



**FEMA**

**MONTANA DEPARTMENT OF  
NATURAL RESOURCES AND CONSERVATION  
COOPERATING TECHNICAL PARTNERS  
MAPPING ACTIVITY STATEMENT**

**Mapping Activity Statement No. 2006-05 – Digital Flood Insurance Rate  
Map Production and Development of Updated Flood Data for  
Yellowstone County**

In accordance with the Cooperating Technical Partners (CTP) Partnership Agreement dated Mar 18, 2005, between the Montana Department of Natural Resources and Conservation (DNRC) and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement (MAS) No. 2006-05 is as follows.

**SECTION 1—OBJECTIVE AND SCOPE**

The objective of the Flood Map Project documented in this MAS is to develop a Digital Flood Insurance Rate Map (DFIRM) and Flood Insurance Study (FIS) report for Yellowstone County. The DFIRM and FIS report will be produced in the FEMA countywide Format using vertical datum NAVD 88.

Existing GIS data and study needs for the community will be researched, obtained, organized and provided in accordance with Activity 1. Scoping will be necessary to determine the final scope of work for this project.

In addition the Mapping Partners involved in this project will develop new and/or updated flood hazard data, as summarized in the table below.

**Table 1.1 Flooding Source(s) to be Studied**

Priority	Flooding Source	Reach Limits	Reach Length	Detailed Riverine		Limited Detail Study	Redeline-ation of SFHAs Using Effective Profiles and New Topography	Refine/ Establish Zone A
				Hydrology	Hydraulics			
1	Blue Creek	Upstream of Yellowstone River to Aquiesta Drive	2.5 miles	n/a	X	n/a	n/a	n/a
2	Blue Creek	Bridge at Yellowstone River	0.5 miles	X	X	n/a	n/a	n/a
3	Pryor Creek	Hwy 87 N to confluence with Yellowstone River	8 miles	X	X	n/a	n/a	n/a

This Flood Map Project will be completed by the following

- Montana DNRC;
- DNRC’s contractor;
- Michael Baker, Jr., Inc., the FEMA National Service Provider (NSP); and
- FEMA Region VIII.

The CTP shall notify FEMA and/or their contractor by e-mail of all meetings with community officials at least one week prior to the meeting (with as much notice as possible). FEMA and/or their contractor may or may not attend the community meetings

The activities for this Flood Map Project, including required Quality Assurance/Quality Control (QA/QC) reviews, and the Mapping Partners that will complete them are summarized in the table below. The sections of this MAS that follow the table below describe the specific activities, responsible Mapping Partner(s), FEMA standards that must be met, and resultant map components.

**Table 1.2 Flood Mapping Project Activities**

Activities	CTP	FEMA
Scoping	X	
Outreach	X	
Field Survey	X	
Independent QA/QC Review of Field Survey		X
Topographic Data Development	X	
Independent QA/QC Review of Topographic Data		X
Base Map Acquisition and Preparation	X	
Hydrologic Analyses	X	
Independent QA/QC Review of Hydrologic Analyses		X
Hydraulic Analyses (including Levee Evaluation, if applicable)	X	
Independent QA/QC Review of Hydraulic Analyses		X
Floodplain Mapping (Detailed Riverine, Redelineation Using Effective Flood Profiles and Updated Topographic Data <sup>1</sup> , Refinement or Creation of Zone A, Redelineation (digitization) of Non-Revised Areas <sup>1</sup> , Merge Revised and Non-Revised Information)	X	
Independent QA/QC Review of Floodplain Mapping		X
Redelineation (Redelineation Using Effective Flood Profiles and Updated Topographic Data <sup>1</sup> , Refinement and Redelineation (digitization) of Non-Revised Areas <sup>1</sup> )		
Independent QA/QC Review of Redelineation		
Develop DFIRM Database (including Graphic Specifications)	X	
Independent QA/QC Review of DFIRM Database and Graphics		X
Produce Preliminary Map Products	X	
Post-Preliminary Processing	X	X
<sup>1</sup> These sub-tasks can be performed and reported in the Management Information Portal (MIP) Work Flow as part of Floodplain Mapping activity or Redelineation activity.		

*FEMA has developed tools to assist in the development of the flood hazard data studies and DFIRMs if the DNRC wishes to use them. FEMA will provide all DNRC's contractors access to and training in these tools. The tools available at this time include WISE software and the DFIRM production tools. The use of these tools will improve the Flood Map Modernization and efficiency of all mapping partners.*

QA/QC review activities may be performed by the CTP or the NSP at the discretion of FEMA. Please note FEMA will also be performing periodic audits and overall study/project management to ensure study quality.

FEMA will be providing download/upload capability for intermediate data submittals through the MIP. Data submittals uploaded via the MIP will include the same data required prior to the existence of the MIP, with the addition of Metadata profiles required for search and retrieve capabilities. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance.

Metadata profiles are to be included with each of the following four activities that must satisfy Data Capture Standards; Base Map Data, Topographic Data, Hydrologic Data, and Hydraulic Data. The metadata profiles are available from FEMA.

**Compliance with Floodplain Boundary Data Quality Standards:** The data quality standards documented in Section 7 of the Multi-Year Flood Hazard Identification Plan (MHIP) for Fiscal Year 2004-2008 (Version 1, November 2004) should be used as the basis for producing DFIRMs. The MIP utilities available at the time of study submittals should be run to verify compliance with these data quality standards. Compliance with these standards will help FEMA achieve a Map Modernization goal of providing a reliable, web-based national flood layer in digital GIS format.

The floodplain boundary data quality standards outlined in Table 7-1 of the MHIP should be followed in addition to existing standards specified for floodplain mapping in the Guidelines, including Volume I, Section 1.4 and Appendices C, D, E, F, G, H, K, L, M, and N. Table 7-1 shall be applied to all approximate, existing detailed and new detailed studies for riverine flooding sources. FEMA will be providing download/upload capability for intermediate data submittals through the Management Information Portal (MIP). Data submittals uploaded via the MIP, will include the same data required prior to the existence of the MIP.

## Scoping

Responsible Mapping Partner: DNRC and FEMA/NSP

Scope: This task involves collecting and reviewing data from a variety of sources including community surveys, other Federal and State Agencies, NFIP State Coordinators, Community Assistance Visits (CAV's) and FEMA archives. DNRC will evaluate the effective FIS report and FIRM maps to see if it needs to be updated. DNRC will provide lists of mapping needs from the MNUSS database, the Scoping Tool, and community surveys and CAV's if available.

Data collection will be performed by FEMA/NSP, including the initial population of the Scoping Tool. This task includes obtaining the best available base map materials (e.g. corporate limits, roads, orthophotos, etc) along with stream centerline files. The acquired data will be imported into the scoping tool and used during the Scoping Task. In the Scoping Tool all streams should have unique names, the limits of the effective FEMA studies should be identified, LOMC areas should be identified, and community requests should be identified. This task also includes populating the streamlines with existing pipeline and scoped studies currently underway.

Identify all stream reaches where levees are shown as providing protection against the 1-percent-annual-chance flood. Request the information specified in Title 44 Code of Federal Regulations (CFR) 65.10, Mapping of areas protected by levee systems, from the community or other party seeking continued recognition of the levee.

In cooperation with the FEMA Region, a Project Management Team will be established consisting of FEMA, NSP, the DNRC, the DNRC contractor, officials from each community being studied, and other appropriate stakeholders. The Project Management Team will be responsible for coordinating the activities of this project and completing all tasks identified in this Statement of Work.

If the Special Flood Hazard Area (SFHA) is proposed to be mapped as contained by a levee on a new FIRM then the requirements of 44 CFR 65.10 must be provided to FEMA regardless if the flooding source is proposed to be restudied or not. All levee systems impacting existing and proposed SFHAs shall be identified during this task and relevant information on the levee's ownership, structure (including freeboard, stability, seepage, closure, etc.), maintenance, operations, and interior drainage shall be obtained and

inventoried. For all levees proposed to be shown on the new FIRM as providing protection from the 1-percent-annual-chance flood (i.e., those known to have adequate freeboard, available as-built plans, adequate maintenance, and operation plans, etc.) that do not have certification documentation available, the levee owner and/or community(s) protected shall be contacted by FEMA via letter requesting the missing requirement(s) of 44 CFR 65.10. During this step, the time frame for providing the requested data shall be established in coordination with the FEMA Regional Office. If certification, plans, etc. are not provided within the established timeframe, then the need for new flood hazard analysis/mapping shall be documented. At the end of this task, FEMA's Flood Levee Inventory System must be updated for all levees identified by the FEMA/NSP.

