UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

Ref: 8ENF-L

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NOV 0 7 2013

Leland F. Wilson
179 North Fort Shaw Road
Fort Shaw, MT 59443

Re: Administrative Order on Consent
Docket No. CWA-08-2014-0006

Dear Mr. Wilson:

Enclosed is a copy of the Administrative Order on Consent ("AOC") that has now been signed by Michael Gaydosh for the U.S. Environmental Protection Agency ("EPA") and filed with the EPA Region 8 Hearing Clerk. The AOC becomes effective upon your receipt of this letter and the enclosed AOC, so the time frames and deadlines in the AOC will be calculated based on the day on which you receive this.

If you have any questions relating to the requirements of the AOC, please feel free to call me or have your attorney call me at 303-312-6637 to discuss them. Any technical questions relating to the work required under the AOC should be directed to Ken Champagne, Section 404 Enforcement Program, at 303-312-6608.

The EPA appreciates your time and effort in working to resolve this matter.

Sincerely,

Wendy I. Silver
Senior Attorney

Enclosure

cc: Rebecca L. Summerville, Datsopoulos, MacDonald & Lind, P.C.

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 8

2013 NOV -6 PM 1:49

EPA REGION VIII
HEARING CLERK

IN THE MATTER OF	)	
	)	
Leland F. Wilson	)	**ADMINISTRATIVE ORDER**
179 North Fort Shaw Road	)	**ON CONSENT**
Fort Shaw, Montana 59443	)	
	)	Docket No. **CWA-08-2014-0006**
	)	
Respondent.	)	
	)	

I. INTRODUCTION

1. This Administrative Order on Consent (Consent Order) is entered into voluntarily by the United States Environmental Protection Agency (EPA) and Leland F. Wilson (Respondent). This Consent Order concerns implementation of a restoration plan to address allegedly illegal discharges of dredged or fill material to Rocky Reef Spring Creek and its adjacent wetlands in Sections 35 and 36, Township 21 North, Range 2 West, and Sections 2 and 3, Township 20 North, Range 2 West, Cascade County, Montana (the Site).

II. STATUTORY AUTHORITY

2. This Consent Order is issued under section 309(a) of the Clean Water Act (CWA), 33 U.S.C. § 1319(a). The authority to issue this Consent Order has been properly delegated to the Assistant Regional Administrator of the Office of Enforcement, Compliance and Environmental Justice, EPA Region 8. This Consent Order is based on the EPA's findings of violation of section 301(a) of the CWA, 33 U.S.C. § 1311(a), which, among other things, prohibits the discharge of pollutants into waters of the United States except as in compliance with section 404 of the CWA, 33 U.S.C. § 1344.

III. PARTIES BOUND

3. This Consent Order shall apply to and be binding upon the EPA and upon Respondent and Respondent's agents, successors, and assigns. Each signatory to this Consent Order certifies that he

or she is authorized to execute and legally bind the party he or she represents to this Consent Order. No change in the ownership of the Site shall alter Respondent's responsibilities under this Consent Order unless the EPA, Respondent, and the transferee agree in writing to allow the transferee to assume such responsibilities. Additionally, no later than thirty (30) calendar days prior to such transfer, Respondent shall notify the EPA at the address specified in paragraph 37, below.

IV. STATEMENT OF THE PARTIES

4. The following FINDINGS OF FACT AND OF VIOLATION are made solely by the EPA. In signing this Consent Order, Respondent neither admits nor denies the FINDINGS OF FACT AND OF VIOLATION. As such, and without any admission of liability, Respondent consents to the issuance of this Consent Order and agrees to abide by all of its conditions. Respondent waives any and all remedies, claims for relief and otherwise available rights to judicial or administrative review that Respondent may have with respect to this Consent Order, including any right of judicial review under the Administrative Procedure Act, 5 U.S.C. §§ 701-706. Respondent further agrees not to challenge the jurisdiction of the EPA or the FINDINGS OF FACT AND OF VIOLATION below in any proceeding to enforce this Consent Order or in any action under this Consent Order. Except as otherwise limited by the preceding three sentences, in any penalty action brought by or on behalf of the EPA for the CWA violations alleged in this Consent Order, Respondent does not waive and reserves all available defenses, remedies, and claims for relief.

