

Request for Proposals

2025 French Creek Flood Mitigation Scoping Project

Introduction

Custer County, South Dakota, is seeking proposals from qualified and experienced consulting engineering firms to provide flood mitigation services. This project builds upon the County's ongoing flood resilience planning efforts, initiated in 2023, and the recently completed **French Creek Flood Mitigation Study (2024)**. The study highlighted the need for hydraulic improvements and increased floodplain capacity to better protect the community from future flooding.

The proposed scoping project will refine these findings by prioritizing mitigation projects, conducting feasibility and benefit-cost analyses, and developing engineering designs. The ultimate goal is to identify and design high-priority flood mitigation projects while assisting the community in securing funding for final design and implementation.

This project is funded through the Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC) Grant Program. As a recipient of BRIC funding, Custer County is committed to ensuring that all aspects of this project comply with FEMA's grant requirements, including but not limited to federal procurement standards, reporting obligations, and compliance with applicable federal, state, and local laws.

All proposals submitted in response to this RFP must acknowledge that the funding for this project is made possible through a grant from FEMA BRIC. The successful bidder will be required to adhere to all grant conditions and provide any necessary documentation to support compliance with FEMA regulations.

General Background

Custer County is a rural county of 8,360 people (2021 American Community Survey) in southwestern South Dakota. After experiencing devastating flooding in 2019, the County started to take a more holistic, watershed-scale approach to building flood resilience. The proposed scoping project is the next step in this effort.

Flood Mitigation Plan Study Area

French Creek Watershed in Custer County above Stockade Lake.

Scope of Work

Custer County's French Creek Watershed Flood Mitigation Scoping Project is the next step in a flood resilience planning process that the county began in 2023. The project began with the French Creek Flood Mitigation Study (Phase 1 and Phase 2 Summary Reports attached), which identified the need for hydraulic improvements and additional floodplain capacity. Building upon this work, the proposed scoping project will prioritize projects, conduct feasibility and benefit-cost analyses, and result in engineering designs. The goal of this project is to identify and design priority flood mitigation projects through 60% design, and assist in obtaining funding for final design and construction.

Task 1 – Project Prioritization

- a. Identify potential projects – The existing conditions 2D hydraulic model will be used to identify potential flood mitigation projects. An initial community meeting will be held to review simulations from the updated existing conditions model using the updated flow estimates, including the recent 2019 flooding event.
- b. Community meeting – Community input will be gathered directly at the community meeting to understand the public's experiences with recent flooding, problematic locations, and ideas for potential solutions. A discussion-based question-and-answer session will aid in the community's understanding of flood risk and potential mitigation solutions and establish expectations. An online community survey will be hosted to gather community input from community members unable to attend.
- c. Community official meetings – A meeting will be held with community officials to review the existing conditions model and discuss and prioritize potential projects. It is anticipated that a meeting with community officials will be required following the public meeting to disseminate results and gain concurrence on the projects of focus.
- d. Preliminary flood reduction benefits – A preliminary analysis of the flood reduction benefits of the potential flood mitigation projects will be carried out. Limited hydraulic modeling will be completed during this sub task and will focus on the ideal or optimal outcome of project implementation with the generation of qualitative ranking information that can be used to inform community officials.
- e. Preliminary opinion of probable construction costs – A planning-level opinion of probable construction costs will be developed for each potential flood mitigation project. Limited data will be used during this sub task with an anticipated qualitative outcome that can be used in ranking projects and informing community officials.
- f. Community official meetings – Following the initial community and official meetings and the generation of qualitative-level flood reduction benefits and probable construction costs, the project team will inform community officials of findings and results for the officials' determination and prioritization of projects for analysis during the feasibility analysis task.

Task 2 – Project Feasibility Analysis

Three to five projects identified in Task 1 Project Prioritization will undergo alternatives development and feasibility analysis. This is dependent upon the Task 1 Project Prioritization outcome. Project Feasibility Analysis sub tasks are described below.

- a. Identify constraints and potential alternatives at each project location – It is assumed that each culvert replacement project and each floodplain capacity promotion project will have unique alternatives. These unique project alternatives have not yet been identified.
 - i. Constraints of each project will be examined and used to identify an alternative or alternatives for that project.

