HARRIS COUNTY, TEXAS

Office of Management and Budget 1001 Preston; Suite 500 Houston, TX 77002 713-274-1135

Grants Coordination Section - Conveyance Form

Application ☐ Award ☒ Amendment

Department Name / Number	DUNs	Grant Title
Flood Control - 090	174079756	Remapping Study '18

Funding Source: U.S. Department of Homeland Security: CFDA# 97.045		**Grant Agency:** U.S. Department of Homeland Security	
Program Year:	1 st	**Program Ending:**	
Grant Begin Date:	10/01/2018	**Grant End Date:**	09/30/2023
Grant Org. Key:	0Z1P025_GY19 XHI09029	**If applicable, Prior Year Org. Key:**	N/A

Grant Description:

Funded by the U.S. Department of Homeland Security, the Cooperating Technical Partners Program creates partnerships between FEMA and communities that participate in the National Flood Insurance Program to maintain up-to-date flood hazard maps and other hazard information.

	Revised Total Budget	New Grant Funded	Orig. Grant Funded	New County Funded	Orig. County Funded
Salary & Benefits	$0.00	$0.00	$0.00	$0.00	$0.00
Non-Labor	$16,120,792.48	$0.00	$6,500,000.00	$1,620,792.48	$8,000,000.00
Sub Tot. Incremental Cost	**$16,120,792.48**	**$0.00**	**$6,500,000.00**	**$1,620,792.48**	**$8,000,000.00**
Indirect Cost	$0.00	$0.00	$0.00	$0.00	$0.00
TOTALS	**$16,120,792.48**	**$0.00**	**$6,500,000.00**	**$1,620,792.48**	**$8,000,000.00**

* under development

Full Time Equivalent Positions	0.00	**Date Guidelines are Available**	
% of Positions Paid by Grant	0.00 %	**Grant Submittal Deadline Date**	

Grant Discussion:

This amendment is related to an award approved by Commissioners Court on 9/25/18 and previously amended on 9/24/19 and 7/20/21. The purpose of this item is to extend the grant end date to 9/30/23 to expend the remaining funds and to increase the match by $620,792.48 due to project costs not reimbursable by the grant. All other aspects remain the same.

County Funded Cost Projection

Year	Required	Discretionary
2019	862,079.25	100,000.00
2020	1,724,158.50	200,000.00
2021	1,724,158.50	200,000.00
2022	2,586,237.73	300,000.00
2023	1,724,158.50	200,000.00

Completed by : Mattingly, Mike **Date :** 9/7/22

Reviewed by: **Date :** 9/9/22

ORDER

THE STATE OF TEXAS §
§
COUNTY OF HARRIS §

On this, the 13th day of September, 2022, the Commissioners' Court of Harris County, Texas, sitting as the governing body of Harris County and acting on behalf of the Harris County Flood Control District, upon motion of Commissioner _____, seconded by Commissioner _____, duly put and carried,

IT IS ORDERED that County Judge Lina Hidalgo or her designee be hereby authorized to approve, and that the Harris County Flood Control District Executive Director Tina Petersen or her designee be hereby authorized, on behalf of the Harris County Flood Control District, to apply for, an amendment to the following grant from FEMA:

APPROVAL TO APPLY – Federal Emergency Management Agency - 2018 Cooperating Technical Partners – EMT-2018-CA-00013 – MAAPnext Award Amendment

Existing Period of Grant:	October 1, 2018 – September 30, 2022	
Amended Period of Grant:	October 1, 2018 – September 30, 2023	
Existing Budget:	Federal	$6,500,000.00
	Local	$8,000,000.00
Amended Budget:	Federal	$6,500,000.00
	Local	$8,620,792.48

HARRIS COUNTY FLOOD CONTROL DISTRICT

9900 Northwest Freeway
Houston, Texas 77092
346-286-4000
www.hcfcd.org

September 1, 2022

Mr. Larry Voice
Senior Engineer, Mitigation Division, FEMA Region 6
800 N. Loop 288
Denton, TX 76209

SENT VIA ELECTRONIC MAIL: NO HARD COPY TO FOLLOW

RE: FY2018 Award EMT-2018-CA-00013-S01
Grant Amendment Request

Dear Mr. Voice:

Please consider this our official letter of intent for our request to extend the Period of Performance for the Fiscal Year 2018 CTP Grant **EMT-2018-CA-00013** from its current end date of **September 30, 2022,** to a revised end date of **September 30, 2023,** and to revise the budget.

As FEMA requested, we are removing the Post-Preliminary Processing and Open House tasks from the scope of work. There is no guarantee we will be able to start these tasks before the end of the revised period of performance, and we will be able to address these tasks under EMT-2020-CA-00004. The scope of the Project Management and Outreach task will be updated to include planning and preparation for future Open House meetings. Remaining funds for all tasks will be moved to Project Management, as all the other tasks are complete. The total partner contribution has been increased by $620,792.48 to reflect discretionary funds that were expended on these tasks.

Status of MAS tasks:

- Project Management – Ongoing; This task occurs for the duration of the project.
- Perform Field Survey – Complete; Deliverables submitted to FEMA
- Develop Topographic Data – Complete; Deliverables submitted to FEMA
- Develop Hydrologic Data – Complete; Deliverables submitted to FEMA
- Develop Hydraulic Data – Complete; Deliverables submitted to FEMA
- Perform Floodplain Mapping – Complete; Deliverables submitted to FEMA
- Develop Flood Risk Products and Datasets - Complete; Deliverables submitted to FEMA
- Flood Risk Review Meeting – We have held these for all responsive communities
- Post-Preliminary Processing (Support) – Removed from EMT-2018-CA-00013 Scope of Work
- Open House – Removed from EMT-2018-CA-00013 Scope of Work

Amount of funds drawn down to date:

- Federal
  - Disbursements - $5,872,841.12
  - Receipts - $2,814,529.66
- Non-Federal
  - $8,620,792.48

Remaining Funds Available:

- Federal - $627,158.88
- Non-Federal - $0

Budget outlining how remaining Federal and non-Federal funds will be expended:

Project Task	FEMA Contribution	Partner Contribution	Total Remaining Contribution
Project Management	$627,158.88	$0	$0
Perform Field Survey	$0	$0	$0
Develop Topographic Data	$0	$0	$0
Develop Hydrologic Data	$0	$0	$0
Develop Hydraulic Data	$0	$0	$0
Perform Floodplain Mapping	$0	$0	$0
Develop Flood Risk Products and Datasets	$0	$0	$0
Flood Risk Review Meeting	$0	$0	$0
Post-Preliminary Processing	$0	$0	$0
Open House	$0	$0	$0
Total Remaining Funds	**$627,158.88**	**$0**	**$627,158.88**

The plan for completion of the project is as follows:

- The District will continue Project Management & Outreach activities consistent with our Communication Plan and the MAS under this award while budget remains
- The District will continue Project Management & Outreach activities consistent with our Communication Plan and the MAS under EMT-2019-CA-00010 and EMT-2020-CA-00004 when EMT-20180CA-00013 budget is expended
- The District will conduct Post-Preliminary Processing and Open House activities under EMT-2020-CA-00004 at the appropriate time following FEMA's issuance of preliminary data.

I hereby certify that the activity/activities whose schedule are controlled by the District will be completed within the extended period of performance without any modification to the original Statement of Work/Mapping Activity Statement approved by FEMA.

Sincerely,

Tina Petersen, Ph. D., P.E.
Executive Director
Harris County Flood Control District

TP:TJW:crf

Attachments: Mapping Activity Statement No. 31
Court Order

Budget Narrative
Detailed Budget Narrative
RCA Form
Quantities Baseline Schedule

HARRIS COUNTY MAAPnext
PART 1
AMENDED BUDGET NARRATIVE

08/29/2022

HARRIS COUNTY FLOOD CONTROL DISTRICT

9900 Northwest Freeway
Houston, TX 77092
713-684-4000

The Harris County Flood Control District, a Cooperating Technical Partner of FEMA, is applying for a grant amendment for the performance of Phase 2 of a Risk MAP Project for the following HUC-12 watersheds:

- Brays Bayou
- White Oak Bayou
- Hunting Bayou
- Spring Creek
- Cypress Creek
- Little Cypress Creek
- Willow Creek
- Greens Bayou
- Barker Reservoir
- Addicks Reservoir
- Buffalo Bayou

The project would call for $6,500,000 federal dollars along with a $8,620,792.48 local match.

The money would be used to collect survey information to verify roadway crossings and stream geometry, perform hydrologic and hydraulic analysis, produce draft floodplain mapping, produce non-regulatory Risk MAP products, to conduct outreach to community stakeholders and the public, and to perform all reporting as required by the grant.

The primary benefits to the community is enhanced understanding of the flooding risks in the Watershed.

Table 1. Budget by Category – Phase 2

Budget Category	Federal Amount	Non-Federal Amount
Personnel	$0	$0
Contractual	$6,500,000	$8,620,792.48
Fringe Benefits	$0	$0
Travel	$0	$0
Equipment	$0	$0
Supplies	$0	$0
Other	$0	$0

Indirect Costs	**$0**	**$0**
TOTALS	**$6,500,000**	**$8,620,792.48**

Project Task	FEMA Contribution	HCFCD Leverage	Total	Comment
Phase Two - Risk Identification and Assessment				
Project Management	$ 2,086,779.49	$ 1,888,549.09	$ 3,975,328.58	Includes Project Risk Identification, Progress Reporting, MIP Updates, etc.
Perform Field Survey	$ 750,000.00	$ 458,407.10	$ 1,208,407.10	Includes QA/QC Task
Develop Topographic Data	$ -	$ 503,262.45	$ 503,262.45	Includes QA/QC Task
Develop Hydrologic Data	$ -	$ 2,048,170.05	$ 2,048,170.05	Includes QA/QC Task
Develop Hydraulic Data	$ 2,300,000.00	$ 2,411,533.43	$ 4,711,533.43	Includes QA/QC Task
Perform Floodplain Mapping	$ 900,000.00	$ 746,072.31	$ 1,646,072.31	Includes QA/QC Task
Develop Flood Risk Products and Datasets	$ 463,220.51	$ 248,451.32	$ 711,671.83	Includes QA/QC Task
Flood Risk Review Meeting	$ -	$ 316,346.73	$ 316,346.73	
TOTAL FUNDING AMOUNT	$ 6,500,000.00	$ 8,620,792.48	$ 15,120,792.48	

MAAPnext Detailed Budget Narrative

Task	Unit	Quantity	Unit Cost	Task Cost	Totals	Note
Project Management					$ 3,975,328.58	
Project Management, Lead PM Team (PMT)						PMT leads SOP development and ensure consistency & quality across watershed teams
Technical Support & Guidance Maintenance	Hours	8322	$ 174.04	$ 1,448,328.58		4 year schedule assuming a member of PMT always working on study; Unit cost is wieghted average of positions
QA Review of data development	Each	100	1200	$ 120,000.00		8hrs each; 5 reviews & submittals per watershed
Meetings (HCFCD, Watershed leads, etc.)	Each	300	800	$ 240,000.00		Meetings w/ HCFCD bi monthly; Watershed teams (7) @ 4/6 weeks
Project Management (individual teams)						
Project Mobilization	Each	11	16000	$ 176,000.00		Study Plan and QA/QC Plan development; Project KO Workshop attendance
Meetings & Coordination	Each	187	800	$ 149,600.00		Coordination meetings every 6 weeks for 2 years
Progress Reports & Monitoring	Hours	4097.5	$ 240.00	$ 983,400.00		Assumes 11 watershed Lead PM hours for ~20 hrs a month
Perform Community Engagement & Project Outreach						
Meetings (FPAs, community leaders, etc.)	Each	30	2000	$ 60,000.00		Assumes an average of 1 signficant meeting a month
Comprehensive Comms. Plan Develop	Hours	700	180	$ 126,000.00		Assumes full time weighted average Comms. Rate for 3 months development timeline
Comprehensive Comms. Maint. & Implementation	Hours	4,200	160	$ 672,000.00		Assumes 100 hours a month of implemenation of developed plan
Perform Field Survey					$ 1,208,407.10	
Structure, Field survey	Structures	220	$ 3,700	$ 814,107.10		
Bathymeteric Locations	Locations	70	$ 4,800	$ 336,000.00		
Survey TSDNs (11)	Each	11	$ 5,300	$ 58,300.00		
Develop Topographic Data					$ 503,262.45	
Seamless terrain development	Square Miles	1611.4	$ 312	$ 503,262.45		
Develop Hydrologic Data					$ 2,048,170.05	
Hydrologic Methodology Development (Prior Expense)	Actual Cost	1	$ 754,968	$ 754,968.00		
Hydrologic Data Development	Square Miles	1611.4	$ 620	$ 999,068.00		
Hydrology TSDN & FIS	Square Miles	1611.4	$ 183	$ 294,134.05		
Develop Hydraulic Data					$ 4,711,533.43	
Detailed Study Development	Linear Miles	800	$ 5,400	$ 4,320,000.00		
Hydraulic TSDN & FIS	Linear Miles	800	$ 489	$ 391,533.43		
Perform Floodplain Mapping					$ 1,646,072.31	
Riverine Floodplain Detailed	Linear Miles	800	$ 1,890	$ 1,512,000.00		
TSDN	Linear Miles	800	$ 168	$ 134,072.31		
Develop Flood Risk Products and Datasets					$ 711,671.83	
Grids, Changes since last FIRM, etc.	Linear Miles	800	$ 730	$ 584,000.00		
Non-Riverine Flood Risk	Square Miles	1611.4	$ 79	$ 127,671.83		
Flood Risk Review Meeting					$ 316,346.73	
Pre/Post meeting coordination/exhibits	Meetings	22	$ 14,379	$ 316,346.73		

HARRIS COUNTY FLOOD CONTROL DISTRICT
COOPERATING TECHNICAL PARTNERS (CTP)
FLOOD RISK PROJECT
MAPPING ACTIVITY STATEMENT (MAS)

Mapping Activity Statement No. 31

The Flood Risk Project described in this FRP-MAS dated June 15, 2018 shall be completed in accordance with the CTP Partnership Agreement dated July 31, 2000 between the Harris County Flood Control District (herein referred to as "CTP") and the Federal Emergency Management Agency (FEMA).

The Flood Risk Project within this MAS includes the following project areas and production phases:

- Brays Bayou, White Oak Bayou, Hunting Bayou, Spring Creek, Cypress Creek, Little Cypress Creek, Willow Creek, Greens Bayou, Barker Reservoir, Addicks Reservoir, and Buffalo Bayou– Phase Two (Risk Identification & Assessment)
- Harris County– Phase Three (Regulatory Update *Support*)

This Flood Risk Project will be completed by the following entities:

- Harris County Flood Control District; and
- Harris County Flood Control District's Contractors

Contents

Preface: FEMA Region 6 - Implementation of the Risk MAP

FEMA Region 6 has produced a number of regionally specific Risk MAP Implementation documents that shall be used to guide project efforts for studies performed in Region 6 States (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). The information in this section is intended to assist CTPs in the preparation of the Mapping Activities Statements for submittal and funding.

