



FEMA

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**SOUTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES
COOPERATING TECHNICAL PARTNERS
MAPPING ACTIVITY STATEMENT**

Mapping Activity Statement No. FY09.14

In accordance with the Cooperating Technical Partners (CTP) Partnership Agreement dated September 20, 1999 between South Carolina Department of Natural Resources (SCDNR) and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement (MAS) No. FY09.14 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 Berkeley, Florence and Lexington Counties, South Carolina. All processes and deliverables shall be completed in accordance to the Federal Emergency Management Agency's (FEMA's) *Guidelines and Specifications for Flood Hazard Mapping Partners* (G&S) and effective Procedure Memoranda (PMs). These documents can be found on FEMA's website at http://www.fema.gov/plan/prevent/fhm/gs_main.shtm and http://www.fema.gov/plan/prevent/fhm/gs_memos.shtm.

The DFIRM and FIS report will be produced in the FEMA Countywide format in the North American Vertical Datum of 1988 (NAVD88). (Refer to PM 41 for exceptions.) All DFIRM panels for Berkeley (79) and Florence (83) Counties will be updated. For Lexington County 90 of the 118 DFIRM panels will be updated.

In addition, the Mapping Partners involved in this project will develop new and/or updated flood hazard data, as summarized in Table 1.1, Flooding Source(s) to be Studied.

- URS Corporation (Mapping and QA/QC Subcontractor);
- Watershed Concepts, AECOM Water (Mapping and QA/QC Subcontractor); and
- Other subcontractors as necessary.

The Mapping Partner shall notify FEMA and all applicable parties of all meetings with community officials at least two weeks prior to the meeting (with as much notice as possible). FEMA and/or its Contractor may or may not attend the community meetings.

The Mapping Partner shall maintain an archive of all data submitted. (All supporting data must be retained for three years from the date a funding recipient submits its final expenditure report to FEMA.)

The activities for this Flood Map Project, including any required Quality Control Requirements as outlined in PM 42, and the Mapping Partners that will complete them are summarized in Table 1.2, Flood Mapping Project Activities. The sections of this MAS that follow the table below describe the specific mapping activities, responsible Mapping Partner(s), FEMA standards that must be met, and resultant map deliverables.

The SCDNR or its mapping contractor assigned the floodplain mapping task will include the Provisionally Accredited Levee (PAL) classification if known. Levee classification will be documented in Table 1.3, Levee PAL Classification. If the PAL Classification for a levee changes during the course of the project FEMA will contact the SCDNR or its mapping contractor to discuss the need to revise the statement of work.

Table 1.3 – Levee PAL Classification

County	Levee Name	Provisionally Accredited Levee Classification	Additional Mapping Required
Berkeley	TBD	TBD	TBD
Florence	TBD	TBD	TBD
Lexington	TBD	TBD	TBD

The SCDNR or its mapping contractor is responsible for the implementation of an independent Quality Assurance/Quality Control (QA/QC) plan for all assigned activities. The SCDNR or its mapping contractor will submit a Summary Report that describes and provides the results of all automated or manual QA/QC review steps. The report should include the process for all assigned activities.

Independent QC review activities may be performed by the CTP's or FEMA's contractor at the discretion of FEMA. If the CTP will be utilizing its contractors to do the QC review, this should be identified during scoping. The CTP will need to submit its QC plan to the Regional Project Officer for approval. Please note FEMA will also be performing periodic audits and overall study/project management to ensure study quality. The CTP will be responsible for addressing any and all comments resulting from independent QC, including re-submittal of deliverables as needed to pass technical review.

Metadata is required for all activities. Mapping Partners are required to comply with Appendix N (Data Capture Standards, or DCS) and Appendix M (TSDN) of Guidelines and Specifications for Flood Hazard Mapping Partners to completely document the work performed. On July 9, 2008, FEMA provisionally released a revised version of the DCS. FEMA recommends that the new DCS be implemented, in lieu of the current DCS (Appendix N), on any project where it is expected to save time and/or money. The ultimate goal of the new DCS is to consolidate the DCS deliverables and the TSDN to reduce the overlapping requirements for Mapping Partners. Because the newly released revised DCS is not yet complete and the necessary MIP changes have not yet been implemented, in order to ensure that FEMA retains complete documentation of studies, FEMA requires that all FEMA-contracted studies must comply with either the existing or the revised DCS and a complete TSDN be submitted as a final deliverable by the effective date of the project (in addition to uploads to the MIP). Mapping Partners are required to certify their TSDNs by signing the certification of project page to ensure that TSDNs submitted represent the final version of all required documentation or that all MIP uploads represent a complete set of required documentation. The submittal of the TSDN requirement will continue until the revised DCS is finalized.

