

MAS NO. 2005-01
STATE OF MONTANA

APPENDIX B

DRAFT SCOPE OF WORK

**Missoula County, Montana Digital Flood Insurance Rate Map Production
and Development of Updated Flood Data
August 10, 2005**

Section 1

INTRODUCTION

The objective of the Flood Map Project documented in this Scope of Work (SOW) is to develop a Digital Flood Insurance Rate Map (DFIRM) and Flood Insurance Study (FIS) report for Missoula County and Incorporated Areas. This project will be completed by the PBS&J Team, hereafter called the Consultant; the State of Montana Department of Natural Resources and Conservation, Water Resources Division, Floodplain Program (DNRC); and the Federal Emergency Management Agency (FEMA), primarily acting through their consultant, Michael Baker Jr., Inc., hereafter called the National Service Provider (NSP).

The majority of the project work will be performed by the Consultant. DNRC will perform many of the outreach activities and the NSP will perform independent QC activities. All activities and their responsible parties will be specifically defined in this SOW.

This SOW is based on the Mapping Activity Statement (MAS), specifically, MAS No. 2005-01, dated June 28, 2005; and is directly related to the MAS. Tasks documented herein directly match with the Activities defined in the MAS. Modifications to the MAS in the form of Special Problem Reports or other change orders are also considered modifications to this SOW. The Consultant should reference the MAS for FEMA Standards and requirements for project processes and deliverables.

This SOW covers Missoula County and Incorporated areas, including the City of Missoula, which lies entirely within the boundaries of Missoula County. The product of this SOW will be a single set of digital floodplain data for the entire county. By reference, the signed MAS for this project shall be incorporated into this SOW. PBS&J shall be responsible for completing activities in the MAS that have been assigned to the DNRC. PBS&J is not responsible for completing activities in the MAS that have been assigned to FEMA or the National Service Provider (NSP). PBS&J shall prepare all new digital information, including maps and flood profiles, in elevations that are adjusted to NAVD 1988 datum, regardless of the datum for the source information. PBS&J shall respond to and address all comments and deficiencies that are brought forth during the QA/QC process and by the project Sponsors. PBS&J will complete all tasks and provide final deliverables to the DNRC, FEMA and Missoula County by the end of the performance period, which will not extend beyond September 30, 2007 for the associated Mapping Activity Statement.

This project is being funded primarily by Federal monies and under FEMA's National Flood Insurance Program. As such, the project must be performed in accordance with and meet FEMA's standards. The Consultant will ensure that the project meets all of FEMA's requirements and standards for this project. FEMA has developed DFIRM Tools, including the WISE Scoping Tool, and the Consultant will either use these tools and update FEMA's databases as needed or ensure that their products meet with FEMA's Data Capture Standards. FEMA will be providing download/upload capability for such submittals through the Mapping Information Platform (MIP). As this capability is provided, products identified in

the activities of the MAS (and associated SOW), and as outlined in FEMA Guidance and Specifications will be uploaded to the MIP. Alternatively, the Consultant will submit to the NSP at the following milestones in accordance with the Data Capture Specifications:

- Project Scoping (as specified);
- Terrain Data Processing Completed;
- Field Survey Completed;
- Hydrology Completed (draft and final);
- Hydraulics Completed (draft and final); and
- DFIRM Mapping (draft and preliminary).

ATTACHMENTS

To supplement this SOW, the following items are attached:

- Detailed Costs for DFIRM Conversion and Individual H&H Studies (Attachment A),
- Panelization Scheme (Attachment B),
- Project Schedule (and revised Project Schedules) (Attachment C),
- Common Terminology and Definitions of this SOW and MAS No. 2005-01 (Attachment D) and,
- Special Problem Reports or other modifications to MAS No. 2005-01 (Attachment E).

CONTENTS

This project is defined by the following major tasks, which are defined throughout the rest of this document:

- Pre-Scoping
- Scoping
- Base Map Acquisition
- Field Surveys
- Topographic Data Development
- Hydrologic Analysis
- Hydraulic Analysis
- Floodplain Mapping: Detailed, Approximate, and Redelineation
- DFIRM/FIS Production: Non-revised areas, Revised areas, Graphics/Database, and FIS Production
- Preliminary DFIRM/FIS Distribution
- Post-Preliminary Processing
- Meetings and Coordination
- Schedule and Reporting
- H&H-Specific Tasks

Section 2

DFIRM PRODUCTION TASKS

Task 1: Pre-Scoping (MAS Activity 1)

Pre-Scoping will be performed by the DNRC and the NSP; the Consultant will review the deliverables and become familiar with the project. The Pre-Scoping involves collecting data from a variety of sources including community surveys, other Federal and State Agencies, NFIP State Coordinators, Community Assistance Visits (CAVs) and FEMA archives. The NSP will collect and compile such data and evaluate the effective FIS report and FIRM maps to see if they need to be updated. The NSP will compile lists of mapping needs from the MNUSS database, community surveys, the Scoping Tool, and CAVs if available. The NSP will provide:

- Copies of all digital files obtained and lists of files that may be available at a later date;
- A Pre-Scoping Report including all data compiled from the described research;
- Summary of the Community's needs; and
- Scoping Tool project files.

DNRC will make initial contact with the communities and establish a contact list. DNRC will perform brief interviews with the communities to inform them of the project and gather general information about ordinances, mapping needs, and existing base map data. DNRC will provide:

- Contact information for all communities and project team members
- Pre-Scoping Interviews and Coordination Briefing

The Consultant will be provided with copies of the above deliverables and will review and become familiar with the information.

Task 2: Scoping (MAS Activity 2)

The NSP will provide an Available Data Inventory document to DNRC and the Consultant. This document will include:

- Details of Mapping Needs Assessments, including a summary of MNUSS data;
- Description of the effective FIRM panels, FIRM panels, FIS reports, and other flood hazard data or existing study data, including data for adjacent counties.
- CAV and CAC file overview;
- A scoping map;
- Inventory of available base map information;
- Inventory of available topographic data;
- Inventory of available flood hazard data; and
- Inventory of other available hydrologic and hydraulic information and data.

The Consultant will review the provided documentation and utilize the information.

The Consultant will be expected to monitor the project on an ongoing basis and bring to DNRC's attention any issues that could delay or prohibit the Flood Map Project. Some examples of potential obstacles to completing the project in a timely fashion include the following: inability to address mapping needs adequately with available funding; difficulty coordinating community funding with FEMA funding; lack of an available base map meeting FEMA minimum specifications; hydrologic and/or hydraulic issues; community concerns; reliance on other studies or data (e.g., topographic mapping) that will not be available within the project's scheduling constraints; needs not having as high a priority as originally identified; and other relevant project constraints.