Preliminary Research Activities can be separated into two categories—researching effective information and researching available data for the Flood Map Project. The following information shall be collected if needed and reviewed: FEMA archive inventory of effective FIRM panels, FBFM panels, FIS reports, and other flood hazard data or existing study data; summary of information in the MNUSS database; summary of contiguous community agreement checks; CAV and CAC files; and “scoping map” and an overview of the results of the research. The DNRC has already compiled most of this information in a Scoping Report.

The DNRC will coordinate, set-up, and hold the Scoping Meeting. This includes identifying a time, place, and all participants. The purpose of this meeting is to present the current information to the local officials (state, county and municipal) and coordinate on prioritization and identification of study areas. The DNRC shall be responsible for compiling the necessary information for the meeting. These items may include: FIS and FIRM for affected communities; USGS quads for the study area; best available community base map(s); effective FIRM summary; Available Data Inventory; Scoping Map; Scoping Meeting Agenda/Minutes form; Aerial photos/topographic mapping if available; existing drainage studies or other H&H data; Community master plan(s)/Drainage Master Plan(s); Zoning Maps; Street Maps; As-built plans; and Floodplain Ordinance(s).

The project management team shall review the initial mapping needs list, review the research findings, and make selections of proposed methods for obtaining/producing flood data. Any additions or changes to the needs list shall be discussed with all members. All needs shall also be prioritized. In general, highest priority shall be given to the following areas: areas of dense existing or anticipated development, including areas where new road crossings have been constructed over stream(s); areas affected by flood-control structures and/or channelization; areas where natural physical changes in the floodplain have been significant (due to subsidence or extreme erosion, for example); areas that were studied by approximate methods and unmapped areas, especially those with development pressure; areas where the community has experienced flooding outside mapped floodplains, with severe damage to buildings and/or infrastructure; areas where mapped flood hazards do not match those shown on contiguous FIRMs (unless those FIRMs are not considered to be accurate); and areas where flood data (BFEs, floodplains, and regulatory floodways) are likely to be changed the most by a restudy.

Based on the discussion of mapping needs, the DNRC and FEMA Project Officer will finalize the areas to be included in the project (based on recommendations provided by the Project Team). Areas to be studied by detailed and approximate methods shall be identified. The following issues will be discussed and refined: Review and Refinement of Flood Hazard Identification Methodologies, Review of Proposed Paneling Scheme, Review and Refinement of Base and Topographic Map Source, and Finalization of Map Production and Database Options.

The FEMA Regional Officer will hold the role of the Consultation Coordination Officer (CCO) for this flood study as identified in Title 44 of the Code of Federal Regulations Part 66. At this point, the FEMA will prepare and set up the Community Case File and Flood Elevation Docket for the maintenance of all communication and coordination throughout the project as outlined in 44CFR Part 66 and 67.

Standards: All Scoping work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: The DNRC shall make the following products available to FEMA:

- The Final Scope of work will be delivered to the Regional Project Officer.
- QA/QC Plan for the review of the mapping project outlined in this MAS. This will include the checklists developed for that review in accordance with the schedule included in Section 6 of this MAS.
- The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the Scoping activity is complete.

## OUTREACH

*(NOTE: The performance of outreach takes place throughout the life of the flood study project. Therefore, we recommend that the tracking of outreach as a function of the MIP Workflow will be distributed amongst the following activities: Scoping, Produce Preliminary Map Products and Post Preliminary Processing.)*

The outreach activities for a Flood Map Project can best be understood as a process that begins during the Project Scoping phase and continues through the Map Production and Post-preliminary phases.

The overarching goal for conducting outreach is to create a climate of understanding and ownership of the mapping process at the State and local levels. Well-planned outreach activities can reduce political stress, confrontation in the media, and public controversy, which can arise from lack of information, misunderstanding, or misinformation. These outreach activities also can assist FEMA and other members of the Project Team in responding to congressional inquiries.

By proactively reaching out to all key stakeholders as early in the Flood Map Project as possible, the maps can be used to their full potential. The likelihood of appeals may also be reduced or eliminated. Specific responsible Mapping Partner activities shall include, but are not limited to:

- Establishing two-way communication to address the needs of, inform and obtain feedback from, the stakeholders;
- Ensuring compliance with due process requirements;
- Interacting with technical representatives to ensure production of accurate and up-to-date maps;
- Enhancing ownership by communities; and
- Tracking, monitoring, and evaluating outreach activities and adjusting efforts according to ongoing feedback and evolving project needs.

All communication with local governments will be done in accordance with Title 44 Code of Federal Regulations Part 66.

## Field Survey

Responsible Mapping Partner: DNRC

Scope: To supplement any field reconnaissance conducted during the Project Scoping phase of this project, the DNRC shall conduct an appropriate and necessary level of 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.

In addition to the initial field reconnaissance, the DNRC shall conduct field surveys as needed, including obtaining channel and floodplain cross sections, identifying or establishing Temporary Bench Marks, and obtaining the physical dimensions of hydraulic and flood-control structures. The DNRC also shall coordinate with other Mapping Partners that are involved in the Topographic Data Development process.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

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

Deliverables: In accordance with the Technical Support Data Notebook (TSDN) format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the DNRC shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- A report summarizing the findings of the field reconnaissance;
- Maps and drawings that provide the detailed survey results, if applicable;
- Survey notebook containing cross sections and structural data, if applicable;
- Documentation of the Datum;
- Format Survey Database or Data Delivery consistent with the Data Capture Standards –Appendix N of the *Guidelines and Specifications for Flood Mapping Partners*, 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 DFIRM as outlined in approved QA/QC Plan.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## Topographic Data Development

Responsible Mapping Partner: DNRC

Scope: To supplement the field surveys conducted under this MAS, the DNRC shall obtain additional topographic data of the overbank areas of the flooding sources studied to delineate floodplain boundaries. The DNRC shall gather the most current topographic data for the given community and determine how it compares to existing conditions and level of accuracy. The DNRC shall use the best available existing topographic data for the flooding sources as listed in Table 1-1.

If there is no new topographic data available that can be used and it is demonstrated that there is a need during the scoping phase, with approval from the Region Project Officer, the DNRC shall generate new topographic data for the flooding sources as detailed in Table 1-1. The DNRC also shall coordinate with other team members conducting field surveys. Contour interval and/or accuracy for the topographic data shall be selected based on the current FEMA requirements as documented in *Guidelines and Specifications for Flood Hazard Mapping Partners*. No FEMA funds shall be expended on new topographic data unless prior approval is given by the Regional Project Officer after analyzing the request submitted at the end of the scoping period.

If appropriate, the DNRC also shall develop topographic maps and/or Digital Elevation Models for the subject flooding sources using the data collected under this topographic data development process and via field surveys. In addition, the DNRC shall address all concerns or questions regarding the topographic data development that are raised by FEMA/NSP during the independent QA/QC review.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

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

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* the DNRC shall upload the digital data to the MIP or submit to FEMA by using other digital media if the MIP is unavailable, so that FEMA/NSP can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 for this Activity. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital topographic maps;

- Report summarizing methodology and results;
- Mass points and breaklines data;
- Digital work maps with contours;
- Checkpoint analyses to assess the accuracy of data, including Root Mean Square Error calculations to support vertical accuracy;
- Identification of remote-sensing data voids and methods used to supplement data voids;
- National Geodetic Survey data sheets for Network Control Points used to control remote- sensing and ground surveys;
- Metadata compliant with Federal Geographic Data Committee standards;
- Documentation of the Datum;
- Format Terrain Database or Data Delivery consistent with the Data Capture Standards –Appendix N of the *Guidelines and Specifications for Flood Mapping Partners*; 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 DFIRM as outlined in approved QA/QC Plan.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

### **Independent QA/QC Review of Topographic Data**

Responsible Mapping Partner: FEMA/NSP

Scope: FEMA/NSP shall review the mapping data generated by the DNRC under Topographic Data Development to ensure that these data are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

This review will be performed in a timely manner so as to eliminate impact to the project schedule.

