping Partner as to whether to include that information in paragraph or tabular format (or a combination thereof), depending on which is more appropriate.

E.3.2.2.1 Changes Since Last FIRM

The project-level summary of Changes Since Last FIRM (CSLF) information and results is also included within Section 3.2 of the FRR, as shown in Table 3. The areas of Special Flood Hazard Area (SFHA) and floodway change are reported within this table. If the project area covers communities affected by coastal flooding that have published Coastal High Hazard Areas (CHHA, or V zones), an additional line should also be added to the CSLF table (see examples in Tables 3 and 4 in bold italics). However, in non-coastal areas, this row should be removed.

Table 3: Changes Since Last FIRM Table Example

Area of Study	Total Area (mi^2)	Increase (mi^2)	Decrease (mi^2)	Net Change (mi^2)
Within SFHA	13.2	2.5	1.4	1.1
Within Floodway	1.9	0.7	0.9	-0.2
Within CHHA (Zone VE or V)	**0.8**	**0.5**	**0.5**	**0.0**

As an enhancement, if the total population and/or number of structures affected by the changes are estimated, an additional table should be added to reflect this, as the example below shows.

Table 4: CSLF Building and Population Impact Table Example

Area of Study	# Buildings: Increase	# Buildings: Decrease	# Buildings: Net Change	Population : Increase	Population : Decrease	Population : Net Change
Within SFHA	45	32	13	180	106	74
Within Floodway	6	7	-1	20	25	-5
Within CHHA (Zone VE or V)	**18**	**2**	**16**	**74**	**9**	**65**

These tables are populated by using values contained in the L_CSLF_Summary table in the FRD. The combination of the *CSLFSUMMID* and *LOCATION* fields provides access to each unique record in this table.

Table 5: CSLF Table Data Sources

Table Column	L_CSLF_Summary Associated Field
Total Area	AREA_SM
Increase	AREA_INCR
Decrease	AREA_DECR
Net Change	AREA_NET
Increase Population	POP_INCR
Decrease Population	POP_DECR
Net Population	POP_NET
Increase Buildings	BLDG_INCR

Table Column	L_CSLF_Summary Associated Field
Decrease Buildings	BLDG_DECR
Net Buildings	BLDG_NET

The area and quantity summaries within the CSLF tables should only reflect the information within the footprint of the project area. For example, for a watershed-based Flood Risk Project, although CSLF information may have been calculated or available outside of the watershed, only area changes within the watershed's footprint should be included here.

E.3.2.2.2 Flood Depth and Analysis Grids

Flood Depth and Analysis rasters are stored in the FRD. They are not included as a feature of the FRR. End users of these data are encouraged to view them in a Geographic Information System (GIS) environment. This information can be utilized as a standalone dataset or used in conjunction with other data layers at the user's discretion. Although it is not required, graphic figures showing the depth grid results can be included if doing so would help communicate flood risk.

E.3.2.2.3 Flood Risk Results Information

Section 3.2 of the FRR should also include a risk assessment summary table at the project level. An example of this table is shown in Table 6 on the following page, where data has been exported from Hazus and included for different categories, such as residential or commercial specific occupancies. Depending on the return periods for which risk assessment results have been provided at the project level, the respective columns may be added or removed accordingly. If the data needed to support showing additional subtotals have not been exported from Hazus, this table can be modified to show only total losses for each return period. It is suggested that this table be added as its own page in landscape orientation.

Although not reflected in the example, the FRR template contains footnotes for this table that should be added into the respective cells of the table, as outlined in the template.

Dollar figures in this table should be represented at their full value, rather than reported in thousands of dollars. For example, a flood loss of $15 million should be shown as $15,000,000 in the table, rather than $15,000. Additional rounding guidance is contained below.

The values reported in the "Total Building & Contents Losses" row should be the sum of the 3 rows above it. The "TOTAL" row should be equal to the sum of the "Total Building & Contents Losses" and "Business Disruption" rows. Because of rounding, it is important to check that this is the case prior to finalizing.