Region 6 Risk MAP Implementation Guidance, Tools and Templates are available on the Risk MAP SharePoint site at:

Risk MAP SharePoint > Region 6 > Resources Page > Regional Implementation Documents

Projects should be phased in alignment with the Framework to Achieve Mitigation Action, available at:

Risk MAP SharePoint > Region 6 > Resources Page > Regional Implementation Documents > Framework_V4

Phasing Risk MAP Project Production. In order to allow the flexibility required to move projects from initiation (Discovery) to effective issuance, FEMA Region 6 has identified the following phases for project funding:

- Phase Zero – Investment
  - Preparation of Base Level Engineering for HUC8 (or larger basin)
- Phase One - Discovery
  - To include Flood Risk Report, Flood Risk Map and Flood Risk Database
  - Discovery and Discovery Close-Out meetings
- Phase Two - Risk Identification and Assessment
  - Engineering and Risk MAP product development
  - Project Kick-off, Flood Risk Review and Resilience meetings
- Phase Three - Regulatory Product Update
  - Preparation of FIS and FIRM
  - Panel Preparation, Preliminary Panel Issuance
  - Consultation Coordination Officer's (CCO) Meeting
  - Effective Panel Issuance

FEMA Region 6 requires its Cooperating Technical Partners to utilize this phased approach for all Flood Risk Projects submitted for funding.

Standards for Flood Risk Analysis and Mapping. All processes and deliverables shall be completed in accordance with the Federal Emergency Management Agency (FEMA)'s Standards for Flood Risk Analysis and Mapping, dated November 30, 2015, located on FEMA's website at: http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping. These guidelines and standards (http://www.fema.gov/media-library/assets/documents/35313) define the specific implementation of the statutory and regulatory requirements for NFIP flood risk analysis and mapping, and address the performance of flood risk projects, processing of letters of map change and related Risk MAP activities. The guidelines and standards are organized in a hierarchy:

> **Program Standards** – A required element of the Risk MAP program. Exceptions to program standards can only be granted by program leadership through an exemption process.

Working Standards – A required element usually at a higher level of specificity than the program standards. Working standards are applied by specialists (engineers, planners, technicians, scientists, etc.) and have minimal ethical, political and legal impacts to the program. FEMA Regional offices may occasionally grant exceptions to these requirements.

Guidance – A recommended approach to meet the standard. Accepted approaches are not limited to this recommended approach; mapping partners may use other methods to meet or exceed the standards.

Best Practices/Lessons Learned – Any method, in addition to guidance, that meets or exceeds the standard. Best practices are shared by regions and mapping partners following successful approaches to program activities.

All the standards for the Risk MAP program have been published as a FEMA policy. This policy supersedes all of the standards included in the previous Guidelines and Specifications for Flood Hazard Mapping Partners and associated procedure memorandums. However, useful guidance is still available in these documents (http://www.fema.gov/media-library/assets/documents/34953). Additional information can be found on FEMA's website at http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Multiple Watershed Projects/Project Areas. If a CTP wishes to submit more than one project area for consideration of award, the CTP shall prepare a separate FRP-MAS for each project area submitted. The CTP shall use the Region 6 FRP-MAS Template as a starting point for preparing each MAS to be submitted, the scope elements that shall be included in the MAS should provide the FEMA POC with a clear understanding of the project tasks and scope elements identified. All phases and tasks that are not to be completed as a part of the project shall be removed from the FRP-MAS documents submitted for award consideration.

MAS and SOW documents should be numbered sequentially. Should your CTP be submitting more than one FRP-MAS, number the submittal as shown below. ***Example:*** CTP's last FY17 MAS submittal was MAS #8 in the previous award year, numbering is suggested and detailed below for reference.

Solution: The CTP will prepare a Program Management, one Communications Special Project and three Flood Risk Project Mapping Activity Statements (FRP-MAS) funded in FY18, The number with the numbering identified below:

- FY18-PM-SOW-09 (Program Management 2018)
- FY18-FRP-MAS-10 (FY18 - Project area 1)
- FY18-FRP-MAS-11 (FY18 - Project area 2)
- FY18-FRP-MAS-12 (FY18 - Project area 3)
- FY18-COMS-SOW-13 (Communications – Special Project 2018)

Project Footprint. In order to maintain the Regional investment and production tracking databases, the Mapping Partner shall identify the following information for the project area that this FRP-MAS covers:

- Identification of HUC8 unit for projects that are watershed based (Table 1.1 – Watershed)
- Identification of FIPS code for projects that are county/parish based (Table 1.1 – County/Parish)
- ***Irregular Project Footprints.*** For projects that are not county/parish or watershed based, the CTP will provide a GIS file with the proposed project footprint (Project FIRM panels or HUC-12 boundary area) for use in national roll up with the FRP-MAS.

- ***Maintenance.*** If the footprint of a project is modified, a revised GIS foot print file shall be submitted and reviewed for scope alterations should the foot print modification may require an amendment.
- **Risk MAP SharePoint.** Assistance with the SharePoint may be requested through spadmin@riskmapcds.com. FEMA Region 6 points of contact for assistance and questions related to the Risk MAP SharePoint are diane.howe@fema.dhs.gov and/or esavage@h2opartnersusa.com. Please note that after 90-days your account password will need to be reset. Please email spadmin@riskmapcds.com to reset your password.
    - Numerous templates have been created to aid the CTP in preparing for and delivering the Region's objectives as identified by phase and task in the Framework to Achieve Mitigation Action. CTPs may utilize the regionally provided templates available on the Risk MAP SharePoint site at: http://pm.riskmapcds.com/FEMA_REGIONS/REGIONVI/Resources
    - Additionally, CTPs may use the FEMA Region 6 Risk MAP SharePoint site to upload their CTP templates under the Mapping Partners Tab at the following location:
    - http://pm.riskmapcds.com/FEMA_REGIONS/REGIONVI/pages/Mapping%20Partners.aspx

SECTION 1 – OBJECTIVE AND SCOPE

The objective of the Flood Risk Project documented in this MAS is to develop and/or support flood hazard data and program-related tasks through completing technical risk analysis and mapping activities. These activities may or may not result in a new or updated Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for one or more communities within the project area. This Flood Risk Project Mapping Activity Statement (FRP-MAS) includes a project specific scope of services and deliverables for the following project efforts:

- Project Management Activities
- Brays Bayou, White Oak Bayou, Hunting Bayou, Spring Creek, Cypress Creek, Little Cypress Creek, Willow Creek, Greens Bayou, Barker Reservoir, Addicks Reservoir, and Buffalo Bayou– Phase Two (Risk Identification & Assessment)
- Harris County – Phase Three (Regulatory Update)

The watersheds and jurisdictions, in which Flood Risk Projects will be performed, as well as their applicable project type/activities, are summarized in *Table 1.2 – Flood Risk Project Ara and Community Identification*. All applicable project phases should be identified in the last column of the table for each watershed, county/parish or community listed below. Project Reports will be created and distributed to counties/parishes and communities identified as including Discovery in the Project Type. The MIP project will be established and a foot print will be established based on the information included in Table 1.2.

Table 1.1: Flood Risk Project Area and Community Identification (Watershed project geography)

Watershed Name	HUC-8 Code	Communities Included in Project Area *(include CID if available)*	Project Phase *(0 – Base Level Engineering, 1 – Discovery, 2 – Risk Identification & Assessment, 3 – Regulatory Product Update)*
Spring Creek, Cypress Creek, Little Cypress	12040102	City of Houston (480296) City of Humble (480297)	2 – Risk Identification & Assessment, 3 – Regulatory Product Update

Creek, and Willow Creek		City of Tomball (480315) City of Waller (480641) Harris County Unincorporated Areas (480287)	
Brays Bayou, White Oak Bayou, Hunting Bayou, Greens Bayou, Barker Reservoir, Addicks Reservoir, and Buffalo Bayou	12040104	City of Bellaire (480289) City of Bunker Hill Village (480290) City of Galena Park (480293) City of Hedwig Village (480294) City of Hillshire Village (480295) City of Houston (480296) City of Humble (480297) City of Hunter Creek Village (480298) City of Jacinto City (480299) City of Jersey Village (480300) City of Katy (480301) City of Missouri City (480304) City of Piney Point Village (480308) City of Southside Place (480312) City of Spring Valley (480313) City of Stafford (480233) City of West University Place (480318) Harris County Unincorporated Areas (480287)	2 – Risk Identification & Assessment, 3 – Regulatory Product Update

Table 1.1: Flood Risk Project Area and Community Identification (County/Parish project geography)

County/Parish Name, State	FIPS Code	Communities Included in Project Area *(include CID if available)*	Project Phase *(0 – Base Level Engineering, 1 – Discovery, 2 – Risk Identification & Assessment, 3 – Regulatory Product Update)*
Harris County, TX	48201C	City of Bellaire (480289) City of Bunker Hill Village (480290) City of Galena Park (480293) City of Hedwig Village (480294) City of Hillshire Village (480295) City of Houston (480296) City of Humble (480297) City of Hunter Creek Village (480298) City of Jacinto City (480299) City of Jersey Village (480300) City of Katy (480301) City of Missouri City (480304) City of Piney Point Village (480308) City of Southside Place (480312) City of Spring Valley (480313) City of Stafford (480233) City of Tomball (480315) City of Waller (480641) City of West University Place (480318) Harris County Unincorporated Areas (480287)	2 – Risk Identification & Assessment, 3 – Regulatory Product Update

Additionally, the CTP involved in this project will develop flood hazard data for the project area as summarized in the tables below:

- Table 1.2 – Total Riverine Stream Mileage Counts by Type of Study
- Table 1.3 – Total Coastal Mileage Counts by Type of Study
- Table 1.4 – Total Levee Mile Counts by Type of Study

CTPs should identify the mileage which will be included in the project effort to be included in the study described by the FRP-MAS within the table above. CTPs may add another set of lines to the table to describe multiple watersheds or multiple jurisdictions within the table.

Table 1.2 – Total Riverine Stream Mileage Counts by Type of Study

Current, Updated or New Study?	Watershed Name or Jurisdiction	Current CNMS Validity Status?	Detailed w/ Floodway (Zone AE)	Detailed no Floodway (Zone AE)	Limited Detail (Zone AE Or Zone A)	Approximate (Base Level Engineering)	Redelineation (Only applicable to Valid CNMS Miles)
Effective Study Mileage	Harris County	Valid = 0	0	0	0	0	0
		Unknown = 0	0	0	0	0	0
		Unverified = 768.2	768.2	0	0	0	0
Updated Study Mileage	Harris County	Valid = 0	0	0	0	0	0
		Unknown = 0	0	0	0	0	0
		Unverified = 768.2	768.2	0	0	0	0
New Study Mileage	Harris County	Valid = 0	0	0	0	0	0
		Unknown = 31.8	31.8	0	0	0	0
		Unverified = 0	0	0	0	0	0

Project Management Activities

Task – Perform Project Management

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: Project Management is the active process of planning, organizing, and managing resources toward the successful accomplishment of predefined project goals and objectives. The CTP will coordinate with the FEMA Regional Office with respect to Project Management activities and technical mapping activities identified below.

Quantities and Baseline Schedule (QBS) form. The QBS form will be prepared by the CTPs and delivered to the R6 MIP Champion (jennifer.knecht@fema.dhs.gov) shortly after award. The QBS form identifies the initial project schedule, geography and project tasks that will be completed as a part of the Mapping Activities Statement. CTPs that require time for identification of contract support and procurement should work with their FEMA POC and the R6 MIP Champion to identify the project timeline for entry into the system of record. **The updated FY18 QBS form can be found on the Regional SharePoint page at:** RMD SharePoint > R6 > Resources > Other Resources > FY18 Quantities and Baseline Schedule Form

Quality Assurance Program for Mapping Partners. The CTP is responsible for implementation of the prepared CTP Quality Assurance/Quality Control (QA/QC) Plan. The QA/QC plan defines and outlines the CTP's oversight for all tasks, services and activities undertaken within this Mapping Activities Statement (MAS). The CTP will submit a Summary Report that describes and provides the results of all

automated or manual QA/QC review steps as outlined in (FEMA)'s Standards for Flood Risk Analysis and Mapping, dated November 30, 2015. The plan should include the process for all activities identified within the MAS.

It is expected that each CTP within the Region have in place a Quality Assurance/Quality Control (QA/QC) plan. Independent QC review activities may be included in the costs associated with the delivery of CTP data for tasks identified within the MAS. Independent QC review activities may be performed by the CTP or FEMA's contractor at the discretion of FEMA. If the CTP will be responsible for the QC review, the entity that will perform QC should be identified in this MAS. The CTP will need discuss and document the necessity for external review of its submission, otherwise, the CTP will need to submit its QA/QC plan to the Regional Project Monitor for approval.

Please note FEMA will also be performing periodic audits and overall study/project management to ensure quality, including National Quality Reviews (QRs) required per FEMA standards for all flood risk projects. Whether or not the CTP performs the Independent QC review mentioned in the preceding paragraph, the CTP will be responsible for addressing any and all comments resulting from National QRs and any additional independent QA reviews required by the FEMA Regional Office, including re-submittal of deliverables as needed to pass technical or quality review. The CTP will submit regulatory products to FEMA's designated National QR reviewer for review and approval prior to public issuance.

Additionally, should the study be selected for Independent Verification and Validation (IV&V), the partner will be provided a copy of the IV&V findings. If the findings indicate that items are not in accordance with FEMA's Standards for Flood Risk Analysis and Mapping, dated November 30, 2015, the partner will assist FEMA in the preparation of materials meeting these standards.

Quality Control Reports. FIRM-related tasks require a passing QC Report from FEMA's National FIRM database auto-validation tool for Quality Review (QR) #1, #2, and #5 as required in FEMA standards. Training materials for these steps are available on the Mapping Information Platform (MIP) at MIP User Care>Training Materials. The MIP can be accessed at the following web address: http://hazards.fema.gov.

Mapping Information Platform (MIP) Use/Update and Earned Value and Reporting Requirements. The MIP is designed to track the Earned Value of all Regionally funded Mapping Partner efforts (MAS, PM-SOW, COMS-SOW, etc.). The FEMA Mapping Information Platform (MIP) is designed to track the Earned Value of Flood Risk Projects. The MIP study application allows FEMA and the CTP to manage the status of these projects at a task level. The cost and schedule information, updated monthly by the CTP for each contracted task, is compared to the baseline established for those tasks. This information is rolled up to a project level and monitored by the FEMA Region to assess progress and Earned Value. This information is automatically calculated by the MIP, using the actual cost and schedule of work performed, or "actuals," and comparing them to the expected cost and schedule of work performed, or "baseline."

