

TMAC

Technical Mapping Advisory Council

January 31, 2020

To: Pete T. Gaynor, Administrator, FEMA

From: Jeffrey L. Sparrow, TMAC Chairman

Subject: Technical Mapping Advisory Council 2019 Report to FEMA



In Michael Grimm's July 8, 2019 letter to me (attached), FEMA tasked TMAC with reviewing past TMAC recommendations and identifying topics to be further explored by TMAC in future years. This tasking was made with reference to the four components the Risk Management Directorate has identified as core elements of the future flood hazard mapping program. FEMA requested that TMAC "use these four components and their objectives when considering topics to recommend to FEMA, as these are the topic areas FEMA wants to improve in the coming years."

This memo and attachments summarize the work performed by TMAC in 2019 in response to Mr. Grimm's letter and identify the topics we propose as focus areas in 2020.

TMAC divided into three subcommittees, one for each of the first three components of FEMA's vision for the future flood hazard mapping program. Each subcommittee reviewed all previous TMAC recommendations through the lens of their assigned component, received briefings from FEMA and subject matter experts, and determined which recommendations would benefit from further TMAC development. Each of the pertinent previous recommendations, along with some newly identified topics were then evaluated and categorized as items of potential focus in calendar year 2020 or a future year. The subcommittees prepared write ups summarizing their work, which are attached for reference.

During a December 11-12, 2019 in-person meeting of the TMAC each subcommittee presented its findings and facilitated a discussion of its findings by the Council. Upon conclusion of these discussions, the Council completed a multi-voting exercise (results attached) to determine which past recommendations/new concepts would be best addressed in 2020. The results were then discussed and the TMAC developed and approved the following proposed scope statement to guide their efforts in calendar year 2020.

Proposed Calendar 2020 TMAC Scope of Work

Work with stakeholders to recommend elements of a future Flood Hazard Mapping Program that:

- Identifies flood hazards in a graduated way,
- Identifies flood risk to improved property in a graduated way, and
- Promotes increased investments in flood mitigation through new incentive structures.

And lay out a transition path to those ends by:

- Identifying obstacles,
- Highlighting opportunities,
- Identifying useful elements of the current program that are important to continue, and
- Proposing specific roles that could be played by the State, Local, Tribal, Territorial, private, non profit, academic, and other entities in assessing, communicating, and managing flood hazards and risks.

While the TMAC members reflect a broad spectrum of stakeholders we are only 20 voices and we see benefits in going beyond the minimum public involvement requirements mandated by the Federal Advisory Committee Act as we develop the 2020 annual report. We believe garnering additional input from a broader audience through more extended listening sessions and other mechanisms will improve our ability to address the above topics.

FEMA also requested the TMAC review recommendations related to Component 4 (Modernize the management and delivery of the flood hazard mapping program) of its future vision for the flood hazard mapping program. As FEMA addresses this component, TMAC would encourage FEMA to increase transparency, improve operational efficiency, increase business intelligence for continuous improvement, and increase reliability and predictability of flood mapping products and services to the customer. More information on this component can be found in Section 1.4 of the attached Subcommittee Report. We view this component as an inherent FEMA role, but would be glad to address it in 2020, should FEMA think it appropriate.

TMAC thanks FEMA for the opportunity to help advance the flood hazard mapping program. We look forward to working on the above issue in 2020 and would like to get started as soon as possible. If you have any questions about this memo or the attachments, please contact me.

Attachments:

Attachment A – Michael Grimm’s July 8, 2019 Letter

Attachment B – FEMA 2019 TMAC Subcommittee Member Appointment Memo

Attachment C – FEMA 2019 TMAC Subcommittee Report

Attachment D – Results of TMAC multi-voting exercise at December 11-12, 2019 meeting

Attachment E – TMAC Charter

Attachment F – TMAC Bylaws

Attachment G – Summary of Previous TMAC Goals, Recommendations, and Implementation Actions

Attachment H – TMAC 2019 Administrative and Public Meetings

Attachment I – TMAC 2019 Subcommittee Meetings

Attachment A –
Michael Grimm's July
8, 2019 Letter



FEMA

July 8, 2019

Jeffrey Sparrow, P.E., CFM
Chair, Technical Mapping Advisory Council
21308 Small Branch Place
Ashburn, Virginia 20148

Dear Mr. Sparrow:

The Biggert-Waters Flood Insurance Reform Act of 2012 established the Technical Mapping Advisory Council (TMAC) to review and make recommendations to the Federal Emergency Management Agency (FEMA) on matters related to the National Flood Mapping Program (NFIP). FEMA appreciates the dedication the TMAC has shown to date, and we value the continued engagement as the Agency considers ways to improve how flood hazard data is generated and delivered, redesigns flood risk rating for insurance, and evolves its products and services to best meet NFIP customer needs.

In 2019, FEMA will work with the TMAC to identify the topics that would best leverage the Council's expertise in the coming years to support FEMA's evolution of the flood hazard mapping program. Given the limited time remaining in 2019, FEMA will not task the TMAC to publish a full Annual Report; rather, the TMAC will provide topics in a memorandum for FEMA to consider tasking the TMAC with in future years. The identification of new topics will be informed by the past recommendations and an understanding of FEMA's current vision for the flood hazard mapping program. FEMA tasks the TMAC with the following discussion agenda:

- 1. A review of past recommendations and identification of recommendations that need to be revisited based on the current vision of the mapping program, and**
- 2. Topic areas that will support FEMA's vision of the mapping program that have not been explored in the past.**

FEMA's vision for the future of the flood hazard mapping program is a multi-year strategy of new concepts and approaches that are built off the progress of the Risk Mapping, Assessment, and Planning (Risk MAP) program. FEMA has identified several guiding principles that will facilitate this transition from the current to the future state of this program:

- A. The future program is focused on building on the current Risk MAP program successes and its continuous improvement.

- B. The program is focused on flood hazard and includes mapping, assessment, and planning functions.
- C. The flood hazard mapping strategy spans a 5-year timeframe. Within this time, FEMA will have evolved our products, services, and approach to incorporate the future state elements and will be in transition toward implementing them across the program.
- D. The flood hazard mapping strategy builds on internal and external strategic drivers including legislative authorities, guidance from oversight agencies, stakeholder input, and customer feedback.
- E. The program will continue to leverage strategic partnerships that create a balance of roles for the federal government, the private sector, and State, Local, Tribal, and Territorial (SLTT) entities. The program will leverage the strengths of other sectors, where possible, to create this balance.

The future vision of FEMA's flood hazard mapping program is focused on the four elements and their associated objectives below. The TMAC should use these four elements and their objectives when considering topics to recommend to FEMA, as these are the topic areas FEMA wants to improve in the coming years.

1. **Shift from a binary to a graduated view of flood risks**
 - a. Deliver fair and equitable insurance rates
 - b. Support a sounder financial framework for the NFIP
 - c. Manage flood impacts, and increase community and individual resilience
 - d. Increase potential sales of flood insurance by increasing demand pool size
 - e. Offer more comprehensive risk understanding to improve land-use decisions
2. **Ensure a significant and appropriate role for the private sector and for SLTT entities**
 - a. Decrease program costs
 - b. Increase stewardship by states and communities
 - c. Leverage the pace, innovation, and reach of the private sector
 - d. Focus the federal role
3. **Increase access to flood hazard data to improve resulting mitigation and insurance actions at the local and private levels**
 - a. Make flood risk data easy to obtain and understand
 - b. Change behaviors related to flood risk and drive action
 - c. Make information mainstream to improve decision making
4. **Modernize the management and delivery of the flood hazard mapping program**
 - a. Increase transparency
 - b. Improve operational efficiency

Mr. Jeffrey Sparrow

July 8, 2019

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- c. Increase business intelligence for continuous improvement
- d. Increase reliability and predictability of flood mapping products and services to the customer
- e. Incorporate good business practices and meet government program management standards
- f. Ensure a strategically aligned statutory and regulatory framework

FEMA recognizes the reduced timeframe and requests that a memorandum that identifies the topics to be covered in the coming years be developed and delivered by the TMAC. These recommendations should be guided by the two tasks listed at the beginning of this memo and take into account FEMA's vision for the future of flood hazard mapping, the challenges associated with the current status quo of the Risk MAP program, and the four elements and their associated objectives listed above. The tasking memo for the 2020 Annual Report will be based on this input.

I am excited about the continued engagement between FEMA and the TMAC. I appreciate the Council's continued dedication to sharing its knowledge and insight with FEMA to further strengthen our evolving flood mapping program, reduce risk, and help keep our nation safe.

Sincerely,



Michael M. Grimm
Assistant Administrator
Risk Management Directorate
Federal Insurance and Mitigation Administration

Attachment B –
FEMA 2019 TMAC
Subcommittee
Member
Appointment Memo



September 12, 2019

Good afternoon,

The Technical Mapping Advisory Council (TMAC) is pleased to have you participate in the development of the *TMAC 2019 Annual Report Memo* as a member of the TMAC 2019 Subcommittee: Shifting from Binary to Graduate View of Flood Risks, led by Mr. Scott Giberson and Mr. Josh Stuckey. This letter confirms your appointment to the subcommittee through the delivery of the *TMAC 2019 Annual Report Memo* to the Federal Emergency Management Agency (FEMA) Administrator.

TMAC 2019 Shifting from Binary to Graduate View of Flood Risks Subcommittee	
Scott Giberson	Subcommittee Co-Chair/ Subcommittee Member
Carolyn Kousky	Subcommittee Member
Robert Mason	Subcommittee Member
Salomon Miranda	Subcommittee Member
Jim Nadeau	Subcommittee Member
Josh Stuckey	Subcommittee Co-Chair/ Subcommittee Member

The purpose of the subcommittee is to identify and recommend future topics or previous TMAC recommendations that FEMA should consider as the future of flood hazard mapping works to shift from a binary to graduate view of flood risks. The topics put forth by this committee to FEMA will assist FEMA in developing future tasking memos to guide the work of the TMAC. These tasking memos will dictate the themes and purpose of future TMAC Annual Reports. Each year, the TMAC submits an annual report to the FEMA Administrator that contains a description of the Council's activities and a summary of recommendations made by the Council to the FEMA Administrator, as required by the *Biggert-Waters Flood Insurance Reform Act of 2012* (BW-12).

Per Article III of the TMAC Bylaws and BW-12, your responsibilities as a TMAC member and subcommittee member include:

- Attending and participating in Council and subcommittee meetings and conference calls;

- Providing written input on the annual report and deliverables; and
- Acting in compliance with the TMAC Charter, Bylaws, and *Federal Advisory Committee Act* (FACA) requirements.

As a member of the TMAC subcommittee, you will be considered to be a Special Government Employee (SGE). And as an SGE, you will be required to fill out a financial disclosure form known as an OGE 450 form. To access this form, please visit:

<https://oge.gov/Web/oge.nsf/Resources/OGE+Form+450:+Confidential+Financial+Disclosure+Report>. Once you have completed this form, please send it back to me at michael.nakagaki@fema.dhs.gov as soon as possible. I apologize for this inconvenience.

I look forward to working with you as part of the TMAC 2019 Subcommittee: Shifting from Binary to Graduate View of Flood Risks. If you have any questions, or if there is any additional information I can provide, please do not hesitate to contact me at michael.nakagaki@fema.dhs.gov or 202-212-2148.

Thank you,

A handwritten signature in black ink, appearing to read "Michael Nakagaki". The signature is fluid and cursive, with the first name "Michael" being larger and more prominent than the last name "Nakagaki".

Michael Nakagaki
DFO for the TMAC
FEMA - Engineering Resources Branch
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Mobile: 202-340-5497
michael.nakagaki@fema.dhs.gov



September 12, 2019

Good afternoon,

The Technical Mapping Advisory Council (TMAC) is pleased to have you participate in the development of the *TMAC 2019 Annual Report Memo* as a member of the TMAC 2019 Subcommittee: Ensuring a Significant and Appropriate Role for the Private Sector and SLTT Entities, led by Mr. Doug Bellomo and Mr. Ngoc Nguyen. This letter confirms your appointment to the subcommittee through the delivery of the *TMAC 2019 Annual Report Memo* to the Federal Emergency Management Agency (FEMA) Administrator.

TMAC 2019 Subcommittee: Ensure a Significant and Appropriate Role for the Private Sector and SLTT Entities	
Doug Bellomo	Subcommittee Co-Chair/ Subcommittee Member
Jeffrey Giering	Subcommittee Member
David Love	Subcommittee Member
Ngoc Nguyen	Subcommittee Co-Chair/ Subcommittee Member
Luis Rodriguez	Subcommittee Member
Jeff Sparrow	Subcommittee Member

The purpose of the subcommittee is to identify and recommend future topics or previous TMAC recommendations that FEMA should consider as the future of flood hazard mapping works to ensure a significant and appropriate role for the private sector and SLTT entities. The topics put forth by this committee to FEMA will assist FEMA in developing future tasking memos to guide the work of the TMAC. These taskings memos will dictate the themes and purpose of future TMAC Annual Reports. Each year, the TMAC submits an annual report to the FEMA Administrator that contains a description of the Council's activities and a summary of recommendations made by the Council to the FEMA Administrator, as required by the *Biggert-Waters Flood Insurance Reform Act of 2012* (BW-12).

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Thank you,



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September 12, 2019

Good afternoon,

The Technical Mapping Advisory Council (TMAC) is pleased to have you participate in the development of the *TMAC 2019 Annual Report Memo* as a member of the TMAC 2019 Subcommittee: Increasing Access to Flood Hazard Data to Improve Resulting Mitigation and Insurance Actions at the Local and Private Levels, led by Ms. Suzanne Jiwani and Dr. Michael Tischler. This letter confirms your appointment to the subcommittee through the delivery of the *TMAC 2019 Annual Report Memo* to the Federal Emergency Management Agency (FEMA) Administrator.

TMAC 2019 Subcommittee: Increase Access to Flood Hazard Data to Improve Resulting Mitigation and Insurance Actions at the Local and Private Levels	
Dave Guignet	Subcommittee Member
Suzanne Jiwani	Subcommittee Co-Chair/ Subcommittee Member
Carey Johnson	Subcommittee Member
Tony LaVoi	Subcommittee Member
Jonathan Smith	Subcommittee Member
Michael Tischler	Subcommittee Co-Chair/ Subcommittee Member

The purpose of the subcommittee is to identify and recommend future topics or previous TMAC recommendations that FEMA should consider as the future of flood hazard mapping works to increase access to flood hazard data to improve resulting mitigation and insurance actions at the local and private levels. The topics put forth by this committee to FEMA will assist FEMA in developing future tasking memos to guide the work of the TMAC. These taskings memos will dictate the themes and purpose of future TMAC Annual Reports. Each year, the TMAC submits an annual report to the FEMA Administrator that contains a description of the Council's activities and a summary of recommendations made by the Council to the FEMA Administrator, as required by the *Biggert-Waters Flood Insurance Reform Act of 2012* (BW-12).

Per Article III of the TMAC Bylaws and BW-12, your responsibilities as a TMAC member and subcommittee member include:

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I look forward to working with you as part of the TMAC 2019 Subcommittee: Increasing Access to Flood Hazard Data to Improve Resulting Mitigation and Insurance Actions at the Local and Private Levels. If you have any questions, or if there is any additional information I can provide, please do not hesitate to contact me at michael.nakagaki@fema.dhs.gov or 202-212-2148.

Thank you,



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Attachment C –
FEMA 2019 TMAC
Subcommittee
Report

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Introduction

The TMAC in 2019 reviewed previous Council recommendations for pertinence to the four components FEMA's Risk Management Directorate has identified as core elements of the future flood hazard mapping program. The following document contains a summary report of the subcommittee's work.

1. Shift from a Binary to a Graduated View of Flood Risks

1.1 Past Recommendations

In 2019, the TMAC was tasked with reviewing and assessing past recommendations from the TMAC reports generated in 2015, 2016, 2017, and 2018 to identify which recommendations are relevant to shifting from a binary to a graduated view of flood risks; and determine new topic areas that will support FEMA's vision of the mapping program that have not been explored in the past.

There have been numerous historical recommendations from the TMAC as it relates to the concept of shifting from binary to graduated views of flood risk for the various stakeholders of the National Flood Insurance Program (NFIP). The overarching recommendation being Annual Report 1 (AR 1), which in short urges FEMA to implement a process to continuously improve the risk products it creates to meet the needs of the various users. That said, there are specific themes in previous recommendations that point to a more graduated articulation of risk beyond binary hazard identification. They include:

Structure Specific Risk – Specifying risk at the structural level pulls away from a binary concept. These concepts are found in detail within AR 10, AR 10.1, AR 10.2, AR 10.3, and AR 23; with pilot project recommendations discussed in AR 25.2, AR 26.1, AR 26.2; and as it relates to the damages incurred by various structures in AR 14, AR 14.1, and AR 14.2.

Digital Environments – Paper cartographic products are limited in their ability to customize visualizations, perform analysis, and toggle multiple layers for ease of interpretation. AR 16 and AR 16.1 recommendations toward moving into the digital environment and away from printed maps should be useful in improving delivery and use of graduated risk through mapping products.