Table 6: Flood Risk Assessment Table Example: Estimated Potential Losses for Flood Event Scenarios

Type	Inventory Estimated Value	% of Total	10% (10-yr) Dollar Losses	10% Loss Ratio	2% (50-yr) Dollar Losses	2% Loss Ratio	1% (100-yr) Dollar Losses	1% Loss Ratio	0.2% (500-yr) Dollar Losses	0.2% Loss Ratio	Annualized Losses ($/yr)	Ann. Loss Ratio
Residential Building & Contents	$94,500,000	77%	$10,400,000	11%	$13,600,000	14%	$19,300,000	20%	$32,900,000	35%	$1,400,000	1%
Commercial Building & Contents	$15,100,000	12%	$2,100,000	14%	$3,200,000	21%	$4,300,000	28%	$4,900,000	32%	$300,000	2%
Other Building & Contents	$13,100,000	11%	$1,700,000	13%	$2,200,000	17%	$3,600,000	27%	$5,400,000	41%	$200,000	2%
Total Building & Contents	$122,700,000	100%	$14,200,000	12%	$19,000,000	15%	$27,200,000	22%	$43,200,000	35%	$1,900,000	2%
Business Disruption	N/A	N/A	$800,000	N/A	$1,300,000	N/A	$2,000,000	N/A	$4,100,000	N/A	$100,000	N/A
TOTAL	**$122,700,000**	**N/A**	**$15,000,000**	**N/A**	**$20,300,000**	**N/A**	**$29,200,000**	**N/A**	**$47,300,000**	**N/A**	**$2,000,000**	**N/A**

Table 7: Flood Risk Assessment Table Rounding Guidance

Value	Rounding Guidance
All loss ratios less than 1%	rounded to nearest tenth of a percent
All loss ratios greater than or equal to 1%	rounded to nearest percent
Dollar loss Under $100,000	rounded to nearest $10,000 (note that this means that dollar losses less than $5,000 should be rounded to $0
Dollar loss Over $100,000	rounded to nearest $100,000

The flood losses reported in Table 6 should come from the loss assessment results in the FRD. The table is only populated for flood events that have been calculated for the whole project area and whose coverage is consistently available. Other flood events beyond the typical five can be added if applicable, but their associated flood loss results would need to be globally available within the project area and have been calculated in a manner consistent with the other values reported in the table.

If flood risk assessments were calculated at the building or structure level within the project area, a summary of what that analysis revealed should also be included in this section. It is recommended that a table similar to Table 6 should be produced, summarized for the area within which the site-specific risk assessments were performed. Alternatively, text can be added to provide the summary of results rather than within a table. However, if this level of risk assessment was only performed for certain areas or communities within the project area, it may be more appropriate to include this information within that particular community's summary in Section 3.3 of the FRR.

E.3.2.3 Coastal-Specific Flood Risk Datasets

For certain coastal non-regulatory flood risk datasets produced for the Flood Risk Project, their associated summary tables should also be included in Section 3.2. Additionally, as with all flood risk datasets, information can be provided in text format as well to describe the results of each dataset, and more importantly, how its information can be used to help stakeholders understand, manage, and mitigate their flood risk.

E.3.2.3.1 Increased Flooding Scenarios

For coastal locations where the increased flooding scenarios dataset was produced, a table should be added to the FRR that summarizes the additional areas that would be inundated by incremental rises of 1, 2, or 3 feet (or whatever increase calculated) above the total water level elevation (stillwater plus waves) for the specified flood frequencies (see Table 8).

Table 8: Increased Flooding Scenarios Example Table: Additional Areas Inundated by Coastal Flood Level Increases

Flood Event Frequency	Additional Area (mi^2) Inundated by a 1-ft Increase	Additional Area (mi^2) Inundated by a 2-ft Increase	Additional Area (mi^2) Inundated by a 3-ft Increase
1-percent-annual-chance	0.3	0.7	1.1

The values for this table come directly from the attributes in the S_Inc_Flood_Scen_Ar table of the FRD.

E.3.2.3.2 Simplified Coastal Zones

For coastal locations where simplified coastal zones were mapped, a table should be added to the FRR that summarizes the total area within each wave action level (High, Moderate, and Low) (see Table 9). Additionally, if building footprint information is available and was used to count the number of structures located within each hazard polygon, this count should be included within the table. If a building count was not performed, that column can be removed from the FRR table.

Table 9: Simplified Coastal Zones Example Table

Wave Action	Total Area (mi^2)	# of Structures
High (V Zone)	0.8	**36**
Moderate (Coastal A Zone)	1.2	**187**
Low (A Zone)	0.7	**255**

The values for this table come directly from the attributes in the S_Simpl_Cst_Zone_Ar feature class of the FRD.

E.3.2.3.3 Other Coastal Flood Risk Datasets

There are no standardized tables for the other coastal flood risk datasets that can be produced. It is left to the discretion of the Mapping Partner for how to report those results in the FRR as a table. Alternatively, if reporting those results within Section 3.2 does not make sense, no summary is required.