Once the FEMA Regional Office has funded the project outlined in this CTP-FRP-MAS, the Regional MIP Champion will obligate projects and create the tasks in the MIP for CTP data and progress update reporting. This step establishes the baseline for the project in the MIP, using the cost and schedule information for each task as outlined in this document.

Once the baseline has been established in the MIP, the CTP shall input the performance and actual cost to date for all tasks within each project for which the CTP is responsible. Mapping Partners shall complete these updates at a minimum of once every 30 days and at the completion of the task. Mapping Partners shall update the progress in the MIP with actual costs, percent complete and as of dates by the 25th of each month in the Track Task Progress Workbench.

When a task is completed, including all QA/QC activities in this MAS, plus the Quality Control Reviews required by FEMA standards, the CTP shall enter 100% complete, enter the actual completion cost, and the actual completion date within the Track Task Progress Workbench. The tasks will be available on the Track Progress workbench up to 90 days after the completion of the producer task in each purchase. The MIP

shall also be populated with appropriate leverage information regarding who (CTP or community) paid for the data provided and the amount of data used by the Flood Risk Project. The CTP shall maintain a Schedule Performance Index (SPI) and Cost Performance Index (CPI) between 0.92-1.08.

The CTP is required to report on the earned value of projects that are in the MIP monthly and must give explanations for variances outside of the tolerance defined above. Special Problem Reports (SPR) explaining any variance must be submitted in a timely manner by the CTP. The FEMA Regional Project Monitor shall work with CTPs to detail a Corrective Action Plan (CAP) when a CTP partner is outside of the tolerance. A CAP must define the reason for the variance and the intended resolution. FEMA Regional Offices must coordinate with FEMA Headquarters when CAPs are developed.

Program Management and overarching Community Outreach and Mitigation Strategies (COMS) SOW tasks are now tracked in the MIP. Cost and schedule performance measures must be defined and documented in those separate MAS or SOW. These measures must be used to monitor partner performance and to determine future funding eligibility. This exception only applies to tasks not able to be conducted or tracked in the MIP.

CTPs shall provide financial and schedule baselines each Project, Purchase and Task using the FY18 R6 Quantities and Baseline Schedule form. The Project Officer, as needed, may request additional information on status of the project on an ad hoc basis.

CTPs should note that projects obligated in the MIP only include FEMA dollars. CTPs should update the MIP to inform FEMA of the FEMA dollars spent each month. Leverage costs, fees and data are entered separately at the completion of the tasks, but are not included in the task dollars for project incremental progress reporting. The CTP is required to report project progress in the MIP on a monthly basis and should monitor the health of their projects in the MIP. CTPs shall assure that all MIP tasks are updated monthly by the 25th of each month to assure their projects are in an acceptable Schedule Performance Indicator (SPI) value.

More information is available in the Earned Value Management task later within this Mapping Activities Statement.

Leverage reporting in the MIP. The MIP shall also be populated with appropriate leverage information regarding who paid for the data provided and the amount of data used by the Risk MAP Project. It is expected that the CTP partner will include the leverage costs, fees and data provided at the completion of each tasks identified in this document as leverage. Should the units available for reporting in the MIP not match those necessary, the CTP shall enter additional information in the comments section to identify the actual units reported. (Leverage Dollars may need to be reported for the Discovery efforts under the MIP Scoping task, but only panels are currently available as a unit for reporting.) These funds should be entered in the MIP by task and purchase.

Grant Documentation Maintenance. The CTP should alert the FEMA Regional Project Monitor should a project require a modification to the scope, schedule or budget. In cases where there may be changes to scope, schedule or budget, an award amendment may be required, and in this case, the CTP should discuss with their FEMA Regional Project Monitor the modification required on the award, to determine the correct course of action and paperwork requirements for the amendment. If the CTP determines an extension to the Period of Performance will be required, the FEMA Regional Project Monitor should be notified, per the NOFO, no later than 30 days before the Period of Performance ends. Grant document requirements vary dependent on the changes that are being incurred and should be discussed with your Project Monitor.

CTP Coordination with FEMA. The Mapping Partner shall notify FEMA at least four weeks prior to all relevant meetings requiring FEMA staffing/support. The CTP should notify all other applicable parties of all Flood Risk Project meetings with community officials, and other relevant meetings, at least two weeks prior to the meeting (with as much notice as possible). FEMA and/or its contractor may or may not attend

the community meetings. Staffing needs from FEMA are to be coordinated through the Watershed Project Team (WPT) meetings.

Additionally, the CTP shall manage their contractor to assure delivery of the appropriate items and shall approve all data delivered on their behalf, prior to its submission. The CTP lead shall coordinate inquiries with the responsible FEMA POC to assure delivery of the tasks outlined in this FRP-MAS.

Watershed Project Team. In cooperation, the State CTP Lead and the FEMA Project Monitor will establish a Watershed Project Team (WPT). The WPT should be established at the onset of a project. The WPT is intended to assure a broad discussion of existing risk assessment and understanding of the project area prior to meeting with the communities.

The WPT should review the need for input from a subject matter experts to include Floodplain Management and Insurance, the National Flood Insurance Program, the Hazard Mitigation Planning and Hazard Mitigation Assistance available through FEMA's Mitigation Division, the team may vary from project to project. These subject matter experts may be Local, Regional, State or Federal partners, based on the project needs. The WPT should also include the identified FEMA Project Monitor as a team member. As a project progresses, it may be deemed that other FEMA team members are necessary for the successful delivery of Risk MAP within the project area. The WPT will be led by the CTP and meet periodically throughout a project's lifecycle. The CTP is responsible for coordinating the activities identified in this MAS. The FEMA Region should be provided with documentation identifying the WPT membership and meeting schedule.

Status Reports. In order to facilitate information sharing and a continuing dialogue between the Watershed Project Team (WPT) and the community, the CTP will provide communities with regular status reports outlining the current project status, key accomplishments to date, identified risks, if any, and next steps including estimated next meeting date and meeting content (template to be provided from FEMA or can be created by Mapping Partner). These status reports will be provided to FEMA for review before electronic distribution. Project update status reports will be distributed to communities at mid-points between each of the meetings, and between the Final Meeting and effective date (if included in this MAS), to help introduce and prepare the communities for upcoming discussions.

Project Risks and CTP Mitigation Steps. Threats to the planned completion of a project may come from various sources. Risks should be identified during the planning phase and monitored throughout the project so that potential impact can be assessed and solution strategies developed and implemented as needed.

Table 1.1 – Project Risk Identification

Project Risk	Potential Impact to Project, Team or Delivery of Successful Project Effort	Mitigation/Solution Strategy

LiDAR Data Acquisition Delayed	Schedule Delay	Request schedule extention
NOAA Atlas 14 Data Release Delayed	Schedule Delay	Build models, run calibration events, and push the run of probabilistic events to later.
Delay in getting agreements with contractors	Schedule Delay	Initiate work to be done by delayed contractors with in-house resources or other contractors.
Identify changes in added studied streams during the study (may want to change which previously unstudied streams we study)	Change of scope	Coordinate with FEMA to revise MAS

Project Documentation. The CTP will deliver Technical Study Data Notebooks (TSDNs) intermittently, in accordance with Regional guidance. The CTP shall consult the Scope and Deliverables section within each project phase to assure they are preparing and delivering all project documentation in accordance with Regional Guidance. The CTP will review their deliveries to FEMA for completeness and certify each submittal as being in accordance with FEMA's Standards for Flood Risk Analysis and Mapping; dated November 30, 2015 and revisions thereto. CTPs shall approve all deliverables submitted on their behalf.

Key Decision Point Process Support. CTPs shall support FEMA Regional Project Monitors in preparation of project specific documentation to support the Key Decision Point process. Preparation of Key Decision Point (KDP) process paperwork for the following steps:

- KDP0 – Shall be submitted by the CTP with the Quantity and Baseline Schedule form for any Base Level Engineering and/or Discovery efforts. The KDP0 form should provide information the identification, prioritization and selection of the project that will be initiated.
- KDP1 – Shall be submitted with the Quantity and Baseline Schedule form for any Phase 2 (Risk Identification & Assessment) work that will prepare refined engineering analysis or compile a first time parish or county-wide modernization effort. The KDP1 write up should include information collected during the Discovery effort and document community requests for study update.
- KDP2 is required prior to the preparation of preliminary Regulatory Products. CTPs shall support the FEMA PM and Regional Support Center in documenting community acceptance and comments received when presented during the Flood Risk Review meeting, and throughout the technical data preparation. CTPs shall indicate:
    - Number of panels intersected by the updated analysis prepared and
    - Describe severity of change and a recommendation for the panels that should be updated or remain as is based on the analysis prepared in Phase Two.
- KDP3 documentation required for issuance of the Preliminary FIRM/FIS and KDP4 support required prior to the initiation of the 90-Day Appeal and Comment period will be supported by the R6 Regional Support Center (RSC)
- KDP5 support may be required of CTPs who are active in supporting the review and incorporation of any comments/appeals received. CTPs who support review and inclusion of technical data during Phase 3 (Regulatory Product Update) may assist the RSC documentation effort prior to the issuance of the Letter of Final Determination.

Other Requirements

- The Project Monitor may request additional information on status of projects on an ad hoc basis in order to answer incoming correspondence and required reporting for FEMA leadership. The CTP will provide information as requested by the FEMA Project Monitor.
- The Mapping Partner shall maintain an archive of all data submitted. All supporting data must be retained for a minimum of three years from the date a funding recipient submits its final expenditure report to FEMA.
- FEMA will provide download/upload capability for data submittals through the MIP located at https://hazards.fema.gov. As each activity is completed, ALL final and editable data files shall must be submitted to the MIP for validation.
- FIRM and FIS report for the watersheds and areas identified in Table 1.1 will be produced in the North American Vertical Datum of 1988 (NAVD88).
- Metadata is required for all digital activities. {Insert appropriate Data Capture language applicable to this Mapping Activity Statement.}

Standards: All Discovery process work shall be performed in accordance with the standards specified in Section 5 – Standards.

Deliverables: The CTP shall prepare the following deliverables while performing the Project Management activities identified above:

- Project Specific Quantities & Baseline Form (QBS) – Prepare and update if warranted
- QA/QC Summary Reports
- Corrective Action Plans, as required
- Progress data entry in the Mapping Information Platform (MIP) shall be submitted to the MIP by 25th of the month, to include:
    - Actual Cost to Date
    - Report (As of) Date
    - Percent complete
    - Data uploads, as required
- Leverage shall also be entered into the MIP by task.
- Special Problems Report to detail any schedule or cost variations from that documented in the QBS form submitted at project initiation
- Monthly/Quarterly Coordination calls with the FEMA POC will be performed and recorded under this task
- Updates for the Status of Studies tracker portal will be submitted via email to JBaker@Halff.com and JYoung@halff.com for update as a project traverses project milestones.
- Maintenance and update of the identified project risks identified in Table 1.1 (Project Risk Identification) throughout this phase of project delivery
- Project coordination materials will be uploaded and shared with FEMA POC through the Region 6 Risk MAP SharePoint.
- Project management discussions and documentation will be maintained under this task
- Ad-hoc status inquiries, reports and input related to project performance and project scope may be required periodically. The CTP will support the FEMA POC in providing this information as required.
- Monthly Earned Value data reporting through the MIP with variance explanations to support management of technical mapping activities within specified time frame, for both Regulatory and Flood Risk Products.

- Management of SPI/CPI performance for an organization.
- Overall project Quality Management Plan including QA/QC maintenance information, such as maintaining a QA/QC log and providing a QA/QC approach to FEMA for review and approval.
- Management of adherence to scope of work and quality of work for an organization.
- Key Decision Point (KDP) support, as required
- Grant Award Amendments, as required
- CTP documentation support for the Key Decision Point (KDP) submittals for Regional and FEMA HQ required approvals

Task – Perform Community Engagement & Project Outreach

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: The CTP is expected to provide supplementary support to the Mapping Partner responsible for the Community Engagement activities funded through the CTP-PM-SOW or CTP-COMS-SOW and/or other contracts. Community Engagement activities funded through this MAS shall not supplant or duplicate Community Engagement activities funded through other grants or contracts.

This Flood Risk Project will include in-person opportunities to engage communities, build risk awareness, increase capabilities for risk communication, and stimulate mitigation action at the local level. The overarching goal is to create a climate of understanding and ownership of the mapping process at the State and local levels. Well-planned and executed community engagement and project outreach can reduce political stress, confrontation in the media, and public controversy, which can arise from lack of information, misunderstanding, or misinformation.

The actual number of meetings will be determined based on the risk and need at the local level and determined as part of developing the project-based communication plan. Provisions may be made for remote access video/audio feeds for those that cannot attend in person. These activities should be reviewed for implementation throughout the Risk MAP lifecycle and the defined meetings within it. All Mapping Partners shall use Community Engagement strategies and tactics throughout the delivery of the Risk MAP program in each watershed or project area.

Although these activities cannot be included as a line item, the Mapping Partner shall keep in mind that the efforts undertaken within the FRP-MAS are intended to increase the:

- Understanding of natural hazard risk within a community,
- Support of local efforts to reduce natural hazard risk within a community or watershed area, and
- Effectiveness of meetings and engagement opportunities with communities throughout the Risk MAP lifecycle.

Community action and community engagement cannot be purchased by line item; however, if utilized, they can influence and advance by proper project and communications planning throughout the Risk MAP process.

Watershed and Community Assessment. Activities include assessing a watershed and high priority communities to understand what is important to them, their mitigation priorities, and their existing relationships with FEMA. May include holding telephone discussions with local officials and residents to understand the watershed and identify key stakeholders. Will include local planners, floodplain administrators (FPAs), elected officials, community leaders, local levee/dam/coastal leadership/business owners and others, based on local needs.

Action Identification and Planning. Support for communities to identify and/or advance mitigation opportunities, and/or select amongst alternatives, through the provision of data, analysis and/or strategic support. Based on information learned from conversations with community influencers, as well as the Hazard Mitigation Plan, and information obtained though Discovery, identify the top 2–3 actions to focus on advancing within each community, and create a plan to advance them.

30-Day Review of Proposed Models: Before any data development tasks within a flood risk project, including a FIRM update, begin, each community affected by the flood insurance study must be notified of the planned model or models to be used. The affected communities will be provided with a 30-day period beginning upon notification to consult with FEMA and the CTP regarding the appropriateness of the mapping model or models to be used. The results of the consultation do not necessarily guarantee that a change should be made and should be clearly documented. This consultation does not waive or otherwise affect the right of the community to later appeal any flood hazard determinations.

