COLORADO WATER CONSERVATION BOARD
COOPERATING TECHNICAL PARTNERS
MAPPING ACTIVITY STATEMENT

Mapping Activity Statement No. 6 – Digital Flood Insurance Rate Map Production and Development of Updated Flood Data

In accordance with the Cooperating Technical Partners (CTP) Partnership Agreement dated July 15th, 2002, between Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement (MAS) No. 6 is as follows.

SECTION 1—OBJECTIVE AND SCOPE

The objective of the Flood Map Project documented in this MAS is to develop hydrologic and hydraulic information for South Boulder Creek in unincorporated Boulder County, Colorado and in the City of Boulder for inclusion in a Digital Flood Insurance Rate Map (DFIRM) and Flood Insurance Study (FIS) report for Boulder County, Colorado and Incorporated Areas. The product of this MAS will be digital floodplain data for the South Boulder Creek floodplain to be included within a single set of digital floodplain data for the entire county.

The DFIRM and FIS report will be produced in the FEMA Countywide Format.

The Mapping Partners involved in this project will conduct a technical review of existing flood hazard data and the completion of new and updated flood hazard data, as summarized in the table below.

Flooding Source	Reach Limits	Technical Review of Hydrologic Analyses and Completion of New Hydrologic Analyses	Hydraulic Analyses	Floodplain Mapping	Redelineation Using Effective Flood Profiles and Updated Topographic Data	Refinement or Creation of Zone A
South Boulder Creek	From Eldorado Springs to the confluence with Boulder Creek, including all overflows in the vicinity of the crossing of US Highway 36 and all overflows downstream of that crossing	X	X	X		

This Flood Map Project will be completed by the following

- CWCB;
- PBS&J team, QA/QC contractor to CWCB;
- City of Boulder;
- Boulder County; and
- FEMA Flood Map Production Coordination Contractor (MCC), or other contractor designated.

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 Table 1-1. 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 1-1. Summary of Project Activities and Assignments

Activities	CTP	FEMA
Activity 1 –Technical Review of Existing Hydrologic Analyses	X	
Activity 2 – Completion of New Hydrologic Analyses	X	
Activity 2A – Independent QA/QC Review of New Hydrologic Analyses		X
Activity 2B – Completion of New Hydraulic Analyses	X	
Activity 2C – Independent QA/QC Review of New Hydraulic Analyses		X
Activity 3 – Floodplain Mapping (Detailed Riverine)	X	
Activity 4 – Independent QA/QC Review of Floodplain Mapping (Revised Areas)		X
Activity 5 – DFIRM Production (Merge Revised and Non-Revised Information)	X	
Activity 5A – Application of DFIRM Graphic and Database Specifications	X	
Activity 5B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphic and Database Specifications		X
Activity 6 – Preliminary DFIRM and FIS Report Distribution	X	X
Activity 7 – Post-Preliminary Processing	X	X

Activity 1 - Technical Review of Existing Hydrologic Analyses

Responsible Mapping Partner: CWCB and PBS&J team

Scope: CWCB, through PBS&J team, shall review the technical, scientific, and other information contained in existing hydrologic analyses for South Boulder Creek to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM. 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.)

Standards: All work under Activity 1 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, CWCB, through PBS&J, shall make the following products available to FEMA:

- 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 may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 2 – Hydrologic Analyses

Responsible Mapping Partner: CWCB and the City of Boulder

Scope: CWCB, through the City of Boulder, shall perform hydrologic analyses for approximately 132 square miles of drainage area for the flooding source(s) listed earlier in this MAS. CWCB, through the City of Boulder, shall calculate peak flood discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events using the MIKE 11computer program. These flood discharges will be the basis for

subsequent hydraulic analyses under Activity 2B. In addition, CWCB, through the City of Boulder, shall address all concerns or questions regarding Activity 2 that are raised during the independent QA/QC review performed by FEMA under Activity 2A.

If Geographic Information System (GIS)-based modeling is used, CWCB, through the City of Boulder, 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 CWCB, through the City of Boulder, shall provide full user documentation, technical algorithm documentation, and the software to FEMA for review before performing the hydrologic analyses.