Pre-Scoping Meeting Activities

- Initiate the Pre-Scoping activities by identifying the PMT, determining the community contacts, and collecting pertinent information about the community. Conduct background research to collect current mapping needs and begin available geospatial data search.
- Obtain spatial data to be used during the meeting preparation effort.
- Acquire the current effective data for the community, such as the flood hazard data shown in effective FIS reports and on effective FIRMs and Flood Boundary and Floodway Maps (FBFMs), and pertinent flood structure data.
- If pre-scoping steps are performed by a separate Contractor, submit a report summarizing the data collection efforts and deliverables.

Preliminary Research Activities can be separated into three categories—researching selected needs, effective information and researching available data for the Flood Map Project. The selected needs data identified during the Mapping Needs Assessment process can be obtained through the FEMA Region or FEMA's Contractor and plotted on the scoping map for discussion during the scoping meeting. The following tasks shall be completed to research effective information: inventory the FEMA's archives and/or information management systems for effective FIRM panels, FBFM panels, FIS reports, and other flood hazard data or existing study data; summarize the information in the effective streams file and effective coastal study; summarize contiguous community agreement checks; review Community Assistance Visit (CAV) and Community Assistance Contact files; and develop a "scoping map" and an overview of the results of the research. Other data collected during preliminary research activities will include obtaining community information and the best readily available base map materials (political areas, transportation, hydrology, shorelines ortho-imagery, and topography data). Stream centerlines should be populated with the limits of the effective FEMA studies and selected needs attributes.

Scoping Meeting

- Coordinate, setup, and hold the Scoping Meeting to inform the community of the upcoming flood study and of their responsibilities related to it; this includes identifying a time, place, and participants. The purpose of this meeting is to present the information gathered during the preliminary research activities to the local officials (State, county, and municipal) and coordinate on prioritization and identification of study areas. SCDNR or its mapping contractor shall be responsible for compiling the necessary information for the meeting.
- Review list of selected needs and capture additional community needs and/or wants in order to determine the level of effort and the extent of any new/updated studies. Review the selected needs list, effective and other data research findings, and make selections of proposed methods for obtaining/producing flood data.
- Compile the information prepared for and recorded during the Scoping Meeting

During the Scoping Meeting, the PMT shall review the needs list. Any additions or changes to the selected needs list shall be discussed with all members.

The SCDNR or its mapping contractor will be acting as the Consultation Coordination Officer (CCO) for this flood study as identified in 44 CFR Part 66. During the Scoping Meeting, the SCDNR or its mapping contractor must inform the communities of their responsibilities as described under the above-referenced regulation. Following initial contact with the communities,

- 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 - Schedule.
- Updated list of CEO or local FPA contacts or a report from CIS showing this information has been updated.
- Report documenting levee information transmitted to the FEMA Regional office and/or the PMT. In the event that there are not any levees within the study area, this fact can be documented in the Scoping Report.
- Report from MNUSS and/or other FEMA needs management system, showing needs identified during the scoping process that will not be addressed in the final scope of project are entered. Unmet needs should be documented in a geospatial format so they can be input to FEMA's needs management system. If there are not any unmet needs for the study area, this fact should be documented in the scoping report.
- Report showing that, if obtained from non-Federal sources, information on available terrain and ortho-imagery data has been entered into the NDEP and NDOP project tracking Web sites, respectively.
- Other deliverables including reports, correspondence, agenda, meeting summaries, tabular data, and geospatial files to be submitted throughout the scoping process as specified in FEMA's G&S, Appendix I and Appendix M.

Outreach

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 PMT in responding to congressional inquiries.

The SCDNR will work with the Regional Office during the initiation of this activity to determine an Outreach Plan for implementation throughout the mapping project. The Regional Office will have access to many outreach tools that have been developed for this process that can be utilized or customized. Volume 1 of the G&S provides specific outreach goals that can be considered.

All communication with local governments will be done in accordance with 44 CFR Part 66.

Deliverables:

- Upon determination of an Outreach and Coordination Approach, the SCDNR shall deliver the following to the FEMA Regional Project Officer in accordance with the schedule outlined in Section 6 - Schedule:

Topographic Data Development

Responsible Mapping Partner: SCDNR

Scope: SCDNR shall obtain additional topographic data of the overbank areas of the flooding sources for Lexington County. These data will be used for hydrologic analysis, hydraulic analysis, floodplain boundary delineation and/or testing of floodplain boundary standard compliance. SCDNR or its mapping contractor shall gather information on what topographic data is available for Berkeley and Florence Counties and what accuracy and currency it meets. These data will be used for hydrologic analysis, hydraulic analysis, floodplain boundary delineation and/or testing of floodplain boundary standard compliance. SCDNR or its mapping contractor shall use this topographic data that is better than that of the original study. In coordination with the partner who performed scoping, ensure that the FEMA Geospatial Data Coordination Policy and Implementation Guide is followed and the data obtained or to be produced are documented properly.

