



United States  
Department of  
Agriculture

Natural Resources  
Conservation  
Service

In Cooperation with:  
Powder River  
Conservation District

Town of Kaycee,  
Wyoming

# FINAL – Watershed Project Plan Environmental Assessment

## Kaycee Flood Protection Project Middle Fork Powder River Watershed Johnson County, Wyoming



*August 27, 2002 –  
Middle Fork of the  
Powder River,  
Kaycee, Johnson  
County, Wyoming*

January 2008

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# FINAL Watershed Project Plan – Environmental Assessment (EA)

## Kaycee Flood Protection Project Middle Fork Powder River Watershed Johnson County, Wyoming

**Lead Agency:**

United States Department of Agriculture (USDA)–Natural Resources Conservation Service (NRCS)

**Sponsored by:**

Powder River Conservation District  
Town of Kaycee, Wyoming

**Responsible Federal Official (RFO):**

J. Xavier Montoya, NRCS State Conservationist, Wyoming

**Abstract:**

The Interdisciplinary team consisting of the NRCS, the Sponsors and various contributing agencies provided for planning support and evaluated alternatives to protect the citizens of the town of Kaycee, Middle Fork Powder River Watershed, Johnson County, Wyoming from the dangers of flooding. The recommended alternative will reduce flood damages to their homes, businesses and community structures. Flood damage reduction benefits, environmental and socioeconomic impacts, as well as construction, operation, and maintenance costs were considered in the evaluation process of the alternatives. The NRCS recommended plan is to propose the construction of flood control dikes and a flood wall along the north side, and dikes and grade work on the south side of the Middle Fork Powder River through the town of Kaycee. Relocation of eleven structures and one property buyout will remove all structures from the planned floodplain located between the dikes and flood walls. The proposed dikes would be constructed adjacent to the stream channel and would not affect wetlands adjacent to the stream. The recommended plan is needed to provide safety to the residents of Kaycee, and protect the homes, businesses and community structures caused by flood events.

Action	Extent	Refer to:
<u>1. What action is being recommended for the Kaycee Flood Protection Project?</u>		
Construct dikes and flood wall along the banks of the Middle Fork Powder River through the town of Kaycee. Relocation of structures from inside the dikes which will become the 100-year floodplain.	Approximately 4,160 feet of dike and 240 feet of flood wall would be constructed to contain a 100-year storm frequency event. Buyout of 1 house and relocation of 6 trailers, 2 cabins, and 3 outbuildings, from inside the proposed dike locations which will become the 100-year floodplain	Pages 1, 3, 5, 15, and 24.

Action	Extent	Refer to:
<u>2. Why is the action being recommended?</u>		
Kaycee experiences frequent flooding to many of the homes, businesses and community structures located in the town of Kaycee, Wyoming. The action of the recommended plan is to alleviate the on-going flooding that occurs in the town.	Currently there are 47 structures that remain in the existing 100-year floodplain. These structures will be protected to the 100-year storm frequency event by the dikes / flood wall / relocation alternative.	Pages 2, 5, 13, 15, 22, and 23.
<u>3. What other action(s) would meet the same need?</u>		
A. Construction of flood storage structures – one structure just above town or three smaller structures located on tributaries further upstream in the watershed.	The cost of storage structures makes the action not feasible for this project. Estimated costs of structures – \$43 million.	Pages 2, 16, 17, 18, 20 and 39.
B. Flood proofing of the affected structures.	Flood proofing of the structures that remain located in the existing 100-year floodplain do not meet the efficiency and acceptability criteria.	
<u>4. What would it mean not to meet this need?</u>		
The “No Action” alternative would continue to allow flooding of the Middle Fork Powder River Watershed posing an imminent threat to life and property of the citizens and structures within the town of Kaycee.	Currently there are 47 structures and 70 citizens at risk in the 100-year floodplain. Estimated average annual damages are \$387,100.	Pages 21, 22, 23, 24, and 25.
<u>5. What are the effects of the recommended plan and alternative plan(s)?</u>		
Protect the town of Kaycee to the 100-year storm frequency level. Environmental impacts are expected to be minimal within the scope and intensity of the project. Adverse impacts are one buyout and the relocation of 11 structures; riparian disturbance during construction and re-establishment; and removal of 27 cottonwoods adjacent to the river channel.	Eleven property relocations and one buyout will be necessary from inside the proposed dike locations. Dike construction will require 4.8 acres. Ten citizens will have their lives and property disrupted with relocation to a suitable location. Twenty-seven cottonwoods will be removed and mitigated with pole plantings.	Pages 25, 40, and 41.

Action	Extent	Refer to:
<b>6. What factors will be used when making the decision between the alternatives</b>		
Criteria:	Homes, businesses, and community structures in the town of Kaycee would be protected. The project cost is approximately \$956,300.	Pages 3, 16, 17, 21, and 37.
<ul style="list-style-type: none"> <li>• Completeness</li> <li>• Effectiveness</li> <li>• Efficiency</li> <li>• Acceptability</li> </ul>		
Factors:		
<ul style="list-style-type: none"> <li>• Satisfaction of the project purpose.</li> <li>• Relative costs.</li> <li>• Technological feasibility.</li> <li>• Logistics.</li> <li>• Environmental consequences.</li> </ul>		
<b>7. Are there any ways to mitigate adverse effects?</b>		
Relocation of eleven properties and buyout of one property is necessary for the recommended plan. Disturbed areas will be re-vegetated, and pole plantings will mitigate the 27 cottonwoods being removed for dike construction.	Compensation and/or assistance with relocation cost(s) to be provided to property owners. Re-vegetation costs are included in project costs.	Pages 5, 24, 25, 39 and E-3.
<b>8. What monitoring is needed that is not included in the recommended or alternative plan(s)?</b>		
Maintain the integrity of the proposed dikes and flood walls.	This maintenance will be completed by the town of Kaycee.	Pages 24, 25, 39, D-7, and E-3.

**To request further information, please contact:**

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**Watershed Agreement  
between the**

**Powder River Conservation District**  
(Referred to herein as PRCD)

**Town of Kaycee, Wyoming**

(The aggregate referred to herein as Sponsors)

**and the**

**United States Department of Agriculture  
Natural Resources Conservation Service,**  
(Referred to herein as NRCS)

**Whereas**, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for the Middle Fork Powder River Watershed, State of Wyoming, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001, et seq.); and

**Whereas**, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to NRCS; and

**Whereas**, there has been developed through the cooperative efforts of the Sponsors and NRCS a Watershed Project Plan – Environmental Assessment, for works of improvement for the Middle Fork Powder River Watershed, State of Wyoming, hereinafter referred to as the Watershed Project Plan or plan, which plan is annexed to and made a part of this agreement;

**Now**, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the Sponsors hereby agree on this Watershed Project Plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this plan and including the following:

**1. Costs:**

The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs incurred in the installation of works of improvement.

**2. Real Property:**

The Sponsors will acquire such real property as will be needed in connection with the works of improvement. The percentages of the real property acquisition costs to be borne by the Sponsors and NRCS are as follows:

	Sponsors (percent)	NRCS (percent)	Estimated Real Property Acquisition Costs
Works of Improvement			
Floodway System	25.0	75.0	340,000

The Sponsors agree that all land acquired or improved with Public Law 83-566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project (100 years) except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement.

**3. Relocation Payments and Assurances:**

The Sponsors hereby agree to comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as further provided by Uniform Relocation Assistance and Real Property Acquisition for Federally Assisted Programs (49 C.F.R. Part 24 and 7 C.F.R. Part 21) when acquiring real property interests for this federally assisted project. If the Sponsors are legally unable to comply with the real property acquisition requirements of the Act, they agree that, before any federal financial assistance is furnished they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the Sponsors agree that they will reimburse owners for necessary expenses as specified in 7 C.F.R. 21.1006(c) and 21.1007.

The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the Sponsors and NRCS as follows:

	Sponsors (percent)	NRCS (percent)	Estimated Relocation Costs
Works of Improvement			
Floodway System	25.0	75.0	32,000

**4. Administration Costs:**

The Sponsors and NRCS will each bear the project administration costs that each incurs, estimated to be \$2,500 and \$47,500, respectively.

**5. Construction Costs:**

The percentages of construction costs for structural measures to be paid by the Sponsors and by NRCS are as follows:

	Sponsors (percent)	NRCS (percent)	Estimated Construction Costs
Works of Improvement			
Floodway System	0.5	99.5	524,300

**6. Engineering Services Costs:**

The amounts and percentages of the engineering services costs to be borne by the Sponsors and NRCS are as follows:

	Sponsors (percent)	NRCS (percent)	Estimated Engineering Services Costs
Works of Improvement			
Floodway System	0.0	100.0	50,000

**7. Term of the Agreement:**

The term of this agreement is for the expected life of the project (100 years) and does not commit the NRCS to assistance of any kind beyond the end of the program life unless agreed to by all parties.

**8. Floodplain Management:**

Before construction of any project for local flood protection, the sponsoring local organization shall agree to participate in and comply with applicable Federal floodplain management and flood insurance programs. Zoning to exclude future construction of structures in the floodplain will be done by the Sponsors.

**9. Land Treatment Assistance:**

The Sponsors will provide assistance to landowners and operators to ensure the installation of the land treatment measures shown in the Watershed Project Plan.

**10. Operation & Maintenance:**

The Sponsors will encourage landowners and operators to continue to operate and maintain the land treatment measures after the long-term contracts expire, for the protection and improvement of the watershed.

**11. Water and Mineral Rights:**

The Sponsors will acquire or provide assurance that landowners or water users have acquired such water, mineral, or other natural resources rights pursuant to state law as may be needed in the installation and operation of the works of improvement.

**12. Permits:**

The Sponsors will obtain and bear the cost for all necessary federal, state, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

**13. NRCS Assistance:**

This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

**14. Additional Agreements:**

A separate agreement will be entered into between NRCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

**15. Amendments:**

This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may de-authorize or terminate funding at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, NRCS shall promptly notify the Sponsors in writing of the determination and the reasons for the de-authorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by NRCS shall be in accord with the legal rights and liabilities of the parties when project funding has been de-authorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the Sponsors having specific responsibilities for the measure involved.

**16. Prohibitions:**

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise there from; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

**17. Operation and Maintenance (O&M):**

The Sponsors will be responsible for the operation, maintenance, and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an O&M Agreement. An O&M Agreement will be entered into before federal funds are obligated and continue for the project life (100 years). Although the Sponsors responsibility to the Federal Government for O&M ends when the agreement expires, the Sponsors acknowledge that continued liabilities and responsibilities associated with works of improvement may exist beyond the project life.

**18. Emergency Action Plan:**

Prior to construction, the Sponsors shall provide leadership in preparing an Emergency Action Plan (EAP) and will update the EAP annually with local emergency response officials. NRCS will provide technical assistance in preparation and updating of the EAP. The purpose of the EAP is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of a floodway system where failure may cause loss of life or as required by state and local regulations. The NRCS will determine that an adequate EAP is prepared prior to the execution of fund obligating documents of the structure.

**19. Nondiscrimination Provisions:**

The program or activities conducted under this agreement will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and the American's With Disabilities Act of 1990. They will also be in accordance with regulations of the Secretary of Agriculture (7 C.F.R. 15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

**20. Certification Regarding Drug-Free Workplace Requirements (7 C.F.R. 3017, Subpart F):**

By signing this Watershed Agreement, the Sponsors are providing the certification set out below. If it is later determined that the Sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

*Controlled substance* means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 C.F.R. 1308.11 through 1308.15);

*Conviction* means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the federal or state criminal drug statutes;

*Criminal drug statute* means a federal or non-federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

*Employee* means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of sub-recipients or subcontractors in covered workplaces).

**Certification:**

A. The Sponsors certify that they will or will continue to provide a drug-free workplace by:

- (1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (2) Establishing an ongoing drug-free awareness program to inform employees about:
  - (a) The danger of drug abuse in the workplace;
  - (b) The grantee's policy of maintaining a drug-free workplace;
  - (c) Any available drug counseling, rehabilitation, and employee assistance programs; and
  - (d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.
- (3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);
- (4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will:
  - (a) Abide by the terms of the statement; and
  - (b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
- (5) Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph (4) (b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;
- (6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employee who is so convicted:

- (a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
  - (b) Requiring such employee to participate satisfactorily in a drug-abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.
- (7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).
- B. The Sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.
- C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

**21. Certification Regarding Lobbying (7 C.F.R. 3018) (applicable if this agreement exceeds \$100,000):**

- (1) The Sponsors certify to the best of their knowledge and belief, that:
- (a) No federal appropriated funds have been paid or will be paid, by or on behalf of the Sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
  - (b) If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
  - (c) The Sponsors shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.
- (2) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, of the U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

**22. Certification Regarding Debarment, Suspension, and Other Responsibility Matters – Primary Covered Transactions (7 C.F.R. 3017).**

- (1) The Sponsors certify to the best of their knowledge and belief, that they and their principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or agency;
  - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
  - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
  - (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (federal, state, or local) terminated for cause or default.
- (2) Where the primary Sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

**TOWN OF KAYCEE**

By: \_\_\_\_\_ Title: \_\_\_\_\_  
(Printed Name)

This action was authorized at an official meeting of the Kaycee Town Council on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_, at \_\_\_\_\_, Wyoming.

Attest: \_\_\_\_\_ Date: \_\_\_\_\_  
(Signature)

**POWDER RIVER CONSERVATION DISTRICT**

By: \_\_\_\_\_ Title: \_\_\_\_\_  
(Printed Name)

This action was authorized at an official meeting of the Powder River Conservation District on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_, at \_\_\_\_\_, Wyoming.

Attest: \_\_\_\_\_ Date: \_\_\_\_\_  
(Signature)

**U.S. DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE**

Approved By \_\_\_\_\_ Date: \_\_\_\_\_  
J. Xavier Montoya, State Conservationist

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## Summary of Watershed Project Plan – Environmental Assessment

**Project Name:** Kaycee Flood Protection Project, Middle Fork Powder River Watershed

**County:** Johnson County

**State:** Wyoming

**Sponsors:**

Powder River Conservation District  
Town of Kaycee, Wyoming

**Document Type:** Watershed Project Plan – Environmental Assessment

**Description of Recommended Plan:** The recommended plan is to construct flood control dikes and a flood wall along the north side, and dikes and grade work on the south side of the Middle Fork Powder River through the town of Kaycee, Wyoming. There will be one property buyout and eleven structures relocated along the river to allow for the construction of the dike locations. The area between the dikes will become the 100-year floodplain. The action of the recommended plan is needed to provide safety to the residents of Kaycee and protect the homes, businesses and community structures from flooding of a 100-year storm frequency event. The proposed dikes would be constructed adjacent to the stream channel and will not affect wetlands adjacent to the stream in the project area, or downstream outside of the project area.

**Affected Environment:** The affected environment of this project is the community of Kaycee and the area within Kaycee that is affected under the 100-year floodplain. The project area of the recommended plan is specifically from the north-bound Interstate 25 (I-25) Bridge over the Middle Fork Powder River through town to a point just before the sewage treatment ponds. Water quality would remain unchanged if the recommended plan is implemented. Sediment from upstream will continue to flow through the town area, with no effect to the current sediment loads. Downstream effects will not be changed from existing conditions.

**Resource Information:**

<b>Project Area – 152 acres</b>		<b>Land Ownership – Private</b>	<b>100%</b>
<b>Land Use / Land Cover:</b>		<b>Farms</b>	
Developed	65.9 acres	Number of Farms	2
Grass, Pasture	37.2 acres	Average farm size in project area	38 acres
Shrub, Forest, Riparian	38.9 acres	Number–minority farmers	0
Water	10.0 acres	Number–limited resource farmers	0
		Number–animal feeding operations	0

**Wetlands–Project Area:** Small areas of wetlands adjacent to the channel would not be impacted by the action of the recommended plan. There are 16.2 acres of wetlands, of which 10.0 acres is water. The remaining 6.2 acres of wetlands is 0.041 percent of the project area.

**Floodplains–Project Area:** Floodplain would be limited to the area inside of the dikes.

**Highly Erodible Lands (HEL):** None.

**Threatened & Endangered Species (T&E):** Ute Ladies'-tresses: no impact to aquatic or wetland habitat should result from these measures.

**Cultural Resources:** None found in the project area.

**Project Beneficiary Profile:**

<b>Socioeconomic Information</b>	<b>Town of Kaycee</b>	<b>Johnson County</b>	<b>Wyoming</b>
Income in 1999			
Per Capita Income	\$16,584	\$19,030	\$19,134
Median Household Income	\$33,056	\$34,012	\$37,892
Unemployment	0.0%	3.7%	3.5%
Poverty Rate			
Families	10.9%	7.2%	8.0%
Families w/female householder	0.0%	20.7%	30.9%
Individuals	14.6%	10.1%	11.4%
Median Single-family Home Value	\$58,800	\$115,500	\$96,600
Education			
High School Completion Rate	86.9%	90.1%	87.9%
Bachelor's Degree or Higher	17.6%	22.2%	21.9%
Population	249	7,075	493,782
White	98.0%	97.0%	92.1%
Non-White	2.0%	3.0%	7.9%
Elderly (65 years and over)	12.0%	18.0%	11.7%

Source: U.S. Bureau of the Census – Census 2000  
[http://eoadiv.state.wy.us/demog\\_data/pop2000/ProfilePDFsWY/C2K-Profiles.html](http://eoadiv.state.wy.us/demog_data/pop2000/ProfilePDFsWY/C2K-Profiles.html)

**Problem Identification:** Records show flooding has occurred in the town of Kaycee in the following years: 1927, 1930, 1963, 1978, 1985, 1993 (3 floods), 1995 (3 floods), 1996 (2 floods), and 2002. On August 27, 2002, an estimated four-foot wall of water swept through the town of Kaycee due to flooding in the Middle Fork Powder River. On August 28, 2002, the Wyoming Emergency Management Agency reported the following: 19 trailers, 22 houses, and 12 of the 15 businesses in Kaycee received flood damage.

**Project Purpose and Need:** The project purpose is flood control. The need for the recommended plan is for the protection of life and property by reducing the threat of future flooding to Kaycee's residential, business and community structures from up to a 100-year storm frequency event on the Middle Fork Powder River, Wyoming.

**Alternatives Considered:**

- A. No Action – Dikes would not be constructed and no action would be taken to prevent flooding.
- B. Dike/Flood Wall – Construct flood control dikes and a flood wall through the town of Kaycee to control the 100-year flood flows.
- C. Flood Proofing – This alternative consists of flood proofing the residential, business and community structures within the 100-year floodplain, by either raising each structure or constructing a dike around each structure.
- D. Relocation – This alternative consists of relocating each residential, business and community structure out of the 100-year floodplain.
- E. Water Storage-Flood Retention Reservoir – This alternative would consist of building a flood control dam upstream of the town of Kaycee. Flood water would be stored and control released to prevent flooding in town.

**Principal Project Purposes and Measures:** The project purpose is flood control. The action of the recommended plan is to construct approximately 4,160 feet of dike and 240 feet of flood wall through the town of Kaycee to control the 100-year flood flows. This alternative would consist of building a dike on the north side of the river from the I-25 abutment to the downstream edge of town. The south dike would be constructed from the Highway 196 Bridge (Nolan Ave) west for 800 feet. The area near Harold Jarrard Park would have a combination of a dike, constructed west of the rodeo arena, and fill placed on the existing road sloped towards the river. This would allow passage to and from the Harold Jarrard Park by vehicles with trailers. Eleven structures will be relocated outside of the dikes. One structure will be bought out and removed. These structures are currently located inside of the proposed dike construction area.

The city sewer lagoons are currently protected from the 100-year flood flows. Flood gates will be placed in dikes to allow water to flow back into the stream channel. The existing river channel will be maintained with no encroachments. The materials for construction of the dikes/flood wall will be obtained from the city landfill borrow area.

**Other Impacts:** Some residents will have to relocate out of the floodplain. Some cottonwood trees and other vegetation will be disturbed or removed for construction of the dikes. Wildlife migration along the Middle Fork Powder River would be disrupted during construction of the dikes.

**Environmental Values Changed:**

Wooded Floodplain	Potentially 27 cottonwood trees removed.
Wildlife Habitat	Short-term loss during construction, positive long-term change with removal of undesirable species, and planting of desirable species.
Wetlands	No change.
Fisheries	No change.
Cultural Resources	No change.
Prime Farmland	None.
Noxious Weeds	Potential increase.

Environmental values changed: No adverse environmental effects are expected if the recommended plan is implemented. Some temporary disturbance would occur as a result of construction which may alter wildlife movement, and increase sediment if precipitation occurred during construction. Some dust and increased noise would also occur. Some vegetation including desirable tree species may be removed to construct the dikes/flood wall.

Major conclusions: Of the alternatives considered, the dike / flood wall / relocation alternative is the least cost alternative and it meets the completeness, effectiveness, efficiency, and acceptability criteria (see Watershed Modeling and Economic Analysis section).

Controversy / Issues to be resolved: Limited adverse impacts are expected from the recommended plan. Relocations will disrupt individuals living in the construction area. Acquiring funding for the project is the issue to be resolved.

**Public Participation / Consultation:** NRCS completed a Flood Damage Reduction Preliminary Investigation Report (PIR) jointly with the U.S. Army Corp of Engineers (COE) in December 2004. A number of alternatives were considered to protect the citizens and the residential, business and community structures due to flooding as a result of a 100-year storm frequency event.

A Public Scoping meeting to review the PIR and solicit input was held March 17, 2005, at the Harold Jarrard Park Building, 603 Nolan Avenue, Kaycee, Wyoming from 7:00 to 9:00 p.m. Twenty-

five people attended the meeting including personnel from four state and federal agencies. Comments were received for 30 days after the meeting. Twenty-one comments were received, including those obtained at the scoping meeting. Occasional update meetings were held with the town Council, to which the town invited residents to attend. Newspaper notices also kept the residents updated on the progress of the project planning. Informational meetings were held with the project Sponsors during the planning period. Meetings were held with Kaycee residents and concerned citizens to gather sociological information and an assessment of the direction the people felt the community should pursue. Representatives of Johnson County, and state and federal agencies, groups and individuals have been involved in the decision making process. On March 7, 2006, an interagency scoping meeting was held with representatives from local, state and federal agencies attending.

**Project Costs:**

<b>Estimated Project Costs</b>			
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>			
<b>(Dollars)<sup>1/</sup></b>			
<b>Installation Cost Item</b>	<b>PL 83-566 Federal Funds <sup>2/</sup></b>	<b>Sponsors</b>	<b>PROJECT TOTAL</b>
<b>Structural Measures</b>			
<b>Floodway System</b>			
Earth Dikes	\$475,309	\$1,250	\$476,559
Reinforced Concrete	\$96,491	\$1,250	\$97,741
<b>Subtotal - Structural Measures</b>	<b>\$571,800</b>	<b>\$2,500</b>	<b>\$574,300</b>
<b>Nonstructural Measures</b>			
Bridge Work (Nolan Avenue)	\$0	\$10,000	\$10,000
Real Property Rights	\$255,000	\$85,000	\$340,000
Relocation	\$24,000	\$8,000	\$32,000
<b>Subtotal - Nonstructural Measures</b>	<b>\$279,000</b>	<b>\$103,000</b>	<b>\$382,000</b>
<b>Estimated - Total Project</b>	<b>\$850,800</b>	<b>\$105,500</b>	<b>\$956,300</b>

<sup>1/</sup> 2007 Price Base

<sup>2/</sup> Natural Resources Conservation Service - responsible for assisting in installation of works of improvement.

**Project Benefits:** The project will provide safety to the residents of Kaycee and will protect homes, businesses and community structures from floods up to a 100-year frequency event. Some short-term employment would be created for construction of the project.

<b>Estimated Project Benefits</b>		
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>		
<b>(Dollars)<sup>1/</sup></b>		
<b>Item</b>	<b>Average Annual Benefits</b>	<b>Reduction<sup>2/</sup></b>
Flood Damage Reduction	\$387,100	99%

<sup>1/</sup> 2007 Price Base

September / 2007

<sup>2/</sup> Damages and benefits will accrue from floods of greater magnitude than the 100-year frequency event, but these were not evaluated.

**Mitigation:** Construction will not occur during those months (April to August) when flood events or wildlife nesting may likely occur to prevent sedimentation from reaching the stream or disruption of wildlife species nesting. During construction, silt fences would be placed between the stream and the construction area to contain run-off during precipitation events. The dikes and the area disturbed during construction will be re-vegetated. Pole plantings of cottonwood trees and the re-planting of other desirable species is planned in the project area. A native seed mix would be planted on the disturbed areas and dikes. Straw mulch would be applied, and crimped into the soil to aid in establishing seedlings.

## Introduction

This Environmental Assessment was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008); the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies; in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 4321, et seq.); and NRCS Planning Policy. Responsibility for compliance with the National Environmental Policy Act resides with the NRCS.

The project purpose is flood control. The need for the recommended plan is the protection of life and property by reducing flooding of the Kaycee residences, businesses and community structures up to a 100-year storm frequency event on the Middle Fork Powder River, Wyoming

On August 27, 2002, an estimated four-foot wall of water swept through the town of Kaycee, Wyoming due to flooding of the Middle Fork Powder River. The damage in portions of Johnson County and specifically to Kaycee resulted from nearly 7.5 inches of rainfall that fell in portions of the Middle Fork Powder River Basin. The intensity of the rainfall caused water torrents to speed through the town causing residential and commercial buildings to be swept off of their foundations, careen into other structures and float down river.

A post flood analysis by the Wyoming Emergency Management Agency performed on August 28, 2002, reported the following flood damage: 19 trailers, 22 houses, and 12 of the 15 businesses located in Kaycee. The emergency response actions included debris removal, hazardous structure removal, emergency streambank protection, and private road protection. On August 30, 2002, Wyoming Governor Jim Geringer requested disaster relief. On September 18, 2002, the Federal Emergency Management Agency (FEMA) informed Governor Geringer that their request for assistance was denied.

The town of Kaycee requested assistance under Section 205 in a letter to the U.S. Army Corps of Engineers (COE), Omaha District, dated October 15, 2002. The town of Kaycee requested watershed planning assistance through the Powder River Conservation District (PRCD) and the NRCS, on October 8, 2002. In turn, the PRCD requested NRCS assistance November 13, 2002. The COE and the NRCS completed a Preliminary Investigation Report (PIR) in December 2004, in which a number of alternatives were considered to protect the citizens and residential, business and community structures from the 100-year storm frequency event.

This Environmental Assessment (EA) describes the plan formulation process, alternatives considered, and discloses project impacts. There were no significant adverse environmental impacts identified during the scoping process. The sponsoring organizations are the Powder River

Conservation District (PRCD) and the town of Kaycee. The NRCS assisted with the design of the recommended plan, and assisted the Sponsors with the preparation of this plan-EA.

The U.S. Fish and Wildlife Service (USFWS), Wyoming Game and Fish Department (WGFD) and the Wyoming State Historic Preservation Office (SHPO) have been and will continue to be contacted as the process continues.

The purpose to be served by the recommended plan is flood prevention and the protection of the lives of the citizens as well as the residences, businesses and community structures in the town of Kaycee. The recommended plan includes the construction of dikes on the north and south side of the Middle Fork Powder River, with a flood wall proposed on the north side of the river. The estimated cost of the project is \$956,300. At this time funding for the project has not been obtained.

### **Project Organization Framework**

This Kaycee Flood Protection Project is sponsored by the town of Kaycee and the Powder River Conservation District (PRCD). Both entities desire to see the town of Kaycee protected from future storm events. NRCS was on the scene during the emergency response to the August 27, 2002, flood and provided funding through their Emergency Watershed Protection Program (EWP). The COE were on site to help evaluate all alternatives for a flood protection project.

### **Responsible Federal Official (RFO)**

The Wyoming NRCS State Conservationist J. Xavier Montoya is the RFO.

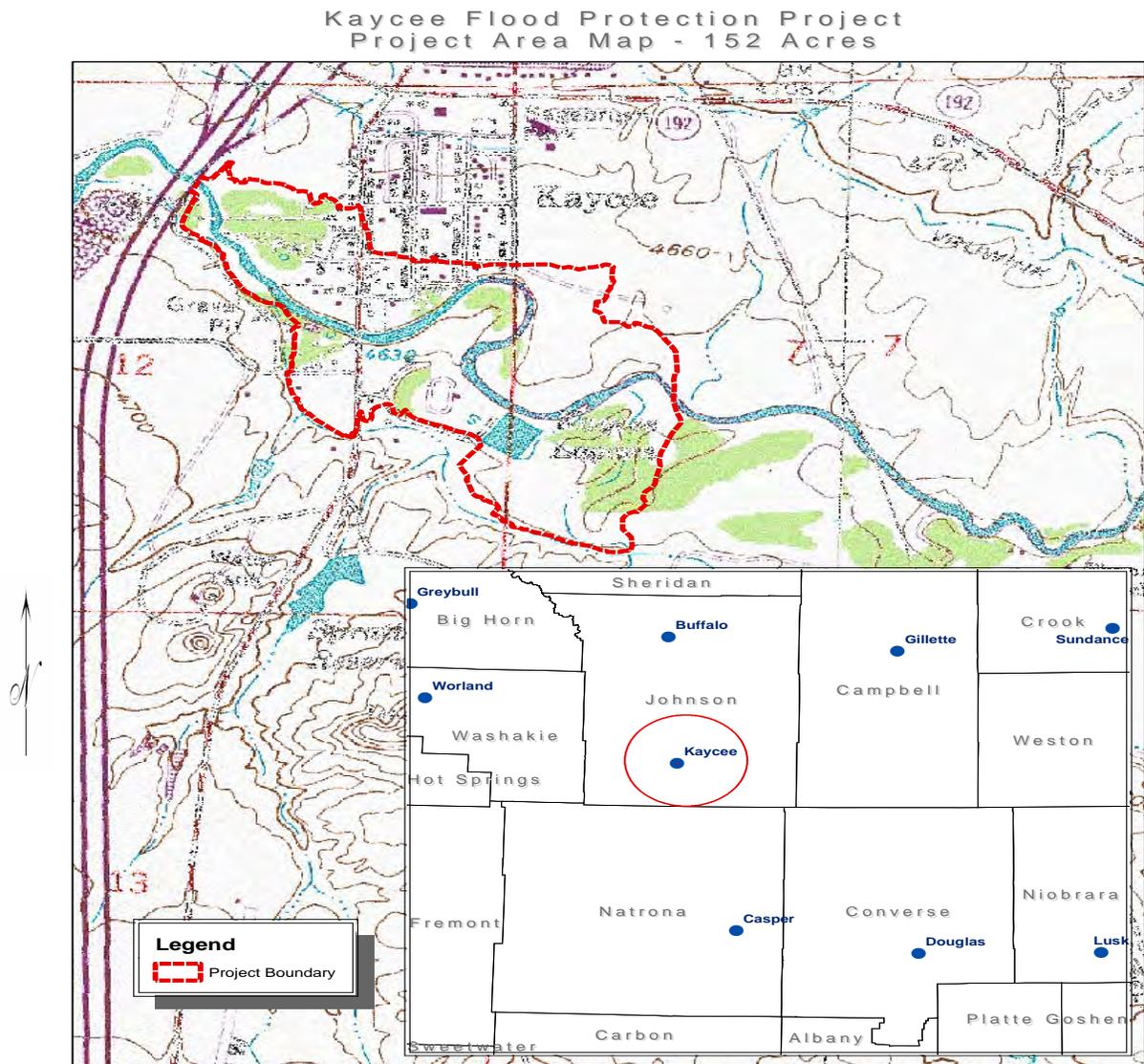
## **Project Setting**

### **Project Physical Description and Conditions**

This section describes pertinent physical, social, and economic conditions of the project area which is 152 acres in the town of Kaycee located on the main stem of the Middle Fork Powder River. The Middle Fork Powder River watershed physical conditions, including the size and location, stream system, climate, geology, topography and soils are expected to remain constant throughout the evaluated life of the project (100 years).

#### **Location and Size**

The project area is located on the Middle Fork Powder River Watershed. For the scope of this EA, the project area of 152 acres, identified in the town of Kaycee, is considered. Within the project area the 152 acres is private land. Of this acreage 65.9 acres are developed land; 37.2 acres are in pasture and native grass land; 38.9 acres are shrub, forest, riparian land; and 10.0 acres are water. There are 16.2 acres of wetlands, of which 10.0 acres is water. The remaining 6.2 acres of wetlands is 0.041 percent of the project area. There are two farms within the project area. These two operations produce crops and/or livestock within the project area. One producer grazes horses and/or cattle and has some irrigated alfalfa adjacent to the stream. The second producer has four acres of alfalfa adjacent to the stream.



