

# **SCOPE OF WORK**

**FOR**

**Cascade COUNTY, MT**

**FY 2007**

**Prepared by:**



**3810 Valley Commons Drive, Suite 4  
Boxeman, MT 59718**

**Prepared for:**

**Montana Department of Natural Resources and Conservation,  
P.O. Box 201601,  
Helena, Montana 59620-1601**

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### Attachments

Project Work Plan

Project Cost Worksheet

## **Overview and General Requirements**

### **A. Overview**

As part of the Map Modernization Program, PBS&J has been tasked to provide DFIRM conversion services and hydrologic and hydraulic engineering services for Cascade County, Montana.

This document outlines the Scope of Work (SOW), deliverables and project schedule. Upon completion, the completed DFIRM and studies will be submitted to FEMA for approval.

The objective of the Flood Map Project documented in this SOW is to develop a Digital Flood Insurance Rate Map (DFIRM) and Flood Insurance Study (FIS) report for Cascade County and Incorporated Areas. The product of this SOW will be a single set of digital floodplain data for the entire county. This project will be completed primarily by PBS&J, the Montana Department of Natural Resources and Conservation (DNRC), and the Federal Emergency Management Agency (FEMA), primarily acting through their consultant, Michael Baker Jr., Inc., hereafter called the National Service Provider (NSP).

### **B. Compliance with FEMA Standards and DNRC MAS No. 2007-01**

The PBS&J Project Manager will review and be familiar with DNRC MAS No. 2007-01 for the DFIRM conversion and restudy of Flood Hazard Areas within Cascade County. The Project Manager will ensure that all FEMA standards, requirements, and deliverables associated with the tasks outlined in this Scope of Work are met, adhered to, and provided. 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 and are specifically outlined in this SOW. It is understood that some tasks will be completed by the DNRC. Those tasks are excluded from this scope of work. PBS&J is not responsible for completing activities in the MAS that have been assigned to FEMA or the NSP.

PBS&J shall prepare all new digital information, including maps and flood profiles, in elevations that are adjusted to North America Vertical Datum (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 Cascade County by the end of the performance period, which will not extend beyond October 30, 2009, for the associated MAS.

If there are concerns or questions about meeting MAS standards, including schedule or budget, the Project Manager will immediately bring the issue to the attention of DNRC and will work with DNRC and other appropriate parties toward resolution.

### **C. Schedule**

The scope is based on a 27-month duration for the project from Notice-to-Proceed (NTP). Upon NTP, PBS&J will work with DNRC to create a reasonable schedule which attempts to meet the final deliverable dates noted in DNRC MAS No. 2007-01. The anticipated schedule is included as an appendix to this scope of work.

## Task 1 – Project Management, Coordination and Meetings

### A. Scope of Work

#### 1.1 Project Management, Coordination and Meetings

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

**1.1.1 Project Management.** PBS&J management will coordinate all aspects of the work, including data collection, research, and DFIRM conversion. 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. PBS&J will provide regular updates to DNRC via phone and email as needed throughout the project.

**1.1.2 Coordination and Progress Meetings.** PBS&J will attend a total of 15 progress meetings with the DNRC during the 21 month duration of the project. The work plan associated with this task is based on attending one progress meeting every month during the Preliminary phase and one meeting every other month during the Post-Preliminary Phase. If additional stakeholder coordination is required, it is anticipated that those stakeholders will be included in the monthly coordination meetings rather than having a separate meeting. This will keep meeting time to a minimum. It is anticipated that some of these meetings may occur as conference calls rather than formal meetings.

**1.1.3 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.

**1.1.4 Public Meetings.** This proposal assumes that two formal meetings will be held for the DFIRM portion of the project, including a "sneak-peak" meeting where draft preliminary work products are presented and an open house to present preliminary products to educate interested parties and members of the public regarding the DFIRM conversion project and its potential implications for NFIP purposes. This task provides time to prepare for and attend those meetings. PBS&J will assist the DNRC with handouts and documentation for these meetings. It is anticipated that the DNRC will coordinate and facilitate the meetings, and PBS&J will prepare for, attend, participate, and prepare meeting notes for project-related meetings.

<b>Task 2 – DFIRM Conversion</b>
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**A. Scope of Work**

**2.1 Scoping**

PBS&J will directly support DNRC in the Map Modernization Scoping Process. As part of this work it is assumed that the NSP will provide an Available Data Inventory document to the DNRC and PBS&J. 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 including those located within states that border Montana;
- A summary of contiguous community agreement checks;
- 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.