SCDNR shall generate new topographic data for Lexington County. SCDNR also shall coordinate with team members conducting field surveys. Accuracy for the topographic data shall be selected based on the current FEMA requirements as documented in the G&S. Normally this is 37cm RMSE except for extremely flat areas. No FEMA funds shall be expended on new topographic data unless prior approval is given by the Regional Project Officer after analyzing the need for updated topographic data at the end of the scoping period.

For this activity, SCDNR or its mapping contractor also shall generate the data collected under this Topographic Data Development task and via field surveys to create a best available digital elevation model for the subject flooding sources. In addition, SCDNR or its mapping contractor shall address all concerns or questions regarding the topographic data development and processing that are raised by SCDNR or its mapping contractor during the independent QA/QC review. SCDNR or its mapping contractor should confirm with the FEMA Project Officer the automated appropriate data model(s) (i.e. contours, Digital Elevation Models (DEMs), TIN, mass points and breaklines) for the intended use of the data.

SCDNR or its mapping subcontractor shall use topographic data for the areas described in the Table 1.4 Summary of Topographic Data table. The source of the topographic data should be indicated as well. SCDNR or its mapping subcontractor 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 the G&S.

For this activity, SCDNR or its mapping subcontractor also shall develop topographic maps and/or DEMs for the subject flooding sources using the data collected under this Topographic Data Development process and via field surveys. In addition, SCDNR or its topographic data development subcontractor shall address all concerns or questions regarding the topographic data development that are raised by SCDNR or its topographic data development QA/QC subcontractor during the independent QC review, or during the PM 42 defined Validation Process.

Scope: SCDNR or its mapping subcontractor shall perform an impartial review of the mapping data gathered for Berkeley and Florence Counties and mapping data generated for Lexington County by SCDNR or its topographic data development subcontractor 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. The CTP and contractor for the CTP, if applicable must ensure that independent QA/QC is performed and that organizational conflict of interest issues do not exist with respect to independent QA/QC processes. FEMA may audit or assist in these activities if deemed to be necessary by the Regional Project Officer.

Please note FEMA will also be performing periodic audits and overall study/project management to ensure study quality. The CTP will be responsible for addressing any and all comments resulting from independent QC, including re-submittal of deliverables as needed to pass technical review.

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

Deliverables: In accordance with the G&S, SCDNR or its mapping subcontractor shall make the following products available to FEMA by uploading the digital data to the MIP. Additionally, the TSDN format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule.

- 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.

Base Map Acquisition and Preparation

Responsible Mapping Partner: SCDNR

Scope: Base Map Acquisition consists of obtaining the digital base map Berkeley, Florence and Lexington Counties for the project and as necessary, preparing the base map for use. SCDNR or its mapping subcontractor shall provide the digital base map. The required activities are as follows:

- Obtain digital files (raster or vector) of the base map. In coordination with the partner who performed scoping, ensure that the FEMA Geospatial Data Coordination Policy and Implementation Guide is followed.
- 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.
- Review and supplement the content of the acquired base map to comply with the requirements of the G&S.
- For the base map components that have a mandatory data structure, convert the base map data to the format required in the G&S.
- Certify that the digital data meets the minimum standards and specifications that FEMA requires for DFIRM production.

watershed development, or other unique basin characteristics, the Mapping Partner performing the hydrologic analysis may obtain RPO approval to develop a rainfall-runoff model using a computer program such as HEC-HMS, HEC-1 or other FEMA approved model. For limited detailed studies, the peak flood discharges for the 1-percent-annual-chance storm events shall be calculated using appropriate USGS Regional Regression Equations. These flood discharges will be the basis for subsequent Hydraulic Analyses performed under this MAS. In addition, SCDNR or its mapping subcontractor shall address all concerns or questions regarding the hydrologic analyses that are raised during the independent QA/QC review performed by SCDNR or its QA/QC subcontractor during the QA/QC review.

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

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

Deliverables: In accordance with the G&S, SCDNR or its mapping subcontractor shall make the following products available to FEMA by uploading the digital data to the MIP so that SCDNR or its QA/QC subcontractor can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 - Schedule. A metadata file complying with the NFIP Metadata Profiles Specifications, must accompany the uploaded digital data. Additionally, the TSDN format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

- Digital copies of all detailed hydrologic modeling (input and output) files for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events;
- Digital Summary of Discharges Tables presenting discharge data for the flooding sources for which hydrologic analyses were performed;
- Digital versions of draft text for inclusion in 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 DCS—in the G&S; 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 the approved QA/QC Plan.
- For GIS-based modeling, deliverables shall include all input and output data, intermediate data processing products, and GIS data layers.
- For Limited Detail Study modeling, deliverables to be included are the same as for detailed studied streams except only the 1-percent-annual-chance storm event hydrologic modeling (input and output) files are required.
- 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 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.
- 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.