Transitioning Away From the 1%-Annual-Chance Flood Line – Recognizing the regulatory and legal implications tied to the 1% line, recommendations found within AR 25, AR 26, AR 27, and pilot project recommendations related to the floodway in AR 26.2 will assist in vetting this concept in advance of legal and regulatory changes.

Probabilistic Mapping – AR 30 is the key recommendation for moving the mapping program away from a binary system. Though it does not drive a structure specific system, it bridges the two worlds of binary and graduated risk and should be considered the primary recommendation for developing new products that depict graduated risk.

Non-Regulatory Product Creation – Mentioned in multiple ARs but well defined within AR 33 and 34, non-regulatory products may be the preferred vehicle for testing and articulating graduated risk and for assessing the obstacles to successfully gaining acceptance of the concept.

A summary of past recommendations and new topic areas is provided in Table 1-1.

Table 1-1. Past TMAC Recommendations and New Topic Areas Relevant to Shifting from a Binary to a Graduated View of Flood Risks

Recommendation No./ New Topic Area Title	Description	Timeline to Focus on*
AR 10, AR 10.1, AR 10.2, AR 10.3, AR 23	Structure Specific Risk	FY 2020
AR 25, AR 26, AR 26.2, AR 27	Transitioning Away from 1%-Annual-Chance Flood Line	FY 2020
AR 30	Probabilistic Mapping	FY 2020
AR 33, AR 34	Non-Regulatory Product Creation	FY 2020
New Topic 1	Barriers to Graduated Risk within Law, Regulation, and Policy	FY 2020
New Topic 2	Harnessing the Power of Insurance Rating Platform	FY 2020
AR 25.1, AR 26.1, AR 26.2	Structure Specific Risk Pilot Projects	Beyond FY 2020
AR 14, AR 14.1, AR 14.2	Structure Damage Profiles	Beyond FY 2020
AR 16, AR 16.1	Digital Environments	Beyond FY 2020
New Topic 3	Challenge the “One Map for All Stakeholders” Concept	Beyond FY 2020
New Topic 4	Mitigating the Impacts of Non-synchronous Program Movements Towards Graduated Risk	Beyond FY 2020
New Topic 5	Incentives to Develop Local Buy-In to Graduated Risk	Beyond FY 2020

* See further explanations in Sections 1.2 and 1.3

1.2 Recommendations and Topic Areas to Be Focused on in FY 2020

Recommendations Related to Structure-Specific Risk (AR 10, AR 10.1, AR 10.2, AR 10.3, AR 23):

Enhancing the functionality of the NFIP mapping program beyond a binary system to better serve the various stakeholders is essential to the health, safety, and resiliency of those stakeholders, and likely the most key component to the continued health of the NFIP. Arguably FEMA’s greatest impact is in articulating comprehensive flood risk within and beyond the Special Flood Hazard Area (SFHA). FEMA could ask TMAC to assist by developing recommendations on better ways to articulate structure-specific risk.

Recommendations Related to Transitioning away from the 1%-Annual-Chance Flood Line (AR 25, AR 26, AR 26.2, AR 27): In order to better leverage this essential control, FEMA must find a way to map real risk beyond a binary “in or out” paradigm. By doing so, the other legs of the program—insurance, mitigation, and floodplain management—will benefit more compared to focusing on the other legs independently of mapping. Mapping, insurance, mitigation, and floodplain management are typically depicted as a four-legged stool making up the elements of the NFIP, however the better analogy may be to turn the stool over and realize the base of the NFIP program, and its future, is mapping and communicating real risk. It is this base that holds the other functions together. Without mapping real risk, one cannot know where mitigation efforts are best served to reduce the risk, how to best regulate the risk through floodplain management, or how to price structures at risk properly through insurance. FEMA could ask TMAC to develop further recommendations on transitioning away from the 1%-annual-chance flood line, especially as it relates to the insurance, mitigation, and floodplain management aspects of the program.

Recommendations Related to Non-Regulatory Product Creation (AR 33, AR 34): Prior recommendations relating to probabilistic mapping, structure specific risk, and transitioning away from the 1%-annual-chance flood and floodway lines are closely tied to developing graduated risk profiles, and these recommendations could potentially be executed simultaneously. Within the current statutory and regulatory framework, it seems FEMA can elect to map and display several more levels of flood risk both inside and outside the SHFA to demonstrate the continuum of the flood hazard levels that exist. FEMA could task TMAC with identifying non-regulatory products that can help drive decisions toward purchasing flood insurance, mitigation prioritization, and reducing risk.

Recommendation Related to Probabilistic Mapping (AR 30): FEMA could ask TMAC to develop some specific methodologies to rapidly deploy the concepts of TMAC recommendation AR 30, that simultaneously assists in the progress of the recommendations for transitioning away from the 1%-annual-chance flood event and structure specific risk mapping.

New Topic 1: Barriers to Graduated Risk within Law, Regulation, and Policy. While FEMA is defining the goal of the mapping program, FEMA could ask TMAC to identify and explore the barriers within policy, regulation, and law that must be considered before the mapping function of the NFIP can shift from binary to graduated risk communication within regulatory products. What effort and time is needed to remove those barriers? Is the timing such that non-regulatory communication of graduated risk should be focused on in the interim?

New Topic 2: Harnessing the Power of Risk Rating 2.0. With the introduction of Risk Rating 2.0, FEMA will be shifting the paradigm on which flood insurance premium rates are based. Going forward, flood-insurance rates will be based on a broader range of flood frequencies and other location, property setting, and structure-specific characteristics incorporated into a still evolving premium rate-setting engine. However, it is not clear if, how, or when the flood hazard maps will reflect the new flood-hazard data. The introduction of this new rate-setting engine, even as regulations continue to require use of the 1%-annual-chance flood frequency for mandatory purchase, floodplain management, and flood mitigation requirements, imposes challenges regarding the potential for confusing inconsistencies between flood insurance rates on the one hand and these regulatory requirements on the other. At the same time, it opens the doors to significant opportunities.

In order to accurately assess flood insurance prices at a property level, FEMA has engaged a number of private catastrophe modeling companies to model the flood risk of its portfolio and has worked with an intermediary firm to merge the various model results with its own information on historical flood claims and damages, providing more risk information than is available on the Flood Insurance Rate Map (FIRM). This information could be harnessed, visualized, and mapped to provide users of the FIRM with additional and often superior detail on flood risk around the country. FEMA could ask the TMAC to:

- Explore ways the NFIP mapping initiatives can harness the power of the insurance rating platform to move more rapidly from binary hazard identification to graduated risk determination.
- Consider how the additional information might best be used to ensure fair and equitable flood-insurance rates, increase flood-insurance subscriptions, better inform community awareness and understanding of flood-risks, and promote community-level flood mitigation policies and practices.

1.3 Recommendations and Topic Areas to Be Focused on Beyond FY 2020

For the longer-term focus areas, including Structure Specific Risk Pilot Projects, Structure Damage Profiles, and Digital Environments, the TMAC has identified some challenges related to the Risk Rating 2.0 (RR 2.0) developing graduated risk profiles ahead of the mapping initiatives. However, these challenges should not be obstacles that slow the goal of making the NFIP financially stable through the insurance rating system, rather opportunities to focus flood hazard mapping to move in a similar direction.

With the adoption of rating reform, NFIP insurance prices will no longer be as dependent on FIRM zones. As such, the original primary purpose of the Flood Insurance Rate Map may be diminished as it relates to being the primary driver of insurance pricing. As previously mentioned, FIRMs have become the primary flood risk communication and risk information product for many stakeholders beyond FEMA actuaries. Unfortunately, the FIRM does not provide these users with all the information they need in an easily useable and accessible format. Freeing the FIRM from insurance pricing opens the possibility of rethinking what a FEMA “flood map” is and what it should be, with the possibility of developing a reformed product that better meets the needs of local governments, banks, floodplain managers, and households, if the actuaries rely on this product less. FEMA might consider asking TMAC to assist in several new topic areas in 2021 and beyond.

New Topic 3: Challenge the “One Map for All Stakeholders” Concept. TMAC could help FEMA determine if the non-synchronous shift from binary to graduated risk communication between insurance, management, mitigation, and mapping lends itself to a divergence of regulatory and non-regulatory products for each stakeholder. In other words, is it time to consider moving away from the “one map for all stakeholders” concept?

New Topic 4: Mitigating the Impacts of Non-Synchronous Program Movements Towards Graduated Risk. Consider, given the extension of RR 2.0 to Fall of 2021, tasking TMAC with providing interim mitigating recommendations to lessen the impacts to the various stakeholders prior to or immediately following the rollout.

New Topic 5: Incentives to Develop Local Buy-In to Graduated Risk. TMAC could provide insight into the development of incentive programs that enable the buy-in of the various stakeholders as the program accelerates the move from binary to graduated risk.

1.4 Modernize Management and Delivery

Currently, FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) program is used to identify flood risk and promote informed planning and development practices to help reduce loss of life and property damage through mitigation actions. Risk MAP products include maps, studies, reports, and databases, which assist communities to make informed decisions about flood risk. As the flood insurance program transitions to a new risk rating system in 2021, FEMA should consider updating Risk MAP to:

Increase transparency – Improve communication of flood risk prior to property acquisitions or any other federally-backed financial assistance. Emphasizing the importance of actual flood risk creates an avenue to implement stronger mitigation measures.

Improve operational efficiency – FEMA should make it a priority to deliver products and services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products,

services, and support. Improving on mapping products' timeline should also be a priority since this process takes years to complete.

Increase business intelligence for continuous improvement – FEMA should consider leveraging technologies to improve the mapping products to include graduated flood risk communication, so stakeholders can make informed mitigation decisions.

Increase reliability and predictability of flood mapping products and services to the customer – FEMA should invest in:

- Non-regulatory products that depict graduated flood risk.
- Updating mapping products on a regular basis.
- Leveraging the new risk rating technology to improve on communicating graduated flood risk to stakeholders.

Incorporate good business practice and meets governmental program management standards – FEMA should incentivize communities that utilize graduated flood risk and other floodplain management best management practices to minimize the loss of life and property.

Ensure a strategically aligned statutory and regulatory framework – with the understanding that it would take a long time to make changes to the NFIP regulations in the CFR, FEMA should continue producing guidelines through its Building Science Branch to include graduated flood risk mitigation measures

2. Ensure a Significant and Appropriate Role for the Private Sector and for State, Local, Tribal, and Territorial Entities

2.1 Past Recommendations

The TMAC was also tasked with reviewing and assessing past recommendations to identify which recommendations are relevant to ensuring a significant and appropriate role for the private sector and for State, Local, Tribal, and Territorial (SLTT) entities. There are no new topic areas related to this element. A summary of past recommendations is provided in Table 2-1.

Table 2-1. Past TMAC Recommendations Relevant to Ensuring a Significant and Appropriate Role for the Private Sector and for SLTT Entities

Recommendation No./New Topic Area Title	Description	Timeline to Focus on*
AR 1	FEMA should establish and implement a process to assess the present and anticipated flood hazard and flood risk products to meet the needs of the various users. As part of this process, FEMA should routinely: <ol style="list-style-type: none"> Conduct a systematic evaluation of current regulatory and non-regulatory products (data, maps, reports, etc..) to determine if these products are valued by users, eliminating products which do not cost-effectively meet needs; Consider user requirements prior to any updates or changes to data format, applications, standards, products, or practices are implemented; Proactively seek to provide authoritative, easy to access and use, timely, and informative products and tools; and, Consider future flood hazards and flood risk. 	FY 2020
AR 2.2	FEMA should develop, with input from stakeholders, a list of factors to be used for prioritizing flood hazard and risk assessment studies across the country.	FY 2020
AR 19	FEMA should develop and implement a suite of strategies to incentivize communities, nongovernment organizations and private sector stakeholders to increase partnering and subsequent contributions for flood hazard and risk updates and maintenance.	FY 2020
AR 26	FEMA should coordinate with floodplain managers and mitigation planners to identify and test data and tools needed to support floodplain management and mitigation as it moves away from the 1-percent-annual-chance line.	FY 2020
AR 10.2	FEMA and its partners should identify data needs and standards for developing and maintaining accurate, location-specific flood frequency information, including associated flood conditions (e.g., velocity, waves, erosion, duration, for both present and future flood conditions).	Beyond FY 2020
AR 14	FEMA, and its mapping partners including the private sector, should transition to a flood risk assessment focus that is structure specific. Where data is available, FEMA and its partners should contribute information and expertise consistent with their interests, capabilities, and resources toward this new focus. <ol style="list-style-type: none"> A necessary prerequisite for accurate flood risk assessments is detailed flood hazard identification, which must also be performed to advance mitigation strategies and support loss estimations for insurance rating purposes. FEMA should initiate dialogue with risk assessment stakeholders to identify potential structure-specific risk assessment products, displays, standards, and data management protocols that meet user needs. FEMA and its partners should develop guidelines, best practices, and approaches to implementing structure-specific risk assessments. 	Beyond FY 2020
AR 27	FEMA should develop, in coordination with stakeholders, a transition plan for moving away from the 1-percent-annual-chance flood line.	Beyond FY 2020

Recommendation No./New Topic Area Title	Description	Timeline to Focus on*
AR 28	FEMA should develop a series of mapping prototype products aimed at more effectively communicating residual flood risk related to levees, dams, and event-driven coastal erosion. Products developed should incorporate end user and stakeholder testing, and FEMA should develop standards for routine production and presentation, if applicable.	Beyond FY 2020

* See further explanations in Sections 2.2 and 2.3

2.2 Recommendations and Topic Areas to Be Focused on in FY 2020

Recommendation AR 1: The user base for the flood mapping program has been expanding for several decades from its initial use in the late 1960s for flood insurance, evolving to include floodplain management in the mid to late 1970s, then renewed interest by banks given mandatory flood insurance purchase requirements. Today users include emergency managers, locally elected officials, developers, real estate agents, and others.

Though the product has evolved with these increased uses, significant advancements such as the proliferation of internet access and mapping technologies (GIS, LiDAR, advanced flood modeling) in the last few years have created opportunities to better serve the current user base while reducing costs for map production and maintenance. Additionally, Congress has recently directed FEMA to improve insurance pricing and provided new statutory authority along with new funding sources for flood mitigation through the Disaster Response and Recovery Reform Act of 2018.

The continued expansion of the user base, significant technological developments, a push to improve flood insurance pricing, and a renewed emphasis for reducing flood risks make implementing a more formal user engagement process both urgent and important. Such a process can be used to sunset products of little value while establishing new products to better serve while improving procedures to take advantage of new technologies and changed attitudes. Aims of this endeavor would include decreasing program costs, increasing non-federal stewardship, focusing the federal role, creating markets for the private sector, and leveraging innovations. In FY 2020, the TMAC could identify specific ways in which FEMA can make progress toward completing this recommendation, including exploring independent analyses of the processes and products.

Recommendation AR 2.2: During the Map Modernization Program, FEMA created the nationwide Multi-Year Flood Hazard Identification Plan (MHIP). The MHIP was a communication tool that informed stakeholders as to when a given community’s flood hazard maps were scheduled to be modernized. As FEMA evolves the flood hazard mapping program, it needs to advance this recommendation to provide clarity to stakeholders on when a given community’s flood hazard data is scheduled for an update and when new risk communication information/tools might be provided. A multi-year plan for evolving flood hazard mapping program and updating community information will garner support for the program and provide clarity for FEMA and stakeholders along with creating opportunities to align state, local, and federal efforts in a way that reduces overall program cost. It also will allow stakeholders, especially communities, to align with FEMA’s plan and be prepared to take on larger roles and responsibilities in delivering the future flood hazard mapping program.

In FY 2020, the TMAC could assist FEMA in drafting factors and a process for starting coordination with stakeholders leading to the development of a multi-year plan. The sooner this plan is created as the

flood hazard mapping program evolves the better. Some would say that FEMA could create the MHIP because it was a multi-year Presidential initiative. Without a Presidential initiative, FEMA would need to make planning assumptions regarding future year funding to create the plan. The plan would need to be updated annually based on actual funding and revised funding assumptions.

Recommendation AR 19: As FEMA emphasizes and promotes protection of life and property and long-term mitigation through the National Mitigation Investment Strategy (NMIS), the need for ways to smartly combine resources at all levels toward these ends will continue to increase. In light of this, FEMA needs to encourage and reward SLTT, non-government and private sector stakeholders for developing partnerships and coalitions that assist in providing updates to hazard and risk data sets—elements that are critical to make wise mitigation investments. These partnerships should unify efforts to reduce duplication and facilitate complimentary actions at all levels.