V. THE EPA'S FINDINGS OF FACT AND OF VIOLATION

5. Respondent is an individual with a primary place of residence of 179 North Fort Shaw Road, Fort Shaw, Montana, 59443.

6. At all relevant times, Respondent controlled and/or operated the Site, including Rocky Reef Spring Creek and its adjacent wetlands.

7. Rocky Reef Spring Creek is a relatively permanent tributary of the Sun River, which is a relatively permanent tributary of the Missouri River. The Missouri River is, and was at all relevant times, a navigable, interstate water of the United States.

8. On June 17, 2010, the United States Army Corps of Engineers (Corps) received from Respondent a Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and other Water Bodies for an approximate 4-mile long stream restoration and enhancement project on Rocky Reef Spring Creek at the Site.

9. On July 15, 2010, the Corps conducted a pre-construction Site meeting with Respondent's consultant, Mr. Allen McNeal, to review a proposed stream restoration and enhancement project on Rocky Reef Spring Creek at the Site. During this Site meeting, the Corps instructed Mr. McNeal that the project was to result in no net loss of wetlands or channel length.

10. In a letter to Respondent dated August 10, 2010, the Corps verified that Respondent's approximate 4-mile long stream restoration and enhancement project on Rocky Reef Spring Creek was authorized under Nationwide Permit 27.

11. Sometime in December 2010, Respondent and/or persons acting on his behalf commenced construction of the stream restoration and enhancement project on Rocky Reef Spring Creek at the Site.

12. Sometime in October 2011, Respondent hired new consultants, Mr. Justin Devers and Mr. Michael Bias, to complete the stream restoration and enhancement project on Rocky Reef Spring Creek at the Site.

13. On December 1, 2011, the Corps conducted an inspection of the Site as a result of complaints from the Montana Department of Environmental Quality (MT DEQ) and Montana Fish Wildlife and Parks (MT FWP) that Respondent had exceeded the scope of the permits for the project. During the inspection, the Corps found that Respondent had discharged excavated materials into wetlands adjacent to Rocky Reef Spring Creek in Reach C of the project. The Corps found that

Respondent's activities were outside the scope of the August 10, 2010, Nationwide Permit 27 authorization and verbally informed Mr. Devers to Cease and Desist work.

14. In a letter to Respondent and Mr. Devers dated December 2, 2011, the Corps found, and the EPA through issuance of this Order finds, that Respondent's activities, as described in paragraph 13 of this Order, exceeded the August 10, 2010, Nationwide Permit 27 authorization, and therefore are in violation of section 404 of the CWA.

15. On December 7, 2011, and January 24, 2012, multi-agency inspections were conducted at the Site with Respondent, Mr. Devers, and Mr. Bias. The agencies participating in these inspections included the Corps, MT FWP, MT DEQ, Cascade County Conservation District, and the Natural Resources Conservation Service. During these inspections, the Corps found, and the EPA through issuance of this Consent Order finds, that Respondent had discharged excavated material into a wetland of approximately 1.03 acres in Reach A, in violation of section 404 of the CWA. Furthermore, the Corps found, and the EPA through issuance of this Consent Order finds, that the culverted road crossing that was constructed within Rocky Reef Spring Creek by Respondent at the end of Reach C was required by the August 10, 2010, Nationwide Permit 27 authorization to be a bridge constructed over Rocky Reef Spring Creek, and therefore is in violation of section 404 of the CWA.