## Stream System

The Middle Fork Powder River flows approximately 56 miles from the Natrona County line through the town of Kaycee. Other streams that enter the Middle Fork Powder River above Kaycee include Alkali Creek, Beaver Creek, Buffalo Creek, Red Fork Powder River, Sheep Creek, and Spring Creek. Numerous intermittent and ephemeral streams also enter the stream system.

A Stream Visual Assessment Protocol (SVAP) survey was conducted by NRCS personnel on January 8, 2007, to assess physical conditions of the stream reach within the project area. Active channel width at the survey site was 59 feet, with a gradient of 0.3 percent. Factors taken into consideration for SVAP include channel condition, hydrologic alteration, riparian zone, bank stability, water appearance, nutrient enrichment, barriers to fish movement, in-stream fish cover, pools, invertebrate habitat, canopy cover, manure presence, salinity, riffle imbeddedness, and macro-invertebrates observed. SVAP is based on a scoring system in

which a score of >9.0 is excellent, 7.5 to 8.9 is good, 6.1 to 7.4 is fair, and <6.0 is poor. The stream reach assessed scored 3.1, putting it into the poor category.

An explanation of scores using the factors identified above follows:

*Channel condition* – Extensive use of rock rip-rap at both bridges. Near vertical banks indicate a tendency to move laterally.

*Hydrologic alteration* – Concerns the frequency of flooding and ability for floodwater to reach its' historic floodplain. Attempts have been made to prevent lateral movement using rock rip-rap, car bodies, etc., which has lead to entrenchment (down-cutting). Bank full indicators are present in some areas.

*Riparian zone* – The existing vegetation consists mainly of introduced or invasive species.

*Bank stability* – This is more of a function of rock rip-rap than desirable vegetation.

*Water appearance* – The water is turbid.

*Barriers to fish movement* – Diversions are located both upstream and downstream.

*In-stream fish cover* – Default score of 4 was chosen.

*Pools* – The Wyoming Department of Environmental Quality (WYDEQ) performed an assessment below the sewage lagoons on the Middle Fork Powder River (just below the project area) in 2002. Pools measured (4) had an average of 3.3 feet in depth. The stream at that point was classified as a “C4” using the Rosgen classification. Fish that were present were listed as small (<2 inches) and not identified.

## **Climate**

The following information was taken from the NRCS Ecological Site Description for a Lowland (LL) 10-14 inch Northern Plains Precipitation Zone in Major Land Resource Area (MLRA) 58B, which is described as Northern Area High Plains. The project area is located within this Ecological Site. This site is located on nearly level land adjacent to streams that run water at least during the major part of the growing season.

Wide fluctuations may occur in yearly precipitation and result in more drought years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in the winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in the winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Wind speed averages about eight miles per hour (mph), ranging from ten mph during the spring to seven mph during late summer. Daytime winds are generally stronger than night-time and occasional strong storms may bring brief periods of high winds with gusts to more than 75 mph.

The following table shows average maximum and minimum temperatures, total precipitation, and snowfall fluctuations by month at Kaycee for the past 57-year period according to data provided by the Western Regional Climate Center.

<b>Period of Record Monthly Climate Summary</b>					
Period of Record: 08/01/1948 to 12/31/2005					
<b>Month</b>	<b>Average Max. Temperature (F)</b>	<b>Average Min. Temperature (F)</b>	<b>Average Total Precipitation (in.)</b>	<b>Average Total Snowfall (in.)</b>	<b>Average Snow Depth (in.)</b>
<b>Jan</b>	37.6	6.9	0.4	6.7	2
<b>Feb</b>	41.6	12.6	0.36	6.4	1
<b>Mar</b>	48.2	19.8	0.7	7.4	0
<b>Apr</b>	57.9	28.5	1.5	6.6	0
<b>May</b>	67.8	38.2	2.25	1.3	0
<b>Jun</b>	78.7	46.5	2.05	0.1	0
<b>Jul</b>	88	52.6	1.15	0	0
<b>Aug</b>	86.7	50.2	0.83	0	0
<b>Sep</b>	75.6	40.1	1.07	0.4	0
<b>Oct</b>	63.1	29.5	1.03	2.4	0
<b>Nov</b>	47.6	17.6	0.52	5.6	1
<b>Dec</b>	39.7	9.7	0.37	6.5	1
<b>Annual</b>	61	29.4	12.24	43.3	1

Source: Western Regional Climate Center <http://www.wrcc.dri.edu/>

### Geology, Topography, and Soils

**Geology** – The project area is located on the western flank of the Powder River structural basin, about ten miles from the Bighorn Mountains. The Bighorn Mountains were formed during the Laramide Orogeny beginning about 60 million years ago (Lageson, 1988). As the mountains were pushed up, the basin subsided. The younger sedimentary rocks that had once covered the Bighorns were mostly removed by erosion during the uplift. This sediment nearly filled the basin. The present landscape is the result of erosion by water and ice.

The mountains rise abruptly to relatively uniform elevations of 8,000 to 9,000 feet, with a few higher peaks. The exposed core of the mountains is composed predominantly of Precambrian metamorphic and igneous rocks as old as 3.0 billion years (Love and Christiansen, 1985). The sedimentary rocks on the flanks dip into the basin at angles of about 6° or 7° west of Kaycee (Kouhout, et al., 1957), but steepen to near vertical near Buffalo (Whitcomb, et al., 1966).

The town of Kaycee is located along the Middle Fork Powder River. The bedrock of the project area is mapped by Kohout (1957) as primarily alluvium (Qal) and first terrace above river (Qt<sub>1</sub>). These are described as “unconsolidated floodplain and terrace deposits of clay, silt, and fine sand containing lenses of coarser sand and gravel that differ locally in thickness and extent.”(Whitcomb, et al., 1966) These alluvial deposits are derived from the rocks of the Bighorn Mountains, and can be as much as 100 feet thick. Underlying the alluvial materials is the Cody shale. This is described by Feathers (1981) as “dark grey shale, limey near base with

some bentonitic beds and inter-bedded, lenticular fine-grained often shaley sandstones”. The Cody shale can be divided into several members including the Shannon and Sussex sandstone members.

**Findings:**

A subsurface geologic investigation of the project was made in two phases. The first phase was to examine potential borrow materials for the dikes. Three test holes were augered in the vicinity of the landfill in the Northeast ¼, of Section 7, Township 43 North, Range 81 West. This area is mapped as Cody shale. Samples of the soil materials were sent to the NRCS National Soil Mechanics Center (SMC) in Lincoln, Nebraska for analysis. Soil materials consisted of very fine-grained, high plasticity, fat clay (CH soil) and fine-grained, medium plasticity, lean clay (CL soil).

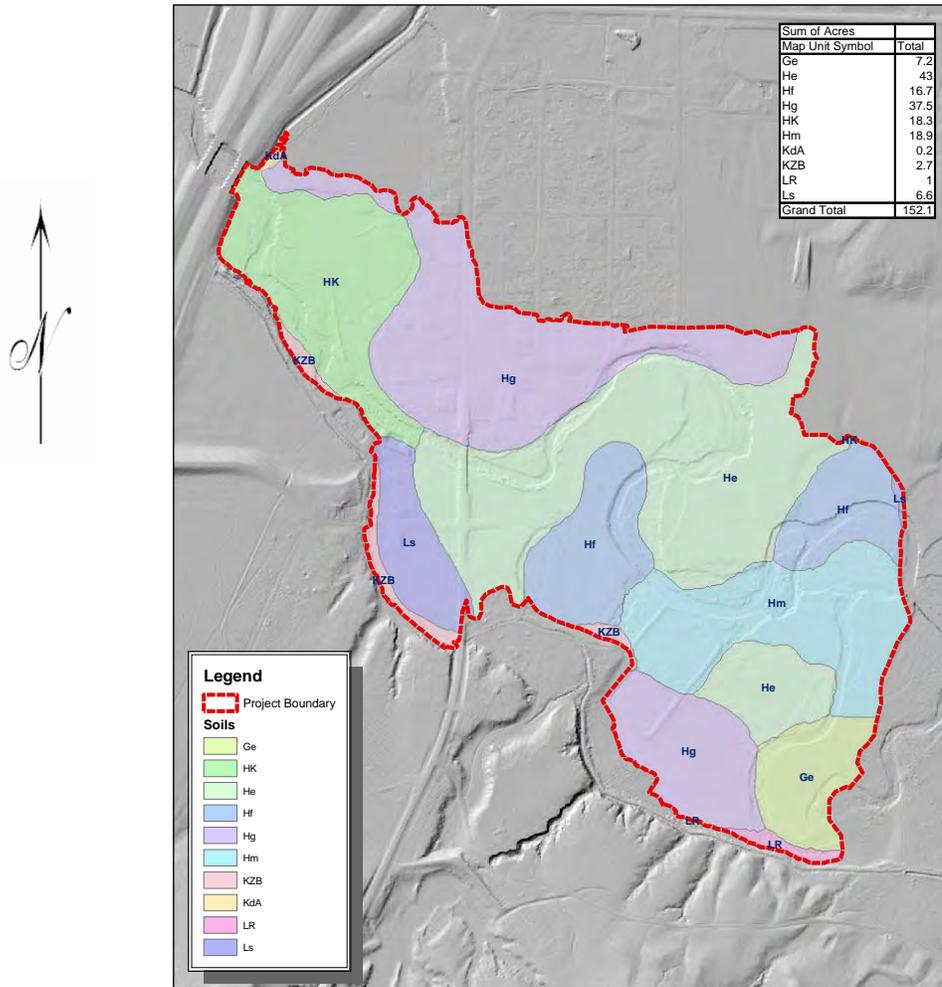
The second phase of the investigation was to determine the thickness and character of foundation materials along the dikes in town. Six test holes were augered along both sides of the river. Samples of these materials were also sent to the SMC for testing to aid in stability analysis of the dikes. Alluvial soil materials generally consisted of 7 to 9 feet of medium-plasticity, sandy lean clays or lean clay with sand (both CL soils), overlying 2 to 3 feet of sandy lean clay with gravel (SC soil), overlying coarse-grained, low seepage rates, low plasticity, clayey gravel with sand (GC soil).

Topography – Elevations within the watershed range from a high of 6,980 feet near the Natrona County Line to a low of 4,638 feet at Kaycee. The watershed winds through steep, rocky canyons in the upper portion of the watershed, and gradually becomes gently sloping as it reaches the confluence with Buffalo Creek. Topography within the project area is gently sloping to nearly level, with a high elevation of 4,661 feet and a low of 4,638 feet. The stream channel within the project area is moderately incised with an obvious floodplain.

Soil Features – The soil map units that occur within the project area, along with approximate acreage is shown below. The soils map shows locations of these soils within the project area. SSURGO A, more detailed description of the map units, is available in appendix D.

Map Symbol	Map Unit Name
He	Haverson silt loam
Hf	Haverson silt loam, wet
Hg	Haverson clay loam
HK	Haverson-Glenberg assoc., saline
Hm	Haverson silt loam, sandy subsoil variant
KdA	Kim loam, 0-3% slopes
KZB	Kim-Zigweid assoc. gently sloping
Ls	Lohmiller silty clay loam

Kaycee Flood Protection Project  
 Soils Map



### Project Cultural Resource Conditions

No cultural resources were found in the project area on March 9, 2006, when Jay Meyer, NRCS State Archeologist, made a reconnaissance survey of the proposed dike locations for possible cultural resources. No sites were identified within the town of Kaycee boundaries.

#### Section 106, NHPA (National Historic Preservation Act) Compliance.

Watershed level – A file search at the SHPO Wyoming Cultural Records Office of the immediate area around Kaycee was conducted on February 10, 2003, by the NRCS State Archeologist. Three sections showed known sites, eligibility unknown or noncontributing segment. Most of the sites reported are connected with the Bozeman Trail. As there are very few segments of the Bozeman Trail that are identifiable, any trace or records found of the Trail will require an evaluation by either the NRCS and/or COE archeologist. A record of sites listed by the Wyoming State Historical

Society that are in Johnson County and in or near Kaycee can be found in appendix G. Sussex is included in this list since it is located in Johnson County approximately 20 miles downstream of Kaycee.

Known cultural resources have been taken into consideration during the planning process. The proposed construction locations are not affecting any known or listed sites. If additional sites or structures are identified that may be damaged or altered by project action, work will be stopped immediately until the applicable provisions of federal and state laws dealing with archaeological and historical site preservation have been addressed. The NCRS Cultural Resource Specialist will evaluate the sites of any ground disturbing activities, in accordance with NRCS state and national policies and the agreements with the Wyoming State Historic Preservation Office and the National Advisory Council on Historic Preservation.

### **Project Social and Economic Conditions**

Kaycee, Wyoming is located in the eastern foothills of the Big Horn Mountains in Johnson County in north-central Wyoming. The Middle Fork Powder River runs through the south end of town. The population of Kaycee, as cited by the U.S. Census 2000, is 249 and has remained fairly constant over the last 47 years (though down by 35 from 1960). In 2006 the town of Kaycee had a population of 260 according to the town clerk. Declining population, as seen in other small rural communities, does not seem to be a big issue here, and with a median age of 36.8 it appears as though it will continue to sustain itself. Many towns of this size are seeing trends toward older populations; only 12 percent of the overall population of Kaycee is 65 years and older compared to 18 percent for Johnson County. Ninety-eight percent of the population was reported as White in both the 1990 and 2000 census figures. Ancestry is primarily German and English, though that has changed in the last ten years. In 1990, 30 percent of the population of Kaycee claimed German as their ancestral background; in 2000, only 12.6 percent made the same claim. There was also a marked increase in the numbers who claimed United States as their ancestral heritage: 6 percent in 1990 and 23 percent in 2000.

As reported in the U.S. Census 2000, the labor force of Kaycee is 116 with 100 percent employment. The top six employment sectors in Kaycee and the corresponding percent of the workforce are education, health and social services (22.4 percent), public administration (13.88 percent), arts, entertainment, recreation, accommodation & food services (12.9 percent), other services (12.1 percent), agriculture (11.2 percent), and construction (9.5 percent). Two operations produce crops and/or livestock within the project area. One producer grazes horses and/or cattle and has some irrigated alfalfa adjacent to the stream. The second producer has four acres of alfalfa adjacent to the stream

Per capita and median household income is \$16,584 and \$33,056 respectively. The per capita income is 14.75 percent lower than that of Johnson County and 15.38 percent lower than the per capita income for the State of Wyoming. Likewise the median household income for Kaycee is lower than the county and state at 2.89 percent and 14.63 percent respectively. Of the families living in Kaycee 10.9 percent are living at the poverty level or below which is 33.94 percent higher than that of the county and 26.61 percent higher than that of the state levels of poverty. The median single-family home value is \$115,500 for Johnson County and \$96,600 for the State of Wyoming, and \$58,500 for Kaycee, which is 96.43 percent lower than Johnson County and 64.29 percent lower than the state as a whole.

The town has an elected mayor and town council form of government, with five persons elected to the town council and a town clerk.

## Watershed Problems and Opportunities

The project purpose is flood control. The need for the recommended plan is the protection of life and property by reducing flooding of the Kaycee residences, businesses and community structures up to a 100-year storm frequency event on the Middle Fork Powder River, Wyoming

On August 27, 2002, an estimated four-foot wall of water swept through the town of Kaycee, Wyoming from flooding in the Middle Fork Powder River. The damage in portions of Johnson County and specifically to Kaycee resulted from nearly 7.5 inches of rainfall that fell in portions of the Middle Fork Powder River Basin. The intensity of the rainfall caused water torrents to speed through the town causing residential and commercial buildings to be swept off of their foundations, careen into other structures and float down river. Records show flooding has occurred in the following years in the town of Kaycee: 1927, 1930, 1963, 1978, 1985, 1993 (3 floods), 1995 (3 floods), 1996, (2 floods), and the flood of 2002. The flood of 2002 damaged approximately 22 residences and caused over \$2 million in damages to the town of Kaycee. In the ten years previous to the August 2002, flood event there had been six flood events through town

A post flood analysis by the Wyoming Emergency Management Agency performed on August 28, 2002, reported the following flood damage: 19 trailers, 22 houses, and 12 of the 15 businesses located in Kaycee. Emergency response actions included debris removal, hazardous structure removal, emergency streambank protection, and private road protection. On August 30, 2002, Wyoming Governor Jim Geringer requested disaster relief. On September 18, 2002, the Federal Emergency Management Agency (FEMA) informed Governor Geringer that their request for assistance was denied.

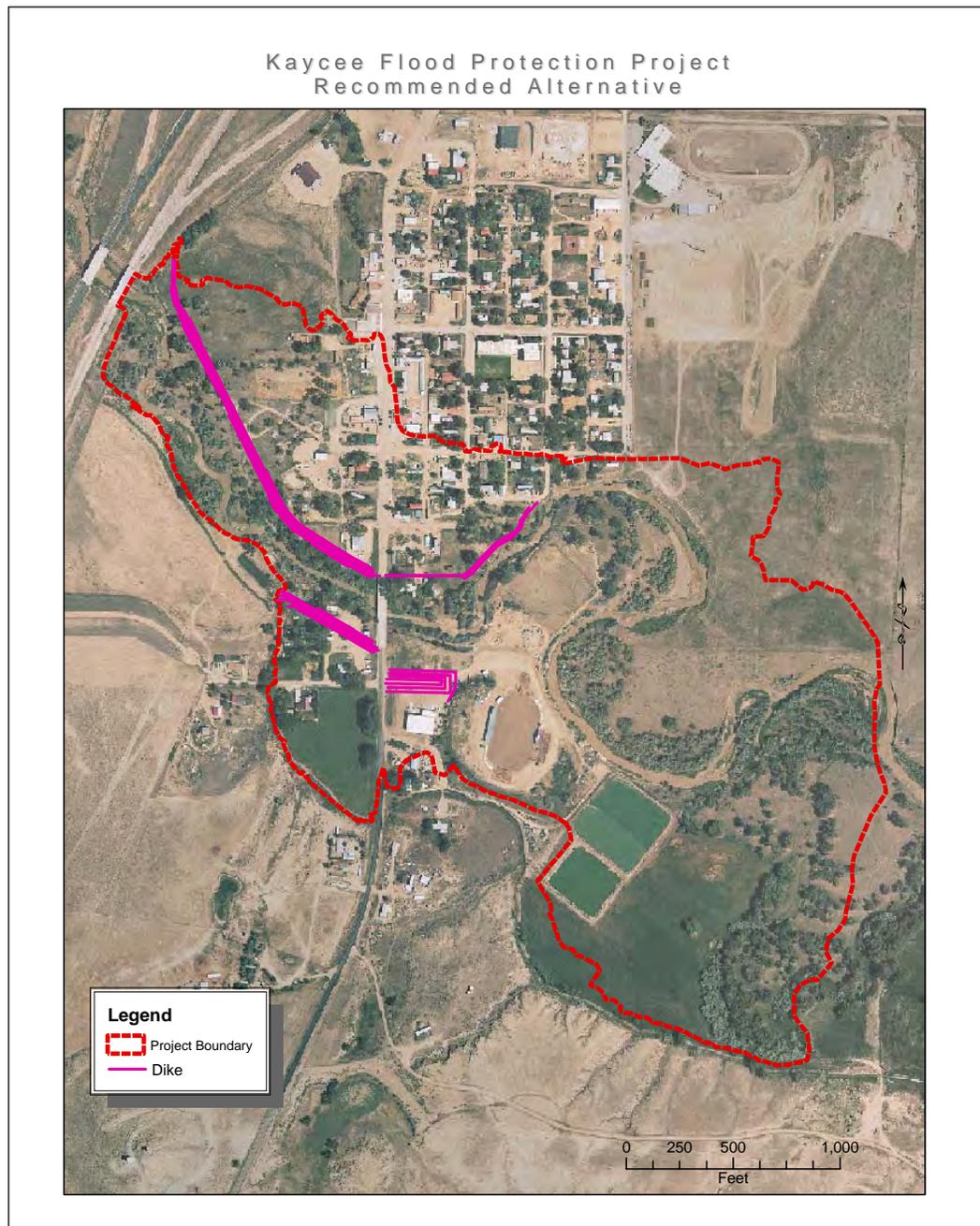
Assistance for cleanup and reconstruction came from surrounding communities, as well as state and federal agencies. Total rehabilitation costs were \$902,339; the NRCS expended \$535,143 and local contributions amounted to \$367,196. Benefits and results from the cleanup and reconstruction process were:

- 17,000+ hours of volunteer time logged
- 23 homes, 6 businesses and 25 various vacant garages/outbuildings were removed
- 10+ acres of debris was removed
- 7,362 feet of river debris was removed
- 4 bridges were protected
- 6,390 acres of hayland and pastureland were protected
- 2,443 feet of streambank was protected
- 5 public, 55 private and 15 business buildings were protected
- 6 utilities were protected
- Estimated value of property protected – \$3,370,683
- Economic benefit estimates – \$982,125
- Environmental benefit estimates – \$2,040,925
- Social benefit estimates – \$3,679,757
- Total estimated benefit – \$10,073,490

A Letter of Request was received on November 13, 2002, from the project Sponsors for the development of a watershed planning effort to construct flood protection under the authority of the Watershed Protection and Flood Prevention Act, Public Law (PL) 83-566, as amended (126 USC 10011008). In August 2004, the Wyoming Board of Agriculture reviewed the PL 83-566 application for federal assistance, ranked the project as a high priority, and recommended the project for

planning assistance. On August 21, 2004, the Planning Authorization for the initiation of a Watershed Project Plan–Environmental Assessment was completed and signed by Lincoln E. Burton, NRCS State Conservationist, Casper, Wyoming. Through a collaborative effort, the NRCS and the COE completed the Flood Damage Reduction Preliminary Investigation Report (PIR) in December 2004.

On March 17, 2005, a Public Scoping Meeting for review of the PIR and the initiation of the planning effort was held at the Harold Jarrard Park Building in Kaycee, Wyoming. The NRCS presented the PIR to the project Sponsors and the community of Kaycee. An open house was held to allow for public comments and to answer questions for those in attendance. On March 7, 2006, an interagency scoping meeting was held to gain feedback from local, state, and federal agencies regarding issues and concerns related to the flood protection project.



## **Recommended Plan**

The recommended plan is to construct flood control dikes, a flood wall, and strengthen some existing rock rip-rap along the north side, and dikes and grade work on the south side of the Middle Fork Powder River through the town of Kaycee, Wyoming. Eleven existing structures will need to be relocated outside of the dikes. One buyout will need to be done to remove a home from inside the proposed dike locations. The proposed dikes would be constructed adjacent to the stream channel on upland areas, and will not affect wetlands along the stream. During construction there will be approximately 4,160 feet of dike, 240 feet of flood wall, and replacement of 645 feet of rock rip-rap completed to control the 100-year flood flows through the town of Kaycee. This alternative will consist of building a dike on the north side of the river from the I-25 to the downstream edge of town. The south dike will be constructed from the Highway 196 Bridge (Nolan Ave) west for 800 feet. The area near Harold Jarrard Park will have a combination of a dike constructed west of the rodeo arena, and fill placed on the existing road sloped towards the river. This will allow passage to and from the Harold Jarrard Park by vehicles.

The city sewer lagoons are currently protected from the 100-year flood flows. Flood gates will be placed in dikes to allow water to flow back into the stream channel. The existing river channel will be maintained with no encroachments. The materials for construction of the dikes/flood wall would be obtained from the city landfill borrow area.

## **Need for the Recommended Plan**

The need for the recommended plan is for the protection of life and property by reducing future flooding of the Kaycee residences, businesses and community structures during a 100-year storm frequency event on the Middle Fork Powder River, Wyoming. Action to control future flood flows through town is needed since the likelihood of future flood events of the Middle Fork Powder River are inevitable. Flood events pose a continued threat to public safety as well as contribute to major damages to residential, business and community properties. In order to address the issue of flood control feasibly, it will be necessary to consider activities that allow flood flows to pass safely through Kaycee, while taking measures to minimize the relocation of permanent structures currently in the 100-year floodplain.

### Needs:

1. Protection of the private residences located in the floodplain along the river inside of the town boundaries.
2. Protection of the business district from flooding.
3. FEMA mapping of the floodplain.
4. Relocation of structures as a consideration in the planning effort.

## **Objectives for the Recommended Plan**

Considering the recent flooding history of the town of Kaycee, flood protection measures need to be put in place to protect life and property.

### Objectives:

1. Protect the structures located in the town of Kaycee, Wyoming from flooding as a result of the 100-year storm frequency event.
2. Control the flood waters as they pass through the town of Kaycee, Wyoming.
3. Maintain stream quality through the project reach.
4. Maintain aesthetics of the riparian area along the stream corridor, while providing flood protection.

## Scope of this Environmental Analysis

The purpose and scope of this project is to provide flood protection and reduce the threat to life and property within the 100-year flood delineation of the Middle Fork Powder River through the town of Kaycee, Wyoming.

This project will deal with the elements necessary to control flood waters, maintain the river channel corridor, protect structures located where flood waters can cause damage, and protect the integrity of the stream channel through Kaycee.

The intent of the Kaycee Flood Protection Project is to control flood waters of the Middle Fork Powder River from the 100-year storm frequency event, and reduce the flood flow to the residential, business, and community areas of the town of Kaycee.

NRCS completed a Flood Damage Reduction Preliminary Investigation Report (PIR) jointly with the COE on the Middle Fork Powder River in December 2004. This report estimated the flood protection and stream stabilization concerns of the project area through the town of Kaycee, Wyoming. Five alternatives were considered to protect the town and residential, business and community structures from flooding as a result of the 100-year storm frequency event. Preliminary estimates for the recommended plan showed a positive benefit/cost ratio and thereby a viable watershed project.

On March 17, 2005, a Public Scoping Meeting for the initiation of the planning effort was held at the Harold Jarrard Park Building in Kaycee, Wyoming. The NRCS presented the PIR to the project Sponsors and the community of Kaycee. This meeting was held to allow for public comments to identify the concerns of the local community regarding the flood protection project through the town of Kaycee and to answer questions for those in attendance.

There were five potential alternatives identified in the PIR which were presented and discussed at the public scoping meeting.

- The first alternative was the “*No Action*” – nothing would be done to prevent future flooding.
- The second alternative was *Dike/Flood Wall* – to construct a dike and flood wall through the town of Kaycee to protect from the 100-year storm frequency flows.
- The third alternative presented and discussed was *Flood Proofing* – this alternative consists of flood proofing the residential, business and community structures within the 100-year floodplain, by either raising each structure or constructing a dike around each structure.
- The fourth alternative was *Relocation* – this alternative consists of relocating residential, business and community structures out of the 100-year floodplain.
- The fifth alternative presented and discussed was a *Water Storage-Flood Retention Reservoir* – this alternative would consist of building a flood control dam upstream of the town of Kaycee. Flood water would be stored and control released to prevent flooding in town.

### Description of Alternatives Considered but Eliminated from Detailed Study

All alternatives brought forward through the scoping process were analyzed for the four criteria completeness, effectiveness, efficiency, and acceptability (see Watershed Modeling and Economic Analysis section) and against the following five factors: 1) satisfaction of purpose and needs statement, 2) relative costs, 3) technological feasibility, 4) logistics, and 5) environmental consequences. Alternatives that failed to meet the criteria were eliminated from further study.

Those alternatives not advanced into planning and evaluation were *Water Storage-Flood Retention Reservoir* and *Flood Proofing*. The *Relocation* alternative by itself was also eliminated; however, relocation of some structures became a component of the recommended alternative.

### Water Storage–Flood Retention Reservoir Alternative

There have been a number of previous studies that identified potential stream storage sites. A Preliminary Investigation Report (PIR) was completed which identified flood mitigation measures, including storage, as a potential alternative. In this PIR, the watershed problems and needs identified included: 1) flood protection, 2) drainage, both surface and subsurface, and 3) irrigation water supply. NRCS identified that storage of 50,000 acre feet was needed. NRCS evaluated the costs and benefits of storage for flood protection and in the 1961 PIR made the following statement “storage sufficient to protect Kaycee is not economically justified, the costs far exceed the benefits.”

In January 1976, the Bureau of Land Management (BLM) completed and issued a draft Environmental Impact Statement (EIS). In the EIS, BLM identified a reservoir site on the Middle Fork Powder River. This structure was planned for 50,000 acre feet of reservoir storage to be utilized by agriculture for irrigation and industry for undisclosed purposes. The structure was planned for 1,160 acres of surface water. The project area included 1,019 acres of private property and approximately 141 acres of BLM property. In the 1976 EIS, BLM identified the estimated cost for this structure at \$30–\$35 million. It is not known if BLM ever issued a Record of Decision (ROD) on this EIS, the structure was never constructed.

In January 1986, the Wyoming Water Development Commission (WWDC) contracted with Harza Engineering Company to undertake Phase I of the Level III study. The “Conceptual Design Report for the Middle Fork Powder River Dam and Reservoir Project” was completed. This report identified and planned for a 190 ft. high dam, impounding 59,600 acre feet of storage. In 1986, this report identified the estimated cost of this dam at \$43,500,000. This report is archived with the WWDC.

In February 2002, the WWDC commissioned the study and publication of the Powder / Tongue River Basin Plan Final Report. This very broad basin plan identified four potential storage/reservoir projects in the Powder River upstream from Kaycee, for “future water use opportunities.” These four structures varied in storage size and the 2002 WWDC report did not contain any cost estimates.

All the cited studies concluded that the expense of a flood control structure far exceeds the potential benefits for flood protection of the town of Kaycee.

### Flood Proofing Alternative

This alternative consists of flood proofing the residences in place within the 100-year floodplain, by either raising the structure or constructing a dike around the structure. These structures would be required to be vacated in the event of a flood. Flood proofing costs for 47 structures located in the 100-year floodplain would be \$1,546,112.

### Relocation Alternative

This alternative consists of relocating residential, business and community structures out of the 100-year floodplain. Some residential development has taken place above the 100-year floodplain in or around Kaycee that would allow structures to be removed and relocated. Since the flood event some homes have been relocated. There were a total of 47 structures within the current 100-

year floodplain that would need to be relocated. This alternative, by itself, was eliminated from detailed study due to the relative costs and logistics. However with the construction of the dikes and flood wall of the recommended alternative there would remain only twelve structures in the planned 100-year floodplain. These eleven specific relocations and one buyout were incorporated into the recommended alternative. This would allow the planned 100-year floodplain to be free of structures.

### Resources / Issues Eliminated from Further Study

The alternatives identified in the PIR were presented and discussed at the scoping meeting. As a result of the discussion on the alternatives the following list of concerns was developed.

<b>IDENTIFIED CONCERNS</b>			
<b>Economic, social, cultural, &amp; environmental concerns</b>	<b>Degree of Concern</b>	<b>Degree of significance to decision making</b>	<b>Remarks / Findings</b>
Access affected during floods	High	High	Levees would improve access by restricting flood events within channel rather than through town.
Air Quality	Low	Low	Some dust may arise during construction.
Bank erosion from flooding	High	Moderate	Some bank erosion would continue to occur.
Cultural Resources	Moderate	Low	No effect from recommended plan.
Endangered and threatened species and species of state concern	High	Low	A survey for Ute Ladies'-tresses was completed by US FWS, no evidence of the species was found.
Floodplain Management	High	Moderate	Flood events may increase water depth within the floodplain within those areas where levees are constructed.
Grazing	Moderate	Low	Fencing of levees for seedling establishment and maintenance.
Public Health and Safety	High	High	Project would provide safety for the residents of Kaycee up to a 100-year flood event.
Recreation	Moderate	Low	No effect from recommended plan.
Riparian Habitat	High	Low	Levees would not affect riparian habitat. 27 cottonwoods would be removed from the floodplain.
Stream impacts – Fish habitat	Moderate	Low	No effect from recommended plan.
Water Quality	High	Low	No effect from recommended plan.
Water Quantity	High	Low	No effect from recommended plan.
Wetlands	High	Moderate	No effect from recommended plan.

Wildlife Habitat	Moderate	Low	Landscape will change with construction of the levees. Removing undesirable species and replacing with desirable species should benefit most wildlife species.
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The following resources and issues were eliminated from further study.

Air Quality – Air quality is currently excellent, during construction some degradation is anticipated, after construction air quality will return to excellent.