Strategies should focus on financial incentives that reward and promote partnerships and lessen the cost of hazard data collection, analysis, and maintenance. Rewarding partnerships and encouraging more responsibility for data development and maintenance creates a greater sense of ownership and “buy-in.” Locally credible current data is critical to protecting life and property and increasing flood resilience in communities. Sharing the responsibility of flood hazard and risk data development and maintenance has multiple benefits. As advancements in technology continue to be made and as risk knows no boundary, it is imperative that FEMA work with stakeholders and end users to develop efficient strategies that incorporate current and future hazard and risk data collection practices. Focusing TMAC efforts on identifying how to accomplish this recommendation in FY 2020 will help FEMA expand programs like the Cooperating Technical Partners (CTP) and the Community Rating System (CRS) using some of the strategies outlined in NMIS.

Recommendation AR 26: As FEMA continues to use data and tools for flood risk management that are more graduated than the 1% annual chance flood hazard, it will need to more actively and directly engage the floodplain management community—a key constituency focused on reducing flood risk. The focus of these engagements would involve the development and testing of new tools and products aimed at helping floodplain managers understand what is possible given modern technology, while also building ownership in advancing the floodplain management discipline. Engagements with industry to facilitate innovations that decrease program costs while re-shaping the roles various groups play in executing elements of the NFIP will help bring clarity to the Federal role. In FY 2020, the TMAC could identify specific ways in which FEMA can help re-shape how floodplains are managed, and flood risks are reduced.

2.3 Recommendations and Topic Areas to Be Focused on Beyond FY 2020

Recommendation AR 10.2: AR 10.2 is recommended because data and standards for developing and maintaining accurate, location-specific flood frequency information are important elements of a successful flood risk assessment program. Clear standards for developing and maintaining information and the types of data needed will allow FEMA and its mapping partners to maximize collaboration, increase use of limited resources, and improve the effectiveness in implementing flood risk assessment work.

Recommendation AR 14: AR 14 is recommended for focus because as FEMA and its mapping partners move toward structure specific flood risk assessments, it is important to build a transition plan with

stakeholder input to guide efforts, telegraph change, and make good use of limited funding. Information for this transition plan may include outcomes desired, timelines, potential policy and guidance updates, resource allocations, and roles and responsibilities of FEMA, state, communities, and private sector. The transition plan will facilitate better communication and collaboration with mapping partners and reduce redundant efforts and costs for FEMA and its mapping partners.

Recommendation AR 27: FEMA is currently working on an initiative to define the Future of Flood Risk Data (FFRD) that will support the next generation of the flood mapping program. This initiative builds on the successes achieved through the Risk Mapping, Assessment, and Planning (Risk MAP) program and looks to address opportunities to achieve a new set of program outcomes based on stakeholder and customer input, including TMAC recommendations, collected in recent years. In FY 2020, FEMA will continue to advance the FFRD initiative by initiating an exploration phase through multiple key projects that will help define elements of a future program. Therefore, AR 27 would be most applicable to focus on in future years beyond FY 2020 when the program is ready to transition to its future state.

Recommendation AR 28: AR 28 is recommended to be revisited in a future year to allow for inclusion of results from the recent initiative between FEMA and the US Army Corps of Engineers to examine residual risk of dams and levees. Overall the recommendation aligns with the future flood mapping program's objectives through use of end user and stakeholder testing to foster increased stewardship at the local level. Prototype products based on emerging technological advancements can capture private sector innovation. FEMA's role can be focused on production standards while allowing for the development products to vary to account for regional differences such as geology, topography, and population density. Providing the means for SLTT entities to identify residual risk within their communities will support FEMA's strategic goal of creating a culture of preparedness.

3. Increase Access to Flood Hazard Data to Improve Resulting Mitigation and Insurance Actions at the Local and Private Levels

3.1 Past Recommendations

The TMAC was also tasked with reviewing and assessing past recommendations to identify which recommendations are relevant to increasing access to flood hazard data to improve resulting mitigation and insurance actions at the local and private levels; and determine new topic areas that have not been explored in the past. A summary of past recommendations and new topic areas are provided in Table 3-1.

Table 3-1. Past TMAC Recommendations and New Topic Areas Relevant to Increasing Access to Flood Hazard Data to Improve Resulting Mitigation and Insurance Actions at the Local and Private Levels

Recommendation No./ New Topic Area Title	Description	Timeline to Focus on*
AR 26	FEMA should coordinate with floodplain managers and mitigation planners to identify and test data and tools needed to support floodplain management and mitigation as it moves away from the 1-percent-annual-chance line.	FY 2020
AR 28.3	FEMA should refine existing non-regulatory products and develop new non-regulatory products to clarify coastal flood risks in the vicinity of erodible features, and highlight the spatial areas affected by event-driven coastal erosion and primary frontal dune delineation. Possible products include: <ol style="list-style-type: none"> 1. Delineation of model results in the vicinity of the eroded Primary Frontal Dune 2. Representation of the regulatory flood zones in the absence of an erodible dune feature 	FY 2020
AR 1	FEMA should establish and implement a process to assess the present and anticipated flood hazard and flood risk products to meet the needs of the various users. As part of this process, FEMA should routinely: <ol style="list-style-type: none"> a) Conduct a systematic evaluation of current regulatory and non-regulatory products (data, maps, reports, etc.) to determine if these products are valued by users, eliminating products which do not cost-effectively meet needs; b) Consider user requirements prior to any updates or changes to data format, applications, standards, products, or practices are implemented; c) Proactively seek to provide authoritative, easy to access and use, timely, and informative products and tools; and, d) Consider future flood hazards and flood risk. 	Beyond FY 2020
AR 7	<p><u>Riverine</u> FEMA should develop guidelines, standards, and best practices for selection and use of riverine models appropriate for certain geographic, hydrologic, and hydraulic conditions.</p> <ol style="list-style-type: none"> a) Provide guidance on when appropriate models would be 1-D vs 2-D, or steady state vs unsteady state, b) Support comparative analyses of the models and dissemination of appropriate parameter ranges; and c) Develop quality assurance protocols. <p><u>Coastal</u> FEMA should develop guidelines, standards and best practices for selection and use of coastal models appropriate for certain geographic, hydrologic, and hydraulic conditions.</p> <ol style="list-style-type: none"> a) Provide guidance on when appropriate models would be 1-D vs 2-D; b) Support comparative analyses of the models and dissemination of appropriate parameter ranges; and c) Develop quality assurance protocols 	Beyond FY 2020

Recommendation No./ New Topic Area Title	Description	Timeline to Focus on*
AR 16	<p>FEMA should transition from the current panel-based cartographic limitations of managing paper maps and studies to manage National Flood Insurance Program (NFIP) data to a database derived, digital-display environment that are fully georeferenced and relational, enabling a single digital authoritative source of information and database-driven displays. Towards this transition, FEMA should:</p> <ol style="list-style-type: none"> Prepare a multi-year transition plan to strategically transition all current cartographic and/or scanned image data to a fully georeferenced, enterprise relational database. Update required information for map revisions (MT-2 application forms) and Letter of Map Changes (LOMCs) applications to ensure accurate geospatial references, sufficient data to populate databases, and linkages to existing effective data. Adopt progressive data management approaches to disseminate information collected and produced during the study and revision process, including LOMCs. Ensure that the data management approach described in (c) is sufficiently flexible to allow efficient integration, upload, and dissemination of NFIP and stakeholder data (e.g., mitigation and insurance data that are created and maintained by OFA), and serve as the foundation for creating all digital display and mapping products. Provide a mechanism for communities to readily upload jurisdictional boundary data, consistent with requirements to participate in the NFIP, as revised, allowing other stakeholders access. 	Beyond FY 2020
AR 28	FEMA should develop a series of mapping prototype products aimed at more effectively communicating residual flood risk related to levees, dams, and event-driven coastal erosion. Products developed should incorporate end user and stakeholder testing, and FEMA should develop standards for routine production and presentation, if applicable.	Beyond FY 2020
AR 33	Building from AR16, FEMA should share and communicate data that can help drive decisions toward purchasing flood insurance, mitigation prioritization, and reducing risk. This data should support historical, future, and probabilistic analyses of coastal, fluvial, and pluvial flood hazards. FEMA should work with other agencies to assist data collection, creation, and sharing to support integrated water resources management and encourage data sharing.	Beyond FY 2020
FC 5	Generate future conditions data and information such that it may frame and communicate flood risk messages to more accurately reflect the future hazard in ways that are meaningful to and understandable by stakeholders. This should enable users to make better-informed decisions about reducing future flood-related losses	Beyond FY 2020
New Topic 6	Cloud-based Flooding Image Reporting System	Beyond FY 2020

* See further explanations in Sections 3.2 and 3.3

3.2 Recommendations and Topic Areas to Be Focused on in FY 2020

Recommendation AR 26: The decision to begin communicating risk at an individual structure, rather than through a discrete boundary describing a flood frequency, is a core principle of FEMA’s RR 2.0. It remains imperative that FEMA develop and execute a comprehensive communication strategy for explaining this change in risk representation to floodplain managers and mitigation planners. This communication strategy may be extended to include the public, governments at all levels, and the insurance industry. It is also critical that FEMA understand the feedback from these groups in order to deliver an effective product. Implementation of RR 2.0 has recently been delayed until October 2021¹.

¹ <https://www.fema.gov/news-release/2019/11/07/fema-defers-implementation-risk-rating-20>

Undertaking the development of this strategy in FY 2020 would be extremely timely for FEMA to take advantage of the implementation date.

Recommendation 28.3: Non-regulatory products for event-driven coastal erosion have not yet been developed by FEMA. Developing the non-regulatory products at the time of communication of the regulatory products makes sense. Because over 80% of the coastal regulatory studies are near-complete or complete, the opportunity exists to develop non-regulatory products using the final coastal analyses that clarify coastal flood risks in the vicinity of erodible features and highlight the spatial areas affected by event-driven coastal erosion and primary frontal dune delineation. Therefore, the TMAC could review and provide input to FEMA on their activities related to this recommendation in FY 2020.

3.3 Recommendations and Topic Areas to Be Focused on Beyond FY 2020

Recommendation AR 1: The TMAC could review the on-going process of assessing flood hazard and flood risk products in order to ensure the process is completing its intended purpose. Of concern is evaluating the users who have provided input, to ensure a broad spectrum of users is represented. Also, of interest is how the results of the process are supporting recommendations AR 16, AR 26, AR 28 and AR 33.

Recommendation AR 7: FEMA's guidance and standards update process is designed to address this issue. Through that process, FEMA has many touchpoints with partners and stakeholders through which information is collected about best practices and have conversations for improvements. An evaluation of the effectiveness of the process and determination of whether there are obstacles to implementing best practices could be evaluated by TMAC in future years.

Recommendation AR 16: It appears that FEMA is working on a solution, via the IT Roadmap, to resolving most of these issues. TMAC could review these updates when they are rolled out and review them to see if they address the issues and meet the current needs and expectations of the FEMA user community.

Recommendation AR 28: FEMA is developing data and tools to support moving floodplain management and mitigation away from the binary choice 1%-annual-chance line. Mapping prototype products for areas with residual risk should coordinate with these tools. Development of the residual risk prototypes should be delayed until AR 26 is closer to completion, and the TMAC could be utilized to provide input and recommendations as these products are being developed.

Recommendation AR 33: The Increasing Flood Insurance Coverage committee of the 2018 TMAC was tasked with identifying ways to leverage the national flood mapping program to support FEMA's moonshot goal of doubling flood insurance coverage by 2021. While the outcomes of the recommendation (AR 33) to FEMA by the 2018 TMAC are still under advisement, the need to identify ways to better communicate flood hazards to broaden insurance coverage and mitigation of flood risks remains. However, flood hazards are best understood, managed, and mitigated at the local level. FEMA has undertaken considerable efforts to modernize the nation's inventory of flood hazard maps and is actively engaging the resources allocated to the national flood hazard mapping program (over \$400 million in FY 2019) to further modernize flood hazard (engineering and mapping) data. FEMA excels at setting guidelines and standards for flood data and products use; however, community ownership and stimulating flood risk reduction efforts often fall short. The dichotomous nature of "in vs. out" of the

floodplain will persist unless a comprehensive product overhaul and awareness campaign is undertaken. The TMAC has already recommended and FEMA is actively implementing overhauls to the national flood hazard mapping program. These changes, in addition to the “customer-centric” message expected to be developed in support of Risk Rating 2.0 will ultimately lead to behavior changes and a more ubiquitous understanding of flood risk.

However, the fact remains that transferring flood risk away from the personal (i.e., through insurance or mitigation) is just that: a personal decision. Affecting change from the federal level may not be the best strategy. FEMA may leverage existing frameworks such as the Recovery through Federal-State-Local Partnership² and the National Mitigation Investment Strategy³ and collaborations such as CTP, Mitigation Assessment Teams (MATs), and relationships with organizations such as the Association of State Floodplain Managers (ASFPM) and the National Association of Realtors to funnel support through SLTT governments. By supporting SLTT “champions” flood hazard and risk products that are meaningful to stakeholders may be developed, all while respecting national standards and performance metrics. Flood hazard and risk-related data collection, management, and product delivery may also be coordinated and collaborated on at various stakeholder levels. SLTT partners should be empowered to provide insight and feedback on the needs of their respective communities so FEMA can fully support engagement of the most at-risk populations.

To accomplish this, the goals of the FEMA 2018 – 2022 Strategic Plan may be followed:

- 1) Build a Culture of Preparedness – Enhance support of SLTT efforts to engage at risk populations. Utilize structure-specific flood risk data to provide property owners and businesses a snapshot of their flood risk, what contributes to their flood risk, and what mitigation actions may be implemented to reduce their flood risk.
- 2) Ready the Nation for Catastrophic Disasters – Prepare flood hazard and risk products that are meaningful and can be integrated into emergency planning, capital planning, and long-term SLTT planning efforts. FEMA could (and should) focus on providing more comprehensive support to SLTT exercises, planning, and outreach activities, possibly through MAT efforts.
- 3) Reduce the Complexity of FEMA – Create flood hazard data that is not necessarily focused on the precision of a hydraulic model or terrain dataset, but one that communicates individual flood risk and clearly identifies contributing factors.

The general layman likely does not know the difference between a Zone A and Zone AE SFHA and whether the vertical datum is the National Geodetic Vertical Datum of 1929 (NGVD 29) or the North America Vertical Datum of 1988 (NAVD 88), but they do understand their house may be damaged 50% of its worth if it rains 7 inches in 24 hours in their vicinity. FEMA should support open source data so flood hazard and risk information may be readily used and consumed by other mapping applications across a variety of disciplines. Many SLTT partners have extremely robust mapping applications. FEMA should support SLTT mapping applications and consider supporting other digital mapping applications from realty sites such as Zillow or other Multiple Listing Services (MLS), and applications such as Google or Bing maps. These efforts are likely not short-term solutions, but implementation may be focused in

² <https://www.whitehouse.gov/wp-content/uploads/2019/03/DisasterRecovery.pdf>

³ <https://www.fema.gov/national-mitigation-investment-strategy>

areas of greatest need and where stakeholder engagement activities are already in place (e.g., CTPs), and the TMAC could provide insights for FEMA that could assist in outlining these solutions.

Recommendation FC 5: Communication of flood risk to the general public and local communities is a major initiative of FEMA. With recent increased intensity of storm events, the general public has increased interest on the risk for future flood conditions. It is important that FEMA generates future conditions data in a format that communicates the increased flood risk in an understandable way. FEMA has not finalized the future conditions data to be generated, so determining the communication format is not a FY 2020 issue.

New Topic 6: Cloud-Based Flooding Image Reporting System. FEMA and the NFIP community are in need of a cloud-based reporting system the public and local officials could use to document and upload flooding pictures. These pictures would enable anyone in the FEMA community to access flooding information when and where it is happening. These pictures should be geocoded, and time stamped via the internal GPS on a smart phone, or located on the map via a user interface to define the date and time that each photograph is taken. These pictures and data could be used to: 1) document and define emergency response based on the volume of pictures during an event, 2) calibrate flood models and high-water marks after an event, and 3) provide data for mitigation documentation after an event. The TMAC could provide recommendations on such a system in future reports.