16. On April 3, 2012, the Corps referred this case to the EPA for enforcement in accordance with the "*Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency Concerning Federal Enforcement of the Section 404 Program of the Clean Water Act*," dated January 19, 1989.

17. The activities described in paragraphs 13, 14, and 15, above, were performed using common earthmoving vehicles and equipment, all of which were operated by Respondent and/or by persons acting on his behalf.

18. Respondent is a "person" as defined in section 502(5) of the CWA, 33 U.S.C. § 1362(5).

19. The material discharged into wetlands in Reaches A and C and the culverted road crossing in Reach C described in paragraphs 13, 14, and 15, above, is and was at all relevant times "dredged material" or "fill material" as defined in 33 C.F.R. § 323.2(c) or 33 C.F.R. § 323.2(e), respectively, and "pollutants" as defined in section 502(6) of the CWA, 33 U.S.C. § 1362(6).

20. Rocky Reef Spring Creek and its adjacent wetlands filled and disturbed by Respondent's unauthorized activities provided various functions and values, including: wildlife habitat for birds, mammals, reptiles and amphibians; water quality enhancement; flood attenuation; and/or aesthetics.

21. The vehicles and equipment described in paragraph 17, above, are and were at all relevant times each a "point source" as defined in section 502(14) of the CWA, 33 U.S.C. § 1362(14).

22. Rocky Reef Spring Creek and its adjacent wetlands referenced above are and were at all relevant times "waters of the United States" as defined in 33 C.F.R. § 328.3(a) and therefore "navigable waters" as defined in section 502(7) of the CWA, 33 U.S.C. § 1362(7).

23. The placement of dredged or fill material into Rocky Reef Spring Creek and its adjacent wetlands constitutes the "discharge of pollutants" as defined in section 502(12) of the CWA, 33 U.S.C. § 1362(12).

24. Section 301(a) of the CWA, 33 U.S.C. § 1311(a), prohibits, among other things, the discharge of pollutants by any person into waters of the United States except as in compliance with section 404 of the CWA, 33 U.S.C. § 1344(a).

25. Section 404 of the CWA, 33 U.S.C. § 1344, sets forth a permitting system authorizing the Secretary of the Army, acting through the Chief of Engineers of the Corps, to issue permits for the discharge of dredged or fill material into navigable waters which are defined as waters of the United States.

26. According to 33 C.F.R. § 323.3(a), a permit issued by the Corps is required for the discharge of dredged or fill material into waters of the United States, unless an exemption pursuant to 33 C.F.R. § 323.4 applies.

27. The impacts to Rocky Reef Spring Creek and its adjacent wetlands described in paragraphs 13, 14, and 15 above, exceeded and were therefore in violation of the August 10, 2010, authorization granted by the Corps pursuant to Nationwide Permit 27.

28. The activities conducted by Respondent and/or by persons acting on his behalf as described in paragraphs 13, 14, and 15, above, violate section 301(a) of the CWA, 33 U.S.C. § 1311(a). Each discharge of pollutants from a point source by Respondent into waters of the United States without the required permits issued pursuant to section 404 of the CWA, 33 U.S.C. § 1344, constitutes a violation of section 301(a) of the CWA, 33 U.S.C. § 1311(a). Each day the discharges remain in place without the required permits constitutes an additional day of violation of section 301(a) of the CWA.

29. Activities to be carried out under this Consent Order are remedial, not punitive, and are necessary to achieve the CWA's objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," as specified in section 101(a) of the CWA, 33 U.S.C. § 1251(a). Restoration and mitigation are appropriate to address the actual and potential harm to water quality, aquatic habitat, and wildlife habitat, as well as other functions and values, caused by Respondent's unpermitted activities. Respondent has submitted to the EPA a Wetlands Delineation Report and a Rocky Reef Spring Creek Stream and Restoration Plan to address the violations alleged by the EPA.

30. This Consent Order was issued after consultation and coordination with the Corps' Omaha District, Helena Regulatory Office.