E.3.2.4 Dam-Specific Flood Risk Datasets

For certain dam non-regulatory flood risk datasets produced for the Flood Risk Project, their associated summary tables should be included in Section 3.2. Information can also be provided in text format as well to describe the results of each dataset, and more importantly, how its information can be used to help stakeholders understand, manage, and mitigate their flood risk.

E.3.2.4.1 Dam Locations

If dam break or similar analyses were performed as part of the Flood Risk Project, a table listing each of the dams studied as part of the project should be included in the FRR. The listing should provide a short description of the dam, including its location, construction date, and purpose.

Table 10: Dam Descriptions Example Table

Dam	Description
Dam A	Located in Flood County, USA. Constructed in 1952 primarily for the purpose of water supply and recreation. Primary impounding structure for Flood Lake., etc.…
Dam B	Description here…

The entries for this table come directly from the attributes in the S_RM_Dams_Pt table of the FRD.

E.3.2.4.2 Dam Flood Risk Assessments

For typical riverine projects, potential flood losses are estimated based on flood depths for specific percent annual chance events (i.e., 10-, 2-, 1-, and/or 0.2-percent) and then annualized. For dam release analyses, potential losses are estimated for certain scenarios, which are a combination of a flooding event, release type, and reservoir condition. For dams where this type of analysis was performed, a table summarizing this information, by scenario, should show both the estimated losses and loss ratios classified by residential, commercial, and other building types (see Table 11). The same rounding guidance previously outlined in Table 7 also applies here.

Table 11: Flood Risk Assessment Example Table for Dam Releases: Estimated Potential Losses for Dam Flood Event Scenarios

Type	Inventory Estimated Value	% of Total	Normal Pool + PMF + Piping Failure: Dollar Losses	Loss Ratio	Top of Dam + 1% Annual Chance Event + Overtopping: Dollar Losses	Loss Ratio
Residential Building & Contents	$94,500,000	77%	$10,400,000	11%	$13,600,000	14%
Commercial Building & Contents	$15,100,000	12%	$2,100,000	14%	$3,200,000	21%
Other Building & Contents	$13,100,000	11%	$1,700,000	13%	$2,200,000	17%
Total Building & Contents	$122,700,000	100%	$14,200,000	12%	$19,000,000	15%

Type	Inventory Estimated Value	% of Total	Normal Pool + PMF + Piping Failure: Dollar Losses	Loss Ratio	Top of Dam + 1% Annual Chance Event + Overtopping: Dollar Losses	Loss Ratio
Business Disruption	N/A	N/A	$800,000	N/A	$1,300,000	N/A
TOTAL	**$122,700,000**	**N/A**	**$15,000,000**	**N/A**	**$20,300,000**	**N/A**

Note that for this summary table, and all other dam-related summary tables that discuss specific "scenarios", it may be necessary to provide additional text explaining each scenario in as much of a non-technical way as possible to help the reader better understand the results.

E.3.2.4.3 Dam Upstream and Downstream Inundation Areas

If this dataset was scoped for the project, a table summarizing the upstream and downstream inundation areas for each dam studied should be provided (see Table 12). This table should include the total inundation area in both square miles and acres for each scenario studied.

Table 12: Dam Inundation Areas Example Table

Dam	Upstream / Downstream	Scenario	Total Area (mi^2)	Total Area (Acres)
Dam A	Upstream	Top of Dam + PMF	0.5	320
Dam A	Upstream	Normal Pool + 1%	0.3	190
Dam A	Downstream	Normal Pool + PMF + Piping Failure	1.1	700
Dam A	Downstream	Top of Dam + 1% + Overtopping Failure	1.7	1,090
Dam B	Upstream	Top of Dam + PMF	1.6	1,020
Dam B	Upstream	Normal Pool + 1%	1.0	640
Dam B	Downstream	Normal Pool + PMF + Piping Failure	1.7	1,090
Dam B	Downstream	Top of Dam + 1% + Overtopping Failure	2.2	1,410

The entries for this table are calculated from the spatial area of the features in the S_US_Inundation_Ar table of the FRD, based on the SCENAR_ID attribute for the specific dam release scenario, for each analyzed dam.

E.3.2.4.4 Dam Easements

If this dataset was scoped for the project, a table summarizing the easements for each dam studied should be provided (see Table 13). This table should include the total number of

easements and area covered by easements in both square miles and acres for each easement type.