Attachment D –
Results of TMAC
multi-voting exercise
at December 11-12,
2019 meeting

Recommendation/New Topic Area No.	Description	Subcommittee 1 Timeline	Subcommittee 2 Timeline	Subcommittee 3 Timeline	Prioritization in room (Number of Votes)	Final Vote (includes emailed Votes)
AR 1	FEMA should establish and implement a process to assess the present and anticipated flood hazard and flood risk products to meet the needs of the various users. As part of this process, FEMA should routinely: a) Conduct a systematic evaluation of current regulatory and non-regulatory products (data, maps, reports, etc.) to determine if these products are valued by users, eliminating products which do not cost-effectively meet needs; b) Consider user requirements prior to any updates or changes to data format, applications, standards, products, or practices are implemented; c) Proactively seek to provide authoritative, easy to access and use, timely, and informative products and tools; and, d) Consider future flood hazards and flood risk.	N/A	FY 2020	Beyond FY 2020	7	7
IA 2.2	FEMA should develop, with input from stakeholders, a list of factors to be used for prioritizing flood hazard and risk assessment studies across the country.	N/A	FY 2020	N/A	6	6
AR 7	<u>Riverine</u> FEMA should develop guidelines, standards, and best practices for selection and use of riverine models appropriate for certain geographic, hydrologic, and hydraulic conditions. a) Provide guidance on when appropriate models would be 1-D vs 2-D, or steady state vs unsteady state, b) Support comparative analyses of the models and dissemination of appropriate parameter ranges; and c) Develop quality assurance protocols.	N/A	N/A	Beyond FY 2020	0	
AR 10	FEMA should transition from identifying the 1-percent-annual-chance floodplain and associated base flood elevation as the basis for insurance rating purposes to a structure-specific flood frequency determination and associated flood elevations.	FY 2020	N/A	N/A	10 - note that these were grouped together as they are very similar	10
IA 10.1	FEMA should develop a strategy for obtaining the building footprints and relevant building elevations of properties throughout the Nation to be used in determining structure-based flood risk.	FY 2020	N/A	N/A		
IA 10.2	FEMA and its partners should identify data needs and standards for developing and maintaining accurate, location-specific flood frequency information, including associated flood conditions (e.g., velocity, waves, erosion, duration, for both present and future flood conditions).	FY 2020	Beyond FY 2020	N/A		
IA 10.3	FEMA should perform a demonstration(s) to learn from and document data requirements, processes, and standards necessary for nationwide implementation for structure-based risk assessment.	FY 2020	N/A	N/A		
AR 14	FEMA, and its mapping partners including the private sector, should transition to a flood risk assessment focus that is structure specific. Where data is available, FEMA and its partners should contribute information and expertise consistent with their interests, capabilities, and resources toward this new focus. a) A necessary prerequisite for accurate flood risk assessments is detailed flood hazard identification, which must also be performed to advance mitigation strategies and support loss estimations for insurance rating purposes. b) FEMA should initiate dialogue with risk assessment stakeholders to identify potential structure-specific risk assessment products, displays, standards, and data management protocols that meet user needs. c) FEMA and its partners should develop guidelines, best practices, and approaches to implementing structure-specific risk assessments.	Beyond FY 2020	Beyond FY 2020	N/A	0	
IA 14.1	FEMA and its partners should identify data needs and standards for developing and maintaining accurate structure characteristics needed for risk estimation. Included in this should be a review of building characteristics data in existing flood risk estimation models, projects, programs, and databases.	Beyond FY 2020	N/A	N/A	0	
IA 14.2	FEMA and its partners should review and, if needed, modify flood damage functions to better capture structure-specific damage resulting from various flood hazards.	Beyond FY 2020	N/A	N/A	0	1
AR 16	FEMA should transition from the current panel-based cartographic limitations of managing paper maps and studies to manage National Flood Insurance Program (NFIP) data to a database derived, digital-display environment that are fully georeferenced and relational, enabling a single digital authoritative source of information and database-driven displays. Towards this transition, FEMA should: a) Prepare a multi-year transition plan to strategically transition all current cartographic and/or scanned image data to a fully georeferenced, enterprise relational database. b) Update required information for map revisions (MT-2 application forms) and Letter of Map Changes (LOMCs) applications to ensure accurate geospatial references, sufficient data to populate databases, and linkages to existing effective data. c) Adopt progressive data management approaches to disseminate information collected and produced during the study and revision process, including LOMCs. d) Ensure that the data management approach described in (c) is sufficiently flexible to allow efficient integration, upload, and dissemination of NFIP and stakeholder data (e.g., mitigation and insurance data that are created and maintained by OFA), and serve as the foundation for creating all digital display and mapping products. e) Provide a mechanism for communities to readily upload jurisdictional boundary data, consistent with requirements to participate in the NFIP, as revised, allowing other stakeholders access.	Beyond FY 2020	N/A	Beyond FY 2020	0	
IA 16.1	FEMA should implement the following features into a future, dynamic, database-derived, digital display environment to manage the update, maintenance, and dissemination of all flood hazards and risk data across the country: · Data are geospatial and captured in a relational geodatabase. · Data can be dynamically queried and displayed (point and click). · Development of a new website that features users-specific inputs, and where data provides one access point for multiple sources of flood hazard data and risk assessment information. · Products are developed on-the-fly using dynamic data calling features. · The new website and database support scalability, based on data availability, population, flood frequency and population impacted, and flood insurance penetration.	Beyond FY 2020	N/A	N/A	0	
AR 19	FEMA should develop and implement a suite of strategies to incentivize communities, nongovernment organizations and private sector stakeholders to increase partnering and subsequent contributions for flood hazard and risk updates and maintenance.	N/A	FY 2020	N/A	2	2
AR 23	FEMA should develop, in conjunction with others in the public and private sectors, flood risk-rated insurance premiums for all structures within and outside the identified Special Flood Hazard Area. These premiums should be based on the nature and severity of the flood hazard, structure elevation, and other characteristics, as well as structure damage functions and vulnerability	FY 2020	N/A	N/A	5	5
AR 25	As FEMA transitions away from the 1-percent-annual-chance line, a risk score for existing and proposed structures should be developed. Each structure should be assigned a current conditions risk score and a future conditions risk score.	FY 2020	N/A	N/A	3	4
IA 25.1	FEMA should perform pilot projects utilizing risk scores to determine the best data and methods to accurately calculate structure-specific risk for floodplain management for existing and new structures.	Beyond FY 2020	N/A	N/A		

AR 26	FEMA should coordinate with floodplain managers and mitigation planners to identify and test data and tools needed to support floodplain management and mitigation as it moves away from the 1-percent-annual-chance line.	FY 2020	FY 2020	FY 2020	12 - note that these were grouped together as they are very similar	15
IA 26.1	FEMA should perform pilot projects to understand the implications and opportunities for floodplain management in regard to moving to risk scores and determine other relevant data.	Beyond FY 2020	N/A	N/A		
IA 26.2	FEMA should perform pilot projects to determine possible alternatives or modifications to the floodway concept.	FY 2020 and also Beyond FY2020	N/A	N/A		
AR 27	FEMA should develop, in coordination with stakeholders, a transition plan for moving away from the 1-percent-annual-chance flood line.	FY 2020	Beyond FY 2020	N/A		
AR 28	FEMA should develop a series of mapping prototype products aimed at more effectively communicating residual flood risk related to levees, dams, and event-driven coastal erosion. Products developed should incorporate end user and stakeholder testing, and FEMA should develop standards for routine production and presentation, if applicable.	N/A	Beyond FY 2020	Beyond FY 2020	0	
IA 28.3	FEMA should refine existing non-regulatory products and develop new non-regulatory products to clarify coastal flood risks in the vicinity of erodible features, and highlight the spatial areas affected by event-driven coastal erosion and primary frontal dune delineation. Possible products include: 1. Delineation of model results in the vicinity of the eroded Primary Frontal Dune 2. Representation of the regulatory flood zones in the absence of an erodible dune feature	N/A	N/A	FY 2020	0	
AR 30	FEMA should establish upper and lower bounds for the 1%-annual-chance exceedance flood elevation using a confidence interval size of their choosing, and use those limits to map the SFHA "Boundary Zone"—the area where this SFHA boundary is most likely to be. FEMA should share SFHA Boundary Zone information with the public, and other key interested parties, test how it is received, and make improvements prior to formalizing any specific standards or policy for routine map updates.	FY 2020	N/A	N/A	3	5
AR 33	Building from AR16, FEMA should share and communicate data that can help drive decisions toward purchasing flood insurance, mitigation prioritization, and reducing risk. This data should support historical, future, and probabilistic analyses of coastal, fluvial, and pluvial flood hazards. FEMA should work with other agencies to assist data collection, creation, and sharing to support integrated water resources management and encourage data sharing.	FY 2020 - but agreed its probably beyond during discussion	N/A	Beyond FY 2020	0	
AR 34	To increase insurance coverage, expanding on AR28, FEMA should include, as part of their non-regulatory products suite, areas previously identified as SFHAs, including information available in the Community Information System, and areas of previous flooding. This information should be easily maintained, support and communicate the actuarial rating of NFIP flood insurance, and empower informed decisions by property owners and local, regional, Tribal, and State agencies.	FY 2020	N/A	N/A	0	
FC 5	Generate future conditions data and information such that it may frame and communicate flood risk messages to more accurately reflect the future hazard in ways that are meaningful to and understandable by stakeholders. This should enable users to make better-informed decisions about reducing future flood-related losses	N/A	N/A	Beyond FY 2020	0	
New Topic 1	Barriers to Graduated Risk within Law, Regulation, and Policy	FY 2020	N/A	N/A	1	1
New Topic 2	Harnessing the Power of Insurance Rating Platform	FY 2020	N/A	N/A	2	5
New Topic 3	Challenge the "One Map for All Stakeholders" Concept	Beyond FY 2020	N/A	N/A	1	3
New Topic 4	Mitigating the Impacts of Non-synchronous Program Movements Towards Graduated Risk	Beyond FY 2020	N/A	N/A	0	
New Topic 5	Incentives to Develop Local Buy-In to Graduated Risk	Beyond FY 2020	N/A	N/A	0	
New Topic 6	Cloud-based Flooding Image Reporting System	N/A	N/A	Beyond FY 2020	0	

Attachment E – TMAC Charter

**U.S. Department of Homeland Security
Federal Emergency Management Agency
Technical Mapping Advisory Council
Charter**

1. Committee’s Official Designation:

Technical Mapping Advisory Council

2. Authority:

Pursuant to section 100215 of the Biggert-Waters Flood Insurance Reform Act of 2012, Public Law 112-141, 126 Stat. 924, 42 U.S.C. § 4101a (“the Act”), this charter establishes the Technical Mapping Advisory Council (TMAC or Council). This statutory committee is established in accordance with and operates under the provisions of the *Federal Advisory Committee Act* (FACA) (Title 5, United States Code, Appendix).

3. Objectives and Scope of Activities:

The TMAC advises the Administrator of the Federal Emergency Management Agency (FEMA) on certain aspects of FEMA’s flood risk mapping activities.

The TMAC recommends to the Administrator:

- A. How to improve in a cost-effective manner the:
 - 1. Accuracy, general quality, ease of use, and distribution and dissemination of flood insurance rate maps and risk data; and
 - 2. Performance metrics and milestones required to effectively and efficiently map flood risk areas in the United States.
- B. Mapping standards and guidelines for:
 - 1. Flood Insurance Rate Maps (FIRMs); and
 - 2. Data accuracy, data quality, data currency, and data eligibility;
- C. How to maintain, on an ongoing basis, FIRMs and flood risk identification; and
- D. Procedures for delegating mapping activities to State and local mapping partners.

The TMAC recommends to the Administrator and other Federal agencies participating in the Council:

- A. Methods for improving interagency and intergovernmental coordination on flood mapping and flood risk determination; and
- B. A funding strategy to leverage and coordinate budgets and expenditures across Federal agencies.

The TMAC submits an annual report to the Administrator that contains a description of the activities of the Council, an evaluation of the status and performance of FIRMs and mapping activities to revise and update FIRMs as required by the Act, and a summary of the activities of the Council.

4. Description of Duties:

The duties of the TMAC are solely advisory in nature.

5. Official to Whom the Committee Reports:

The TMAC provides advice and recommendations to the Administrator of FEMA.

6. Support:

FEMA shall be responsible for providing financial and administrative support to the Council. Within FEMA, the Risk Management Directorate of the Federal Insurance and Mitigation Administration provides this support.

7. Estimated Annual Operating Costs and Staff Years:

The estimated annual operating cost associated with supporting TMAC's functions is estimated to be \$800,000 for FY2019 and \$800,000 for FY2020. This includes surge support for all direct and indirect expenses. Three staff directly support the TMAC for a total of 1.5 FTE. One half-time, and two part-time FTEs.

8. Designated Federal Officer:

A full-time or permanent part-time employee of FEMA is appointed by the Administrator as the TMAC Designated Federal Officer (DFO). The FEMA Administrator may also appoint one or more Alternate DFOs. The DFO or an Alternate DFO approves or calls TMAC meetings, approves meeting agendas, attends all committee and subcommittee meetings, adjourns any meeting when the DFO determines adjournment to be in the public interest, and chairs meetings when requested in the absence of the Chair.

9. Estimated Number and Frequency of Meetings:

Meetings of the TMAC may be held with the approval of the DFO. The Council shall meet a minimum of two times each year at the request of the Chairperson or a majority of its members and may take action by a vote of the majority of the members.

Council meetings are open to the public unless a determination is made by the appropriate DHS official in accordance with DHS policy and directives that the meeting should be closed in accordance with Title 5, United States Code, subsection (c) of section 552b.

10. Duration:

Continuing

11. Termination:

This charter is in effect for two years from the date it is filed with Congress unless sooner terminated. The charter may be renewed at the end of this two-year period in accordance with section 14 of FACA.

12. Member and Designation:

Members of the Council are defined by Section 100215(b)(1) of the Biggert-Waters Flood Insurance Reform Act of 2012 and include four designated members and sixteen appointed members.

The four designated members of the Council serve as Regular Government Employees and consist of:

- The FEMA Administrator or the designee thereof;
- The Secretary of the Interior or the designee thereof;
- The Secretary of Agriculture or the designee thereof;
- The Under Secretary of Commerce for Oceans and Atmosphere or the designee thereof.

The sixteen additional members of the Council are appointed by the Administrator or designee. These members are appointed based on their demonstrated knowledge and competence regarding surveying, cartography, remote sensing, geographic information systems, or the technical aspects of preparing and using FIRMs.

To the maximum extent practicable, the membership of the Council will have a balance of Federal, State, local, tribal and private members, and include geographic diversity including representation from areas with coastline on the Gulf of Mexico and other States containing areas identified by the Administrator as at high risk for flooding or as areas having special flood hazard areas.

These members are selected from among the following professional associations or organizations:

- a. One member of a recognized professional surveying association or organization;
- b. One member of a recognized professional mapping association or organization;
- c. One member of a recognized professional engineering association or organization;
- d. One member of a recognized professional association or organization representing flood hazard determination firms;
- e. One representative of the United States Geological Survey;
- f. One representative of a recognized professional association or organization representing State geographic information;

- g. One representative of State national flood insurance coordination offices;
- h. One representative of the U.S. Army Corps of Engineers;
- i. One member of a recognized regional flood and storm water management organization;
- j. Two representatives of different State government agencies that have entered into cooperating technical partnerships with the Administrator and have demonstrated the capability to produce FIRMs;
- k. Two representatives of different local government agencies that have entered into cooperating technical partnerships with the Administrator and have demonstrated the capability to produce flood insurance maps;
- l. One member of a recognized floodplain management association or organization;
- m. One member of a recognized risk management association or organization; and
- n. One State mitigation officer.

The non-Federal members in a., b., c., d., i., l., m., and n. serve as Special Government Employees as defined in Title 18, United States Code, section 202(a), and must comply with all that requires (such as the annual filing of a new entrant Confidential Financial Disclosure Report (OGE 450)). The members in e., and h., serve as Regular Government Employees. The non-Federal members in f., g., j., and k. serve as representatives of their respective associations or organizations and are not Special Government Employees as defined in Title 18 of United States Code, section 202(a).

Members may serve terms of office of up to three consecutive years. The FEMA Administrator or his Designee may reappoint or extend members for additional terms up to a cumulative total of six consecutive years. When the TMAC terminates, all appointments to the Council shall terminate.

Officers:

The Council membership shall elect any one member to serve as Chairperson of the Council. The Chairperson shall preside over Council meetings in addition to specific responsibilities authorized under the Act.

13. Subcommittees:

The DFO may establish subcommittees for any purpose consistent with this charter. Such subcommittees may not work independently of the chartered committee and must present their work to the TMAC for full deliberation and discussion. Subcommittees have no authority to make decisions on behalf of the TMAC and may not report directly to the Federal government or any other entity.

14. Recordkeeping:

The records of the TMAC, established subcommittees, or other subgroups of the Council, shall be maintained and handled in accordance with General Records Schedule 6.2, or other approved agency records disposition schedule. These records are available for public inspection and

copying, in accordance with the *Freedom of Information Act* (Title 5, United States Code, section 552).

15. Filing Date:

July 16, 2019
Department Approval Date

July 19, 2019
CMS Consultation Date

July 22, 2019
Date Filed with Congress

Attachment F – TMAC Bylaws

**Federal Emergency Management Agency
Technical Mapping Advisory Council
Bylaws**

ARTICLE I AUTHORITY

As required by the *Biggert-Waters Flood Insurance Reform Act of 2012* (BW-12), codified at 42 United States Code Section 4101a, the Federal Emergency Management Agency (FEMA) Technical Mapping Advisory Council (TMAC) is established. The Technical Mapping Advisory Council shall operate in accordance with the provisions of the *Federal Advisory Committee Act* (FACA), as amended (Title 5, U.S.C., Appendix).