Standards: All work under Topographic Data Development shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA/NSP shall make the following products available to FEMA and the DNRC by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable and providing it electronically to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete.

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

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Base Map Acquisition**

Responsible Mapping Partner: DNRC

Scope: Base Map Acquisition consists of obtaining the digital base map, for the project. The DNRC shall provide the digital base map. The required activities are as follows:

- Obtain digital files (raster or vector) of the base map.
- Secure necessary permissions from the map source to allow FEMA's use and distribution of hardcopy and digital map products using the digital base map, free of charge.
- Certify that the digital data meets the minimum standards and specifications that FEMA requires for DFIRM production.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

Standards: The Base Map Acquisition shall be performed in accordance with the standards specified in Section 5 of this MAS. The Data Capture Standards must be met for this deliverable to be acceptable.

Deliverables: The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the DNRC shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at time of delivery. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The DNRC shall make the following products available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Written certification that the digital data meet the minimum standards and specifications;
- Documentation that FEMA can use the digital base map; and
- Documentation of the Datum, if appropriate.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## Hydrologic Analyses

Responsible Mapping Partner: DNRC

Scope: Where hydrologic analyses are required for new or revised studies, the methods and discharge values shall be identified in Appendix B. The flood discharges will then be used as the basis for subsequent hydraulic analyses under Activity 8. The DNRC shall address all concerns or questions regarding Activity 6 that are identified by FEMA/NSP during the independent QA/QC review under Activity 7.

If Geographic Information System (GIS)-based modeling is used, such as for approximate A zones, the DNRC shall document automated data processing and modeling algorithms and provide them to FEMA to ensure they are consistent with the standards outlined above. 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 DNRC shall provide full user documentation, technical algorithm documentation, and the software to FEMA for review before performing the hydrologic analyses.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

Standards: All Hydrologic Analyses work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* the DNRC shall upload the digital data to the MIP or submit to FEMA by using other digital media if the MIP is unavailable, so that FEMA/NSP can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 for this Activity. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital copies of all hydrologic modeling (input and output) files for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events;
- Digital copies of approximate hydrology values and a description of the method used will be made available if requested;
- Digital Summary of Discharges Tables presenting discharge data for the flooding sources for which hydrologic analyses were performed;

- Digital draft text for Section 3.1, Hydrologic Analyses, of the FIS report;
- Digital versions of all backup data used in the analysis, including work maps;
- Format Hydrology Database or Data Delivery consistent with the Data Capture Standards – Appendix N of the Guidelines and Specifications for Flood Mapping Partners; 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 DFIRM.
- For GIS-based modeling, deliverables shall include all input and output data, intermediate data processing products, and GIS data layers.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Independent QA/QC Review of Hydrologic Analyses**

Responsible Mapping Partner: FEMA/NSP

Scope: FEMA/NSP shall review the technical, scientific, and other information submitted by the DNRC specific to the hydrologic analyses to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. This work shall include, at a minimum, the activities listed below.

- 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 models;
  - Use of appropriate methodology(ies);
  - Correctly applied methodology(ies)/model(s), including QC of input parameters;
  - Comparison with gage data and/or regression equations, if appropriate; and
  - Comparison with discharges for contiguous reaches or flooding sources.
- Maintain records of all contacts, reviews, recommendations, and actions and make them readily available to FEMA;
- Maintain an archive of all data submitted for hydrologic modeling review. (All supporting data must be retained for 3 years from the date funding recipient submits its final expenditure report to FEMA.); and
- If data changed during review, then updated deliverables for previous task will be submitted at this time.

This review will be performed in a timely manner so as to eliminate impact to the project schedule.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA/NSP shall make the following products available to FEMA and the DNRC by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery and providing it in digital format to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete.

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

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Hydraulic Analyses**

Responsible Mapping Partner: DNRC

Scope: DNRC shall perform hydraulic analyses for the specific flooding sources listed in Appendix B of this MAS. For new or revised studies based on detailed analyses, the hydraulic modeling will include the 10-, 2-, 1-, and 0.2 percent-annual-chance events, as well as the regulatory floodway, based on peak discharges computed under Activity 6. For new or revised studies based on approximate or limited detailed analyses, the hydraulic modeling will only include the 1-percent-annual-chance event. The hydraulic methods used for these analyses will involve step backwater calculations performed using a FEMA accepted 1-dimensional model such as the US Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) computer model, currently version 3.1.2.

The DNRC shall use the cross-section and field data collected during Field Survey to perform the hydraulic analyses. The hydraulic analyses will be used to establish flood elevations and regulatory floodways for the subject flooding sources.

The DNRC may use the FEMA CHECK-2 or CHECK-RAS checking program to check the reasonableness of the hydraulic analyses. To facilitate the independent QA/QC review, the DNRC shall provide explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate. In addition, the DNRC shall address all concerns or questions regarding the hydraulic analyses that are raised by FEMA/NSP during the independent QA/QC review.

The DNRC shall document automated data processing and modeling algorithms for GIS-based modeling and provide them to FEMA for review to ensure they are consistent with the standards outlined above. Digital datasets are to be documented and provided to FEMA for approval before performing the hydraulic analyses to ensure the datasets meet minimum requirements. If non-commercial (i.e., custom-developed) software is used for the analyses, then the DNRC shall provide full user documentation, technical algorithm documentation, and software to FEMA for review before performing the hydraulic analyses.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

**Standards:** All Hydraulic Analyses work shall be performed in accordance with the standards specified in Section 5 of this MAS.

**Deliverables:** In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* the DNRC shall upload the digital data to the MIP or submit to FEMA by using other digital media if the MIP is unavailable, so that FEMA/NSP can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 for this Activity. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital profiles of the 10-, 2-, 1- and 0.2-percent-annual-chance water-surface elevations representing existing conditions using the FEMA RASLOT program or similar software;
- Digital Floodway Data Tables for each flooding source that is compatible with the DFIRM database;
- Digital hydraulic modeling (input and output) files;
- Digital tables with range of Manning's "n" values;
- Explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as appropriate;
- Digital versions of all backup data used in the analyses;
- Digital versions of draft text for inclusion in the FIS report;
- For GIS-based modeling, deliverables include all input and output data, intermediate data processing products, GIS data layers, and final products in the format of the DFIRM database structure;
- Format Hydraulic Database or Data Delivery consistent with the Data Capture Standards – Appendix N of the Guidelines and Specifications for Flood Mapping Partners; 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 DFIRM.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

### **Independent QA/QC Review of Hydraulic Analyses**

Responsible Mapping Partner: FEMA/NSP

Scope: FEMA/NSP shall review the technical, scientific, and other information submitted by the DNRC under Hydraulic Analysis to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice and are sufficient to revise the FIRM. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. This work shall include, at a minimum, the activities listed below.

- 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);
  - Starting water-surface elevations;
  - Cross-section geometry;
  - Manning's "n" values and expansion/contraction coefficients;
  - Bridge and culvert modeling;
  - Flood discharges;
  - Regulatory floodway computation methods; and
  - Tie-in to upstream and downstream non-revised Flood Profiles.
- Use the CHECK-2 or CHECK-RAS program as appropriate to flag potential problems and focus review efforts.
- Maintain records of all contacts, reviews, recommendations, and actions and make them readily available to FEMA.
- Maintain an archive of all data submitted for hydraulic modeling review. (All supporting data must be retained for 3 years from the date funding recipient submits its final expenditure report to FEMA.)
- If data changed during review, then updated deliverables for previous task will be submitted at this time.

This review will be performed in a timely manner so as to eliminate impact to the project schedule.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA/NSP shall make the following products available to FEMA and the DNRC by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery and providing a digital copy to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete.