VI. ORDER FOR COMPLIANCE

Based upon the foregoing FINDINGS OF FACT AND OF VIOLATION, and pursuant to the authority vested in the Administrator of the EPA pursuant to section 309(a) of the CWA, 33 U.S.C. § 1319(a), as properly delegated to the Assistant Regional Administrator of the Office of Enforcement, Compliance and Environmental Justice, EPA Region 8, it is hereby ORDERED:

31. Respondent shall immediately terminate all unauthorized discharges of dredged or fill material, now and in the future, into waters of the United States, unless specifically authorized by the Corps under a valid permit issued pursuant to section 404 of the CWA, 33 U.S.C. § 1344. This prohibition includes all mechanical land clearing, dredging, filling, grading, leveling, installation of utilities, construction, and any other activities that result in a discharge of dredged or fill material into waters of the United States.

32. Respondent shall conduct restoration and mitigation activities for impacts to waters of the United States resulting from the unauthorized discharges of dredged or fill material at the Site in accordance with the schedule and other requirements set forth in the November 1, 2013, Rocky Reef Spring Creek Stream & Wetland Restoration Plan attached to this Consent Order as Exhibit A (the Plan) which is hereby approved by the EPA.

33. Within fourteen (14) calendar days of receipt of this Consent Order, Respondent shall submit to the EPA the name and qualifications, including professional resume, of a consultant experienced in stream and wetlands restoration who will directly supervise all work performed pursuant to the Plan.

34. Respondent shall obtain all necessary permits to implement the Plan and then commence all restoration activities in accordance with the approved Plan, including the time frames specified therein, and all granted permits. Respondent shall demonstrate that all necessary permits have been granted by providing copies of all such permits, and any amendments thereto, to the EPA within seven calendar days of issuance of each permit.

35. All activities conducted pursuant to this Consent Order and involving the use of heavy construction equipment shall be undertaken under the direct supervision of the consultant retained pursuant to paragraph 33.

36. This Consent Order is not a permit or an authorization to place or discharge dredged or fill material in waters of the United States. Respondent shall consult with the Corps at the address and

telephone number below to determine if any work to be performed pursuant to this Consent Order requires a permit from the Corps under section 404 of the CWA. If any such permit is required, Respondent shall obtain such permit(s) and provide a copy or copies to the EPA pursuant to paragraph 34, above, prior to initiating any work that is to be performed pursuant to this Consent Order.

U.S. Army Corps of Engineers
Helena Regulatory Office
10 West 15th Street, Suite 2200
Helena, MT 59626
Telephone: 406-441-1375
Facsimile: 406-441-1380

37. Respondent shall submit all notifications under this Consent Order, and related correspondence to:

Kenneth M. Champagne, 8ENF-W
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129
Telephone: 303-312-6608
Facsimile: 303-312-7518

and

Wendy I. Silver, 8ENF-L
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop St.
Denver, CO 80202-1129
Telephone: 303-312-6637
Facsimile: 303-312-6953

38. In addition to the notification requirements set forth in paragraph 37, after issuance of any Corps authorization for the restoration work, Respondent shall submit all notifications and correspondence to the Corps in accordance with the terms and conditions in the Corps permit(s).

39. The Plan and any other deliverables, reports, specifications, schedules, and attachments required by this Consent Order are, upon approval by the EPA, incorporated into this Consent Order. Any non-compliance with the Plan, deliverables, reports, specifications, schedules, permits, or

attachments shall be deemed a failure to comply with this Consent Order and shall be subject to EPA enforcement.

40. Respondent shall allow, or use his best efforts to allow, access to the Site by any authorized representatives of the EPA, the Corps, the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, Cascade County Conservation District, MT FWP, and MT DEQ, or any of the agencies' contractors, upon proper presentation of credentials, for any of the following purposes:

a. To inspect and monitor progress of the activities required by this Consent Order;

b. To inspect and monitor compliance with this Consent Order; and

c. To verify and evaluate data and other information submitted to the EPA.