ARTICLE II PURPOSE

The Technical Mapping Advisory Council provides advice and recommendations to the Administrator of FEMA to improve the preparation of Flood Insurance Rate Maps (FIRMs). The Technical Mapping Advisory Council will examine performance metrics, standards and guidelines, map maintenance, delegation of mapping activities to State and local mapping partners, interagency coordination including leveraging budgets and expenditures across agencies, and other requirements mandated by the authorizing BW-12 legislation. In addition, the Technical Mapping Advisory Council provides advice and recommendations to the FEMA Administrator on future risks from climate change, rising sea levels, and FIRM development, as mandated by BW-12.

ARTICLE III MEMBERSHIP AND MEMBER RESPONSIBILITIES

Section 1. Composition.

Members of the Council include designated members and additional members appointed by the FEMA Administrator or his designee. See 42 U.S.C. § 4101a.

The designated members of the Council are:

- The FEMA Administrator or the designee thereof;
- The Secretary of the Interior or the designee thereof;
- The Secretary of Agriculture or the designee thereof; and,
- The Under Secretary of Commerce for Oceans and Atmosphere or the designee thereof.

The appointed members may be selected from among the following professional associations or organizations:

- A member of a recognized professional surveying association or organization;
- A member of a recognized professional mapping association or organization;

- A member of a recognized professional engineering association or organization;
- A member of a recognized professional association or organization representing flood hazard determination firms;
- A representative of the United States Geological Survey;
- A representative of a recognized professional association or organization representing State geographic information;
- A representative of State national flood insurance coordination offices;
- A representative of the Corps of Engineers;
- A member of a recognized regional flood and storm water management organization;
- Two representatives of different State government agencies that have entered into cooperating technical partnerships with the Administrator and have demonstrated the capability to produce FIRMs;
- Two representatives of different local government agencies that have entered into cooperating technical partnerships with the Administrator and have demonstrated the capability to produce flood insurance maps;
- A member of a recognized floodplain management association or organization;
- A member of a recognized risk management association or organization;
- A State mitigation officer.

Subject Matter Experts/Technical Advisors: The Technical Mapping Advisory Council may hear from subject matter experts/technical advisors (“SMEs”) who will be asked to provide specialized information or assistance as appropriate and approved by the Designated Federal Officer (DFO). Individual Technical Mapping Advisory Council members may request SMEs, by expertise or skillset, to appear before the Technical Mapping Advisory Council, as needed. Member requests will be made to the Chair for consideration and consultation with the Technical Mapping Advisory Council Designated Federal Officer (DFO). FEMA will not compensate SMEs for their services, but they may be reimbursed for travel and lodging expenses.

Section 2. Appointment.

With the exception of the Secretary of the Interior, Secretary of Agriculture, and Under Secretary of Commerce for Oceans and Atmosphere, members of the Technical Mapping Advisory Council are appointed by and serve at the pleasure of the FEMA Administrator in an advisory role. Membership is voluntary, and members are not compensated for their services. Appointments are personal to the member and cannot be transferred to another individual. Members may not designate someone to attend in their stead, participate in discussions, or vote. In compliance with FACA, members, while engaged in the performance of their duties away from their home or regular places of business, may be allowed travel

expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code.

Section 3. Terms of Office.

Members may serve terms of office of up to three consecutive years. The FEMA Administrator or his Designee may reappoint or extend members for additional terms up to a cumulative total of six consecutive years. When the Technical Mapping Advisory Council terminates, all appointments to the Council shall terminate.

Section 4. Certification of Non-Lobbyist Status.

All members of the Technical Mapping Advisory Council who serve as Special Government Employees (SGEs) must annually self-certify that they are not registered lobbyists under the Lobbying Disclosure Act, Title 2 U.S.C., Section 1603, and must advise the Department of Homeland Security (DHS) through the Federal Emergency Management Agency if they register as a lobbyist while serving on the Technical Mapping Advisory Council. Members who are SGEs and who register as a lobbyist after their appointment or re-appointment will be replaced on the Council.

Representative Members Lobbyist Status: Members of the Technical Mapping Advisory Council who serve as representatives of an association or organization and who are not SGEs shall register as required in accordance with the requirements of the Lobbying Disclosure Act if they engage in lobbying activities or are a lobbying contact as defined in 2 U.S.C. 1602. Any individual who so registers shall advise the DFO of such registration within 30 days of the registration or prior to the next meeting of the Technical Mapping Advisory Council, whichever occurs earlier.

Section 5. Members' Responsibilities.

Because the membership of the Technical Mapping Advisory Council is constructed to balance as many perspectives on floodplain mapping and future risk assessment as possible, member attendance and participation at meetings is vital to the Technical Mapping Advisory Council's mission. Members are expected to personally attend and participate in Council, subcommittee meetings, and conference calls. Members will also be expected to provide written input to any final reports or deliverables.

The DFO or Chair may recommend to the FEMA Administrator that any appointed member unable to fulfill their responsibility be replaced on the Council or subcommittee. Members of the Technical Mapping Advisory Council may be recommended for removal for reasons such as, but not limited to:

- a. Missing two consecutive meetings, including teleconference calls;

- b. Registering as a lobbyist after appointment; or,
- c. Engaging in activities that are illegal or violate the restrictions on members' activities as outlined below.

Section 6. Restriction on Members' Activities.

- a. Members may not use their access to the Federal Government as a member of this Council for the purpose of soliciting business or otherwise seeking economic advantage for themselves or their companies. Members may not use any non-public information obtained in the course of their duties as a member for personal gain or for that of their company or employer. Members must hold any non-public information in confidence.
- b. The Council as a whole may advise FEMA on legislation or recommend legislative action. In their capacities as members of the Technical Mapping Advisory Council, individual members may not petition or lobby Congress for or against particular legislation or encourage others to do so.
- c. Members of the Technical Mapping Advisory Council are advisors to the agency and have no authority to speak for the Council, FEMA, or for the Department outside the Council structure.
- d. Members may not testify before Congress in their capacity as a member of the Technical Mapping Advisory Council. If requested to testify before Congress, members of the Technical Mapping Advisory Council:
 - 1. Cannot represent or speak for the Council, DHS, any agency, or the Administration in their testimony;
 - 2. Cannot provide information or comment on Council recommendations that are not yet publicly available;
 - 3. May state they are a member of the Council; and,
 - 4. May speak to their personal observations as to their service on the Council.
- e. If speaking outside the Council structure at other forums or meetings, the restrictions in Section (d) also apply.

ARTICLE IV OFFICIALS

Section 1. Technical Mapping Advisory Council Leadership.

Technical Mapping Advisory Council members will elect a Chair through a nomination and formal vote. (The FEMA Administrator, or his designee, shall serve in this capacity until a Chair is elected.) The Chair will be responsible for appointing one or more Vice Chairs. The Chair and Vice Chairs will serve for a two-year term. The Chair may be reelected for one additional two-year term. In the event the DFO determines that an extension of term of a Chair or Vice Chair is necessary in order to complete their oversight of an outstanding task or report, not to exceed six months. If a Chair or Vice-chair is not able to serve for their

entire term, an additional election will be held. The Chair will select chairs for any subcommittee established. Only voting members can serve as subcommittee chairs.

Chair Responsibilities:

- a. Appoints officers to assist in carrying out the duties of the Technical Mapping Advisory Council;
- b. Works with the DFO to develop meeting agendas;
- c. Sets and maintains a schedule for Technical Mapping Advisory Council activities (e.g., report development);
- d. Works with the Technical Mapping Advisory Council membership to develop the draft annual report;
- e. Signs the final reports addressed to the FEMA Administrator;
- f. Coordinates with the DFO to form subcommittees with assigned areas of consideration;
- g. Selects subcommittee chairs and vice chairs;
- h. Resolves member conflicts.

Vice Chair Responsibilities:

- a. Works with subcommittee chairs to ensure work is being completed;
- b. Coordinates member engagement;
- c. Assists Chair in conducting review of meeting minutes and recommendation reports;
- d. Elevates any unresolved issues to the Chair;
- e. Serves as Chair in absence of the Chair.

Subcommittee Chair Responsibilities:

- a. Works with the DFO to develop subcommittee meeting agendas;
- b. Facilitates subcommittee discussions;
- c. Reports to the Chair and Vice Chair; and
- d. Reports out subcommittee work at Technical Mapping Advisory Council meetings.

Section 2. Designated Federal Officer.

The DFO and Alternate DFO (ADFO), if one or more is appointed, serves as FEMA's agent for all matters related to the Technical Mapping Advisory Council and are appointed by the FEMA Administrator. In accordance with the provisions of the FACA, the DFO or ADFO must:

- a. Approve or call meetings of the Council and its subcommittees;
- b. Approve agendas for Council and subcommittee meetings;
- c. Attend all meetings;

- d. Adjourn meetings when such adjournment is in the public interest; and,
- e. Chair meetings of the Council when directed to do so by the FEMA Administrator or when requested in the absence of the Chair.

In addition, the DFO is responsible for assuring administrative support functions are performed, including the following:

- a. Notifying members of the time and place of each meeting;
- b. Tracking all recommendations of the Council;
- c. Maintaining the record of members' attendance;
- d. Preparing the minutes of all meetings of the Council's deliberations, including subcommittee and working group activities;
- e. Attending to official correspondence;
- f. Maintaining official records and filing all papers and submissions prepared for or by the Council, including those items generated by subcommittees and working groups;
- g. Reviewing and updating information on Council activities in the Shared Management System (i.e., FACA database) on a monthly basis;
- h. Acting as the Council's agent to collect, validate and pay all vouchers for pre-approved expenditures; and
- i. Preparing and handling all reports, including the annual report as required by FACA.

ARTICLE V MEETING PROCEDURES

Section 1. Meeting Schedule and Call of Meetings.

Technical Mapping Advisory Council will meet in plenary sessions approximately two to four times a year, with additional virtual meetings as needed, at the discretion of the DFO. The Council may hold hearings, receive evidence and assistance, provide information, and conduct research, as it considers appropriate, subject to resources being made available. With respect to the meetings, it is anticipated that some may be held via teleconference, with public call-in lines. Technical Mapping Advisory Council meetings will be open to the public unless a determination is made by the appropriate FEMA official that the meeting should be closed in accordance with subsection (c) of section 5 USC, Section 552b, Government in the Sunshine Act .

Section 2. Agenda.

Meeting agendas are developed by the DFO in coordination with the Technical Mapping Advisory Council Chair. In accordance with the responsibilities under FACA, the DFO approves the agenda for all Council and subcommittee meetings, distributes the agenda to members prior to the meeting, and publishes the agenda for Council meetings in the Federal Register. Subcommittee meeting agendas

will be posted on FEMA's website, when they are available, and are not published in the Federal Register.

FEMA will publish the meeting notice and agenda in the Federal Register at least 15 calendar days prior to each Technical Mapping Advisory Council meeting or official public conference call. Once published in the Federal Register, the agenda items cannot be changed prior to or during a meeting.

Section 3. Quorum.

A quorum of the Technical Mapping Advisory Council is fifty percent plus one of the appointed Council members. In the event a quorum is not present, the Technical Mapping Advisory Council may conduct business that does not require a vote or decision among members. Votes will be deferred until such time as a quorum is present.

Section 4. Voting Procedures.

When a decision or recommendation of the Technical Mapping Advisory Council is required, the Chair will request a motion for a vote. A motion is considered to have been adopted if agreed to by a simple majority of a quorum of Technical Mapping Advisory Council members. Members vote on draft reports and recommendations in open meetings through a resolution recorded in the meeting minutes. Only members present at the meeting—either in person or by teleconference—may vote on an item under consideration. No proxy votes or votes by email will be allowed.

Section 5. Minutes.

The DFO will prepare the minutes of each meeting and distribute copies to each Council member. Minutes of open meetings will be available to the public on the Technical Mapping Advisory Council website at <http://www.fema.gov/TMAC>. The minutes will include a record of:

- a. The time, date, and place of the meeting;
- b. A list of all attendees including Council members, staff, agency employees and members of the public who presented oral or written statements;
- c. An accurate description of each matter discussed and the resolution, if any, made by the Council;
- d. Copies of reports or other documents received, issued, or approved by the Council; and
- e. An accurate description of public participation, including oral and written statements provided.

The DFO ensures that the Chair certifies the minutes within 90 calendar days of the meeting to which they relate and prior to the next Technical Mapping Advisory Council meeting.

Minutes of closed meetings will also be available to the public upon request subject to the withholding of matters about which public disclosure would be harmful to the interests of the Government, industry, or others, and which are exempt from disclosure under the *Freedom of Information Act* (FOIA) (5 U.S.C., section 552).

Section 6. Open Meetings.

Technical Mapping Advisory Council meetings shall be open and announced to the public in a notice published in the Federal Register at least fifteen calendar days before the meeting. Members of the public may attend any meeting or portion of a meeting that is not closed to the public and, at the determination of the Chair and DFO, may offer oral comment at such meeting. Meetings will include a period for oral comments unless it is clearly inappropriate to do so. Members of the public may submit written statements to the Technical Mapping Advisory Council at any time. All materials provided to the Council shall be available to the public when they are provided to the members. Such materials, including any submissions by members of the public, are part of the meeting record.

Section 7. Closed Meetings.

All or parts of Technical Mapping Advisory Council meetings may be closed in limited circumstances and in accordance with applicable law. No meeting may be partially or fully closed unless the component head issues a written determination that there is justification for closure under the provisions of subsection (c) of 5 United States Code 552b, the *Government in the Sunshine Act*. Where the DFO has determined in advance that discussions during a Council meeting will involve matters about which public disclosure would be harmful to the interests of the government, industry, or others, an advance notice of a closed meeting, citing the applicable exemptions of the *Government in the Sunshine Act*, will be published in the Federal Register. The notice may announce the closing of all or just part of a meeting. If, during the course of an open meeting, matters inappropriate for public disclosure arise during discussions, the DFO or Chair will order such discussion to cease and will schedule it for a future meeting of the Council that will be approved for closure. No meeting or portion of a meeting may be closed without prior approval and notice published in the Federal Register at least 15 calendar days in advance. Closed meetings can only be attended by DFO, Council members, and necessary agency staff members. Presenters must leave immediately after giving their presentations and answering any questions.

Section 8. Other Meetings, No Public Notice Required.

Public notice is not required for meetings of administrative or preparatory work. Administrative work is a meeting of two or more Technical Mapping Advisory Council or subcommittee members convened solely to discuss administrative matters or to receive administrative information from a Federal officer or agency. Preparatory work is a meeting of two or more Technical Mapping Advisory Council or subcommittee members convened solely to gather information, conduct research, or analyze relevant issues and facts in preparation for a Technical Mapping Advisory Council meeting or to draft position papers for consideration by the Technical Mapping Advisory Council.

ARTICLE VI EXPENSES AND REIMBURSEMENTS

Expenses related to the operation of the Technical Mapping Advisory Council will be paid by the Federal Insurance and Mitigation Administration. Expenditures of any kind must be approved in advance by the DFO. All such expense reports will be sent to the DFO for action and reimbursement. The DFO will be responsible for handling the payment of expenses. Members are responsible for submitting expense reports by the deadlines set by the DFO or they may not be reimbursed. The DFO will be responsible for developing the procedures for expense reimbursement.

ARTICLE VII ADMINISTRATION

The Federal Insurance and Mitigation Administration shall be responsible for providing financial and administrative support to the Technical Mapping Advisory Council subject to the availability of appropriations.

ARTICLE VIII SUBCOMMITTEES

Section 1. Establishment of subcommittees.

The DFO may establish standing subcommittees with an overarching mission to work on specific focus areas and provide advice to the Technical Mapping Advisory Council on a continuing basis. The DFO may also establish ad-hoc subcommittees to work and report on specific focus areas. The number, designation, mission, scope, and membership of subcommittees are determined by the DFO in consultation with the Chair and Vice Chairs. The Chair may also request of the DFO to establish (or reorganize) a subcommittee. The creation and operation of the subcommittees must be approved by the DFO on behalf of FEMA.

Subcommittee Members: Technical Mapping Advisory Council subcommittees may consist of Technical Mapping Advisory Council members and non-Technical Mapping Advisory Council members as limited below. Technical

Mapping Advisory Council members may be named to serve on a specific subcommittee and may contribute to others as requested.

Subcommittees will not function independently of the Technical Mapping Advisory Council or provide advice or recommendations directly to FEMA. Subcommittees (standing and ad-hoc) must present all advice, recommendations, and reports to the full Technical Mapping Advisory Council during a public meeting or teleconference for discussion, deliberation, and final approval. In general, the requirements of FACA do not apply to subcommittees of advisory committees that report a parent advisory committee and not directly to a Federal officer or agency. However, minutes must be maintained for the public record and the DFO and/or ADFO must participate in all subcommittee proceedings.

Section 2. Membership.

Subcommittee membership should be balanced in relation to the subcommittee's mission and focus areas. The DFO and the Chair, with input from Council members, identify and determine the membership for the subcommittee, including a chair (and vice chair if deemed necessary).

Subcommittee chairs may request the DFO to invite non- Technical Mapping Advisory Council individuals to serve on the subcommittee, as necessary. Only Technical Mapping Advisory Council members may serve as the chair or vice chair of a subcommittee (standing or ad-hoc). The subcommittee chair can also advise the DFO that briefings from external subject matter experts are needed to provide pertinent and vital information not available among the current Technical Mapping Advisory Council membership or from Federal staff. All such requests shall be made to the DFO who will facilitate the process to obtain non-council members for their subject matter expertise.