Deliverables:

- As needed, email communication and documentation of potential obstacles.

Scoping Subtask 2-1: Project Scope

The Consultant will develop a Project Scope. The following items will be addressed in the Project Scope: review available information; determine if and how effective FIS data can be used in new project; identify other data needed to complete the Project and its source; and the DFIRM format. This scope will be coordinated with members of the Project Team and the communities and county involved with the project. The Project Scope will establish priority levels for flooding sources to be analyzed and mapped, and estimate schedules and associated costs for completion of the components of flood mapping. A Draft Project Scope will be prepared following the Scoping Meeting, and will include reach lengths identified to date; estimated costs for approximate, limited detail, and detailed mapping; and a draft panelization scheme. The Final Project Scope will include final numbers and details associated with the project.

Deliverables:

- Draft Project Scope document
- Final Project Scope document
- A QA/QC plan for the review of specific project deliverables associated with Tasks outlined in this SOW and Activities outlined in the MAS No. 2005-01.

Scoping Subtask 2-2: Scoping Meeting

The DNRC will coordinate, set up, and conduct the Scoping Meeting. FEMA/NSP shall be responsible for compiling the necessary information for the meeting as contained on the Scoping Meeting Item Checklist. These items may include: FIS and FIRM for affected communities; USGS quads for the study area(s); best available community base map(s); effective FIRM summary; Available Data Inventory; Scoping Map; aerial photos/topographic mapping if available; existing drainage studies or other Hydrology & Hydraulics (H&H) data; Community master plan(s)/Drainage Master Plan(s); Zoning Maps; Street Maps; As-built plans; and Floodplain Ordinance(s).

The Consultant will send the Project Manager and a GIS Specialist to attend the Scoping Meeting. DNRC will open the meeting with a project overview, then the Consultant will work with DNRC to lead discussion of the following, as necessary:

Review and Refinement of Flood Hazard Identification Methodologies (H&H)

The attendees shall discuss the extent of riverine modeling required for the project. The research completed during the pre-Scoping Meeting phase shall be reviewed to determine the extent and applicability of previous modeling. Issues to be discussed include the following: models to be used from FEMA's approved models list; requirements for tie-ins to adjacent NFIP maps; areas where complex models might be required; and vertical datum.

Final Prioritization of Restudy Areas (H&H)

The attendees will review the documented community mapping needs and agree upon a priority of those needs. The Consultant will gather data on any existing models and other details needed to determine detailed costs for the identified reaches, as well as establish a contact and date by which the models will be received (within one month wherever possible).

Review of Proposed Paneling Scheme (H&H)

The scoping map shall be used to review the proposed paneling and scale scheme. The Consultant will document panelization changes suggested by the community and use this information to develop a revised panelization.

Review and Refinement of Base and Topographic Map Sources (GIS)

FEMA's base map specifications will be discussed. The discussion shall include the following topics: Base map source (i.e., locally developed data or DOQs meeting FEMA's minimum specifications) to be used for the project; Topographic and planimetric data sources; Coordination of countywide issues, if necessary; horizontal and vertical datums; and acquisition of the base map, if digital files are not available. The Consultant will document the available data from each community representative including a date by which the community will forward to them the specified files (within one month wherever possible).

Finalization of Map Production and Database Options:

The proposed DFIRM format and optional features and data for the enhanced DFIRM Database (e.g., GIS data for watershed boundaries, stream reach hydrologic network structure, land use data, soil data, digital elevation certificates, photographs of structures) from the draft Scope of Project shall be reviewed, refined, and finalized.

At the meeting, the Consultant will be responsible for ensuring that all necessary information for the development of the Project Scope and detailed cost estimates for the selected reaches have been collected.

The Consultant will prepare meeting notes, including a proposed schedule and task assignments, and will submit the documentation to DNRC following the meeting. DNRC will review and finalize the meeting notes, schedule, task assignments, and will make this information available to attendees, upon request.

Deliverables:

- Attendance at Scoping Meeting by Project Manager and GIS Specialist
- Hard copy map of draft panelization, including indication of existing flood hazard data
- Presentation or handouts as needed to relay information to Scoping Meeting attendees
- Documentation of schedule of receipt of Base Mapping and Existing Model data
- Documentation of prioritized reaches for restudy
- Meeting notes

Task 3: Base Map Acquisition (MAS Activity 12)

The Consultant shall provide the digital base map for the project. This will include the following:

- Obtain digital files (raster or vector) of the base map,
- Secure necessary permissions from the map source to allow FEMA's use and distribution of hardcopy and digital map products using the digital base map, free of charge,
- Document that the digital data meets the minimum standards and specifications that FEMA requires for DFIRM production,
- Coordinate with and notify Missoula County and the City of Missoula of the final base map (raster or vector).
- Populate the DFIRM database with the information required by FEMA.

Deliverables: In accordance with FEMA Standards, provided to DNRC and FEMA/NSP:

- Written documentation that the digital data meet FEMA's minimum standards and specifications; and
- Documentation that FEMA can use the digital base map.

Task 4: Profile Digitization and Vertical Datum Conversion (MAS Activity 10)

Profiles will be digitized and geo-referenced to the NAVD1998 datum using conversion factors determined from FEMA specifications. This work shall include, at a minimum, the activities listed below.

Datum Conversion

- Unless a community-wide conversion factor can be used, a stream-by-stream conversion factor must be determined for each flooding source. The datum conversion process is documented in Appendix B of the FEMA Guidelines & Specifications for Flood Hazard Mapping Partners.

Profile Digitization

- Many of the specifications for digitizing profiles in the correct format can be found in Appendix J of the FEMA Guidelines & Specifications for Flood Hazard Mapping Partners.
- All communities and unincorporated areas are combined to produce a seamless set of county-wide profiles for each reach.
- LOMC's are incorporated.
- The datum conversion factor is applied to each flooding source.

Task 5: Review of LOMCs and Existing Data Study Information (MAS Activity 10)

PBS&J shall review the technical, scientific, and other information supporting Existing Data Studies (XDS) submitted by the DNRC or the Mapped Communities 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 of LOMCs
- Review of XDSs

- Review the submittal for regulatory adequacy, completeness of required information, and supporting data and documentation.
- Use of acceptable model(s);
- 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 of receipt.)

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

- 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.