Respondent shall also allow the EPA access to records relevant to this Consent Order for the purposes stated in subparagraphs 40.a. – c. This Consent Order shall in no way limit or otherwise affect the EPA's authority, or the authority of any other governmental agency, to enter the Site, conduct inspections, have access to records, issue notices and orders for enforcement, compliance, or abatement purposes, or monitor compliance pursuant to any statute, regulation, permit, or court order.

41. This Consent Order shall be effective upon receipt by Respondent of a fully executed copy.

42. Issuance of this Consent Order shall not be deemed an election by the United States to forego any civil or criminal action to seek penalties, fines or other appropriate relief under the CWA for violations giving rise to the Consent Order.

43. The EPA agrees to submit all notifications and correspondence to:

Leland F. Wilson
179 North Fort Shaw Road
Fort Shaw, MT 59443

44. Any party hereto may, by notice, change the address to which future notices shall be sent or the identities of the persons designated to receive notices hereunder.

45. If an event causes or may cause delay in the achievement of the requirements of this Consent Order, Respondent shall notify the EPA orally as soon as possible and in writing within ten working days from the date Respondent first knew of such event or should have known of such event by exercise of due diligence, whichever is earlier. Respondent's written notice shall specify the length of the anticipated delay, the cause(s) of the delay, the measures taken or to be taken by Respondent to minimize the delay and a timetable by which those measures will be or have been implemented. Notification to the EPA pursuant to this paragraph of any anticipated delay, by itself, shall not excuse the delay or the obligation of Respondent to comply with requirements and deadlines of this Consent Order, unless the EPA grants in writing an extension of the applicable requirement or deadline.

46. If Respondent demonstrates to the EPA's satisfaction that the delay or anticipated delay has been or will be entirely caused by circumstances beyond Respondent's control (or the control of any of Respondent's agents) that Respondent could not have foreseen and prevented despite due diligence, and that Respondent has taken all reasonable measures to prevent or minimize such delay, the EPA may excuse performance or extend the time for performance of such requirement for a period not to exceed the actual delay resulting from such circumstances. The EPA's determination on these matters shall be made as soon as possible, and in writing within ten working days, after the receipt of Respondent's written notification of the event. The parties agree that changed economic circumstances shall not be considered circumstances beyond the control of Respondent.

47. Following successful completion of all of the tasks described in the Plan and in this Consent Order as determined by the EPA, nothing herein shall prevent the Respondent from seeking authorization from the Corps under section 404 of the CWA, 33 U.S.C. § 1344, to conduct additional work at the Site in areas covered by the Plan. Successful completion of the tasks described in the Plan shall be deemed a complete remedial response to the CWA violations alleged herein by the EPA. Nothing in this Consent Order shall prevent Respondent from seeking authorization from the Corps

under section 404 of the CWA, 33 U.S.C. § 1344, to conduct additional work at the Site in areas not covered by the Plan.

48. Each party shall bear its own costs and attorneys fees in connection with this matter.

49. Respondent understands and acknowledges the following:

a. Section 309(d) of the CWA, 33 U.S.C. § 1319(d), authorizes civil penalties of up to $37,500 per day for each violation of an order issued by the Administrator of the EPA under section 309(a) of the CWA, 33 U.S.C. § 1319(a).

b. Compliance with the terms and conditions of this Consent Order shall not be construed to relieve Respondent of his obligations to comply with any applicable federal, state or local law or regulation.

c. Failure by Respondent to complete the tasks described herein in the manner and time frame specified pursuant to this Consent Order may subject Respondent to a civil action under section 309 of the CWA, 33 U.S.C. § 1319, for violation of this Consent Order.