Hydraulic Analyses

Responsible Mapping Partner: SCDNR

Scope: SCDNR or its mapping subcontractor shall perform detailed hydraulic analyses for the flooding sources listed earlier in Table 1.1. The modeling will include the 10-, 2-, 1-, and 0.2-percent-annual-chance events based on peak discharges computed under Hydrologic Analyses. The hydraulic methods used for this analysis will include HEC-RAS version 3.1.3 or other approved FEMA model.

SCDNR or its mapping subcontractor shall use the cross-section and field data collected during Field Survey and the topographic data collected during the Topographic Data Collection, when appropriate, to perform the hydraulic analyses. The hydraulic analyses will be used to establish flood elevations and regulatory floodways for the subject flooding sources.

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

SCDNR or its mapping subcontractor shall also perform limited detailed hydraulic analyses. The modeling will include the 1-percent-annual-chance events based on peak discharges computed under Hydrologic Analyses. The hydraulic methods used for this analysis will include HEC-RAS version 3.1.3 or other FEMA approved model.

SCDNR or its mapping subcontractor shall use the measured field data collected during Field Survey to perform the limited detailed hydraulic analyses. The limited detailed hydraulic analyses will be used to establish flood elevations for the subject flooding sources in Table 1.1. A floodway and flood profiles will not be developed for limited detail studies. A table of the cross sections with BFEs will be included in the FIS text if the areas are identified as AE zones. This approach and impacts to the communities' implementation of 60.3(c)(10) within their floodplain ordinances will be explained to the communities during the scoping meetings. SCDNR will gain concurrence with this approach from the affected communities at this time.

Any flooding sources associated with a levee that are mapped as providing protection on effective FIRMs, but will not meet certification requirements for the new FIRMs, will require revised hydraulic analysis. This revised analysis should be done in accordance with the G&S, PMs 34, 43 and others that may be appropriate.

SCDNR or its mapping subcontractor shall summarize the hydrologic analysis for each county in optional Table 1.7 Summary of Hydraulic Analysis.

- Digital version of draft BFE Table with stream station, cross section designation, the 1-percent-annual-chance water surface elevation and the 1-percent-annual-chance discharge for each stream studied by limited detailed methods;
- Format Hydraulic Database or Data Delivery consistent with the Data Capture Standards—in the G&S; 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 the approved QA/QC Plan.
- 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;
- 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. Appropriate leverage information includes who paid for the data and the amount of data used by the Flood Map Project.

Independent QA/QC Review of Hydraulic Analyses

Responsible Mapping Partner: SCDNR

Scope: SCDNR or its QA/QC subcontractor shall perform an impartial review of the technical, scientific, and other information submitted by SCDNR or its mapping subcontractor 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. The CTP and contractor for the CTP, if applicable must ensure that independent QA/QC is performed and that organizational conflict of interest issues do not exist with respect to independent QA/QC processes. 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.

Please note FEMA will also be performing periodic audits and overall study/project management to ensure study quality. The CTP will be responsible for addressing any and all comments resulting from independent QC, including re-submittal of deliverables as needed to pass technical review.

- 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;

Dune assessment and erosion will be performed following the 540 sq ft rule, as computed by FEMA's Coastal Hazard and Mapping Program (CHAMP). The primary frontal dune will be identified and assessed, using the LIDAR data, in order to determine the inland extent of the VE Zones at the landward toe of the dunes.

Overland Wave Height Analysis

The obstruction types identified during the Field Survey activity will be used as input in WHAFIS 3.0 to determine wave decay overland.

Wave Runup 2%

FEMA's Procedure Memorandum 37 (2005) establishes the need for higher wave runup elevations. The concept of the 2% wave runup (versus the mean wave runup previously calculated for FEMA studies) is introduced as the highest 2% of wave runups affecting the shoreline during the 100-year event. If high dunes or bluffs exist, their steeper profiles may cause wave runup to be greater than the calculated wave crest. RUNUP 2.0, TAW method and the SPM method will be used to calculate runup.

Any flooding sources associated with a levee that are mapped as providing protection on effective FIRMs, but will not meet certification requirements for the new FIRMs, will require revised hydraulic analysis. This revised analysis should be done in accordance with the G&S, PMs 34, 43 and others that may be appropriate.

Standards: All Coastal Flood Hazard Analyses work shall be performed in accordance with the standards specified in Section 5 - Standards.