Table 13: Easements Example Table

Dam	Easement Type	Number of Easements	Total Area (mi^2)	Total Area (Acres)
Dam A	Drainage	14	0.1	60
Dam A	Flowage	12	0.1	65
Dam A	Conservation	8	0.4	260
Dam B	Drainage	11	0.1	55
Dam B	Flowage	18	0.2	120
Dam B	Conservation	7	0.5	315

The entries for this table are calculated from the features in the S_Easements_Ar table of the FRD.

Note that although this table has been customized for the studied dams, there may be value in reporting this information for other locations in the study area that are not directly related to dams. The table can, therefore, be customized accordingly and included elsewhere in the FRR (e.g., for riverine, coastal, and levee-influence areas) if easement data is available.

E.3.2.4.5 Critical Facilities

If this dataset was scoped for the project, a paragraph summarizing the impacts of certain dam release scenarios on the impacted critical facilities should be included in the FRR. The FRR template provides an example of the type of information that could be included to describe such impacts. Emphasis should be placed on highlighting at-risk facilities or issues that stakeholders within the project area should be aware of, especially if mitigation opportunities are available.

Note that although this information has been customized for the studied dams, there may be value in reporting this information for other locations in the study area that are not directly related to dams. The table can, therefore, be customized accordingly and included elsewhere in the FRR (e.g., for riverine, coastal, and levee-influence areas) if critical facility data is available.

E.3.2.5 Levee-Specific Flood Risk Datasets

For certain levee non-regulatory flood risk datasets produced for the Flood Risk Project, their associated summary tables should be included in Section 3.2. Information can also be provided in text format as well to describe the results of each dataset, and more importantly, how its information can be used to help stakeholders understand, manage, and mitigate their flood risk.

E.3.2.5.1 Levee Locations

If flooding sources with levees were studied as part of the Flood Risk Project, and levee-specific flood risk datasets were developed for the levee(s), a table listing each of the levee systems

should be included in the FRR. The listing should provide a short description of the levee, including its location, construction date, and purpose.

Table 14: Levee Descriptions Example Table

Levee System	Description
Levee System A	Located in Flood County, USA. Constructed in 1984 primarily for the purpose of directing flood waters away from the city of Floodville. Current levee accreditation status is…
Levee System B	Description here…

The entries for this table come directly from the attributes in the S_Levee_Ln table of the FRD.

E.3.2.5.2 Levee Flood Risk Assessments

For typical riverine projects, potential flood losses are estimated based on flood depths for specific percent annual chance events (i.e., 10-, 2-, 1-, and/or 0.2-percent) and then annualized. For levees, potential losses are estimated for different scenarios, which are based on a flooding event and the levee accreditation status of the flooding source analyzed. These estimated losses can be calculated at the census block or site-specific (user-defined facility) level and should be summarized in a table. This table should show the estimated losses and loss ratios classified by residential, commercial, and other building types, for each scenario analyzed. The same rounding guidance previously outlined in Table 7 also applies here. The building disruption row is generally only applicable when doing a census block-based risk assessment, and can, therefore, be removed for summary tables based on risk assessments at the building level.

Table 15: Flood Risk Assessment Example Table for Levees: Estimated Potential Losses for Levee Flood Event Scenarios

Type	Inventory Estimated Value	% of Total	1% Annual Chance + Non-Accredited + Riverine: Dollar Losses	Loss Ratio	Levee Shadow + Non-Accredited + Riverine: Dollar Losses	Loss Ratio
Residential Building & Contents	$94,500,000	77%	$10,400,000	11%	$13,600,000	14%
Commercial Building & Contents	$15,100,000	12%	$2,100,000	14%	$3,200,000	21%
Other Building & Contents	$13,100,000	11%	$1,700,000	13%	$2,200,000	17%

Type	Inventory Estimated Value	% of Total	1% Annual Chance + Non-Accredited + Riverine: Dollar Losses	Loss Ratio	Levee Shadow + Non-Accredited + Riverine: Dollar Losses	Loss Ratio
Total Building & Contents	$122,700,000	100 %	$14,200,000	12%	$19,000,000	15%
Business Disruption	N/A	N/A	$800,000	N/A	$1,300,000	N/A
TOTAL	**$122,700,000**	**N/A**	**$15,000,000**	**N/A**	**$20,300,000**	**N/A**

E.3.2.5.3 Levee Analysis Impact Areas

If this dataset was scoped for the project, a table summarizing the levee analysis impact areas for each levee and scenario should be provided (see Table 16). This table should include the total area in both square miles and acres.