Cultural Resources – No known cultural resources exist within the project area. If cultural resources are found during construction, all construction activities would cease, and a Cultural Resource Specialist would be brought in to evaluate the resource.

Ecological Critical Areas – No ecological critical areas are known to exist.

Fish – No disturbance to the stream riparian corridor; or stream alteration would occur as a result of the recommended plan. Minimal impacts to fish or the fisheries are expected with rock rip-rap replacement. Access to the site by fisherman will likely remain as is.

Fisheries – According to the WGFD the fish species expected to occur in the Middle Fork Powder River are the white sucker, long-nose sucker, stonecat, flathead chub, and long-nose dace. No species identified on the Wyoming Species of Concern list have been found in the Middle Fork Powder River within the project area.

Grazing – Those areas where dikes are constructed will be seeded to grass, and livestock will be excluded. Agricultural acres taken out of production have been converted to housing development.

Land Rights – Responsibility of land rights acquisition rests with the town of Kaycee.

Recreational Use – No change in recreational use is anticipated. Some residents want to create a walkway while others are opposed to a walkway because of privacy issues. Resolving this issue will be left up to the residents of Kaycee.

Water Quality and Quantity – Water quality should remain constant under both Alternative A and B. Increased sediment may occur during construction. Silt fences will be installed to inhibit sediment from reaching the stream during construction. Impacts from construction are expected to be slight due to the distance of the dikes from the stream. No change will occur to water quantity as the result of the project. Downstream effects will remain as they currently are with existing conditions. The stream returns to the existing floodplain immediately to the east of the sewer lagoons.

## Formulation and Comparison of Alternatives

### Formulation Process

The Sponsors have identified the following objectives: (1) Protect the structures inside of the 100-year floodplain located in the town of Kaycee; (2) Control the flood waters as they pass through the town of Kaycee; (3) Maintain stream quality through the project reach; (4) Maintain aesthetics of the

riparian area along the stream corridor, while providing flood protection. A list of alternatives was developed and through the scoping and evaluation criteria process the dike/flood wall/relocation alternative was chosen as the recommended plan.

### **Initiation of NEPA (National Environmental Policy Act) Process**

The Natural Resources Conservation Service in Casper, Wyoming, received a request, dated November 13, 2002, to assist the Powder River Conservation District in the development of a watershed planning effort. The Conservation District request listed the concern of flood protection.

NRCS completed a Flood Damage Reduction Preliminary Investigation Report (PIR) jointly with the COE December 2004, to determine if there was a potentially feasible alternative to the Kaycee flooding problem.

In conjunction with the PIR, there were two public information meetings held (see below) on the Kaycee Flood Protection Project. These meetings provided the project Sponsors and NRCS feedback from the community as to their resource concerns and priorities. These concerns and priorities confirmed the interest from the public and the Sponsors that there was an interest in a project to protect the city from flooding.

<b>Kaycee Flood Protection Project – Public Meetings</b>		
<b>Date:</b>	<b>Meeting:</b>	<b>Number of Attendees:</b>
March 17, 2005	Public scoping meeting in Kaycee at the Harold Jarrard Park Building to identify resource concerns.	40
March 7, 2006	Public and interagency meeting in Kaycee at the Harold Jarrard Park Building to discuss resource concerns.	14

A Legal Notice was published in the Kaycee Community Voice, March 1, 2005, and in the Buffalo Bulletin March 3, and March 10, 2005. Invitation letters were also sent to all residents February 28, 2005. Appropriate federal and state agencies were contacted and received notice of the scoping meeting.

A public scoping meeting was scheduled, publicized, and held on March 17, 2005, at the Harold Jarrard Park Building in Kaycee, Wyoming. The public scoping meeting included many representatives from a variety of organizations, private citizens, and government agencies. Comments were received up to 30 days after the scoping meeting.

### **Watershed Modeling and Economic Analysis**

The preliminary engineering design work was incorporated into an economic analysis of present condition (no action alternative) and the structural measure of building dikes and flood walls along with the nonstructural measure of one property buyout and eleven relocations to determine the national economic development (NED) plan. The watershed hydrologic and hydraulic modeling was developed using the COE Hydrologic Engineering Center's River Analysis System (HEC-RAS) modeling tool. The HEC-RAS modeling predicted water surface profiles for flood levels of 2-, 5-, 10-, 25-, 50-, 100-, and 500-year storm frequency events. The 100-year storm frequency flood levels served as the design storm for comparison to the present condition for effectiveness of the flood protection measures. The seven storm frequency flood levels were used with the data from the HEC-RAS modeling along with the damage coefficient tables, structure/house cards, and cross-

sections which were entered into the Urban Floodwater Damage Economic Evaluation (URB1) to complete several iterations of URB1 runs in order to calculate total damages of future without project (FWOP) over the 100 year life of the project. The HEC-RAS program is a state-of-the-art flood protection planning model supported by the COE and is in common usage by NRCS.

The alternative plans described in this Watershed Project Plan/EA were formulated considering the four criteria outlined in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G; 1983): (1) completeness; (2) effectiveness; (3) efficiency; and (4) acceptability.

- Completeness – is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if other plans are crucial to the realization of the contributions of the objective.
- Effectiveness – is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.
- Efficiency – is the extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation’s environment.
- Acceptability – is the workability and viability of the alternative plan with respect to the acceptance by state and local entities and the public and compatibility with the existing laws, regulations, and public policies.

The “no action” and recommended alternatives were evaluated in terms of damage reduction and economic benefits and costs.

### **Alternatives and Resources / Issues Studied in Detail**

Alternatives formulated during the preliminary investigation and suggested alternatives from the March 17, 2005, public scoping meeting were combined and consolidated by the interdisciplinary team. These alternatives were then evaluated by the interdisciplinary team and project Sponsors as a “first look” at potential resource issues/concerns with a brief economic analysis of benefit versus costs for each of the identified alternatives. The five alternatives presented and discussed throughout the scoping process, were narrowed down to two as a result of the scoping process.

The following two alternatives and relative resources/ issues were studied in detail.

#### Alternative A – “No Action” (Future without project)

This alternative would mean no action would take place. The “no action” alternative would not provide any additional flood protection to the town of Kaycee.

#### Alternative B – Dikes / Flood Wall / Relocation (NED and Recommended Plan)

The recommended plan is to combine the elements of some of the suggested alternatives into one alternative. This alternative would consist of building flood dikes and/or portions of flood walls both north and south of the river from the I-25 abutment to the downstream edge of town. With the construction of dikes and flood wall, the threat of flood from a 100-year storm frequency event will be reduced so that only twelve structures will be impacted by the construction of the project. Of these twelve structures, 11 will need to be relocated and there will need to be one property buyout. Approximately 2,500 cubic yards of earth will need to be removed from under the Highway 196

Bridge (Nolan Ave) in order to pass the 100-year storm frequency without overtopping the bridge. The estimated cost to increase the flow area under the bridge is \$10,000.

### **Description of Alternative Plans**

Alternatives A (No Action), and B (Dike / Flood wall / Relocation) are discussed in detail. These plans were identified by the federal agencies, reviewed by representatives of the town of Kaycee, and selected for consideration in the assessment for the purpose of finding a federal interest.

#### **Alternative A: Future Without Project (FWOP) / “No Action”**

The “no action” alternative is a required alternative to give a base line of the present condition and projected future condition with no project action. Conditions will remain as they are and no flood control measures will be implemented. The town will continue to contend with frequent flooding and the consequential threat of loss of lives and damage to property. Community development and improvement will be limited. Without financial help the community cannot relocate people out of the floodplain or mitigate the recurring flood damage. The threat of future flood damages will continue resulting in damages similar to 2002, as well as determinations where Kaycee was not eligible for FEMA assistance; that is unless the regulations are changed.

Without flood protection/mitigation the town will continue to have the expense and effort of contending with damage, debris, and sediment from floods. The Highway 196 Bridge (Nolan Ave) will continue to be at risk from floodwaters. If the bridge is destroyed or damaged, direct access for individuals south of the bridge to I-25, emergency services, and general services will be eliminated. The alternate route is a very lengthy and circuitous.

Individuals will continue to rebuild within the floodplain. For many of these individuals this is the only land they own, they do not have the financial resources to move out of the floodplain. Their ability to rebuild is stretched with each successive flood, and the structures or repairs will be of lesser quality than what they had before. That portion of town within the floodplain will continue to sustain damage on a frequent basis which will lead to a decline in appearance and quality of structures in that portion of town. Based on an assessment of the community, the population of Kaycee is stagnant. With additional flooding, the community acknowledged the likely downward trend with people leaving after additional flood events.

Safety – Residents of Kaycee would continue to be at the mercy of flood events.

Social Effects – Flooding from the Middle Fork Powder River has been stressful for the residents of Kaycee. Social effects include:

- Emotional stress associated with the fear of impending floods, especially among the elderly and children.
- Threats to human health and safety.
- Economic burdens associated with post-flooding repairs and clean-up activities.
- Depressed real estate values.
- Closure of transportation routes which restrict traffic, especially emergency services.
- Personal despair caused by the loss of or damage to, clothing, home furnishings, vehicles, appliances, and other personal belongings.

- Loss of community and personal pride when time and money that could be spent to improve and strengthen the community must instead be directed toward flood-recovery activities.

Wildlife – Wildlife use would essentially be the same for this alternative and the recommended alternative. Migration of wildlife through the project area would not be affected. The current flood regime would continue to support limited cottonwood and willow establishment within the floodplain. Existing flood regime will continue to replenish the limited wetlands that exist. Channelization and down-cutting would continue to degrade habitat for aquatic and terrestrial species. Cottonwood trees would not be removed.

Cultural – No construction would take place; therefore potential disturbance to artifacts that may be buried would not take place.

The “no action” plan would not meet any of the objectives or the needs by the town to resolve its flood problems.

### **Comparison to the NED Account**

The average annual damages without project is \$387,100 due to floodwater damage to residential, business and community structures and contents. The average annual cost to protect the residential, business and community structures up to the 100-year storm frequency event is \$48,350. The community of Kaycee will continue to experience economic loss due to flood damages under the “no action” alternative.

### **Past Actions**

The town of Kaycee has fourteen recorded flooding events dating back to 1927. In March 1996, the NRCS State Engineer looked at flooding in and around the community. Some flood waters can come from a small drainage just north of Kaycee. To alleviate these flows, box culverts were installed under Wyoming Highway 191 to carry water to the river. A drainage ditch just east of the freeway was enlarged and routed to the river. This drainage is a tributary to the Middle Fork Powder River just upstream from Kaycee. Also during the last few years the town has installed rock rip-rap in the river channel to protect the city lagoon.

The actual Middle Fork Powder River has had numerous studies on an Irrigation/Storage reservoir above town. An Environmental Impact Statement was completed on a proposed reservoir on the Middle Fork Powder River in Wyoming January 23, 1976 by the Bureau of Land Management. The project was never constructed. In 2006 the Wyoming Water Development Council approved a grant to complete a Level 1 study on the Middle Fork Powder River for possible reservoir sites.

In April 2004, a Kaycee Flood Mitigation Mapping Project was funded through NRCS, the town of Kaycee, and the Powder River Conservation District. This mapping project was very beneficial in developing the current design of the dikes around the town.

Until the town can be protected, residents are watching the river during a storm event. It is not an uncommon practice to move everything off the floor to higher ground. Since the 2002 flood, sand bags have been delivered to the community to be used for protection until the community can install the needed flood protection dikes.

### **Present Actions**

Homes have been rebuilt, or mobile homes have been purchased and repositioned on the same lots as before the 2002 flood event. Streets have been repaired, as well as the water and sewer infrastructure. Some businesses have been rebuilt and repaired; some business have relocated or left the community after being destroyed in the 2002 flood event. One housing development has been approved and two or three homes have been built in the development, which is located above the 500-year floodplain. More lots are available.

### **Reasonably Foreseeable Actions**

If no action is taken, flood events will continue to impact Kaycee posing an imminent threat to life and property. Home sites developed outside of the floodplain may be used for relocated structures or new homes.

### **Management Requirements, Mitigations and Monitoring**

The WYDEQ is doing some water quality monitoring under the WYDEQ / Environmental Protection Agency (EPA) 319 program. A base line of water quality and aquatic fauna will be gathered and monitored for a few years.

### **Alternative B: Dikes / Flood Wall / Relocation (NED and Recommended Plan)**

The recommended alternative is to construct approximately 4,160 feet of dike and 240 feet of flood wall through the town of Kaycee to control flood flows up to and including a 100-year storm frequency event. Dikes on both the north and south banks of the river are considered. The dikes are formulated to provide protection from the 100-year storm frequency event. An additional two feet of freeboard was added to the dike height to allow for any uncertainties with design or the 100-year storm frequency flood depths.

This alternative would consist of building flood dikes both north and south of the river from the I-25 abutment to the downstream edge of town. The south dike will be constructed to allow passage into and from the Harold Jarrard Park by all appropriate vehicles. The existing river channel will be maintained with no encroachments. This alternative is discussed in greater detail under recommended plan.

Wildlife – This alternative should have minimal or no impacts on listed species. The WGFD and the USFWS have been consulted, and anticipate little or no impact to wildlife species of concern.

### **Comparison to the NED Account**

The national economic development (NED) plan is the alternative that reasonably maximizes net national economic benefits consistent with protecting the nation's environment. Alternative B is the NED alternative. The benefit to cost ratio is 8.01:1.0.

Effects	Average Annual Benefits	Average Annual Costs	Benefit / Cost Ratio
Residential / Commercial	\$387,100	\$48,350	8.01 : 1.0

**Past Actions**

Flooding has occurred, damage has been repaired and structures have remained in the 100-year floodplain. Emergency measures have been put into place as time and money allowed. Emergency protection was accomplished by the community and other volunteers, and with some county emergency funds.

**Present Actions**

The town of Kaycee is aggressively pursuing a remedy to the frequent flooding. The NRCS and COE have provided assessment and planning assistance. The NRCS is completing NEPA analysis to assist the Sponsors in acquiring federal funding to install the recommended alternative for flood protection.

**Reasonably Foreseeable Actions**

The town of Kaycee will pursue adequate funding to install the needed flood protection, and relocate the necessary structures. Approximately 2,500 cubic yards of earth will need to be removed from under the Highway 196 Bridge (Nolan Ave) in order to pass the 100-year storm frequency without overtopping the bridge. The estimated cost to increase the flow area under the bridge is \$10,000.

Relocations can be done to existing home site developments or other appropriate locations.

**Management Requirements, Mitigations and Monitoring**

Structures will be installed following NRCS standards and specifications. Operation and Maintenance will be identified in the O&M agreement with the town of Kaycee. Seeding, re-vegetation and pole plantings are planned. WYDEQ will continue to monitor for water quality on the portion of stream passing through Kaycee.

**Comparison of Environmental Consequences**

<b>Summary of Impacts by Alternative for Each Issue</b>		
<b>Issue / Resource</b>	<b>Alternative A – No Action</b>	<b>Alternative B – Dikes / Flood wall / Relocation</b>
Aesthetic Resource	Aesthetics of the river course will remain the same, with no change in riparian vegetation. Russian olive and other invasive species will likely continue to increase.	Some riparian vegetation will be removed for construction of the dikes. Dikes will be seeded to maintain a natural grass view. Some trees will remain in the river corridor, but some may be removed for dike construction. Pole plantings to mitigate removal will be completed.
Aquatic Habitat	Aquatic habitat will remain the same. Rated poor condition by the SVAP analysis.	Aquatic habitat will not be disturbed and will remain the same as the “no action” alternative.

Cultural Resources	Cultural resources have not been listed in the project area. No change will take place. Structures will continue to age and may become eligible historical resources.	No sites or listings are presently in the project area. If during construction cultural resource sites are discovered, the project area will be investigated as per NRCS agreement with SHPO.
Downstream Effects	Downstream effects will remain unchanged. Some road crossings and diversion structures may be at risk.	The flood model without project as compared to the flood model with flood dikes, indicates that the water surface elevation during the passage of the 100-year storm frequency event is basically unchanged at the downstream end of the project, which would lead to the conclusion that the downstream effects are basically unchanged with project
Flood Control	The town and downstream areas will experience similar flood damages to historical events.	100-year flood flows will be contained in the flood channel through town. Structures will be protected in the project area. Downstream areas will experience flows similar to historic flows.
Floodplain Management	Kaycee has been a participant in the NFIP under FEMA. The first NFIP map was published for Kaycee, Wyoming in November 1974. Flood insurance will be available for residents. The floodplain will continue to be managed consistent with state and local floodplain regulations.	A new 100-year floodplain map has been produced for FEMA under contract by COE. An update to the floodplain map will be requested after construction of the project.  The floodplain will continue to be managed consistent with state and local floodplain regulations.
Land Rights	Ownership will remain the same and “no action” to acquire flood prone areas will be done.	The town of Kaycee will acquire the necessary land rights to construct dikes and flood walls to protect to the 100-year storm frequency flood flows.
Recreational Use	No change is expected.	Use may increase with installation of the dikes. The town park may see more use with renovation. Construction of a walking path on the dikes will increase recreation use.
Relocation/Buyout	No properties will be relocated or purchased by the town.	Eleven structures will be relocated and there will be one property buyout. Fair market value will be paid for the properties. There will no longer be structures within the planned 100-year floodplain.
Safety	Threat of loss of life will remain.	Threat of loss of life and/or property will be removed up to the 100-year storm frequency flood flow. Relocations will remove persons from the flood prone area.

Shoreline Vegetation	No change, no impoundments are expected to be built in the project area.	No change, no impoundments are expected to be constructed in the project area.
Socioeconomic Conditions	A slow decline is expected as people move away from the possible flood conditions.	Conditions are expected to improve, as residents feel safe and acquire property outside of the 100-year floodplain. Businesses are able to continue without the threat of loss from flood waters.
Soils	No change in the rate of erosion and sedimentation.	Soils disturbed in the project area will be seeded and a return of riparian vegetation will help stabilize areas of disturbance after construction.
Threatened and Endangered Species	No change in occasional visitation of some species is expected.	No change in occasional visitation of some species is expected.
Water Quality	No change is expected. Water is sediment laden from soils in the upper watershed.	Some sedimentation may increase during construction. After construction a decrease of sedimentation from the project site is expected as the area is stabilized and seeded to vegetation to protect the soils.
Wetlands	No change is expected.	No change is expected.
Wildlife	Wildlife use will remain the same level as now.	Some disturbance during construction is expected. But use will continue after construction is completed and area is re-vegetated.

### Effects of Alternatives

This section of the Environmental Assessment is an explanation of the existing environment in the project area that will be affected by the project; the natural resources, such as vegetation and wildlife, and the human resources, such as socioeconomics and cultural resources, which are in the vicinity of these alternatives and could be impacted. The actual affects to the environment will be explained in the Environmental Consequences section.

Existing environmental conditions are described using areas of scales appropriate for the geographic variability factor. Most natural resource features such as geology, soils, mineral resources, and land cover are described within the project area only. Wildlife was considered within the project area and those wildlife species that may migrate through the project area.

Socioeconomics and recreation area of consideration was determined for the town of Kaycee for the purpose of this study.

Four structural alternatives were initially considered as alternatives to meet the identified need for flood protection of the town of Kaycee on the Middle Fork Powder River.

A decision process based on engineering, cost, environmental considerations, and social considerations identified two alternatives to be considered; the “no action” alternative and the dikes / flood wall / relocation alternative.

### **Description of the Project Area**

Kaycee, Wyoming is located in the eastern foothills of the Big Horn Mountains in Johnson County in north-central Wyoming. The Middle Fork Powder River runs through the south end of town. Two adjacent watersheds located upstream and west of town comprise 437, 611 acres of mountain and foothill lands. The project area consists of 152 acres in the town of Kaycee located on the main stem of the Middle Fork Powder River. With a population of 249–260 residents, Kaycee is a small rural ranch community. The town of Kaycee has one school facility that houses kindergarten through high school students. Many of the students are bussed in from the outlying homes and ranches.

Interstate 25 (I–25) runs adjacent to the city limits on the west side of town. There is a bridge crossing on the interstate over the Middle Fork Powder River large enough to allow flood flows to pass under the highway roadway.

### **Affected Environment of Resources / Issues Studied in Detail**

#### Wildlife

Low precipitation and other climatic factors combine to create a harsh environment for wildlife. Game species that occur within the upper or west side of the watershed are cottontail rabbit, mourning dove (seasonal), sage grouse, elk, mule deer, white-tailed deer, antelope, and infrequently, moose. Numerous bird species occur within the watershed.

Game species such as mule deer, white-tailed deer and antelope frequently travel the stream corridor within the proposed project area. In addition, numerous non-game species such as coyote, red fox, weasel, skunk, raccoon, badger, beaver, muskrat, and ground squirrel can be expected to occur. Songbirds such as meadowlarks, sparrows, robins, and blackbirds frequent the proposed project area. Neo-tropical birds and waterfowl frequently visit during seasonal migration

Urban Wildlife – Species occurring in the urban area would be the same species as described under “Wildlife” above.

#### Threatened, Endangered, Proposed and Candidate species.

The table below gives the species and status of threatened, endangered, proposed, and candidate species for Johnson County in Wyoming. Data provided by the U.S. Fish and Wildlife Service (November, 2006).

<b>Species</b>		<b>Status</b>
Black-footed Ferret	<i>Mustela nigripes</i>	Endangered
Canada Lynx	<i>Lynx canadensis</i>	Threatened
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened

Canada Lynx – In Wyoming, the lynx lives in sub-alpine/coniferous forests of mixed age and structural classes. Mature forests with downed logs and windfalls provide cover for denning

sites, escape, and protection from severe weather. Early to mid-successional forest with high stem densities of conifer saplings provide optimal habitat for the lynx 's primary prey, the snowshoe hare. Since the nearest habitat for this species is in the Bighorn Mountains approximately 15 miles away, no impacts are expected to occur as a result of the recommended plan.

Black-footed ferret – This species may be affected if prairie dog towns are impacted. No impacts to prairie dog towns are expected from the recommended plan. Therefore no impacts are expected to this species.

Ute Ladies'-tresses – This species is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows. Soils where this plant has been found typically range from fine silt/sand, to gravels and cobbles, as well as to highly organic and peaty soil types. This species is not found in heavy or tight clay soils or in extremely saline or alkaline soils.

Habitat for this species may exist along the banks of the Middle Fork Powder River. As long as disturbance is limited to those areas outside the riparian area, no impact is expected to this species.

Brad Rogers from the U.S. Fish and Wildlife Service surveyed the area for Ute Ladies'-tresses, none were found, so there is no effect to this species.

Wyoming Species of Special Concern

The Wyoming Game and Fish Department also lists native species of concern. This list is not broken down to the county level; it is state-wide. Species in the Native Species Status 1 (NSS1) column in the table below are at higher risk. The NRCS State Biologist has coordinated with the WGFD to address any species of concern that occur in Johnson County and the Middle Fork Powder River.

<b>Fish and Amphibian Species</b>	
NSS1	NSS2
Bluehead sucker	Bonneville cutthroat
Finescale dace	Burbot
Flannelmouth sucker	Colorado River cutthroat
Hornyhead chub	Goldeye
Leatherside chub	Kendall WS dace
Pearl dace	Orangethroat darter
Roundtail chub	Plains topminnow
Sturgeon chub	Sauger
Suckermouth minnow	Shovelnose sturgeon
Western Silvery minnow	Yellowstone cutthroat
Wyoming toad	
Boreal toad	

<b>Non-Game Bird Species</b>	
Common Loon	Trumpeter Swan
Yellow-billed Cuckoo	Bald Eagle

<b>Non-Game Mammal Species</b>	
Black-footed Ferret	Pygmy Shrew
Lynx	Spotted Bat
Long-eared Myotis	Northern Myotis
Townsend’s Big-eared Bat	Long-legged Myotis
Pallid Bat	Fringed Myotis

Source: Wyoming Game and Fish Department (04/14/2005)

The Wyoming Game and Fish Department had no terrestrial concerns regarding the recommended alternative. No aquatic concerns were identified as long as the scope of the project remained the same and no alteration was made to the stream.

Water Bodies – The Middle Fork Powder River flows through the project area. The Middle Fork Powder River flows approximately 56 miles from the Natrona County line through the town of Kaycee. Approximately 45 miles of the stream occur within the assessed watersheds. Other streams that enter the Middle Fork Powder River include Alkali Creek, Beaver Creek, Buffalo Creek, Red Fork Powder River, Sheep Creek, and Spring Creek. Numerous intermittent and ephemeral streams also enter the stream system. In addition, a sewage lagoon occurs adjacent to the proposed project area and is further discussed in this document.

Vegetation –

*Watershed* – The upper or west side of the watershed consists of uplands that are predominately shrub-steppe. Some timbered ridges occur on north slopes. Those areas consisting of heavy clay soils are where runoff from precipitation events is most likely to occur. These areas are characterized by sparse plant cover and visible signs of erosion. The vegetation on these areas is normally Gardners’ saltbush, Black greasewood, Western wheatgrass, alkali sacaton, inland saltgrass, and other saline-tolerant species.

*Project Area* – Within the project area, cottonwoods, Russian olive, and willow species are the primary over-story. The under-story is dominated by introduced species such as smooth brome, annual bromes, crested wheatgrass, Kentucky bluegrass, and reed canarygrass. See appendix D for a list of plant species found within the project area.

Noxious & Invasive Plant Species – Noxious and invasive weed species that occur within the project area are downy brome, Canada thistle, Scotch thistle, Tamarisk (Salt cedar), Russian olive, quackgrass, foxtail barley, creeping meadow foxtail, reed canarygrass, smooth brome, spreading dogbane, showy milkweed, rough cocklebur, lesser burdock, and lambsquarters.

Aesthetic Resources

Aesthetics of this small rural western community are typical of communities located along a small river. The riparian area is covered with native or invaded grasses, shrubs and trees. The river course has been disturbed in some areas where it has been necessary in the past to install bank armoring to achieve stability and protect structures. The water appearance is turbid from the upstream sediments available in the system. Cottonwoods and Russian olive are prevalent along the river course. The area is not highly developed, and thus maintains the rural rugged

look. Ground cover is abundant whether seeded or natural. Wildlife can be observed using the area, with song birds, cottontails, and some deer available for viewing

## **Environmental Consequences / Risk and Uncertainty**

This section is the scientific and analytical basis for the comparison of the alternatives. The environmental consequences in this chapter are organized by resource topics, with the impacts of the two alternatives combined under the resource headings.

In accordance with Executive Order 11988, Floodplain Management, the recommended alternative will reduce the risk of flood loss and minimize the impact of floods on human safety by containing the 100-year storm frequency event. The floodplain size will be reduced through the town of Kaycee, however, very little disturbance of the natural channel is needed to construct the flood dikes and flood wall thereby preserving the natural channel. Floodplain disturbance above the natural channel is limited to clearing sod and woody vegetation beneath the footprint of the flood dikes and removing additional woody vegetation along the perimeter of the footprint of the flood dikes to facilitate construction. The only disturbance along the natural channel is to prepare a subgrade and place rock rip-rap along approximately 645 feet of the channel bank. This will prevent the natural channel from encroaching on the constructed flood dikes and the reinforced concrete flood wall.

The flood dikes will be located to minimize the loss of the floodplain; minimize the impact of relocation of homes, businesses and community structures; minimize the loss of woody vegetation; and minimize the impact downstream from the project.

The installation of the recommended flood dike alternative will not increase the channel and floodplain water erosion potential. The average water velocity, with project, does not increase significantly. Immediately after construction, all disturbed areas and the earthen embankments for the flood dikes will be seeded to re-establish vegetation. During the establishment period, the disturbed areas in the floodplain and the earthen embankments will temporarily be subject to increased erosion.

### **Aesthetic Resources**

#### Alternative A – No Action

Direct and Indirect Impacts – Continued housing and infrastructure development in the floodplain will further degrade the aesthetics of the area. Some development outside of the floodplain will allow some affected individuals and families to relocate out of the floodplain area. Economic considerations may preclude the opportunity of relocation. The real estate realities of trying to sell property inside of the floodplain will not allow limited resource families to relocate without some kind of financial assistance.

Cumulative Impacts – As individuals continue to sustain flood damages to residences, as well as businesses and community structures located in the floodplain, the long term affects will be to decrease their financial ability to recover from flood damage costs. This, over time, will reduce the ability of the community to recover from the impacts of not providing protection from continued flooding. Eventually, individuals will be forced to relocate outside of the community and to seek other means of employment, thus decreasing the size and base of the town.

### Alternative B – Dikes / Flood wall / Relocation

Direct and Indirect Impacts – During construction of the dikes, aesthetics will be affected by construction equipment and disturbance in the area where dikes will be constructed. In addition, some trees; both desirable and undesirable, will be removed. Some bare soil may be visible while seeded plant species establish.

Cumulative Impacts – Reducing the effects of continued flooding on the individual resources within the community will benefit the town by maintaining and possibly increasing the number of families and individuals able to safely live and pursue employment in the area. Stream stability and the aquatic community will be maintained as flood flows are controlled

### **Wildlife**

#### Alternative A – No Action

Conditions would remain as they currently are. Channelization and down-cutting will continue to degrade aquatic and terrestrial species habitat. Undesirable plant species such as Tamarisk (Salt cedar) and Russian olive would likely continue to increase creating poor quality habitat.

#### Alternative B – Dikes / Flood wall / Relocation

Direct Impacts – Twenty-seven cottonwood trees would be removed which would provide less habitat for tree dependent species. The dikes would likely provide cover for wildlife and also create a barrier in some areas for wildlife movement along the stream corridor.

This alternative should have minimal or no impact on wildlife species as long as the following occurs:

- Major earth work and in-stream construction activities are limited or eliminated during the May 1 – July 1 time period when the majority of the high water events occur.
- Dikes are only constructed where absolutely necessary to gain flood protection and are not constructed with stream channel material.

It is likely that the Powder River Conservation District and/or the citizens of Kaycee would plant desirable tree species in those areas that would support them. This would not only replace the cottonwood trees and undesirable tree species that were removed for construction of the dikes, but would provide for a younger age class of cottonwoods and/or willows currently not found in the areas proposed for construction. Native species used to reclaim the dikes and disturbed areas would likely provide for better wildlife habitat.

### **Vegetation / Riparian Habitat / Wetlands**

#### Alternative A – No Action

Direct and Indirect Impacts – Undesirable species would continue to dominate within the project area. Some desirable species such as willow and cottonwood may reproduce but would be unlikely to increase due to the competitive nature of Russian olive and Tamarisk (Salt cedar).

### Alternative B – Dikes / Flood wall / Relocation

Direct and Indirect Impacts – Some tree species would be removed during construction. Existing graminoid species would be removed or covered by construction of dikes/flood wall. The construction of the earthen dikes and reinforced concrete flood wall will not disturb any existing wetlands. The placement of the rock rip-rap on the streambank will be conducted under the guidance of COE General Permits compliant with Executive Orders 11990.

Cumulative Impacts – Desirable over-story species would likely be re-established, providing a younger age class of tree species which are currently not found in the project area. Desirable grass species would be seeded on the dikes which may provide for seed dispersion onto adjacent areas

### **Downstream Effects**

#### Alternative A – No Action

Direct Impacts – Flooding will continue as in the past, with flood waters and debris causing similar impacts to the community.

Indirect Impacts – There may be more impacts as streambanks continue to erode and change course. Additional debris can cause channel change and structure failure by blockage or accumulation.

Cumulative Impacts – Continued flooding has the potential to decrease cropland productivity with debris buildup and soil erosion. There will be continued damage to road crossings, fences and other structures as a result of no control on flooding.

#### Alternative B – Dikes / Flood wall / Relocation

Direct Impacts – The flood protection structures will contain the flows and may move the waters through and past the town sooner than waters that have spread over the landscape. The volume would be equivalent, but the flow velocity may increase with the concentration through town. As the flows pass below town, the channel will allow for normal passage that has been seen with earlier flood flows.

Indirect Impacts – Less debris will be carried as flows are controlled and the section of stream through town has been stabilized.

Cumulative Impacts – Potential flows with less debris could have beneficial effects downstream.

### **Public Health and Safety / Access**

#### Alternative A – No Action

Direct Impacts – Potential loss of life and property will continue.

Indirect Impacts – Social structure and long term viability of the community will remain in question as flood events continue.

Cumulative Impacts – The successive negative impacts of each additional flood event will potentially erode the stability of the community.