Task 6: Floodplain Mapping/Redelineation (MAS Activity 10C and 10D)

The Consultant shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) for all effective flooding sources identified as requiring redelineation. The extent of redelineation efforts will depend upon many factors including availability of adequate topographic mapping and/or aerial photography and availability of adequate hydrologic/hydraulic data. Where inadequate topographic and hydrologic/hydraulic information is available, approximate A zones may be redelineated based on aerial photography only, however, this will be reviewed with the DNRC prior to any redelineation efforts. The Consultant shall use the topographic data acquired previously 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, the Consultant shall evaluate the topographic data to determine if changes are significant enough to invalidate the floodplain boundary and regulatory floodway boundary redelineations. If so, the Consultant shall contact DNRC (and the FEMA/NSP as needed) with a recommendation. In addition, Consultant shall incorporate the results of all effective Letters of Map Change (LOMCs) issued by FEMA and Existing Data Studies (XDS) that meet FEMA specifications since the date of the current effective FIRM for each community, within the revised areas as appropriate. If LOMCs and XDSs do not reflect the same hydraulic characteristics as in the effective study, the consultant shall contact DNRC (and the FEMA/NSP as needed) with a recommendation.

Deliverables: In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- Digital work maps showing the 1 and 0.2-percent-annual-chance floodplain boundary delineations and redelineations, regulatory floodway boundaries (as applicable), cross-sections, BFEs, flood insurance risk zone labels, and all applicable base map features;
- Written summary of the analysis methodologies;

- Any backup or supplemental information, including supporting calculations and assumptions for any computed 1-percent-annual-chance water-surface elevations used in the mapping required for the independent QA/QC review under Activity 11;
- Hardcopy and digital versions of input and output for any computer programs that were used;
- 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
- Documentation that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM;
- NSP Format Mapping Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards.
- If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted.

Task 7: DFIRM and FIS Production (MAS Activity 13, 13a)

Upon completion of the DFIRM panels and FIS, the Consultant shall submit the panels or FIS to FEMA/NSP for an independent QA/QC review. The Consultant shall address all related comments and questions that are identified by FEMA/NSP during the independent QA/QC review.

Task 7a: Non-Revised Areas (MAS Activity 13)

For all flooding sources except those segments for which updated flood data will be developed as part of this project, the Consultant shall convert the information shown on the effective FIRM and Flood Boundary Floodway Map (FBFM) panels for all incorporated and unincorporated areas to digital format in conformance with FEMA DFIRM specifications. The redelineation will include adjustment of approximate zones utilizing best available aerial photography and/or topographic mapping. The Consultant shall use the base map acquired previously for the conversion. The Consultant shall digitize 44 FIRM panels, and create a total of 51 printed DFIRM panels, as documented in the attached panelization scheme (Attachment B).

The Consultant also shall incorporate the results of LOMCs issued by FEMA since the date of the current effective FIRM for each affected community. In areas with Mappable Letters of Map Revision (LOMRs) that are based on better topographic data than available in the project base map acquired under Activity 12 the LOMR data shall be incorporated by digitization of the LOMR map data. This situation may arise where a topographic survey was performed specifically for a LOMR and that data was not available for incorporation into the base map compiled under Activity 12 or the data was of a small scale not practical for incorporation.

The Consultant shall not digitize the flood theme for those segments of flooding sources for which updated flood data will be developed. Rather, the Consultant shall leave these as “holes” in the digital flood theme that will be filled in as part of Task 12 (as applicable).

Deliverables: In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- 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, including a check that the road and floodplain relationship is maintained for all non-revised areas.

Task 7b: Merging Revised and Non-Revised Information (MAS Activity 14)

Upon completion of the floodplain mapping activities for the revised areas (Task 12) and the DFIRM production for non-revised areas (Task 7a), the Consultant shall merge the digital floodplain data into a single, updated DFIRM. This work includes the tie-in of flood hazard information for areas that were not studied as part of this Flood Map Project. The Consultant 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 the MAS. The Consultant shall coordinate with FEMA and those Mapping Partners responsible for Task 12, as necessary, to resolve any potential tie-in issues.

Deliverables: In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- 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
- Documentation that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM.

Task 7c: Application of FEMA Graphics and Database Specifications (MAS Activity 14a)

The Consultant shall apply the final FEMA DFIRM graphics and database specifications to the DFIRM files. 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 users). The Consultant shall coordinate with FEMA and those Mapping Partners responsible for Tasks 12 through 13, as necessary, to resolve any problems that are identified.

Deliverables: In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- 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; and
- NSP Format DFIRM Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards.

Task 7d: FIS Production

The Consultant shall compile a countywide FIS Report for the subject county. This work shall include converting any hardcopy FIS texts into digital format and recompiling the texts into one FIS in countywide format or adding all required sections to the FIS text. All Floodway Data Tables and Flood Profiles will be converted to NAVD 88.

Deliverable: In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- FIS Report, in a countywide format.

Task 8: Preliminary DFIRM and FIS Report Distribution (MAS Activity 15)

This Task involves 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. This Task will be performed by the Consultant, DNRC, and FEMA/NSP as defined below.

The Consultant shall prepare the FIS report in the FEMA Countywide Format according to FEMA Standards. The Consultant shall also 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.

The NSP shall perform a final QA/QC review of the Preliminary DFIRM and FIS report, including all data tables, Flood Profiles, and other components of the FIS report, according to FEMA Standards. The

NSP shall work with the Consultant, DNRC, and FEMA as appropriate to resolve discrepancies identified during the final QA/QC review.

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

The Consultant shall prepare Preliminary SOMAs for all affected communities if appropriate. The SOMAs shall list pertinent information regarding LOMCs that will be affected by the issuance of the DFIRM (i.e., superseded, incorporated, revalidated).

Deliverables: In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- Preliminary transmittal letters;
- Preliminary copies of the DFIRM and FIS report, including all new or updated data tables and Flood Profiles;
- Preliminary copies of the DFIRM and FIS report shall be mailed to the Chief Executive Officer (CEO) or 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 mailed with the Preliminary copies of the DFIRM and FIS report when 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; and
- 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.

Task 9: Post-Preliminary Processing (MAS Activity 16)

This task 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 tasks will be performed by the Consultant, DNRC, and FEMA/NSP as defined below.

When required, upon completion of a 30-day community comment period and/or final coordination meeting with the affected communities, the Consultant shall initiate the 90-day appeal period, if necessary, by completing the following (in accordance with FEMA Standards):

- Prepare and mail proposed BFE determination letters to the community CEOs and floodplain administrators;
- Prepare and place news release notifications of BFE changes in prominent newspapers with local circulation; and
- Prepare and place the appropriate notices (Proposed Rules) in the *Federal Register*.