30-Day Review of Completed Models, Work Maps, and Database: When a flood risk project will include new or updated FIRM panels, the CTP must provide access to the draft FIRM database and other contributing data, as requested, to the communities by the conclusion of Quality Review 1. The CTP also must provide the affected communities with a 30-day period during which the communities may provide data to FEMA and the CTP that can be used to supplement or modify the existing data. The CTP should incorporate any community-submitted data into the project as appropriate. Data or information submitted must be completed to a level to be directly incorporated to the study or demonstrate scientific incorrectness by:

- Identifying and provide documentation of the methods, or assumptions purported to be scientifically incorrect.
- Supporting data as to why the methods, or assumptions used are not appropriate.
- Providing new or alternative analysis and mapping data utilizing methods consistent with prevailing engineering principles and meeting FEMA's Standards.
- Providing technical information or data indicating why the provided new or updated analysis and mapping should be accepted as more correct.

Television and Radio Outreach: Several guidance documents discuss requirements which discuss BW-12/HFIAA and Standard 622 required additional outreach using television and radio outlets to further educate property owners. In accordance with Section 216 of BW-12, the Project Team, in coordination with the appropriate staff in the Regional Office of External Affairs, will need to engage with the media in an effort to educate property owners about flood map revisions and the process available to such owners to appeal proposed changes in flood elevations through their community. FEMA still cannot fund advertising, so public service announcements should be considered as a prime opportunity. Section 216 specifically requires including local radio and television stations in the education effort. Although Section 216 of BW-12 does not mention the other flood hazard information components that are subject to appeal, any engagement with the media should include explanations of the entire appeals and comments process including other flood hazard determinations (i.e., SFHAs, regulatory floodways) and comments on other information on the FIRM and FIS report. Refer to www.fema.gov/media-library-ata/1470349528634-666513f8fd8ef403b7eb2ff5b2310b61/SE_Guidance_Due_Process_Phase_May_2016_508.pdf for more information.

Meetings. Meetings are included in each phase of project delivery later in the document. Objectives and requirements are included in each phase versus being included in the Community Engagement section to promote the Phased funding approach and the R6 Quantities and Baseline Schedule (QBS) form being completed appropriately.

Project Outreach and Communication Planning. The CTP will work with the Regional Office during the initiation of this activity to develop the Project Outreach and Communication Planning effort to support the implementation of the mapping project. FEMA R6 has developed two tools that may be used by CTPs to meet the requirements of Project Outreach and Communications planning, mainly:

- Communication and Action Tracker Worksheet – Prepare and Maintain
- Project and Communications Management Tool (excel file)

Open House Planning and Preparation. The CTP will conduct planning and preparation activities for Phase 3 Open House meetings. The Open House meetings themselves will be funded under a different grant award.

Standards: All Community Engagement and Outreach work shall be performed in accordance with the standards specified in Section 5 – Standards. All communication with local governments will be done in accordance with 44 CFR Part 66.

Deliverables: The CTP shall prepare the following deliverables while performing the Community Engagement activities identified above:

- Communication and Action Tracker Worksheet – Prepare and Maintain
- Project and Communications Management Tool (excel file)
- Watershed/Community Assessment outputs
- Telephone logs and emails
- Meeting invitation, agenda, presentation slides (as requested), and meeting notes
- Action Identification and Advancement Plan
- Project update status reports for project communities.
- Provide documentation of adherence with the requirements for the community 30-day review of proposed models and 30-day review of work maps, completed models, and associated information.

Phase Two - Risk Identification and Assessment

Phase two begins at the Project Kick-Off meeting and ends with the delivery of the Risk MAP products at the Resilience Meeting with all participating parties. The emphasis of this phase is to deliver the required and identified elements (products, services and technical assistance) within the selected project areas to further the Awareness and Action metrics. The following tasks may be included in the project work for Phase Two.

Note: Engineering analysis prepared during phase two may be included in a Phase Three effort for the Regulatory Product Update effort in the future. If the engineering analysis prepared is used to update the FIS and FIRM, the party whom produced the analysis is expected to participate with FEMA (and its future mapping partner) in responding to appeals and comments received during the 90-day appeal period. This effort may be funded under a separate Mapping Activity Statement in the future.

Task: Develop Topographic Data

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: Topographic/elevation data may be new or existing. New is defined as data that will be flown and processed for the areas specified in this MAS study areas according to the referenced specifications. Existing topographic/elevation data (previously flown and/or processed) may be used to produce flood studies and related products. However, if new data is not to be collected, the FEMA Region should be consulted before leveraging the best available existing topographic to ensure acceptability for the intended level of flood hazard study.

The CTP shall obtain additional topographic data for the floodplain areas to be studied including overbank areas. These data will be used for hydrologic analysis, hydraulic analysis, coastal analysis, floodplain boundary delineation and/or testing of floodplain boundary standard compliance. The CTP shall gather availability, currency, and accuracy information for existing topographic data covering the affected communities in this MAS. The CTP shall use topographic data for work in this MAS only if it is better quality than that of the original study or effective studies. The Mapping Partner will ensure that the FEMA Geospatial Data Coordination Policy and Implementation Guide is followed and the data obtained or to be produced are documented properly as per those policies and guidelines.

Requirements for New Topographic Data: The CTP shall generate new topographic data for areas defined in Table 1.7. The CTP also shall coordinate with team members conducting field surveys as part of this MAS. The CTP should follow guidelines set forth in the Elevation Guidance (September 2015) to determine the appropriate accuracy and data products required for the areas specified in this MAS. For this activity, the CTP shall utilize the data collected under this Topographic Data Development task and via field surveys to create a best available digital elevation model for the subject flooding sources. In addition, the CTP shall address all concerns or questions regarding the topographic data development and processing that are raised by the CTP during the independent QA/QC review. The CTP should confirm with the FEMA Project Officer the appropriate data model(s) (i.e., Digital Elevation Models (DEM), mass points and breaklines) for the intended use of the data.

Requirements for development of Terrain Data Capture: For this activity, the CTP shall utilize the data collected under the New and/or Existing Topographic Data Capture task and via field surveys to create a best available digital elevation model for the subject flooding sources. The CTP should confirm with the FEMA Project Officer the appropriate data model(s) (i.e. DEMS) for the intended use of the data.

In addition, the CTP shall address all concerns or questions regarding the topographic data development that are raised during the Independent QA/QC review.

Table 1.7 – Summary of Topographic Data

Watershed/ Flooding Source	Beginning and End Points of Topo Data Collection	New/Existing OR Leveraged	Accuracy & Year Acquired	Source/ Data Vendor	Contact Information	Use Restrictions
Clear Creek, Armand Bayou, Sims Bayou, Brays Bayou, White Oak Bayou, Galveston Bay, San Jacinto River, Hunting Bayou, Vince Bayou, Spring Creek, Cypress Creek, Little Cypress Creek, Willow Creek, Carpenters Bayou, Goose Creek, Greens Bayou, Cedar Bayou, Jackson Bayou, Luce Bayou, Barker Reservoir, Addicks Reservoir,	January 13, 2018 to March 22, 2018	New	Nonvegetated Vertical Accuracy (NVA) Root Mean Square Error in the y direction (RMSEz) is < 10 cm, or 0.328084 ft. NVA Accuracyz 95% is < 19.6 cm, or 0.6430446 ft. Vegetated Vertical Accuracy (VVA) Accuracyz 95% is < 29.4 cm, or 0.9645669 ft. Acquired 2018	TNRIS	Joey Thomas Elevation Specialist & RDC Team Lead Research & Distribution Center Strategic Mapping Program	None

and Buffalo Bayou						

Standards: All Topographic Data Development work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: The CTP shall make the following products available to FEMA by uploading the digital data to the MIP in accordance with the schedule outlined in Section 6 – Schedule. Where paper documentation is required by state law for professional certifications, the CTP may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the regional and/or state representative to verify state reporting requirements.

- An intermediate Technical Study Data Notebook (TSDN) describing the scope of work, direction from FEMA, issues, information for next mapping partner, etc.
- Acquisition planning document detailing flight and sensor parameters.
- Acquisition and processing document detailing actual flight, acquisition, and processing methodology and results.
- Raw Point Cloud
- Fully Classified Point Cloud
- Breaklines
- Bare Earth DEM
- Contours
- Survey ground control and checkpoints, including x, y, z file of points, survey control documentation, photographs at point locations, and Certification of Work.
- Checkpoint analyses spreadsheet used to assess the accuracy of data, including Root Mean Square Error calculations to support vertical accuracy.
- Identification of data voids and methods used to supplement data voids.
- Low confidence area polygon file and metadata.
- National Geodetic Survey data sheets for Network Control Points used to control topographic data acquisition and ground surveys.
- Metadata file complying with the NFIP Metadata Profiles Specifications, and
- Support documentation and Certification of Work. Where paper documentation is required by State Law for Professional certifications, the Mapping Partner may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the Regional and/or State representative to verify state reporting requirements.
- Updates to the National Digital Elevation Program (NDEP) project tracking at http://www.ndep.gov/.
- Watershed Project Team meeting minutes and documentation/resolution of any concerns raised in coordination with local community technical staff throughout this task effort.
- Perform Quality Assurance and Quality Control (QA/QC) review and provide:
    - A Summary Report that describes the findings of the independent QA/QC review;
    - Confirmation of update(s) made to the NDEP; and
    - Recommendations to resolve any problems that are identified during the independent QA/QC review.
- Upload of all study data through the MIP Data Development Task – Develop Topographic Data
- Report leverage data in the MIP Data Development Task – Develop Topographic Data for any leverage data utilized in this task.

Task: Perform Field Survey

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: The CTP shall conduct a detailed field reconnaissance of the specific study area to determine conditions along the floodplain(s), types and numbers of hydraulic and/or flood-control structures, apparent maintenance or lack thereof of existing hydraulic structures, locations of cross sections to be surveyed, and other parameters needed for the hydrologic and hydraulic analyses.

The CTP shall conduct field surveys, including obtaining channel and floodplain cross sections, identifying or establishing temporary or permanent bench marks, and obtaining the physical dimensions of hydraulic and flood-control structures. If appropriate, the CTP shall also identify items needed for coastal analyses including land cover, vegetation types, housing, dunes, beach nourishment, coastal structures, and transects. The CTP shall also coordinate with other entities that are involved in the Topographic Data Development process regarding ongoing activities and deliverables.

Existing survey data, or as-built data, may be used to produce flood studies and related products. However, if existing data are to be collected, the FEMA Region should be consulted before leveraging the best available existing survey data to ensure acceptability for the intended level of flood hazard study.

As necessary, the Watershed Project Team shall coordinate with local community technical staff to coordinate and validate its findings with the local community technical staff intermediately throughout Phase Two. At a minimum, the Watershed Project Team shall reach out to communities in order to alert them of the task progress and provide them insight on the findings and results of the task effort undertaken. This/These meeting(s) shall include of the FEMA POC.

Standards: All Field Survey work shall be performed in accordance with the standards specified in Section 5 – Standards.

Deliverables: The CTP shall make the following products available to FEMA by uploading the digital data to the MIP, in accordance with the schedule outlined in Section 6. Where paper documentation is required by state law for professional certifications, the CTP may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the regional and/or state representative to verify state reporting requirements

- An intermediate Technical Study Data Notebook (TSDN) describing the scope of work, direction from FEMA, issues, information for next mapping partner, etc.
- Digital photographs of cross section locations and structures
- Digital sketches of cross section and structure data
- Documentation of the horizontal and vertical datum
- National Geodetic Survey data sheets for Network Control Points used to control topographic data acquisition and ground surveys
- Digital versions of draft text for inclusion in the FIS report
- Digital survey data consistent with the Data Capture Technical Reference
- Metadata file complying with the NFIP Metadata Profiles Specifications
- Support documentation
- Certification of Work
- DFIRM Database files
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken as outlined in the approved QA/QC Plan.

- Upload of all study data through the MIP Data Development Task – Perform Field Survey
- Report leverage data in the MIP Data Development Task – Perform Field Survey for any leverage data utilized in this task.

Task: Develop Hydrologic Data

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: The CTP shall perform hydrologic analyses for the flooding source(s) identified in Table 1.8—*Summary of Hydrologic Analyses*. Hydrologic analysis activities include the determination of peak flood discharges, the use of rainfall-runoff models, regression equations, gage analysis, and hydrograph development to support the level of detail required for the project. The CTP shall calculate peak flood discharges and/or flood hydrographs for the 10%, 4%, 2%, 1%, "1% plus", "1% minus", and 0.2% annual chance events using the analysis method listed in Table 1.8. These flood discharges will be the basis for subsequent Hydraulic Analyses performed under this MAS. In addition, the CTP will be responsible for addressing any and all comments resulting from the independent QC, including resubmittal of deliverables as needed to pass technical review.

If GIS-based modeling is used, the CTP shall document automated data processing and modeling algorithms, and provide the data to FEMA to ensure these are consistent with FEMA standards. Digital datasets (such as elevation, basin, or land use data) are to be documented and provided to FEMA for approval before performing the hydrologic analyses to ensure the datasets meet minimum requirements. If non-commercial (i.e., custom-developed) software is used for the analysis, then the CTP shall provide full user documentation, technical algorithm documentation, and the software to FEMA for review before performing the hydrologic analyses.

The CTP will compare the calculated, or computed, discharge with discharge determined from reliable gage data, if any. This comparison will only be done at locations where the two discharge values are considered representative of the same flooding source. Results of this comparison will be used in making a professional judgment for determining the discharge to be used for the hydraulic analysis.

Table 1.8: Summary of Hydrologic Analyses

Study Area/Flooding Source	Method	Square Miles of Leveraged Hydrology	Square Miles of New Hydrology
Harris County/ Brays Bayou, White Oak Bayou, Hunting Bayou, Greens Bayou, Spring Creek, Cypress Creek, Little Cypress Creek, Willow Creek, Barker Reservoir, Addicks Reservoir, and Buffalo Bayou	Basin Development Factor	▪ 0	▪ 1611.4

Standards: All Hydrologic Analyses work shall be performed in accordance with the standards and guidance specified in Section 5 – Standards.