Deliverables: In accordance with the G&S, SCDNR or its mapping subcontractor shall make available to FEMA the following products by uploading the digital data to the MIP so that SCDNR or its QA/QC subcontractor can access it for an independent QA/QC review in accordance with the schedule outlined in Section 6 - Schedule. A metadata file complying with the NFIP Metadata Profiles Specifications, must accompany the uploaded compliant digital data. Additionally, the TSDN format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

- Draft digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundaries, BFEs, limit of moderate wave action boundary and flood insurance risk zones;
- Digital wave envelope profiles for each transect representing the 1-percent-annual-chance stillwater elevation including setup wave crest or run-up elevations, location of the heel of the PFD, and ground profile conditions including eroded dune profile;
- Digital versions of draft text for inclusion in the FIS report;
- Draft work maps showing each transect located accordingly;
- Digital coastal modeling (input and output files);
- Digital versions of any other supporting computations;
- All backup data used in the analyses; 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 the approved QA/QC Plan.

format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule.

- 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.
- If the data changed during the QA/QC process, then the updated deliverables from the Coastal Flood Hazard Analyses will be resubmitted at this time.

Floodplain Mapping

Responsible Mapping Partner: SCDNR

Scope for Detailed Riverine or Coastal Analysis: SCDNR or its mapping subcontractor shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) and any other applicable elements for the flooding sources for which detailed hydrologic, hydraulic, and/or coastal analyses were performed. SCDNR or its mapping subcontractor shall incorporate all new or revised hydrologic, hydraulic, and/or coastal modeling 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: SCDNR or its mapping subcontractor shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries, regulatory floodway boundaries, and coastal high hazard zones (if required) for the flooding sources listed earlier in Table 1.1. SCDNR or its mapping subcontractor 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 do not reflect the same hydraulic characteristics as in the effective study, SCDNR or its mapping subcontractor shall evaluate the topographic data to determine if changes are significant enough to invalidate the floodplain boundary and regulatory floodway boundary redelineations. If so, SCDNR or its mapping subcontractor shall contact the FEMA Regional Project Officer, identified in Section 12 – Points of Contact, with a recommendation.

Coastal redelineation will not be performed due to updated coastal hydrology being developed as part of the South Carolina Coastal Storm Surge Study currently underway. This new storm surge data will be used to update the coastal hazard analysis for Berkeley County.

Scope for Limited Detail Study: SCDNR or its mapping subcontractor shall delineate the 1- percent-annual-chance floodplain boundaries (AE zones) and any other applicable elements for the flooding sources for which limited detailed hydrologic and hydraulic analyses were performed for the flooding sources listed earlier in Table 1.1 or in the subsequent Scoping Report. SCDNR or its mapping subcontractor shall incorporate all new hydrologic and hydraulic modeling and shall use the topographic data acquired under Topographic Data Development to delineate the floodplain boundaries on a digital work map. Concurrence on floodways for limited detailed studied streams will be made with the communities.

Scope for Refinement or Creation of Zone A: SCDNR or its mapping subcontractor shall delineate the 1-percent-annual-chance floodplain boundaries for the flooding sources listed earlier in Table 1.1 or in the

format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal. 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 the Independent QA/QC review at the completion of this activity.

This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule.

- Digital work map showing the Coastal High Hazard Area (V zone) delineated along Atlantic Ocean shorelines, transect locations, 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFEs, flood insurance risk zone designation labels, gutters, PFD, and all applicable base map features;
- Draft DFIRM database prepared in accordance with the requirements in G&S;
- Digital versions of input and output for any computer programs that were used consistent with the DCS—in the G&S;
- 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 the 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, Coastal and /or Hydraulic Analyses and Floodplain Mapping consistent with the DCS—in the G&S;
- An explanation for the use of existing topography for the studied reaches, if appropriate.
- Written summary of the analysis methodologies;
- Digital versions of draft FIS report, Floodway Data Tables and updated profiles including all profiles and tables converted appropriate datum, as well as any other necessary items for the finalization of the preliminary FIS;
- If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted consistent with the DCS—in the G&S;
- 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.

Independent QA/QC Review of Floodplain Mapping

Responsible Mapping Partner: SCDNR

Scope: SCDNR or its QA/QC subcontractor shall perform an impartial review of the floodplain mapping submitted by SCDNR or its mapping subcontractor 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. The CTP and contractor for the CTP, if applicable must ensure that independent QA/QC is performed and that organizational conflict of interest issues do not exist with respect to independent QA/QC processes. 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.

- 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 tasks will be submitted at this time.

Develop Draft DFIRM Database

Responsible Mapping Partner: SCDNR

Scope: SCDNR or its mapping subcontractor shall prepare the database in accordance with G&S, for upload to the MIP. SCDNR or its mapping subcontractor shall coordinate with appropriate Mapping Partners, as necessary, to resolve any problems that are identified during development of the DFIRM Database.