The Consultant shall support FEMA 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.

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

The Consultant shall support FEMA/NSP in responding to comments not received within the 90-day appeal period or 30-day comment period (referred to as “special correspondence”), including drafting responses for FEMA review when appropriate and finalizing responses when requested by FEMA. The Consultant also shall mail the final correspondence (and enclosures if appropriate) and distribute appropriate copies of the correspondence and enclosures upon receipt of authorization from DNRC and FEMA.

If necessary, the Consultant shall work cooperatively with the NSP to revise the DFIRM and FIS report at the direction of DNRC and the FEMA Regional Project Officer and the Consultant shall distribute Revised Preliminary copies of the DFIRM and FIS report to the CEO and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA.

The Consultant shall prepare Final SOMAs for the affected communities as appropriate.

The Consultant shall work with DNRC and FEMA/NSP to establish the effective date for the DFIRM and FIS report, and shall prepare a Letter of Final Determination (LFD) for each affected community for FEMA review in accordance with the FEMA *Document Control Procedures Manual*. The Consultant also shall mail the final signed LFDs and enclosures (including the Final SOMA and the Final Rule for publication in the *Federal Register*, when appropriate) and distribute appropriate copies of the signed LFDs and enclosures upon receipt of authorization from FEMA.

The Consultant 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. The Consultant 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.

The Consultant, when appropriate, shall prepare and distribute revalidation 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.

The Consultant will maintain detailed records of costs associated with Post-Preliminary tasks. In the event that anticipated costs for Post-Preliminary Processing are exceeded, the Consultant will work with DNRC to prepare a Special Problems Report for FEMA to request additional funding. DNRC and PBSJ

will have a meeting(s) before a Special Problems Report is officially prepared to identify and agree upon the specific tasks needed to address the issues at hand and costs associated with those tasks.

The NSP shall ensure that technical and administrative support data are packaged in the FEMA-required TSDN format and stored properly in the library archives.

Deliverables: In accordance with FEMA Standards, provided to DNRC and NSP/FEMA:

- Documentation that the news release notifications 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; and
- LOMC Revalidation Letters if appropriate.

Task 10: Meetings and Coordination (MAS Activity 17)

The DNRC and the Consultant will include local officials as part of the Project Team and will coordinate with Project Team members throughout the life of the project. The Consultant shall meet and coordinate with DNRC and project stakeholders (e.g., Mapped Communities) to ensure successful implementation of project objectives. DNRC will coordinate and facilitate the meetings, and the Consultant will prepare for, attend, participate, and prepare meeting notes for project-related meetings.

The anticipated meetings will include the following:

- Formal progress/review meetings with DNRC and other stakeholders as requested by the DNRC;
- Public meetings/open houses with Mapped Communities to present draft/preliminary products and to educate interested parties and members of the public regarding the DFIRM conversion project and its potential implications for NFIP purposes; and
- Informal meetings as needed (in person or teleconference) with the federal-state team to resolve issues, receive input, and clarify SOW items.
- Attendance as a technical witness at state and local map adoption hearings, as needed.

Task 11: Project Management and Reporting

The Consultant shall adhere to the project schedule as attached. Any changes to the schedule must be approved in advance by DNRC and attached to this SOW.

The Consultant shall comply with the following reporting requirements:

- Provide weekly project updates by email to DNRC;
- Provide monthly cost and progress reporting, itemized by SOW Tasks, to the DNRC in the format provided by DNRC;
- Collect and maintain a set of deliverables for all tasks during contract performance.

Section 3
NEW FLOODPLAIN (REVISED) AREAS

Tasks 12, 13, 14 and 15 outline the work associated with new floodplain mapping studies for the following areas:

New Floodplain Analysis Study Table

Flooding Source	Reach Limits	Hydrologic Analyses	Hydraulic Analyses	Floodplain Mapping (Detailed)	Redelineation Using Effective Flood Profiles and Updated Topographic Data	Refinement or Creation of Zone A
Clark Fork River West of Frenchtown	Section A to Section X of the existing study		X	X		
Butler / LaValle Creek		X	X	X		X
Lolo Creek		X				X
Clark Fork River near Clinton					X	

The work generally consists of the following activities:

1. Field Surveys and Reconnaissance (MAS Activity 3)
2. Topographic Data Development (MAS Activity 4)
3. Hydrologic Analyses (MAS Activity 6)
4. Hydraulic Analyses (MAS Activity 8)
5. Floodplain Mapping (MAS Activity 10)

FEMA and NSP review is generally required after all activities. Each flooding source identified in the H&H Study Table will be addressed either by:

- a. Detailed Riverine Mapping,
- b. Limited Detail Riverine Mapping,
- c. Redelineation Using Effective Flood Profiles and Updated Topographic Data or Aerial Photography, or
- d. Refinement or Creation of Zone A.

For each of these, the Consultant shall delineate floodplain and floodway boundaries as required for the flooding sources identified in the H&H Study Table. The Consultant shall incorporate all new or revised modeling as required and shall use the best available topographic data to delineate the boundaries on a digital work map. Upon completion of floodplain mapping (for each mapping method: a, b, and c), the Consultant shall submit the mapping to FEMA/NSP for an independent QA/QC review. The Consultant shall address all related concerns or questions that are identified by FEMA/NSP during the independent QA/QC review.

Task 12 – Clark Fork River West of Frenchtown Floodplain Mapping

A. Introduction

The PBS&J Team shall use the existing hydrology data and rebuild a hydraulic model from existing hard copy data to establish the river floodway for 15.4 miles of the Clark Fork River west of Frenchtown. The project reach begins at the Mineral County/Missoula County line (section A) and progresses upstream to the start of an established floodway (section X). The hydraulic analysis methods used for this analysis will include the HEC-RAS computer program.

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

B. Assumptions and Approach

- Reach boundaries will extend from the Mineral County line (section A) upstream to section X.
- No new survey data will be generated for this task.
- Hydrology from the existing FIS will be used.
- A hard copy of the existing hydraulic model will be obtained from the NSP and used to recreate the hydraulic model.
- Any new river crossings constructed since the existing model became effective will be ignored.
- Floodway modeling will consist of running the new 100-year model with 0.5-foot maximum surcharge floodway encroachments.
- Submittal and review fees charged by FEMA will either be waived by FEMA or will be paid by DNRC or the local agencies.