#### Alternative B – Dikes / Flood wall / Relocation

Direct Impacts – Homes, businesses and community structures would be protected from flooding. Economic loss from water damage would be reduced. Roads and infrastructure would be protected. Emergency costs would be decreased. Mental anguish would decrease as citizens realize their families and possessions are protected. Maintenance costs would increase on the installed protection structures.

Indirect Impacts – The socioeconomic stability of the community may continue to improve. The community as a whole will increase in size and viability with the protection of the town's infrastructure upon the project implementation.

Cumulative Impacts – Potentially the community and economic viability may increase as the flooding is controlled and health and safety improve. Areas that have previously held stagnant waters will be absent and disease from airborne vectors will decrease. Recreation may increase with the use of the town facilities and in the surrounding area.

#### **Identification of the Recommended Alternative**

The national economic development (NED) plan is the recommended plan (Alternative B). The plan includes the construction of approximately 4,160 feet of dike and 240 feet of flood wall through the town of Kaycee to protect the citizens and residential, business and community structures from flooding as a result of up to and including a 100-year storm frequency event.

### **Consultation and Public Participation**

A Letter of Request was received on November 13, 2002, from the project Sponsors for the development of a watershed planning effort to construct flood protection under the authority of the Watershed Protection and Flood Prevention Act, Public Law (PL) 83-566, as amended (126 USC 10011008).

In August 2004, the Wyoming Board of Agriculture reviewed the PL 83-566 application for federal assistance, ranked the project as a high priority, and recommended the project for planning assistance. On August 21, 2004, the Planning Authorization for the initiation of a Watershed Project Plan Environmental Assessment was completed and signed by Lincoln E. Burton, State Conservationist, NRCS, Casper, Wyoming.

Through a collaborative effort the NRCS and the COE completed the Flood Damage Reduction Preliminary Investigation Report (PIR) in December 2004.

On March 17, 2005, a Public Scoping Meeting for the initiation of the planning effort was held at the Harold Jarrard Park Building in Kaycee, Wyoming. The NRCS presented the PIR to the project Sponsors and the community of Kaycee. This meeting was held to allow for public comments to identify the concerns of the local community regarding the flood protection project through the town of Kaycee and to answer questions for those in attendance. The public scoping meeting had many

representatives from a large variety of organizations, private citizens, and government agencies. A copy of the agenda and list of representation can be found in the Scoping Report (April 10, 2006).

There were three published announcements and one invitation letter for the public scoping meeting as shown below.

<b>Kaycee Flood Protection Project – Public Notices</b>	
<b>Date:</b>	<b>Article:</b>
February 28, 2005	Invitation Letter to attend the scoping meeting.
March 1, 2005	<i>Legal Notice.</i> Kaycee Community Voice. 1 Mar 2005: 17.
March 3, 2005	<i>Public Notice.</i> Buffalo Bulletin. 3 Mar 2005: B10.
March 10, 2005	<i>Public Notice.</i> Buffalo Bulletin. 10 Mar 2005: B10.

On March 7, 2006, an interagency scoping meeting was held to gain feedback from local, state, and federal agencies regarding issues and concerns related to the flood protection project. State, federal and local agencies were invited for input and identification of concerns related to this flood protection project in Kaycee, Wyoming. A copy of the agenda and sign-in sheet can be found in the Scoping Report (April 10, 2006). Written comments were received during the comment period ending April 7, 2006.

## **Permits, Licenses, and/or Other Consultation Requirements**

### **Lead Agency, Cooperating and Other Interested Agencies**

The NRCS is the lead agency for the Watershed Project Plan – Environmental Assessment. At this time there are no organizations with Cooperating Agency Status. Other interested agencies contributing in the process are Wyoming Department of Transportation (WYDOT), Wyoming Game and Fish Department (WGFD), Wyoming Water Development Commission (WWDC), Bureau of Land Management (BLM), U.S. Army Corps of Engineers (COE), and U.S. Fish and Wildlife Service (USFWS). Contact with the required agencies for permitting will be made prior to construction.

**Tribal Consultation** – The recommended plan does not encompass any tribal lands, nor did the Cultural Resource Specialist identify any tribal cultural sites. If any potentially sensitive sites are encountered, appropriate tribal consultation will be initiated in accordance with NRCS state and national policies. Letters have been sent to the tribal chair for the Eastern Shoshone and Northern Arapahoe Tribes to provide project awareness and an opportunity for input.

### **Permits**

U.S. Army Corp of Engineers (COE): 404 Permits – Placing earthfill, installing pipe drains, and placing reinforced concrete adjacent to the Middle Fork Powder River, and placing rock in the Middle Fork Powder River, may require an authorization from the COE under Section 404 of the Clean Water Act.

Wyoming Department of Environmental Quality: Discharge Permits – Storm water discharge from the construction site will require authorization from the WYDEQ.

Local Building Permits:

Utility Notifications – Before any excavation commences, the contractor will need clearance from Wyoming One Call to locate utilities in the area of construction.

## Recommended Watershed Plan

### Rationale for Recommended Alternative

Action to control future flood flows through town is needed since the likelihood of future flood events of the Middle Fork Powder River are inevitable and can pose continued significant threat to public safety as well as contribute to significant property and content damage to residential, business and community properties. Records show flooding has occurred in the following years in the town of Kaycee: 1927, 1930, 1963, 1978, 1985, 1993 (3 floods), 1995 (3 floods), 1996, (2 floods), and the flood of 2002. The flood of 2002 damaged approximately 22 residences and caused over \$2 million in damages to the town of Kaycee. In the ten years previous to the August 2002 flood event, there have been six flood events through town.

During the flood event in 2002, five access bridges were undermined leaving people stranded and isolated. Roadsides were washed out making passage unsafe. Streambanks were eroded jeopardizing utility lines and putting human safety at high risk.

Approximately one-fourth of the town is constructed in the 50-year floodplain which consists mainly of mobile homes and the majority of buildings in the business section.

Conditions will remain as they are and no flood control measures will be implemented. The town will continue to contend with frequent flooding and the consequential threat of loss of lives and property damage. Community development and improvement will be limited. Without financial help the community cannot relocate people out of the floodplain or mitigate the recurring flood damage. The threat of future flood damages will continue resulting in determinations similar to 2002, where Kaycee was not eligible for FEMA assistance.

Without flood protection/mitigation the town will continue to have the expense and effort of contending with damage, debris, and sediment from floods. The Highway 196 Bridge on Nolan Avenue will continue to be at risk from floodwaters. If the bridge is destroyed or damaged, direct easy access for individuals south of the bridge to I-25, emergency services, and general services will be eliminated. The alternate route is a very lengthy and circuitous.

Individuals will continue to rebuild within the floodplain. For many of these individuals this is the only land they own, they do not have the financial resources to move out of the floodplain. Their ability to rebuild is stretched with each successive flood, and the structures or repairs will be of lesser quality than what they had before. That portion of town within the floodplain will continue to sustain damage on a frequent basis which will lead to a decline in appearance and quality of structures. Based on an assessment of the community, the population of Kaycee is static. With continued flooding, the community acknowledged the likely downward trend as people leave after additional flood events.

## Measures to be Installed

The recommended plan is Alternative B (Dikes / Flood wall / Relocation). The purpose is to protect the town of Kaycee from flooding. The plan consists of constructing flood dikes on both sides of the Middle Fork Powder River through the town of Kaycee, from I-25 on the west side of town to the town limits on the east side of town. In addition to the earthen dikes, the river channel will be rock armored for a short distance, and the earthen dike will transition to a reinforced concrete flood wall for a short distance. The recommended alternative meets the completeness, effectiveness, efficiency, and acceptability criteria when analyzed against the satisfaction of the project purpose, relative costs, technological feasibility, logistics and environmental consequences factors.

### Structural

Approximately 4,160 feet of earthen flood dikes are planned along both sides of the Middle Fork Powder River for flood protection. Approximately 240 feet of reinforced concrete flood wall are planned along the streambank for flood protection also. Approximately 645 feet of rock rip-rap is planned along the Middle Fork Powder River for streambank protection. Seven surface drains are planned to be installed through the dikes to discharge water from behind the dikes to the Middle Fork Powder River. All of the discharge pipes will include flood gates to prevent flood water from backing into town. See sheet 1 of the drawings in appendix F for the plan view of the project floodway system.

### Floodway System

The floodway on the north side of the river begins immediately downstream from Interstate 25 at Station 0+00, Northwest embankment, with an earth dike along the north side of the Middle Fork Powder River. The earth dike continues downstream to the Highway 196 Bridge (Nolan Ave), Station 19+62.5. Pipe drains with flood gates for surface drainage from behind the Northwest embankment are planned at Stations 10+00, 14+25, and 19+62.5. See sheet 3 of the drawings in appendix F for the plan view and profile of the flood dikes. See sheet 6 of the drawings in appendix F for cross sections of the earth dikes and pipe drains.

The floodway on the south side of the river begins approximately 1,150 feet downstream from Interstate 25 at Station 0+90, Southwest embankment, with an earth dike along the south side of the Middle Fork Powder River. The earth dike continues downstream to the Highway 196 Bridge (Nolan Ave), Station 7+57. Pipe drains for surface drainage from behind the Southwest embankment are planned at Station 6+87. See sheet 5 of the drawings in appendix F for the plan view and profile of the flood dikes, and cross sections of the earthen dikes and pipe drain.

The floodway continues along the north side of the river, east of the Highway 196 Bridge (Nolan Ave), at Station 0+00, Northeast embankment, with an earth dike along the north side of the Middle Fork Powder River. The earth dike continues to Station 9+20 where the earth dike transitions to a reinforced concrete flood wall. The reinforced concrete flood wall continues east for approximately 240 feet, to Station 11+60, Northeast embankment. Rock rip-rap is planned along the north side of the Middle Fork Powder River channel between Stations 4+00 and 7+00, and Stations 8+55 and 11+60, for streambank protection. A pipe drain for surface drainage from behind the Northeast embankment is planned at Station 5+44. The floodway on the north side of the river ends at approximately Station 11+60, Northeast embankment. See sheet 3 of the drawings in appendix F for the plan view and profile of the flood dikes and flood wall. See sheet 7 of the drawings in appendix F for cross sections of the dike, rock rip-rap, and the pipe

drain. See sheet 10 of the drawings in appendix F for details of the reinforced concrete flood wall.

The floodway continues along the south side of the river, east of the Highway 196 Bridge (Nolan Ave), at Station 0+10 Southeast embankment. The floodway begins with an earthen embankment shaped to 2:1 side slopes on the south, 20:1 side slopes on the north, and a 28 foot top width. The earthen embankment will serve as vehicle access and parking as well as flood protection. At approximately Station 1+30, both sides of the embankment are shaped to 20:1 side slopes. The 20:1 side slopes and the top of the embankment are planned for a gravel surface from Station 0+10 to approximately Station 2+80. Beginning at approximately Station 2+80, the earthen embankment transitions to an earth dike with a 12 foot top width and 2:1 side slopes. The earth dike ends at approximately Station 6+20. Pipe drains for surface drainage from behind the Southeast embankment are planned at Stations 0+39 and Station 5+24. See sheet 4 of the drawings in appendix F for the plan view and profile of the floodway system. See sheet 8 of the drawings in appendix F for cross sections of the embankment, dikes, and pipe drains.

**Measures to be Installed**

<b><u>Earth Dikes</u></b>	<b><u>Reinforced Concrete</u></b>
Earthfill	Reinforced Concrete
Borrow Excavation	Steel Reinforcement
Foundation Excavation	
18-Inch Diameter PVC Pipe	
18-Inch Diameter Flap Gate	
Seeding and Mulching	
Stripping & Replacing Topsoil	
Road Base	
Tree Removal and Disposal	
Rock rip-rap	
Drainfill	
Geotextile	

The dikes, flood walls, water control structures will be constructed according to NRCS standards and specifications

**Land Treatment Practices**

- Conservation Practice Standard 356 – Dike
- Conservation Practice Standard 342 – Critical Area Seeding
- Conservation Practice Standard 382 – Fence
- Conservation Practice Standard 580 – Streambank and Shoreline Protection
- Conservation Practice Standard 587 – Structure for Water Control

## **Nonstructural Measures**

### **Floodplain Acquisition**

With installation of the recommended alternative, the size of the new 100-year floodplain will be considerably reduced. It will be contained within the area between the dikes. The area outside of the dikes will be declassified from the 100-year floodplain. This will allow the structures located there to be outside of the potential flood damage area.

### **Flood Proofing**

Without the recommended alternative installation there would be approximately 47 structures that would need to be flood proofed. Flood proofing would raise the entry level of the structure above the 100-year storm frequency water surface elevations. However the structures would still be surrounded by water during a flood event, thus occupants would have limited access to emergency services.

### **Relocation of Existing Floodplain Properties**

Without the recommended alternative installation, 47 structures would need to be relocated out of the floodplain. The costs and logistics of relocating all 47 structures would not meet the efficiency and acceptability criteria (see Watershed Modeling and Economic Analysis section).

Under the recommended alternative, there are 11 structures that will need to be relocated consisting of two small cabins, six mobile home structures, and three out-buildings. There is also the need for one residential property buyout.

### **Wetland or Floodplain Conservation Easements**

Affected private lands will be acquired by the town of Kaycee. The area will be zoned to eliminate building in the floodplain. The remaining portion of the floodplain is owned and controlled by the town of Kaycee.

### **Mitigation Features**

Disturbed areas will be re-seeded and pole plantings of cottonwoods will be completed in the project area. Water Quality is being monitored by the PRCD under the WYDEQ / EPA 319 program.

## **Permits and Compliance**

404 Permits – Placing earthfill, installing pipe drains, and placing reinforced concrete adjacent to the Middle Fork Powder River, and placing rock in the Middle Fork Powder River, may require an authorization from the Corps of Engineers under Section 404 of the Clean Water Act.

Discharge Permits – Storm water discharge from the construction site will require authorization from the WYDEQ.

Utility Notifications – Before any excavation commences, the contractor will need clearance from Wyoming One Call to locate utilities in the area of construction.

## **Installation and Financing**

### **Framework for Carrying Out Plan**

#### Phase I

- a. Relocate and/or remove buildings
- b. Relocate utilities
- c. Tree/Fence Removal

#### Phase II

- a. Foundation preparation and foundation excavation for dikes
- b. Borrow area clearing
- c. Pipe and structure installation
- d. Dike construction
- e. Streambank stabilization and fabricated flood wall construction
- f. Topsoil and seeding

### **Responsibilities**

Operation, maintenance, and replacement (OM&R) of the structural measures associated with the recommended alternative is the responsibility of the watershed Sponsors. Those structural measures include the earth dike, the reinforced concrete flood wall, the pipe drains and flood gates, the rock rip-rap, and fence. Other measures that will require operation, maintenance, and replacement are vegetation. A specific OM&R agreement will be completed for the project.

NRCS will provide engineering assistance for construction and inspection of the project, relocation assistance will be provided, and contracting assistance will be provided as requested by the Sponsors. Archeological surveys will be provided when necessary by NRCS.

### **Contracting**

Contracting will be done by the town of Kaycee with the assistance of NRCS.

### **Real Property and Relocation**

Property rights will be acquired by the town of Kaycee. Relocation will be accomplished by the town of Kaycee with the assistance of NRCS under the Uniform Relocation Act.

### **Cultural Resources**

A search has been done by the NRCS State Archeologist. As the project progresses, if there is a site uncovered, construction will cease until the appropriate determination can be made and the site protected.

### **Financing**

Federal assistance may be available through the PL-566 Watershed Program of the NRCS. This assistance is provided under authority of the Watershed Protection and Flood Prevention Act (Public Law 83-566) as amended. The balance of funds will be furnished by the Sponsors.

The project Sponsors are exploring different funding sources. The town of Kaycee has submitted a grant application to the Abandoned Mine Land Program. They have submitted a request for direct appropriation to the office of Senator Enzi. Recently they received information from FEMA's Pre-Disaster Mitigation Grant Program, and are looking into the State of Wyoming's Coalbed Methane Impact funds for availability to the town of Kaycee.

### **Conditions for Providing Assistance**

Federal assistance is subject to the appropriation of funds and the accrual of Sponsor secured land rights and permits necessary for the installation of the project measures.

The town of Kaycee will certify they have obtained the necessary land rights and permits for construction of the project.

### **Operation, Maintenance, and Replacement**

Operation, maintenance, and replacement of the structural measures associated with the recommended alternative is the responsibility of the watershed Sponsors. Those structural measures include the earth dike, the reinforced concrete flood wall, the pipe drains and flood gates, the rock rip-rap, and fence. Other measures that will require operation, maintenance, and replacement are vegetation.

The earth dikes will require frequent inspection to make sure that there is adequate vegetation, rodents are not borrowing into the earth dike, that unwanted woody vegetation is not growing on the dike, and that the earth dike is not showing signs of erosion. After any significant runoff event, the earth dikes should be inspected for damage from water erosion. Maintenance of the earth dikes will include maintaining exclusion fences to keep livestock from the earth dikes; removing woody vegetation from the earth dike; re-establishing cover grass as needed on the earth dike; and repairing eroded dike surfaces as needed. The exclusion fence may need to be replaced periodically over the life of the project (100 years). The earth dike is intended to last the life of the project.

The pipe drains and flood gates will require frequent inspections to check for structural damage and/or corrosion, vandalism, trash and sediment buildup that restricts the capacity of the pipe, and erosion at the entrance or exit to the pipe. After any significant runoff event the pipe drains and flood gates should be inspected for trash and sediment blockage, excessive erosion at the pipe entrance and exit, and structural damage. Maintenance of the pipe drains and gates includes repairing structural damage as needed, removing trash and sediment to maintain the pipe capacity, repairing erosion at the pipe entrance and exit, and repairing any vandalism to the gates. The gate should be checked to make sure it is operational.

The reinforced concrete flood wall will also require frequent inspections to check for cracking or spalling concrete surfaces, movement of the concrete flood wall, exposed reinforcing steel in the concrete flood wall, and vandalism. After any significant runoff event, the reinforced concrete flood wall should be inspected for damage or excessive erosion of the foundation material. Maintenance of the reinforced concrete flood wall includes repairing minor cracks and spalls, repairing minor vandalism such as graffiti, and repairing foundation erosion as needed. Any major cracking or spalling or exposed reinforcing steel or excessive wall movement may require replacement of the damaged wall. However, the reinforced concrete flood wall is intended to last the life of the project.

The rock rip-rap will require frequent inspections to check for erosion, missing or displaced rocks, and vandalism. After any significant runoff event, the rock rip-rap should be inspected for excessive erosion and missing or displaced rocks. Maintenance of the rock rip-rap includes replacing rocks as needed, and repairing excessive erosion. The rock rip-rap is intended to last the life of the project.

## **Tables**

Tables 1, 2, 4, and 6 show the costs for the recommended plan. The cost for the proposed structural measures for the floodway system is \$956,300 as shown in Table 1. These items are separated in Table 2. Public Law (PL) 83-566 funds will cover \$850,800 and local funds will cover \$105,500. Approximately 88.97 percent of the total project cost will be covered by PL 83-566 funds and 11.03 percent will be the responsibility of the Sponsors. Engineering costs include the direct cost of engineering, surveys, investigations, and the design and specifications of the structural measures. Project administration costs include contract administration, inspection services during construction, advisory services, and administration of relocation payments. The Sponsors are responsible for 100 percent of their administration costs related to the project.

Table 3a shows the structural data for the dikes (dikes). Table 4 shows the estimated annual national economic development (NED) costs. Operation, Maintenance and Replacement costs (OM&R) are also shown in Table 4. The project Sponsors will incur these additional OM&R costs over the 100 year project life. Table 5 shows the estimated average annual economic benefits resulting from the installed proposed project measures. Table 6 summarizes the economic benefits and costs of the project.

**Table 1 Estimated Installation Costs**

<b>Table 1 - Estimated Installation Costs</b>										
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>										
<b>(Dollars)<sup>1/</sup></b>										
Installation Cost Item	Unit	Number (Non- federal Land)	Estimated Cost (Dollars) <sup>1/</sup>							<b>PROJECT TOTAL</b>
			PL-566 Federal Funds			Other Funds				
			PL-566 Federal Funds <sup>2/</sup> (Federal Land)	PL-566 Federal Funds <sup>2/</sup> (Nonfederal Land)	PL-566 Federal Funds TOTAL	Other Funds (Federal Land)	Other Funds (Nonfederal Land)	Other Funds TOTAL		
<b>Structural Measures</b>										
<b>Floodway System</b>										
Earth Dikes	ft	4,160	\$0	\$470,559	\$470,559	\$0	\$0	\$1,000	\$1,000	\$471,559
Reinforced Concrete	ft	240	\$0	\$91,741	\$91,741	\$0	\$0	\$1,000	\$1,000	\$92,741
<b>Subtotal - Structural Measures</b>			<b>\$0</b>	<b>\$562,300</b>	<b>\$562,300</b>	<b>\$0</b>	<b>\$0</b>	<b>\$2,000</b>	<b>\$2,000</b>	<b>\$564,300</b>
<b>Nonstructural Measures</b>										
Bridge Work (Nolan Street)			\$0	\$0	\$0	\$0	\$0	\$10,125	\$10,125	\$10,125
Real Property Rights			\$0	\$262,125	\$262,125	\$0	\$0	\$85,250	\$85,250	\$347,375
Relocation			\$0	\$26,375	\$26,375	\$0	\$0	\$8,125	\$8,125	\$34,500
<b>Subtotal - Nonstructural Measures</b>			<b>\$0</b>	<b>\$288,500</b>	<b>\$288,500</b>	<b>\$0</b>	<b>\$0</b>	<b>\$103,500</b>	<b>\$103,500</b>	<b>\$392,000</b>
<b>Total Project</b>			<b>\$0</b>	<b>\$850,800</b>	<b>\$850,800</b>	<b>\$0</b>	<b>\$0</b>	<b>\$105,500</b>	<b>\$105,500</b>	<b>\$956,300</b>

<sup>1/</sup> 2007 Price Base

<sup>2/</sup> Natural Resources Conservation Service - responsible for assisting in installation of works of improvement.

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**Table 2 Estimated Cost Distribution – Structural Measures**

<b>Table 2 - Estimated Cost Distribution - Structural Measures</b>									
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>									
<b>(Dollars)<sup>1/</sup></b>									
<b>Installation Cost - PL-566 Funds</b>									
	Construction	Engineering	Mitigation	Real Property Rights	Relocation Payments	Project Administration	Total PL-566 Funds		
<b>Structural Measures</b>									
Floodway System	\$453,217	\$50,000	\$21,083	\$0	\$0	\$38,000	<b>\$562,300</b>		
<b>Nonstructural Measures</b>									
Floodway System	\$0	\$0	\$0	\$255,000	\$24,000	\$9,500	<b>\$288,500</b>		
<b>Grand Totals</b>	<b>\$453,217</b>	<b>\$50,000</b>	<b>\$21,083</b>	<b>\$255,000</b>	<b>\$24,000</b>	<b>\$47,500</b>	<b>\$850,800</b>		
<b>Installation Cost - Other Funds</b>									
	Construction	Real Property Rights	Relocation Payments	Project Administration	Total Other Funds	Total Estimated Cost Distribution			
<b>Structural Measures</b>									
Floodway System	\$0	\$0	\$0	\$0	\$0	<b>\$562,300</b>			
<b>Nonstructural Measures</b>									
Floodway System	\$10,000	\$85,000	\$8,000	\$2,500	\$105,500	<b>\$394,000</b>			
<b>Totals</b>	<b>\$10,000</b>	<b>\$85,000</b>	<b>\$8,000</b>	<b>\$2,500</b>	<b>\$105,500</b>	<b>\$956,300</b>			

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<sup>1/</sup> 2007 Price Base

**Table 3 Structural Data – Dikes**

**Table 3a – Structural Data – Dikes<sup>1/</sup>**  
**Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming**

Dike	Stationing	Top Width (ft)	Average Side Slope	Average Height of Dike (ft)	100-year Frequency Velocity (ft/s)	Dike Protection	Volume of Earth Fill (yd <sup>3</sup> )
Northwest Embankment	0+00 to 19+62.5	12	2:1	7.5	6.7	Vegetated	15,508
Northeast Embankment	0+00 to 19+20	12	2:1	4.7	7.5	Vegetated	4,748
Northeast Embankment	9+20 to 11+60	N/A	N/A	1.5	7.5	Concrete and Rock Riprap	44.5 <sup>2/</sup>
Southwest Embankment	0+90 to 7+57	12	2:1	7.1	6.4	Vegetated	5,274
Southeast Embankment	9+10 to 2+60	28	20:1	3.2	11.2	Gravel	2,703
Southeast Embankment	2+60 to 2+60	12	2:1	3.5	3.8	Vegetated	2,700

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<sup>1/</sup> Dikes are Class 1 – NRCS Conservation Practice Standard 356

<sup>2/</sup> Concrete Volume

**Table 4 Estimated Average Annual NED Costs**

<b>TABLE 4 - Estimated Average Annual NED Costs</b>				
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>				
<b>(Dollars)<sup>1/</sup></b>				
Evaluation unit	-----Project Outlays-----			
	Amortization of Installation Cost	Operations, Maintenance, and Replacement Cost	Other Direct Costs	Total
<b>Structural Measures</b>				
Floodway System	\$47,100	\$1,250	\$0	\$48,350
<b>Grand Total</b>	<b>\$47,100</b>	<b>\$1,250</b>	<b>\$0</b>	<b>\$48,350</b>

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<sup>1/</sup>2007 Price Base, amortized over 100 years at a discount rate of 4.875 percent

**Table 5 Estimated Average Annual Flood Damage Reduction Benefits**

<b>TABLE 5 - Estimated Average Annual Flood Damage Reduction Benefits</b>			
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>			
<b>(Dollars)<sup>1/</sup></b>			
Item	----- Estimated Average Annual Damages <sup>2/</sup> -----		Damage Reduction Benefit <sup>2/</sup>
	Without Project	With Project <sup>3/</sup>	
<b>Floodwater</b> Residential / Commercial	\$387,100	\$0	\$387,100
<b>Grand Total</b>	<b>\$387,100</b>	<b>\$0</b>	<b>\$387,100</b>

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<sup>1/</sup> 2007 Price Base

<sup>2/</sup> All damages and benefits are agriculture-related due to this rural community having a low population.

<sup>3/</sup> Damages and benefits will accrue from floods of greater magnitude than the 100-year frequency event, but these were not evaluated.

**Table 6 Comparison of NED Estimated Benefits and Costs**

<b>TABLE 6 - Comparison of NED Estimated Benefits and Costs</b>			
<b>Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming</b>			
<b>(Dollars)<sup>1/</sup></b>			
Evaluation Unit	Average Annual Benefits <sup>2/</sup>	Average Annual Costs	Benefit / Cost Ratio
<b>Structural Measures</b>			
Floodway System	\$387,100	\$48,350	8.01 : 1.0
<b>Total</b>	<b>\$387,100</b>	<b>\$48,350</b>	<b>8.01 : 1.0</b>

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<sup>1/</sup> 2007 Price Base

<sup>2/</sup> All damages and benefits are agriculture-related due to this rural community having a low population.

## List of Preparers

### Introduction

The Natural Resources Conservation Service (NRCS) is the lead agency for the Watershed Project Plan – Environmental Assessment. At this time there are no organizations with Cooperating Agency Status. Other interested agencies contributing in the process are Wyoming Department of Transportation (WYDOT), Wyoming Game and Fish Department (WGFD), Wyoming Water Development Commission (WWDC), and Bureau of Land Management (BLM). Contact with the required agencies for permitting will be made prior to construction.

The following NRCS Agency Personnel assisted with the planning and preparation of this Watershed Plan – Environmental Assessment.

<u>Name</u>	<u>Title</u>	<u>Education</u>	<u>Years Experience</u>
Theresa Bowen	Management Analyst	BS Business Administration	25
George Gamblin	Range Management Specialist	BS Range Management	17
Lee Hackleman	State Hydrologist	BS Agricultural Engineering & MS Agricultural Engineering	15
Rory Karhu	District Conservationist/Biologist	BS Biology and MS Zoology	8
Jay Mar	Assistant State Conservationist for Programs	BS Range Botany and BS Wildlife Zoology	26
Jay Meyer	NRCS State Archaeologist	BA Anthropology MA Anthropology	22
Allison McKenzie	District Conservationist	BS Rangeland Ecology and Watershed Management	13
Evan Murray	Resource Conservationist	BS Zoology and BS Range Science	35
Ryan Murray	Rangeland Management Specialist	BS Rangeland Ecology and Watershed Management	9
Paul Obert	State Biologist	BS Wildlife Management	30
Mark Opitz	State Conservation Engineer	BS Civil Engineering	35
Randy Wiggins	State GIS Coordinator	BS Natural Resource Management	31

## Circulation and Distribution List

### Copies Available:

Copies of this Watershed Project Plan – Environmental Assessment for the Kaycee Flood Protection Project are available at the following locations:

Powder River Conservation District 350 Nolan Avenue Kaycee, Wyoming	Town of Kaycee 268 Nolan Avenue Kaycee, Wyoming	Natural Resources Conservation Service 100 East B St, Room 3001 Casper, Wyoming
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### Notification of Availability / Copies Distributed for Review

First Name	Last Name	Organization	City	ST
Bob	Bennett	Bureau of Land Management	Cheyenne	WY
John	Lawson	Bureau of Reclamation Wyoming Area Office	Mills	WY
Ivan D.	Posey	Eastern Shoshone Tribe	Fort Washakie	WY
Douglas	Gore	Federal Emergency Management Agency	Denver	CO
Bill	Bass	Forest Service Region II	Sheridan	WY
Honorable Dave	Freudenthal	Governor of Wyoming	Cheyenne	WY
Gerald	Fink	Johnson County Commissioners	Buffalo	WY
Marilyn	Long	Johnson County EM Coordinator	Buffalo	WY
Rod	Litzel	Johnson County Weed and Pest	Buffalo	WY
Randy and Christy	Cleveland	Landowner	Kaycee	WY
Bill and Erin	Walter	Landowner	Kaycee	WY
Deb	Bush	League of Women Voters	Powell	WY
Honorable Barbara	Cubin	Member, United States House of Representatives	Casper	WY
Richard	Brannan	Northern Arapaho Tribe	Fort Washakie	WY
Lynne	Boomgaarden	Office of State Lands & Investments	Cheyenne	WY
Kevin F.	Lind	Powder River Basin Resource Council	Sheridan	WY

<b>First Name</b>	<b>Last Name</b>	<b>Organization</b>	<b>City</b>	<b>ST</b>
Jason	Williams	Powder River Conservation District	Kaycee	WY
Scott	Zimmerman	Rocky Mountain Farmers Union	Greenwood Village	CO
Andrea	Erickson Quiroz	The Nature Conservancy – Wyoming Chapter	Lander	WY
Allen	Streeter	Town of Kaycee	Kaycee	WY
Robert	Pistono	Trout Unlimited – Wyoming	Jackson	WY
Matt	Bilodeau	U.S. Corps of Engineers	Cheyenne	WY
Brian	Kelly	U.S. Fish & Wildlife Service	Cheyenne	WY
Myron	Brooks	U.S. Geological Survey	Cheyenne	WY
Honorable John	Barrasso	United States Senator	Casper	WY
Honorable Michael	Enzi	United States Senator	Gillette	WY
Larry	Fvoboda	US EPA Region VIII	Denver	CO
Lois	VanMark	USDA Farm Service Agency	Casper	WY
Blaine	Horn	UW Extension Service	Buffalo	WY
Glen	Whipple	UW Extension Service	Laramie	WY
Keith	Kennedy	Wyoming Agricultural Business Association	Pine Bluffs	WY
Bobbie	Frank	Wyoming Association of Conservation Districts	Cheyenne	WY
George	Parks	Wyoming Association of Municipalities	Cheyenne	WY
Ken	Keffer	Wyoming Audubon	Casper	WY
Bill	Schilling	Wyoming Business Alliance	Casper	WY
Steve	Thomas	Wyoming Chapter Sierra Club	Sheridan	WY
John	Etchepare	Wyoming Department of Agriculture	Cheyenne	WY
John V.	Corra	Wyoming Department of Environmental Quality	Cheyenne	WY
John	Cos	Wyoming Department of Transportation	Cheyenne	WY
Robert	Hathaway	Wyoming Ducks Unlimited	Gillette	WY

<b>First Name</b>	<b>Last Name</b>	<b>Organization</b>	<b>City</b>	<b>ST</b>
Ken	Hamilton	Wyoming Farm Bureau Federation	Laramie	WY
Terry	Cleveland	Wyoming Game and Fish Department	Cheyenne	WY
Honorable Michael	Madden	Wyoming House of Representatives	Buffalo	WY
Joe	Moore	Wyoming Office of Homeland Security	Cheyenne	WY
Jim	Case	Wyoming Office of Homeland Security	Cheyenne	WY
Laurie	Milford	Wyoming Outdoor Council	Lander	WY
Ben	Bigalke	Wyoming Pheasant Forever	Buffalo	WY
Mary	Randolph	Wyoming Rural Development Council	Cheyenne	WY
Honorable John	Schiffer	Wyoming Senate	Kaycee	WY
Patrick T.	Tyrrell	Wyoming State Engineer's Office	Cheyenne	WY
Mary	Hopkins	Wyoming State Historical Preservation Office	Cheyenne	WY
Jim	Magagna	Wyoming Stock Growers Association	Cheyenne	WY
Michael K.	Purcell	Wyoming Water Development Commission	Cheyenne	WY
Mark	Winland	Wyoming Wildlife Federation	Cheyenne	WY
Bryce	Reece	Wyoming Wool Growers Association	Casper	WY

## Glossary

**Acquisition and Relocation (Buyout):** Purchase and/or removal (relocation or demolition) of properties from flood-prone areas. Process includes purchase of real property, appraisals, closing costs, moving expenses, demolition, and salvage removal.