Standards: All work under Activity 2 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of hydrologic modeling for South Boulder Creek, CWCB, through the City of Boulder, shall submit the results to FEMA for an independent QA/QC review under Activity 2A. CWCB, through the City of Boulder, shall submit the results of the hydrologic analyses for the remaining flooding sources for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, CWCB, through the City of Boulder, shall make the following products available to FEMA:

- Digital copies of all hydrologic modeling (input and output) files for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events;
- Digital and hardcopy versions of the Summary of Discharges Table presenting discharge data for the flooding sources for which hydrologic analyses were performed;
- Digital and hardcopy versions of draft text for Section 3.1, Hydrologic Analyses, of the FIS report; and
- Digital and hardcopy versions of all backup data used in the analysis, including work maps.

For GIS-based modeling, deliverables shall include all input and output data, intermediate data processing products, and GIS data layers.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 2A - Independent QA/QC Review of Hydrologic Analyses

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the technical, scientific, and other information submitted by CWCB under Activity 2 to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM. 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.
- 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.)

Standards: All work under Activity 2A shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available:

- 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 may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 2B – Hydraulic Analyses

Responsible Mapping Partner: CWCB and the City of Boulder

Scope: CWCB, through the City of Boulder, shall perform hydraulic analyses for approximately 6 miles of the flooding sources listed earlier in this MAS. The modeling will include the 10-, 2-, 1-, and 0.2-percent-annual-chance events based on peak discharges computed under Activity 2. The hydraulic methods used for this analysis will include MIKE 11, MIKE 21, and MIKEFLOOD.

The hydraulic analyses will be used to establish flood elevations and regulatory floodways for the subject flooding sources.

CWCB, through the City of Boulder, shall address all concerns or questions regarding Activity 2B that are raised by FEMA during the independent QA/QC review under Activity 2C.

CWCB, through the City of Boulder, 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 CWCB, through the City of Boulder, shall provide full user documentation, technical algorithm documentation, and software to FEMA for review before performing the hydraulic analyses

Standards: All work under Activity 2B shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of hydraulic modeling for South Boulder Creek, CWCB, shall submit the results to FEMA for an independent QA/QC review under Activity 2C. CWCB, through the City of Boulder, shall submit the results of the hydraulic analyses for the remaining flooding sources for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, CWCB, through the City of Boulder, shall make the following products available to FEMA:

- Digital profiles of the 10-, 2-, 1- and 0.2-percent-annual-chance water-surface elevations representing existing conditions using the FEMA RASPLOT program or similar software;
- Digital and hardcopy versions of the Floodway Data Table for each flooding source that is compatible with the DFIRM database;
- Digital and hardcopy versions of all hydraulic modeling (input and output) files;
- Digital and hardcopy versions of table with range of Manning's "n" values;
- Digital and hardcopy versions of all backup data used in the analyses;
- Digital and hardcopy 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.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 2C - Independent QA/QC Review of Hydraulic Analyses

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the technical, scientific, and other information submitted by CWCB, through the City of Boulder, under Activity 2B to ensure that the data and modeling are consistent with FEMA standards and standard engineering practice and are sufficient to prepare the DFIRM. 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.

- 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.)

Standards: All work under Activity 2C shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available:

- 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 may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 3 - Floodplain Mapping (Detailed Riverine)

Responsible Mapping Partner: CWCB, City of Boulder and PBS&J team

Scope: CWCB, through the City of Boulder, 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 analyses were performed. CWCB shall incorporate all new or revised hydrologic and/or hydraulic modeling and shall use the best available topographic data to delineate the floodplain and regulatory floodway boundaries on a digital work map. In addition, CWCB shall incorporate the results of all effective Letters of Map Change (LOMCs) within the revised areas as appropriate. Also, CWCB, through the City of Boulder and others, shall address all concerns or questions regarding Activity 2B that are raised during the independent QA/QC review under Activity 2C.