**2.1.1 Communication, Coordination and Potential Obstacles.** PBS&J will review the provided documentation and utilize the information provided by the DNRC and the NSP. PBS&J will monitor the project on an ongoing basis and bring to the DNRC’s attention any issues that could delay or substantially affect 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.

**Deliverable:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.1	As needed, email communication and documentation of potential obstacles

**2.1.2 Project Scope.** PBS&J 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 the new project;
- Identify other data needed to complete the Project and its source; and
- 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 for the DNRC, 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:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.2	Draft Project Scope document
D.2.3	Final Project Scope document

**2.1.3 Scoping Meeting.** PBS&J will attend the Scoping Meeting which will be coordinated, set up, and conducted by the DNRC. PBS&J will send the Project Manager and a Geographic Information Systems (GIS) Specialist to attend the Scoping Meeting. It is anticipated that once a general overview of the project has been given, the meeting will separate into workgroups focusing on the following topics:

***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 based on the estimated costs provided by PBS&J. PBS&J 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 (1) month wherever possible).

***Review of Proposed Paneling Scheme (H&H):***

The scoping map shall be used to review the proposed paneling and scale scheme. PBS&J 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 Digital Orthoquads (DOQ’s) 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.

PBS&J 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 (1) 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 Project Scope shall be reviewed, refined, and finalized.

At the meeting, PBS&J 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. If additional information is required

PBS&J will prepare meeting notes, including a proposed schedule and task assignments, and will submit the documentation to the DNRC following the meeting. The DNRC will review and finalize the meeting notes, schedule, task assignments, and will distribute this to all attendees, including contact information, within one (1) week of the meeting.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.4	Attendance at Scoping Meeting by Project Manager and GIS Specialist
D.2.5	Presentation or handouts as needed to relay information to Scoping Meeting attendees
D.2.6	Hard copy map of draft panelization, including indication of existing flood hazard data
D.2.7	Documentation of schedule of receipt of Base Mapping and Existing Model data
D.2.8	Documentation of prioritized reaches for restudy
D.2.9	Meeting notes

**Exclusions/Assumptions:**

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 H&H data;
- Community master plan(s)/Drainage Master Plan(s);
- Zoning Maps;
- Street Maps;
- As-built plans; and
- Floodplain Ordinance(s).

**2.2 Base Map Acquisition**

As part of Base Map Acquisition, PBS&J will complete the following tasks in accordance with FEMA Standards & Requirements:

**2.2.1 Data Collection and Compilation.** The PBS&J team will acquire and compile digital base map data from the DNRC, NSP and local communities. This data may be in

both raster and vector format. As part of the acquisition process PBS&J will secure the 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.

**2.2.2 Digital Base Map Development.** Once electronic files have been compiled, PBS&J will develop the digital base map for the project. As part of this development, PBS&J will work with communities to certify that the digital data meets the minimum standards and specifications that FEMA requires for DFIRM production. If data cannot be certified to meet these standards it will not be incorporated into the base mapping. PBS&J will work with the DNRC, FEMA and the NSP to determine the appropriate base map format; vector or raster based. The DFIRM database will be populated with the information required by the FEMA G&S.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.10	Written certification that the digital data meet FEMA's minimum standards and specifications
D.2.11	Documentation that FEMA can use the digital base map
D.2.12	Digital Base Map Files

**2.3 Profile Digitization and Vertical Datum Conversion**

Profiles will be digitized and geo-referenced to the NAVD1988 datum using conversion factors determined from FEMA specifications. This work shall include, at a minimum, the activities listed below.

**2.3.1 Datum Conversion.** Unless a community-wide conversion factor can be used, a stream-by-stream conversion factor must be determined for each flooding source to adjust data from NGVD29 datum to NAVD88 datum. The datum conversion process is documented in Appendix B of the FEMA Guidelines & Specifications for Flood Hazard Mapping Partners. PBS&J will develop conversion factors for each stream reach and flooding source per the G&S.

**2.3.2 Profile Digitization.** Effective FIS profiles will be digitized per the FEMA G&S, Appendix J. PBS&J will apply the datum conversion developed in Task 4.1 to the digitized profiles. This task will result in the creation of a seamless county-wide set of profiles for each flooding source. Letters of Map Change (LOMCs) will be incorporated in the digitized profiles.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.13	Datum conversion factors for all flooding sources from NGVD29 to NAVD88
D.2.14	Digitized flood profiles of all flooding mapped flooding sources in NAVD88

**2.4 Review of LOMC’s and Existing Data Study Information**

The following tasks will be completed to ensure incorporation of LOMC’s and XDS’s.