- 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; and
- If the data changed during the Hydrologic and/or Hydraulic Analyses QA/QC process, then the updated and verified deliverables from these activities will be resubmitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Floodplain Mapping**

Responsible Mapping Partner: DNRC

**Scope for Detailed Riverine Analysis:** The DNRC shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) for the flooding sources for which detailed hydrologic, and/or hydraulic were performed. The DNRC shall incorporate all new or revised hydrologic, hydraulic and shall use the topographic data acquired under Topographic Data Development to delineate the floodplain and regulatory floodway boundaries on a digital work map.

### **Scope of Redelineation of Detailed Floodplain Boundaries Using Updated Topographic Data:**

*(NOTE: This specific task can be tracked in the MIP Workflow separately in the Data Development Task: Perform Redelineation if preferred)*

The DNRC shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries for the flooding sources as documented in Appendix B. The DNRC shall use the topographic data acquired under Topographic Data Development to delineate the floodplain and regulatory floodway boundaries as appropriate on a digital work map. If the new topographic data does not reflect the same hydraulic characteristics as in effective study, the DNRC shall evaluate the topographic data to determine if changes are significant enough to invalidate the floodplain boundary and regulatory floodway boundary redelineations. If so, the DNRC shall contact the FEMA Regional Project Officer, identified in Section 12 of this MAS, with a recommendation.

**Scope for Refinement or Creation of Zone A:** The DNRC shall delineate the 1-percent-annual-chance floodplain boundaries for the flooding sources as documented in Appendix B. The DNRC shall use existing topographic data or the topographic data acquired under Topographic Data Development to delineate the floodplain boundaries on a digital work map. The DNRC may expand on the approaches for analyzing Zone A areas outlined in *Guidelines and Specifications for Flood Hazard Mapping Partners* and in FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas* (April 1995), and/or develop new approaches. Such approaches must be coordinated with the FEMA Regional Project Officer identified in Section 12 of this MAS before analysis and mapping begin.

### **Scope for Non-revised Areas:**

*(NOTE: This specific task can be tracked in the MIP Workflow separately in the Data Development Task: Perform Redelineation if preferred)*

For all flooding sources except those segments for which updated flood data will be developed, the DNRC shall convert the information shown on the effective FIRM and Flood Boundary Floodway Map (FBFM) panels for all appropriate areas of the County to digital format in conformance with FEMA DFIRM specifications. The DNRC shall use the acquired base map for the conversion. The DNRC shall not digitize the flood theme for those segments of flooding sources for which updated flood data will be developed.

**Scope for Merging Revised and Non-Revised Information:** Upon completion of the floodplain mapping activities for the revised areas and the non-revised areas, the DNRC shall merge the digital floodplain data into a single, updated DFIRM. This work is to include tie-in of flood hazard information for areas that were not studied as part of the Flood Map Project documented in this MAS. The DNRC also shall tie in the revised and non-revised Flood Profiles, floodplain boundaries, and regulatory floodway boundaries with contiguous communities that were not studied as part of the Flood Map Project documented in this MAS. The DNRC shall coordinate with FEMA and any additional Mapping Partners responsible for other components of Floodplain Mapping, as necessary, to resolve any potential tie-in issues.

The DNRC shall incorporate the results of all effective Letters of Map Change (LOMCs) for all affected communities on the DFIRM. Also, the DNRC shall address all concerns or questions regarding Floodplain Mapping that are raised by FEMA/NSP during the independent QA/QC review.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

**STANDARDS: ALL FLOODPLAIN MAPPING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS SPECIFIED IN SECTION 5 OF THIS MAS. MAPPING QUALITY STANDARDS SHOULD BE CONSISTENT WITH SECTION 7 OF THE MHIP. THE DNRC MAY EXPAND ON THE APPROACHES FOR ANALYZING ZONE A AREAS OUTLINED IN GUIDELINES AND SPECIFICATIONS FOR FLOOD HAZARD MAPPING PARTNERS AND IN FEMA 265, MANAGING FLOODPLAIN DEVELOPMENT IN APPROXIMATE ZONE A AREAS (APRIL 1995), AND/OR DEVELOP NEW APPROACHES. SUCH APPROACHES MUST BE COORDINATED WITH THE FEMA REGIONAL PROJECT OFFICER BEFORE ANALYSIS AND MAPPING BEGIN.**

**Deliverables:** In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, and upon completion of floodplain mapping for those areas as documented in Appendix B, the DNRC shall upload the digital data to the MIP or submit by using other digital media if the MIP is unavailable at time of delivery, so that FEMA/NSP can access it for the independent QA/QC review. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The mapping for the remaining flooding sources including any non-revised digital panels and all merged revised and non-revised floodplain mapping data is to be submitted for a final QA/QC review at the completion of this activity. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the

activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFEs, flood insurance risk zone labels, and all applicable base map features;
- DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM as outlined in approved QA/QC Plan;
- Any backup or supplemental information, including supporting calculations and assumptions used in the mapping required for the independent QA/QC review of Hydrologic, Hydraulic Analyses and Floodplain Mapping;
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- Written summary of the analysis methodologies;
- Digital versions of input and output for any computer programs that were used;
- Format Mapping Database or Data Delivery consistent with the Data Capture Standards –Appendix N of the Guidelines and Specifications for Flood Mapping Partners;
- If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Independent QA/QC Review of Floodplain Mapping**

Responsible Mapping Partner: FEMA/NSP

Scope: FEMA/NSP shall review the floodplain mapping submitted by the DNRC under Floodplain Mapping to ensure that the results of the analyses performed are accurately represented, the redelineation of existing data on new, updated topography is appropriate and to ensure that the new DFIRM panels accurately represent the information shown on the effective FIRMs and FBFMs for the unrevised areas that are mapped. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. This work shall include, at a minimum, the activities listed below.

- Review the cross sections for proper location and orientation on the work map and agreement with the Floodway Data Table.
- Review the BFEs shown on the work map for proper location and agreement with the results of the hydraulic modeling.
- Review the regulatory floodway widths for agreement with the widths shown in the Floodway Data Table and the results of the hydraulic modeling.

- Review the floodplain boundaries for agreement with the flood elevations shown in the Floodway Data Table and the contour lines and other topographic information shown on the work maps.
- Review the floodplain widths at cross sections as shown on the work maps to ensure they match the Floodway Data Table.
- Review the floodplain boundaries as shown on the work maps to ensure they match the Flood Profiles.
- For non-revised floodplain areas, the 1 and 0.2-percent-annual-chance floodplain boundaries agree with the floodplain boundaries shown on the FIRM and the contour lines, other topographic information, and planimetric information shown on the DFIRM base.
- Road and floodplain relationships are maintained for all unrevised areas.
- Review the flood insurance risk zones as shown on the work maps to ensure they are labeled properly.
- Review the DFIRM mapping files to ensure they were prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- Review the metadata files to ensure they include all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

This review will be performed in a timely manner so as to eliminate impact to the project schedule.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA/NSP shall make the following products available to FEMA and DNRC by uploading the digital data to MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery and providing a copy in digital format to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete.

- A Summary Report that describes the findings of the QA/QC review, noting any deficiencies in or agreeing with the mapping results;
- Recommendations to resolve any problems that are identified during the independent QA/QC review;
- An annotated work map with all questions and/or concerns indicated, if necessary; and
- If data changed during review, then updated deliverables for previous task will be submitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## Redelineation

*(NOTE: It has been inferred that the intention of the Perform Redelineation task in the Work Flow was to provide a single task in which to capture the data for projects that were strictly an upgrade to a digital product, or “digital conversion” along with development of a DFIRM Dbase. However, the definition of Redelineation seems to infer that remapping on updated topographic data is being performed. It is important to understand what each of the Regions intends to use the Redelineation Task for with regarding the project management and tracking in the MIP Workflow so that a consistent definition and definitive guidance can be prepared.)*

Responsible Mapping Partner: DNRC

### **Scope of Redelineation of Detailed Floodplain Boundaries Using Updated Topographic Data:**

*(NOTE: This specific task can be tracked in the MIP Workflow separately in the Data Development Task: Perform Floodplain Mapping, if preferred)*

The DNRC shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries for the flooding sources listed in Appendix B. The DNRC shall use the topographic data acquired under Topographic Data Development to delineate the floodplain and regulatory floodway boundaries as appropriate on a digital work map. If the new topographic data does not reflect the same hydraulic characteristics as in effective study, the DNRC shall evaluate the topographic data to determine if changes are significant enough to invalidate the floodplain boundary and regulatory floodway boundary redelineations. If so, the DNRC shall contact the FEMA Regional Project Officer identified in Section 12 of this MAS with a recommendation.