Standards: All work under Activity 3 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: Upon completion of floodplain mapping for the flooding sources described in Table 1, CWCB shall submit the results to FEMA for an independent QA/QC review under Activity 4. The

mapping for the remaining flooding sources is to be submitted for a final QA/QC review at the completion of this activity.

In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, CWCB shall make the following products available to FEMA:

- 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*;
- 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;
- Any backup or supplemental information used in the mapping required for the independent QA/QC review outlined under Activity 3; and
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- A Summary Report that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM.

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 may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 4 - Independent QA/QC Review of Floodplain Mapping (Revised Areas)

Responsible Mapping Partner: FEMA

Scope: FEMA shall review the floodplain mapping submitted by CWCB under Activities 3 to ensure that the results of the analyses performed are accurately represented. 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.
- 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*.

Standards: All work under Activity 4 shall be performed in accordance with the standards specified in Section 5 of thisMAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available:

- 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; and
- An annotated work map with all questions and/or concerns indicated, if necessary.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 5 –DFIRM Production (Merging Revised and Non-Revised Information)

Responsible Mapping Partner: CWCB and PBS&J team

Scope: Upon completion of the floodplain mapping activities (Activity 3) for the revised flooding sources, specifically including South Boulder Creek, and the DFIRM production for non-revised areas under a separate MAS between CWCB and FEMA, CWCB shall merge the digital floodplain data for South Boulder Creek with the digital floodplain data for other portions of Boulder County and incorporated municipalities into a single, updated DFIRM. This work will include revision of floodplain data for South Boulder Creek on approximately 10 digital map panels for Boulder County and incorporated municipalities. 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. CWCB 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. CWCB shall coordinate with those Mapping Partners responsible for the work being performed for other portions of Boulder County and incorporated municipalities under the separate MAS between CWCB and FEMA, as necessary, to resolve any potential tie-in issues.

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

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, CWCB shall make the following products available to FEMA:

- 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*;
- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale; 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 may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 5A – DFIRM Production (Application of DFIRM Graphics and Database Specifications)

Responsible Mapping Partner: CWCB and PBS&J team

Scope: CWCB shall apply the final FEMA DFIRM graphic and database specifications to the DFIRM files produced under Activity 6. 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) on approximately 10 digital map panels for Boulder County and incorporated municipalities. CWCB shall coordinate with those Mapping Partners responsible for Activities, 5 and with those Mapping Partners responsible for the work being performed for other portions of Boulder County and incorporated municipalities under the separate MAS between CWCB and FEMA, as necessary, to resolve any problems that are identified during Activity 5A.

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

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, CWCB shall make the following products available to FEMA:

- 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*;
- Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale; 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 may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 5B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications

Responsible Mapping Partner: FEMA.

Scope: Upon completion of the floodplain mapping activity (Activity 3) and DFIRM production activities (Activities 5, and 5A), FEMA shall review the DFIRM to ensure it meets current FEMA graphic specifications. In addition, FEMA shall review the DFIRM spatial database to determine if it meets current FEMA database specifications. FEMA 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*.
- The FIS report is prepared in the FEMA Countywide Format as documented in Appendix J of *Guidelines and Specifications for Flood Hazard Mapping Partners.*

Standards: All work under Activity 6B shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in described in Appendix M of *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA shall make the following products available:

- 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.

Appendix M may be downloaded from the FEMA Flood Hazard Mapping Web site at www.fema.gov/pdf/fhm/frm_gsam.pdf.

Activity 6 - Preliminary DFIRM and FIS Report Distribution

Responsible Mapping Partners: CWCB and FEMA

Scope: Activity 6 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. The activities to be performed are summarized below.

Preliminary Transmittal Letter Preparation. CWCB and FEMA shall prepare letters to 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.

Final QA/QC Review of Preliminary DFIRM and FIS Report: CWCB and FEMA 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*.

Discrepancy Resolution: CWCB and FEMA shall cooperate as appropriate to resolve discrepancies identified during the final QA/QC review.

Distribution of Preliminary DFIRM and FIS Report: CWCB and FEMA 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.