- ii. Current identified constraints for culvert replacement projects include the existence of sewer lines above or below culvert sections. Culvert replacement shape sections will require evaluation for suitability and viability and the need for alternate sewer conveyance evaluated as applicable and if necessary.
 - iii. Current identified constraints for the promotion of floodplain capacity projects exist in the spatial variability and availability of areas suitable to provide necessary attenuation.
- b. Conceptual opinion of probable construction costs – The qualitative opinion of probable costs generated in Task 1 will be updated to include additional detail for the potential projects and their alternatives for use at the quantitative feasibility analysis level. Cost information generated during the feasibility analysis will be used to inform project viability.
- c. Conceptual alternatives hydraulic modeling – The proposed conceptual projects developed during Task 1 and alternatives identified during Task 2 will each undergo hydraulic modeling at a conceptual level to inform feasibility and flood reduction benefits.
- d. Conceptual quantification of flood reduction benefits – Flood reduction benefits will be quantified as appropriate for each project and inform alternative effectiveness.
- e. Final project selection – An engineering recommendations report will be produced at the end of Task 2 documenting alternatives development and the feasibility analysis. The report will include conceptual cost information and relative flood reduction benefit information to present the community viable projects and their alternatives. The outcome of Task 2 will be an engineering recommendation for a project for which construction funding should be pursued after completing a FEMA Benefit Cost Analysis (BCA) in Task 3 for the selected project.

Task 3 – Selected Alternative Development and Benefit Cost Analysis

- a. Conceptual flood mitigation model – The selected project will be simulated to create a proposed conditions model from the existing conditions model. It is assumed that the selected alternatives will exist as a singular project that is a collection of the alternatives analyzed and recommended in Task 2.
- b. Design advancement – The selected project will be advanced up to the approximate 60% design level and as necessary to conduct hydraulic modeling included in this sub task and subsequent BCA task.
- c. Following formalization, advancement, and modeling, the existing conditions and proposed conceptual flood mitigation alternatives will be shared at a second (communitywide) project meeting to gather additional input on the simulated flood mitigation concepts.
- d. A formal Benefit Cost Analysis (BCA) using the FEMA BCA Toolkit and estimates of probable construction costs for the project will be developed. A technical memorandum will be developed documenting the BCA methodology.
 - iv. Flood-prone areas that would benefit from mitigation projects will be identified.
 - v. State of South Dakota, City of Custer, and/or Custer County data will be used to inform value.
 - vi. Simulations will be completed at the 10-year, 25-year, 50-year, and 100-year flood recurrence intervals for existing and proposed conditions.
 - vii. Losses will be calculated based on depth for existing and proposed conditions using standard depth damage functions developed by U.S. Army Corps of Engineers (USACE).
 - viii. Pre- and post-mitigation expected damages will be determined.

Task 4 - Environmental

Projects considered under this application will be designed to comply with the requirements set forth under the National Environmental Policy Act (NEPA) of 1969, in accordance with regulations of the Council on Environmental Quality (CEQ) for implementing NEPA (40 Code of Federal Regulations [CFR] parts 1500-1508).

- a. Environmental Resource Review – Create project location maps, to include:
 - i. Identification of environmental resources with the project’s area of potential effect. A legend shall be included describing the environmental resources identified.
 - ii. Identify any Section 4(f)/6(f) eligible properties, such as public parks, recreation areas, and wildlife/waterfowl refuges, or historic sites of local, state, or national significance.
 - If Section 4(f) or 6(f) resources are present, determine if the project can be included as an exemption or would have a de minimis impact. The appropriate documentation letter would be prepared for agency review and concurrence.
 - iii. Desktop delineation of wetland or other waters of the United States (OWUS).
- b. Agency coordination – Determine level of agency involvement based on environmental resources identified within the Environmental Resources Review task.
 - i. If a grant is obtained, federal monies will be utilized for projects, necessitating compliance, at a minimum, with the Endangered Species Act and Section 106 of the National Historic Preservation Act. Coordination with the U.S. Fish and Wildlife Service and the South Dakota State Historic Preservation Office, and USACE would occur.
 - ii. For projects occurring in FEMA-mapped floodplain resources, coordination with the local floodplain manager would also be required.
- c. Wetland delineation
 - i. For culvert replacement projects, the project area to be surveyed and delineated will be a 400-foot-wide corridor based on the roadway centerline (200 feet on either side) to ensure adequate data collection for any scope or design changes.
 - ii. For floodplain capacity-building projects, such as reconnection of the floodplain to a stream or the creation of detention or attenuation basins, the project area to be surveyed will be dependent upon the location and footprint of the project.
 - iii. A field wetland delineation would be conducted for each project location in accordance with the 1987 U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual and the appropriate Regional Supplement. A wetland delineation report would be completed for each project location to be utilized in the Section 404 permitting process.
 - Field data would be collected with a Global Positioning System (GPS) unit capable of sub-meter accuracy and delivered in datum as appropriate based on the project location.
 - Wetland delineations remain valid for a five-year timeframe which would need to be considered prior to fieldwork occurring as compared to the proposed construction timeline.