### **Scope for Non-revised Areas:**

*(NOTE: This specific task can be tracked in the MIP Workflow separately in the Data Development Task: Perform Floodplain Mapping, if preferred)*

For all flooding sources except those segments for which updated flood data will be developed, the DNRC shall convert the information shown on the effective FIRM and Flood Boundary Floodway Map (FBFM) panels for all appropriate areas of the County to digital format in conformance with FEMA DFIRM specifications. The DNRC shall use the acquired base map for the conversion. The DNRC shall not digitize the flood theme for those segments of flooding sources for which updated flood data will be developed.

The DNRC shall incorporate the results of all effective Letters of Map Change (LOMCs) for all affected areas. Also, the DNRC shall address all concerns or questions regarding Redelineation that are raised by FEMA/NSP during the independent QA/QC review.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

**STANDARDS: ALL REDELINEATION WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS SPECIFIED IN SECTION 5 OF THIS MAS. MAPPING QUALITY STANDARDS SHOULD BE CONSISTENT WITH SECTION 7 OF THE MHIP.**

**Deliverables:** In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* and upon completion of Redelineation for those flooding sources as documented in Appendix B, the DNRC shall upload the digital data to the MIP or submit by using other digital media if the MIP is unavailable at time of delivery, so that FEMA/NSP can access it for the independent QA/QC review. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The Redelineation for the remaining flooding sources including any non-revised digital panels is to be submitted for a final QA/QC review at the completion of this activity. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFEs, flood insurance risk zone labels, and all applicable base map features;
- DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;

- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Any backup or supplemental information, including supporting calculations and assumptions used in the mapping required for the independent QA/QC review of Hydrologic, Hydraulic Analyses and Floodplain Mapping;
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- Format Mapping Database or Data Delivery consistent with the Data Capture Standards –Appendix N of the Guidelines and Specifications for Flood Mapping Partners;
- If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted; 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 DFIRM as outlined in approved QA/QC Plan.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Independent QA/QC Review of Redelineation**

Responsible Mapping Partner: FEMA/NSP

Scope: FEMA/NSP shall review the redelineation submitted by the DNRC under Redelineation to ensure that the redelineation of existing data on new, updated topography is appropriate and to ensure that the new DFIRM panels accurately represent the information shown on the effective FIRMs and FBFMs for the unrevised areas that are mapped. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. This work shall include, at a minimum, the activities listed below.

- Review the cross sections for proper location and orientation on the work map and agreement with the Floodway Data Table.
- Review the BFEs shown on the work map for proper location and agreement with the results of the hydraulic modeling.
- Review the regulatory floodway widths for agreement with the widths shown in the Floodway Data Table and the results of the hydraulic modeling.
- Review the floodplain boundaries for agreement with the flood elevations shown in the Floodway Data Table and the contour lines and other topographic information shown on the work maps.
- Review the floodplain widths at cross sections as shown on the work maps to ensure they match the Floodway Data Table.
- Review the floodplain boundaries as shown on the work maps to ensure they match the Flood Profiles.
- For non-revised floodplain areas, the 1 and 0.2-percent-annual-chance floodplain boundaries agree with the floodplain boundaries shown on the FIRM and the contour lines, other topographic information, and planimetric information shown on the DFIRM base.
- Road and floodplain relationships are maintained for all unrevised areas.

- Review the flood insurance risk zones as shown on the work maps to ensure they are labeled properly.
- Review the DFIRM mapping files to ensure they were prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- Review the metadata files to ensure they include all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

This review will be performed in a timely manner so as to eliminate impact to the project schedule.

Standards: All Independent QA/QC work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA/NSP shall make the following products available to FEMA and the DNRC by uploading the digital data to MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery and providing a digital copy to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete.

- A Summary Report that describes the findings of the QA/QC review, noting any deficiencies in or agreeing with the mapping results;
- Recommendations to resolve any problems that are identified during the independent QA/QC review;
- An annotated work map with all questions and/or concerns indicated, if necessary; and
- If data changed during review, then updated deliverables for previous task will be submitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **DFIRM Database**

Responsible Mapping Partner: DNRC

Scope: The DNRC shall apply the final FEMA DFIRM graphic and database specifications to the DFIRM files produced under Floodplain Mapping and/or Redelineation. This work shall include adding all required annotation, line pattern, area shading, and map collar information (e.g., map borders, title blocks, legends, notes to user). The DNRC will be preparing the database for this project in the Standard format. The database shall be produced in accordance with Appendix L of the Guides and Specifications for Flood Hazard Mapping Partners. The DNRC shall coordinate with those Mapping Partners responsible for Floodplain Mapping and/or Redelineation, as necessary, to resolve any problems that are identified during development of the DFIRM Database and graphics.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

**Standards:** All DFIRM Database work shall be performed in accordance with the standards specified in Section 5 of this MAS.

**Deliverables:** In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, the DNRC shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. Where paper documentation is required by State Law for Professional certifications, you may submit the paper in addition to a scanned version of the paper for the digital record.

- DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*;
- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale;
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM as outlined in approved QA/QC Plan; and
- Format DFIRM Database or Data Delivery consistent with the Data Capture Standards –Appendix N of the Guidelines and Specifications for Flood Mapping Partners.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

### **Independent QA/QC Review of DFIRM Dbase**

**Responsible Mapping Partner:** FEMA/NSP

**Scope:** Upon completion of the floodplain mapping and redelineation activities, FEMA/NSP shall review the DFIRM spatial database to determine if it meets current FEMA database specifications. In addition, FEMA/NSP shall review the DFIRM to ensure it meets current FEMA graphic specifications. The DNRC shall coordinate with other Mapping Partners, as necessary, to resolve any problems identified during this QA/QC review. This work shall ensure that the requirements below are met.

- All required DFIRM features are accurately and legibly labeled and follow the examples shown in the FEMA DFIRM specifications. This includes all flood insurance risk zones, BFEs, cross sections, studied streams, mapped political entities, and all roads within and adjacent to the 1-percent-annual-chance floodplains.
- All DFIRM features are correctly symbolized with the appropriate symbol, line pattern, or area shading and follow the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- All map collar information is complete, correct, and follows the requirements specified in *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- DFIRM mapping files are in one of the GIS file and database formats specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners* and conform to those specifications for content and attribution.
- DFIRM database files are in one of the database formats specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners* and conform to those specifications for content and attribution.
- Metadata files describing the DFIRM data include all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*.

*This review will be performed in a timely manner so as to eliminate impact to the project schedule.*

**Standards:** All DFIRM Database Development work shall be performed in accordance with the standards specified in Section 5 of this MAS.

**Deliverables:** In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMS/NSP shall make the following products available to FEMA and the DNRC by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery and providing a digital copy to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity.

- A Summary Report that describes the findings of the QA/QC review noting any deficiencies in or agreeing with the mapping results and the results of all automated or manual QA/QC steps taken during the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- An annotated copy of the DFIRM with all questions and/or concerns indicated, if necessary.
- If the data changed during the QA/QC process, then the updated deliverables from Floodplain Mapping and Redelineation will be resubmitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## Produce Preliminary Map Products

Responsible Mapping Partners: DNRC

Scope: Preliminary Map Products consists of the final preparation, review, and distribution of the Preliminary copies of the DFIRM and FIS report for community official and general public review and comment. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. The activities to be performed are summarized below.

*Preliminary Transmittal Letter Preparation.* The DNRC shall prepare letters and transmit the Preliminary copies of the DFIRM and FIS report and related enclosures to all affected communities, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA. This letter may be prepared for FEMA only or FEMA and DNRC signature.