News Release Preparation: CWCB and FEMA 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. CWCB and FEMA shall file the notifications for later submittal for review.

Preliminary Summary of Map Actions (SOMA) Preparation: CWCB and FEMA 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).

Standards: All work under Activity 6 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in 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.* CWCB and FEMA shall make the products listed below available.

- Preliminary transmittal letters shall be prepared. These letters and any additional letters required by FEMA shall be prepared in accordance with the current version of the FEMA *Document Control Procedures Manual.*

- 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.

- Revised DFIRM mapping files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided on CD-ROM.

- Revised DFIRM database files, prepared in accordance with the requirements in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided on CD-ROM.

- Revised metadata files describing the DFIRM data, including all required information shown in *Guidelines and Specifications for Flood Hazard Mapping Partners*, shall be provided on CD-ROM.

- 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 shall be provided.

Activity 7 - Post-Preliminary Processing

Responsible Mapping Partners: CWCB and FEMA

Scope: Activity 7 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. The activities to be performed are summarized below.

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 MCC and CWCB 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.

- The appropriate notices (Proposed Rules) are published in the *Federal Register*.

Resolution of Appeals and Protests: FEMA and CWCB shall cooperate in reviewing and resolving 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 and revised DFIRM and FIS report materials for FEMA review.

FEMA shall mail all associated correspondence upon authorization by FEMA.

Preparation of Special Correspondence: FEMA and CWCB shall cooperate in responding to comments not received within the 90-day appeal period (referred to as "special correspondence"), including drafting responses for FEMA review when appropriate and finalizing responses when requested by FEMA. FEMA also shall mail the final correspondence (and enclosures if appropriate) and distribute appropriate copies of the correspondence and enclosures.

Revision of DFIRM and FIS Report: If necessary, FEMA and CWCB shall work together to revise the DFIRM and FIS report at the direction of the FEMA Regional Project Officer and 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: CWCB and FEMA shall prepare Final SOMAs for the affected communities as appropriate.

Processing of Letter of Final Determination: FEMA and CWCB shall cooperate 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 accordance with the FEMA *Document Control Procedures Manual*. FEMA also shall mail the final signed LFDs and enclosures and distribute appropriate copies of the signed LFDs and enclosures.

Processing of Final DFIRM and FIS Report for Printing: CWCB and FEMA 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. FEMA also shall 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. CWCB and FEMA, when appropriate, shall prepare and distribute letters 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: CWCB and FEMA 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.

Standards: All work under Activity 8 shall be performed in accordance with the standards specified in Section 5 of this MAS.

Deliverables: In accordance with the TSDN format described in 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 and CWCB shall make the following products available:

- 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; and
- Complete, organized archived technical and administrative support data

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 February 2002. Appendix M is available for viewing or download on the FEMA Web site at 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*.)

Additionally, FEMA shall collect and maintain a set of products for all Activities and shall compile a comprehensive TSDN for the entire project. Table 2-1 below lists all of the applicable sections in the TSDN for each Mapping Activity. The table does not include columns for Activities 3A or 5B because there is no relevant information for those two activities within the TSDN.

Table 2-1. Mapping Activities and Applicable TSDN Sections

TSDN Section	Mapping Activities						
	1	2, 2A, 2B, 2C	3	4	5, 5A, 5B	6,	7
General Documentation							
Special Problem Reports	X	X	X	X	X	X	X
Telephone Conversation Reports	X	X	X	X	X	X	X
Meeting Minutes/Reports	X	X	X	X	X	X	X
General Correspondence	X	X	X	X	X	X	X
Engineering Analyses							
Hydrologic Analyses	X	X	X				
Hydraulic Analyses	X	X	X				
Key to Cross-Section Labeling	X	X	X				
Key to Transect Labeling	X	X	X				
Draft FIS Report	X						
Mapping Information		X	X	X	X	X	X
Miscellaneous Reference Information	X	X	X	X	X	X	X

SECTION 3—PERIOD OF PERFORMANCE

The mapping activities outlined in this MAS will begin on October 15, 2003, and will be completed no later than June 15, 2005. The mapping activities may be terminated at the option of FEMA or CWCB in accordance with the provisions of the Partnership Agreement dated July 15th, 2002.