IN THE MATTER OF Leland F. Wilson, Docket No. CWA-08-2014-0006

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8,
Complainant

Date: 11/06/13

for Andrew M. Gaydosh
Assistant Regional Administrator
Office of Enforcement, Compliance and Environmental Justice
1595 Wynkoop Street
Denver, CO 80202

Leland F. Wilson,
Respondent

Date: November 1 2013

By: Leland F. Wilson
Leland F. Wilson

FINAL

ROCKY REEF SPRING CREEK STREAM & WETLAND RESTORATION PLAN

Fort Shaw, Montana

Prepared for:
Leland Wilson
Rocky Reef Road
Fort Shaw, Montana

Prepared by:

WGM Group, Inc.
1111 East Broadway St
Missoula, MT 59802

October 2013

EPA# MWO-2010-1307-MTH

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(under separate cover)

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1.0 BACKGROUND

Rocky Reef Spring Creek is a tributary to the Sun River, located approximately one mile north of the community of Fort Shaw within T20N, R2W, Section 3 and T21N, R2W, Sections 34, 35 and 36 in Cascade County, Montana. Rocky Reef Spring Creek is a formerly un-named channel and irrigation ditch/wastewater conveyance stretching approximately 4 miles from the "reef," through agricultural lands to the confluence with the Sun River (**Figure 1**). This channel was present circa 1908 based on a land survey conducted for Fort Shaw land ownership and historically served as wastewater conveyance for flood irrigation, and conveyance/diversion points for contemporary irrigation using pumps.

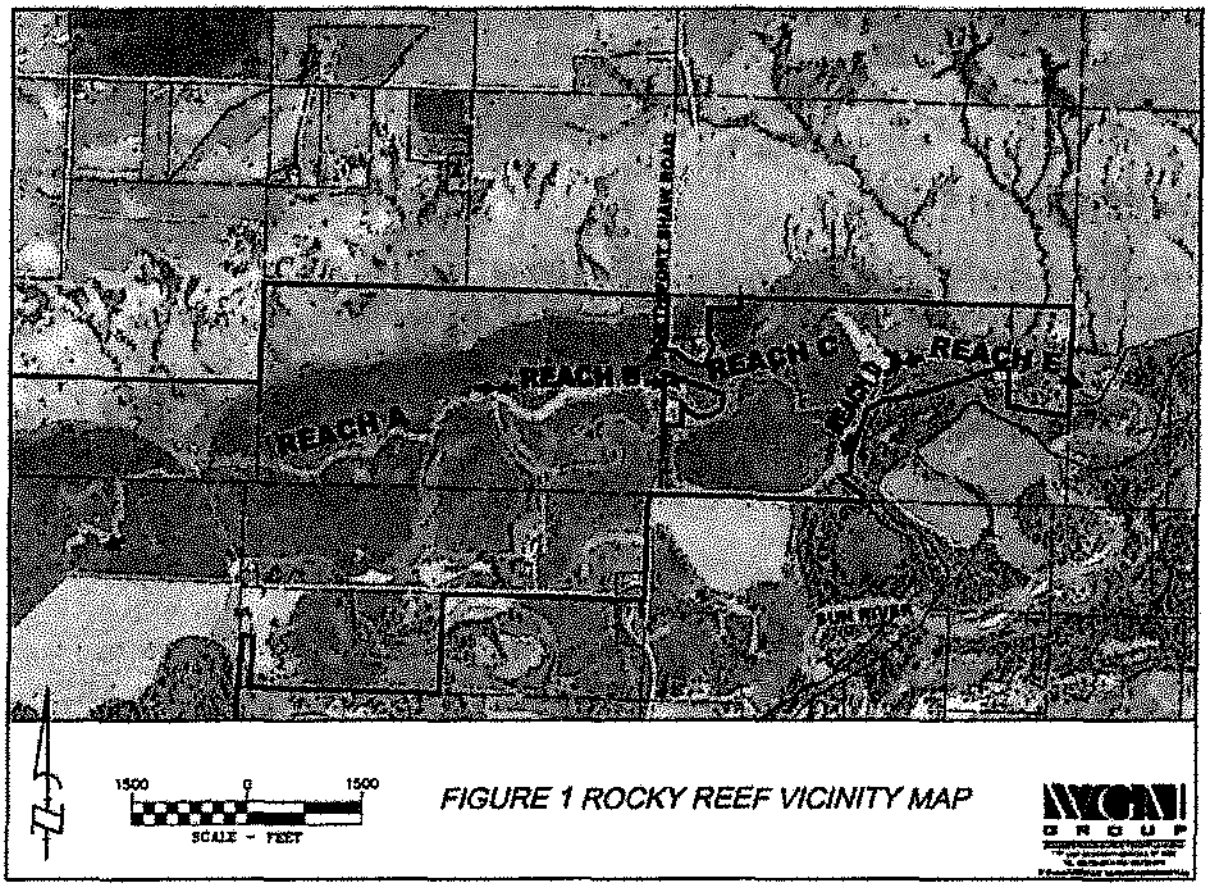
The overall configuration of Rocky Reef Spring Creek is largely human-created and a reflection of a century of land use. Historically, the channel was developed as an irrigation water conveyance and waste ditch for Fort Shaw lands. Irrigation water originating from the Sun River was distributed via the constructed channel and excess wastewater was returned to the Sun River several miles downstream.