*Distribution of Preliminary DFIRM and FIS Report:* The DNRC shall distribute the Preliminary copies of the DFIRM and FIS report to all affected communities, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

*News Release Preparation:* The DNRC shall prepare news release notifications of BFE changes for all affected communities if appropriate and perform QA/QC reviews of the notices for accuracy and compliance with FEMA format requirements. The DNRC shall file the notifications for later submittal to FEMA for review.

*Preliminary Summary of Map Actions (SOMA) Preparation:* The DNRC shall prepare Preliminary SOMAs for all affected communities if appropriate. The SOMA shall list pertinent information regarding LOMCs that will be affected by the issuance of the DFIRM (i.e., superseded, incorporated, revalidated).

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Standards: All Preliminary Map Products work shall be performed in accordance with the standards specified in Section 5 of this MAS. Mapping quality standards should be consistent with Section 7 of the MHIP. The Data Capture Standards must be met for this deliverable to be acceptable.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, DNRC shall make the following products available to FEMA and the DNRC by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. The DNRC shall upload the required deliverables to the MIP in accordance with the schedule outlined in Section 6 for this Activity.

The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete.

- Preliminary transmittal letters shall be prepared and transmitted. These letters and any additional letters requested by FEMA shall be prepared in accordance with the current version of the FEMA *Document Control Procedures Manual* and in conjunction with Guidance provided by the Region and/or their contractor.
- The FIS report is prepared in the FEMA *Countywide or Partial Countywide Format* as documented in Appendix J of *Guidelines and Specifications for Flood Hazard Mapping Partners*.
- Preliminary copies of the DFIRM and FIS report, including all updated data tables and Flood Profiles shall be mailed to the Chief Executive Officer (CEO) and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.
- Preliminary SOMAs, prepared in accordance with FEMA requirements, shall be provided as appropriate.
- If appropriate, revised DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided by uploading the digital data to the MIP or submitting it by using other digital media if the MIP is unavailable at the time of delivery.
- If appropriate, revised DFIRM database files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided by uploading the digital data to the MIP or submitting it by using other digital media if the MIP is unavailable at the time of delivery.
- If appropriate, revised metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided by uploading the digital data to the MIP or submitting it by using other digital media if the MIP is unavailable at the time of delivery.
- A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance.
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the final preparation of the preliminary DFIRM shall be provided as outlined in approved QA/QC Plan.

### **Independent QA/QC of Preliminary Map Products**

Responsible Mapping Partners: FEMA/NSP

Scope includes:

*Final QA/QC Review of Preliminary DFIRM and FIS Report:* The FEMA/NSP shall perform a final QA/QC review of the Preliminary DFIRM and FIS report, including all data tables, Flood Profiles, and other components of the FIS report. The QA/QC review procedures shall be consistent with the *Guidelines and Specifications for Flood Hazard Mapping Partners* and the QA/QC report submitted for approval at the end of scoping.

*Discrepancy Resolution:* The DNRC shall work to resolve discrepancies identified during the final QA/QC review.

Deliverables: In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA/NSP shall make the following products available to FEMA and the DNRC by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery and providing a digital copy to the DNRC. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. This submittal will occur in accordance with the schedule outlined in Section 6 for this Activity.

- A Summary Report that describes the findings of the QA/QC review noting any deficiencies in or agreeing with the mapping results and the results of all automated or manual QA/QC steps taken during the independent QA/QC review;
- Recommendations to resolve any problems that are identified during the independent QA/QC review; and
- An annotated copy of the DFIRM with all questions and/or concerns indicated, if necessary.
- If data changed during review, then updated deliverables for previous task will be submitted at this time.

Appendix M and Appendix N may be downloaded from the FEMA Flood Hazard Mapping website at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

## **Post-Preliminary Processing**

Responsible Mapping Partners: DNRC and FEMA/NSP

Scope: Post-preliminary Processing includes coordination with FEMA and the Community to schedule a Community Meeting(s) for review of the Preliminary DFIRM if required. This activity consists of finalizing the DFIRM and FIS report after the Preliminary copies of the DFIRM and FIS report have been issued to community officials and the public for review and comment. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer. The activities to be performed are summarized below.

Community Coordination Meeting: If a community coordination meeting is required, DNRC shall arrange for and verify that the following activities are completed:

- Establish invitee list
- Schedule meeting date and place
- Complete and Distribute Meeting Notice/Letter
- Record Meeting Minutes, and
- Identify any/all communities with BFE changes for required appeal period.

*Initiation of Statutory 90-Day Appeal Period:* When required, upon completion of a 30-day community comment period and/or final coordination meeting with the affected communities, the DNRC shall arrange for and verify that the following activities are completed in accordance with the current version of the *FEMA Guidelines and Specifications for Flood Hazard Mapping Partners and Document Control Procedures Manual*:

- Proposed BFE determination letters are sent to the community CEOs and floodplain administrators.

News release notifications of BFE changes are published in prominent newspapers with local circulation in accordance with 44 CFR.

- The DNRC shall prepare the appropriate notices (Proposed Rules) that are to be published in the *Federal Register*. The DNRC shall then deliver those notices to FEMA for publication.
- When the DNRC holds public meetings to present and discuss the results of this Flood Map Project, FEMA may attend the meetings and assist where possible if requested.

*Resolution of Appeals and Protests:* FEMA/NSP, supported by the DNRC, shall review and resolve appeals and protests received during the 90-day appeal period. For each appeal and protest, the following activities shall be conducted as appropriate:

- Initial processing and acknowledgment of submittal;
- Technical review of submittal;
- Preparation of letter(s) requesting additional supporting data;
- Performance of revised analyses; and
- Preparation of a draft resolution letter for co-signature with FEMA and the DNRC and revised DFIRM and FIS report materials for FEMA review.

The DNRC shall mail all associated correspondence upon authorization by FEMA.

*Preparation of Special Correspondence:* The DNRC shall support FEMA/NSP in responding to comments not received within the 90-day appeal period, but before the maps become effective (referred to as “special correspondence”), including drafting responses for FEMA review when appropriate and finalizing responses for co-signature. The DNRC shall also shall mail the final correspondence (and enclosures if appropriate) and distribute appropriate copies of the correspondence and enclosures upon receipt of authorization from FEMA.

*Revision of FIRM and FIS Report:* If necessary, the DNRC shall work together with FEMA/NSP to revise the DFIRM and FIS report and shall distribute Revised Preliminary copies of the DFIRM and FIS report to the CEO and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

*Final SOMA Preparation:* The DNRC shall prepare Final SOMAs for the affected communities, with assistance from FEMA as appropriate.

*Processing of Letter of Final Determination:* The DNRC shall work with FEMA/NSP to establish the effective date for the DFIRM and FIS report, and shall prepare a Letter of Final Determination (LFDs) for each affected community for FEMA review in coordination with the Region and their contractor, and in

accordance with the FEMA *Document Control Procedures Manual*. The DNRC shall mail the final signed LFDs and enclosures and distribute appropriate copies of the signed LFDs upon receipt of authorization from FEMA.

*Processing of Final DFIRM and FIS Report for Printing:* The DNRC shall prepare final reproduction materials for the DFIRM and FIS report and provide these materials to the FEMA Map Service Center for printing by the U.S. Government Printing Office. They shall also prepare the appropriate paperwork to accompany the DFIRM and FIS report (including Print Processing Worksheet, Printing Requisition Forms, and Community Map Actions Form) and transmittal letters to the community CEOs.

*Revalidation Letter Processing.* The DNRC, when appropriate, shall prepare and distribute letters for FEMA signature to the community CEOs and floodplain administrators to notify the affected communities about LOMCs for which determinations will remain in effect after the DFIRM and FIS report become effective.

*Archiving Data:* The FEMA/NSP shall ensure that technical and administrative support data are packaged in the FEMA required format and stored properly in the library archives until they are transmitted to the FEMA Engineering Study Data Package Facility. In addition, the FEMA/NSP will maintain copies of all data for a period of no less than 3 years.

Refer to Appendix B, CTP Contractor Scope of Work, for details concerning this Activity.

Prior to uploading any data to the MIP or delivering any data to FEMA/NSP in digital format, the CTP shall have completed a review checklist as available from the NSP, or similar documentation for that data, for this activity.