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

Deliverables: In accordance with G&S, SCDNR or its mapping subcontractor shall make the following products available to FEMA by uploading the digital data to the MIP. Additionally, the Technical Support Data Notebook format described in G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

- DFIRM database files prepared in accordance with the requirements in G&S and in the required format(s) and
- A metadata file complying with the FEMA NFIP Metadata Profile Specifications.

Produce Preliminary Map Products

Responsible Mapping Partner: SCDNR

Scope: SCDNR or its mapping subcontractor shall apply the final FEMA DFIRM graphic and database specifications to the DFIRM files produced under Floodplain Mapping. 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). SCDNR or its mapping subcontractor will be preparing the database for this project in the Standard format. The database shall be produced in accordance with the G&S. SCDNR or its mapping subcontractor 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.

Preliminary Summary of Map Actions (SOMA) Preparation: The SCDNR or its mapping subcontractor 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).

- All map collar information is complete, correct, and follows the requirements specified in G&S.
- Preliminary DFIRM database is in a GIS file and database format as specified in FEMA's G&S, and conform to those specifications for content and attribution.
- DFIRM database files are in one of the database formats specified in FEMA's G&S, and conform to those specifications for content and attribution.

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

Deliverables: In accordance with the G&S, SCDNR or its QA/QC subcontractor shall make the following products available to FEMA by uploading the digital data to the MIP. Additionally, the TSDN format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

This submittal will occur in accordance with the schedule outlined in Section 6 – Schedule.

- 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.

Distribute Preliminary Map Products

Responsible Mapping Partners: SCDNR

Scope: Preliminary Map Products consists of the final preparation, review, and distribution of the Preliminary copies of the DFIRM and FIS report and the Preliminary SOMA for community officials and the 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 SCDNR or its mapping subcontractor 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 for signature by FEMA and SCDNR or its mapping subcontractor.

Distribution of Preliminary DFIRM and FIS Report: The SCDNR or its mapping subcontractor 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 SCDNR or its mapping subcontractor shall use the BFEs on the Web tool in accordance with PM 44 to create BFE notices for studies that result in new or modified BFEs. The

- 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, FEMA and or SCDNR or its mapping subcontractor shall arrange for and verify that the following activities are completed in accordance with the current version of the FEMA G&S, appropriate PMs and Document Control Procedures Manual:

- Proposed BFE determination letters are sent to the community CEOs and floodplain administrators.
- Ensure that news release notifications of BFE changes are published in prominent newspapers with local circulation in accordance with 44 CFR.
- The SCDNR or its mapping subcontractor shall prepare the appropriate notices (Proposed Rules) that are to be published in the *Federal Register*. The SCDNR or its mapping subcontractor shall then deliver those notices to FEMA for publication.
- When SCDNR or its mapping subcontractor 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: SCDNR or its mapping subcontractor 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 joint signature by SCDNR and FEMA along with the revised DFIRM and FIS report materials for FEMA review.

SCDNR or its mapping subcontractor shall mail all associated correspondence upon authorization by FEMA.

SCDNR or its mapping subcontractor's role in supporting the appeal and protest process includes up to 80 hours of technical support. If the SCDNR or its mapping subcontractor's required level of effort to resolve appeals and protest exceeds 80 hours total, SCDNR will coordinate with FEMA for resolution options.

Additionally, the TSDN format described in the G&S must be delivered in accordance with Section 2 – Technical and Administrative Support Data Submittal.

This submittal will occur in accordance with the schedule outlined in Section 6 - Schedule.

- 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 (if applicable) 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;
- Completed, organized, and archived technical and administrative support data; and
- Completed, organized, and archived case files and flood elevation dockets.

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 MAS shall be submitted in the TSDN format in accordance with the FEMA G&S. Table 2.1 Mapping Activities and Applicable TSDN Sections 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 the G&S.)

SECTION 3—PERIOD OF PERFORMANCE

The mapping activities outlined in this MAS will be completed as specified in the Agreement Articles of the Cooperative Agreement. The Mapping Activities may be terminated at the option of FEMA or SCDNR in accordance with the provisions of the Partnership Agreement dated September 20, 1999. If these mapping activities are terminated, all products produced to date must be returned and updated into the MIP and the remaining funds from uncompleted activities, provided by FEMA for this MAS, will be returned to FEMA.

SECTION 4—FUNDING/LEVERAGE

FEMA is providing funding, in the amount of \$1,504,084, to SCDNR for the completion of this Flood Map Project. SCDNR 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 leverage listed below includes in-kind services and blue book values for acquired information (i.e. base map data, hydrologic and hydraulic analyses, etc.). These values should also be reported in the MIP by the appropriate task owner. The current Blue Book is dated January 2009 and can be downloaded from FEMA's Information Resource Library at <http://www.fema.gov/library/viewRecord.do?id=2473>. SCDNR shall complete Table 4.1 Contribution and Leverage.