Montana agency staff, restoration professionals, and landowner Lee Wilson recognized the potential for the Rocky Reef channel to provide significant benefits to the Sun River fishery. Prior to 2010, Mr. Wilson made a number of changes on his Rocky Reef property which reflect his longstanding interest in habitat conservation and restoration. These efforts included the relocation of irrigation diversions from the channel, conversion from flood irrigation to pivots (c. 2006) and development of a channel restoration and enhancement plan (c. 2010).

In 2010, Montana Fish, Wildlife & Parks (MFWP) supplied partial funding for restoration of Rocky Reef Spring Creek through the Future Fisheries program. Additional sponsors included PPL Montana, Missouri River Flyfishers, Trout Foundation, and the USDA Natural Resources Conservation Service (NRCS). Mr. Wilson provided the majority of the funding. Planned restoration activities involved increasing channel sinuosity, narrowing and deepening over-widened portions of the channel, removing silt accumulations, creating riffle-pool habitat, transplanting sods on newly constructed stream banks and replacing a series of undersized culverts with larger sized pipes.

The joint permit application CA-28-10 was submitted in June 2010 with Mr. Wilson as the Applicant/landowner and Alan McNeal as the contractor/agent (**Appendix A**). Plans included a design narrative, typical cross-sections and existing bed profile/water surface shown on a relative datum. The 310 permit was issued in July 2010. Construction of the project area west of North Fort Shaw Road began in 2010 under the supervision of George Liknes (MFWP), contractor Alan McNeal, and equipment operator Rich Thumma (Streamworks). Among numerous field modifications to the original design were changes in plan form, sinuosity, streambed elevation, and associated infrastructure (e.g. constructed subdrains). Earthwork was largely completed from the reef to the North Fort Shaw Road (reaches A and B). A small segment of the upper end of reach C was also completed by McNeal/Liknes/Streamworks.

Figure 1: Rocky Reef Vicinity Map



In 2011, consultant Michael Bias and contractor Justin Devers were engaged by the landowner to complete the remainder of the project east and downstream of North Fort Shaw Road. Construction was halted following a cease and desist order dated December 2, 2011 from the U.S. Army Corps of Engineers (USCOE) (**Appendix B**). An additional order was issued by the Cascade Conservation District (CD) on December 16, 2011(**Appendix C**).