Task 5 - Design

Estimate cost of this task assuming the outcome of Task 3 results in the identification of three culvert replacement projects and two floodplain capacity projects.

- a. Topographic survey – A detailed topographic survey will be completed for each project area for use in hydraulic modeling verification and design.
- b. Detailed hydraulic modeling – The detailed hydraulic modeling component included in this task will be completed to meet 90% design and permitting requirements.
- c. Plans and specifications – Plans and specifications will be developed to a level sufficient to meet requirements for future construction grant application development. It is assumed that plans and specifications developed up to the 90% level will be sufficient to meet these requirements.

- d. Cost estimate – Unit costs and quantities will be developed to produce an estimated cost for construction.
- e. Hydraulics and BCA update – Depending on the degree of design refinements, the proposed conditions hydraulic model will be updated, as will the FEMA BCA.

Task 6 – Future Construction Grant Application Development

- a. Final requirements – The project scoping activity will result in the development and design of projects to mitigate flooding along French Creek. The outcome of this activity will be the development and design of projects that will require future construction funding for implementation.
- b. Grant application development – It is anticipated that this activity will result in the information required by an application for a project construction grant. Final design, permitting, and construction requirements including the development of construction plans, construction bid package, and construction contract documents will be (submitted?) with an application for project construction.
 - i. Work occurring in wetlands adjacent to French Creek will likely require authorization under Section 404 of the Clean Water Act. If wetland areas can be avoided (i.e., basins strategically located in upland areas not mapped as wetland), Section 404 authorization would not be needed. Culvert replacement activities would likely be authorized under a Nationwide Permit for Maintenance Activities or Linear Transportation Projects.
 - ii. The grantee will prepare permit or approval applications with supporting documentation and plans to satisfy the applicable state and federal environmental regulation requirements, as necessary, or as specified in future scopes of work.

Consultant Responsibilities and Deliverables

The selected consultant will work under the direction of the County Emergency Management Director and will be responsible for consultation with the major stakeholder groups and public engagement. In addition, the consultant is responsible for the following items and activities:

- a. General management of the project
- b. All materials needed for public presentations, provided to the County in reproducible formats
- c. Drafting and preparation of the plan documents, graphics, and mapping for stakeholder groups and County Commissioner review
- d. Data collection, analysis and presentation
- e. Organization and facilitation of public meetings
- f. Public comment summary
- g. Presentations at public community meetings and County Commissioner meetings.

Task-specific deliverables are detailed below.

Task 1 – Project Prioritization

- a. Preliminary analysis of flood risk-reduction benefits.
- b. List of prioritized projects.
- c. Preliminary construction cost estimates.

Task 2 – Project Feasibility Analysis

- a. Conceptual alternatives hydraulic model.

Task 3 – Selected Alternative Development and Benefit-Cost Analysis (BCA)

- a. 60% Design plans and specifications.
- b. Benefit-cost analysis.
- c. Technical Memorandum detailing final project selection.

Task 4 – Environmental Review

- a. Environmental Resources Map – Identification of environmental constraints and compliance requirements.
- b. Agency Coordination Plan – Summary of required regulatory agency involvement.
- c. Wetland Delineation Report – GPS-mapped delineations for permitting purposes.
- d. Section 404 Permitting Documentation – Compliance report for Clean Water Act requirements (if applicable).

Task 5 – Design

- a. Topographic Survey Data – Collected field data for hydraulic modeling and design verification.
- b. 90% Hydraulic Modeling Report – Detailed modeling results supporting project design and permitting.
- c. Plans and Specifications – Construction-ready design documents at 90% completion.
- d. Final Cost Estimate – Unit cost breakdown and total construction cost projection.
- e. Updated FEMA BCA and Hydraulic Model – Adjusted analysis based on design refinements.

Task 6 – Future Construction Grant Application Development

- a. Final Project Scoping Report – Comprehensive summary of project design and environmental considerations.
- b. Grant Application Package – Submission-ready materials including project plans, cost estimates, and regulatory compliance documentation.
- c. Permit and Approval Applications – Drafts of required permits (e.g., Section 404, floodplain development permits).