Section 3 Subcommittee Quorum

A Subcommittee quorum consists of: (1) the presence (either in person or by teleconference) of fifty percent plus one of Technical Mapping Advisory Council members currently appointed to the Subcommittee; and (2) Technical Mapping Advisory Council members make up more than a third of the Subcommittee members present. In the event a Subcommittee quorum is not present, the Subcommittee may conduct business that does not require a vote or decision among members. Votes will be deferred until such time as a quorum is present.

Section 4 Subcommittee Voting Procedures

When a decision or recommendation of the Subcommittee is required, and a Subcommittee Quorum as defined above is present, the Subcommittee Chair may request a motion for a vote. A motion is considered to have been adopted if agreed to by a simple majority of the Technical Mapping Advisory Council

Subcommittee members present. Members may vote on draft reports and recommendations that will be presented to the full Technical Mapping Advisory Council. Only members present at the meeting—either in person or by teleconference—may vote on an item under consideration. No proxy votes or votes by email will be allowed.

Section 5. Focus Areas

Focus Areas are identified areas of consideration for the Council to review, either via subcommittee or by the Technical Mapping Advisory Council through discussion as an entire body. The DFO will determine focus areas in consultation with the Technical Mapping Advisory Council Chair. The DFO will then work with the Chair and Vice Chair to identify whether the focus area should be assigned to a standing subcommittee, an ad hoc subcommittee; or submitted to the Technical Mapping Advisory Council for discussion and review.

Section 6. Workload and meetings.

Subcommittees may have more than one focus area to address. Subcommittee chairs will recommend the appropriate number of conference calls necessary to address focus areas, working in coordination with the DFO.

The subcommittee chair determines what materials are needed to prepare a response and develop a report to the Technical Mapping Advisory Council. The DFO will supply the requested materials to the Technical Mapping Advisory Council subcommittee upon request and resource availability.

ARTICLE IX RECOMMENDATIONS AND REPORTING

P.L. 112-141 directs Technical Mapping Advisory Council to submit an annual report to the Administrator that contains a description of the activities of the Council; an evaluation of the status and performance of flood insurance rate maps and mapping activities to revise and update flood insurance rate maps; and a summary of recommendations made by the Council to the Administrator.

Once the Technical Mapping Advisory Council achieves consensus on a report and recommendations, the Technical Mapping Advisory Council Chair is responsible for providing a final version of the report to the FEMA Administrator. The final report and any accompanying memoranda will be posted on the Technical Mapping Advisory Council website.

ARTICLE X RECORDKEEPING

The DFO maintains all records of the advisory Council in accordance with the General Records Schedule 6.2, or other approved agency, or FEMA policies and procedures records disposition schedule. These records shall be available for public inspection and copying, in accordance with the *Freedom of Information Act* (Title 5, United States Code, section 552).. All documents,

reports, or other materials presented to, or prepared by or for the Council, constitute official government records and are available to the public upon request.

ARTICLE XI BYLAWS APPROVAL AND AMENDMENTS

The DFO may amend these bylaws at any time, and the amendments shall become effective immediately upon approval by the DFO/ADFO.



Michael Nakagaki
Designated Federal Officer

Date approved: June 10, 2019

Attachment G –
Summary of Previous
TMAC Goals,
Recommendations,
and Implementation
Actions

GOAL 1: ACCURATE DATA, MODELS, AND RISK ASSESSMENTS

AR 2

Develop national program 5-year plan.

AR 3

Develop national program goals and metrics.

AR 4

Work with partners to ensure topo data is collected to Federal standards.

AR 5

Document horizontal and vertical accuracy of topo data.

AR 6

Review updated statistical models (Bulletin 17C).

AR 7

Develop guidance for selection and use of riverine and coastal models.

AR 8

Develop guidance related to coastal two-dimensional storm surge modeling.

AR 9

Update coastal event-based erosion methods.

FC 1

Provide future conditions flood risk products using standardized timeframes.

FC 2

Identify and quantify accuracy and uncertainty of data.

FC 3

Provide flood hazard products for coastal areas that includes erosion and sea level rise (SLR) using scenario approach.

FC 4

Provide flood hazard products for riverine areas that include future conditions.

FC 5

Generate future conditions data to frame and communicate messages.

FC 6

Perform demonstration projects.

FC 7

Future conditions should be consistent with existing conditions analysis and future conditions scenarios. PR 1 Adopt AR15 recommendations that relate to the technical credibility of the program.

PR 2

Adopt FC report recommendations 1-7.

PR 3

Complete implementation of the statutory requirements of the National Flood Mapping Program.

PR 4

Enhance communication and transparency with stakeholders.

PR 5

Investigate offering multi-year program management grants to Cooperating Technical Partnerships (CTP).

PR 6

Facilitate, partner, and leverage high-resolution topo data.

PR 7

Work with partners to examine ways to shorten the study process.

PR 8

Move to database-driven, digital display of flood hazard data.

PR 9

Identify residual risk associated with levees, other flood control structures, and dams.

PR 10

Replace Zone D designation for non-accredited levees with more appropriate risk zones.

PR 11

Evaluate program metrics to better measure efficient production, valid inventory and stakeholder acceptance.

PR 12

Include an inventory metric that reports quantity, quality, and time aspects for all levels of geography.

PR 13

Include a metric that shows progress towards the digital platform.

PR 14

Evaluate benefits and costs and value to the Nation as a result of different funding levels of the National Flood Mapping Program.

AR 23

Develop, flood risk-rated insurance premiums for all structures based on the nature and severity of the flood hazard, structure elevation, and other characteristics.

AR 24

Communicate the cost of risk-rated insurance today and over time, including the benefits and cost that mitigation measures will have on premiums.

AR 28

Develop a series of stakeholder-tested mapping prototype products aimed at more effectively communicating residual flood risk related to levees, dams, and event-driven coastal erosion.

AR 29

Initiate stakeholder needs assessments to identify end users' highest priority needs for future conditions products and services that support its current flood-related programs and their evolution over time.

AR 32

Modify its Flood Hazard Mapping Key Decision Point Process and adopt criteria to weigh the value of providing non-regulatory projects.

AR 33

Share and communicate data that support historical, future, and probabilistic analyses of coastal, fluvial, and pluvial flood hazards; work with other agencies to support integrated water resources management and encourage data sharing.

AR 34

Include areas previously identified as SFHAs as part of non-regulatory products suite that are easily maintained, support and communicate actuarial rating and empower informed decisions by property owners and SLTT agencies.

GOAL 2: TIME AND COST-EFFICIENT GENERATION OF DATA

AR 11

Update the Mapping Information Platform (MIP) to add greater flexibility.

AR 12

Determine cost impact due to new program requirements.

AR 13

Integrate process for mass LiDAR-based Letters of Map Amendment (LOMA).

GOAL 3: UTILIZATION OF COST-EFFICIENT TECHNOLOGIES

AR 16

Transition to a database-derived, digital display environment.

GOAL 4: INTEGRATED FLOOD RISK MANAGEMENT FRAMEWORK

AR 10

Transition to structure-specific flood frequency determination.

AR 14

Transition to structure-specific risk assessment.

AR 25

As FEMA transitions away from the 1-percent-annual-chance line, a current and future conditions risk score for existing and proposed structures should be developed.

AR 26

Coordinate with floodplain managers and mitigation planners to identify and test data and tools needed to support floodplain management and mitigation as it moves away from the 1-percent-annual-chance line.

AR 27

Develop, in coordination with stakeholders, a transition plan for moving away from the 1-percent-annual-chance line.

GOAL 5: AWARENESS OF FLOOD HAZARD AND RISK DATA

AR 1

Implement a process to assess the needs of users.

AR 15

Communicate messages that consider long-term resilience strategies.

AR 30

Establish a Special Flood Hazard Area Boundary Zone.

AR 31

Conduct behavioral risk audits and address bias on how individuals process information on flood risk to their property.

GOAL 6: ADDED VALUE PARTNERING AND LEVERAGING

AR 17

Consider National Academy of Public Administration (NAPA) recommendations on agency cooperation and federation.

AR 18

Partner to ensure availability of accurate water level and stream flow data and enhance the National Hydrography Dataset (NHD).

AR 19

Implement strategies to incentivize stakeholders to increase partnerships.

AR 20

Develop measures to evaluate CTP capabilities and competencies and increase responsibilities.

AR 21

Establish a National Flood Hazard Risk Management Coordination Committee.

GOAL 7: PERMANENT, SUBSTANTIAL PROGRAM FUNDING

AR 22

Define financial needs to implement recommendations.

Key	
Recommendation Sources:	
AR	TMAC 2015 Annual Report or TMAC 2016 Annual Report
FC	TMAC Future Conditions Risk Assessment and Modeling (2015)
PR	TMAC National Flood Mapping Program Review (2016)
Acronyms:	
CTP	Cooperating Technical Partner
KDP	Key Decision Point
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
MIP	Mapping Information Platform
NAPA	National Academy of Public Administration
NFIP	National Flood Insurance Program
NHD	National Hydrology Dataset
SLR	Sea Level Rise



INITIATIVES

Structure-Based Risk Assessments

BENEFIT: Transform the NFIP to protect current and future generations

National Program 5 Year Plan

BENEFIT: Increase transparency and leveraging of Federal funds

Future Conditions

BENEFIT: Stop building future problems

RECOMMENDATION / IMPLEMENTATION ACTION	
AR 1 (2015)	<p>FEMA should establish and implement a process to assess the present and anticipated flood hazard and flood risk products to meet the needs of various users. As part of this process, FEMA should routinely:</p> <ol style="list-style-type: none"> a) Conduct a systematic evaluation of current regulatory and non-regulatory products (data, maps, reports, etc.) to determine if these products are valued by users, eliminating products which do not cost-effectively meet needs; b) Consider user requirements prior to any updates or changes to data format, applications, standards, products, or practices are implemented; c) Proactively seek to provide authoritative, easy to access and use, timely, and informative products and tools; and d) Consider future flood hazards and flood risk. <p>Former Numbering IA16 2.1 (New Numbering AR 1.1) FEMA should construct and implement and measure the effectiveness of public communication strategies that reflect how individuals acquire and process information on low- probability, high-consequence events. The strategies would include:</p> <ul style="list-style-type: none"> • Using a variety of media to illustrate and communicate flood hazard and risk information to different audiences and generational groups; • Illustrating location-specific inundation levels by working with private-sector mapping companies and other partners to integrate street-level photos with overlays of flood levels at multiple return intervals into FEMA's mapping platform; • Working with real estate listing services to display flood hazard and risk information data for their customers; and • Displaying historical flood information, including flood boundaries and depths, where available.
AR 2 (2015)	<p>FEMA should develop a national five-year flood hazard and risk assessment plan and prioritization process that aligns with program goals and metrics (see Recommendation 3). This should incorporate a rolling five-year plan to include the establishment and maintenance of new and existing studies and assessments in addition to a long-term plan to address the unmapped areas. Mapping and assessment priorities should be updated annually with input from stakeholders (e.g., Multi- Year Hazard Identification Plan). The plan should be published and available to stakeholders.</p> <p>Former Numbering IA16 1.1 (New Numbering AR 2.1) FEMA should publish the State Geographic Information System (GIS) Standard Operating Procedures on a graphical web interface so that sources of local geospatial information are readily available to everyone.</p> <p>Former Numbering IA16 3.1 (New Numbering AR 2.2) FEMA should develop, with input from stakeholders, a list of factors to be used for prioritizing flood hazard and risk assessment studies across the country.</p>
AR 3 (2015)	<p>FEMA should develop National Flood Hazard and Risk Assessment Program goals that include well-defined and easily quantifiable performance metrics. Specifically, the program goals should include metrics for the following:</p> <ol style="list-style-type: none"> a) Maintaining an inventory of valid (verified), expiring, unverified, and unknown flood hazard miles; b) Addressing the non-modernized areas of the Nation and unstudied flood hazard miles; c) Conducting flood risk analysis and assessments on the built environment; and d) Counting population having defined floodplains using a stream-level performance indicator for a better representation of study coverage. <p>Former Numbering IA16 3.2 (New Numbering AR 3.1) FEMA should merge the Coordinated Needs Management Strategy (CNMS) and Risk Mapping, Assessment, and Planning (Risk MAP) Progress websites so users can see in one place what needs updating and what is being updated.</p>

	Former Numbering IA16 3.3 (New Numbering AR 3.2) FEMA should evaluate whether adding the number or density of Light Detection and Ranging (LiDAR)-based Letters of Map Amendment (LOMAs) to Secondary Element contributes to the CNMS metric effectiveness.
AR 4 (2015)	FEMA should work with Federal, State, local, and Tribal partners to ensure topographic, geodetic, water-level, and bathymetry data for the flood mapping program is collected and maintained to Federal standards. Future FEMA topographic and bathymetric LiDAR acquisition should be consistent with 3D Elevation Program (3DEP) and Interagency Working Group on Ocean and Coastal Mapping standards, and all geospatial data for the flood mapping program should be referenced to current national datums and the National Spatial Reference System. Water level gage datums for active gages should be referenced to current national datums and the National Spatial Reference System and, to the extent practical, datums for inactive gages should be converted to meet these standards.
AR 5 (2015)	FEMA should document the horizontal and vertical accuracy of topographic data input to flood study models and the horizontal and vertical accuracy of topographic data used to delineate the boundaries of the flood themes. These data should be readily available to users, and clearly reported with products.
AR 6 (2015)	FEMA should periodically review and consider use of new publicly available statistical models, such as the proposed Guidelines for Determining Flood Flow Frequency, Bulletin 17C, for flood-frequency determinations.
AR 7 (2015)	Riverine. FEMA should develop guidelines, standards, and best practices for selection and use of riverine models appropriate for certain geographic, hydrologic, and hydraulic conditions. a) Provide guidance on when appropriate models would be 1-D vs. 2-D, or steady state vs. unsteady state, b) Support comparative analyses of the models and dissemination of appropriate parameter ranges; and c) Develop quality assurance protocols. Coastal. FEMA should develop guidelines, standards, and best practices for selection and use of coastal models appropriate for certain geographic, hydrologic, and hydraulic conditions. a) Provide guidance on when appropriate models would be 1-D vs. 2-D, b) Support comparative analyses of the models and dissemination of appropriate parameter ranges, and c) Develop quality assurance protocols.
AR 8 (2015)	FEMA should develop standards, guidelines, and best practices related to coastal 2-D storm surge modeling in order to expand the utility of the data and more efficiently perform coastal flood studies.
AR 9 (2015)	FEMA should review and update existing coastal event-based erosion methods for open coasts and develop erosion methods for other coastal geomorphic settings.
AR 10 (2015)	FEMA should transition from identifying the 1-percent-annual-chance floodplain and associated Base Flood Elevation (BFE) as the basis for insurance rating purposes to a structure-specific flood frequency determination and associated flood elevations. Former Numbering IA16 1.2 (New Numbering AR 10.1) FEMA should develop a strategy for obtaining the building footprints and relevant building elevations of properties throughout the Nation to be used in determining structure-based flood risk. Former Numbering IA16 6.1 (New Numbering AR 10.2) FEMA and its partners should identify data needs and standards for developing and maintaining accurate, location-specific flood frequency information, including associated flood conditions (e.g., velocity, waves, erosion, duration), for both present and future flood conditions. Former Numbering IA16 6.4 (New Numbering AR 10.3) FEMA should perform a demonstration(s) to learn from and document data requirements, processes, and standards necessary for nationwide implementation for structure-based risk assessment.
AR 11 (2015)	FEMA should modify the current workflow production process and supporting management system, the Mapping Information Platform (MIP), to reduce unnecessary delays created by redundant tasks and the inflexibility of the system. The process and system are not currently designed to properly manage non-

regulatory products or products that do not fit predefined footprints. FEMA should modify the system to enable flexibility in project scope and size, such as the choice of watershed size, not limiting projects to only the hydrologic unit code 8 (HUC8).

Former Numbering IA16 4.1 (New Numbering AR 11.1) FEMA should develop a process for reviewing various aspects of the Flood Insurance Study (FIS) workflow and procedures to ensure that:

- Workflow efficiencies and cost-effectiveness, including during the Key Decision Point (KDP) process, are encouraged;
- Complementary reporting systems are integrated;
- Revisions to the FIS workflow and procedures incorporate a dynamic, digital display environment system;
- All internal paperwork required for publishing the notice in the Federal Register is reviewed;
- Best Management Practices are incorporated; and
- Guidance from FEMA HQ and/or Regional offices is documented and shared.