C. General information

- Length of segment to be modeled is approximately 15.4 miles measured along the channel.
- Engineers will calibrate the new hydraulic model to results of the existing FIS.

D. Scope of Work

The following presents itemized scoping items including specific work products and assumptions. Included with this scope of work is a work plan which presents hours by task.

1. Project Management, Coordination and Meetings

The PBS&J team will conduct the following items necessary for the management and coordination of the project:

1.1 Project Management. PBS&J management will coordinate all aspects of the work, including data collection, research, and hydraulic analysis. As part of the management task, PBS&J will prepare and submit monthly progress reports and invoices to the DNRC. A written summary of progress presented as percent complete for specific work tasks will be included with the monthly invoices.

1.2 Coordination and Progress Meetings. PBS&J will attend a total of 6 progress meetings with the DNRC during the 16-week duration of the task. The work plan associated with this task is based on attending one progress meeting every month and two additional meetings as necessary.

1.3 Internal Team Meetings and Coordination. PBS&J's Project Manager will be responsible for ongoing internal coordination of the project team. Internal team meetings will be held with adequate frequency to keep the study proceeding on schedule and to ensure thorough communication on technical issues and approaches.

1.4 Public Meeting. This proposal assumes that one formal meeting, involving the City of Missoula, Missoula County, oversight agencies (FEMA and/or DNRC), the public, or a combination thereof, will be held during the project duration. This subtask provides time to prepare for and attend that meeting.

4 Hydraulics

The PBS&J team will conduct the following work to develop the hydraulic model and required technical submittals:

4.1 Data Collection. PBS&J will attempt to obtain a hard copy of the input/output data for hydraulic model associated with the FIS.

4.2 Develop initial geometric input for HEC-RAS. PBS&J will develop the geometric input necessary for HEC-RAS modeling based on the data from the hydraulic model for the FIS.

4.3 HEC-RAS floodplain runs and troubleshooting (100yr, no floodway). PBS&J will run HEC-RAS model simulations representing the 100-year flood and troubleshoot the models as necessary to match established BFEs. Troubleshooting will involve verifying that the results are reasonable, resolving warnings and/or errors in HEC-RAS output, adjusting bridge/culvert modeling parameters as necessary for accurate simulation, and fine-tuning split-flow parameters.

4.4 HEC-RAS floodway runs for 0.5-ft rise. PBS&J will develop a floodway model by adding floodway encroachments, set at the current regulatory floodway lines, to the 100-year HEC-RAS model of existing conditions. PBS&J will run the regulatory floodway model to verify that the allowable 0.5-ft rise is not exceeded at any location. If the allowable rise is exceeded, the encroachment stations will be adjusted as necessary to bring the rise down to no more than 0.5 ft.

4.5 Workmaps. PBS&J will produce GIS and hardcopy workmaps showing topography, floodplain inundation, and proposed floodway. These digital workmaps will be prepared using GIS and will show the topographic contours along with the 100-year floodplain inundation and the proposed floodway encroachment lines. Base Flood Elevation contours will also be included in the digital workmap files. Hardcopy versions of the workmaps will be plotted for submittal to DNRC, City of Missoula, Missoula County, FEMA and other reviewing entities. These workmaps will be included in the Technical Support Data Notebook.

4.5.5 Incorporate any revisions requested by the DNRC.

4.6 Technical Support Data Notebook. In order to provide complete documentation of the study process, decisions and results, PBS&J will prepare a Technical Support Data Notebook (TSDN) for the study, following FEMA's format and content requirements. The compilation of the TSDN will begin early in the study and will be an ongoing effort throughout the duration of the project. This effort will include limited draft contributions to the Flood Insurance Study (FIS) Report. Included in this notebook on CD-ROM will be the final HEC-RAS input files. The final hydrologic computations will be included. Narrative for each structure that affects water surface elevations should be given. Also a narrative in regard to assumed critical depths, and other model warnings should be given.

5.0 Quality Assurance/Quality Control

PBS&J will perform QA/QC on all deliverables submitted to the DNRC, FEMA and reviewing agencies.

5.1 Independent QA/QC. The modeling work and workmaps will be reviewed independently, at appropriate junctures, by one or more registered Professional Engineers at PBS&J that will not be otherwise integrally involved in the project. The reviewers will prepare an independent QA/QC summary describing their findings and recommended modifications, if any.

6.0 Post Submittal Coordination and Follow-up

Following submittal of the technical data to FEMA, PBS&J will perform the following task:

6.1 FEMA Coordination. PBS&J will coordinate with FEMA to provide any additionally requested information. This coordination is anticipated to consist of phone conversations and/or meetings with local FEMA Region VIII staff.

Task 13 – Butler/LaValle Creek Floodplain Mapping

A. Introduction

The PBS&J Team shall perform hydraulic analyses for 5.7 miles of Butler and LaValle Creeks. A detailed study with floodway will be performed for 3.2 miles of stream with the Grass Valley French Ditch as the upstream boundary and the Frenchtown Irrigation Ditch as the down stream boundary (hereafter referred to as "Section 1"). In addition, an enhanced Zone A study will be performed for 2.5 miles of stream with the Frenchtown Irrigation Ditch as the upstream boundary and the Clark Fork River floodplain/O'Keefe Creek as the down stream boundary (hereafter referred to as "Section 2").

For Section 1, the modeling will include the 10-, 2-, 1-, and 0.2-percent-annual-chance events based on peak discharges from a detailed hydrology analysis. The hydraulic analysis methods used for this analysis will include the HEC-RAS computer program.

For Section 2, the modeling will include the 1-percent-annual-chance event based on peak discharges from a new hydrologic analysis, also included in the scope of work for this project. The hydraulic analysis methods used for this analysis will include the use of the HEC-RAS computer program.

New topographic data will be obtained from an outside vendor for both stream Sections. Topographic data will have an accuracy of 2 feet.

Additionally, the PBS&J Team will adhere to ASFPM's May 12, 2003 resolution on topographic data development and floodplain mapping which states: "The flood elevations and the floodplain delineations on the maps must correlate reasonably to the best available topographic information for the stream and adjacent corridor."