Respondents to the Request for Proposal (RFP) must be prepared to meet all requirements for work funded by the Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC) Grant Program. As well as meeting all Environmental Review standards required by Federal & State agencies, in addition to the Federal Water Pollution Control Act, Protection of Wetlands, and the Endangered Species Act of 1973. Consultants who are Minority, Women, Disadvantaged, Small Businesses, and/or Small Businesses in rural areas are strongly encouraged to apply. The items listed in the scope of services are representative of the services and items that may be required but are not meant to comprise an exclusive list of services and items that may be required.

Proposed Project Schedule

The project timeline will be approximately 24 months (not including the adoption process) from the notice to proceed. At a minimum, monthly progress meetings shall be held and may be conducted through video conferencing and/or webinars, set up and organized by the consultant. The consultant is expected to schedule and attend public participation activities and present to the City Council as detailed in the scope of work.

The County anticipates the following general timeline for receiving and evaluating the proposals, selecting a consultant, and completion of the plan. This schedule is subject to change if it is in the County's best interest to do so:

Advertise for Consultant Proposals
Proposals Due
Evaluation of Proposals
Notice of Award
Project Completion

May 21, 2025
June 6, 2025, 5:00 p.m.
June 7 - 13, 2025
June 16, 2025
24 months from Notice to Proceed

Qualifications

The chosen consultant must have extensive multidisciplinary experience in hydrology, hydraulics, stormwater management, civil engineering, GIS analysis, community engagement, and hazard mitigation planning, with demonstrated experience on projects of a similar nature. The ideal consultant will bring both technical expertise and stakeholder coordination skills to ensure that flood mitigation solutions are data-driven, feasible, and publicly supported. Strong communication and public engagement skills are essential, as the consultant will be expected to collaborate effectively with developers, engineers, and community members. Additionally, the consultant must be able to develop solutions that align with the County's requirements while taking a comprehensive approach to the overall community flood resilience.

Proposal Content

Proposals should address the following items in numerical order and must not exceed 25 pages in length. Electronic submissions are encouraged to incorporate hyperlinks when referencing work samples.

1. **Qualifications** – Provide a detailed background on the firm, including its history, expertise, and experience. Include biographies or resumes of key team members assigned to the project.
2. **Relevant Experience** – Outline previous experience with projects of a similar nature.
3. **References** – Supply at least three references, including contact details, for comparable projects. References should specifically relate to the proposed project manager and key personnel. The County reserves the right to contact any listed references.
4. **Review of Scope of Work and Schedule** – Evaluate the scope of work and provide insights into the consultant's understanding of the project, their role in fulfilling the outlined tasks, and any suggested additional services that may enhance project outcomes. Include a schedule aligned with key project milestones, incorporating any recommended changes.
5. **Project Approach and Community Engagement** – Describe the methodology and activities required to achieve the project's objectives. Include details on community engagement strategies, including the use of social media or web-based platforms for public input and approaches to conducting public meetings.
6. **Cost Proposal** – Present a detailed cost breakdown for professional services and related expenses, categorized by project components and hours allocated per task. Provide an itemized list of reimbursable expenses. The cost proposal must be submitted separately in a sealed envelope.

Custer County will not be responsible for any costs incurred by consultants in the preparation and submission of their proposals, including travel expenses for pre-award interviews.

Proposers must submit one (1) PDF proposal for items one through five above via email to sesser@custercountysd.com and one (1) separate PDF cost proposal via email to mzerfas@custercountysd.com. Submissions must be received no later than 5:00 p.m. local time on **Friday, June 6, 2025**.

Late submissions will not be considered.

Any questions or requests for additional information must be submitted via email to **Steve Esser, County Emergency Management Director**, at sesser@custercountysd.com no later than **1:00 p.m. local time on May 30, 2025**.

Custer County reserves the right to reject any or all proposals, waive any technical or legal deficiencies, and accept the proposal deemed to be in the County's best interest.

Evaluation of Proposals and Selection Process

Following the submission deadline, the County will promptly begin reviewing proposals. The County reserves the right to request further details and to reject any or all submissions. As part of the review process, applicants may be invited to present their proposals to County representatives.

Proposals will be assessed based on the following key factors:

1. The overall quality and responsiveness of the proposal, including its completeness, clarity, conciseness, and understanding of the project scope.
2. The qualifications of the consulting team demonstrated through their knowledge, skills, and relevant experience.
3. Proven experience in developing master drainage plans or handling similar projects.
4. A track record of effective public engagement strategies across diverse community groups.
5. References from past clients for projects of comparable scope.
6. The proposed timeline for completion and budget considerations.

Consultants should note that services may be discontinued if the project is canceled for any reason.