Former Numbering IA16 4.2 (New Numbering AR 11.2) FEMA should take into consideration the following items at the next review of the MIP system:

- Integrate the MIP and KDP process into one system.
- Provide mapping partners more visibility on Data Validation Tasks (i.e., who is responsible for these tasks at the Regional office) and ensure more proactive coordination is implemented before and after the data validation tasks.
- The MIP should take into account the uniqueness of Cooperating Technical Partners (CTPs) and enable more flexibility in all areas of the flood production process, including product upload, geographic areas, metadata requirements, and Quality Assurance/Quality Control (QA/QC) reviews.
- Transition the MIP to a geodatabase system, similar to the CNMS, in which information is saved geospatially and used to run customized queries and reporting for Regional offices, mapping partners, and CTPs.
- Enhance functionality to create auto-generation of template correspondence (e.g., Summary of Map Actions [SOMA] letters).
- Provide greater flexibility in user controls.
- Provide additional user access to related information.
- Add risk product workflows.
- Integrate an efficient solution to seamless mapping or HUC or State geographic areas.

Former Numbering IA16 4.3 (New Numbering AR 11.3) FEMA Regions should clearly document and communicate MIP workflow validation and QA/QC procedures, correspondence protocols and approvals, documentation requirements, and other Region-specific guidance expectations of the flood study process. Additionally, FEMA Regions should regularly update partners with staff changes and roles and responsibilities for the Regional staff.

Former Numbering IA16 4.4 (New Numbering AR 11.4) FEMA Headquarters (HQ) should develop additional guidance and training for mapping partners related to the Code of Federal Regulations (CFR) requirements for due process and Federal Register notifications. Regions should also be encouraged to create addendums that communicate their specific requests and internal timelines for their coordination activities with Production Technical Services (PTS) contractors and CTPs.

Former Numbering IA16 4.5 (New Numbering IA 11.5) The TMAC recommends that FEMA work with the Customer and Data Services (CDS) contractor to evaluate the ability to migrate the MIP into a relational database system that can access data from other components of the flood insurance study program, such as a revised version of the Flood Insurance Rate Map (FIRM) database. Further efficiencies in reporting, data integration, and archival processes can occur if both a MIP database and FIRM database systems can

	relate to one another.
AR 12 (2015)	FEMA, in its update of guidance and standards, should determine the cost impact when new requirements are introduced and provide guidance to consistently address the cost impact for all partners.
AR 13 (2015)	FEMA should develop guidelines and procedures to integrate a mass LiDAR-based LOMA process into the National Flood Hazard and Risk Assessment Program. As part of this process, FEMA should also evaluate the feasibility of using parcel and building footprint data to identify eligible “out as shown” structures as an optional deliverable during the flood mapping process.
AR 14 (2015)	<p>FEMA and its mapping partners, including the private sector, should transition to a flood risk assessment focus that is structure specific. Where data are available, FEMA and its partners should contribute information and expertise consistent with their interests, capabilities, and resources toward this new focus.</p> <p>a) A necessary prerequisite for accurate flood risk assessments is detailed flood hazard identification, which must also be performed to advance mitigation strategies and support loss estimations for insurance rating purposes.</p> <p>b) FEMA should initiate dialogue with risk assessment stakeholders to identify potential structure-specific risk assessment products, displays, standards, and data management protocols that meet user needs.</p> <p>c) FEMA and its partners should develop guidelines, best practices, and approaches to implementing structure-specific risk assessments.</p> <p>Former Numbering IA16 6.2 (New Numbering AR 14.1) FEMA and its partners should identify data needs and standards for developing and maintaining accurate structure characteristics needed for risk estimation. Included in this should be a review of building characteristics data in existing flood risk estimation models, projects, programs, and databases.</p> <p>Former Numbering IA16 6.3 (New Numbering AR 14.2) FEMA and its partners should review and, if needed, modify flood damage functions to better capture structure-specific damage resulting from various flood hazards.</p>
AR 15 (2015)	FEMA should leverage opportunities to frame and communicate messages to stakeholders in communities, so they understand the importance of addressing the flood risk today and consider long-term resilience strategies. Messages should be complemented by economic incentives, such as low-interest loans and mitigation grants, that lead community leaders and individuals to undertake cost-effective risk reduction measures.
AR 16 (2015)	<p>FEMA should transition from the current panel-based cartographic limitations of managing paper maps and studies to manage NFIP data to a database derived, digital-display environment that is fully georeferenced and relational, enabling a single digital authoritative source of information and database-driven displays. Towards this transition, FEMA should:</p> <p>a) Prepare a multi-year transition plan to strategically transition all current cartographic and/or scanned image data to a fully georeferenced enterprise relational database.</p> <p>b) Update required information for map revisions (MT-2 application forms) and Letter of Map Change (LOMC) applications to ensure accurate geospatial references, sufficient data to populate databases, and linkages to existing effective data.</p> <p>c) Adopt progressive data management approaches to disseminate information collected and produced during the study and revision process, including LOMCs.</p> <p>d) Ensure that the data management approach described in (c) is sufficiently flexible to allow efficient integration, upload, and dissemination of NFIP and stakeholder data (e.g., mitigation and insurance data that are created and maintained by Other Federal Agencies [OFA]), and serve as the foundation for creating all digital display and mapping products.</p> <p>e) Provide a mechanism for communities to readily upload jurisdictional boundary data, consistent with requirements to participate in the NFIP, as revised, allowing other stakeholders access.</p>

	<p>Former Numbering IA16 5.1 (New Numbering AR 16.1) FEMA should implement the following features into a future, dynamic, database-derived, digital display environment to manage the update, maintenance, and dissemination of all flood hazards and risk data across the country:</p> <ul style="list-style-type: none"> • Data are geospatial and captured in a relational geodatabase. • Data can be dynamically queried and displayed (point and click). • Develop a new website that features user-specific inputs, and where data provide one access point for multiple sources of flood hazard data and risk assessment information. • Products are developed on-the-fly using dynamic data calling features. • The new website and database support scalability, based on data availability, population, flood frequency and population impacted, and flood insurance penetration. <p>Former Numbering IA16 5.2 (New Numbering AR 16.2) FEMA should perform a demonstration(s) to learn from and document data requirements, processes, and standards necessary for nationwide implementation of a geodatabase- derived, digital display environment.</p> <p>Former Numbering IA16 5.3 (New Numbering AR 16.3) FEMA should utilize the National Flood Hazard Risk Management Coordination Committee to implement the TMAC’s vision, including the new database-derived, digital display environment.</p>
AR 17 (2015)	FEMA should consider National Academy of Public Administration (NAPA) recommendations on agency cooperation and federation (6, 7, 8, 9, 13, and 15) and use them to develop more detailed interagency and intergovernmental recommendations on data and program-related activities that can be more effectively leveraged in support of flood mapping.
AR 18 (2015)	FEMA should work with Federal, State, local, and Tribal agencies, particularly the U.S. Geological Survey (USGS) and the National Ocean Service, to ensure the availability of the accurate water level and streamflow data needed to map flood hazards. Additionally, FEMA should collaborate with USGS to enhance the National Hydrography Dataset to better meet the scale and resolution needed to support local floodplain mapping, while ensuring a consistent national drainage network.
AR 19 (2015)	<p>FEMA should develop and implement a suite of strategies to incentivize communities, nongovernment organizations, and private sector stakeholders to increase partnering and subsequent contributions for flood hazard and risk updates and maintenance.</p> <p>Former Numbering IA16 7.2 (New Numbering AR 19.1) FEMA should investigate opportunities and obstacles to implementing multi-year funding cooperative agreements that complement the five-year CTP Plan.</p> <p>Former Numbering IA16 7.3 (New Numbering AR 19.2) FEMA should facilitate and fund demonstration projects for CTPs to incentivize program innovation and efficiencies.</p>
AR 20 (2015)	<p>FEMA should work with CTPs to develop a suite of measures that communicate the project management successes, competencies, and capabilities of CTPs. Where CTPs demonstrate appropriate levels of competencies, capabilities, and strong past performance, FEMA should further entrust additional hazard identification and risk assessment responsibilities to CTPs.</p> <p>Former Numbering IA16 7.1 (New Numbering AR 20.1) FEMA should evaluate the LOMC Review Partnership pilot program and develop clear program requirements, responsibilities, and performance metrics. This information should be used to formally establish the LOMC Review Partnership program, and increase the number of designated communities, where appropriate.</p>
AR 21 (2015)	To ensure strong collaboration, communication, and coordination between FEMA and its CTP mapping partners, FEMA should establish a National Flood Hazard and Risk Management Coordination Committee. The role of the committee should be focused around the ongoing implementation of the

	five-year Flood Hazard Mapping and Risk Assessment Plan. FEMA should add other members to the committee that have a direct bearing on the implementation of the plan.
AR 22 (2015)	FEMA should define the financial requirements to implement the TMAC’s recommendations and to maintain its investment in the flood study inventory.
AR 23 (2016)	FEMA should develop, in conjunction with others in the public and private sectors, flood risk-rated insurance premiums for all structures within and outside the identified Special Flood Hazard Area (SFHA). These premiums should be based on the nature and severity of the flood hazard, structure elevation, and other characteristics, as well as structure damage functions and vulnerability.
AR 24 (2016)	FEMA should communicate to the property owner and other interested parties the cost of risk-rated insurance today and over time for new and existing structures to make the risk transparent. These data should include the benefits and cost that mitigation measures will have on these premiums.
AR 25 (2017)	As FEMA transitions away from the 1-percent-annual-chance line, a risk score for existing and proposed structures should be developed. Each structure should be assigned a current conditions risk score and a future conditions risk score. AR 25.1 FEMA should perform pilot projects utilizing risk scores to determine the best data and methods to accurately calculate structure-specific risk for floodplain management for existing and new structures.
AR 26 (2017)	FEMA should coordinate with floodplain managers and mitigation planners to identify and test data and tools needed to support floodplain management and mitigation as it moves away from the 1-percent-annual-chance line. AR 26.1 FEMA should perform pilot projects to understand the implications and opportunities for floodplain management in regard to moving to risk scores and determine other relevant data. AR 26.2 FEMA should perform pilot projects to determine possible alternatives or modifications to the floodway concept.
AR 27 (2017)	FEMA should develop, in coordination with stakeholders, a transition plan for moving away from the 1-percent-annual- chance flood line.
AR 28 (2017)	FEMA should develop a series of mapping prototype products aimed at more effectively communicating residual flood risk related to levees, dams, and event-driven coastal erosion. Products developed should incorporate end user and stakeholder testing, and FEMA should develop standards for routine production and presentation, if applicable. AR 28.1 FEMA should conduct pilot projects with communities and other stakeholders to evaluate how effective the prototypes are at communicating residual risk. AR 28.2 Once prototypes are developed and evaluated, FEMA should leverage the existing flood study process and other community engagement touchpoints to communicate residual risk. AR 28.3 FEMA should refine existing non-regulatory products and develop new non-regulatory products to clarify coastal flood risks in the vicinity of erodible features, and highlight the spatial areas affected by event-driven coastal erosion and Primary Frontal Dune (PFD) delineation. Possible products include: <ul style="list-style-type: none"> • Delineation of model results in the vicinity of the eroded PFD • Representation of the regulatory flood zones in the absence of an erodible dune feature
AR 29 (2017)	FEMA should initiate stakeholder needs assessments to identify end users’ highest priority needs for future conditions products and services that support its current flood-related program and the program's evolution over time. AR 29.1 FEMA should engage a broad array of Federal, State, Tribal, and community-level stakeholders,

	<p>private-sector stakeholders, and partners throughout the design, planning, execution, and interpretation of the Needs Assessment.</p> <p>AR 29.2 FEMA should ensure that the Needs Assessment collects information on users’ intended applications and addresses key analytical variables, such as relevant timeframe(s), spatial resolution, level of study, future conditions scenarios (e.g., land use, erosion, sea level rise), product type, uncertainty, and visualization preferences.</p> <p>AR 29.3 FEMA should integrate an ongoing future conditions needs gathering step as part of the standard flood study process and during other local community engagement touchpoints, and use the information gained to adapt FEMA’s products to respond to evolving user needs and advancements in science and technology.</p>
AR 30 (2018)	FEMA should establish upper and lower bounds for the 1%-annual-chance exceedance flood elevation using a confidence interval size of their choosing and use those limits to map the SFHA “Boundary Zone”—the area where this SFHA boundary is most likely to be. FEMA should share SFHA Boundary Zone information with the public, and other key interested parties, test how it is received, and make improvements prior to formalizing any specific standards or policy for routine map updates.
AR 31 (2018)	As part of efforts to communicate uncertainty, FEMA should periodically conduct behavioral risk audits and address the biases that characterize how individuals process information on flood risk to their property. The audits and actions taken (including language regarding the likelihood of flooding) to address biases will also help other key stakeholders, such as floodplain managers, local officials, lenders, developers, and real estate agents, to encourage property owners to invest in cost-effective mitigation measures and purchase flood insurance before the next flood occurs.
AR 32 (2018)	FEMA should modify its Flood Hazard Mapping Key Decision Point Process and adopt criteria to weigh the value of providing non-regulatory projects even where the development of Flood Insurance Rate Maps (FIRMs) or Flood Insurance Studies (FISs) is not warranted.
AR 33 (2018)	Building from AR16, FEMA should share and communicate data that can help drive decisions toward purchasing flood insurance, mitigation prioritization, and reducing risk. This data should support historical, future, and probabilistic analyses of coastal, fluvial, and pluvial flood hazards. FEMA should work with other agencies to assist data collection, creation, and sharing to support integrated water resources management and encourage data sharing.
AR 34 (2018)	To increase insurance coverage, expanding on AR28, FEMA should include, as part of their non- regulatory products suite, areas previously identified as SFHAs, including information available in the Community Information System, and areas of previous flooding. This information should be easily maintained, support and communicate the actuarial rating of NFIP flood insurance, and empower informed decisions by property owners and local, regional, Tribal, and State agencies.
FC 1 (2015)	<p>Provide future conditions flood risk products, tools, and information for coastal, Great Lakes, and riverine areas. The projected future conditions should use standardized timeframes and methodologies wherever possible to encourage consistency and should be adapted as actionable science evolves.</p> <p>Former Numbering 3-4 (New Numbering FC 1.1) FEMA should define a future population metric that uses a standard future population database along with various budget scenarios for keeping the data current to predict the percent of the population covered at various points in the future.</p> <p>Former Numbering 3-5 (New Numbering FC 1.2) FEMA should take into account future development (excluding proposed flood control structures for the base condition/scenario) for future conditions mapping. An additional scenario can be generated that does include future flood control structures.</p> <p>Former Numbering 3-6 (New Numbering FC 1.3) FEMA should use population growth as an indicator of</p>

	<p>areas with increased potential flood risk.</p> <p>Former Numbering 4-4 (New Numbering FC 1.4) FEMA should develop guidance for how local zoning and land use planning can be used to identify where and how land use will change in the future and incorporate that into local hazard and risk modeling.</p> <p>Former Numbering 4-11 (New Numbering FC 1.5) FEMA should develop a policy and standards on how to consider and determine erosion zones that are outside of the SFHA as they ultimately affect flooding and environmental conditions within the SFHA.</p> <p>Former Numbering 5-2 (New Numbering FC 1.6) FEMA should use a scenario approach for future conditions flood hazards calculation and mapping that will allow users to evaluate the robustness of proposed solutions to a range of plausible future conditions, including uncertain land use and climate change impacts.</p>
<p>FC 2 (2015)</p>	<p>Identify and quantify accuracy and uncertainty of data and analyses used to produce future conditions flood risk products, tools, and information.</p> <p>Former Numbering 3-2 (New Numbering FC 2.1) FEMA should use future risk assessments to take into account the likelihood of events occurring and their impacts, as well as the associated uncertainties surrounding these estimates.</p> <p>Former Numbering 3-7 (New Numbering FC 2.2) FEMA should publish multiple future conditions flood elevation layers that incorporate uncertainty so as to provide a basis for building designs that lower flood risk.</p>
<p>FC 3 (2015)</p>	<p>Provide flood hazard products and information for coastal and Great Lakes areas that include the future effects of long-term erosion and sea/lake level rise. Major elements are:</p> <ul style="list-style-type: none"> • Provide guidance and standards for the development of future conditions coastal flood risk products; • Incorporate local relative sea/lake level rise scenarios and long-term coastal erosion into coastal flood hazard analyses; and • Consider the range of potential future natural and man-made coastal changes, such as inundation and coastal erosion. <p>Former Numbering 4-1 (New Numbering FC 3.1) FEMA should use a scenario approach when considering shoreline location for the estimation of future conditions flood hazards. At least two scenarios should be evaluated, one in which the shoreline is held at its present location, and another in which the shoreline is eroded according to the best available shoreline erosion data.</p> <p>Former Numbering 4-6 (New Numbering FC 3.2) FEMA should develop guidance for incorporating future conditions into coastal inundation and wave analyses.</p> <p>Former Numbering 4-8 (New Numbering FC 3.3) FEMA should develop consistent methods and models for long-term coastal erosion hazard mapping.</p> <p>Former Numbering 5-4 (New Numbering FC 3.4) FEMA should use Parris, et. al., 2012, or similar global mean sea level scenarios, adjusted to reflect local conditions, including any regional effects (Local Relative Sea Level) to determine future coastal flood hazard estimates. Communities should be consulted to determine which scenarios and time horizons to map, based on risk tolerance and criticality.</p> <p>Former Numbering 5-5 (New Numbering FC 3.5) FEMA should work with other Federal agencies (e.g., National Oceanic and Atmospheric Administration [NOAA], U.S. Army Corps of Engineers [USACE], USGS), the U.S. Global</p>