**2.4.1 Technical Reviews.** PBS&J shall review the technical, scientific, and other information supporting LOMC’s and XDS’s submitted by the DNRC to ensure that the data and modeling are consistent with FEMA Standards and Requirements, and standard engineering practice and are sufficient to prepare the DFIRM. PBS&J shall also review

XDS to meet the DNRC rules and regulations for designation and approval of submitted floodplain studies. This work shall include, at a minimum, the activities listed below:

- 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;
- 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 three (3) years from the date of receipt); and
- Comply with the DNRC designation and approval requirements.

PBS&J will not be responsible for preparing the studies in Technical Study Data Notebook (TSDN) format described in Appendix M of Guidelines and Specifications for Flood Hazard Mapping Partners, and will not be responsible for coordinating with FEMA or the NSP during the review process of any LOMC's or XDS's submitted during the course of the study (other than the studies identified in Task 3 of this SOW). If agreed upon by all mapping partners, XDS's that are not suitable for Limited Detail or Detail studies may be incorporated into the DFIRM as approximate studies if approved by FEMA/NSP/DNRC. All XDS's to be reviewed under this task need to be received within two (2) weeks from the kick-off meeting for the project.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.15	A Summary Report that describes the findings of the independent QA/QC review
D.2.16	Recommendations to resolve any problems that are identified during the independent QA/QC review

**2.5 Redelineation**

The following redelineation tasks shall be completed in accordance with the FEMA Standards and Requirements.

**2.5.1 1- and 0.2-percent Redelineation.** PBS&J shall delineate the 1- and 0.2-percent-annual-chance floodplain boundaries and the regulatory floodway boundaries (if required) for all effective flooding sources 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. PBS&J 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 does not reflect the same hydraulic characteristics as in the effective study, PBS&J shall evaluate the topographic data to determine if changes are significant enough to invalidate the floodplain boundary and regulatory floodway boundary redelineations. If so, PBS&J shall contact the DNRC (and the FEMA/NSP as needed) with a recommendation.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.17	Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, Base Flood Elevations (BFE's), flood insurance risk zone labels, and all applicable base map features
D.2.18	DFIRM mapping files
D.2.19	Metadata files describing the DFIRM data
D.2.20	Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale
D.2.21	Documentation that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM
D.2.22	Any backup or supplemental information used in the mapping required for the independent QA/QC review outlined under Activity 11
D.2.23	An explanation for the use of existing topography for the studied reaches, if appropriate
D.2.24	NSP Format Mapping Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards

## 2.6 DFIRM and FIS Production

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

**2.6.1 Non-Revised Areas.** For all flooding sources, except those segments for which updated flood data will be developed as part of this project, PBS&J 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 as referenced in the State of Montana Business Case Plan. PBS&J shall use the base map acquired previously for the conversion. PBS&J shall digitize 32 FIRM panels and create a total of 47 printed panels, as documented in the attached panelization scheme (Attachment 2). PBS&J shall incorporate the results of LOMCs issued by FEMA since the date of the current effective FIRM for each affected community.

### Deliverables:

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.25	Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFE's, flood insurance risk zone labels, and all applicable base map features
D.2.26	DFIRM mapping files
D.2.27	Metadata files describing the DFIRM data
D.2.28	Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale
D.2.29	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

**2.6.2 Merging Revised and Non-Revised Information.** Upon completion of the floodplain mapping activities for the revised areas (Task 3) and the DFIRM production

for non-revised areas (Task 7.1), PBS&J 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. PBS&J 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. PBS&J shall coordinate with FEMA and those Mapping Partners responsible for Task 3, as necessary, to resolve any potential tie-in issues.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.30	Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFE's, flood insurance risk zone labels, and all applicable base map features
D.2.31	DFIRM mapping files
D.2.32	Metadata files describing the DFIRM data
D.2.33	Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale
D.2.34	Documentation that describes and provides the results of all automated or manual QA/QC review steps taken during the preparation of the DFIRM

**2.6.3 Application of FEMA Graphics and Database Specifications.** PBS&J 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). PBS&J shall coordinate with FEMA and those Mapping Partners responsible for Tasks 12 through 20, as necessary, to resolve any problems that are identified.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.35	Digital work maps showing the 1- and 0.2-percent-annual-chance floodplain boundary delineations, regulatory floodway boundary delineations, cross sections, BFE's, flood insurance risk zone labels, and all applicable base map features
D.2.36	DFIRM mapping files
D.2.37	Metadata files describing the DFIRM data
D.2.38	Complete set of plots of DFIRM panels showing all detailed flood hazard information at a suitable scale
D.2.39	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
D.2.40	NSP Format DFIRM Database or Intermediate Data Delivery consistent with the NSP Data Capture Standards

**2.6.4 FIS Production.** PBS&J 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 (1) 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.