County-Furnished Materials

The following data or documentation will be available for use by the selected consultant team:

- Flood Mitigation Study Phase 1 Memorandum with Summary of Documents Reviewed and Hydraulic Structure Inventory (dated November 8, 2023)
- French Creek Flood Mitigation Study Phase Two – Hydrology and Hydraulics (dated August 13, 2024)
- Flood frequency analysis for USGS Station 06402995
- 2D Hydrologic Engineering Center River Analysis System (HEC-RAS), Version 6.4 hydraulic model for French Creek above Stockade Lake

Request for Proposals Addendum No. 1

2025 French Creek Flood Mitigation Scoping Project

The 2025 French Creek Flood Mitigation Scoping project request for proposal shall be clarified and added as follows. The bidder proposes to make all the following clarifications or changes. It is understood that the bid shall include any modification of work or additional work that may be required by reason of the following change or clarifications.

The Bidders are to acknowledge the receipt of this Addendum in their proposal. Failure to acknowledge may subject the Bidder to disqualification and rejection of the bid.

RFP Questions and Responses

Custer County received and provided responses to the following.

1. A request for proposal due date extension.

Due to technical issues the French Creek Flood Mitigation Flood Request for Proposal has been extended to Friday June 13th. Bids will be opened at the June 25th Custer County Commission Meeting. The successful Bidder will be notified no later than June 26th.

2. Can we include a cover page, cover letter, table of contents, and section dividers (tabs) without them counting towards the 25-page limit?

A cover page, cover letter, table of contents, and section dividers will not count towards page limits.

3. If we include bios in the proposal, can we include resumes in an appendix that do NOT count towards the 25-page limit?

Resumes may be included as an appendix and do not count towards page limits.

4. Are there page limits on the cost proposal?

No, there is not a page limit on the cost proposal.

5. The French Creek Flood Mitigation Study Phase 1 and Phase 2 Summary Reports were not attached to the RFP. Can they be provided?

The two reports are attached to this addendum.

Attachments

The following documents are attached:

- French Creek Flood Mitigation Study - Phase 1 Memorandum, dated November 8, 2023
- French Creek Flood Mitigation Study - Phase 2 Final Report, dated August 19, 2024



EXTERNAL MEMORANDUM

To: Mr. Robert Brown
Mayor
City of Custer City
622 Crook Street
Custer, SD 57730

cc: Ms. Laurie Woodward, City Administrator, City of Custer
Ms. Tessah Behlings, City Planner, City of Custer
Mr. Steven Esser, Director, Custer County Emergency Services
Mr. Jesse Doyle, Superintendent, Custer County Highway Department
Ms. Bridget Mitchell, PE, Headwaters Economics
Mr. Trent Bruce, PE
Mr. Peter Rausch, PE, CFM, Program Manager, RESPEC
Project Central File [W0584]

From: Nicholas Marnach, PE
Staff Engineer
RESPEC
3824 Jet Drive
Rapid City, SD 57703

Date: November 8, 2023

Subject: French Creek Flood Mitigation Study - Phase 1

PHASE 1 - DOCUMENT REVIEW AND SITE VISIT

Phase 1 for the French Creek Flood Mitigation Study consisted of documents review and a site visit to the French Creek watershed and the City of Custer. The document review resulted in the finding of need for updated flow estimates that can be used in future flood mitigation studies as well as the need for an updated hydraulic model that can represent complex flow within the City of Custer. The document review, including recommendations for flow determination and model development, and the site visit are summarized below. Recommended future work is addressed in closing.

DOCUMENTS REVIEW

Documents that pertain to the French Creek floodplain starting upstream of Custer West Dam and continuing through the City of Custer to the Stockade Reservoir east of the City of Custer were compiled and reviewed to aid in understanding the scope and direction of future French Creek Flood Mitigation work. Documents that were reviewed are as follows:

- / Upper French Creek Mitigation Plan (2001)
- / FourFront Design (2012-2015)
- / Banner Associates – Custer West Dam Re-Construction Project Design Report (2016)
- / Custer County Pre-Disaster Mitigation Plan (2018)
- / FEMA FIS 2012 City of Custer Flood Study and HEC-2 Model

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- / FEMA 2020 City of Custer LOMR and HEC-RAS files
- / Banner Associates Memo – Review of 2020 LOMR at Custer West Dam (2021)
- / City of Custer Documents
 - Municipal Code – Flood Damage Prevention, Zoning
 - Custer City Parks Master Plan
 - Custer City Comprehensive Plan
- / 2019 Drone footage of the City of Custer Flooding
- / LiDAR – State mapping, Custer County 2018, USFS 2023
- / DRAFT Custer County Natural Hazard Mitigation Plan (2023)

The attached “Documents Review” (Attachment A) provides a brief description of each document and includes a summary of relevant information to be used in future phases.