SECTION 4—FUNDING/COST-SHARING

FEMA is providing funding, in the amount of $, to CWCB for the completion of this Flood Map Project. CWCB shall provide any additional resources required to complete the assigned activities for this Flood Map Project.

SECTION 5—STANDARDS

The standards relevant to this Mapping Activity Statement are provided in Tables 5-1 and 5-2. Table 5-1 does not include columns for Activities 3A or 5B because there are no relevant standards for those two activities. 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 is summarized in Table 5-2. Table 5-2 does not include rows for Activities 3A or 5B because there is no relevant information for those two activities within FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners*.

These Guidelines are available for viewing or download from the FEMA Flood Hazard Mapping Web site at http://www.fema.gov./fhm/dl_cgs.htm.

Table 5-1. Applicable Standards for Project Activities

Applicable Standards	Activities						
	1	2, 2B	3	4	5, 5A	6	7
Guidelines and Specifications for Flood Hazard Mapping Partners, February 2002	X	X	X		X	X	X
American Congress on Surveying and Mapping (ACSM) procedures							
Global Positioning System (GPS) Surveys: National Geodetic Survey (NGS-58), "Guidelines for Establishing GPS-Derived Ellipsoid Heights," November 1997							
EM 1000-1-1000, *Photogrammetric Mapping*, March 31, 1993							
EM 1110-2-1003, *Hydrographic Surveys*, October 31, 1994							
Numerical Models Accepted by FEMA for NFIP Usage, January 11, 2002	X						
Content Standards for Digital Geospatial Metadata (Federal Geographic Data Committee, 1998)		X	X		X	X	X
Document Control Procedures Manual, December 2000						X	X

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

Activity Number	Activity Description	Applicable Volume, Section/Subsection, and Appendix
1	Independent QA/QC Review of Existing Data Studies	Volume 1, Section 1.4
		Appendix A, Section A.4
		Appendix C, Section C.5
		Appendices B, E, F, G, H, and M
2	Completion of New Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4)
		Appendix C, Sections C.1 and C.7
		Appendices E, F, G, H, and M
2A	Independent QA/QC of New Hydrologic Analyses	Volume 1, Section 1.4 (specifically Subsection 1.4.1)
		Appendix C, Section C.2
		Appendices E, F, G, H, and M
2B	Completion of New Hydraulic Analyses	Volume 1, Section 1.4 (specifically Subsections 1.4.2.2 and 1.4.2.4)
		Appendix C, Sections C.3 and C.7
		Appendices B, E, F, G, H, and M
2C	Independent QA/QC of New 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
		Appendices B, E, F, G, H, and M
3	Floodplain Mapping (Detailed Riverine)	Volume 1, Section 1.4 (specifically Subsection 1.4.2.3)
		Appendix C, Sections C. 4 and C.6
		Appendices K, L, and M

Table 5-2. Project Activities and Applicable Portions of FEMA Guidelines and Specifications (Cont'd)

Activity Number	Activity Description	Applicable Volume, Section/Subsection, and Appendix
4	Independent QA/QC Review of Floodplain Mapping (Revised Areas)	Volume 1, Section 1.4 (specifically Subsection 1.4.2.3) Appendix C, Sections C.4 and C.6 Appendices K, L, and M
5	DFIRM Production (Merging Revised and Non-Revised Areas)	Volume 1, Section 1.4 (specifically Subsection 1.4.3) Appendices K, L, and M
5A	DFIRM Production (Application of DFIRM Graphic and Database Specifications)	Volume 1, Section 1.4 (specifically Subsection 1.4.3) Appendices K, L, and M
5B	Independent QA/QC Review of DFIRM Product Meeting FEMA Graphic and Database Specifications	Volume 1, Section 1.4 (specifically Subsections 1.4.2.3 and 1.4.3.3) Appendices K, L, and M
6	Preliminary DFIRM and FIS Report Distribution	Volume 1, Section 1.4 (specifically Subsections 1.4.2 and 1.4.3) Appendix C, Sections C.4 and C.6 Appendices J, K, L, and M
7	Post-Preliminary Processing	Volume 1, Section 1.4 (specifically Subsection 1.4.2 and 1.4.3) Appendices J, K, L, and M