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

B. Assumptions and Approach

Section 1

- Reach boundaries on Butler and Lavalley Creeks will extend from the Grass Valley French Ditch downstream to the Frenchtown Irrigation Ditch. This reach includes the confluence of the two streams.
- The hydraulic model will use the Frenchtown Irrigation Ditch as a weir and will be the basis for downstream elevation control in conjunction with results of hydraulic modeling of stream Section 2.
- New 2 foot topographic mapping based on aerial photography will be obtained for this study from an outside vendor.
- Modeling will consist of a HEC-RAS model of the entire reach.
- Floodway modeling will consist of running the new 100-year model with 0.5-foot maximum surcharge floodway encroachments.
- Any work related to Summary of Past Map Actions (LOMR, LOMA, etc), revalidations, and public notices is excluded from this Scope of Work.
- Submittal and review fees charged by FEMA will either be waived by FEMA or will be paid by DNRC or the local agencies.

Section 2

- Reach boundaries for Section 2 extend from the Frenchtown Irrigation Ditch as the upstream boundary to the Clark Fork floodplain/O'Keefe Creek at the downstream boundary.
- New 2 foot topographic mapping based on aerial photography will be obtained for this study from an outside vendor.
- Structures will not be surveyed. Structures will be measured in the field and verified against existing as-built data (if available).
- No surveyed cross sections will be obtained.
- Modeling will consist of a HEC-RAS model of the entire reach.

- No floodway modeling will be performed for this study.
- Any work related to Summary of Past Map Actions (LOMR, LOMA, etc), revalidations, and public notices is excluded from this Scope of Work.
- Submittal and review fees charged by FEMA will either be waived by FEMA or will be paid by DNRC or the local agencies.

C. General information

Section 1

- Length of segment to be modeled is approximately 3.2 miles measured along the valley.
- Approximate number of bridges and other hydraulic structures is assumed to be four.
- Approximate number of ground control points required for aerial photography is 26.
- Modeling engineers will ground-truth topographic mapping by comparison to aerial survey at 2 locations.
- Engineers will obtain and examine plans for all existing bridges and other hydraulic structures (as available).
- Engineers will collect and examine orthophotography for roughness assignment and to plan field reconnaissance.
- Engineers will perform detailed field reconnaissance of all bridge and hydraulic structure sites.

Section 2

- Length of segment to be modeled is approximately 2.5 miles.
- Approximate number of bridges and other hydraulic structures is 4.
- Engineers will obtain and examine plans for all existing bridges and other hydraulic structures (as available).
- Engineers will collect and examine orthophotography for roughness assignment and to plan field reconnaissance.
- Engineers will perform detailed field reconnaissance of all bridge and hydraulic structure sites. Survey data will not be collected for these structures.

D. Scope of Work

The following presents itemized scoping items including specific work products and assumptions. Included with this scope of work is a work plan which presents hours by task.

1. Project Management, Coordination and Meetings

The PBS&J team will conduct the following items necessary for the management and coordination of the project:

1.1 Project Management. PBS&J management will coordinate all aspects of the work, including data collection, research, surveying, topographic verification and hydraulic analysis. As part of the management task, PBS&J will prepare and submit monthly progress reports and

invoices to the DNRC. A written summary of progress presented as percent complete for specific work tasks will be included with the monthly invoices.

1.2 Coordination and Progress Meetings. PBS&J will attend a total of 6 progress meetings with the DNRC during the 16-week duration of the project. The work plan associated with this task is based on attending one progress meeting every month and two additional meetings as necessary.

1.3 Internal Team Meetings and Coordination. PBS&J's Project Manager will be responsible for ongoing internal coordination of the project team. Internal team meetings will be held with adequate frequency to keep the study proceeding on schedule and to ensure thorough communication on technical issues and approaches.

1.4 Public Meeting. This proposal assumes that one formal meeting, involving the City of Missoula, Missoula County, oversight agencies (FEMA and/or DNRC), the public, or a combination thereof, will be held during the project duration. This subtask provides time to prepare for and attend that meeting.

2. Project Survey

The following survey tasks will be completed as part of this project:

2.1 Project Team Kick-off Meeting. A project team kick-off meeting shall be held at the City of Missoula offices with City/County staff and the consultant staff present from PBS&J. PBS&J shall prepare and present a project work plan that encompasses the mapping process. The consultant shall prepare and distribute meeting minutes.

2.2 Project Control. Horizontal and vertical control points will be established using both GPS and conventional surveying techniques. Control points will be tied to existing horizontal and vertical control and will be based upon the Montana State Plane Coordinate System. Previous project control points for existing topographic mapping will also be surveyed and tied to the new control.

2.3 Digital Mapping. All mapping data for this project will be collected to be compatible with GIS and engineering applications. All data features will be separated by levels. All lines and polygons will be mathematically close. The data will be delivered in a format compatible with the County's GIS system and will include files for planimetric feature, DTM, and contours.

2.4 Cross section survey. Mapping will be performed based on aerial photography. Therefore, on the ground cross section data will not be collected, except as listed in Section 2.5 below.

2.5 Structure survey. Cross sections will be surveyed at the upstream and downstream faces of all bridges and hydraulic structures in stream Section 1 to the extent that access can be reasonably attained. A total of 4 structures are assumed for Section 1 of this project. Structure survey will include detailed measurements and surveys of the county road, city street, state highway, and railroad bridges crossing Trumbull Creek and Spring Creek within the project area. Detailed surveys and measurements of structures that exert control on the flood hydraulics of the two streams will also be performed. No structure survey will be performed on bridges and hydraulic structures in stream Section 2.

2.6 Road profile surveys. For all crossings, the PBS&J team will perform profile surveys of the road crossings. The extent of the road profile survey at each crossing will be sufficient to include

all potential areas of overtopping by a 500-year flood. The profile surveys are necessary for accurate hydraulic modeling of each bridge crossing.

2.7 Contingency survey work. The need for additional ground surveying may arise as the hydraulic modeling is being developed. Possible examples of such a need might include a side channel spill area where the spill-over profile is needed, a segment of embankment projecting into the floodplain, or other such contingency. The fee estimate assumes 1 day of contingency survey.

3. Hydrologic Analysis

The Consultant shall perform hydrologic analyses as necessary for the detailed flooding source(s) identified in the H&H Study Table. The Consultant shall calculate peak flood discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance storm events for detailed mapping. These flood discharges will be the basis for subsequent hydraulic analyses.

Upon completion of the hydrologic modeling the flooding sources, the Consultant shall submit the results to FEMA/NSP for an independent QA/QC review. The Consultant shall address all related concerns or questions that are identified by FEMA/NSP during the independent QA/QC review.

Deliverables: The deliverables may include the following, in accordance with FEMA Standards, and provided to DNRC and FEMA/NSP:

- 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.
- NSP Format Hydrology Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards.