Deliverables: The CTP shall make the following products available to FEMA by uploading the digital data to the MIP in accordance with the schedule outlined in Section 6 – Schedule. Where paper documentation is required by state law for professional certifications, the CTP may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the regional and/or state representative to verify state reporting requirements

- An intermediate Technical Study Data Notebook (TSDN) describing the scope of work, direction from FEMA, issues, information for next mapping partner, etc.
- Digital copies of all hydrologic modeling (input and output) files for the 10%, 4%, 2%, 1%, and 0.2% annual chance events.
    - Watersheds should be studied in their entirety
        - Detailed Streams require the 10%, 4%, 2%, 1%, and 0.2% annual chance events to be analyzed
        - Limited Detailed Streams require the 1%, and 0.2% annual chance events to be analyzed
        - Approximate Streams require the1%, and 0.2% annual chance events to be analyzed
    - PMR streams should be studied to a termination point of hydrologic significance (mouth of stream, confluence with larger stream, dam, etc.)
- Digital hydrologic data consistent with the Data Capture Standards as described in the latest Technical Reference: Data Capture.
- FIRM Database files as described in the FIRM Database Technical Reference, Table 2.
- Metadata file complying with the latest Technical Reference: Metadata Profiles for Hydrology.
- Digital Summary of Discharges Tables presenting discharge data for the flooding sources for which hydrologic analyses were performed (for flooding sources mapped as Zone AE on the FIRM).
- Digital versions of draft text for inclusion in the FIS report.
- Digital versions of all backup data used in the analysis including GIS data layers work maps.
- A Hydrology Report summarizing the approach and results of the hydrologic analysis for each study area in Table 1.8.
- Watershed Project Team meeting minutes and documentation/resolution of any concerns raised in coordination with local community technical staff throughout this task effort.
- Perform Quality Assurance and Quality Control (QA/QC) review and provide
    - A Summary Report that describes the findings of the independent QA/QC review;
    - Confirmation of update(s) made to the NDEP;
    - Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the FIRM as outlined in the approved QA/QC Plan.
- Written certification that the digital data meet the minimum standards and specifications.
- Written response to any comments resulting from the independent QA/QC review.
- If data is changed following the independent QA/QC review, then updated deliverables for the Develop Hydrologic Data task must be submitted to the MIP.
- Upload of all study data through the MIP Data Development Task – Develop Hydrologic Data
- Report leverage data in the MIP Data Development Task – Develop Hydrologic Data for any

leverage data utilized in this task.

- Maintain an archive of all data submitted for hydrologic modeling review. (All supporting data must be retained for three years from the date a funding recipient submits its final expenditure report to FEMA, and once the study is effective all associated data should be submitted to the FEMA library)

Task: Develop Hydraulic Data

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: The CTP shall perform hydraulic analyses as described in Table 1.9: Summary of Hydraulic Data. Hydraulics analysis activities include establishing and reviewing regulatory floodways and flood elevations for the 10%, 4%, 2%, 1%, and 0.2% annual chance events based on flood discharge rates computed under Develop Hydrologic Data. The hydraulic methods used for this analysis may include base level and detailed level hydraulic modeling. The base level will use an automated hydraulic model, and use the best available elevation data. It will not include field surveys, floodways, or mapped Base Flood Elevations (BFEs). The detailed level may include field surveys, floodways, and the 10%, 4%, 2%, 1%, 1% plus (and minus) and 0.2% annual chance events, using methods described in Table 1.9. **Where available, the CTP will leverage hydraulic analysis and modeling prepared in the Base Level Engineering modeling efforts undertaken in Discovery as a starting point for this task.**

Enhancement and Model Refinements possible during Phase Two are included in the table below:

Option	Cross Sections	Flow Paths (Left, Right and Channel)	Manning's "n" Values	Structures	Flood Zone
A		Base Level Engineering is more refined than this method			
B		Base Level Engineering is more refined than this method			
C	Each section reviewed by engineers. *R6 Base Level Engineering meets this criteria*	Reach lengths adjusted based on draft floodplain.	Overbanks LULC data, channel value estimated separately.	Included; structure data from national, state or other data source. Estimated base on topography and aerial photos for those not available.	A
D	Each section reviewed by engineers.	Reach lengths adjusted based on draft floodplain.	Overbanks from LULC data, channel value estimated separately and calibrated where possible.	Included; structure data from as-builts, design plans, "measured" in the field, or other community datasets with opening information.	A or AE

Option	Cross Sections	Flow Paths (Left, Right and Channel)	Manning's "n" Values	Structures	Flood Zone
E	Each section reviewed by engineers, Channel bathymetry included in sections.	Reach lengths adjusted based on draft floodplain.	Overbanks from LULC data and field data, channel value estimated separately from field data and calibrated where possible.	Included; structure data from field survey, as-builts, design plans, "measured" in the field.	AE

As necessary, the Watershed Project Team shall coordinate with local community technical staff to coordinate and validate its findings with the local community technical staff intermediately throughout Phase Two. At a minimum, the Watershed Project Team shall reach out to communities in order to alert them of the task progress and provide them insight on the findings and results of the task effort undertaken. This/These meeting(s) shall include of the FEMA POC.

The CTP shall use the cross-section and field data collected during Perform Field Survey and the topographic data collected during the Develop Topographic Data, when appropriate, to perform the hydraulic analyses. The hydraulic analyses will be used to establish flood water surface elevations, floodplain extents, and regulatory floodways for the listed study area or flooding sources.

If applicable, the CTP shall use the FEMA CHECK-2 or CHECK-RAS checking program to verify the reasonableness of the hydraulic analyses. To facilitate the independent QA/QC review, the CTP shall provide explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate. In addition, the CTP shall address all concerns or questions regarding the hydraulic analyses that are raised during the independent QA/QC review including resubmittal of deliverables as needed to pass technical review.

Table 1.9: Summary of Hydraulic Data

ID	Flooding Source Name	Current Inventory (Modernized, Paper, Not Studied/Included)	Current CNMS Status (Unknown, Unverified, Valid)	Current Study Method (BLE, Approximate, Detailed)	Proposed Study Method (Approximate, Limited Detail, Detailed)	Total Mileage
1	D100-00-00	Modernized	Unverified	Detailed	Detailed	30.1
2	D109-00-00	Modernized	Unverified	Detailed	Detailed	1.4
3	D111-00-00	Modernized	Unverified	Detailed	Detailed	2.4
4	D112-00-00	Modernized	Unverified	Detailed	Detailed	4.2
5	D118-00-00	Modernized	Unverified	Detailed	Detailed	6.7
6	D120-00-00	Modernized	Unverified	Detailed	Detailed	3.0
7	D122-00-00	Modernized	Unverified	Detailed	Detailed	3.3

8	D124-00-00	Modernized	Unverified	Detailed	Detailed	1.7
9	D126-00-00	Modernized	Unverified	Detailed	Detailed	2.8
10	D129-00-00	Modernized	Unverified	Detailed	Detailed	3.2
11	D132-00-00	Modernized	Unverified	Detailed	Detailed	1.6
12	D133-00-00	Modernized	Unverified	Detailed	Detailed	2.0
13	D139-00-00	Modernized	Unverified	Detailed	Detailed	1.8
14	D140-00-00	Modernized	Unverified	Detailed	Detailed	3.1
15	D140-04-00	Modernized	Unverified	Detailed	Detailed	0.7
16	D142-00-00	Modernized	Unverified	Detailed	Detailed	2.4
17	D144-00-00	Modernized	Unverified	Detailed	Detailed	1.6
18	E100-00-00	Modernized	Unverified	Detailed	Detailed	25.6
19	E101-00-00	Modernized	Unverified	Detailed	Detailed	8.3
20	E115-00-00	Modernized	Unverified	Detailed	Detailed	6.1
21	Golf Course Tributary	Modernized	Unverified	Detailed	Detailed	0.9
22	E115-04-00	Modernized	Unverified	Detailed	Detailed	0.6
23	E115-09-00	Not Included	Unknown	N/A	Detailed	2.5
24	E116-00-00	Modernized	Unverified	Detailed	Detailed	0.6
25	E116-01-00	Not Included	Unknown	N/A	Detailed	1.0
26	E116-05-00	Modernized	Unverified	Detailed	Detailed	0.7
27	E117-00-00	Modernized	Unverified	Detailed	Detailed	6.8
28	E121-00-00	Modernized	Unverified	Detailed	Detailed	6.3
29	E122-00-00	Modernized	Unverified	Detailed	Detailed	2.9
30	E124-00-00	Modernized	Unverified	Detailed	Detailed	1.3
31	E125-00-00	Modernized	Unverified	Detailed	Detailed	2.0
32	E127-00-00	Modernized	Unverified	Detailed	Detailed	1.6
33	E132-00-00	Not Included	Unknown	N/A	Detailed	2.3
34	E133-00-00	Not Included	Unknown	N/A	Detailed	1.3
35	E135-00-00	Modernized	Unverified	Detailed	Detailed	1.7
36	E141-00-00	Modernized	Unverified	Detailed	Detailed	5.7
37	H100-00-00	Modernized	Unverified	Detailed	Detailed	14.4
38	H102-00-00	Not Included	Unknown	N/A	Detailed	1.6

39	H103-00-00	Modernized	Unverified	Detailed	Detailed	2.8
40	H110-00-00	Modernized	Unverified	Detailed	Detailed	0.9
41	H112-00-00	Modernized	Unverified	Detailed	Detailed	0.4
42	H118-00-00	Modernized	Unverified	Detailed	Detailed	1.3
43	J100-00-00	Modernized	Unverified	Detailed	Detailed	69.6
44	J109-00-00	Modernized	Unverified	Detailed	Detailed	0.4
45	J109-01-00	Modernized	Unverified	Detailed	Detailed	0.9
46	J121-00-00	Modernized	Unverified	Detailed	Detailed	1.1
47	J131-00-00	Modernized	Unverified	Detailed	Detailed	3.8
48	J131-01-00	Modernized	Unverified	Detailed	Detailed	1.2
49	J158-00-00	Modernized	Unverified	Detailed	Detailed	6.1
50	K100-00-00	Modernized	Unverified	Detailed	Detailed	51.9
51	K111-00-00	Modernized	Unverified	Detailed	Detailed	6.1
52	K111-03-00	Modernized	Unverified	Detailed	Detailed	0.4
53	K112-00-00	Modernized	Unverified	Detailed	Detailed	2.2
54	K116-00-00	Modernized	Unverified	Detailed	Detailed	1.1
55	K120-00-00	Modernized	Unverified	Detailed	Detailed	3.1
56	K120-01-00	Modernized	Unverified	Detailed	Detailed	3.2
57	K120-03-00	Modernized	Unverified	Detailed	Detailed	1.9
58	K124-00-00	Modernized	Unverified	Detailed	Detailed	4.4
59	K124-02-00	Modernized	Unverified	Detailed	Detailed	2.7
60	K131-00-00	Modernized	Unverified	Detailed	Detailed	4.0
61	K131-02-00	Modernized	Unverified	Detailed	Detailed	3.0
62	K131-02-04	Modernized	Unverified	Detailed	Detailed	1.3
63	K131-03-00	Modernized	Unverified	Detailed	Detailed	1.7
64	K131-04-00	Modernized	Unverified	Detailed	Detailed	2.0
65	K133-00-00	Modernized	Unverified	Detailed	Detailed	2.9
66	K140-00-00	Modernized	Unverified	Detailed	Detailed	3.7
67	K142-00-00	Modernized	Unverified	Detailed	Detailed	5.8
68	K145-00-00	Modernized	Unverified	Detailed	Detailed	4.1

69	K150-00-00	Modernized	Unverified	Detailed	Detailed	3.1
70	K150-01-0	Modernized	Unverified	Detailed	Detailed	1.2
71	K152-00-00	Modernized	Unverified	Detailed	Detailed	0.8
72	K155-00-00	Modernized	Unverified	Detailed	Detailed	3.7
73	K157-00-00	Modernized	Unverified	Detailed	Detailed	3.8
74	K159-00-00	Modernized	Unverified	Detailed	Detailed	2.8
75	K159-01-00	Modernized	Unverified	Detailed	Detailed	1.0
76	K160-00-00	Modernized	Unverified	Detailed	Detailed	6.3
77	K160-01-00	Modernized	Unverified	Detailed	Detailed	2.8
78	K166-00-00	Modernized	Unverified	Detailed	Detailed	6.1
79	K166-01-00	Modernized	Unverified	Detailed	Detailed	2.6
80	K166-02-00	Modernized	Unverified	Detailed	Detailed	2.8
81	K166-03-00	Modernized	Unverified	Detailed	Detailed	1.0
82	K167-00-00	Not Included	Unknown	N/A	Detailed	2.0
83	K172-00-00	Modernized	Unverified	Detailed	Detailed	4.0
84	K185-00-00	Modernized	Unverified	Detailed	Detailed	1.3
85	L100-00-00	Modernized	Unverified	Detailed	Detailed	21.8
86	L109-00-00	Modernized	Unverified	Detailed	Detailed	0.8
87	L112-00-00	Modernized	Unverified	Detailed	Detailed	2.2
88	L114-00-00	Modernized	Unverified	Detailed	Detailed	1.3
89	L114-01-00	Modernized	Unverified	Detailed	Detailed	2.6
90	M100-00-00	Modernized	Unverified	Detailed	Detailed	20.4
91	M101-00-00	Modernized	Unverified	Detailed	Detailed	0.7
92	M102-00-00	Modernized	Unverified	Detailed	Detailed	0.6
93	M104-00-00	Modernized	Unverified	Detailed	Detailed	1.7
94	M108-00-00	Modernized	Unverified	Detailed	Detailed	0.6
95	M109-00-00	Modernized	Unverified	Detailed	Detailed	1.1
96	M109-01-00	Modernized	Unverified	Detailed	Detailed	0.7
97	M112-00-00	Modernized	Unverified	Detailed	Detailed	2.1
98	M116-00-00	Modernized	Unverified	Detailed	Detailed	1.3

99	M124-00-00	Modernized	Unverified	Detailed	Detailed	2.6
100	P100-00-00	Modernized	Unverified	Detailed	Detailed	43.3
101	P107-00-00	Modernized	Unverified	Detailed	Detailed	5.1
102	P109-00-00	Modernized	Unverified	Detailed	Detailed	1.7
103	P110-00-00	Modernized	Unverified	Detailed	Detailed	1.6
104	P114-00-00	Modernized	Unverified	Detailed	Detailed	2.3
105	P117-00-00	Not Included	Unknown	N/A	Detailed	0.8
106	P118-00-00	Modernized	Unverified	Detailed	Detailed	19.7
107	P118-05-00	Not Included	Unknown	N/A	Detailed	1.5
108	P118-08-00	Not Included	Unknown	N/A	Detailed	1.6
109	P118-09-00	Not Included	Unknown	N/A	Detailed	0.9
110	P118-14-00	Modernized	Unverified	Detailed	Detailed	2.0
111	P118-23-00	Modernized	Unverified	Detailed	Detailed	1.4
112	P118-26-00	Not Included	Unknown	N/A	Detailed	1.0
113	P118-27-00	Not Included	Unknown	N/A	Detailed	1.2
114	P118-31-00	Not Included	Unknown	N/A	Detailed	2.2
115	P121-00-00	Not Included	Unknown	N/A	Detailed	1.5
116	P122-00-00	Not Included	Unknown	N/A	Detailed	2.2
117	P125-00-00	Modernized	Unverified	Detailed	Detailed	4.3
118	P125-04-00	Modernized	Unverified	Detailed	Detailed	0.1
119	P126-00-00	Modernized	Unverified	Detailed	Detailed	4.0
120	P127-00-00	Not Included	Unknown	N/A	Detailed	0.9
121	P127-01-00	Not Included	Unknown	N/A	Detailed	0.3
122	P130-00-00	Modernized	Unverified	Detailed	Detailed	9.8
123	P130-02-00	Modernized	Unverified	Detailed	Detailed	4.4
124	P130-02-02	Modernized	Unverified	Detailed	Detailed	2.0
125	P130-03-00	Modernized	Unverified	Detailed	Detailed	1.3
126	P130-03-01	Modernized	Unverified	Detailed	Detailed	1.2
127	P130-05-00	Modernized	Unverified	Detailed	Detailed	3.7
128	P133-00-00	Modernized	Unverified	Detailed	Detailed	2.2
129	P138-00-00	Modernized	Unverified	Detailed	Detailed	4.6