**Deliverables:**

Deliverable ID	Deliverable Description
D.2.41	FIS Report, in a countywide format

**2.7 Preliminary DFIRM and FIS Report Distribution**

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 PBS&J, the DNRC, and FEMA/NSP as defined below.

**2.7.1 FIS Submittal Preparation.** PBS&J shall prepare the FIS report in the FEMA Countywide Format according to FEMA Standards and Requirements. PBS&J 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 and Requirements. The NSP shall work with PBS&J, the DNRC, and FEMA as appropriate to resolve discrepancies identified during the final QA/QC review.

**2.7.2 FIS Distribution.** PBS&J 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. PBS&J 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. PBS&J shall file the notifications for later submittal to FEMA for review.

**2.7.3 SOMA Preparation.** PBS&J shall prepare Preliminary Summary of Map Actions (SOMA's) for all affected communities if appropriate. The SOMA's shall list pertinent information regarding LOMC's that will be affected by the issuance of the DFIRM (i.e., superseded, incorporated, revalidated).

**Deliverables:**

Deliverable ID	Deliverable Description
D.2.42	Preliminary transmittal letters
D.2.43	Preliminary copies of the DFIRM and FIS report, including all new or updated data tables and Flood Profiles
D.2.44	Preliminary copies of the DFIRM and FIS report shall be mailed to the Chief Executive Officer (CEO) and floodplain administrator of each affected community, all other Project Team members, the State NFIP Coordinator, the FEMA Regional Office, and others as directed by FEMA
D.2.45	Preliminary SOMA's, prepared in accordance with FEMA requirements, shall be mailed with the Preliminary copies of the DFIRM and FIS report when appropriate
D.2.46	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
D.2.47	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

D.2.48	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
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## 2.8 Post-Preliminary Processing

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 PBS&J, the DNRC, and FEMA/NSP as defined below.

**2.8.1 Initiation of 90-day Appeal Period.** When required, upon completion of a 30-day community comment period and/or final coordination meeting with the affected communities, PBS&J shall initiate the 90-day appeal period by completing the following (in accordance with FEMA Standards and Requirements):

- 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.

**2.8.2 Appeals Support.** PBS&J 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.

PBS&J shall mail all associated correspondence upon authorization by the DNRC and FEMA.

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

**2.8.4 Revised Preliminary.** If necessary, PBS&J shall work cooperatively with the NSP to revise the DFIRM and FIS report at the direction of the DNRC and the FEMA Regional Project Officer. PBS&J 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. *Before beginning this work, PBS&J will work with the DNRC and FEMA to develop a scope-of-work and cost to complete the revised preliminary submittal. Because of the unknown nature of this work, it will not be covered under the original contract budget.*

**2.8.5 Final SOMA Preparation.** PBS&J shall prepare Final SOMAs for the affected communities as appropriate.

**2.8.6 Letter of Final Determination.** PBS&J shall work with the 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. PBS&J shall also 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.

**2.8.7 Final Reproduction Materials.** PBS&J 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. PBS&J shall also prepare the appropriate paperwork to accompany the DFIRM and FIS report (including Print Processing Worksheet, Printing Requisition Forms, and Community Map Actions Form) and transmittal letters to the community CEOs.

**2.8.8 Revalidation Letters.** PBS&J, 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.

**2.8.9 Special Problems Report.** PBS&J will maintain detailed records of costs associated with Post-Preliminary tasks. In the event that anticipated costs for Post-Preliminary Processing are exceeded, PBS&J will work with the DNRC to prepare a Special Problems Report for FEMA to request additional funding.

**Deliverables:**

<b>Deliverable ID</b>	<b>Deliverable Description</b>
D.2.49	Documentation that the news release notifications were published in accordance with FEMA requirements
D.2.50	Documentation that the appropriate Federal Register notices (Proposed and Final Rules) were published in accordance with FEMA requirements
D.2.51	Draft and final Special Correspondence (and all associated enclosures, backup data, and other related information) for FEMA review and signature as appropriate
D.2.52	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
D.2.53	Draft and final LFDs (and all associated enclosures, backup data, and other related information) for FEMA review and signature
D.2.54	DFIRM negatives and final FIS report materials, including all updated data tables and Flood Profiles
D.2.55	Paperwork for the final DFIRM and FIS report materials
D.2.56	Transmittal letters for the printed DFIRM and FIS report
D.2.57	LOMC Revalidation Letters if appropriate

**Exclusions/Assumptions:**

All DFIRM submittals will be catalogued during the MIP uploading process. The MIP uploads will meet the TSDN submittal requirements.