Table 16: Levee Analysis Impact Areas Example Table

Levee System	Scenario	Total Area (mi^2)	Total Area (Acres)
Levee A	1% Annual Chance + Non-Accredited + Riverine	0.3	190
Levee A	Levee Shadow + Non-Accredited + Riverine	0.5	320
Levee B	1% Annual Chance + Non-Accredited + Riverine	1.1	700
Levee B	Levee Shadow + Non-Accredited + Riverine	1.7	1,090

The entries for this table are calculated from the spatial area of the features in the S_Lev_Inundation_Ar table of the FRD, based on the SCENAR_ID attribute for the specific levee scenario, for each analyzed levee.

E.3.2.5.4 Critical Facilities

If this dataset was scoped for the project, a paragraph summarizing the impacts of each levee scenario on the impacted critical facilities should be included in the FRR. The FRR template provides an example of the type of information that could be included to describe such impacts. Emphasis should be placed on highlighting at-risk facilities or issues that stakeholders within the project area should be aware of, especially if mitigation opportunities are available.

E.3.3 Section 3.3 – Community Summaries

This section should be used to provide a high-level summary of the communities that comprise the Flood Risk Project area. This section will also introduce the subsequent sections (3.3.x) that provide community-specific flood risk data. A new section will need to be created for each jurisdiction within the project area. For each new section created, a section number should be assigned. The numbering will begin with 3.3.1, and for each jurisdiction added, the number after the second decimal will be increased by one whole number (e.g., 3.3.2, 3.3.3, etc.) Each jurisdiction should have its corresponding Community Identifier (CID) listed in parenthesis after its respective name in the section title.

E.3.3.1 Section 3.3.x.1 – Community Overview

The Community Overview table is populated with the same data used in the Project Area Summary table in Section 3.2 (see Table 17). For the purposes of this section, it is populated only with the data relevant to the community described by the particular section.

Table 17: Community Overview Example Table

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Village of Coastland	0123465	555	24	0.7	30	Y	4	Y

In the FRR template, the following information should be populated for the community below its overview table. As with all similar text in the FRR template, bracketed text in bold italics should be updated with the correct information.

- Participating in the **[County A]** Multi-Hazard Mitigation Plan which expires **[Insert Date]**
- Past Federal Disaster Declarations for flooding = **[Insert Number]**
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = **[Insert Number]** policies totaling approximately **[Insert Dollar Amount]**
- NFIP-recognized repetitive loss properties = **[Insert Number] [(Insert Property Types)]**
- NFIP-recognized severe repetitive loss properties = **[Insert Number] [(Insert Property Types)]**

For the repetitive loss properties, if all properties are either residential or commercial, indicate that by adding the words “All commercial” or “All residential”. Since only residential properties can be categorized as severe repetitive loss by the NFIP, include the words “All residential” if there are severe repetitive loss properties within the community.

To the extent that the spatial information of each policy or repetitive loss property can be spatially identified, the number of NFIP policies, repetitive loss properties, and severe repetitive loss properties for each community should only be reported for those located within the Flood Risk

Project area. Multi-watershed communities, for example, should generally not report the community-wide counts, unless associated properties are truly within the watershed being studied. However, since much of this information is sensitive and may not be readily accessible or spatially identifiable, it is acceptable to report full community-wide claims and repetitive loss counts if a note is also added to the FRR to explain as much.

E.3.3.2 Section 3.3.x.2 – Community Analyses and Results

Most of the information in Section 3.3.x.2 of the FRR is reported in tabular format. However, it may be necessary or worthwhile to also include reference to specific areas that warrant additional discussion or mention, or simply where it may be valuable to draw the attention of the reader to locations where there is a high potential for mitigation action or opportunities. The FRR is flexible in that the user can add information, following the tables themselves, to further describe such occurrences. For example, it may be helpful to provide a brief explanation of specific areas within the community where the changes to the regulatory floodplains resulting from the flood study are more significant than others, or where there is a high concentration of Areas of Mitigation Interest. It is up to the discretion of the Mapping Partner whether to include this type of additional information, and if so, how much detail to provide.