Table 4.1 Contribution and Leverage

Project Task	FEMA Contribution	Partner Contribution	% Partner Leverage	Total Project Cost
Berkeley County	\$551,531	\$184,130	25%	\$735,661
Florence County	\$448,450	\$103,770	19%	\$552,220
Lexington County	\$504,103	\$167,358	25%	\$671,461
TOTAL FUNDING AMOUNTS	\$1,504,084	\$455,258	23%	\$1,959,342

Leverage dollars or units shall be entered as applicable within the Manage Data Development task in the MIP workflow.

Applicable Standards	Activities																
	Scoping	Field Survey	Topo Data	QA/QC Topo Data	Base Map	Coastal	QA/QC Coastal	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 Database	Preliminary Map Products	Post-Preliminary Processing
Engineer Manual 1110-2-1003, <i>Hydrographic Surveys</i> (USACE), January 1, 2002	X	X				X	X	X	X	X							
"Numerical Models Accepted by FEMA for NFIP Usage." Updated April 2003	X					X	X	X	X	X							
NFIP Metadata Profile Specifications	X		X	X							X	X	X	X	X	X	X
<i>Document Control Procedures Manual</i>	X															X	X
44 Code of Federal Regulations Parts 65, 66 and 67	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Data Capture Standards (DCS)</i> Use both Appendix M and Appendix N Or <i>Revised Appendix M</i>		X	X	X	X	X	X	X	X	X							

Activity Description	Applicable Volume, Section/Subsection, and Appendix
	<p>Appendices A, B, C, D, H, and M</p> <p>Coastal Guidelines Updates</p>
<p>Floodplain Mapping and Independent QA/QC</p> <p>Floodplain Mapping (including Redelineation/Digitization)</p>	<p>Volume 1</p> <p>Appendices C, D, E, F, G, H, K, L, and M</p>
<p>Produce Preliminary Map Products and Independent QA/QC</p> <p>Review of Produce Preliminary Map Products</p>	<p>Volume 1</p> <p>Appendices K, L, and M</p>
<p>Distribute Preliminary Map Products and Independent QA/QC</p> <p>Review of Distribute Preliminary Map Products</p>	<p>Volume 1</p> <p>Appendices J, K, L, and M</p>
<p>Post-Preliminary Processing</p>	<p>Volume 1</p> <p>Appendices J, K, L, and M</p>

ACTIVITIES	RESPONSIBLE PARTNER(S)	START DATE	END DATE	COST
Floodplain Mapping: Redelineation	SCDNR	120 days after NTP	390 days after NTP	
Independent QA/QC Review of Floodplain Mapping	SCDNR/FEMA	390 days after NTP	420 days after NTP	
Develop Draft DFIRM Database	SCDNR	420 days after NTP	450 days after NTP	
Produce Preliminary Map Products (including Graphic Specifications)	SCDNR	450 days after NTP	480 days after NTP	
Independent QA/QC Review of Produce Preliminary Map Products	SCDNR/FEMA	480 days after NTP	510 days after NTP	
Distribute Preliminary Map Products	SCDNR	510 days after NTP	540 days after NTP	
Post-Preliminary Processing	SCDNR/FEMA	540 days after NTP	990 days after NTP	
Berkeley County Total Cost				
FLORENCE COUNTY				
ACTIVITIES	RESPONSIBLE PARTNER(S)	START DATE	END DATE	COST
Scoping	SCDNR/FEMA	Date of MAS signature & funding authorization	120 days after NTP	
Field Surveys	SCDNR	120 days after NTP	180 days after NTP	
Topographic Data Development	SCDNR	120 days after NTP	180 days after NTP	
Independent QA/QC Review of Topographic Data	SCDNR	120 days after NTP	180 days after NTP	
Base Map Acquisition	SCDNR	120 days after NTP	180 days after NTP	
Hydrologic Analyses	SCDNR	180 days after NTP	240 days after NTP	
Independent QA/QC Review of Hydrologic Analyses	SCDNR/FEMA	240 days after NTP	270days after NTP	
Hydraulic Analyses	SCDNR	240 days after NTP	300 days after NTP	
Independent QA/QC Review of Hydraulic Analyses	SCDNR/FEMA	300 days after NTP	330 days after NTP	