SECTION 6—SCHEDULE

The activities documented in this MAS shall be completed in accordance with the project schedule shown in Table 6-1. 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
Activity 1 –Technical Review of Existing Hydrologic Analyses	CWCB and PBS&J	11/15/03
Activity 2 – Completion of New Hydrologic Analyses	CWCB and City of Boulder	4/30/04
Activity 2A – Independent QA/QC Review of New Hydrologic Analyses	FEMA	5/15/04
Activity 2B – Completion of New Hydraulic Analyses	CWCB and PBS&J	12/15/04
Activity 2C – Independent QA/QC Review of New Hydraulic Analyses	FEMA	12/31/04
Activity 3 – Floodplain Mapping (Detailed Riverine)	CWCB, PBS&J, and City of Boulder	1/31/05
Activity 4 – Independent QA/QC Review of Floodplain Mapping (Revised Areas)	FEMA	2/28/05
Activity 5 – DFIRM Production (Merge Revised and Non-Revised Information)	CWCB, PBS&J	3/31/05
Activity 5A – Application of DFIRM Graphic and Database Specifications	CWCB, PBS&J	4/15/05
Activity 5B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications	FEMA	5/15/05
Activity 6 – Preliminary DFIRM and FIS Report Distribution	CWCB, FEMA	6/15/05
Activity 7 – Post-Preliminary Processing	CWCB, FEMA	N.A.

SECTION 7—CERTIFICATIONS

The following certifications apply to this MAS:

Task 3 (Floodplain Mapping– Detailed Riverine),

- A Registered Professional Engineer or Licensed Land Surveyor will certify hydrologic and hydraulic analyses and data in accordance with 44 CFR 65.6(f).

- A Registered Professional Engineer or Licensed Land Surveyor will 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).

Task 3 (Floodplain Mapping– Detailed Riverine), Task 4 (Independent QA/QC Review of Floodplain Mapping {Revised Areas}), Task 5 (DFIRM Production {Merging Revised and Non-Revised Information}), and Task 5A (Application of DFIRM Graphic and Database Specifications)

The DFIRM metadata files will 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 the MCC, who may be contacted by telephone at 703-317-6531 or by facsimile at 703-329-3023.

General technical and programmatic information, such as FEMA 265 and the Quick-2 computer program, can be downloaded from the FEMA Web site (www.fema.gov/fhm). Specific technical and programmatic support may be provided through the MCC; such assistance should be requested through the FEMA Project Officer specified in Section 11 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

CWCB intends to use the services of PBS&J team and the City of Boulder as contractors for this Flood Map Project. CWCB shall ensure that the procurement for all contractors used for this Flood Map Project complies with the requirements of 44 CFR 13.36Part 13 may be downloaded in PDF or text format from the U.S. Government Printing Office Web site at http://www.access.gpo.gov/nara/cfr/waisidx_02/44cfr13_02.html.

SECTION 10—FINANCIAL REPORTING

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

SECTION 11—POINTS OF CONTACT

The points of contact for this Flood Map Project are Dan Carlson, the FEMA Regional Project Officer; Brian Hyde, the Project Manager for CWCB; or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. When necessary, the assistance of the MCC should be requested through the FEMA Project Officer, Max Yuan.

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

Brian Hyde
Project Manager
Colorado Water Conservation Board

Date

Bill DeGroot
Project Manager
Urban Drainage & Flood Control District

Date

Frank W. Bruno

8/27/2003

Frank Bruno
City Manager
City of Boulder

Date

Steve Olsen
Division Director
Federal Emergency Management Agency, Region 8

8/28/03

Date

For

8-28-03

Max Yuan
Project Officer
Federal Insurance and Mitigation Administration

Date

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

Brian R. Hyde

8/28/03

Brian Hyde
Project Manager
Colorado Water Conservation Board

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