130	P138-01-00	Not Included	Unknown	N/A	Detailed	0.6
131	P138-01-01	Not Included	Unknown	N/A	Detailed	0.8
132	P138-05-00	Not Included	Unknown	N/A	Detailed	0.7
133	P140-00-00	Modernized	Unverified	Detailed	Detailed	2.1
134	P140-04-00	Modernized	Unverified	Detailed	Detailed	3.8
135	P140-04-03	Modernized	Unverified	Detailed	Detailed	5.4
136	P145-00-00	Modernized	Unverified	Detailed	Detailed	4.6
137	P145-03-00	Modernized	Unverified	Detailed	Detailed	2.6
138	P146-00-00	Modernized	Unverified	Detailed	Detailed	1.8
139	P147-00-00	Modernized	Unverified	Detailed	Detailed	3.0
140	P148-00-00	Modernized	Unverified	Detailed	Detailed	1.6
141	P155-00-00	Modernized	Unverified	Detailed	Detailed	1.4
142	P156-00-00	Modernized	Unverified	Detailed	Detailed	0.9
143	T100-00-00	Modernized	Unverified	Detailed	Detailed	5.5
144	T101-00-00	Modernized	Unverified	Detailed	Detailed	7.1
145	T101-03-00	Modernized	Unverified	Detailed	Detailed	3.1
146	T101-09-00	Not Included	Unknown	N/A	Detailed	0.8
147	T101-10-00	Modernized	Unverified	Detailed	Detailed	0.3
148	T101-13-00	Modernized	Unverified	Detailed	Detailed	1.0
149	T103-00-00	Modernized	Unverified	Detailed	Detailed	2.5
150	T103-01-00	Modernized	Unverified	Detailed	Detailed	0.8
151	U100-00-00	Modernized	Unverified	Detailed	Detailed	16.9
152	U101-00-00	Modernized	Unverified	Detailed	Detailed	16.8
153	U101-07-00	Modernized	Unverified	Detailed	Detailed	3.9
154	U101-08-00	Modernized	Unverified	Detailed	Detailed	2.0
155	U101-22-00	Modernized	Unverified	Detailed	Detailed	2.5
156	U102-00-00	Modernized	Unverified	Detailed	Detailed	14.7
157	U102-01-00	Modernized	Unverified	Detailed	Detailed	1.8
158	U106-00-00	Modernized	Unverified	Detailed	Detailed	6.1
159	U120-00-00	Modernized	Unverified	Detailed	Detailed	3.6

160	W100-00-00	Modernized	Unverified	Detailed	Detailed	47.1
161	W140-00-00	Modernized	Unverified	Detailed	Detailed	3.6
162	W140-01-00	Modernized	Unverified	Detailed	Detailed	2.5
163	W140-01-05	Not Included	Unknown	N/A	Detailed	0.5
164	W140-06-00	Not Included	Unknown	N/A	Detailed	3.6
165	W141-00-00	Modernized	Unverified	Detailed	Detailed	1.9
166	W142-00-00	Modernized	Unverified	Detailed	Detailed	1.3
167	W156-00-00	Modernized	Unverified	Detailed	Detailed	4.1
168	W157-00-00	Modernized	Unverified	Detailed	Detailed	1.7
169	W167-00-00	Modernized	Unverified	Detailed	Detailed	1.8
170	W167-01-00	Modernized	Unverified	Detailed	Detailed	3.3
171	W167-04-00	Modernized	Unverified	Detailed	Detailed	5.3
172	W170-00-00	Modernized	Unverified	Detailed	Detailed	3.2
173	W190-00-00	Modernized	Unverified	Detailed	Detailed	6.6

Standards: All Hydraulic Data work shall be performed in accordance with the standards specified in Section 5 – Standards.

Deliverables: The CTP shall make the following products available to FEMA by uploading the digital data to the MIP review in accordance with the schedule outlined in Section 6 – Schedule.

- Digital copies of all hydraulic modeling (input and output) files for the 10%, 4%, 2%, 1%, and 0.2% annual chance events.
- Digital hydraulic data consistent with the Data Capture Standards as described in the latest Technical Reference: Data Capture.
- Digital versions of draft text for inclusion in FIS report Section titled “Hydraulic Analyses”
- FIS and FIRM Database files as described in the FIRM Database Technical Reference, Table 2.
    - Digital tables with range of Manning’s “n” values;
    - Digital Floodway Data Tables for each flooding source studied by detailed methods that is compatible with the FIRM database.
- Digital versions of draft FIS report, Floodway Data Tables and updated profiles including all profiles and tables converted to the appropriate datum, as well as any other necessary items for the finalization of the preliminary FIS.
- Digital profiles of the 10%, 4%, 2%, 1%, and 0.2% annual chance events, representing existing conditions using the FEMA RASPLOT program or similar software (for flooding sources studied by detailed methods);).
- Digital versions of all backup data used in the analysis, including high water mark data for model calibration, GIS data layers, and any additional hydraulics data collected for use in the preparation of this flood risk project.
- Depth grids for all studied streams for all frequencies as required;

    - For Detailed Study Streams depth grids for the 10%, 4%, 2%, 1%, and 0.2% annual chance events shall be delivered
    - For Limited Detailed Study Streams and Approximate Study Streams depth grids for the 1%, and 0.2% annual chance events shall be delivered
- Metadata file complying with the latest Technical Reference: Metadata Profiles for Hydraulics.
- Complete set of digital work maps to be used at the Flood Engineering Review meeting. Work maps will include all appropriate GIS layers and be PDF files depicting effective and revised flooding, cross sections, streams and roads on an aerial base map.
- A Hydraulic Report summarizing the approach and results of the hydraulic analysis for each study area in Table 1.8.
- Written certification that the digital data meet the minimum standards and specifications.
- Where paper documentation is required by state law for professional certifications, the CTP may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the regional and/or state representative to verify state reporting requirements.
- Upload of all study data through the MIP Data Development Task – Develop Hydraulic Data
- Report leverage data in the MIP Data Development Task – Develop Hydraulic Data for any leverage data utilized in this task.
- Review the submittal for technical and regulatory adequacy, completeness of required information, and supporting data and documentation. The technical review is to focus on the following:
    - Use of acceptable model(s)
    - Use of appropriate methodology(ies)
    - Starting water-surface elevations
    - Cross-section geometry
    - Manning's "n" values and expansion/contraction coefficients
    - Bridge and culvert modeling
    - Ineffective and non-conveyance areas
    - Flood discharges
    - Regulatory floodway computation methods
    - Tie-in to upstream and downstream non-revised Flood Profiles and floodways
    - Agreement between the model, spatial data, work maps, Flood Profiles and Floodway Data Tables
    - Calibration of model(s) where high-water marks are available.
- Verify that the data was submitted under the applicable HUC-8 folders in the MIP.
- Use the CHECK-2 or CHECK-RAS program, as appropriate, to flag potential problems and focus review efforts. Explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate.
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the FIRM as outlined in the approved QA/QC Plan.
- Written response to any comments resulting from the independent QA/QC review.
- If data is changed following the independent QA/QC review, then updated deliverables for the Develop Hydraulic Data task must be submitted to the MIP.
- Maintain records of all contacts, reviews, recommendations, and actions and make the data readily available to FEMA.
- Maintain an archive of all data submitted for hydraulic modeling review. (All supporting data must be retained for three years from the date a funding recipient submits its final expenditure report to FEMA, and once the study is effective all associated data should be submitted to the FEMA library)

Task: Perform Floodplain Mapping

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Additional Scope for Detailed Riverine Analysis: The CTP shall include the modeling effort and definition required to support future mapping of Zone AE and Zone AE with floodway for any streams studied by detailed methods. For detailed riverine analysis, the CTP shall delineate the 1 percent and 0.2 percent annual chance floodplain boundaries, and regulatory floodways and any other applicable elements for the flooding sources for which detailed hydrologic, hydraulic, and/or coastal analyses were performed. The CTP shall incorporate all new or revised hydrologic, hydraulic, and/or coastal modeling and shall use the topographic data acquired under Develop Topographic Data to delineate the floodplain and regulatory floodway boundaries on a digital work map.

The CTP shall incorporate the results of all effective Letters of Map Change (LOMC) for all affected communities on the FIRM and provide to the appropriate PTS the required submittals for incorporation into the National Flood Hazard Layer (NFHL). Also, the CTP shall address all concerns or questions regarding Floodplain Mapping that are raised during the independent QA/QC review.

The CTP shall capture flood hazard engineering and/or mapping data quality issues encountered during this activity in the CNMS database for the area(s) of interest. These issues will be entered as "Requests" or "Needs" in the CNMS requests feature dataset based on the nature of the deficiency encountered. Detailed information on performing this task can be found in the relevant standards specified in Section 5 – Standards.

Task - Develop Flood Risk Products

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: Risk assessment data and analyses are defined as processes for analyzing or evaluating the risk associated with a hazard, and using that information to make informed decisions on the appropriate ways to reduce the impacts of the hazard on people and property. As part of the Risk MAP Program, non-regulatory Flood Risk Products shall be developed for all Discovery watershed areas.

During Phase Two, the CTP will update the previously created Flood Risk Products (Flood Risk Report, Flood Risk Map and Flood Risk Database) to include the findings of the engineering analysis performed. The Mapping Partner will prepare Flood Risk Assessment with a combination of the new engineering analysis, with the previous HUC8 datasets prepared with Base Level Engineering results. The tables and risk assessment calculations within the Flood Risk Report (FRR), Flood Risk Map (FRM) and Flood Risk Database (FRD) will be updated to reflect these changes.

Prepare Flood Risk Products: In "deployed" Watershed project areas the following non-Regulatory products shall be produced under this task:

- ***HUC8 Watershed Flood Risk Report.*** The Flood Risk Report activity includes documenting and delivering local communities a summary of their watershed and local flood risk information along with best practices for risk reduction. This is a standard non-regulatory product. The CTP shall leverage the Watershed Flood Risk Report that was prepared during the Phase One – Discovery effort and update the contents to reflect the changes due to data refinement and interactions with communities throughout the Phase Two efforts. CTPs shall feel free to deviate from the National template in order to prepare and provide a tool that is reliable and useful to the communities throughout the Watershed. Modifications to the delivery of the Flood Risk Report are welcomed

in order to assist communities in understanding their natural hazard risks, allowing them to make decisions at a local level related to minimizing their future natural hazard risk. CTPs shall discuss recommended changes to the delivery of the FRR with their FEMA POC.

- ***Flood Risk Map.*** The Flood Risk Map activity includes developing exhibits that depict non-regulatory flood risk dataset and selected base map information. This is a standard non-regulatory product. The CTP shall leverage the Watershed Flood Risk Report that was prepared during the Phase One – Discovery effort and update the contents to reflect the changes due to data refinement and interactions with communities throughout Phase Two.
- ***Flood Risk Assessment Dataset.*** HCFCD will evaluate the number of structures and estimated damages associated with the 10%, 4%, 2%, 1%, and 0.2% annual chance events. HCFCD will utilize its Structural Inventory data for this analysis, which is a database of structure locations, estimated and surveyed Finished Floor Elevations, property values, and depth-damage curves.
- ***Flood Risk Database.*** The Flood Risk Database shall include information used to prepare the Flood Risk Map and Flood Risk Report. Additionally, the CTP shall deliver the minimum Flood Risk Datasets outlined in SID 417. The following Flood Risk Datasets are required for delivery in the Flood Risk Dataset following the Phase Two efforts (unless an exception has previously been approved):
    - Changes Since Last FIRM (denoting Zone and BFE changes)
    - Water Surface Elevation Grids
        - For Detailed Study Streams (Zone AE) the 10%, 4%, 2%, 1%, and 0.2% annual chance events shall be prepared
        - For Limited Study Streams and Approximate Study Streams (Zone A) the 1%, and 0.2% annual chance events shall be prepared
    - Flood Depth Grids
        - For Detailed Study Streams (Zone AE) the 10%, 4%, 2%, 1%, and 0.2% annual chance events shall be prepared
        - For Limited Study Streams and Approximate Study Streams (Zone A) the 1%, and 0.2% annual chance events shall be prepared
    - Strucutral Inventory analysis results for the 10%, 4%, 2%, 1%, and 0.2% annual chance events shall be prepared
    - Percent Annual Chance Grid
        - This products shall be prepared for all areas analyzed in the Phase Two efforts
    - Percent 30-Year Chance Grid
        - This products shall be prepared for all areas analyzed in the Phase Two efforts
    - Areas of Mitigation Interest (AOMI) - This standard dataset is to be included and delivered within the Flood Risk Database product. The CTP shall update it based on the analysis results and the interactions with communities throughout the project area within the Phase Two efforts.
- Where paper documentation is required by State Law for Professional certifications, the Mapping Partner may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the Regional and/or State representative to verify state reporting requirements.
- Perform Quality Assurance and Quality Control (QA/QC) review on the products prepared within this task and provide:

- A Summary Report that describes the findings of the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review.