Standards: All Post Preliminary DFIRM work shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: The MIP shall be updated for status reporting not less than prescribed quarterly periods and when the activity is complete. In accordance with the TSDN format described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners* and the requirements documented in Section 1 and Appendix A of the FEMA *Document Control Procedures Manual*, FEMA's Contractor and/or FEMA/NSP or DNRC shall make the following products available to FEMA by uploading the digital data to the MIP or submitting it to the FEMA Regional Office if the MIP is unavailable at the time of delivery. A Federal Geographic Data Committee (FGDC) adopted metadata profile, Content Standard for Digital Geospatial Metadata (CSDGM), must accompany the uploaded digital data in order to facilitate proper cataloging of the data for search and retrieve capabilities within the MIP. The metadata profile should be obtained from FEMA or its contractor to assure compliance. This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule. These products will be made available to FEMA in accordance with the schedule outlined in Section 6 for this Activity:

- Documentation that the news releases were published in accordance with FEMA requirements;
- Documentation that the appropriate *Federal Register* notices (Proposed and Final Rules) were published in accordance with FEMA requirements;
- Draft and final Special Correspondence (and all associated enclosures, backup data, and other related information) for FEMA review and signature as appropriate;

- Draft and final Appeal and Protest acknowledgment, additional data, and resolution letters (and all associated enclosures, backup data, and other related information) for FEMA review and signature as appropriate;
- Draft and final LFDs (and all associated enclosures, backup data, and other related information) for FEMA review and signature;
- DFIRM negatives and final FIS report materials, including all updated data tables and Flood Profiles;
- Paperwork for the final DFIRM and FIS report materials;
- Transmittal letters for the printed DFIRM and FIS report;
- LOMC Revalidation Letters if appropriate;
- Complete, organized archived technical and administrative support data; and
- Complete, organized and archived case file and flood elevation docket.

## **SECTION 2—TECHNICAL AND ADMINISTRATIVE SUPPORT DATA SUBMITTAL**

**The Project Team members for this Flood Map Project that have responsibilities for activities included in this MAS shall comply with the data submittal requirements summarized below.**

All supporting documentation for the activities in this Mapping Activity Statement shall be submitted in the TSDN format in accordance with Appendix M of the FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners*, dated April 2003. Appendix M is available for viewing or download on the FEMA Web site at [http://www.fema.gov/pdf/fhm/frm\\_gsam.pdf](http://www.fema.gov/pdf/fhm/frm_gsam.pdf). Table 2-1 indicates the sections of the TSDN that apply to each mapping activity.

If any issues arise that could affect the completion of an activity within the proposed scope or budget, the responsible Mapping Partner shall complete a Special Problem Report (SPR) as soon as possible after the issue is identified and submitted to FEMA. The SPR is to describe the issue and propose possible resolutions. (For additional information on SPRs, refer to Appendix M, Subsection M.2.1.1 of *Guidelines and Specifications for Flood Hazard Mapping Partners*.)

**Table 2-1. Mapping Activities and Applicable TSDN Sections**

TSDN Section	Mapping Activities													
	Scoping	Field Survey	Topo Data	QA/QC of Topo	Base Map	Hydrology	QA/QC of Hydrology	Hydraulic Analysis	QA/QC of Hydraulics	Flood-plain Mapping (and Re-delineation)	QA/QC of FP Mapping	DFIRM Database	Preliminary Map Products	Post-Preliminary
General Documentation														
Special Problem Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Telephone Conversation Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Meeting Minutes/ Reports	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General Correspondence	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Engineering Analyses														
Hydrologic Analyses		X			X	X	X	X	X	X	X			
Hydraulic Analyses		X			X	X	X	X	X	X	X			
Key to Cross-Section Labeling		X			X	X	X	X	X	X	X			
Key to Transect Labeling		X			X	X	X	X	X	X	X			
Draft FIS Report					X	X	X	X	X					
Mapping Information	X		X	X						X	X	X	X	X
Miscellaneous Reference Information	X	X	X	X	X	X	X	X	X	X	X	X	X	X

**SECTION 3—PERIOD OF PERFORMANCE**

The mapping activities outlined in this MAS will begin on September 1, 2006, and will be completed no later than September 30, 2009. The mapping activities may be terminated at the option of FEMA or the DNRC in accordance with the provisions of the Partnership Agreement dated March 18, 2005. If these Mapping Activities are terminated; the remaining funds from uncompleted activities, provided by FEMA for this Mapping Activity Statement, will be returned to FEMA.

**SECTION 4—FUNDING/LEVERAGE**

FEMA is providing funding, in the amount of **X**, to the DNRC for the completion of this Flood Map Project. The DNRC shall provide any additional resources required to complete the assigned activities for this Flood Map Project. During the scoping process, additional needs may be identified. Activities associated with any additional needs would be performed based on availability of additional funds. The

CTP Leverage listed below includes in-kind services and blue book values for acquired information (i.e. base map data, hydrologic and hydraulic analyses, etc.).

<b>Funding for Project</b>	<b>FEMA Contribution</b>	<b>CTP Contribution</b>	<b>% Leverage</b>	<b>Total Project Cost</b>
TOTAL FUNDING AMOUNTS	X	X	20%	X

### SECTION 5—STANDARDS

The standards relevant to this Mapping Activity Statement are provided in Tables 5-1 and 5-2. Information on the correct volume, appendix, section, or subsection of the FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners* to be referenced for each mapping activity are summarized in Table 5-2. These Guidelines are available for viewing or download from the FEMA Flood Hazard Mapping Web site at [http://www.fema.gov/fhm/dl\\_cgs.shtm](http://www.fema.gov/fhm/dl_cgs.shtm).

**Table 5-1. Applicable Standards for Project Activities**

Applicable Standards	Activities														
	Scoping	Field Survey	Topo Data	QA/QC Topo Data	Base Map	Hydrology	QA/QC Hydrology	Hydraulic Analysis	QA/QC of Hydraulic Analysis	Floodplain Mapping (inc. Redelineation)	QA/Qc Flood-plain Mapping	DFIRM Dbase	QA/QC DFIRM Dbase	Preliminary Map Products	Post-Preliminary Processing
<i>Guidelines and Specifications for Flood Hazard Mapping Partners</i> , April 2003	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
American Congress on Surveying and Mapping Procedures	X	X	X	X											
Global Positioning System (GPS) Surveys: National Geodetic Survey (NGS-510), "Guidelines for Establishing GPS-Derived Ellipsoid Heights," November 1997	X	X	X	X											
Engineer Manual 1110-1-1000, <i>Photogrammetric Mapping</i> (USACE), July 1, 2002	X	X	X	X											
Engineer Manual 1110-2-1003, <i>Hydrographic Surveys</i> (USACE), January 1, 2002	X	X													
"Numerical Models Accepted by FEMA for NFIP Usage," Updated April 2003	X				X	X	X	X	X						
<i>Content Standard for Digital Geospatial Metadata</i> (Federal Geographic Data Committee), 1998	X		X	X						X	X	X	X	X	X
<i>Document Control Procedures Manual</i> , December 2000	X													X	X
<i>44 Code of Federal Regulations Part 66 and 67</i>	X													X	

**Table 5-2. Project Activities and Applicable Portions of FEMA Guidelines and Specifications**

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Scoping	Appendix I, Scoping Report document attached in Appendix A to this Mapping Activity Statement; 44 Code of Federal Regulations Part 66 and 67
Field Survey	Volume 1, Section 1.4 (specifically Subsection 1.4.2.1) Appendix A, Sections A.4, A.5, A.6, A.7, and A.8 Appendix F, Section F.3 Appendices B, C, and M
Topographic Data Development	Volume 1, Section 1.4 (specifically Subsection 1.4.2.1) Appendix A, Sections A.2, A.3, A.7, and A.8 Appendix M
Independent QA/QC Review of Topographic Data	Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.1) Appendix A, Sections A.2, A.3, A.7 (specifically Subsection A.7.5), and A.8 (specifically Subsection A.8.6) Appendix M
Base Map Acquisition and Preparation	Volume 1, Section 1.3 (specifically Subsection 1.3.1.8) and 1.4 (specifically Subsections 1.4.3.1 and 1.4.3.2) Appendix A, Section A.1 (specifically Subsection A.1.1)
Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4) Appendix A, Section A.4 Appendix C, Sections C.1 and C.7 Appendices E, F, G, H, and M