FLOW DETERMINATION

Phase 1 determined the need for an updated Flood Frequency Analysis (FFA) that includes the 2019 Flood event to generate updated flow estimates for use in flood modeling to develop future flood mitigation projects. The updated FFA will produce an updated peak flow estimate for the 1% annual chance event as well as produce estimates for events that take place more frequently (i.e. 10-year, 25-year, etc.). Key flow determination findings are as follows:

- / There is a wide range of 100-year (1% annual chance) peak flow estimates existing from previous studies.
- / Previous studies do not include the recent 2019 Flood event to estimate the probability of flood occurrence.
- / An updated probability analysis is required to establish confidence in flow values for use in developing flood mitigation projects.

Regarding the range of 1% annual chance peak flow estimates discovered, there was a substantial reduction in the 100-yr peak flow value from the 2012 FEMA FIS to the 2020 FEMA adopted LOMR, decreasing from 4,150 cfs to 834 cfs (at Custer West Dam), respectively. Additionally, varying 1% annual chance flows were used in some of the documents listed above, including 2,971 cfs for the Banner Associates Custer West Dam Report (2016), and a current USGS StreamStats 1% annual chance peak flow value of 395 cfs. Table 1 shows the range of flows that have been used along French Creek over the past 20 years.

Table 1. Flows at Custer West Dam

Source	100-Yr Flow (cfs)
2012 FIS	4,150
2020 LOMR	834
Banner Associates Custer West Dam Report (2016)	2,971
USGS StreamStats	395

The HEC-RAS model and corresponding reports completed by FEMA’s mapping partner and used for completing the 2020 LOMR were obtained and reviewed as part of Phase 1 efforts. FEMA’s mapping partner provided a brief discussion noting the flow reduction and justification for doing so. The flows

were updated based on a gage analysis that used updated regional regression equations. The 2012 effective flows were based on a regional regression analysis of 11 stream stations based on flows through 1991. The updated gage analysis performed along French Creek at gage station 06402995 went online in 1991 and utilized the newer 1998 regression equations and is considered more accurate and up to date. However, these flows will not have factored in the August 2019 flooding that occurred within the County or up to date flows that were recently provided by USGS at a gage station along French Creek (upstream of Custer West Dam). RESPEC recommends completing an updated FFA that incorporates this new data for use in future flood mitigation projects.

MODEL RECOMMENDATION

Phase 1 determined the need to review the current 1D FEMA HEC-RAS model to understand if it can be modified to reflect recent changes in the floodplain or be used to model future flood mitigation projects. Key model recommendation findings are as follows:

- / The 2019 Flood event drone footage shows numerous split flows occurring throughout French Creek that are not represented in the 1D HEC-RAS model provided by FEMA.
- / A 2D HEC-RAS model is required to accurately reflect split flows and complex inundation observed in the 2019 Flood drone footage.

A 2D mesh will be able to represent these flows and more accurately portray what is occurring along these split flows within the City of Custer. The 2020 LOMR was developed using the 1D HEC-RAS model that incorporated surveyed structure data and channel cross sections completed in 2018. This data can be incorporated into the 2D HEC-RAS model. FEMA used the program WISE as a pre-processor to HEC-RAS to build the 1D model terrain by meshing the most recent LiDAR data and the surveyed cross sections. Information was not provided on the date of the LiDAR, nor was the final terrain created in WISE provided. Efforts will ensure the most recent LiDAR data is utilized in generating a 2D model that has the capability to better represent complex flow in the City of Custer.

SITE VISIT

A site visit was conducted on October 3rd, 2023, with Custer County officials. The French Creek watershed and contributing tributaries were driven from the French Creek headwaters to Stockade Lake. Information from the site visit was compiled into a hydraulic structure inventory (Attachment B). The hydraulic structure inventory generated from the site visit can be used to cross reference and validate hydraulic structure information contained within the 1D model during 2D model creation.

In addition to viewing hydraulic structures during the site visit, Custer County officials communicated an emergency services access issue that could adversely affect emergency response times and/or citizen egress from the Stonehill Development in southeast Custer. It is understood that during a flooding event, such as the one that occurred during 2019, portions of southeast Custer are isolated due to flood waters submerging French Creek crossings in this area.