Table 1.6 – Risk Assessment Product Development Table

Watershed(s) and/or Project Areas	Flood Risk Products (Flood Risk Report/Map)	Flood Risk Database (Datasets)					
		Watershed-wide Composite Floodplain Results	WSEL Grid(s) (BLE)	Depth Grid(s) (BLE)	Hazus Flood Risk Assessment (BLE)	AOMI	Other (Non-Riverine Flood Risk Grid)
Brays Bayou, White Oak Bayou, Hunting Bayou, Greens Bayou, Spring Creek, Cypress Creek, Little Cypress Creek, Willow Creek, Barker Reservoir, Addicks Reservoir, and Buffalo Bayou	X	X	X	X	X	X	X

Standards: All Risk MAP work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: The following products, for those communities identified in Table 1.1, will be made available to FEMA (CD/DVD, external hard drive, FTP, or uploaded to the MIP, as determined by the Region):

- Flood Risk Report
- Flood Risk Map
- Flood Risk Database (including);
  - Changes Since Last FIRM (denoting Zone and BFE changes)
  - Water Surface Elevation Grids
    - For Detailed Study Streams (Zone AE) the 10%, 4%, 2%, 1%, and 0.2% annual chance events shall be prepared
    - For Limited Study Streams and Approximate Study Streams (Zone A) the 1%, and 0.2% annual chance events shall be prepared
  - Flood Depth Grids
    - For Detailed Study Streams (Zone AE) the 10%, 4%, 2%, 1%, and 0.2% annual chance events shall be prepared
    - For Limited Study Streams and Approximate Study Streams (Zone A) the 1%, and 0.2% annual chance events shall be prepared
  - Strucutral Inventory analysis results for the 10%, 4%, 2%, 1%, and 0.2% annual chance events Percent Annual Chance Grid

        - This products shall be prepared for all areas analyzed in the Phase Two efforts.
    - Percent 30-Year Chance Grid
        - This products shall be prepared for all areas analyzed in the Phase Two efforts.
    - Areas of Mitigation Interest (AOMI) - This standard dataset is to be included and delivered within the Flood Risk Database product. The CTP shall leverage the AOMI coverage prepared in Discovery and update it based on the analysis results and the interactions with communities throughout the project area within the Phase Two efforts.
- Project coordination materials will be uploaded and shared with FEMA POC through the Region 6 Risk MAP SharePoint.
- Documentation of all conversation and interactions with communities related to Data Development efforts
    - Enter contact date & info into Region 6 Communications Tracker
    - Call Logs and emails
- Non-Riverine Flood Risk Grid

Task - Flood Risk Review Meeting

Responsible Mapping Partner: Harris County Flood Control District and Contractors

Scope: This meeting will serve to provide community technical staff and decision makers an opportunity to review the engineering analysis and study results prepared under the data development tasks contained within Phase Two. The focus on this meeting shall be to socialize the results of the engineering analysis prepared and assure the community has the proper time and information to provide their input prior to the preparation of any Flood Insurance Rate Maps. The CTP shall collect local feedback, and revise its analysis as needed. The objective of this meeting effort is to:

- Promote local buy-in of study results (Appeals/Comments now, not later)
- Establish local ownership of risk within community
- Review Risk Identification (Engineering) results with local communities
- Review of Hazard Mitigation Plan versus Study Findings
- Identify risk communications needs and options
- Support for identified community driven mitigation actions
- Resolve community comments/appeals before 90-day appeal period
- Community input is required to move forward
- Continue developing relationship with communities

As indicated in each of the Data Development tasks within this phase, FEMA Region 6 and its CTPs shall coordinate with technical staff from local communities in the process earlier than this meeting as the data is being developed. The CTP should work with local communities to identify technical staff to engage with throughout the preparation of the analysis and mapping efforts leading up to this Flood Risk Review meeting. It is the expectation of FEMA that its Mapping Partners shall have intermediate discussions and touch points with the local communities affected by analysis results through webinars (minimum) prior to this meeting.

The Flood Risk Review Meeting will also provide the opportunity to show how datasets and outreach tools can help communities become more resilient by understanding risk data, communicating about risk, prioritizing mitigation actions and improving mitigation plans, especially risk assessments and mitigation strategies. Activities include planning, presenting, and facilitating discussions of data inputs and

engineering models used for flood studies with community officials. In addition, draft work maps showing initial study results will be presented during the meeting.

Standards: All Risk MAP work shall be performed in accordance with the standards specified in Section 5 - Standards. All communication with local governments will be done in accordance with 44 CFR Part 66.

Deliverables: The CTP shall deliver the following to the FEMA Regional Project Monitor in accordance with the schedule outlined in Section 6 – Schedule.

- All documentation prepared for this meeting task shall be delivered in a Coordination & Correspondence TSDN at the completion of Phase Two.
- Watershed Project Team meetings support (intermediately throughout this phase, with the inclusion of the FEMA Project Monitor intermittently for progress update purposes)
- Communication and Action Tracker Worksheet – Prepare and Maintain
- Project and Communications Management Tool (excel file)
- Mitigation Action Tracker data entry for community supported mitigation actions identified
- Preparation and distribution of all letters, newsletters, flyers, exhibits and reports identified by the Watershed Project Team based on project areas
- Project materials for distribution at these meetings will be uploaded and shared with FEMA POC (Diane.Howe@fema.dhs.gov) through the Region 6 Risk MAP SharePoint.
- Preparation of Key Decision Point (KDP) process paperwork and coordination with local entities in order to prepare:
    - KDP2 – Prepare Preliminary Flood Insurance Rate Map (FIRM) panels documentation
    - Indication of the number of panels intersected by the updated analysis prepared
    - Overview of the severity of change and an recommendation for the panels that should be updated or remain as is based on the analysis prepared in Phase Two
- Documentation of all conversation and interactions with communities related to Data Development efforts
    - Enter contact date & info into Region 6 Communications Tracker
    - Call Logs and emails; and
- Meeting invitation, agenda, presentation slides (as requested), and meeting notes for FEMA review.

~~*Phase Three – Regulatory Product Update (Support)*~~

~~Responsible Mapping Partner: Harris County Flood Control District and Contractors~~

~~Scope: Phase Three encompasses the update of the Regulatory Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report. This phase is to update the regulatory FIS and FIRM information prepared in phase two. FEMA's PTS contractor will complete the regulatory product update. Harris County Flood Control District and its contractors will support the effort as described.~~

~~Task - Support to Post-Preliminary Map Production~~

~~Responsible Mapping Partners: Harris County Flood Control District and Contractors~~

~~Scope: If another Mapping Partner is selected to prepare the Phase Three – Regulatory Products Update, the CTP who produced the Hydrology, Hydraulics and Floodplain Mapping tasks will support the Flood Risk Project in responding to Appeals and Comments received during the Statutory 90-Day Appeal and Comment period.~~

This activity consists of responding to appeals and comments received from the communities and residents within the project area. The CTP will be responsible for:

- Coordination with the Post Preliminary Mapping Partner to review the incoming Appeals and Comments associated with the Hydrology, Hydraulics and Floodplain Mapping submittals.
    - The CTP will be responsible for a coordinated review effort with the Phase Three Mapping Partner to prepare suggestions for appeal and comment incorporation.
    - The CTP shall review the draft FIS text sections submitted during the production of the Hydrology, Hydraulics or Floodplain Mapping tasks to identify areas of required update to incorporate the incoming appeal or comment.
    - The CTP shall review the Hydrologic or Hydraulic modeling submitted during the production of the Hydrology, Hydraulics or Floodplain Mapping tasks to identify areas of required update to incorporate the incoming appeal or comment.
    - Conference calls should be held at the close of the appeal period to allow the review of all appeals and comments received.
- The Post Preliminary Mapping Partner will be responsible for the update of the Hydrology, Hydraulics and/or Floodplain Mapping tasks to resolve the incoming appeal or comment.
    - The Post Preliminary Mapping Partner should provide copies of the appeal and comments received to the CTP and provide at least 10 business days for CTP review and comment.
- The CTP should prepare an Addendum/Memorandum to document the suggested amendments to the FIS and modeling as well as the TSDNs submitted during the production of the Hydrology, Hydraulics or Floodplain Mapping tasks for upload to the MIP.
- The CTP should indicate a number of hours, appeals and comments that will be supported for the project areas prepared in Phase Two efforts.

Standards: All Post Preliminary work shall be performed in accordance with the standards specified in Section 5 – Standards.

Deliverables: The CTP shall make the following products available to FEMA by uploading the digital data to the MIP, in accordance with the schedule outlined in Section 6 – Schedule.

- Addendum/Memorandum to document the suggested amendments to the FIS and modeling as well as the TSDNs submitted during the production of the Hydrology, Hydraulics or Floodplain Mapping tasks for upload to the MIP;

Task - Public Meeting or Open House (Optional)

Responsible Mapping Partners: Harris County Flood Control District and FEMA.

Scope: If necessary and agreed upon, the CTP will support the local officials, or deliver the messages, at the Public Meeting if the local officials are unwilling. Also, communities will be encouraged to identify short- and long-term efforts to progress towards increasing flood risk awareness and management. These meetings can be held concurrently or separately at the Region and community's discretion.

- It is FEMA's preference for the local communities to hold and host Open House meetings.
- If a local community requires assistance to staff the meeting or assist an Open House, limited assistance may be funded as deemed necessary.
- For all meetings, provisions may be made for remote access video/audio feeds for those that cannot attend in person.

Standards: All Risk MAP work shall be performed in accordance with the standards specified in Section 5 - Standards. All communication with local governments will be done in accordance with 44 CFR Part 66.

Deliverables: The CTP shall deliver the following to the FEMA Regional Project Monitor in accordance with the schedule outlined in Section 6 – Schedule and include within the TSDN:

- All documentation prepared for this meeting task shall be delivered in a Coordination & Correspondence TSDN at the completion of Phase Three.
- Watershed Project Team meetings support (intermediately throughout this phase, with the inclusion of the FEMA Project Monitor intermittently for progress update purposes)
- Communication and Action Tracker Worksheet – Prepare and Maintain
- Project and Communications Management Tool (excel file)
- Mitigation Action Tracker data entry for community supported mitigation actions identified
- Preparation and distribution of all letters, newsletters, flyers, exhibits and reports identified by the Watershed Project Team based on project areas
- Project materials for distribution at these meetings will be uploaded and shared with FEMA POC (Diane.Howe@fema.dhs.gov) through the Region 6 Risk MAP SharePoint.
- Preparation of Key Decision Point (KDP) process paperwork and coordination with local entities in order to prepare:
    - KDP4 – Begin Appeal Period
    - KDP5 – Issue Letter of Final Determination (LFD)
    - Indication of the number of panels intersected by the updated analysis prepared
    - Overview of the severity of change and an recommendation for the panels that should be updated or remain as is based on the analysis prepared in Phase Three
- Documentation of all conversation and interactions with communities related to preparing and releasing FIRM Panels.
    - Enter contact date & info into Region 6 Communications Tracker
    - Call Logs and emails
- Meeting invitation, agenda, presentation slides (as requested), and meeting notes for FEMA review; and
- Project update status reports for project communities.

SECTION 2 – TECHNICAL AND ADMINISTRATIVE SUPPORT DATA SUBMITTAL

The Project Team members for this Flood Risk Project that have responsibilities for activities included in this MAS shall comply with the data submittal requirements summarized below and in appropriate Procedure Memorandums.

All supporting documentation for the activities in this MAS shall be submitted according to FEMA standards and requirements, and will include a FEDD folder. Submittals must be made to the appropriate PTS for a review of required materials. The CTP will respond to requests from FEMA or its contractors for additional information and ensure that all required documents are included in the TSDN.

If any issues arise that could affect the completion of an activity within the proposed scope or budget, the CTP shall complete and submit to FEMA a Special Problem Report (SPR) as soon as possible after the issue is identified. The SPR describes the issue and proposes possible resolutions. For additional information on SPRs, consult the Regional Office.

Information supporting FEMA standards and requirements regarding the TSDN and FEDD file may be found in Procedure Memorandum 62 *TSDN and FEDD File Protocol for Mapping Projects* and *Data Capture Technical Reference*.

Mapping Activities	TSDN Section												
	General Documentation	Change Requests	Telephone Conversation Reports	Meeting Minutes/ Reports	General Correspondence	Hydrologic Analyses	Engineering Analyses	Hydraulic Analyses	Key to Cross-Section Labeling	Key to Transect Labeling	Draft FIS Report	Mapping Information	Miscellaneous Reference Information
Outreach													
Perform Field Survey		X	X	X	X	X		X	X	X			X
Develop Topographic Data		X	X	X	X							X	X
Develop Hydrology/ Coastal		X	X	X	X	X	X	X	X	X	X		X
Develop Hydraulic Data		X	X	X	X	X	X	X	X	X	X		X
Perform Flood-plain Mapping (and Re-delineation)		X	X	X	X	X		X	X	X		X	X
Develop Flood Risk Products		X	X	X	X							X	X

SECTION 3 – PERIOD OF PERFORMANCE

The period of performance for this MAS will begin on October 1, 2018 and continue through September 30, 2023. The mapping activities outlined in this MAS will be completed as specified in the Cooperative Agreement Funding Opportunity Announcement, Award Notice and/or Articles of Agreement. The Mapping Activities may be terminated at the option of FEMA or the CTP in accordance with the provisions of the Partnership Agreement dated July 31, 2000. If these mapping activities are terminated, all products produced to date must be submitted and updated into the MIP (if applicable) and the remaining funds, provided by FEMA for this MAS, from uncompleted activities will be returned to FEMA.

SECTION 4 – FUNDING/LEVERAGE (For CTP, OFA, and/or Community)

FEMA is providing funding, in the amount of $6,500,000 through a Cooperative Agreement to the Harris County Flood Control Districtfor the completion of this Flood Risk Project. The Harris County Flood Control District shall provide any additional resources required to complete the assigned activities for this Flood Risk Project as outlined in Table 4.1: Contribution and Leverage. During the discovery process, additional needs may be identified. Activities associated with any additional needs would be performed based on availability of additional funds. The leverage listed below includes in-kind services and blue book values for obtained existing information from the CTP or communities associated with the project (i.e., base map data, hydrologic and hydraulic analyses, etc.). These values must also be reported in the MIP by the CTP during the appropriate task. The current Blue Book (4.0) is dated February 2017 and can be downloaded from FEMA's Information Resource Library at www.fema.gov/library/viewRecord.do?id=2473.

Optional: Table 4.1: Contribution and Leverage

Project Task	FEMA Contribution	Partner Contribution	% Partner Leverage (of total project task cost)	Total Project Task Cost (FEMA + Partner)
Project Management	$2,086,779.49	$1,888,549.09	47.5	$3,975,328.58
Perform Field Survey *(includes QA/QC task)*	$750,000	$458,407.10	37.9	$1,208,407.10
Develop Topographic Data *(includes QA/QC task)*	$0	$503,262.45	100	$503,262.45
Develop Hydrologic Data *(includes QA/QC task)*	$0	$2,048,170.05	100	$2,048,170.05
Develop Hydraulic Data *(includes QA/QC task)*	$2,300,000.00	$2,411,533.43	51.2	$4,711,533.43
Perform Floodplain Mapping *(includes QA/QC task)*	$900,000.00	$746,072.31	45.3	$1,646,072.31
Develop Flood Risk Products and Datasets *(includes QA/QC task)*	$463,220.51	$248,451.32	34.9	$711,671.83

Project Task	FEMA Contribution	Partner Contribution	% Partner Leverage (of total project task cost)	Total Project Task Cost (FEMA + Partner)
Flood Risk Review Meeting	$0	$316,346.73	100	$316,346.73
TOTAL FUNDING AMOUNTS	$6,500,000.00	$8,620,792.48	57.0	$15,120,792.48

Final leverage dollars or units will be entered, as applicable, within the Manage Data Development task in the MIP workflow. Leverage data shall be an estimate of available leverage data at the time the MAS is prepared and shall be further defined in the Discovery Report and throughout the project.