## **Task 3 – New Hydrology and Hydraulic Studies**

### **Task 3 – Belt Creek**

#### **A. Introduction**

The PBS&J Team shall perform a limited detail hydraulic analysis for approximately 1.0 mile of Belt Creek within the corporate limits of the Town of Belt. The modeling will include only the 1-percent-annual-chance event based on peak discharge computed from either USGS gaging data or regression equations. The hydraulic analysis methods used for this analysis will include the HEC-RAS computer program. For this analysis, existing topographic data will be supplemented with 10 newly surveyed cross sections per mile.

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. Schedule**

The scope is based on a nine month duration for the project from Notice-to-Proceed.

#### **C. Assumptions and Approach**

- Reach boundaries for Belt Creek include the corporate boundaries of the Town of Belt.
- 2-foot topographic mapping from previous projects will be provided to PBS&J by Cascade County.
- One bridge will be surveyed. Structures will be measured in the field and verified against existing as-built data.
- Ten surveyed cross sections will be obtained.
- Modeling will consist of a HEC-RAS model of the entire reach.
- Floodway modeling will be performed for the 100-year return event only.
- 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.
- Hydrology computations will utilize USGS gaging data or regression equations.

#### **D. General information**

- Length of segment to be modeled is approximately 1.0 miles measured along the channel.
- Number of bridges and other hydraulic structures is assumed to be one.
- 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.

## **E. 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 up to 6 progress meetings with the DNRC during the 9 month duration of the project.

**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 Cascade 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. Hydraulics**

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

**2.1 Hydraulic 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.

**2.2 Engineer Field Reconnaissance.** PBS&J will perform field reconnaissance of the Belt 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.

**2.3 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 most recent available aerial orthophotos, along with field reconnaissance observations, will be used for the initial assignment of roughness values.

**2.4 HEC-RAS Floodplain Runs and Troubleshooting.** 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.

**2.5 Workmaps.** PBS&J will produce GIS and hardcopy workmaps showing topography and floodplain inundation. These digital workmaps will be prepared using GIS and will show the topographic contours along with the 100-year floodplain inundation. 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, Town of Belt, Cascade County, FEMA and other reviewing entities. These workmaps will be included in the Technical Support Data Notebook.

**2.6 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.

### **3.0 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.

### **4.0 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 National FEMA and local FEMA Region VIII staff.

## **Task 3 – New Hydrology and Hydraulic Studies**

### **Task 3 – Missouri River**

#### **F. Introduction**

The PBS&J Team shall perform a limited detail hydraulic analysis for approximately 2.0 miles of the Missouri River beginning at the Lewis & Clark County line and extending downstream to current effective floodplain (cross section BG). The modeling will include only the 1-percent-annual-chance event based on peak discharge computed from either USGS gaging data or regression equations. The hydraulic analysis methods used for this analysis will include the

HEC-RAS computer program. For this analysis, existing topographic data will be supplemented with 10 newly surveyed cross sections per mile.

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.

## **G. Schedule**

The scope is based on a nine month duration for the project from Notice-to-Proceed.

## **H. Assumptions and Approach**

- Reach boundaries for the Missouri River are the Lewis & Clark County line extending downstream to the effective study (cross section BG).
- Existing topographic data will be used for delineation.
- Two bridges will be surveyed. Structures will be measured in the field and verified against existing as-built data.
- Ten surveyed cross sections will be obtained.
- Modeling will consist of a HEC-RAS model of the entire reach.
- No floodway modeling will be performed.
- 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.
- Hydrology will utilize the effective FIS values.

## **I. General information**

- Length of segment to be modeled is approximately 2.0 miles measured along the channel.
- Number of bridges and other hydraulic structures is assumed to be two.
- 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.

## **J. 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 up to 4 progress meetings with the DNRC during the 9 month duration of the project.

**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 Cascade 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. Hydraulics**

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

**2.1 Hydraulic 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.

**2.2 Engineer Field Reconnaissance.** PBS&J will perform field reconnaissance of the Missouri River 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.

**2.3 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 most recent available aerial orthophotos, along with field reconnaissance observations, will be used for the initial assignment of roughness values.

**2.4 HEC-RAS Floodplain Runs and Troubleshooting.** 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.

**2.5 Workmaps.** PBS&J will produce GIS and hardcopy workmaps showing topography and floodplain inundation. These digital workmaps will be prepared using GIS and will show the topographic contours along with the 100-year floodplain inundation. 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, Cascade County, FEMA and other reviewing entities. These workmaps will be included in the Technical Support Data Notebook.

**2.6 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.

### **3.0 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.

### **4.0 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 National FEMA and local FEMA Region VIII staff.