4 Hydraulics

The PBS&J team will conduct the following work to develop the hydraulic model and required technical submittals:

4.2 Data Collection. PBS&J will attempt to obtain as-built plans of the bridges, culverts and other hydraulic structures that affect floodplain hydraulics from the owners of the structures. In order to make efficient use of the various data important to the study (field notes, photos, mapping, calibration data, structure measurements, etc) PBS&J will compile and organize the data into a readily accessible file system, organized around the format of the Technical Support Data Notebook.

4.3 Engineer field reconnaissance. PBS&J will perform field reconnaissance of Butler Creek and LaValle Creek flooding zone. The purpose of the reconnaissance will be to note channel and floodplain vegetation and ground cover; identify potential hydraulic controls; and examine hydraulic structures, bridges, and other features that will affect the floodplain

hydraulics. This effort will include a focused reconnaissance visit at the beginning of the project, as well as later visits to specific sites to validate model results in complex areas.

4.3 Develop initial geometric input for HEC-RAS. PBS&J will develop the geometric input necessary for HEC-RAS modeling. Cross sections will be extracted from the DTM. The as-built structure drawings and structure surveys will provide the information for developing input parameters for bridges and other hydraulic structures as they exist at the time that the model study commences. The aerial orthophotos used site mapping, along with field reconnaissance observations, will be used for the initial assignment of roughness values.

4.4 Develop discharge and boundary condition input for HEC-RAS. Discharge input data for the model will be based on the detailed hydrologic analysis described above. The downstream starting water surface elevation at the Clark Fork floodplain will be taken from the effective floodplain data. At the intersection with O'Keefe Creek (if topographic data indicates appropriate) normal depth will be used as the downstream starting water surface elevation.

4.5 HEC-RAS floodplain runs and troubleshooting (10yr, 50yr, 100yr, 500yr, no floodway). For stream Section 1, PBS&J will run HEC-RAS model simulations representing existing conditions for the 10-year, 50-year, 100-year, and 500-year floods and troubleshoot the models as necessary. Troubleshooting will involve verifying that the results are reasonable, resolving warnings and/or errors in HEC-RAS output, adjusting bridge/culvert modeling parameters as necessary for accurate simulation, and fine-tuning split-flow parameters.

For stream Section 2, PBS&J will run HEC-RAS model simulations representing existing conditions for the 100-year flood and troubleshoot the model as necessary. Troubleshooting will involve verifying that the results are reasonable, resolving warnings and/or errors in HEC-RAS output, adjusting bridge modeling parameters as necessary for accurate simulation, and fine-tuning split-flow parameters.

4.6 HEC-RAS floodway runs for 0.5-ft rise. For stream Section 1, PBS&J will develop a floodway model by adding floodway encroachments to the 100-year HEC-RAS model of existing conditions. PBS&J will run the regulatory floodway model to verify that the allowable 0.5-ft rise is not exceeded at any location. If the allowable rise is exceeded, the encroachment stations will be adjusted as necessary to bring the rise down to no more than 0.5 ft.

4.7 Workmaps. PBS&J will produce GIS and hardcopy workmaps showing topography, floodplain inundation, and proposed floodway. These digital workmaps will be prepared using GIS and will show the topographic contours along with the 100-year and 500-year floodplain inundation and the proposed floodway encroachment lines. Base Flood Elevation contours will also be included in the digital workmap files. Hardcopy versions of the workmaps will be plotted for submittal to DNRC, City of Missoula, Missoula County, FEMA and other reviewing entities. These workmaps will be included in the Technical Support Data Notebook.

4.7.5 Incorporate any revisions requested by the DNRC.

4.8 Flood Profiles and Typical Sections. For stream Section 1, PBS&J will create profile plots showing the thalweg profile along with the 10-, 50-, 100-, and 500-year water surface

profiles. PBS&J will also create typical floodplain cross sections showing the 10-, 50-, 100-, and 500-year water surface elevations where appropriate to clarify the nature and extent of flooding at selected locations.

4.9 Technical Support Data Notebook. In order to provide complete documentation of the study process, decisions and results, PBS&J will prepare a Technical Support Data Notebook (TSDN) for the study, following FEMA's format and content requirements. The compilation of the TSDN will begin early in the study and will be an ongoing effort throughout the duration of the project. This effort will include limited draft contributions to the Flood Insurance Study (FIS) Report. Included in this notebook on CD-ROM will be the final HEC-RAS input files. The final hydrologic computations will be included. Narrative for each structure that affects water surface elevations should be given. Also a narrative in regard to assumed critical depths, and other model warnings should be given.

5.0 Quality Assurance/Quality Control

PBS&J will perform QA/QC on all deliverables submitted to the DNRC, FEMA and reviewing agencies.

5.1 Independent QA/QC. The modeling work and workmaps will be reviewed independently, at appropriate junctures, by one or more registered Professional Engineers at PBS&J that will not be otherwise integrally involved in the project. The reviewers will prepare an independent QA/QC summary describing their findings and recommended modifications, if any.

6.0 Post Submittal Coordination and Follow-up

Following submittal of the technical data to FEMA, PBS&J will perform the following task:

6.1 FEMA Coordination. PBS&J will coordinate with FEMA to provide any additionally requested information. This coordination is anticipated to consist of phone conversations and/or meetings with local FEMA Region VIII staff.

Task 14 – Lolo Creek Floodplain Mapping

1.0 Introduction

The PBS&J Team shall perform hydraulic analyses for 6 miles of Lolo Creek from the Forest Service boundary on the upstream end to the effective Zone A as the downstream boundary. A Zone A will be designated for the 1-percent-annual-chance event based on peak discharge from a regression equation based hydrology analysis. The hydraulic analysis methods used for this analysis will include the HEC-RAS computer program.

Additionally, the PBS&J Team will adhere to ASFPM's May 12, 2003 resolution on topographic data development and floodplain mapping which states: "The flood elevations and the floodplain delineations on the maps must correlate reasonably to the best available topographic information for the stream and adjacent corridor."

For this analysis, existing topographic data will be used.

The PBS&J Team shall use the FEMA CHECK-2 or CHECK-RAS checking program to check the reasonableness of the hydraulic analyses. To facilitate independent QA/QC review, the PBS&J Team shall provide explanations for unresolved messages from the CHECK-2 or CHECK-RAS program, as

appropriate. In addition, the PBS&J Team shall address all concerns or questions regarding this task that are raised by FEMA during independent QA/QC review.