ACTIVITIES	RESPONSIBLE PARTNER(S)	START DATE	END DATE	COST
Independent QA/QC Review of Hydrologic Analyses	SCDNR/FEMA	390 days after NTP	420 days after NTP	
Hydraulic Analyses	SCDNR	390 days after NTP	450 days after NTP	
Independent QA/QC Review of Hydraulic Analyses	SCDNR/FEMA	450 days after NTP	480 days after NTP	
Floodplain Mapping: Detailed / Limited Detailed Riverine	SCDNR	480 days after NTP	540 days after NTP	
Floodplain Mapping: Refinement or Creation of Zone A	SCDNR	330 days after NTP	540 days after NTP	
Floodplain Mapping: Merging Revised and Unrevised Areas	SCDNR	330 days after NTP	540 days after NTP	
Floodplain Mapping: Redelineation	SCDNR	330 days after NTP	540 days after NTP	
Independent QA/QC Review of Floodplain Mapping	SCDNR/FEMA	540 days after NTP	570 days after NTP	
Develop Draft DFIRM Database	SCDNR	570 days after NTP	600 days after NTP	
Produce Preliminary Map Products (including Graphic Specifications)	SCDNR	600 days after NTP	630 days after NTP	
Independent QA/QC Review of Produce Preliminary Map Products	SCDNR/FEMA	630 days after NTP	660 days after NTP	
Distribute Preliminary Map Products	SCDNR	660 days after NTP	690 days after NTP	
Post-Preliminary Processing	SCDNR/FEMA	690 days after NTP	1140 days after NTP	
Lexington County Total Cost - :				
MAS TOTAL COST				

SCDNR shall provide schedule and cost information so that FEMA Region IV can upload the data to the to the MIP workflow tasks within 45 days after the scoping meetings.

SECTION 7—CERTIFICATIONS

Data Capture Standards

- **DCS Certification Form** FEMA-funded data development tasks must be certified using the DCS Certification form provided in revised version of Appendix M. A PDF of the form with the

SECTION 9—CONTRACTORS (CTP)

SCDNR intends to use the services of URS Corporation and Watershed Concepts, AECOM Water as the contractors for this Flood Map Project. SCDNR shall ensure that the procurement for all contractors used for this Flood Map Project complies with the requirements of 44 CFR 13.36.

Part 13 may be downloaded in PDF or text format from the United States Government Printing Office website at http://www.access.gpo.gov/nara/cfr/waisidx_04/44cfr13_04.html.

SECTION 10—REPORTING

Financial Reporting: Because funding has been provided to SCDNR by FEMA, financial reporting requirements for SCDNR will be in accordance with Cooperative Agreement Articles. SCDNR shall also refer to 44 CFR 13.41.

SCDNR shall provide financial reports to the FEMA Regional Project Officer and Assistance Officer in accordance with the terms of the signed Cooperative Agreement for this MAS.

Status Reporting: Status reports will be submitted on a quarterly basis in accordance with the financial reporting submittals. SCDNR shall refer to 44 CFR 13.4 to obtain minimum requirements for status reporting. The Project Officer, as needed, may request additional information on status.

SCDNR may meet with FEMA and/or its contractor up to bi-weekly, or more frequently 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 SCDNR office, and conference calls, as necessary.

Earned Value Reporting: The MIP Workflow is designed to track the Earned Value of mapping projects. This information is automatically calculated by the MIP, using the Actual cost and schedule of work performed, or "actuals" and comparing them to the expected cost and schedule of work performed, or "baseline".

Once the FEMA Regional office has funded a project FEMA will complete the "Obligate Project Funds" screen in the MIP. This step establishes the baseline for the project in the MIP, using the cost and schedule information for each task as outlined in this document and agreed to at the completion of the scoping process.

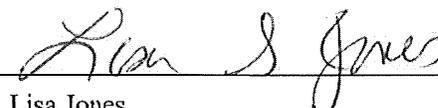
The MIP study workflow allows SCDNR to report on the status of these projects at a task level. The cost and schedule information, updated by the SCDNR for each contracted task, is compared to the baseline established for those tasks. This information is rolled up to a project level and monitored by the FEMA Region to assess progress and Earned Value.

Earned Value reporting involves the reporting of cost, schedule and performance (physical percent complete) in the MIP by the SCDNR.

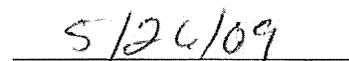
SECTION 12—POINTS OF CONTACT (CTP)

The points of contact for this Flood Map Project are Laura Algeo, the FEMA Regional Project Officer; Lisa Jones, the Project Manager for SCDNR; or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. When necessary, any additional FEMA assistance should be requested through the FEMA Regional Project Officer.

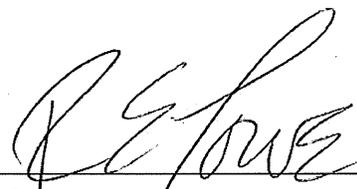
Each party has caused this MAS to be executed by its duly authorized representative.



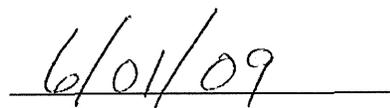
Lisa Jones
Director, Flood Mitigation Program
South Carolina Department of Natural Resources



Date



Laura Algeo
Regional Project Officer
Federal Emergency Management Agency, Region IV



Date