SECTION 5 – STANDARDS

The standards relevant to this MAS are available in FEMA's *Guidelines and Standards Policy Memo* located at http://www.fema.gov/media-library/assets/documents/35313. Additional information, along with links to Guidance, Technical References, Templates and other resources that support these standards, may be accessed and/or downloaded from the FEMA Flood Hazard Mapping website at http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping. The Geospatial Data Coordination Policy and the Geospatial Data Coordination Implementation Guide are located at https://hazards.fema.gov under "Tools & Links."

All Flood Risk Projects, including regulatory National Flood Insurance Program (NFIP) map changes and other Risk Mapping Analysis, and Planning (Risk MAP) activities, shall be completed in accordance with the Federal Insurance and Mitigation Administration (FIMA) Policy 204-078-1, Standards for Flood Risk Analysis and Mapping, Revision 4, dated November 30, 2015 located on FEMA's website at www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping. This policy presents the standards for Flood Risk Projects, Letters of Map Change (LOMC) and other related Risk MAP activities. The standards are organized in a hierarchy:

> **Program Standard** – A required element of the Risk MAP program. Exceptions to program standards can only be granted by program leadership through an exemption process.
>
> **Working Standard** – A required element usually at a higher level of specificity than the program standards. Working standards are applied by specialists (engineers, planners, technicians, scientists, etc.) and have minimal ethical, political, and legal impacts to the program. FEMA Regional Offices may occasionally grant exceptions to these requirements.

Technical references, guidance documents and other best practice recommendations for Flood Risk Projects are located on FEMA's website at www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping. These are also organized in a hierarchy:

> **Technical References** – These documents are specifications of a technical nature, but too granular to be considered standards. There are a number of standards that mandate compliance with the Technical Reference.

Guidance – These documents provide a recommended approach to meet the standards. Accepted approaches are not limited to this recommended approach; other methods may be used to meet or exceed the standards.

Best Practices – Any method, in addition to guidance, that meets or exceeds the standard. Best practices are shared by regions and Mapping Partners following successful approaches to program activities.

All the standards for the Risk MAP Program are listed in the above referenced FIMA Policy. This policy supersedes all of the standards included in the previous *Guidelines and Specifications for Flood Hazard Mapping Partners* and associated Procedure Memorandums (PM). Some useful guidance is still available in these documents. These documents and information about how to use them in coordination with newer documents can be found on FEMA's website at http://www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

FEMA is in the process of updating existing guidance at: http://www.fema.gov/media-library/assets/documents/21123, https://www.fema.gov/media-library/assets/documents/11576 and https://www.fema.gov/guidance-cooperating-technical-partners-program. CTPs (and their contractors) working on a Flood Risk Project are responsible for complying with all appropriate requirements in FEMA's standards and guidelines.

Additionally, CTPs and their sub-awardees must comply with FEMA's Federal Regulation 44 CFR and the appropriate year CTP Funding Opportunity Announcement and Agreement Articles. CTPs shall also coordinate with their Regional office to determine additional standards that should be met.

Table 5.1 – Applicable Standards for Project Activities

	Activities												
Applicable Guidance	**Outreach**	**Perform Field Survey**	**Develop Topographic Data**	**Perform Independent QA/QC: Topographic Data**	**Acquire Base Map**	**Coastal Analysis**	**Perform Independent QA/QC: Coastal Analysis**	**Develop Hydrologic Data**	**Perform Independent QA/QC: Hydrologic Data**	**Develop Hydraulic Data**	**Perform Independent QA/QC: Hydraulic Data**	**Perform Floodplain Mapping (inc. Redelineation)**	**Perform Independent QA/QC: Floodplain Mapping**
Guidelines and Specifications for Flood Hazard Mapping Partners and Procedure Memorandums		X	X	X	X	X	X	X	X	X	X	X	X
FEMA's Geospatial Data Coordination Policy			X		X								
FEMA's Geospatial Data Coordination Implementation Guide			X		X								
Engineer Manual 1110-2-1003, *Hydrographic Surveys* (USACE), January 1, 2002		X											

Applicable Guidance	Activities												
	Outreach	Perform Field Survey	Develop Topographic Data	Perform Independent QA/QC: Topographic Data	Acquire Base Map	Coastal Analysis	Perform Independent QA/QC: Coastal Analysis	Develop Hydrologic Data	Perform Independent QA/QC: Hydrologic Data	Develop Hydraulic Data	Perform Independent QA/QC: Hydraulic Data	Perform Floodplain Mapping (inc. Redelineation)	Perform Independent QA/QC: Floodplain Mapping
"Numerical Models Accepted by FEMA for NFIP Usage," Updated April 2003						X	X	X	X	X	X		
NFIP Metadata Profile Specifications			X	X								X	X
Document Control Procedures Manual	X												
44 Code of Federal Regulations Parts 65, 66 and 67		X	X	X	X	X	X	X	X	X	X	X	X
Data Sharing Agreement													

Table 5.2: Project Activities and Applicable Portions of FEMA Guidelines and Specifications

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Outreach	Volume 1
	Appendix I
	OG 4-11: Risk MAP Meetings Guidance
Develop Non-Regulatory Products	Appendices N and O (draft) September 2011
	PM 59 and 65
	OG 1-11: Risk MAP Guidance for Incorporating Mitigation Planning Technical Assistance and Training into Flood Risk Projects
	OG 2-11: Operating Guidance for Creation of Risk MAP Products
	OG 3-11: Communicating Flood Risk with Risk MAP Datasets and Products

Activity Description	Applicable Volume, Section/Subsection, and Appendix
	OG 6-11: User Guidance for Flood Risk Datasets and Products
	"Risk MAP Products in the MIP" (March 4, 2011)
Perform Field Survey	Volume 1
	Appendices A, B, C, F, and M
Develop Topographic Data and Perform Independent QA/QC: Topographic Data	Volume 1,
	Appendices A and M
	PM 61
Acquire Base Map and Perform Independent QA/QC: Base Map	Volume 1
	Appendices A, K, L, N and O
Develop Hydrologic Data and Perform Independent QA/QC: Hydrologic Data	Volume 1
	Appendices A, C, E, F, G, H, and M
	PM 59
Develop Hydraulic Data and Perform Independent QA/QC: Hydraulic Data	Volume 1
	Appendices A, B, C, E, F, G, H, and M
	PM 34, 43, 51, 52, 53, 59, 63
Perform Floodplain Mapping and Perform Independent QA/QC: Floodplain Mapping (including Redelineation/Digitization)	Volume 1
	Appendices C, D, E, F, G, H, K, L, and M
	PM 51, 52, 53 and 56
	CNMS User's Guide
	CNMS data model
	"NVUE: Calculation Guidance under Risk MAP"

SECTION 6 – SCHEDULE

The activities documented in this MAS shall be completed in accordance with FY18 Quantities Baseline Schedule Form, which should drive the schedule within the MIP. If changes to this schedule are required, the CTP shall coordinate with FEMA and the PMT in a timely manner. The CTP will coordinate with FEMA, or its designee, to develop a baseline schedule for individual project activities. FEMA or its designee will utilize the individual project task schedule create the Flood Risk Project in the MIP and baseline the project activities with schedule and cost information within 30 days of the funds being awarded and FEMA's approval of the final cost and schedule. The baseline schedule for individual project activities

may be re-baselined in the MIP with approval from the FEMA Project Officer, and does not require a change to this MAS unless the overall project end date is modified.

SECTION 7 – CERTIFICATIONS

Data Capture

DCS Certification Form. For data capture standards, refer to the Data Capture Technical Reference updated in May 2017. It can be downloaded from the FEMA website at https://www.fema.gov/media-library-data/1499958171149-d7275e48071f54111d7b614f08b274d8/Dat

Perform Field Surveys and Develop Topographic Data

A Registered Professional Engineer or Licensed Land Surveyor shall provide an accuracy statement for field surveys and/or topographic data used and shall certify these data meet the accuracy statement provided. Data accuracy should be stated used the Federal Geographic Data Committee National Standards for Spatial Data Accuracy, but the American Society for Photogrammetry and Remote Sensing accuracy reporting standards are acceptable.

Develop Hydrologic Data, Develop Hydraulic Data, and Seamless Floodplain Mapping

- A Registered Professional Engineer shall certify hydrologic and hydraulic and coastal analyses and data in accordance with 44 CFR 65.6(f).
- Any levee systems to be accredited will be certified by the levee owner or other appropriate entity in accordance with 44 CFR 65.10.
- Certifications are required at the time the intermediate or final data is submitted.

SECTION 8 – TECHNICAL ASSISTANCE AND RESOURCES

Project Team members may obtain copies of FEMA-issued LOMCs, archived engineering backup data, and data collected as part of the CNMS process from FEMA and/or your Regional Project Officer.

General technical and programmatic information can be downloaded from the FEMA website at http://www.fema.gov/plan/prevent/fhm/frm_soft.shtm. Specific technical and programmatic support may be provided through FEMA and/or its contractor; such assistance should be requested through the FEMA Project Officer specified in Section 12 – Points of Contact.

Project Team members also may consult with the FEMA Regional Project Officer to request support in the areas of selection of data sources, digital data accuracy standards, assessment of vertical data accuracy, data collection methods or subcontractors, and GIS-based engineering and modeling training.

Please contact the region to obtain the most recent version of the Risk MAP timeline.

Assistance with the MIP may be requested at miphelp@riskmapcds.com.

SECTION 9 – CONTRACTOR SUPPORT

Contractor support may be used for all activities within this SOW, except staffing and mentoring, which must be completed by the CTP.

The CTP intends to use the services of various engineering firms as contractors for this SOW. The CTP shall ensure that the procurement for all contractors used for this Program Management Activity complies with the requirements of 2 CFR 200.

Guidance provided in this part includes, but is not limited to, contract administration and record keeping, notification requirements, review procedures, competition, methods of procurement, and cost and pricing analysis. 2 CFR200 may be viewed online at http://www.ecfr.gov/cgi-bin/text-idx?SID=cc011f4fb962e68cb0da4bc91e8fbb43&mc=true&node=pt2.1.200&rgn=div5. Additionally, contractors must not pose a conflict of interest issue.

SECTION 10 – REPORTING

Financial Reporting: Because funding has been provided to the CTP by FEMA, financial reporting requirements for the CTP will be in accordance with the terms of the Cooperative Agreement Funding Opportunity Announcement, Articles of Agreement or Award Notice for this MAS. The CTP shall also refer to 2 CFR 200. The CTP shall provide financial reports to the FEMA Regional Project Officer and Assistance Officer in accordance with the terms of the signed Cooperative Agreement for this MAS.

https://riskmapportal.msc.fema.gov/FEMA_REGIONS/REGIONVI/Contracting_ProgramMgmt/1/CTP%20Grant%20Templates/2016/20160304_CTP_PerformanceMetricsMenu_Draft.docx

Earned Value Data Entry in the MIP: The CTP is required to report on the earned value of projects that are in the MIP monthly and must give explanations for variances outside of the tolerance defined above. The FEMA Regional Offices must implement a Corrective Action Plan (CAP) when a CTP partner is outside of the tolerance. A CAP must define the reason for the variance and the intended resolution. FEMA Regional Offices must coordinate with FEMA Headquarters when CAPs are developed.

COMS-SOW tasks are now identified in the MIP. Cost and schedule performance measures must be defined and documented in the COMS-SOW. These measures must be used to monitor partner performance and to determine future funding eligibility. This exception only applies to tasks not able to be conducted or tracked in the MIP, exceptions shall be documented and coordinated with the Regional MIP Champion, Jennifer Knecht.

Performance Reporting: Recipients are responsible for providing updated performance reports using the SF-PPR on a quarterly basis throughout the period of performance, including partial calendar quarters as well as for periods where no grant award activity occurs. The CTP shall refer to 2 CFR 200 to obtain minimum requirements for progress reporting. The Project Officer, as needed, may request additional information on progress.

The CTP may meet with FEMA and/or its contractor(s) as frequently as needed to review the progress of the project in addition to the quarterly financial and status submittals. These meetings may alternate between FEMA's Regional Office, the Harris County Flood Control Districtoffice, and conference calls, as necessary.

The CTP must report performance of the grant in conjunction with the progress reporting. The performance of the CTP is measured by the following criteria. Quantitative Targets for performance measures will be defined between you and your FEMA Region and amended to the MAS when completed.

Review the minimum performance measures for inclusion by project delivery phase. CTPs and FEMA PMs should coordinate should additional performance measures be applicable. CTPs may reference the "Menu of Measures" document in coordination with your FEMA PM.

Table 10.1: Quantitative Targets for Performance Measures

Phase	Measure	Target
ALL	CTP will maintain the financial health of the project within the Mapping Information Platform (MIP) system of Record.	• Acceptable Schedule Performance Index (SPI) and Cost Performance Index between 0.92 and 1.08 is required. • Region will review project health each month and record when the CTP is contacted for SPI/CPI out of range.
2	CTP will coordinate periodic conference calls/webinars to convene with local technical champions and key influencers in the project/watershed area throughout the Phase Two effort. The project will identify a minimum of # key staff to be coordinated as technical data is prepared over the project lifecycle.	• Quarterly reporting shall update the Region on the identification of local technical champions and key influencers. These champions and influencers shall be indicated in the CTPs project contact database/worksheet. • Quarterly reporting will identify calls held in each quarter and identify next coordination point for tracking of progress on this metric.
2	CTP will work with local communities to identify local resources and information that may be used for model refinements.	CTPs will target # communities for leverage in the form of data or in-kind services to support additional Phase 2 work.

The CTP shall communicate with communities throughout the life of each project. Continued engagement is necessary and appropriate and will build upon the relationships established or enhanced during Discovery and provide transparency into the Risk MAP process.

This may occur through monthly or quarterly updates or project status calls with community leaders, project websites including updates at several milestones or along a specific timeline, or other methods.

SECTION 11—PROJECT COORDINATION

Throughout the project, all members of the Project Team will coordinate, as necessary, to ensure the products meet the technical and format specifications required and contain accurate, up-to-date information. Coordination activities may include:

- Meetings, teleconferences, and video conferences with FEMA and other Project Team members quarterly
- Telephone conversations with FEMA and other Project Team members on a monthly basis, and an ad hoc basis, as required.
- Updates to the MIP and other FEMA status information systems in accordance with FEMA standards and requirements.
- E-mail, facsimile transmissions, and letters, as required.

SECTION 12—Points of Contact

The points of contact for this Flood Risk Project are Larry Voice, the FEMA Regional Project Officer; Todd Ward, the Project Manager for Harris County Flood Control District; or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. When necessary, any additional FEMA assistance should be requested through the FEMA Regional Project Officer.

Each party has caused this MAS to be executed by its duly authorized representative.

_____ _____

The Honorable Lina Hidalgo
County Judge
Harris County

Date

_____ _____

Larry Voice
Regional Project Officer
Federal Emergency Management Agency, Region VI

Date