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Independent QA/QC Review of Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1) Appendix A, Section A.4 Appendix C, Section C.2 Appendices E, F, G, H, and M
Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4) Appendix A, Section A.4 (specifically Subsection A.4.7) Appendix C, Sections C.3 and C.7
Independent QA/QC Review of Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1) Appendix A, Section A.4 (specifically Subsection A.4.7) Appendix C, Section C.5
Floodplain Mapping	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2, 1.4.2.3, and 1.4.3.2) Appendix C, Sections C. 4 and C.6 (specifically Subsection C.6.1.3) Appendix D, Sections D.2 (specifically Subsection D.2.7) and D.3 (specifically Subsection D.3.7) Appendices E, F, G, H, K, L, and M
Perform Redelineation	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2, 1.4.2.3, and 1.4.3.2) Appendix C, Section C.6 (specifically Subsection C.6.1.3) Appendices K, L, and M
Independent QA/QC Floodplain Mapping (including Redelineation/Digitization)	Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3) Appendix C, Sections C.4 and C.6 Appendix D, Sections D.2 (specifically Subsection D.2.7) and D.3 (specifically Subsection D.3.7) Appendices E, F, G, H, K, L, and M

Activity Description	Applicable Volume, Section/Subsection, and Appendix
Independent QA/QC Review of DFIRM Database and Graphic Specs	Volume 1, Section 1.4 (specifically Subsections 1.4.2.3, 1.4.3.3, 1.4.3.9, and 1.4.3.10) ----- Appendices K, L, and M
Production of Preliminary Map Products	Volume 1, Sections 1.4 (specifically Subsections 1.4.2 and 1.4.3) and 1.5 (specifically Subsection 1.5.1) ----- Appendices J, K, L, and M
Post-Preliminary Processing	Volume 1, Section 1.5 (specifically Subsection 1.5.2) ----- Appendices J, K, L, and M

## SECTION 6—SCHEDULE

The activities documented in this MAS shall be completed in accordance with the project schedule below. If changes to this schedule are required, the responsible Mapping Partner shall coordinate with FEMA and the other Mapping Partners in a timely manner.

**Table 6-1. Project Schedule**

Activities	RESPONSIBLE PARTNER(S)	DATE DUE
Scoping (including 1/3 Outreach)	DNRC, FEMA/NSP	6/30/06
Field Surveys	DNRC	10/30/06
Topographic Data Development	DNRC	11/30/06
Independent QA/QC Review of Topographic Data	FEMA/NSP	12/30/06
Base Map Acquisition	DNRC	10/30/06
Hydrologic Analyses	DNRC	1/30/07
Independent QA/QC Review of Hydrologic Analyses	FEMA/NSP	2/30/07
Hydraulic Analyses	DNRC	3/30/07
Independent QA/QC Review of Hydraulic Analyses	FEMA/NSP	4/30/07
Floodplain Mapping: <ul style="list-style-type: none"> <li>• Detailed Riverine</li> <li>• Refinement or Creation of Zone A</li> <li>• Merging Revised and Unrevised Areas</li> </ul> <Floodplain Mapping or Redelineation> <ul style="list-style-type: none"> <li>• Redelineation Using Effective Flood Profiles and Updated Topographic Data</li> <li>• Redelineation/Digitization of Non-Revised Areas</li> </ul>	DNRC	5/30/07
Independent QA/QC Review of Floodplain Mapping	FEMA/NSP	6/30/07
Redelineation <Floodplain Mapping or Redelineation> <ul style="list-style-type: none"> <li>• Redelineation Using Effective Flood Profiles and Updated Topographic Data</li> <li>• Redelineation/Digitization of Non-Revised Areas</li> </ul>	DNRC	n/a
Independent QA/QC Review of Redelineation	FEMA/NSP	n/a
DFIRM Database (including Graphic Specifications)	DNRC	7/30/07
Independent QA/QC Review of DFIRM Database	FEMA/NSP	8/30/07
Produce Preliminary Map Products (including 1/3 Outreach)	DNRC	9/30/07
Post-Preliminary Processing (including 1/3 Outreach)	DNRC, FEMA/NSP	9/30/08

## SECTION 7—CERTIFICATIONS

### Field Surveys and Topographic Data Development

A Registered Professional Engineer or Licensed Land Surveyor shall certify topographic data, in accordance with 44 CFR 65.5(c). Certification of topographic data by the American Society for Photogrammetry and Remote Sensing is also acceptable.

#### **Base Map Acquisition and Preparation**

- A community official or responsible party shall provide written certification that the digital data meet FEMA minimum standards and specifications.
- The responsible Mapping Partner shall provide documentation that the digital base map can be used by FEMA. Please note that uploading base map data to the MIP does not constitute agreement that the digital base map can be used by FEMA. Documentation that the digital base map can be used by FEMA will still be required.

Certifications must be made at the time the intermediate data is submitted. For example, if hydrologic data is submitted, certification will be required at the time it is submitted.

#### **Hydrologic Analyses, Hydraulic Analyses, and Floodplain Mapping**

- A Registered Professional Engineer shall certify hydrologic and hydraulic analyses and data in accordance with 44 CFR 65.6(f).
- A Registered Professional Engineer or Licensed Land Surveyor shall certify topographic information in accordance with 44 CFR 65.5(c).
- Any levee systems to be accredited will be certified in accordance with 44 CFR 65.10(e).

#### **Floodplain Mapping, Independent QA/QC Review of Floodplain Mapping and DFIRM Database**

The DFIRM metadata files shall include a description of the horizontal and vertical accuracy of the DFIRM base map and floodplain information.

### **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 Mapping Needs Assessment Process from FEMA and/or your Regional Project Officer.

General technical and programmatic information, such as FEMA 265 and the Quick-2 computer program, can be downloaded from the FEMA Web site (<http://www.fema.gov/fhm/>). Specific technical and programmatic support may be provided through the FEMA and/or their contractor; such assistance should be requested through the FEMA Project Officer specified in Section 12 of this MAS.

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.

### **SECTION 9—CONTRACTORS**

The DNRC intends to use the services of **PBS&J** as a contractor for this Flood Map Project. The DNRC shall ensure that the procurement for all contractors used for this Flood Map Project complies with the requirements of 44 CFR 13.36.

### **SECTION 10—REPORTING**

FINANCIAL REPORTING:

Because funding has been provided to the DNRC by FEMA, financial reporting requirements for the DNRC will be in accordance with Cooperative Agreement Articles V and VI.

STATUS REPORTING:

Status reports will be submitted on a quarterly basis in accordance with the financial reporting submittals. At a minimum these reports will include a summary of the work as outlined in the Cooperative Technical Partner (CTP)/Map Modernization Project Quarterly Report located in Appendix B of this Mapping Activity Statement. The Project Officer, as needed, may request additional information on status.

The DNRC may meet with FEMA and/or their contractor more frequently (up to bi-weekly if needed) to review the progress of the project in addition to the quarterly financial and status submittals. These meetings will alternate between FEMA's Regional Office, the DNRC office and conference calls as necessary.

### **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 shall include:

- Meetings, teleconferences, and video conferences with FEMA and other Project Team members as needed;
- Telephone conversations with FEMA and other Project Team members on a scheduled basis and an ad hoc basis, as needed;
- Updates to the MIP, and other FEMA status information systems as discussed in this document; and
- E-mail, facsimile transmissions, and letters, as required.

**SECTION 12—POINTS OF CONTACT**

The points of contact for this Flood Map Project are Marijo Camrud, the FEMA Regional Project Officer; Terry Voeller, the Project Manager for the DNRC; or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. When necessary, the any additional assistance of FEMA should be requested through the FEMA Regional Project Officer.

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

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Jack Stults  
Date  
Administrator, Water Resources Division  
Montana Department of Natural Resources and Conservation

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Millie Bowman  
Date  
Montana Map Mod Coordinator  
Project Manager  
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Robert Ives  
Date  
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Dave Jula  
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