**Alluvium:** A general term for all eroded material deposited or in transit by streams, including gravel, sand, silt, clay, and all variations and mixtures of these.

**Average Annual Benefits:** The difference between the without-project average annual damages and the with-project average annual damages plus other benefits, such as recreation.

**Average Annual Cost:** The capital of initial cost amortized to an annual cost plus the necessary operation, maintenance, and replacement cost.

**Conservation Practice or Measure:** A technique or management based on published standards and used to control erosion, conserve water, protect plants, or generally improve soil, water, air, plant, and/or animal resources.

**Erosion (rill):** An erosion process in which numerous small channels are formed by runoff water. Occurs primarily on recently cultivated soil and is intermediate between sheet and ephemeral gully erosion.

**Erosion (sheet):** The removal of a fairly uniform layer of soil from the land surface by runoff water. There are no conspicuous water channels.

**Floodplain:** Level land adjacent to a stream or river channel which is covered with water when the channel overflows its banks at flood stages (see "Frequency").

**Floodwater Damage:** The economic loss caused by floods, including damage by inundation, erosion, scour, or sediment deposition on floodplains. Floodwater damages result from physical damages or losses, reduced crop yields, emergency costs, and business or financial losses.

**Frequency:** An expression or measure of how often a hydrologic event, such as precipitation or a flood, of a given size or magnitude should, on average, be equaled or exceeded. Example:  
10-year – a hydrologic event having a 10 percent chance of occurring in any given year;  
100-year – a hydrologic event having a 1 percent chance of occurring in any given year.

**Land Rights:** Any interest acquired or permission obtained to use land, buildings, structures, or other improvements. Includes the acquisition of land by fee title or certain designated rights to the use of land by perpetual easement. Also includes the costs of modifying utilities, roads, and other improvements.

**NED Plan (National Economic Development Plan):** A plan that reasonably maximizes net national economic development benefits.

**Prime Farmland:** Land that is best suited to producing food, feed, forage, fiber, and oilseed crops, and is available. It includes cropland, pastureland, and forestland, but not urbanized land or water. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern agricultural methods.

**Riparian Corridor:** An ecosystem consisting of land adjacent to creeks, streams, and rivers which includes the channel itself, its floodplain, streambanks, and transitional upland fringes.

**Structural Measure(s):** Project works of improvement such as dams, reservoirs, dikes, diversions, dikes, flood walls, channels, or other constructed devices, installed and maintained for flood prevention; drainage; irrigation; recreation; fish and wildlife; municipal, industrial, or rural water supply; water quality management; or other agricultural water management purposes. Structural measures are installed, operated, and maintained by a project sponsor.

**Technical Assistance:** Help provided to individuals, groups, and units of government on opportunities, potentials, and problems having to do with soil and water resources. May include program formulation, planning, application, and maintenance.

**Watershed:** The area contained within a drainage divide above a specified point on a creek, stream, river, or other water body.

## Appendix A Comments and Responses

The following comments were proved to the NRCS in either written or verbal form during the comment period of November 5 to December 20, 2007. NRCS did not receive any comments regarding the methodology, effectiveness, or impacts of the recommended alternative which required any substantial changes to the final watershed project plan/EIS. All comments received of the draft Watershed Project Plan – Environmental Assessment for the Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Johnson County, Wyoming are summarized along with the responses within this appendix.

**Comments from:** Brad Rogers  
Fish and Wildlife Service  
Buffalo, WY Office  
307-684-1046

Per phone conversation with Paul Obert 12/04/2007

Bald Eagle has been de-listed, move from T&E to sensitive species, migratory birds, or somewhere else. Will send an e-mail for delisting information.

Use of little or no impact – if little impact, need to define impact.

Ute's Ladies Tresses may occur – all activity is outside of the riparian and wetland area. Brad Rogers of USFWS did a site visit for Ute's Ladies Tresses, and none were found, so no effect

Pg. 29 2<sup>nd</sup> paragraph last two sentences no known nesting sites within two miles.

Pg. 32 Alt B Direct impacts – 27 cottonwoods removed – effects eagles, TAKE OUT.

**Comments From:** Rick Schuler, Soil/Water/Air Program Lead  
Bureau of Land Management  
Wyoming State Office  
**Subject:** Review of the Draft Watershed Project Pan,  
Kaycee Flood Protection Project  
**Date:** November 27, 2007

It is quite evident that a great deal of forethought, time, and technical effort have been invested in planning this project. We appreciate the opportunity to review this EA and familiarize ourselves with this project. A couple of comments are offered for your consideration:

Page 1; Affected Environment: construction of the dikes will confine flood flows and increase velocity (this is recognized on page 33; Downstream Effects; AltB-Dikes\*). This will likely result in increased bed/bank erosion and sediment loading. I suggest this needs to be mentioned here to track with statements later in the document.

Page 33; Downstream Effects; AltB-Dikes: in Direct Impacts it is stated that flow volume would be equivalent, but flow velocity may increase-\*. I think this will result in increased bed and bank scouring and sediment movement to stream reaches below town. Where the river is no longer

confined the flood flows will spread out, slow down and deposit the sediment load. The cumulative result will likely be sediment aggradation in downstream reaches. The amount of aggradation is uncertain considering the bank stabilization treatments, but it is probably worthy of mentioning here as part of the cumulative impacts.

Thank you for the opportunity to comment. Best regards..... Rick Schuler

**Response to comments received from Rick Schuler, Bureau of Land Management:**

Response to comments from Rick Schuler, Bureau of Land Management, for the review of the draft Watershed Project Plan – Environmental Assessment for the Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Johnson County, Wyoming.

I compared the 100-year storm HEC-RAS flood models for the existing condition and for the post-project condition on the Middle Fork Powder River. For all of the cross sections provided I compared the velocity in the channel and on either out-of-bank area. The table below shows the results.

River Station 20468.10 (I-25 Bridge)

	<b>LOB</b>	<b>Channel</b>	<b>ROB</b>
Existing	2.79	10.44	5.21
Post Project	2.17	8.89	4.67

River Station 19809.53

	2.50	7.74	2.58
	2.67	6.98	2.30

River Station 19406.35

	2.28	5.46	2.23
	3.85	6.65	3.02

River Station 18594.09

	2.08	7.68	2.42
	3.83	8.30	2.99

River Station 18310.44

	1.74	6.59	2.03
	3.20	6.86	3.12

River Station 18230.22 (Bridge)

	5.20/6.24	4.43/6.03	2.38/3.72
	4.54/6.41	12.03/15.32	4.90/7.18

River Station 18162.78

	2.40	11.39	4.40
	5.57	12.56	6.23

River Station 17947.85

	<b>LOB</b>	<b>Channel</b>	<b>ROB</b>
	3.34	11.19	2.64
	5.18	12.44	3.47

River Station 16680.29

	0.91	3.75	1.72
	0.91	3.75	1.72

River Station 14688.84

	1.21	11.98	1.28
	1.21	11.98	1.28

The only significant change in the channel velocities post project occurs at the Highway 196 Bridge (Nolan Ave) and immediately downstream from the bridge. This section will be armored with rip-rap to provide scour protection for the bridge piers and abutments as well as for the river channel.

A comparison was also made of the water surface elevation for the existing channel and for the post-project channel for the 100-year storm using HEC-RAS models.

<u>River Station</u>	<u>Existing Elevation</u>	<u>Post-Project Elevation</u>	<u>Elevation Difference</u>
20468.10	4656.4	4657.35	+0.95'
19809.53	4654.67	4656.19	+1.52'
19406.35	4654.38	4655.69	+1.31'
18594.09	4652.84	4653.88	+1.04'
18310.44	4652.29	4653.41	+1.12
18230.22	Bridge	Bridge	---
18162.78	4650.74	4651.25	+0.51'
17947.85	4649.39	4649.59	+0.20'
16680.29	4648.68	4648.68	---
14688.84	4644.12	4644.12	---

At the downstream end of the constructed floodway, the water surface elevation and the channel velocities are equal for both the existing model and the post-project model. Based on the models, I do not anticipate any increased erosion or flooding downstream from Kaycee with the construction of the proposed floodway.

Mark W. Opitz, PE  
 State Conservation Engineer  
 USDA–NRCS



Dave Freudenthal  
Governor

## Department of Transportation State of Wyoming



John F. Cox  
Director

December 19, 2007

Mr. J. Xavier Montoya  
Natural Resources Conservation Service  
100 East B Street, Room 3124  
P.O. Box 33124  
Casper, WY 82602

RE: Environmental Assessment of Kaycee Flood Protection Project Draft Watershed  
Project Plans dated November 2007.

Dear Mr. Montoya:

The Wyoming Department of Transportation has reviewed the Draft Environmental Assessment to determine potential impacts to the highway system. The flood control project affects the highway through Kaycee, a proposed highway storm drain system currently being designed by WYDOT and the bridge over the Middle Fork Powder River on Highway 196.

### Hydrology and Design Frequency.

The Draft EA indicated the levee system is designed for the 100-year flood frequency. The EA does not indicate the frequency of the August 2002 flood or whether that event exceeded the 100-year frequency. If it did, a similar flood could result in the inundation of Kaycee. This should be stated to provide full disclosure. Many USACE flood control projects are designed for the 500-year flood. More detail regarding design flood criteria and cost benefit may indicate why a levee system having a 500-year flood design is not cost effective. The August 2002 flood highwater elevations may be compared with those estimated for the 100-year and 500-year floods.

### Bridge impacts

#### Freeboard

Hydraulic data for the proposed project was previously provided for our review. The proposed levee system will cause an increase in the water surface elevation and decrease in bridge freeboard. The EA should identify how much freeboard the bridge will have for the 100-year and 500-year floods. The existing bridge survived the August 2002 flood with

5300 Bishop Boulevard  
Cheyenne, Wyoming 82009-3340

Mr. J. Xavier Montoya  
December 19, 2007  
Page 2

minimal damage. This was, in part, due to the overtopping relief that the low highway grade line provided. The bridge freeboard may not meet standards used in similar projects.

#### Scour

A scour analysis is required to ensure the bridge has functional stability for the 100-year flood and structural stability for the 500-year event. The proposed rock armor should be designed to provide bridge scour protection.

#### Buoyancy

The increase in the water surface due to the levees increases the potential buoyancy of the bridge superstructure. The bridge will need to be reviewed for buoyancy potential and may need remedial structural measures to prevent damage.

#### Drift

Drift has been an ongoing problem at this highway bridge. Drift blockage increases the potential for levee overtopping. The higher water surface elevation increases the potential for drift blockage of the bridge.

#### Storm Drain Impacts

Our proposed highway project will install a new storm drain system to drain the highway pavement. An emergency shut valve will be needed on the proposed 36 inch outfall line once the levee system is installed. WYDOT does not know exactly where to place the storm drain outfall and closure valve to meet levee design requirements and standards. WYDOT requests the NRCS to design and install the WYDOT storm closure valve with their project. The WYDOT storm drain outfall may be in place prior to final design and construction of the levee system. The attached Figure 1 shows the proposed location of the WYDOT outfall system.

#### Floodplain Mapping

The project needs to update the flood mapping for Kaycee otherwise the residents may be required to purchase flood insurance. The vertical datum used in the analysis needs to be shown in the plans.

Mr. J. Xavier Montoya  
December 19, 2007  
Page 3

If you have any questions, please contact Mr. William Bailey or Mr. Keith Fulton of this office at (307) 777-4427.

Sincerely,



for Gregg C. Fredrick, P.E.  
State Bridge Engineer

GCF/WRB/slj

Attachments

cc: B. Patrick Collins, P.E., Assistant Chief Engineer, Engineering and Planning, WYDOT,  
Cheyenne

G:\BRIDGE\H Drive\Documents\HYDRAULICS- Crow 621\EAreview\_Kaycee.wpd

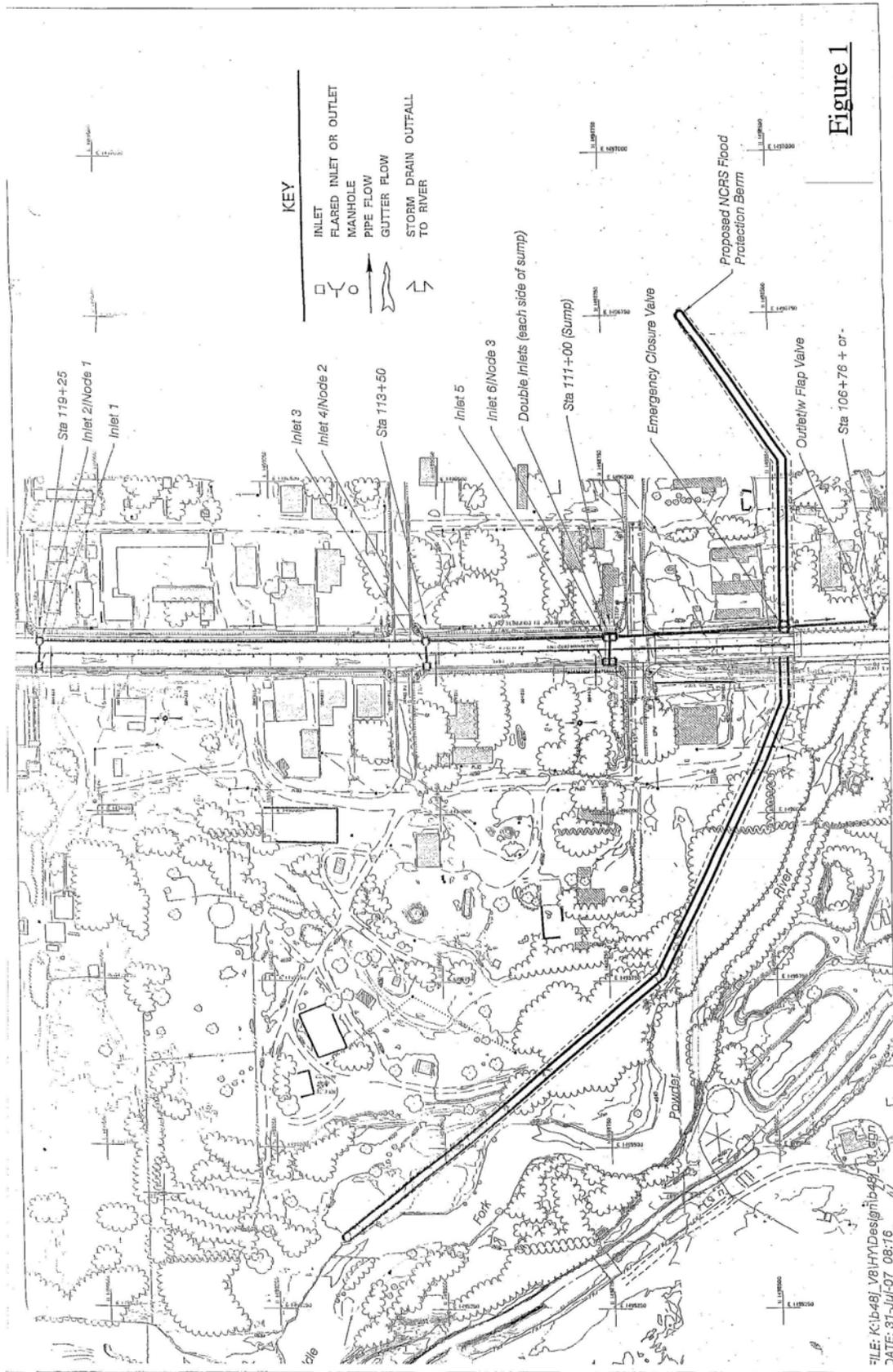


Figure 1

**Response to comments received from Department of Transportation, State of Wyoming:**

Response to comments from the Wyoming Department of Transportation, for the review of the draft Watershed Project Plan – Environmental Assessment for the Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Johnson County, Wyoming.

**Hydrology and Design Frequency:** The 2002 flood is estimated to be approximately 14,000 cubic feet per second (cfs), approximately 3,000 cfs greater than the 100-year storm frequency event. The 2002 flood is estimated to be a 200-year storm frequency event. The 2002 flood would be contained in the designed floodway with limited freeboard.

Bridge Impacts

**Freeboard:** The Highway 196 Bridge (Nolan Ave) freeboard for the 100-year and the 500-year storm frequency events for the existing condition and for the post-project condition are shown below.

	<u>Freeboard*</u>	
	<u>100-year Storm Frequency Event</u>	<u>500-Year Storm Frequency Event</u>
Existing	1.7 feet	1.2 feet
Post-Project	0.6 feet	overtops

\*Freeboard is measured from the water surface to the low elevation of the bridge deck.

**Scour:** Rock rip-rap protection will be included in the engineering plans at the Highway 196 Bridge (Nolan Ave) in Kaycee to protect the piers from scour. The maximum anticipated scour depth for the 100-year flood flows is above the burial depth of the piers. The left bridge abutment may need additional protection to prevent scour damage.

**Buoyancy:** The 100-year flood flows with project will pass through the Highway 196 Bridge (Nolan Ave) without submerging the inlet. However, events much greater than the 100-year storm frequency could completely submerge the bridge. Buoyancy should not be problem during the passage of the 100-year flood flows.

**Drift:** There is very little allowance for the passage of drift through the Highway 196 Bridge (Nolan Ave) during the 100-year storm event with project. Drift will always be a problem at the bridge during flood events. The town will need to be aware of the potential of drift that could obstruct the capacity of the bridge during flood events. Drift will be addressed in the Operation and Maintenance Agreement prepared for the sponsors.

**Storm Drain Impacts:** Wyoming Department of Transportation has provided drawings of the new storm drain system to NRCS. The drawings for the storm drains that will impact the floodway project will be included in the engineering drawings for the floodway.

**Floodplain Mapping:** NRCS is working with the Town of Kaycee to submit a CLOMR (Conditional Letter of Map Revision). The revised FIRM is effective February 2008. The vertical datum used to develop the Effective Model and the Post-Project Model was NAVD 88 NAD 83.

U.S. Department of Homeland Security  
Region VIII  
Denver Federal Center, Building 710  
P.O. Box 25267  
Denver, CO 80225-0267



**FEMA**

R8-MT

December 13, 2007

J. Xavier Montoya  
State Conservationist  
Natural Resources Conservation Service  
100 East B Street, Room 3124  
P. O. Box 33124  
Casper, Wyoming 82602

Dear Mr. Montoya

Thank you for the opportunity to comment on the Watershed Plan - Environmental Assessment (plan-EA) for the Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Wyoming project.

Attached are my comments. If you have any questions, please feel free to contact me at (303) 235-4739 or by Email at [bonnie.heddin@dhs.gov](mailto:bonnie.heddin@dhs.gov).

Sincerely,

A handwritten signature in black ink that reads "Bonnie G. Heddin".

Bonnie G. Heddin, CFM  
Natural Hazards Program Specialist

Comments on Draft Watershed Project Plan Environmental Assessment  
Kaycee Flood Protection Project Middle Fork Powder River Watershed

After the final meeting for the new map for Kaycee, Wyoming, Bonnie Heddin and Kim Johnson stopped in Casper, Wyoming and spoke with 4 employees of the Natural Resources Conservation Service that are working on the plan for this project. At that time, we discussed with them that a Conditional Letter of Map Revision (CLOMR) would be required because there is major changes to the floodplain for this projected project. There will also need to be a “No Rise Certification” if the project affects the floodway.

The proposed project is to build a dike on the north side of the river from the I-25 abutment to the downstream edge of town. A floodwall is proposed on the north side of the river. The south dike would be constructed from the Highway 196 Bridge (Nolan Ave.) west for 800 feet. The area near Harold Jarrard Park would have a combination of a dike, constructed west of the rodeo arena, and fill placed on the existing road sloped towards the river. The recommended plan is to construct flood control dikes, a flood wall, and strengthen some existing rock rip-rap along the north side, and dikes and grade work on the south side of the Middle Fork Powder River through the town of Kaycee, Wyoming. Eleven structures will be relocated outside of the dikes. One structure will be bought out and removed. Flood gates will be placed in dikes to allow water to flow back into the stream channel. The existing river channel will be maintained with no encroachments. During the construction there will be approximately 4,160 feet of dike, 240 feet of flood wall, and replacement of 645 feet of rock rip-rap completed to control the 100-year flood flows through the town of Kaycee, Wyoming. An additional two feet of freeboard was added to the dike height to allow for any uncertainties with design or the 100-year storm frequency flood depths. Approximately 2,500 cubic yards of earth will need to be removed from under the Highway 196 Bridge (Nolan Ave.) in order to pass the 100-year storm frequency without overtopping the bridge.

On page iii – Will the dikes/levees/floodwalls be certified and if so, will the certification be kept up-to-date? The Town of Kaycee will maintain the integrity of the proposed dikes/levees/floodwalls. Will the dikes/levees/floodwalls be shown on the CLOMR as providing protection?

On page 3, they indicated that the soil that is proposed to be used for the dikes/levees/floodwalls is going to be taken from the city landfill borrow area. Tests have been done on the soil. Is the soil appropriate to maintain the integrity of the dikes/levees/floodwalls?

On page 19, they indicate that the downstream effects will remain the same. The flood protection structures will contain the flows and may move the waters through and past the town sooner than waters that have spread over the landscape. The volume would be equivalent, but the flow velocity may increase with the concentration through town. As the flows pass below town, the channel will allow for normal passage that has been seen with earlier flood flows. Less debris will be carried as flows are controlled and the

section of stream through town has been stabilized. Potential flows with less debris could have beneficial effects downstream. I think there needs to be proof that this project will not cause flooding to downstream areas.

On page 36, they refer to permits. There would need to be a Floodplain Development Permit and if there is to be construction in the floodway a “No Rise Certification”. The Town of Kaycee, Wyoming would need to issue the Floodplain Development Permit and the “No Rise Certification” would have to be provided by the contractor or the NRCS.

**Response to comments received from Bonnie G. Heddin, U.S. Department of Homeland Security, Federal Emergency Management Agency:**

Response to comments from Bonnie G. Heddin, U.S. Department of Homeland Security, Federal Emergency Management Agency, for the review of the draft Watershed Project Plan – Environmental Assessment for the Kaycee Flood Protection Project, Middle Fork Powder River Watershed, Johnson County, Wyoming.

NRCS has completed MT-2 Forms 1, 2, and 3, Overview & Concurrence, Riverine Hydrology and Hydraulics, and Riverine Structures, respectively, to accompany the Conditional Letter of Map Revision (CLOMR) for the Town of Kaycee, Wyoming.

The engineering drawings for the dikes/levees/floodwalls will be signed and sealed by a professional engineer licensed in the State of Wyoming. The Town of Kaycee will be responsible for maintaining the integrity of the installed flood protection. For federally constructed projects, the project sponsors sign an operation and maintenance agreement to maintain the project for the life of the project. The dikes/levees/floodwalls as shown on the engineering drawings and included with the documentation for the CLOMR are designed to protect the Town of Kaycee from floods up to and including the 100-year storm event.

Soil samples from the proposed borrow site for the construction of the flood dikes for the Kaycee Flood Protection Project were submitted to the NRCS National Design, Construction, and Soil Mechanics Center in Lincoln, Nebraska, for testing. All tests concluded that the soils from the borrow site would be suitable to construct the flood dikes.

I compared the 100-year storm event HEC-RAS flood models for the existing condition and for the post-project condition on the Middle Fork Powder River. For all of the cross sections provided I compared the velocity in the channel and on either out-of-bank area. The table below shows the results.

River Station 20468.10 (I-25 Bridge)

	<b>LOB</b>	<b>Channel</b>	<b>ROB</b>
Existing	2.79	10.44	5.21
Post Project	2.17	8.89	4.67

River Station 19809.53

	<b>LOB</b>	<b>Channel</b>	<b>ROB</b>
	2.50	7.74	2.58
	2.67	6.98	2.30

River Station 19406.35

	2.28	5.46	2.23
	3.85	6.65	3.02

River Station 18594.09

	2.08	7.68	2.42
	3.83	8.30	2.99

River Station 18310.44

	1.74	6.59	2.03
	3.20	6.86	3.12

River Station 18230.22 (Bridge)

	5.20/6.24	4.43/6.03	2.38/3.72
	4.54/6.41	12.03/15.32	4.90/7.18

River Station 18162.78

	2.40	11.39	4.40
	5.57	12.56	6.23

River Station 17947.85

	3.34	11.19	2.64
	5.18	12.44	3.47

River Station 16680.29

	0.91	3.75	1.72
	0.91	3.75	1.72

River Station 14688.84

	1.21	11.98	1.28
	1.21	11.98	1.28

The only significant change in the channel velocities post-project occurs at the Highway 196 Bridge (Nolan Ave) and immediately downstream from the bridge. This section will be armored with rip-rap to provide scour protection for the bridge piers and abutments as well as for the river channel.

A comparison was also made of the water surface elevation for the existing channel and for the post-project channel for the 100-year storm event using HEC-RAS models.

<u>River Station</u>	<u>Existing Elevation</u>	<u>Post-Project Elevation</u>	<u>Elevation Difference</u>
20468.10	4656.4	4657.35	+0.95'
19809.53	4654.67	4656.19	+1.52'
19406.35	4654.38	4655.69	+1.31'
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17947.85	4649.39	4649.59	+0.20'
16680.29	4648.68	4648.68	---
14688.84	4644.12	4644.12	---

At the downstream end of the constructed floodway, the water surface elevation and the channel velocities are equal for both the existing model and the post-project model. Based on the models, I do not anticipate any increased erosion or flooding downstream from Kaycee with the construction of the proposed floodway.

Based on the water surface profile models for the existing condition and the post-project, I cannot certify that the water surface post-project will be less than 1.0 feet higher than the water surface for the existing condition during the passage of the 100-year storm event.

Mark W. Opitz, PE  
State Conservation Engineer  
USDA–NRCS

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**Appendix B Support Maps**

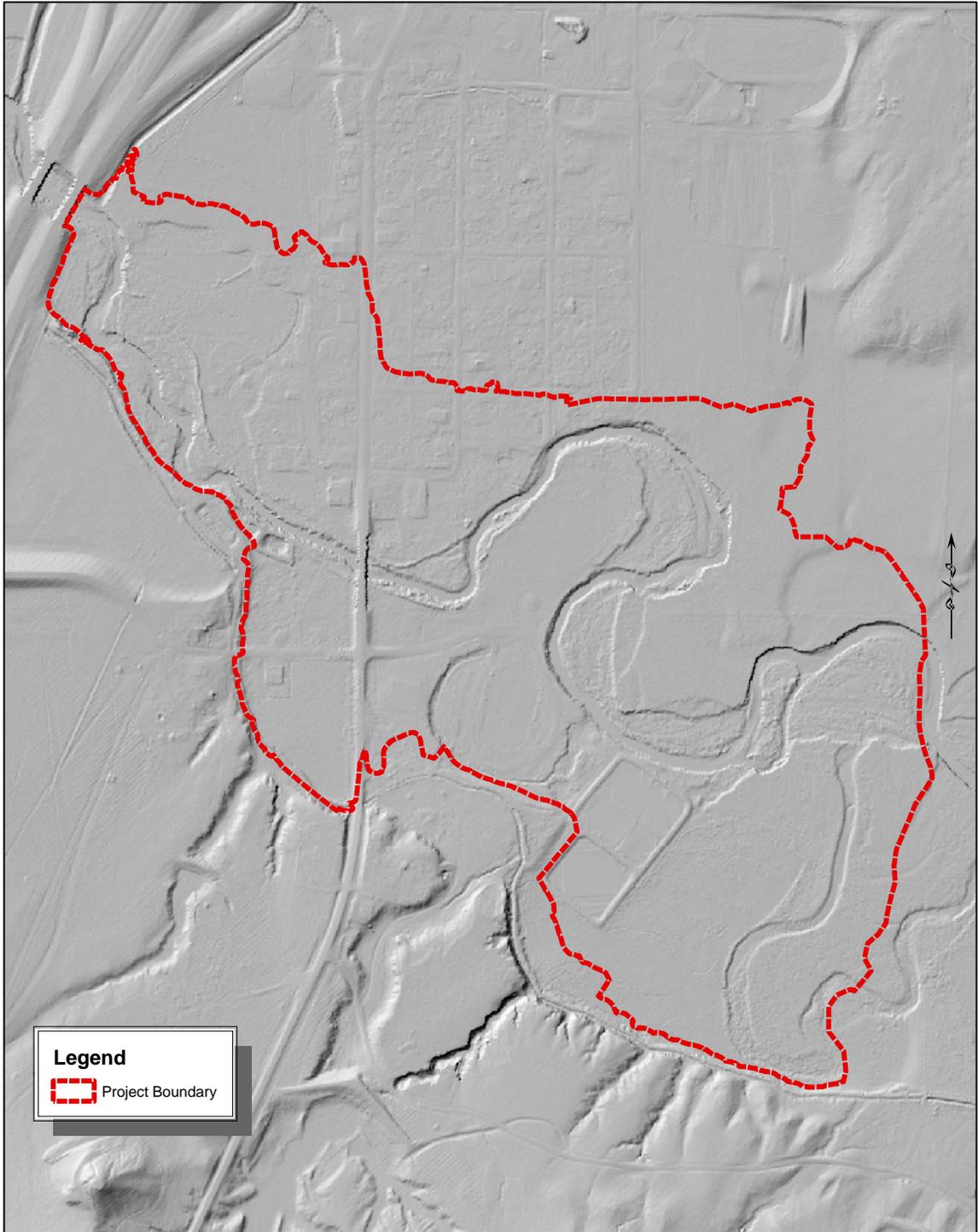
Kaycee Flood Protection Project  
Aerial Photo