If additional flood risk datasets have been produced as part of the Flood Risk Project for which no standard language or summary table examples exist in the FRR template, the results of that data should be adequately discussed in the FRR. Section 3.3.x.2 of the FRR should be used to summarize the results of any of these additional non-standard flood risk datasets for each community where this data is available. It is left to the discretion of the Mapping Partner as to whether to include that information in paragraph or tabular format (or a combination thereof), depending on which is more appropriate.

It is important to note that the quantities and values reported in the tables in this section should be based solely on the portion of the community within the overall project area. For watershed-based studies, for example, the table summaries for a community that spans multiple watersheds should only report on the information within the watershed being studied.

E.3.3.2.1 Changes Since Last FIRM

Guidance specific to the Changes Since Last Firm (CSLF) tables and summaries at the community level is similar to that at the project level (see Section 5.3.2.2 of this guidance). However, this information should only be reported and quantified for the portion of the community within the overall project area.

E.3.3.2.2 Flood Risk Results Information

Guidance specific to the Flood Risk Assessment tables and summaries at the community level is similar to that at the project level (see Section 5.3.2.2 of this guidance). However, this information should only be reported and quantified for the portion of the community within the overall project area.

E.3.3.2.3 Areas of Mitigation Interest

Areas of Mitigation Interest (AoMI) should be reported and discussed at a high level for each community, although specifics should be included if doing so would help draw the attention of

community officials, planners, and other stakeholders to areas that warrant additional discussions around mitigation actions and opportunities. This section is intended to be a user-defined narrative and does not employ standard language; it should focus on the areas identified during Risk MAP meetings that the community is interested in pursuing mitigation action, which typically result from discussions on new engineering and grid datasets.

E.3.3.2.4 Other Enhanced Datasets (Coastal, Dams, Levees)

Guidance specific to the tables and summaries for other flood risk datasets at the community level is similar to that at the project level (see Sections 5.3.2.3 (Coastal), 5.3.2.4 (Dams), and 5.3.2.5 (Levees) of this guidance). However, this information should only be reported and quantified for the portion of the community within the overall project area.

E.4 Section 4 – Actions to Mitigate Flood Risk

The majority of section 4 contains standard language that should generally not change. The section discusses mitigation actions, how they are identified, and programs that exist to assist communities in their mitigation efforts. Additional information may be added or customized, but it is not necessary.

Table 4-1 of the traditional FRR, however, contains additional information that cross-references the AoMI type to specific actions that could be considered to reduce the flood risk associated with that AoMI feature. The AoMIs that are not applicable to the project area should be removed from this table before finalizing.

E.5 Section 5 – Acronyms and Definitions

This section lists acronyms and definitions that pertain to the standard language in the FRR. Because the language is standard throughout, changes to the content of this section will most likely not need to be made. Should a change be warranted, maintain alphabetical order of listings, and keep within the same format used in the section being updated.

E.6 Section 6 – Additional Resources

This section lists supplemental resources that a community can use to learn more about the topics being discussed in the report. All resources should be listed alphabetically by title and given a brief description. Should the need arise to add to the list of FEMA publications, follow the following format and insert into the list alphabetically in ascending order:

[Author], [Year of publication]. [Title], FEMA [Publication #]. [City of Publication], [State of Publication], [Month and Year of publication].

See examples below:

FEMA, 2007f. Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings, FEMA 577. Washington, DC, June 2007.

FEMA, 2008. Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program, FEMA 9-0372, Third Edition. Washington, DC, December 2007.

E.7 Section 7 – Data Used to Develop Flood Risk Products

This section should include paragraphs of free-form text describing the data leveraged by the local/state stakeholders in the production of this Flood Risk Project. This is not intended to be an exhaustive list of resources, nor duplicate information presented in the Discovery Report. It should provide a list of data sources leveraged for the Flood Risk Project to local stakeholders to encourage communication between the entities that have data related to the project area.

F. Additional Formatting Guidance

In order for the FRR to be easily distributable to stakeholders, Mapping Partners should furnish the FRR in PDF format and Microsoft Word format. These formats support being able to be printed 2-sided in color on 8.5" x 11" paper. Hard-copy drafts of the FRR may be provided to communities and stakeholders throughout the life of the Flood Risk Project.

The Flood Risk Map, Flood Risk Project Area Summary and Community Summary pages found in Section 3 should be aligned so that each is contained within an even number of pages to allow each section to be exclusive to itself. A community should be able to pull out their summary pages without portions of other community results sharing the page. This may require the insertion of a blank page as needed in order to maintain an even number of pages per community (necessary for printing 2-sided). On blank pages, insert "This page left intentionally blank".