FUTURE WORK

RESPEC recommends completing an updated hydrologic analysis that includes recorded peak flow information from the 2019 Flood event and which is consistent with methodologies accepted and applied by subject matter professionals to gain confidence in flood estimates to be used in the French Creek Flood Mitigation Study. Additionally, RESPEC recommends creating a 2D HEC-RAS study model for use in developing flood mitigation alternatives along French Creek. The updated hydrology and the creation of HEC-RAS 2D study model can be completed during Phase 2 of the French Creek Flood Mitigation Study. Phase 3 of the French Creek Flood Mitigation Study can use the updated hydrology and hydraulic model to evaluate and recommend potential flood mitigation alternatives.



ATTACHMENT A

DOCUMENTS REVIEW



DOCUMENTS REVIEW

Upper French Creek Flood Mitigation Plan (June 19, 2001)

- / Goals – 1) Identify critical flood hazard issues for the City and County, and 2) identify pre-disaster mitigation measures to reduce future flood losses
- / Primary concern is French Creek and tributaries from headwaters to Stockade Lake
- / Technical Committee formed plan recommending hydrologic study, flood mitigation projects, development of regulations and establishment of Flood Mitigation Board
- / Recommended development of GIS of French Creek drainage basin. Note: Current City GIS contains many of the suggested layers, though appears not to be as robust in identifying structure elevations and size/locations of all hydraulic structures.
- / Technical Committee Recommendations: Infrastructure Study, Granite Heights Road Crossing; re-evaluate Floodplain Ordinances, relocate Mica Plant, 8th Street Bridge, Hoover Court Crossings, Secondary access to southwest Custer, remove structures in floodway, annual meetings and complete hydrological study of French Creek Drainage

FEMA Custer County FIS (including City of Custer) – Effective Date January 6, 2012

- / 1% annual chance of flood near Custer West Dam projected at 4,150 cfs
- / SEE COMPASS 2020 LOMR below – supersedes 2012 FIS peak flood and mapping

FourFront Design – French Creek Drainage Improvements (2013-2014)

- / Focuses – French Creek, Hwy 385 Tributary, Laughing Water Creek
- / Evaluate each crossing based on 2012 FIS 100-year peak flow
- / Hydrology background of effective 2012 FIS:
 - » HEC-1 backwater model 1977-79
 - » Restudy 1983-1985
 - » Last revision 2007-2010, with effective revision Jan 6, 2012
- / Flood modeling HEC-RAS (1-D)
- / Proposed Improvements
 - » Reconstruct West Dam – increase water volume for detention capacity
 - » Modify storage behind West Dam to act as large detention basin
 - » Widen/deepen channel to improve flow
 - » Improve structures such as culverts & bridges
 - » New detention ponds – area between Wazi Lane and West Dam
 - » Stream crossing evaluations focused on six areas: Sidney Park Ave., 11th Street Bridge, 7th Street Bridge, 6th street Bridge, 4th street Bridge, Custer Street
 - » Recommendations – detailed survey followed by final plans & backwater analysis, develop cost estimates and determine Benefit-Cost Analysis of the alternatives.
 - » West Dam recommendation was to remove existing 36" outfall pipe and replace three 48" concrete pipes at stream level (uncontrolled) and convert the previous impoundment to a detention pond.
- / NOTE: FourFront believed West Dam doesn't meet SD criteria to be considered a dam and referenced facility as a stream "barrier".
 - » Believed impoundment depth greater than 6 feet but less than 25 feet AND storage was less than 50-ac-ft. Likely based on outdated water rights information.
 - » Dam had been raised without accompanying increase in water rights. Additionally, SD criteria for acre-feet is at top of dam, not just spillway level.
 - » Water rights were subsequently corrected/ increased by Banner in 2015. Therefore, West Dam meets SD criteria of a "dam", and due to being upstream of the community is also considered High Hazard (see Banner 2016 design report).

BANNER – Custer West Dam Re-Construction Project (May 27, 2016)