### Kaycee Flood Protection Project Land Use



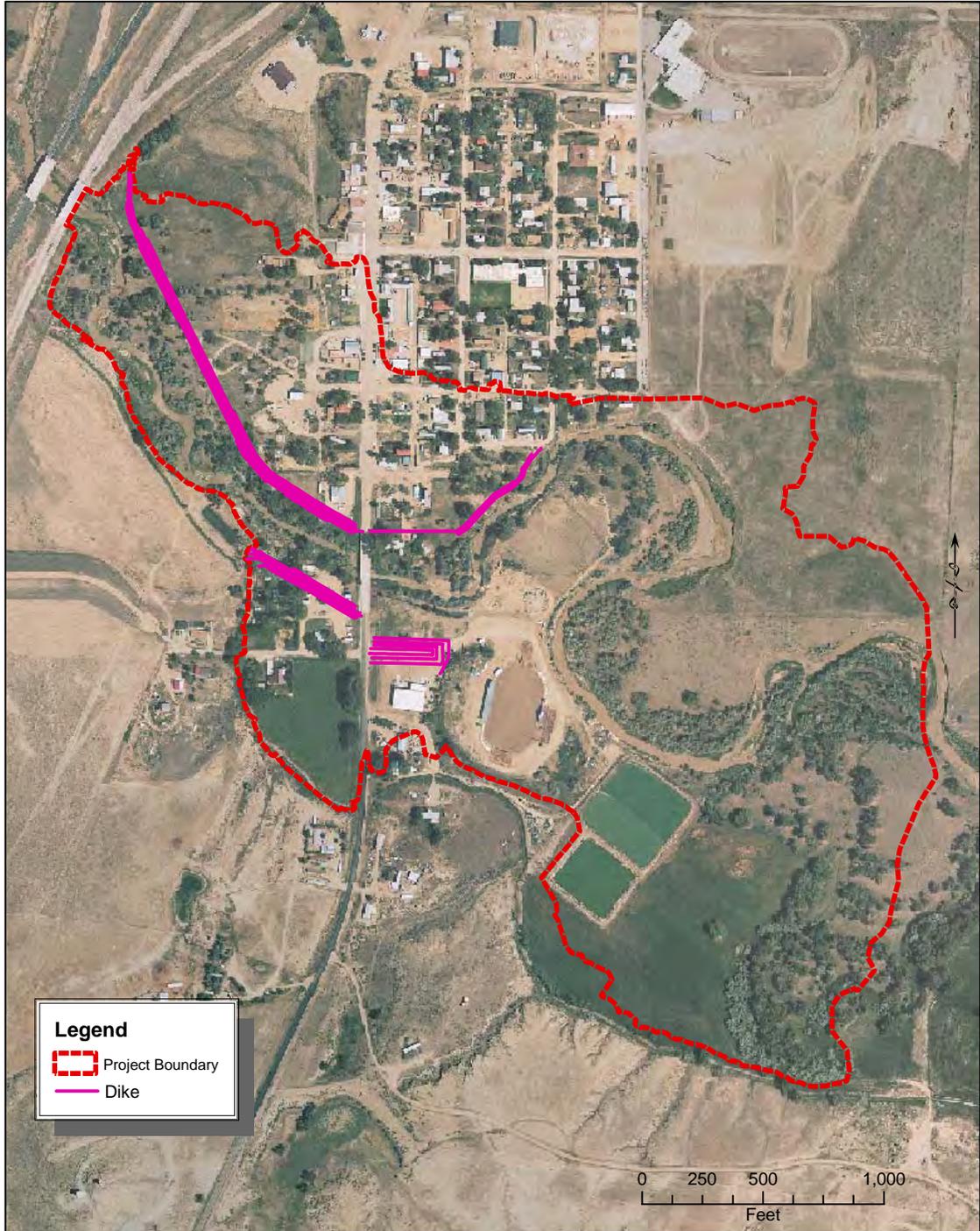
### Kaycee Flood Protection Project LIDAR Elevation Hillshade Map



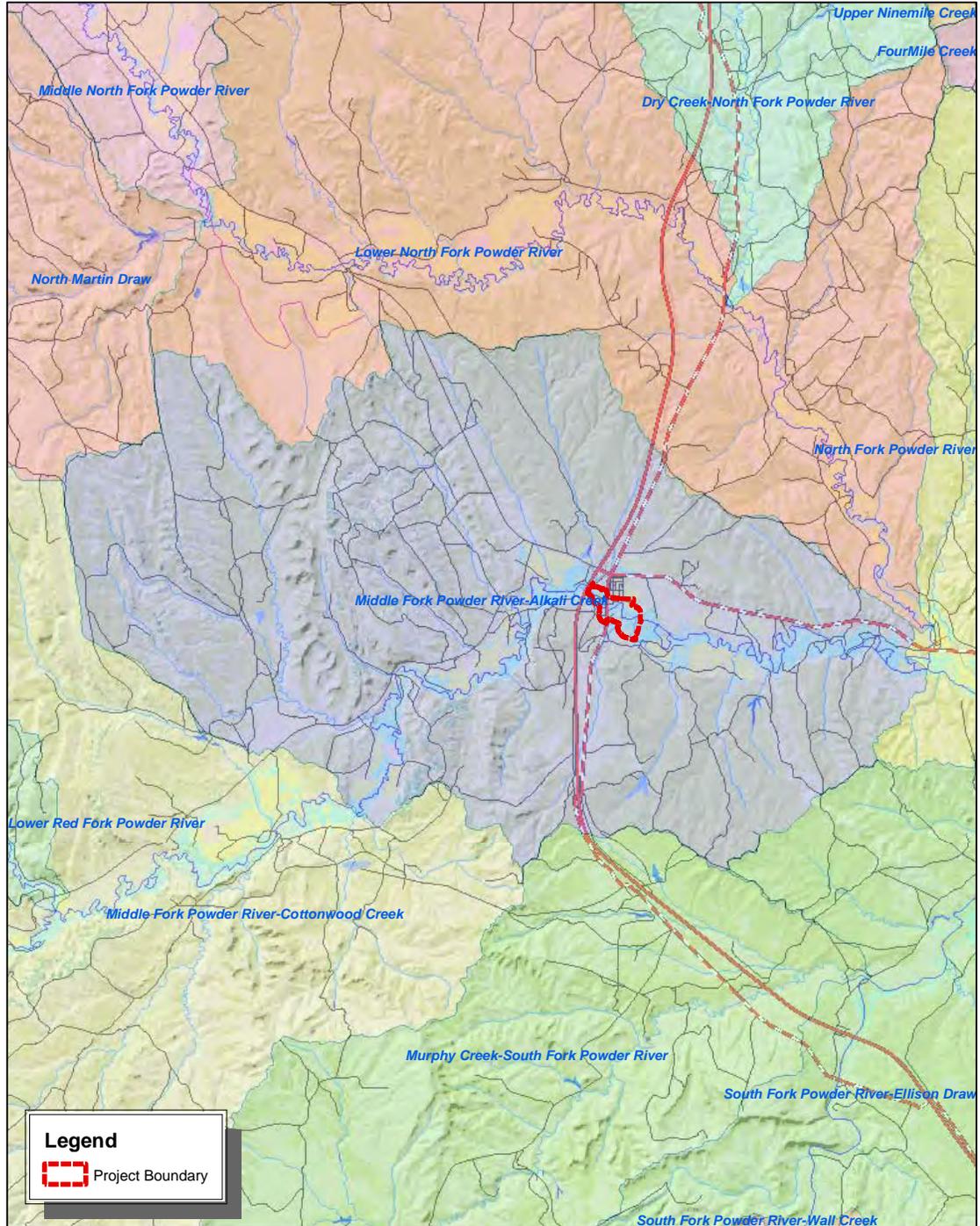
### Kaycee Flood Protection Project Wetlands (NWI)



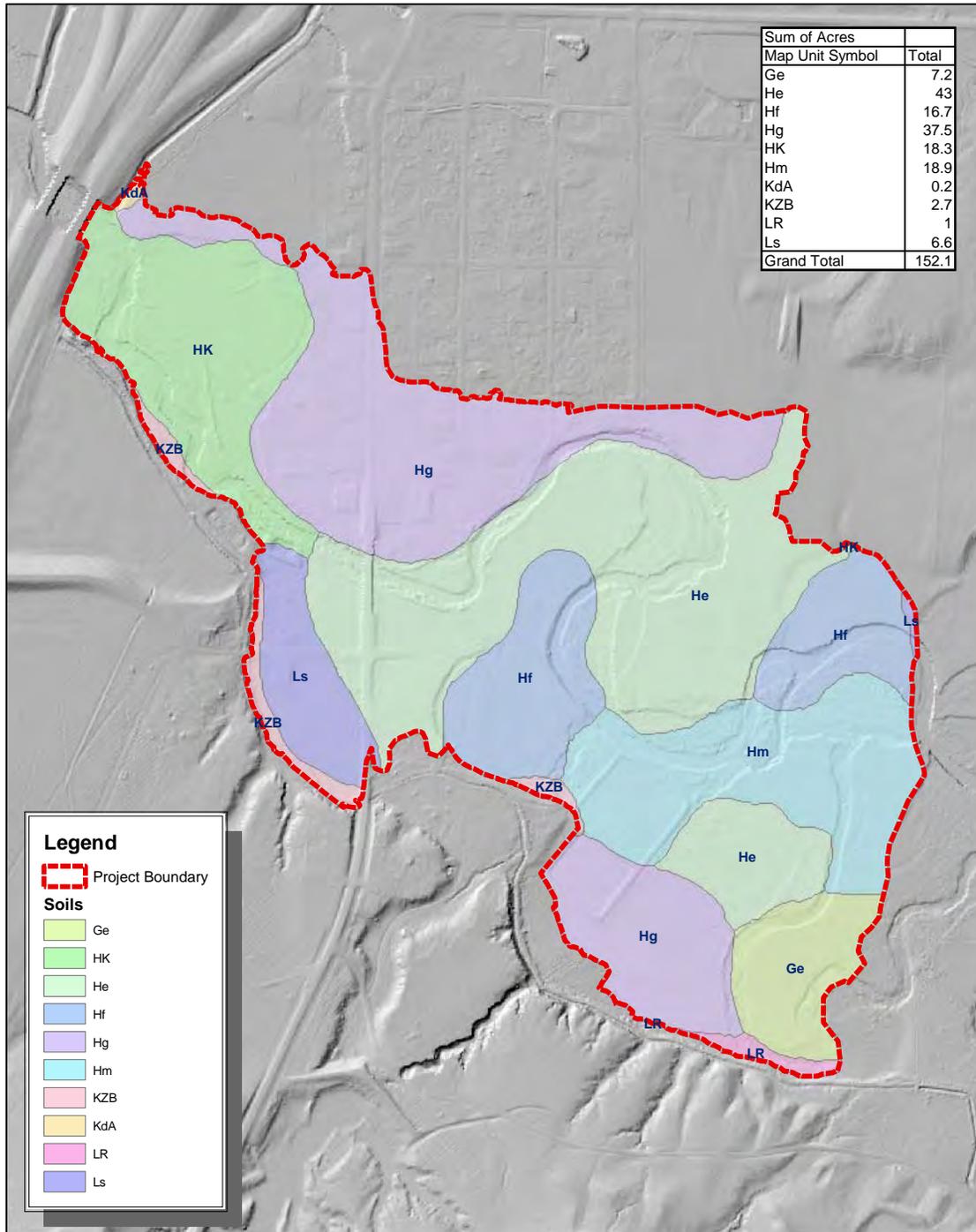
### Kaycee Flood Protection Project Recommended Alternative



### Kaycee Flood Protection Project 6th-Level Watersheds Map



### Kaycee Flood Protection Project Soils Map



### Kaycee, WY LIDAR-Derived Flood Lines



## Appendix C Routine Wetland Determination

**DATA FORM**  
**ROUTINE WETLAND DETERMINATION**  
 (1987 COE Wetlands Delineation Manual)

Project/Site: <u>Kaycee Flood Control Project</u> Applicant/Owner: _____ Investigator: <u>Ray Gullion, Steven Jelden</u>	Date: <u>11-17-06</u> County: <u>Johnson</u> State: <u>Wyoming</u>
Do Normal Circumstances exist on the site? <span style="float: right;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> Is the site significantly disturbed (Atypical Situation)? <span style="float: right;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> Is the area a potential Problem Area? <span style="float: right;"><input type="radio"/> Yes <input checked="" type="radio"/> No</span> (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: <u># 2</u>

**VEGETATION** -H- Herbaceous

	Dominant Plant Species	Stratum	Indicator		Dominant Plant Species	Stratum	Indicator
H	1. <u>Creeping foxtail</u>	<u>5</u>	<u>FACW</u>		9. _____		
H	2. <u>Red top Bent</u>	<u>5</u>	<u>FACW</u>		10. _____		
H	3. <u>Nebraska sedge</u>	<u>35</u>	<u>OBL</u>		11. _____		
H	4. <u>Foxtail barley</u>	<u>5</u>	<u>FACW</u>		12. _____		
H	5. <u>Three square bulrush</u>	<u>50</u>	<u>OBL</u>		13. _____		
	6. _____				14. _____		
	7. _____				15. _____		
	8. _____				16. _____		
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).				<u>100%</u>			
Remarks: <u>2 dominant species using 50/20 rule; both are OBL</u>							

**HYDROLOGY**

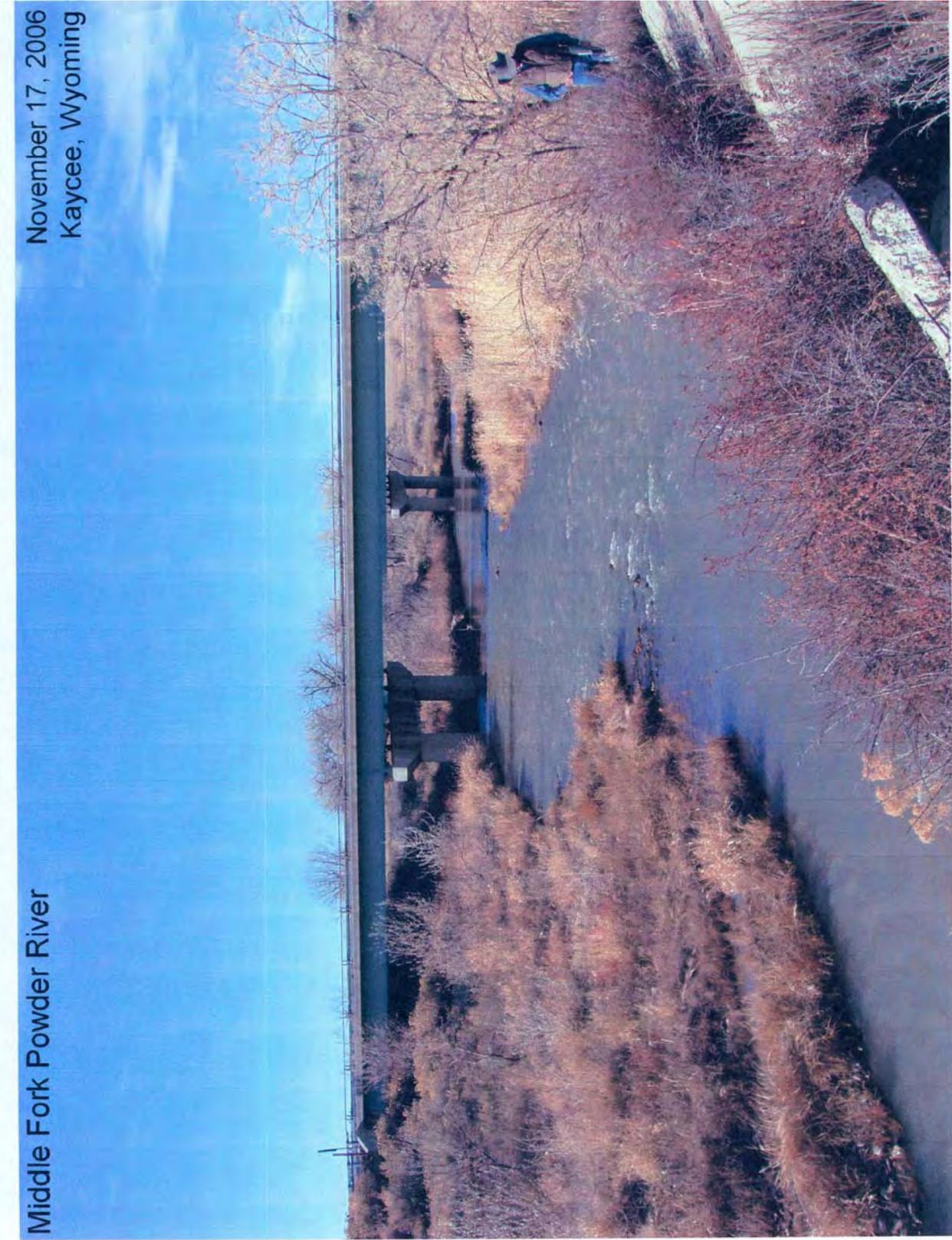
___ Recorded Data (Describe in Remarks): ___ Stream, Lake, or Tide Gauge ___ Aerial Photographs ___ Other <input checked="" type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b> <b>Primary Indicators:</b> ___ Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands <b>Secondary Indicators (2 or more required):</b> <input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 Inches ___ Water-Stained Leaves ___ Local Soil Survey Data <input checked="" type="checkbox"/> FAC-Neutral Test ___ Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: <u>none</u> (in.) Depth to Free Water in Pit: <u>none</u> (in.) Depth to Saturated Soil: <u>4"</u> (in.)	
Remarks: _____	

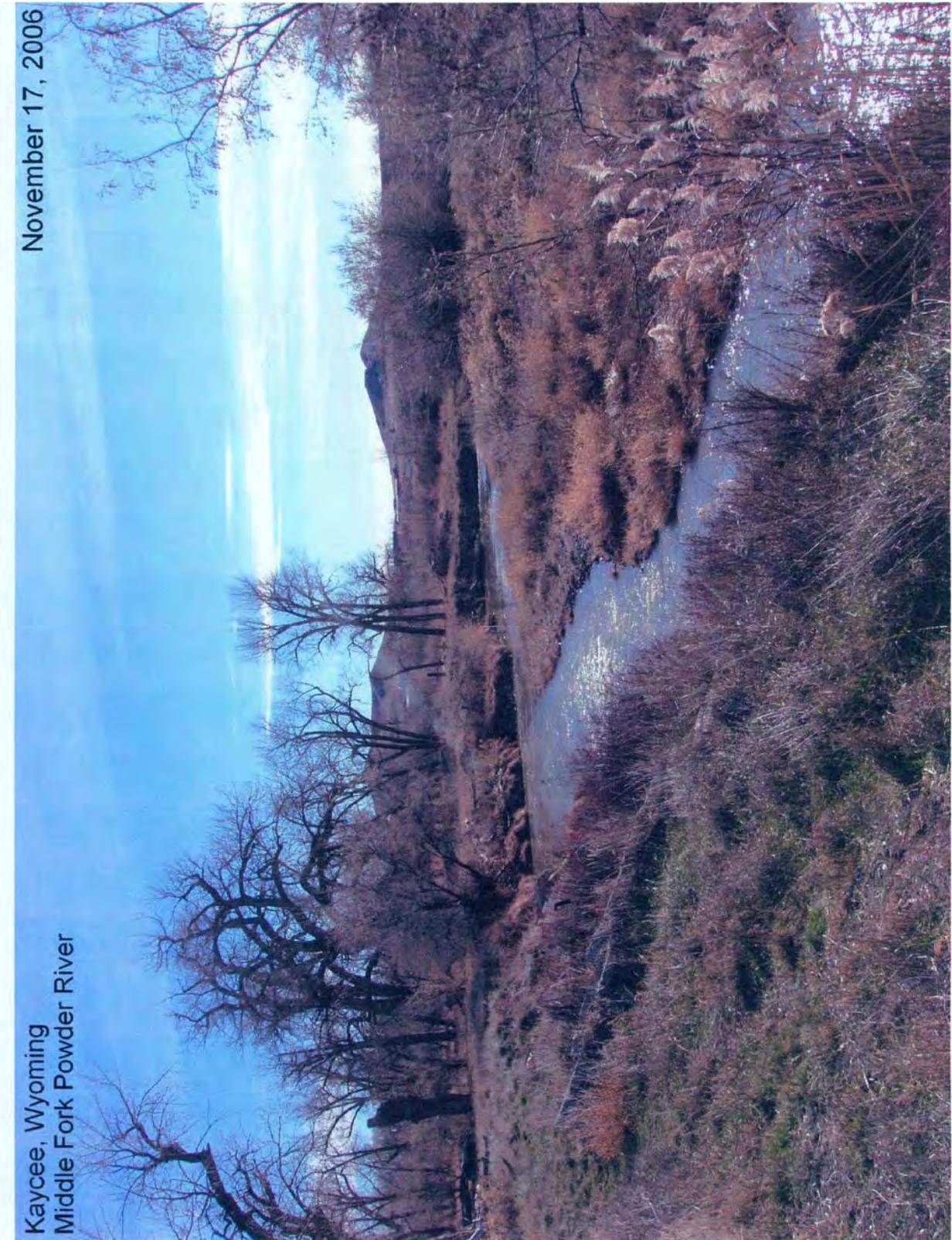




November 17, 2006  
Kaycee, Wyoming

Middle Fork Powder River





November 17, 2006

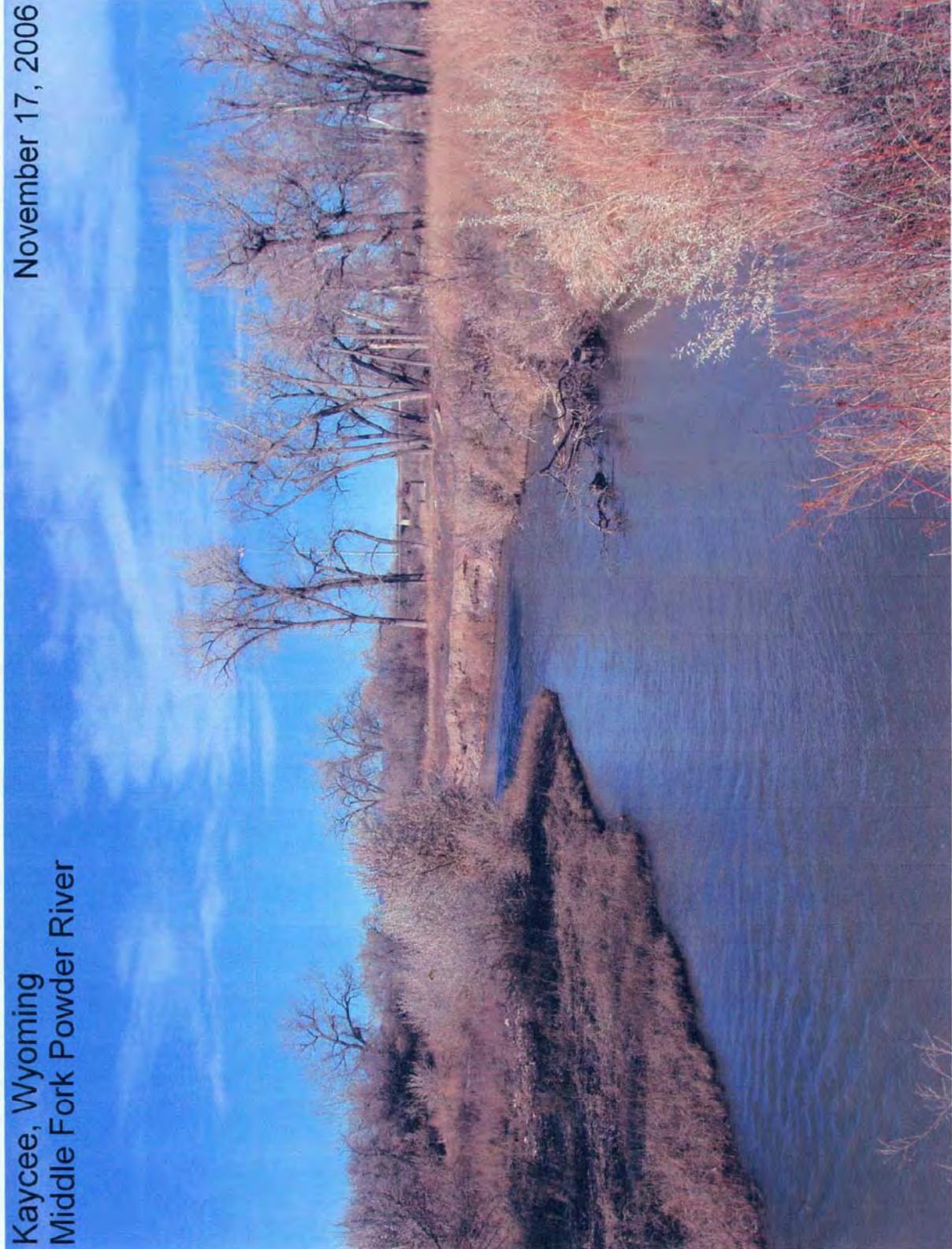
Kaycee, Wyoming  
Middle Fork Powder River



November 17, 2006

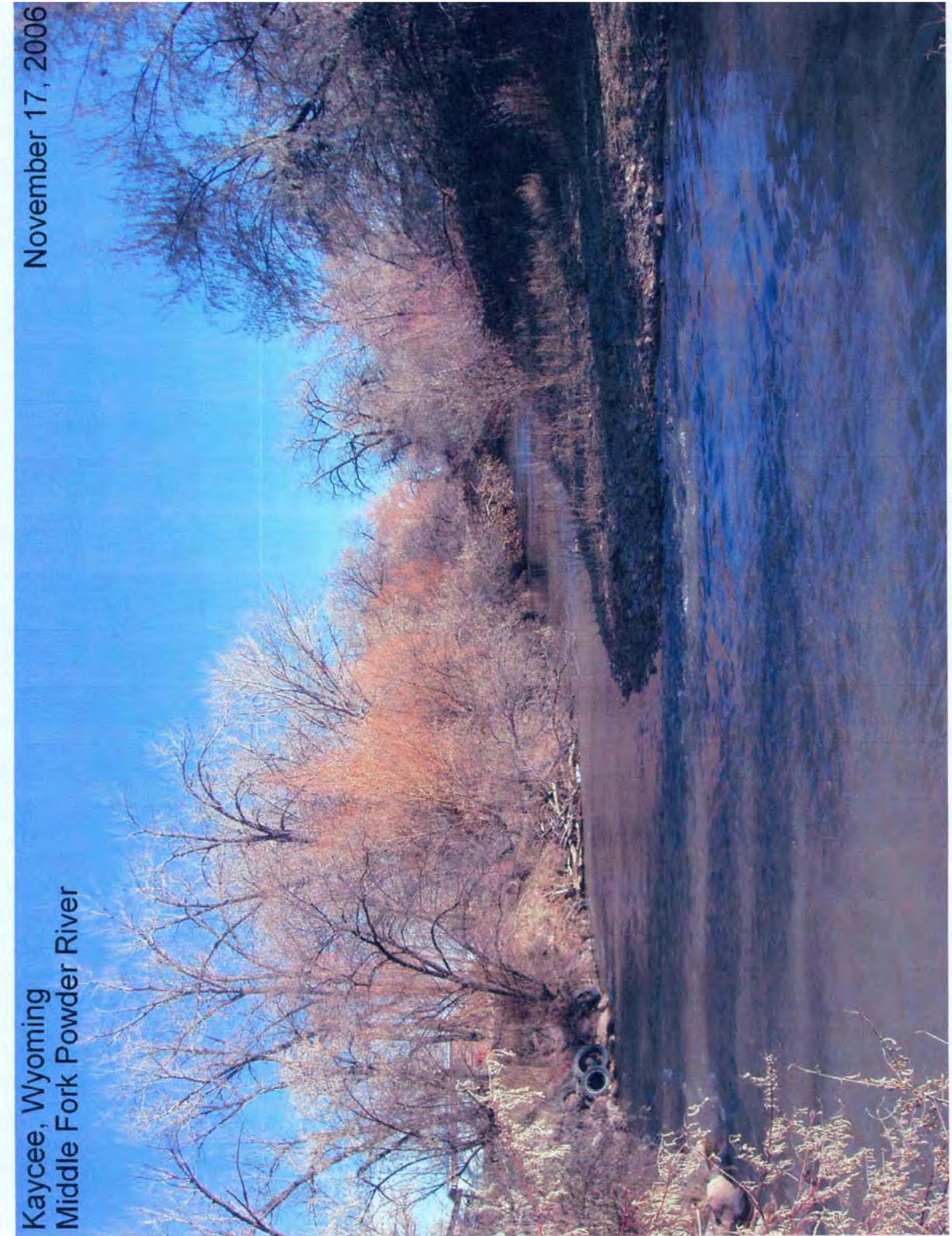
Kaycee, Wyoming  
Middle Fork Powder River

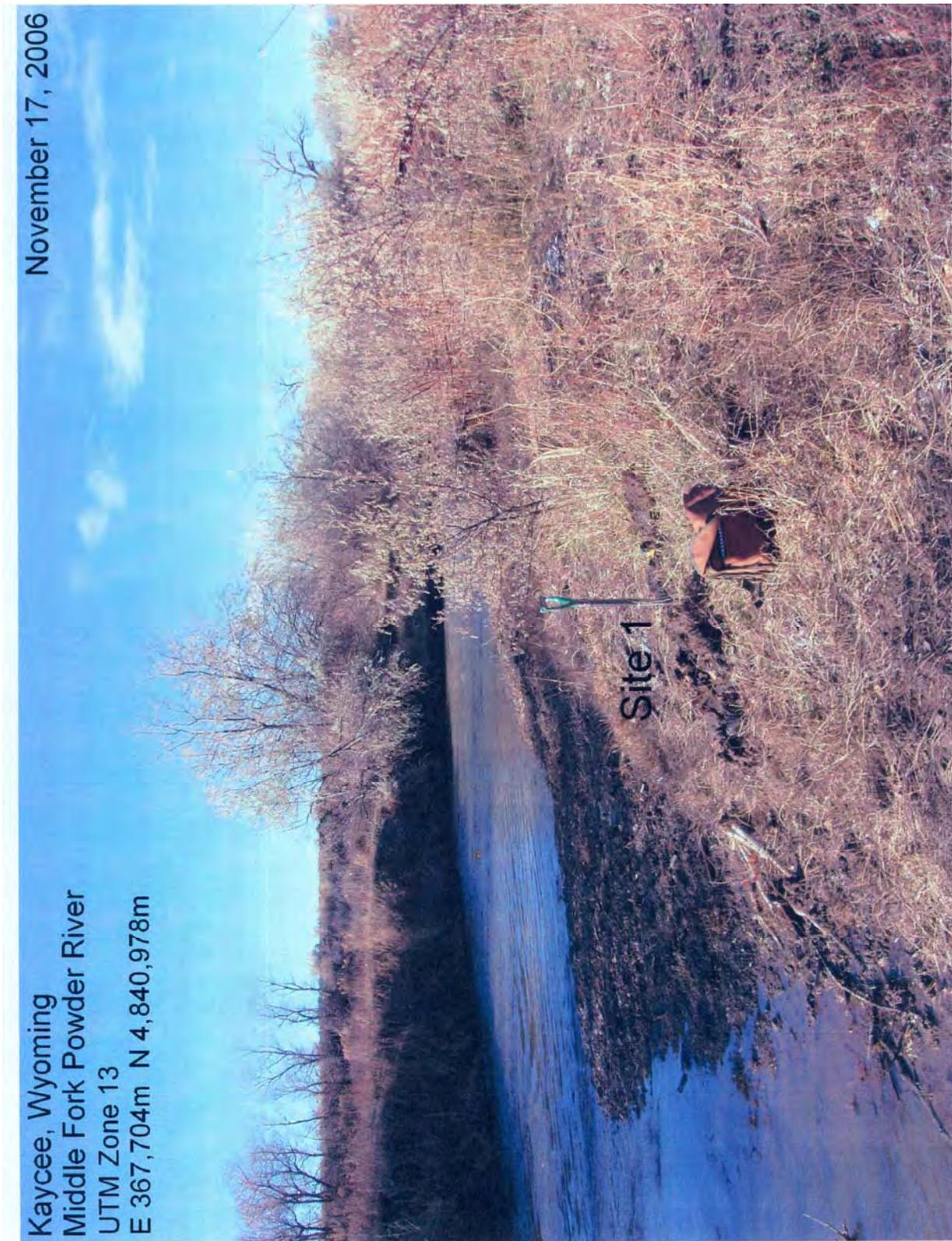




Kaycee, Wyoming  
Middle Fork Powder River

November 17, 2006





Kaycee, Wyoming  
Middle Fork Powder River  
UTM Zone 13  
E 367,704m N 4,840,978m

November 17, 2006

Site 1





## Appendix D Soils and Vegetation Information

### Representative Soil Features

The complete description of the soils within the project area is shown below:

#### **He—Haverson silt loam**

*Page 89 Soil Survey of Johnson County, Wyoming, Southern Part  
Natural Resources Conservation Service*

##### Map Unit Composition

Haverson and similar soils: 85 percent

Minor Components: 15 percent

##### Component Descriptions

Haverson soils - Slope: 0 to 3 percent

Drainage class: Well drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)

Available water capacity: About 9.7 inches (high)

Shrink-swell potential: About 4.5 percent (moderate)

Flooding hazard: Occasional

Calcium carbonate maximum: About 10 percent

Gypsum maximum: About 1 percent

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 0 (nonsodic)

Ecological site: LOWLAND (10-1 4N P)

Land capability subclass (irrigated): 4e

Land capability subclass (nonirrigated): 4e

Typical Profile: A—0 to 6 inches; silt loam, C—6 to 60 inches; stratified sandy loam to clay loam

Minor Components: Glenberg and similar soils - Composition: About 8 percent

Lohmiller and similar soils - Composition: About 7 percent

#### **Hf—Haverson silt loam, wet**

##### Map Unit Composition

Haverson, wet and similar soils: 85 percent

Minor Components: 15 percent

##### Component Descriptions

Haverson, wet soils

Slope: 0 to 3 percent

Drainage class: Somewhat poorly drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)