2.0 Project Management, Coordination and Meetings

The PBS&J team will conduct the following items, as necessary, for the management and coordination of the project:

2.1 Project Management. PBS&J management will coordinate all aspects of the work, including data collection, research, surveying, topographic verification and hydraulic analysis. As part of the management task, PBS&J will prepare and submit monthly progress reports and invoices to the DNRC. A written summary of progress presented as percent complete for specific work tasks will be included with the monthly invoices.

2.2 Coordination and Progress Meetings. PBS&J will attend a total of 1 progress meeting with the DNRC during the duration of the project.

2.3 Internal Team Meetings and Coordination. PBS&J's Project Manager will be responsible for ongoing internal coordination of the project team. Internal team meetings will be held with adequate frequency to keep the study proceeding on schedule and to ensure thorough communication on technical issues and approaches.

2.4 Public Meeting. This proposal assumes that one formal meeting, involving the City of Missoula, Missoula County, oversight agencies (FEMA and/or DNRC), the public, or a combination thereof, will be held during the project duration. This subtask provides time to prepare for and attend that meeting.

3.0 Assumptions and Approach

- Reach boundaries will extend from the Forest Service boundary on the upstream end to the effective Zone A as the downstream boundary.
- The hydraulic model will use normal depth for Lolo Creek as the starting water surface elevation.
- Existing topographic mapping will be used for the study. No new topographic survey is included.
- The Consultant may expand on the approaches for analyzing Zone A areas outlined in *Guidelines and Specifications for Flood Hazard Mapping Partners* and in FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas* (April 1995), and/or develop new approaches. Such approaches must be coordinated with DNRC and the FEMA Regional Project Officer before analysis and mapping begin.
- Any work related to Summary of Past Map Actions (LOMR, LOMA, etc), revalidations, and public notices is excluded from this Scope of Work.
- Submittal and review fees charged by FEMA will either be waived by FEMA or will be paid by DNRC or the local agencies.

4.0 General information

- Length of segment to be modeled is approximately 6 miles measured along the channel.
- Approximate number of bridges and other hydraulic structures is assumed to be zero.

- Engineers will collect and examine orthophotography for roughness assignment.

5.0 Deliverables

In accordance with the FEMA Standards; provided to DNRC and FEMA/NSP:

- Digital work maps showing the new 1-percent-annual-chance floodplain boundary delineations and redelineations, flood insurance risk zone labels, and all applicable base map features;
- Written summary of the analysis methodologies;
- Any backup or supplemental information, including supporting calculations and assumptions for any computed 1-percent-annual-chance water-surface elevations used in the mapping required for the independent QA/QC review under Activity 11;
- Hardcopy and digital versions of input and output for any computer programs that were used;
- 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
- Documentation that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM;
- NSP Format Mapping Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards.
- If automated GIS-based models are applied, all input data, output data, intermediate data processing products, and GIS data layers shall be submitted.

6.0 Hydraulics

1. The PBS&J team will conduct the work to develop the approximated 100-year floodplain and required technical submittals.
2. The PBS&J team will provide complete documentation of the study process, decisions and results to the DNRC for review.
3. The PBS&J team will incorporate any revisions requested by the DNRC.

Task 15 – Clark Fork River Near Clinton Floodplain Assessment

1.0 Introduction

The PBS&J Team shall perform a topographic survey of approximately 0.5 river miles of area north of the Clark Fork river near the town of Clinton. The Burlington Northern railroad grade has been removed in this area without a LOMR. PBS&J will compare the new survey data with the effective BFE and site reconnaissance data. PBS&J will prepare a brief report presenting assessment results and recommendations.

2.0 Assumptions and Approach

- Reach boundaries will extend approximately from sections FF to FE.
- Existing BFE data will be used for the assessment.

3.0 General information

- Length of segment to be assessed is approximately 0.5 miles measured along the channel.
- Assessment will include a qualitative assessment of potential for damaging flow velocities verses backwater only.

4.0 Deliverables

PBS&J will provide to DNRC and FEMA/NSP:

- Summary report with recommendations for further actions;
- Written summary of the analysis methodologies;

***ATTACHMENT A: DETAILED COSTS FOR DFIRM CONVERSION AND
INDIVIDUAL H&H STUDIES***

ATTACHMENT B: PANELIZATION SCHEME

***ATTACHMENT C: PROJECT SCHEDULE
(AND REVISED PROJECT SCHEDULES)***

Table 6-1. Project Schedule - Missoula

ACTIVITIES	RESPONSIBLE PARTNER(S)	DATE DUE
Activity 1 – Pre-Scoping	DNRC, FEMA/NSP	2/30/05
Activity 2 - Scoping	DNRC, FEMA/NSP	5/30/05
Activity 3 – Field Surveys and Reconnaissance	DNRC	11/15/05
Activity 4 – Topographic Data Development	DNRC	11/15/05
Activity 5 – Independent QA/QC Review of Topographic Data	FEMA/NSP	12/15/05
Activity 6 –Hydrologic Analyses	DNRC	2/15/06
Activity 7–Independent QA/QC Review of Hydrologic Analyses	FEMA/NSP	3/1/06
Activity 8 – Hydraulic Analyses	DNRC	4/15/06
Activity 9 – Independent QA/QC Review of Hydraulic Analyses	FEMA/NSP	5/1/06
Activity 10 – Floodplain Mapping Redelineation	DNRC	1/15/06
Activity 11 – Independent QA/QC Review of Floodplain Mapping (Revised Areas)	FEMA/NSP	2/15/06
Activity 12 – Base Map Acquisition	DNRC	11/1/05
Activity 13 – DFIRM Production (Non-Revised Areas)	DNRC	3/1/06
Activity 13A – Independent QA/QC Review of DFIRM Production (Non-Revised Areas)	FEMA/NSP	3/15/06
Activity 14 – DFIRM Production (Merging Revised and Non-Revised Information)	DNRC	4/15/06
Activity 14A – DFIRM Production (Application of DFIRM Graphics and Database Specifications)	DNRC	5/1/06
Activity 14B – Independent QA/QC Review of DFIRM Product Meeting FEMA Graphics and Database Specifications	FEMA/NSP	6/1/06
Activity 15 – Preliminary DFIRM and FIS Report Distribution	DNRC, FEMA/NSP	7/15/06
Activity 16 – Post-Preliminary Processing	DNRC, FEMA/NSP	9/30/07
Activity 17 - Outreach	DNRC	N/a

***ATTACHMENT D: TERMINOLOGY AND DEFINITIONS OF THE SOW
AND MAS 2005-01***

***ATTACHMENT E: SPECIAL PROBLEM REPORTS OR OTHER
MODIFICATIONS TO THE MAS OR SOW***