- / 2012 – Outlet works became inoperable in open state and reservoir has been drained since that time
- / 2015 - Banner established that the dam had been historically impounding more water than Permit allowed, and height and geometry results in regulatory storage capacity was in excess of 50 ac-ft (discrepancy resulted in dam not listed as State's inventory of High Hazard dams)
- / January 2016 – contracted to provide Plans & Specifications for new dam and reservoir
- / Flood Hydrology – Banner used HEC-HMS to develop 100-yr 24-hr, 500-yr 24-hr and PMP together with HEC-GEOHMS and NOAA Atlas 14. PMP were developed using HMR 55A
- / Did not attempt to replicate FEMA FIS flows calculated by different method
- / Same method as USGS Report SIR 2011-5011 "Flood Hydrology and Dam -Breach Hydraulic Analyses of Four Reservoirs in the Black Hills, SD"
- / 100-yr 24-hr storm: 2,971 cfs 200-ft ogee crest spillway with 3 -ft head → 4,010 cfs design
- / Since Custer West Dam clearly meets the SD criteria to be a "dam" and with the dam upstream of the community, a failure of the dam could result in loss of life and therefore should be classified as a high hazard dam with the reconstruction of the dam.
- / Geotechnical evaluation of existing embankment resulted in recommendation for complete removal with reconstruction consisting of over-excavated keyway and appropriate material/compaction.
- / 2016 Opinion of Probable Project Costs (OPPC) to reconstruct Custer West Dam was \$2.95M

City of Custer Memo & Elmer Claycomb Memo/files (August 4, 2016)

- / Memo by Elmer Claycomb, Custer Interim Planning Director, notes irregularities in 2012 FIS and notes 1% flows appear overstated.
- / Appears to be start of City requesting FEMA to initiate re-study of FIS in Custer
- / Calculations utilizing USGS Streamflow Stats and comparison to 10 gaging stations within 15 miles of Custer indicate 1% values 10 to 20 times higher than values in 2012 FIS

Custer City Parks Master Plan – KLJ April 2017

- / Key goals related to Flood Mitigation
- / Development of linear park space & greenways along French Creek (high ranking) and Laughing Water Creek
- / Greenways – minimize flood damage, enhance safety
- / Preserve existing natural vegetation or provide buffers within stream corridors
- / Preserve natural drainage areas and utilize for open space connections
- / Drainageways and their tributaries to be properly managed and utilized for stormwater control
- / Ordinance Section 16.20.060 – limits residential development on lands subject to flooding. If a stream flows through or adjacent to the proposed subdivision, the plat plan shall provide for an easement or right-of-way along the stream for a floodway.

COMPASS – November 2019 Hydrologic Modeling for Custer County (FEMA LOMR Cases 20-08-0443P-400618 & 20-08-0443P-400619)

- / Newly-acquired LiDAR data and survey data into detailed model
- / USGS WRIR 98-4055 – Sub-Region G, high standard error estimate, difficult to regionalize
- / Gage analysis 0640995 (online in 1991) procedures in SIR 2008-5104
- / Gage Analysis in newer and higher quality than 1993 regression equations; new USGS regressions published in 1998

- / Compares well with gage analysis of French Creek
- / Resulted in adoption of 2020 LOMR – 1% flood peak near Custer West Dam projected at 834 cfs
- / Note: 2019 flood occurred after analysis and not included in 2020 LOMR calculations

Banner – Custer West Dam Project Status Update – November 30, 2021

- / Reviewed plans & specifications, verified quantities and update costs to 2022 construction dollars. Updated Opinion of Probable Project Costs (OPPC) was \$3.97M
- / Review updated LOMR approved by FEMA with an effective date of June 3, 2020.
- / Updated LOMR 1% annual probability (100-yr) flood peak at West Dam is reduced to 834 cfs (2016 report determined 2,971 cfs for 100-yr, 24-hr storm at Custer West Dam)
- / Memo generated with impacts resulting from LOMR peak flow change – comparison table and flood inundation map changes
- / Reviewed Permit status and provided memo on action items needed to proceed with project
- / Not included in the OPPC:
 - » Redesign or plan/specification modifications
 - » Required agency submittals for review/approvals
 - » Responding to review comments as any previous approvals have expired
 - » Construction observation/administration
 - » Geotechnical services for construction
 - » Permit re-submittals
 - » Wetland mitigation

BROSZ – February 8, 2023 French Creek Structure Replacement (4th St in Custer)

- / Replace existing 18' single-span timber girder bridge with double barrel 8'x7' CIP Box Culvert
- / Q100 is based LOMR dated October 22, 2020 ; LOMR 100-yr → 865 cfs
- / Note: 2012 FIS – study by COE in-house study, 1972 regional data used in log-Pearson Type III analysis

Stream Gaging Stations – see also Elmer Claycomb & Compass analyses

- / USGS 06402995 French Creek above Stockade Lake near Custer (1991-2022)
- / USGS 06402950 French Creek below Ruby Creek near Custer (2004-2022)
- / USGS 06402940 Ruby Creek near Custer (2004-2022)
- / USGS 06402970 Laughing Water Creek at Custer (2005-2022)
- / SDDANR WQM 102 French Crk west of Custer City downtown (stage 6-07-2010 to 5-24-2019)