Available water capacity: About 10.2 inches (high)

Shrink-swell potential: About 4.5 percent (moderate)

Flooding hazard: Occasional

Seasonal high water table depth: About 12 to 24 inches

##### Descriptions of Detailed Soil Map Units

Gypsum maximum: About 1 percent Salinity maximum: About 8 mmhos/cm (slightly saline)

Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: SALI NE SU BI RRIGATED (10- 14NP)

Potential native vegetation: alkali sacaton, inland saltgrass, western wheatgrass, Nuttalls alkaligrass, alkali cordgrass, greasewood

Land capability subclass (irrigated): 4w Land capability subclass (nonirrigated): 4w  
Typical Profile: A—0 to 6 inches; silt loam, C—6 to 60 inches; stratified sandy loam to clay loam

Minor Components

Glenberg and similar soils Composition: About 4 percent  
Haverson silt loam and similar soils Composition: About 4 percent  
Wet and saline soils and similar soils  
Composition: About 4 percent  
Landform: Floodplains  
Marshes and similar soils  
Composition: About 3 percent  
Landform: Marshes

**Hg—Haverson clay loam**

Map Unit Composition

Haverson and similar soils: 85 percent Minor Components: 15 percent

Component Descriptions

Haverson soils - Slope: 0 to 3 percent  
Drainage class: Well drained  
Slowest permeability: 0.6 to 2.0 in/hr (moderate)  
Available water capacity: About 10.2 inches (high)  
Shrink-swell potential: About 4.5 percent (moderate)  
Flooding hazard: Occasional  
Calcium carbonate maximum: About 10 percent  
Gypsum maximum: About 1 percent  
Salinity maximum: About 2 mmhos/cm (nonsaline)  
Sodium adsorption ratio maximum: About 5 (slightly sodic)  
Ecological site: Loamy  
Land capability subclass (irrigated): 4e Drainage class: Well drained  
Land capability subclass (nonirrigated): 4e Slowest permeability: 2.0 to 6.0 in/hr (moderately rapid)  
Typical Profile: Available water capacity: About 7.1 inches  
A—0 to 6 inches; clay loam (moderate)  
C—6 to 60 inches; stratified sandy loam to clay Shrink-swell potential: About 1.5 percent (low)  
Loam Flooding hazard: Occasional  
Calcium carbonate maximum: About 10 percent  
Minor Components Gypsum maximum: About 2 percent  
Barnum and similar soils Salinity maximum: About 2 mmhos/cm (nonsaline)  
Composition: About 4 percent Sodium adsorption ratio maximum: About 5 (slightly sodic)  
Haverson silt loam and similar soils: Ecological site: LOWLAND (10-14NP)  
Composition: About 4 percent Potential native vegetation: blue grama, prairie sandreed,  
needlegrass, sand bluestem, sand  
Lohmiller and similar soils dropseed, switchgrass, Canada wildrye, sand bluestem  
Composition: About 4 percent sagebrush, thickspike wheatgrass  
Land capability subclass (irrigated): 4e  
Surface area, silty clay loam and similar soils Land capability subclass (nonirrigated): 4e  
Composition: About 3 percent

**H K—Haverson -Glenberg**

Calcium carbonate maximum: About 10 percent association, saline  
Gypsum maximum: About 1 percent  
Salinity maximum: About 2 mmhos/cm (nonsaline) Map Unit Composition  
Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: LOWLAND (10-14NP) Haverson, saline and similar soils: 50 percent  
Land capability subclass (irrigated): 4e Glenberg, saline and similar soils: 25 percent  
Minor Components: 25 percent  
Land capability subclass (nonirrigated): 4e  
Typical Profile: Component Descriptions  
A—0 to 4 inches; loam, C—4 to 60 inches; stratified sandy loam to clay Haverson, saline soils loam  
Slope: 0 to 3 percent  
Drainage class: Somewhat poorly drained  
Glenberg soils Slowest permeability: 0.6 to 2.0 in/hr (moderate)

**Hm—Haverson silt loam, sandy**

Shrink-swell potential: About 4.5 percent (moderate)  
Flooding hazard: Occasional  
Seasonal high water table depth: About 20 to 40 inches  
Calcium carbonate maximum: About 10 percent  
Gypsum maximum: About 1 percent  
Salinity maximum: About 16 mmhos/cm (moderately saline)  
Sodium adsorption ratio maximum: About 5 (slightly sodic)  
Ecological site: SALI NE SUBI RRIGATED (10- 14NP)  
Potential native vegetation: inland saltgrass, nuttalls alkaligrass  
Land capability subclass (irrigated): 6w  
Land capability subclass (nonirrigated): 6w  
Typical Profile:  
A—0 to 4 inches; loam, C—4 to 60 inches; stratified sandy loam to clay loam  
Glenberg, saline soils  
Slope: 0 to 3 percent  
Drainage class: Somewhat poorly drained  
Slowest permeability: 2.0 to 6.0 in/hr (moderately rapid)  
Available water capacity: About 7.1 inches (moderate)  
Shrink-swell potential: About 1.5 percent (low)  
Flooding hazard: Occasional  
Seasonal high water table depth: About 20 to 40 inches  
Calcium carbonate maximum: About 10 percent  
Gypsum maximum: About 2 percent  
Salinity maximum: About 16 mmhos/cm (moderately saline)  
Sodium adsorption ratio maximum: About 5 (slightly sodic)  
Ecological site: SALI NE SU BI RRIGATED (10- 14NP)  
Land capability subclass (irrigated): 6w  
Land capability subclass (nonirrigated): 6w  
Typical Profile: A—0 to 3 inches; sandy loam, C1—3 to 31 inches; sandy loam, Ck2—31 to 60 inches; stratified loamy sand to loam  
Minor Components  
Unnamed and similar soils  
Composition: About 25 percent subsoil variant  
Map Unit Composition  
Haverson, sandy subsoil and similar soils: 85 percent  
Minor Components: 15 percent  
Component Descriptions  
Haverson, sandy subsoil soils  
Slope: 0 to 3 percent  
Drainage class: Well drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)  
Available water capacity: About 8.3 inches (moderate)  
Shrink-swell potential: About 1.5 percent (low)  
Flooding hazard: Occasional  
Calcium carbonate maximum: About 10 percent  
Gypsum maximum: About 1 percent  
Salinity maximum: About 2 mmhos/cm (nonsaline)  
Sodium adsorption ratio maximum: About 5 (slightly sodic)  
Ecological site: LOWLAND (10-1 4N P)  
Land capability subclass (irrigated): 4e  
Land capability subclass (nonirrigated): 4e  
Typical Profile:  
A—0 to 7 inches; silt loam, C—7 to 26 inches; stratified sandy loam to clay loam  
2C—26 to 60 inches; stratified loamy sand to coarse sandy loam  
Minor Components  
Haverson and similar soils  
Composition: About 8 percent  
Glenberg and similar soils  
Composition: About 7 percent

**KdA—Kim loam, 0 to 3 percent**

Map Unit Composition  
Kim and similar soils: 85 percent  
Minor Components: 15 percent  
Component Descriptions  
Kim soils  
Slope: 0 to 3 percent  
Drainage class: Well drained  
Slowest permeability: 0.6 to 2.0 in/hr (moderate)  
Available water capacity: About 11.7 inches (high)  
Shrink-swell potential: About 4.5 percent (moderate)  
Calcium carbonate maximum: About 15 percent  
Gypsum maximum: None  
Salinity maximum: About 0 mmhos/cm (nonsaline)  
Sodium adsorption ratio maximum: About 5 (slightly sodic)  
Ecological site: LOAMY (10-14NP)  
Potential native vegetation: Indian ricegrass, bluebunch wheatgrass, big sagebrush, muttongrass, prairie junegrass, western wheatgrass, needleandthread, small Douglas rabbitbrush  
Land capability subclass (irrigated): 4e  
Typical Profile:  
A—0 to 5 inches; loam C—S to 60 inches; silt loam  
Minor Components  
Kim clay loam and similar soils Composition: About 5 percent  
Stoneham and similar soils  
Composition: About 5 percent  
Zigweid and similar soils  
Composition: About 5 percent

**KZB—Kim-Zigweid association,**

Gently sloping  
Map Unit Composition

Kim and similar soils: 50 percent

Zigweid and similar soils: 30 percent

Minor Components: 20 percent

Component Descriptions

Kim soils

Slope: 0 to 6 percent

Drainage class: Well drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)

Available water capacity: About 11.7 inches (high)

Shrink-swell potential: About 4.5 percent (moderate)

Calcium carbonate maximum: About 15 percent

Gypsum maximum: None

Salinity maximum: About 0 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About 5 (slightly sodic)

Ecological site: LOAMY (10-14NP)

Potential native vegetation: Indian ricegrass, bluebunch wheatgrass, big sagebrush, muttongrass, prairie junegrass, western wheatgrass, needleandthread, Douglas rabbitbrush

Land capability subclass (irrigated): 4e

Land capability subclass (nonirrigated): 4e

Typical Profile:

A—0 to 5 inches; loam, C—S to 60 inches; silt loam

Zigweid soils

Slope: 0 to 6 percent

Drainage class: Well drained

Slowest permeability: 0.6 to 2.0 in/hr (moderate)

Available water capacity: About 10.0 inches (high) (moderate)

Calcium carbonate maximum: About 10 percent

Gypsum maximum: About 3 percent

Salinity maximum: About 2 mmhos/cm (nonsaline)

Sodium adsorption ratio maximum: About S (slightly sodic)

Ecological site: LOAMY (10-14NP)

Potential native vegetation: needleandthread, sedge, blue grama, western wheatgrass, green needlegrass, little bluestem, sideoats grama

Land capability subclass (irrigated): 3e

Land capability subclass (nonirrigated): 3e

Typical Profile:

A—0 to 6 inches; loam, Bw—6 to 14 inches; loam, Bk—14 to 60 inches; loam

Minor Components

Stoneham and similar soils

Composition: About 15 percent

Limon and similar soils

Composition: About 5 percent

### **Ls—Lohmiller silty clay loam**

Map Unit Composition

Lohmiller and similar soils: 80 percent

Minor Components: 20 percent

Component Descriptions

Lohmiller soils

Slope: 0 to 3 percent

Drainage class: Moderately well drained

Slowest permeability: .06 to 0.2 in/hr (slow)  
 Available water capacity: About 11.8 inches (high)  
 Shrink-swell potential: About 7.5 percent (high)  
 Flooding hazard: Occasional  
 Seasonal high water table depth: About 48 to 60 inches  
 Calcium carbonate maximum: About 5 percent  
 Gypsum maximum: About 1 percent  
 Salinity maximum: About 2 mmhos/cm (nonsaline)  
 Sodium adsorption ratio maximum: About 5 (slightly sodic)  
 Ecological site: CLAYEY OVERFLOW (10-14NP)  
 Potential native vegetation: switchgrass, blue grama, western wheatgrass, big bluestem, yellow  
 Indiangrass, fourwing saltbush, sideoats grama, slender wheatgrass  
 Land capability subclass (irrigated): 4s  
 Land capability subclass (nonirrigated): 4s  
 Typical Profile:  
 A—0 to 3 inches; silty clay loam,  
 C—3 to 60 inches; stratified silty clay loam to silty clay  
 Minor Components  
 Barnum and similar soils  
 Composition: About 5 percent  
 Haverson and similar soils  
 Lohmiller-like and similar soils Composition: About 5 percent Landform: Depressions  
 Reddish silt loam soil and similar soils Composition: About 5 percent

The table below shows those plant species found during a reconnaissance of the area by NRCS personnel. The relative abundance is also shown.

Common Name	Scientific Name	Abundance
GRASSES/GRASSLIKES		
Creeping Meadow Foxtail	<i>Alopecurus arundinaceus</i>	Sparse (S)
Bentgrass spp.	<i>Agrostis</i> spp.	Common (C)
Nebraska sedge	<i>Carex</i>	S
Foxtail barley	<i>Hordeum jubatum</i>	C
Three-square bulrush	<i>Scirpus pungens</i>	Rare (R)
Baltic rush	<i>Juncus balticus</i>	Abundant (A)
Reed canarygrass	<i>Phalaris arundinacea</i>	C
Common reed	<i>Phragmites australis</i>	C
*Quackgrass	<i>Elymus repens</i>	C
Cattail	<i>Typha</i> spp.	S
Kentucky bluegrass	<i>Poa pratensis</i>	A
Blue grama	<i>Boutaloua gracilis</i>	C
Smooth brome	<i>Bromus inermis</i>	C
Inland saltgrass	<i>Distichlis spicata</i>	C
Downey brome	<i>Bromus tectorum</i>	A
Western wheatgrass	<i>Pascopyron smithii</i>	C
Crested wheatgrass	<i>Agropyron cristatum</i>	C (west end of project)
Sandberg bluegrass	<i>Poa secunda</i>	C
Basin wildrye	<i>Leymus cinereus</i>	S
Needleandthread	<i>Hesperostipa comata</i>	C

<b>FORBS/MISC.FORBS</b>		
*Canada thistle	<i>Cirsium arvense</i>	S
Spreading dogbane	<i>Apocynum androsaemifolium</i>	R
Showy milkweed	<i>Asclepias</i> spp.	S
*Scotch thistle	<i>Onopordum acanththuim</i>	S
▪Rough cocklebur	<i>Xanthium strumarium</i>	C
*Lesser burdock	<i>Arctium minus</i>	R
Alfalfa	<i>Medicago sativa</i>	C (west end of project)
Green sagewort	<i>Artemisia dracunculus</i>	R
Fringed sagewort	<i>Artemisia frigida</i>	S
Western yarrow	<i>Achillea lanulosa</i>	S
Lambsquarters	<i>Chenopodium album</i>	S
<b>TREES, SHRUBS &amp; HALF-SHRUBS</b>		
Coyote willow	<i>Salix exugia</i>	C
Plains cottonwood	<i>Populus deltoides</i>	C
Boxelder	<i>Acer negundo</i>	C
Russian olive	<i>Eleagnus angustifolia</i>	A
*Tamarisk (Salt cedar)	<i>Tamarix ramosissima</i>	C
Rubber rabbitbrush	<i>Ericameria nauseosa</i>	C
Black greasewood	<i>Sarcobatus vermiculatus</i>	C
Western snowberry	<i>Symphoricarpos occidentalis</i>	S
Silver sagebrush	<i>Artemesia cana</i>	S
Woods rose	<i>Rosa woodsii</i> var. <i>woodsii</i>	R

\*Wyoming Weed and Pest Control Act Designated List

▪ Wyoming Declared List of Weed and Pests – Johnson County

Existing vegetation within the project area consists of an over-story of cottonwoods, Russian olive, Boxelder, and willow species. Under-story species consists mainly of Kentucky bluegrass, smooth brome, reed canarygrass, Basin wildrye, Western wheatgrass, and various forb species. Noxious and invasive weed species include downy brome (cheatgrass), other annual grass and forb species, wild licorice, Canada thistle, Russian olive, and Tamarisk (Salt cedar).

Noxious and invasive weed species will likely spread to the disturbed area without control measures if the recommended plan is implemented. Monitoring of the site will be needed to determine if noxious and invasive weed control is needed.

Growth of native cool season plants begins about April 1 and continues to about July 1. Native warm season plants begin growth about May 15 and continue to about August 15. Green up of cool season plants may occur in September and October if adequate precipitation occurs.

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## **Appendix E Biological Assessment**

### **Kaycee Flood Protection Project, Middle Fork Powder River Watershed**

#### **LOCATION AND SETTING**

The watershed project area is 152 acres along the Middle Fork Powder River within the town of Kaycee, Wyoming. A large amount of the project area is an urban area with businesses, homes, yards, rodeo grounds, sewer lagoons, roads and other areas of human habitation. This urban watershed area is transected by the Powder River.

#### **EXISTING CONDITION**

Land Cover in the 152 acres watershed project;

- Developed/urban = 65.9 acres for 43% of the area.
- Grassland and Pasture = 37.2 acres for 24% of the area.
- Shrub and Tree woodland and riparian = 38.9 acres for 26% of the area.
- Aquatic/water/river = 10 acres for 7% of the area. 16.2 acres of wetland were determined to occur in the watershed. Ten acres of this is the aquatic/water/river cover type and the remaining 6.2 acres is associated with the woodland and riparian area. A narrow band of wetland exists along the rivers edge in the woodland/riparian cover type.

#### **Fish and Wildlife Resources**

There are a good number of species that utilize the watershed area to meet all or part of their needs throughout the year. Many of the bird species are migratory and leave the area during the winter. Examples of species that might be found in the watershed or surrounding area are:

##### **Birds**

Great blue heron, Green-winged teal, Mallard, Blue-winged teal, Cinnamon teal, Redhead, Lesser scaup, Common merganser, Ruddy duck, Sharp-shinned hawk, Cooper's hawk, Swainson's hawk, Ferruginous hawk, Ruffed grouse, Sora, Spotted sandpiper, Black tern, Black-billed cuckoo, Yellow-billed cuckoo, Great horned owl, Northern saw-whet owl, Calliope hummingbird, Belted kingfisher, Red-naped sapsucker, Downy woodpecker, Hairy woodpecker, Willow flycatcher, Least flycatcher, Cassin's kingbird, Tree swallow, Violet-green swallow, Red-breasted nuthatch, White-breasted nuthatch, Brown creeper, House wren, American dipper, Veery, Swainson's thrush, Cedar waxwing, Warbling vireo, Orange-crowned warbler, Yellow warbler, Yellow-rumped warbler, American redstart, MacGillivray's warbler, Common yellowthroat, Wilson's warbler, Yellow-breasted chat, Blue grosbeak, Lazuli bunting, Chipping sparrow, Song sparrow, Lincoln's sparrow, White-crowned sparrow, Bullock's oriole, Pine siskin, and American goldfinch.

##### **Mammals**

Mule and white-tailed deer, pronghorn antelope, coyote, rabbits; several types of mice, shrews, voles and bats; raccoon, weasel, skunk, red fox, muskrat, beaver and mink.

##### **Fishes**

According to the Wyoming Game and Fish Department fish species expected to occur in the Middle Fork Powder River are the white sucker, long-nose sucker, stonecat, flathead chub, and long-nose

dace. No species identified on the Wyoming Species of Concern list have been found within the project area.

### **Species of Concern**

The following are federally listed endangered, threatened, petitioned, or candidate species and Wyoming Game and Fish Department Native Species Status (NSS) 1 and 2 species that have been documented or are predicted to occur based on available habitats in the Middle Fork Powder River (HUC 8) and Upper Powder River Watersheds (HUC 8). This expanded watershed area used to search for species of concern is much larger in area and identifies species that may not occur in the 152-acre project area.

- **Birds:** bald eagle, greater sage grouse, yellow-billed cuckoo
- **Fish:** sturgeon chub, golden eye
- **Mammals:** long-eared myotis, northern myotis
- **Reptiles:** pale milk snake
- **Amphibians:** none
- **Plants:** Ute Ladies'-tresses orchid

### **Habitat Condition**

Riparian, woodland, upland, aquatic and wetland habitat exists in the watershed project. Human disturbance and the encroachment of Russian olive and Tamarisk (Salt cedar) have reduced the value of these habitats for the species found in the watershed. Overall, these habitats are in poor to fair condition. The NRCS conducted a Stream Visual Assessment Protocol in January 2007, and found the river reach within the project area to be in poor condition.

### **NO ACTION**

The habitat condition for fish and wildlife in the short term will remain much the same as it is today. The existing flooding regime will continue to support limited cottonwood and willow establishment within the floodplain and should maintain wetlands occurring adjacent to the river.

However, the long term trend will be a reduction in habitat functions and values due to the continued displacement of native riparian plants with noxious and invasive plants like Russian olive and Tamarisk (Salt cedar). In addition, continued canalization and down-cutting in the river will further degrade aquatic habitat conditions from present levels.

### **PLANNED CONDITION FOR FLOOD PROTECTION**

The impact to fish and wildlife habitat will be from the actual foot print of the constructed dikes, flood walls and rock rip-rap. No existing wetland, aquatic or riparian areas behind these structures should have any alteration of the hydrology supporting them.

#### **Impact of Structural Measures for Flood Protection - Dikes, Flood Walls and Rock Rip-rap**

Approximately 4,160 feet of earth dikes, 240 feet of reinforced concrete flood wall and 645 feet of rock rip-rap are planned for flood protection measures. The foot print of these structural practices will be about 4.8 acres.

No impact to aquatic or wetland habitat should result from these measures. In the riparian/woodland area the construction will cause the removal of 27 cottonwood trees. Most of the cover type impacted by planned measures (4.8 acres) will be to grassy areas in the riparian/woodland and upland.

There should be no impact to any state species of concern or federally listed species from the implementation of planned measures.

### **Fish, Wildlife and Environmental Considerations**

- A 404 permit with the USACOE will be required before construction.
- Migratory Bird Treaty Act – construction activities/dikes/flood walls and rock rip-rap should be built outside the nesting season for migratory birds of April 15th through August 1st.
- Fish and Wildlife Coordination Act – prior to construction activities in the river channel the U. S. Fish and Wildlife Service, Wyoming Game and Fish Department and the COE should be contacted so all concern related to planned structural measures and impacts to the river system are known.
- Endangered Species Act/State Species of Concern - before construction informally consult with the USFWS and WGFD to ensure no new species of concern are identified in the watershed.
- Construction should occur after high runoff events - August through April.
- Construction materials should be hauled in from an outside source and not taken from the river channel materials.
- Use native species for all reseeding and re-vegetation activities.
- Control livestock grazing on areas seeded and planted.
- Control noxious and invasive plants in the watershed.
- Make any fencing wildlife friendly.

### **MITIGATION**

- 27, or more, cottonwood poles should be dormant planted to replace those trees lost from construction.
- The 4.8 acres of dikes should be reseeded with native grasses and forbs/legumes.

### **OPERATION AND MAINTENANCE**

- Noxious and invasive weeds/plants like Russian olive and Tamarisk (Salt cedar) should be controlled.
- Mitigation measures should be maintained.

### **MONITORING**

- Measures for fish and wildlife habitat mitigation should be monitored to ensure success and replacement of functions and values.
- Seedings and plantings need to be checked to ensure success and vegetative establishment.
- Scouting for noxious and invasive weeds/plants in the watershed should occur.

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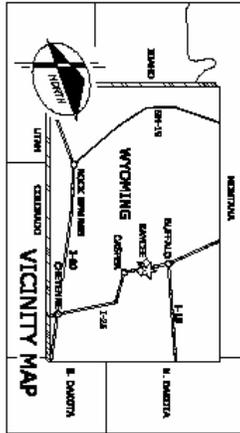
## **Appendix F      Designs and Drawings**

- Sheet 1 of 11 – Title Sheet  
Vicinity Map, Site Plan, Index, and Notes
- Sheet 2 of 11 – Northwest Embankment  
Plan and Profile
- Sheet 3 of 11 – Northeast Embankment  
Plan and Profile
- Sheet 4 of 11 – Southeast Embankment  
Plan and Profile
- Sheet 5 of 11 – Southwest Embankment  
Plan, Profile and Sections
- Sheet 6 of 11 – Northwest Embankment  
Sections
- Sheet 7 of 11 – Northeast and Northwest Embankment  
Sections
- Sheet 8 of 11 – Southeast Embankment  
Sections
- Sheet 9 of 11 – Outlet Structures
- Sheet 10 of 11 – Retaining Wall and Diaphragm Details
- Sheet 11 of 11 – Fence Details

# KAYCEE FLOOD PROTECTION PROJECT

## JOHNSON COUNTY, WYOMING

### UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE



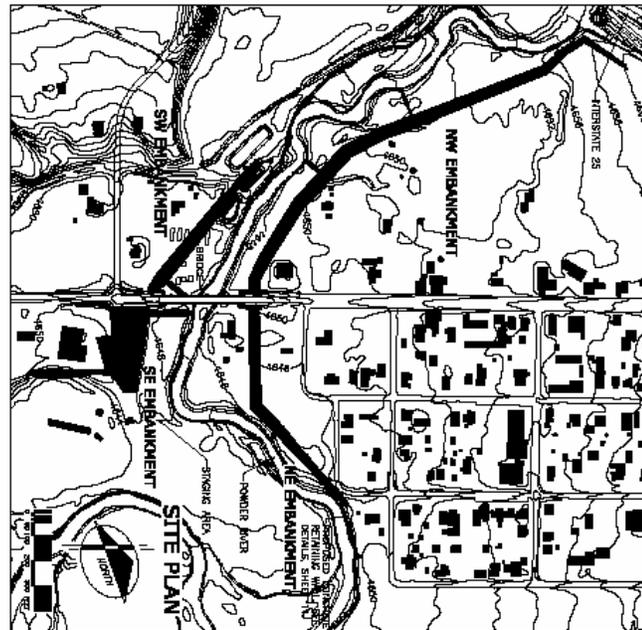
- GENERAL NOTES**
1. THE CONTRACTOR SHALL VERIFY ANY REQUIREMENTS REQUIRED BY LOCAL, COUNTY, AND STATE AGENCIES.
  2. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND STRUCTURES AND SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES AND STRUCTURES.
  3. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND STRUCTURES AND SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES AND STRUCTURES.
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- INDEX OF DRAWINGS**
- |    |                           |
|----|---------------------------|
| 1  | TITLE SHEET               |
| 2  | GENERAL NOTES             |
| 3  | REMOVAL INVENTORY         |
| 4  | SUMMARY OF SPECIFICATIONS |
| 5  | SITE PLAN                 |
| 6  | INDEX                     |
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**REMOVAL INVENTORY**  
 (SEE PLAN SHEETS 2-23 FOR LOCATIONS)

ID	FEATURE DESCRIPTION
F12	REMOVE BARBED WIRE, RAILS E-W
F13	REMOVE 12" HIGH DRAINAGE DITCH E-W
F14	REMOVE 15" HIGH DRAINAGE DITCH E-W
F15	REMOVE 18" HIGH DRAINAGE DITCH E-W
F16	REMOVE 12" HIGH DRAINAGE DITCH E-W
F17	REMOVE 15" HIGH DRAINAGE DITCH E-W
F18	REMOVE 18" HIGH DRAINAGE DITCH E-W
F19	REMOVE 12" HIGH DRAINAGE DITCH E-W
F20	REMOVE 15" HIGH DRAINAGE DITCH E-W
F21	REMOVE 18" HIGH DRAINAGE DITCH E-W
F22	REMOVE 12" HIGH DRAINAGE DITCH E-W
F23	REMOVE 15" HIGH DRAINAGE DITCH E-W
F24	REMOVE 18" HIGH DRAINAGE DITCH E-W
F25	REMOVE 12" HIGH DRAINAGE DITCH E-W
F26	REMOVE 15" HIGH DRAINAGE DITCH E-W
F27	REMOVE 18" HIGH DRAINAGE DITCH E-W
F28	REMOVE 12" HIGH DRAINAGE DITCH E-W
F29	REMOVE 15" HIGH DRAINAGE DITCH E-W
F30	REMOVE 18" HIGH DRAINAGE DITCH E-W
F31	REMOVE 12" HIGH DRAINAGE DITCH E-W
F32	REMOVE 15" HIGH DRAINAGE DITCH E-W
F33	REMOVE 18" HIGH DRAINAGE DITCH E-W
F34	REMOVE 12" HIGH DRAINAGE DITCH E-W
F35	REMOVE 15" HIGH DRAINAGE DITCH E-W
F36	REMOVE 18" HIGH DRAINAGE DITCH E-W
F37	REMOVE 12" HIGH DRAINAGE DITCH E-W
F38	REMOVE 15" HIGH DRAINAGE DITCH E-W
F39	REMOVE 18" HIGH DRAINAGE DITCH E-W
F40	REMOVE 12" HIGH DRAINAGE DITCH E-W
F41	REMOVE 15" HIGH DRAINAGE DITCH E-W
F42	REMOVE 18" HIGH DRAINAGE DITCH E-W
F43	REMOVE 12" HIGH DRAINAGE DITCH E-W
F44	REMOVE 15" HIGH DRAINAGE DITCH E-W
F45	REMOVE 18" HIGH DRAINAGE DITCH E-W
F46	REMOVE 12" HIGH DRAINAGE DITCH E-W
F47	REMOVE 15" HIGH DRAINAGE DITCH E-W
F48	REMOVE 18" HIGH DRAINAGE DITCH E-W
F49	REMOVE 12" HIGH DRAINAGE DITCH E-W
F50	REMOVE 15" HIGH DRAINAGE DITCH E-W
F51	REMOVE 18" HIGH DRAINAGE DITCH E-W

- SUMMARY OF SPECIFICATIONS**
- |    |                       |
|----|-----------------------|
| 1  | CLASSIFY AND SUBGRADE |
| 2  | ERECT FENCE           |
| 3  | REMOVE EXISTING FENCE |
| 4  | REMOVE EXISTING FENCE |
| 5  | REMOVE EXISTING FENCE |
| 6  | REMOVE EXISTING FENCE |
| 7  | REMOVE EXISTING FENCE |
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| 21 | REMOVE EXISTING FENCE |
| 22 | REMOVE EXISTING FENCE |
| 23 | REMOVE EXISTING FENCE |
| 24 | REMOVE EXISTING FENCE |
| 25 | REMOVE EXISTING FENCE |



 Natural Resources Conservation Service United States Department of Agriculture	<b>TITLE SHEET</b> VICINITY MAP, SITE PLAN, INDEX, AND NOTES KAYCEE FLOOD PROTECTION PROJECT JOHNSON COUNTY, WYOMING	DESIGNED: STAMBALGH DRAWN: STAMBALGH CHECKED: OBITZ APPROVED: _____
	DATE: 4-08-2007 DATE: 4-08-2007 DATE: 8-18-2007	

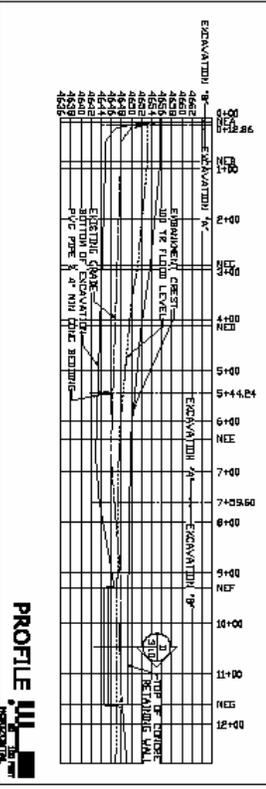
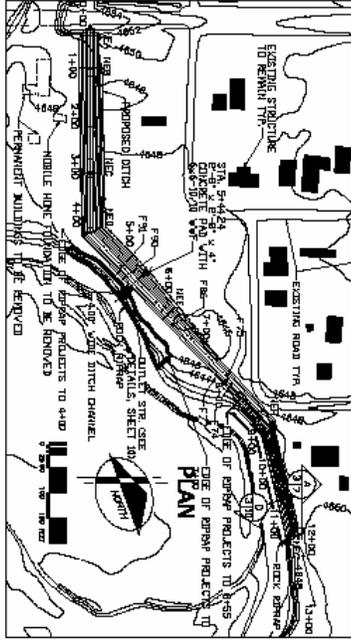


**STATIONING DATA**

STA.	EASTING	NORTHING	(METERS)
0+00	367344.3094	4840036.1872	
1+00	367370.7845	4840036.1872	
2+00	367400.2846	4840036.1872	
3+00	367430.7847	4840036.1872	
4+00	367460.2848	4840036.1872	
5+00	367490.7849	4840036.1872	
6+00	367520.2850	4840036.1872	
7+00	367550.7851	4840036.1872	
8+00	367580.2852	4840036.1872	
9+00	367610.7853	4840036.1872	
10+00	367640.2854	4840036.1872	
11+00	367670.7855	4840036.1872	
12+00	367700.2856	4840036.1872	
13+00	367730.7857	4840036.1872	