	<p>Change Research Program (USGCRP), and the National Ocean Council to provide a set of regional sea level rise scenarios, based on the Parris, et al., 2012 scenarios, for the coastal regions of the United States out to the year 2100 that can be used for future coastal flood hazard estimation.</p> <p>Former Numbering 5-7 (New Numbering FC 3.6) FEMA should prepare map layers displaying the location and extent of areas subject to long-term erosion and make the information publicly available. Elements include:</p> <ul style="list-style-type: none"> • Establishing the minimum standards for long-term erosion mapping that will be used by FEMA that must be met by partners/communities if it is to be incorporated into the FEMA products. • Working with Federal, State, and local stakeholders to develop these minimum standards via pilot studies. • Securing funding that can support sustained long-term erosion monitoring and mapping by allowing for periodic updates. <p>Former Numbering 5-9 (New Numbering FC 3.7) FEMA should support additional research to characterize how a changing climate will result in changes in Great Lakes and ocean wave conditions, especially along the Pacific Coast. The relative importance of waves on this coast makes this an important consideration.</p> <p>Former Numbering 5-10 (New Numbering FC 3.8) For the Great Lakes, the addition or subtraction of future lake level elevations associated with a changing climate is not recommended at this time, due to current uncertainty in projections of future lake levels.</p> <p>Former Numbering 5-11 (New Numbering FC 3.9) FEMA should build upon the existing current conditions flood hazard analyses prepared by FEMA for the NFIP to determine future coastal flood hazards.</p> <p>Former Numbering 5-12 (New Numbering FC 3.10) FEMA should incorporate local relative sea-level rise scenarios into the existing FEMA coastal flood insurance study process in one of the following ways:</p> <ul style="list-style-type: none"> • Direct Analysis: Incorporate sea level rise directly into process modeling (e.g., surge, wave setup, wave runup, overtopping, erosion) for regions where additional sea level is determined to impact the base flood elevation (BFE) non-linearly (e.g., 1FT Sea Level Rise (SLR) = 2FT or more BFE increase). • Linear Superposition: Add sea level to the final calculated total water level and redefine BFE for regions where additional sea level is determined to impact the BFE linearly (e.g., 1FT SLR = 1FT BFE increase). • Wave effects should be calculated based on the higher Stillwater, including sea level rise. <p>Former Numbering 5-13 (New Numbering FC 3.11) Maps displaying the location and extent of areas subject to long-term coastal erosion and future sea-level rise scenarios should be advisory (non-regulatory) for Federal purposes. Individuals and jurisdictions can use the information for decision making and regulatory purposes if they deem appropriate.</p>
<p>FC 4 (2015)</p>	<p>Provide future conditions flood risk products and information for riverine areas that include the impacts of: future development, land use change, erosion, and climate change, as actionable science becomes available. Major elements are:</p> <ul style="list-style-type: none"> • Provide guidance and standards for the development of future conditions riverine flood risk products. • Future land use change impacts on hydrology and hydraulics can and should be modeled with land use plans and projections, using current science and build upon existing model study methods where data are available and possible. • Future land use should assume built-out floodplain fringe and take into account the decrease of storage and increase in discharge. • No actionable science exists at the current time to address climate change impacts to watershed hydrology and hydraulics. If undertaken, interim efforts to incorporate climate change impacts in flood risk products and information should be based on existing methods, informed by historical trends, and incorporate uncertainty based upon sensitivity analyses. • Where sufficient data and knowledge exist, incorporate future riverine erosion (channel migration)

	<p>into flood risk products and information.</p> <p>Former Numbering 4-7 (New Numbering FC 4.1) FEMA should evaluate previously issued guidance for future conditions land use and hydrology to incorporate best practices and lessons learned from communities that have implemented the guidance since 2001.</p> <p>Former Numbering 4-9(New Numbering FC 4.2) FEMA should determine long-term riverine erosion hazard areas for areas subject to high erosion and provide it to the public in a digital layer.</p> <p>Former Numbering 4-10 (New Numbering FC 4.3) FEMA should utilize a national standard for riverine erosion zone delineations that reflects geographic variability.</p> <p>Former Numbering 5-6 (New Numbering FC 4.4) FEMA should take the impacts of future development and land use change on future conditions hydrology into account when computing future conditions for riverine areas.</p> <p>Former Numbering 5-8 (New Numbering FC 4.5) FEMA should implement riverine erosion hazard mapping (E Zones that define channel migration zones), leveraging existing data, models, and approaches that reflect site-specific processes and conditions.</p> <p>Former Numbering 5-15 (New Numbering FC 4.6) FEMA should use observed riverine trends to help estimate what future conditions might look like. In watersheds where floods of interest may decrease in magnitude and frequency, FEMA should use existing riverine study results as the basis for flood hazard mapping. In watersheds where floods exhibit increases in magnitude or frequency, then use best available science to determine future hydrology and flood hazards.</p> <p>Former Numbering 5-16 (New Numbering FC 4.7) FEMA should work with other Federal agencies via the Advisory Committee on Water Information’s Subcommittee on Hydrology to produce a new method to estimate future riverine flood flow frequencies. This method should contain ways to consistently estimate future climate-impacted riverine floods and address the appropriate range of flood frequencies needed by the NFIP.</p> <p>Former Numbering 5-17 (New Numbering FC 4.8) FEMA should produce, and should encourage communities to adopt, future conditions products to reduce flood risk.</p>
<p>FC 5 (2015)</p>	<p>Generate future conditions data and information such that it may frame and communicate flood risk messages to more accurately reflect the future hazard in ways that are meaningful to and understandable by stakeholders. This information should enable users to make better-informed decisions about reducing future flood-related losses.</p> <p>Former Numbering 3-3 (New Numbering FC 5.1) FEMA should frame future risk messages for future conditions data and information such that individuals will pay attention to the future flood risk. Messages may be tailored to different stakeholders as a function of their needs and concerns.</p>
<p>FC 6 (2015)</p>	<p>Perform demonstration projects to develop future conditions data for representative coastal and riverine areas across the Nation to evaluate the costs and benefits of different methodologies or identify/address methodological gaps that affect the creation of future conditions data.</p> <p>Former Numbering 3-1 (New Numbering FC 6.1) FEMA should perform a study to quantify the accuracies, degree of precision, and uncertainties associated with respect to flood studies and mapping products for existing and future conditions. This study should include the costs and benefits associated with any recommendation leading to additional requirements for creating flood-related products.</p>

	<p>Former Numbering 5-3 (New Numbering FC 6.2) FEMA should conduct future conditions mapping pilots to continue to refine a process and methods for mapping and calculating future flood hazards, and capture and document best practices and lessons learned for each.</p> <p>Former Numbering 5-14 (New Numbering FC 6.3) FEMA should support research for future conditions coastal hazard mapping pilots and case studies using the latest published methods to determine the best means to balance the costs and benefits of increasing accuracy and decreasing uncertainty.</p>
FC 7 (2015)	<p>Data and analysis used for future conditions flood risk information and products should be consistent with standardized data and analysis used to determine existing conditions flood risk, but also should include additional future conditions data, such as climate data, sea-level rise information, long-term erosion data; and develop scenarios that consider land use plans, planned restoration projects, and planned civil works projects, as appropriate, that would impact future flood risk.</p> <p>Former Numbering 4-2 (New Numbering FC 7.1) FEMA should support expanded research and innovation for water data collection, for example using Doppler radar.</p> <p>Former Numbering 4-3 (New Numbering FC 7.2) FEMA should use a scenario approach to evaluate the impacts of future flood control projects on future conditions flood hazards.</p> <p>Former Numbering 4-5 (New Numbering FC 7.3) FEMA should support research on future conditions land use effects on future conditions hydrology and hydraulics.</p> <p>Former Numbering 4-12 (New Numbering FC 7.4) FEMA should develop guidance for evaluating locally-developed data from States and communities to determine if it is an improvement over similarly-available national datasets and could be used for future conditions flood hazard analyses.</p> <p>Former Numbering 4-13 (New Numbering FC 7.5) FEMA should develop better flood risk assessment tools to evaluate future risk, both population-driven and climate-driven. Improve integration of hazard and loss estimation models (such as Hazus) with land use planning software designed to analyze and visualize development alternatives, scenarios, and potential impacts to increase use in local land use planning.</p> <p>Former Numbering 5-1 (New Numbering FC 7.6) Future flood hazard calculation and mapping methods and standards should be updated periodically as we learn more through observations and modeling of land surface and climate change, and as actionable science evolves.</p>
PR 1 (2016)	<p>FEMA should adopt the TMAC’s 2015 recommendations that relate to the National Flood Mapping Program’s technical credibility from the TMAC 2015 Annual Report.</p>
PR 2 (2016)	<p>FEMA should adopt the future conditions recommendations from the <i>2015 TMAC Future Conditions Risk Assessment and Modeling</i> report.</p> <p>Former Numbering IA16 8.1 (New Numbering PR 2.1) FEMA should identify and summarize relevant future conditions- related modeling and mapping projects nationwide (Federal or non-Federal sources) that have technical relevance to the NFIP’s mapping program, and capture any data standards, modeling and mapping methods, and/or best practices that can inform FEMA’s future conditions mapping program.</p> <p>Former Numbering IA16 8.2 (New Numbering PR 2.2) FEMA should review existing State-level riverine erosion hazard mapping programs to determine what data standards, modeling and mapping methods, and/or best practices are transferable (i.e., broadly applicable) for potential nationwide implementation of riverine erosion hazard mapping. FEMA should also capture those standards and methods that are</p>

	<p>applicable to specific geographies or physical settings (analogous to the coast-specific models and guidance used in FEMA’s current coastal flood study process).</p> <p>Former Numbering IA16 8.3 (New Numbering PR 2.3) FEMA should include consideration of both SLR and long-term coastal erosion in the modeling and mapping of flood hazards in all new coastal future conditions’ pilots.</p> <p>Former Numbering IA16 8.4 (New Numbering PR 2.4) FEMA should leverage completed FEMA pilot studies and other relevant coastal and riverine future conditions projects and programs nationwide to prepare a gap analysis that captures outstanding data standards and methodological elements critical to implementing future conditions mapping nationwide.</p> <p>Former Numbering IA16 8.5 (New Numbering PR 2.5) FEMA should use the existing body of knowledge gained through completed future conditions pilots, evaluation of existing future conditions-related programs, and other relevant Federal and non-Federal efforts to commence development of future conditions modeling and mapping standards and guidelines.</p> <p>Former Numbering IA16 8.6 (New Numbering PR 2.6) FEMA should convene stakeholders and subject matter experts in the initial scoping, development, and review of new future conditions modeling and mapping standards and guidelines (Implementation Action 8.5). This effort should begin as soon as possible to inform the gap analysis and gap prioritization (Implementation Action 8.4) and enable use of any near-term pilots to address critical information needs.</p> <p>Former Numbering IA16 8.7 (New Numbering PR 2.7) FEMA should develop and test multiple approaches for visualizing future conditions flood risk in one or more future mapping pilots, drawing on relevant social science expertise and lessons learned from prior pilots and other completed mapping projects.</p>
PR 3 (2016)	FEMA should complete the implementation of the statutory requirements of the National Flood Mapping Program.
PR 4 (2016)	FEMA should continue to enhance communication and transparency with program stakeholders by, for example, including organizational and contact information on the Internet.
PR 5 (2016)	FEMA should investigate offering multi-year program management grant periods (versus annual) to Cooperating Technical Partnerships (CTPs).
PR 6 (2016)	FEMA should facilitate, partner, and leverage current high-resolution topographic data (e.g., Light Detection and Ranging [LiDAR] data, other new and emerging technologies).
PR 7 (2016)	FEMA should work with the Congress and other partners to examine ways to shorten the study process, including the time added to the mapping process by QRs, KDPs, and legislated due process, as identified in TMAC’s 2015 Goal 2 Annual Report Recommendation Number 11.
PR 8 (2016)	FEMA should move to a database-derived display, as outlined in the TMAC 2015 Annual Report Recommendation Number 16.
PR 9 (2016)	FEMA should work to identify residual risk areas behind levees and other flood control structures and downstream of dams.
PR 10 (2016)	For non-accredited levees, FEMA should replace the Zone D designation in levee-protected areas with risk zones that are more appropriate for the level of risk.
PR 11 (2016)	<p>FEMA should evaluate the current metrics to better measure the efficient production, valid inventory, and stakeholder acceptance of the National Flood Mapping Program. TMAC recommends that FEMA should:</p> <ul style="list-style-type: none"> • Discontinue the current Deployment and Mitigation Action metrics and replace them with more effective measures, and

	<ul style="list-style-type: none"> Focus revised metrics on measuring the quality and quantity of flood hazard and risk products delivered to communities
PR 12 (2016)	<p>FEMA should have an inventory metric that reports quantity, quality, and time aspects on national, regional, Tribal, State, and watershed levels:</p> <p>a) Quantity: Quantity should be tracked through the life of a floodplain from no study through to detailed study. Statistics should be provided annually.</p> <p>b) Quality: Quality should be measured by retaining the existing New, Valid, Updated Engineering (NVUE) metric of the current inventory and adding an NVUE metric for coastal flood hazard miles.</p> <p>c) Time: Timing should be measured from Discovery to the issuance of Preliminary maps, and from the issuance of Preliminary maps to Effective maps for active projects.</p>
PR 13 (2016)	<p>FEMA should have a metric that shows progress towards meeting a digital platform goal by area of the Nation to compliment FEMA's current population metrics. This metric could include the total area of the country, as well as progress towards Goal 3 and Recommendation 16 in the TMAC 2015 Annual Report.</p>
PR 14 (2016)	<p>FEMA should evaluate the benefits and costs and its value to the Nation as a result of different levels of funding to the National Flood Mapping Program.</p>

AR = TMAC Annual Report (2015), TMAC 2016 Annual Report, or TMAC 2017 Annual Report

PR = TMAC National Flood Mapping Program Review (2016),

FC = TMAC Future Conditions Risk Assessment and Modeling (2015)

IA = Implementation A

Attachment H –
TMAC 2019
Administrative and
Public Meetings

MEETING DATE	MEETING TYPE	LOCATION	BUSINESS PURPOSE
July 31-August 1, 2019	Public	3101 Wilson Blvd., Arlington, VA	The TMAC reviewed, deliberated on, and approved the final TMAC 2018 Annual Report; and received the TMAC 2019 tasking memo. The TMAC established subcommittees to address the FEMA 2019 Tasking Memo.
September 3, 2019	Administrative	Virtual	The TMAC conducted an administrative meeting to receive FEMA briefings on (1) status update on TMAC recommendations, (2) overview of Risk Rating 2.0, (3) Probabilistic Flood Risk Assessment (PFRA), and (4) National Mitigation Investment Strategy.
December 11-12, 2019	Public	3101 Wilson Blvd., Arlington, VA	The TMAC reviewed the subcommittee reports, received public comments, deliberated on, and approved recommendations to be incorporated in the TMAC 2019 Memorandum.
January 9, 2019	Administrative	Virtual	The TMAC conducted an administrative meeting to approve the Final TMAC 2019 Memorandum content for submission to the FEMA Administrator.

Attachment I – TMAC
2019 Subcommittee
Meetings

Shift from a Binary to a Graduated View of Flood Risks

MEETING DATE	MEETING PURPOSE
September 20, 2019	Review and discuss tasking memo.
October 4, 2019	Briefing on FEMA's shift from binary to graduated risk.
October 18, 2019	Review writing assignments.
November 1, 2019	Discuss upcoming milestones and assign reviewers to read draft report.
November 15, 2019	Review, discuss and approve the Subcommittee Report

Ensuring a significant and appropriate role for the private sector and State, Local, Territorial, and Tribal (SLTT) entities

MEETING DATE	MEETING PURPOSE
August 19, 2019	SMEs identification and past recommendations review.
September 6, 2019	Past recommendations review; big picture strategy; and SMEs/Presenters needs discussion.
September 16, 2019	Briefing on Cooperating Technical Partners (CTP) program.
September 27, 2019	Briefings on tribes and Community Rating System (CRS); past recommendation review and discussion.
November 1, 2019	TMAC Memo template and past recommendation review and discussion; and writing assignment.
November 15, 2019	Review, discuss and approve the Subcommittee Report

Increase Access to Flood Hazard Data to Improve Resulting Mitigation and Insurance Actions at the Local and Private Levels

MEETING DATE	MEETING PURPOSE
August 1, 2019	Review TMAC Tasking Memo.
August 23, 2019	SME identification and determine writing assignments.
October 22, 2019	Briefing on previous recommendations and FEMA's current IT capabilities.
November 1, 2019	Review timeline and discuss remaining activities for the year.