**CREST CENTERLINE**

PT.	EASTING	NORTHING	(METERS)	STATIONING	EL. (FT.)	DIR. CHANGE
PC	367344.3094	4840036.1872	0+00.0000	483.7000	VERTICAL	
PVI	367370.7845	4840036.1872	1+00.0000	483.7000	VERTICAL	
PT	367400.2846	4840036.1872	2+00.0000	483.7000	VERTICAL	
PC	367400.2846	4840036.1872	2+00.0000	483.7000	VERTICAL	
PVI	367430.7847	4840036.1872	3+00.0000	483.7000	VERTICAL	
PT	367460.2848	4840036.1872	4+00.0000	483.7000	VERTICAL	
PC	367460.2848	4840036.1872	4+00.0000	483.7000	VERTICAL	
PVI	367490.7849	4840036.1872	5+00.0000	483.7000	VERTICAL	
PT	367520.2850	4840036.1872	6+00.0000	483.7000	VERTICAL	
PC	367520.2850	4840036.1872	6+00.0000	483.7000	VERTICAL	
PVI	367550.7851	4840036.1872	7+00.0000	483.7000	VERTICAL	
PT	367580.2852	4840036.1872	8+00.0000	483.7000	VERTICAL	
PC	367580.2852	4840036.1872	8+00.0000	483.7000	VERTICAL	
PVI	367610.7853	4840036.1872	9+00.0000	483.7000	VERTICAL	
PT	367640.2854	4840036.1872	10+00.0000	483.7000	VERTICAL	
PC	367640.2854	4840036.1872	10+00.0000	483.7000	VERTICAL	
PVI	367670.7855	4840036.1872	11+00.0000	483.7000	VERTICAL	
PT	367700.2856	4840036.1872	12+00.0000	483.7000	VERTICAL	
PC	367700.2856	4840036.1872	12+00.0000	483.7000	VERTICAL	
PVI	367730.7857	4840036.1872	13+00.0000	483.7000	VERTICAL	



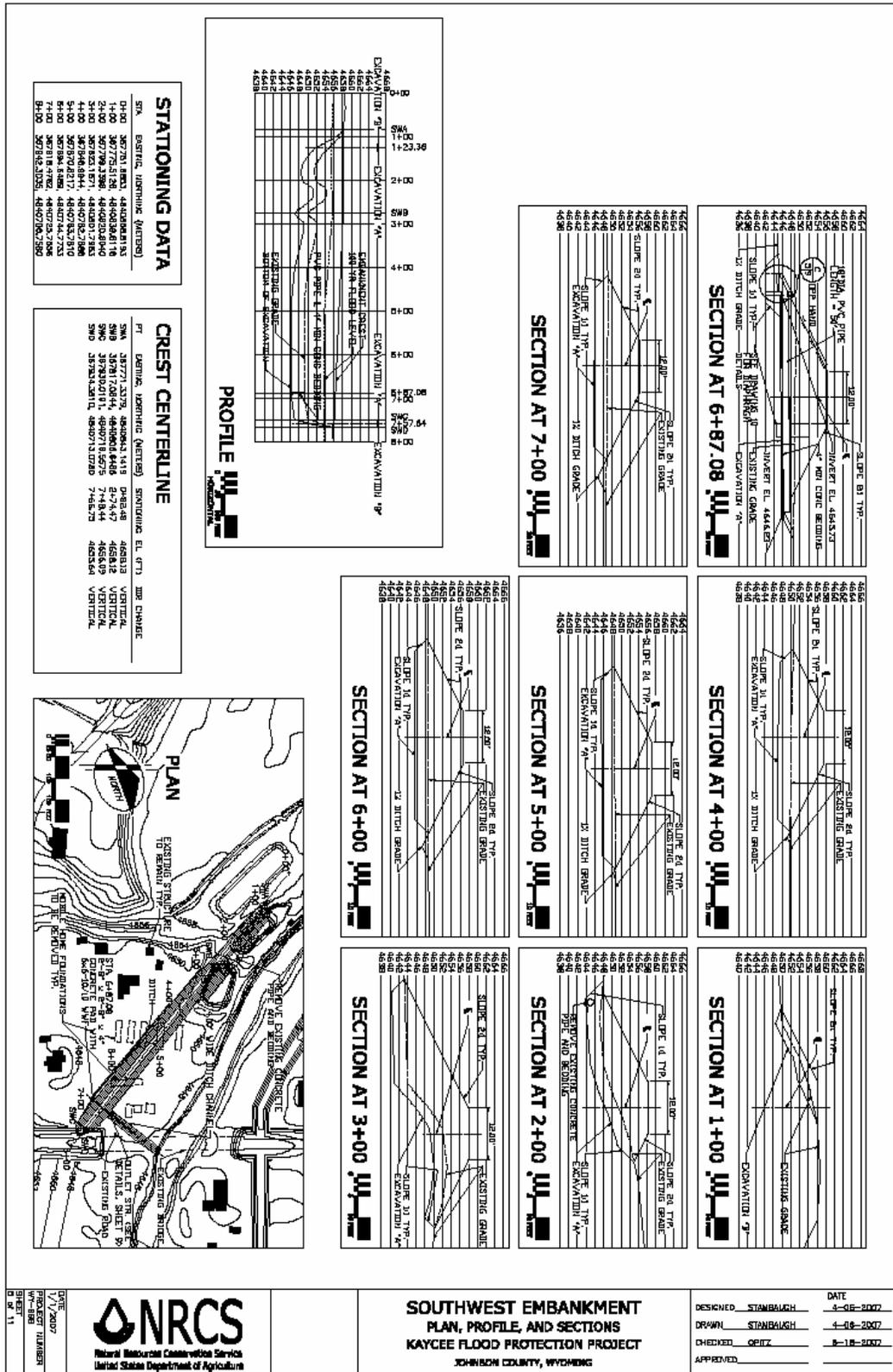
**NRCS**  
 Natural Resources Conservation Service  
 United States Department of Agriculture

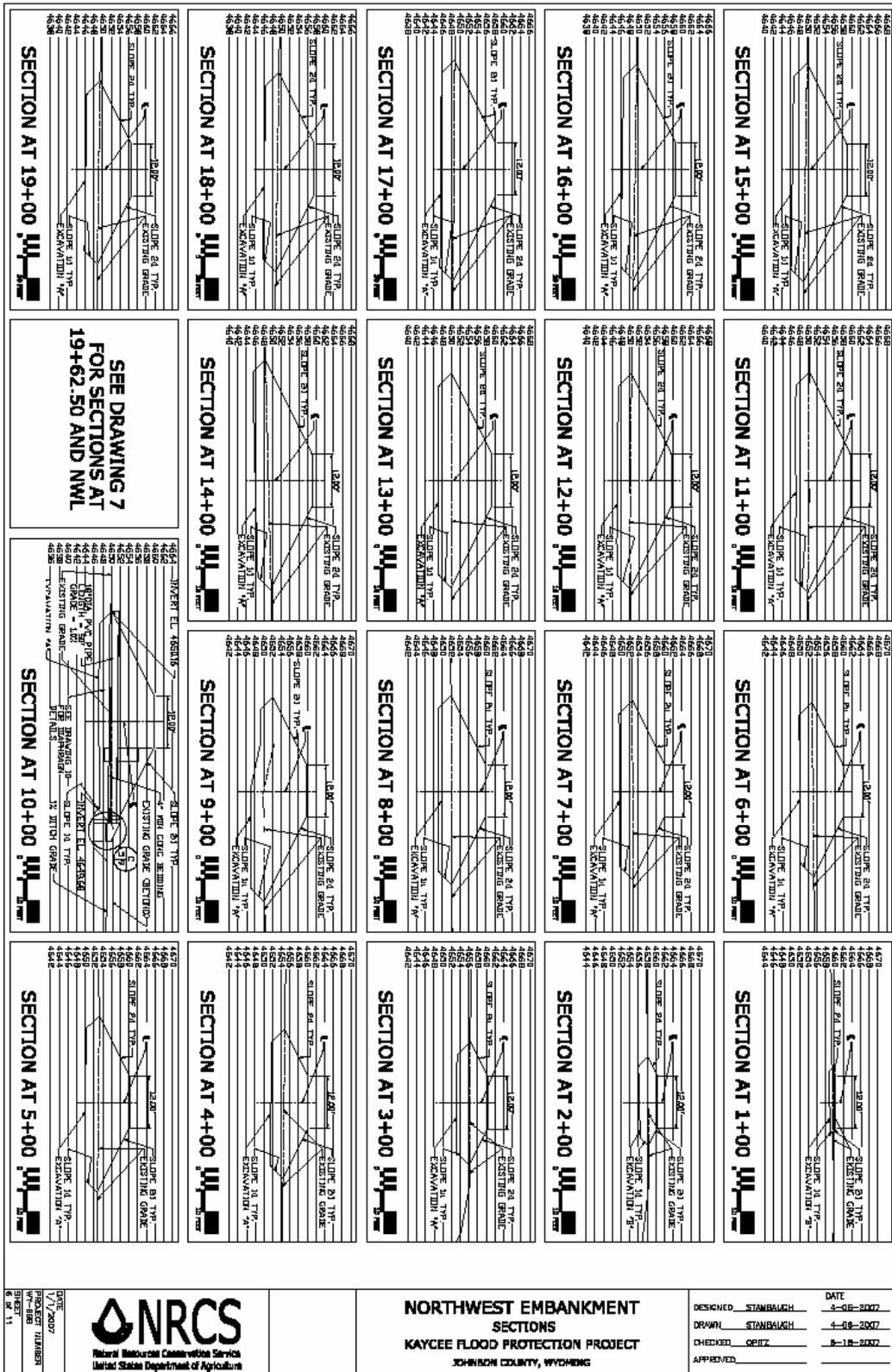
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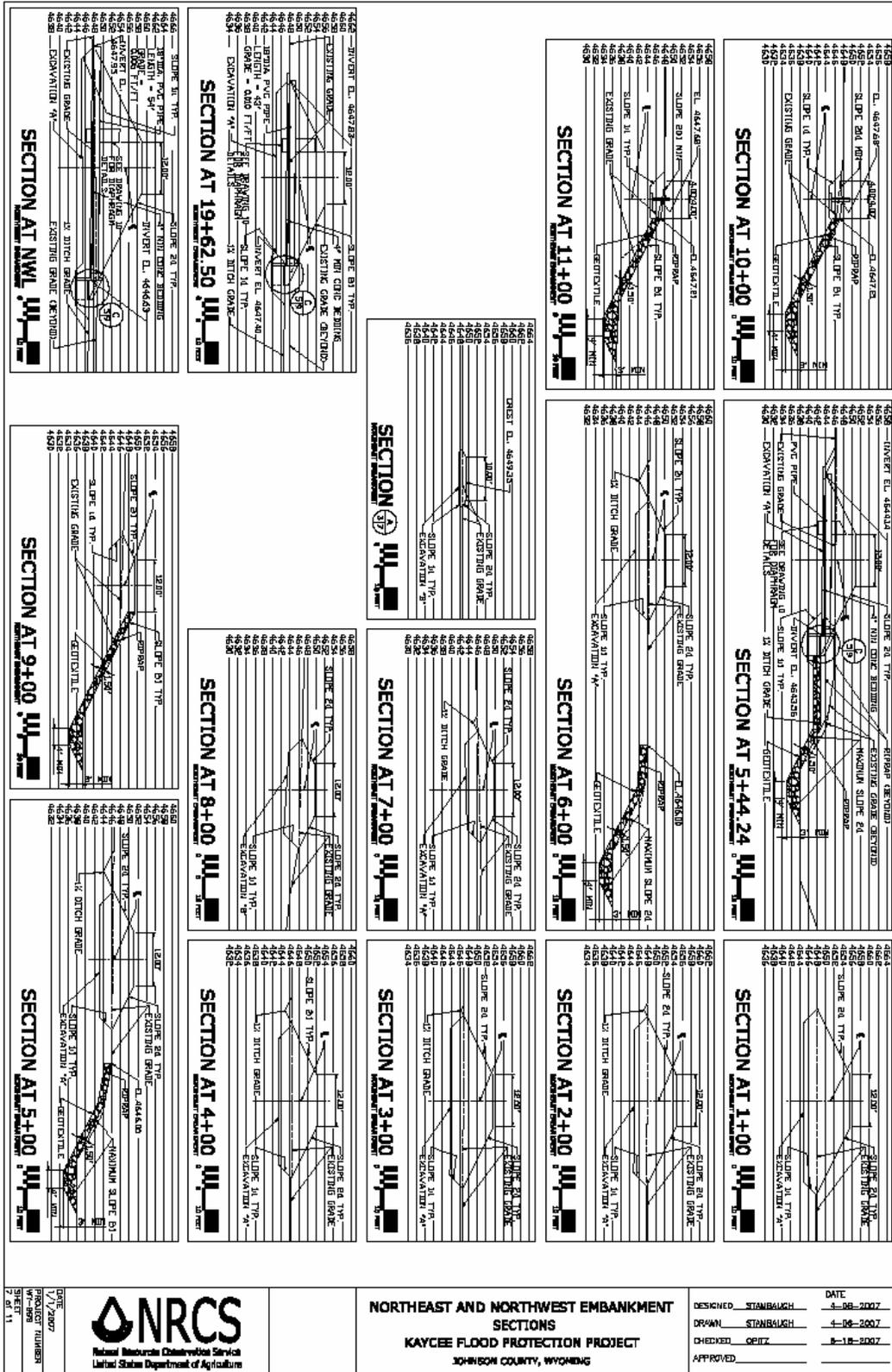
**NORTHEAST EMBANKMENT  
 PLAN AND PROFILE**  
 KAYCEE FLOOD PROTECTION PROJECT  
 JOHNSON COUNTY, WYOMING

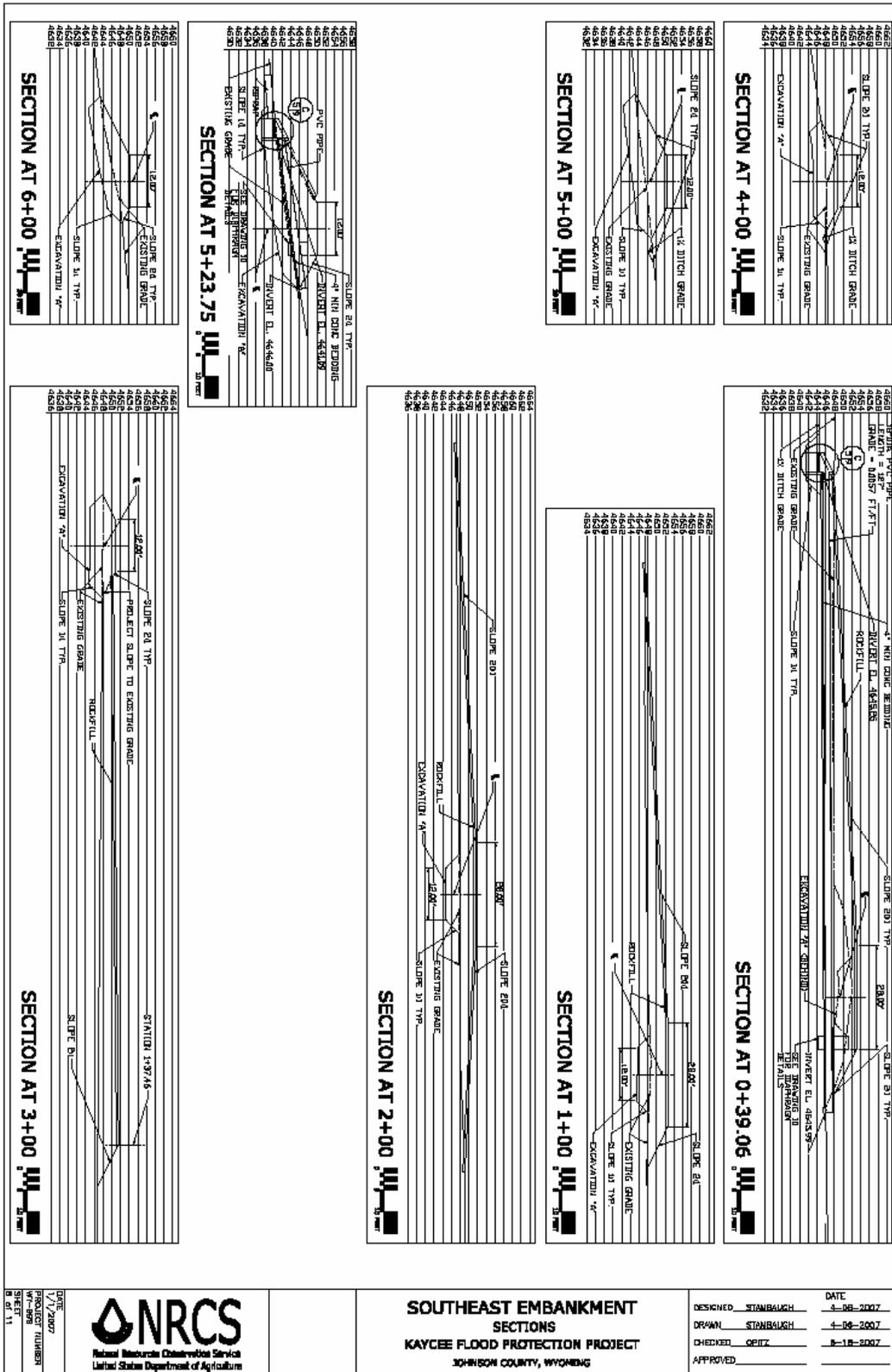
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DRAWN	STANBALUGH		4-08-2007
CHECKED	OPITZ		8-18-2007
APPROVED			









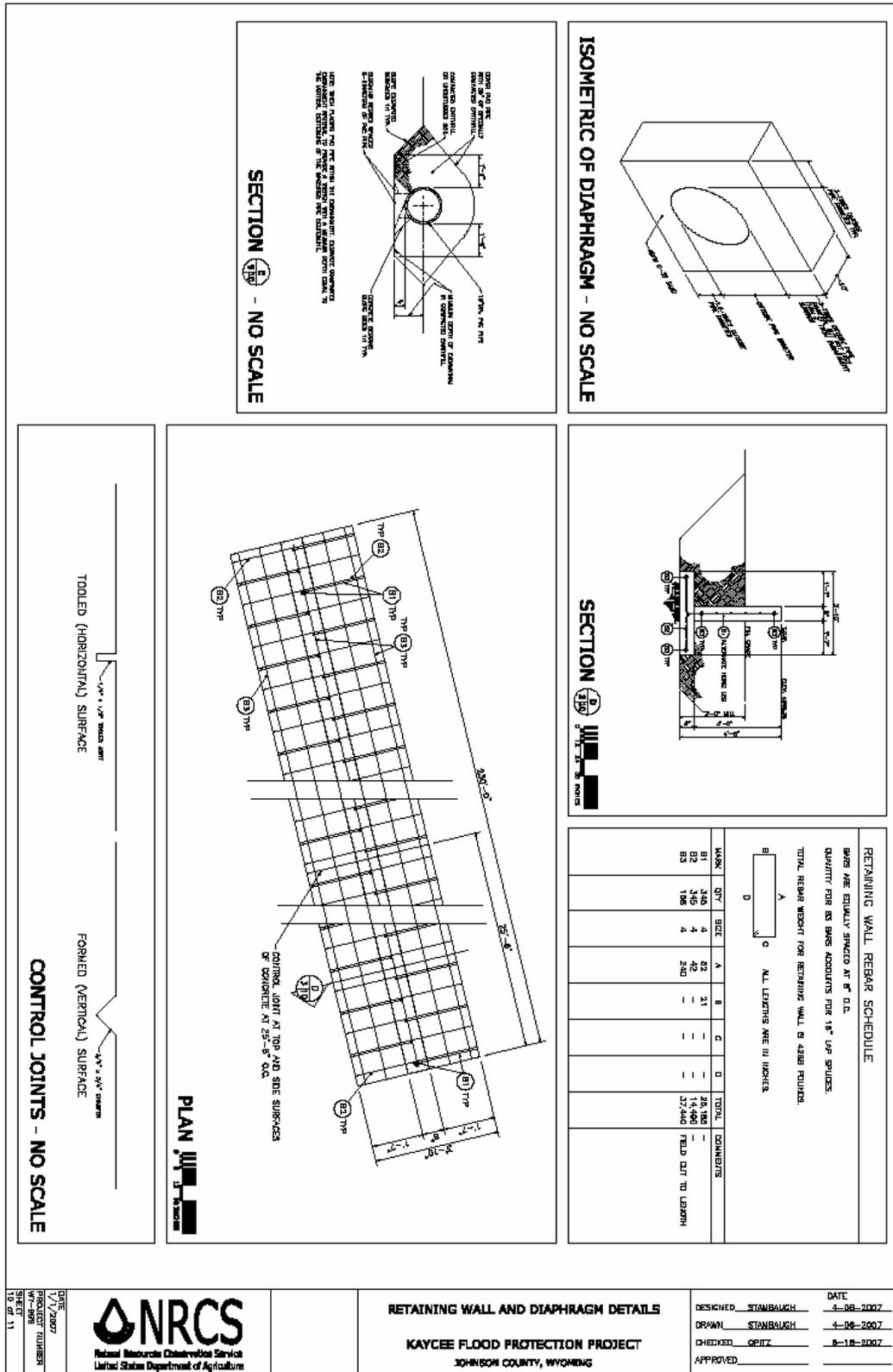


**SOUTHEAST EMBANKMENT SECTIONS**  
 KAYCEE FLOOD PROTECTION PROJECT  
 JOHNSON COUNTY, WYOMING

DESIGNED	STANBALGH	DATE	4-08-2007
DRAWN	STANBALGH		4-08-2007
CHECKED	OPITZ		8-18-2007
APPROVED			

DATE: 11/7/2007  
 PROJECT NUMBER: WY-098  
 SHEET: 11





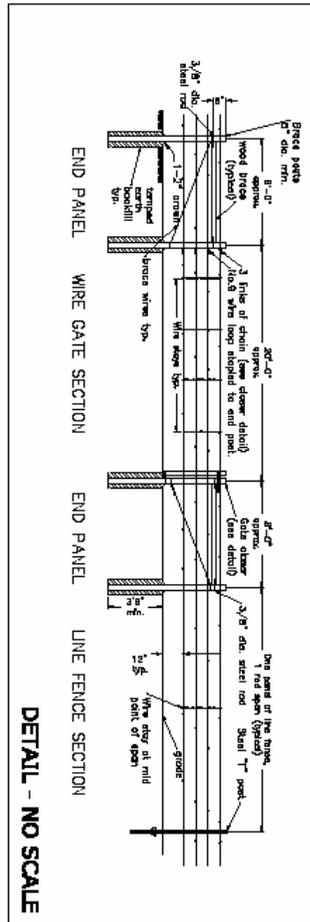
**RETAINING WALL AND DIAPHRAGM DETAILS**  
**KAYCEE FLOOD PROTECTION PROJECT**  
 JOHNSON COUNTY, WYOMING

DESIGNED STANBALKGH  
 DRAWN STANBALKGH  
 CHECKED OPIKZ  
 APPROVED \_\_\_\_\_

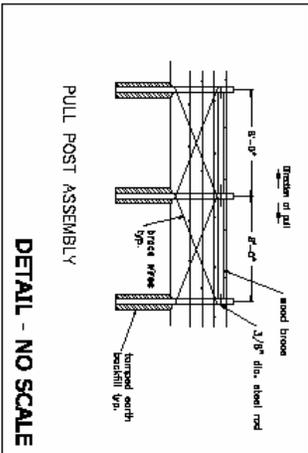
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 4-08-2007  
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 8-18-2007

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 SHEET NUMBER: 10 OF 11

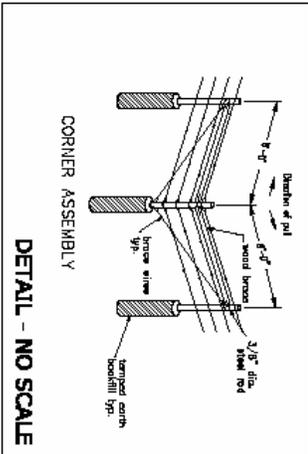
1. MATCH WOOD BRACE TO WOOD POSTS BY FASTENING 3/8" DIA. STEEL ROD 10" INTO 3/8" DIA. DRILLED HOLES.
2. STAPLE CROSS-BRACE WIRES TO WOOD POSTS AT QUARTER POINTS.
3. TRIM BRACE WIRES WITH A WOOD ROD UNTIL THE ASSEMBLY IS RICH. REMOVE RODS AFTER TWISTING.
4. BARBED WIRE SHALL CONSIST OF TWO STRINGS OF 12 1/2 GAUGE CLASS 3 STEEL COATED WIRE WITH 14 GAUGE BRACE WIRES MAY BE 2-FOOT SPACES AT 4" OR 4-FOOT SPACES AT 8".
5. WOOD BRACE TO BE SINGLE RISE OF 4" DIA. PRESSURE TREATED.
6. WOOD POSTS SHALL BE 6 INCHES MINIMUM DIAMETER BY 8'-0" LONG PRESSURE TREATED.
7. BRACE WIRES SHALL BE 8 INCHES HEAVY WEIGHT (GRAV. TOL).
8. STEEL T-POSTS SHALL BE 8" LONG HEAVY WEIGHT (GRAV. TOL).
9. BRACE AND BARRED WIRES SHALL BE SPACED WITH SPACES OF 8" OR SHORTER SPACES OR EQUAL. WIRE ENDS SHALL BE BENT TOWARD COATED SPICES.
10. PREPARE ONE 8'-0" LENGTH OF PULL POST ASSEMBLY PER EACH 100'-FEET OF FENCE LENGTH.
11. IN USE OF 4-STRINGS OF BARRED WIRE 4-STRINGS OR BARBRACE WIRES OF EQUAL GAGE. STRIP NUMBER AND STRIP COUNTING SHALL BE USED TO MATCH EXISTING FENCE.
12. IN USE OF 4-STRINGS OF BARRED WIRE 3" STRIPS FASTENED WITH 4-STRINGS OF BARRED WIRE SHALL BE USED TO MATCH EXISTING FENCE. STRIP NUMBER AND STRIP COUNTING SHALL BE USED TO MATCH EXISTING FENCE. BOTTOM BARRED WIRE SHALL BE SHEPHERD HOOK TYPE WIRE.



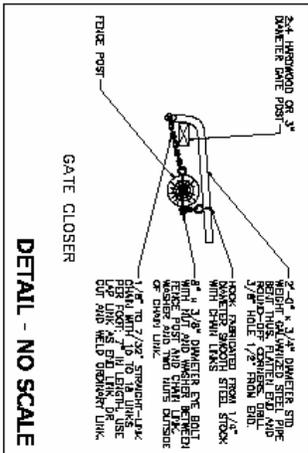
DETAIL - NO SCALE



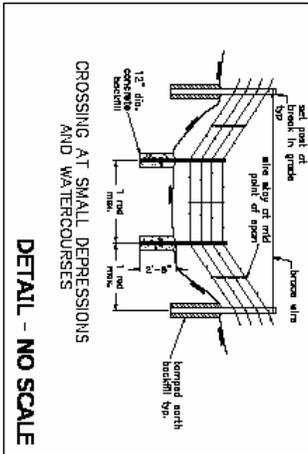
DETAIL - NO SCALE



DETAIL - NO SCALE



DETAIL - NO SCALE



DETAIL - NO SCALE

 <p>Natural Resources Conservation Service                  United States Department of Agriculture</p>	<b>FENCE DETAILS</b>		DESIGNED STANBALGACH	DATE 4-08-2007
	KAYCEE FLOOD PROTECTION PROJECT		DRAWN STANBALGACH	DATE 04-2007
	JOHNSON COUNTY, WYOMING		CHECKED OBITZ	DATE 8-18-2007
			APPROVED	

## Appendix G Supporting Documentation

### Cultural Resource Search of Wyoming SHPO

County	Site	Location	City	Description
Johnson	Dull Knife Battlefield	N of Barnum	Barnum	
Johnson	Lake Desmet Segment, Bozeman Trail	Address Restricted	City Unavailable	Bozeman Trail in Wyoming MPS
Johnson	Trabing Station - Crazy Woman Crossing	Address Restricted	City Unavailable	Bozeman Trail in Wyoming MPS
Johnson	AJX Bridge over South Fork and Powder River	I-25 W. Service Rd. (old hwy 87)	Kaycee	Vehicular Truss and Arch Bridges in Wyoming TR
Johnson	Sussex Post Office and Store	Sussex Rd. and Powder R.	Kaycee	
Johnson	Cantonment Reno	5 mi. N of Sussex at Powder River	Sussex	
Johnson	EDZ Irigary Bridge	Cty. Rd. CN16-254	Sussex	Vehicular Truss and Arch Bridges in Wyoming TR
Johnson	Fort Reno	E of Sussex on Powder River	Sussex	
Johnson	Powder River Station - Powder River Crossing (48JO134 and 48JO801)	Address Restricted	Sussex	Bozeman Trail

Source: National Register of Historical Places, National Park Service

### Flood History Information

#### August, 2002

- National Weather Service Report – Aug 27th
- Casper Star Tribune – Aug. 28th – Kaycee Flooding
- Casper Star Tribune – Aug. 28th – Kaycee Ripped By Wall of Water
- Rapid City Journal – Aug 28th – Storm costs Estimated in the Millions
- The News Record Gillette – Aug 28th – Flood Waters Recede, I-25 Bride Closes
- Casper Star Tribune – Aug 29th – Flood Waters Recede I-25 Bridge Still Closed
- Buffalo Bulletin – Aug. 29th – Powder River Jumps Banks, Floods Kaycee
- Buffalo Bulletin – Aug. 29th – Weather Vane
- Buffalo Bulletin – Sept. 5th – Kaycee Begins Recovery Effort
- Buffalo Bulletin – Sept. 5th – Vignettes of a Community Coping with Catastrophe
- Buffalo Bulletin – Sept. 5th – County Commissioners meet after flood in Kaycee
- buffalo Bulletin – Sept. 5th – The Monumental Cleanup Effort in Kaycee Continues
- Buffalo bulletin – Sept. 5th – They 'll Get By With a Little Help From Friends

- Los Angeles Times – Sept. 8th – Flood Devastates Town But Can't Corral Cowboy Spirit
- Casper Star Tribune – Sept. 10th – Life Among the Ruins
- Casper Star Tribune – Sept 19th – President Snubs Kaycee
- Buffalo Bulletin – Sept. 26th – Homes Donated to Kaycee Families
- Casper Star Tribune – Sept. – Kaycee's Rodeo a Go
- WYDOT Interchange – Sept. 2002 – WYDOT Responds to Kaycee Flood
- Buffalo Bulletin – KA CF Funds Near \$100K
- Buffalo Bulletin – Dec 12, 2002 – Kaycee Plans Move Toward the Future
- Buffalo Bulletin – Dec 26, 2002 – Kaycee Tops 2002 Stories
- PRCD Newsletter – Winter 2003 – Watershed Planning for the town of Kaycee
- Buffalo Bulletin – April 17th – Kaycee Cleanup is Costly
- Casper Star Tribune – Highway Heroes Reopen I-25
- Casper Star Tribune – August 24, 2003 – Kaycee Awash with Good Cheer
- Buffalo Bulletin – October 9, 2003 – Kaycee Community Rebuilds with Optimism

### 1997

Diane Christensen (Powder River Conservation District Clerk) has pictures from this flood coming from the irrigation ditch in back of her house.

### 1994

Buffalo Bulletin – Nov. 10, 1994 – Powder River Floods Twice During 1994

July 14, 1994 – Flood Hits Kaycee Area (4-5 Inches of Rain – Water was going over the tractor.)

Powder River Conservation District (PRCD) – Project Report – July 27, 1995 – Park Floods 3 Times This Last Year Diane Christensen (PRCD Clerk) has pictures from the July flood.

### 1993

Flood 'Video from the Walter's Family out at the Largent Ranch – May 5th

### 1978

Buffalo Bulletin – May 25, 1978 – Commissioners Seek Flood Damage Disaster Aid (3 inches of Rain)

1978 Flood by Louise Turk

### 1972

R. James District Conservationist with NRCS field notes from the flood on 6-20- 972. (3 to 4 inches of Water)

### 1967

Flood in June by B Turk

### 1964

Buffalo Bulletin – June 25 1964 – Kaycee Area Shovel Out After Flood (4.31 inches of rain received during the week, 3.75 inches fell in a 9 hour period)

The Flood of June 22, 1964 Report – 3,67 inches of rain

1962

The Flood at Sussex in May by Louise Turk – In her Sheep Book published in 1993.

1953

Sept. 24, 1953 – Powder River's Worst Flood Occurred Just 30 Years Ago (20 to 30 Ft. Wall of Water – 24 inches of snow hit the mountain area during this same period,)

1926

Hoofprints Calendar – Kaycee Bridge and Flood

1918

July 11, 1918 – Kaycee Independent – Flood at Bar C (Barnum)

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## Appendix H Project Map

Kaycee Flood Protection Project  
Project Area Map - 152 Acres