Preceding restoration approaches (McNeal 2011, Bias 2012) envisioned alterations in profile, planform, and channel geometry to develop natural channel characteristics and enhance fisheries values. For example, the first design (McNeal) alternately raised or lowered grade by several feet in reaches A and B, excised a large natural oxbow and replaced it with a constructed steeper gradient channel through uplands, and envisioned subsurface drains to enhance flows. The Bias/Devers design endeavored to increase stream gradient in reach C by removing a backwatered culvert/fish barrier at the confluence with the Sun River floodplain side channel, and set a lowered and steepened streambed elevation to the North Fort Shaw Road. In both design approaches, increasing channel gradient to flush fine sediments was shared in common, along with generally narrowing and deepening the channel, and creating pool/riffle complexes.

A restored and enhanced stream channel offers the potential for significant fisheries benefits. The Sun River has widely recognized sediment and thermal impairments, including dewatering via substantial irrigation withdrawals. Few Plains tributaries are capable of providing spawning potential or thermal refuge for salmonids for the Sun River. The potentially high value of Rocky Reef Spring Creek enhancement is widely recognized by the landowner, funding agencies, and other cooperators.

2.0 DESIGN APPROACH

In fall 2012, WGM Group was engaged to review previous work on Rocky Reef Spring Creek and assist in developing a plan to 1) address potential wetlands concerns, and 2) provide assistance in achieving stream restoration objectives.

In October 2012, an on-site meeting was held in Fort Shaw including representatives of the EPA (Kenneth Champagne), USCOE (Vicki Sullivan), U.S. Fish and Wildlife Service (USFWS) (Jim Lange), Cascade CD (Tonya Merriman), MFWP (George Liknes), and others.

During the October 2012 meeting, the Rocky Reef project was reviewed to solicit agency concerns, requirements and expectations about work previously completed or in progress. Potential approaches to successfully resolve agency concerns were discussed. A site tour was made with EPA, MFWP, and USCOE staff including upstream reaches A and B and planned restoration reaches C, D, and E located east of North Fort Shaw Road. Work in the reach east of North Fort Shaw road (reach C) was the principal subject of the C&D order and was reviewed in detail on the ground. A small area of wetland (wetland 6) was also visited west of Fort Shaw Road.

At the conclusion of the October 2012 meeting, the consensus opinion could be summarized as development of a restoration strategy that achieved "no net loss of wetlands" and a "fully-functioning stream." This perspective is reflected in the following proposed design. The following report along with the companion wetlands delineation (WGM 2013) endeavors to provide a plan to resolve concerns raised in the C&D order.

2.1 Site Investigation

In October and November 2012 wetland delineation was undertaken in areas of interest identified by EPA. These included areas east of North Fort Shaw Road (reach C) as well as a small wetland area to the west of North Fort Shaw Road (wetland 6, WGM 2013). The wetland delineation included survey-grade GPS survey of jurisdictional wetland boundaries within and adjoining the stream restoration project. Wetland transects were established within reach C and three piezometers were installed in an unaltered reach to evaluate depth to groundwater relative to wetland species composition and wetland limits. Stream reach C adjoins wetlands 2 and 4.

Survey-grade GPS was used to develop a long profile of the partially constructed existing channel and water surface in reach C. Representative channel cross-sections were measured in reach C and pebble counts were collected. No reference reach existed for the site as nearly all

stream segments were either altered due to historic land use practices or previously reconstructed. Field data thus reflect existing conditions rather than target stream restoration goals.

The entirety of the partially completed stream restoration project was visited on three occasions to review previous restoration efforts, and proposed work. Historical aerial imagery was reviewed. Previous design materials, including permit applications and correspondence developed by Alan McNeal and Mike Bias were also reviewed. Agency staff familiar with the project were contacted for information and professional opinions in late 2012 and throughout 2013(MFWP, USFWS, National Resource Conservation Service (NRCS), Cascade Conservation District, Department of Natural Resources and Conservation (DNRC), and the USDA Farm Service Agency (FSA).

2.2 Site Characteristics

The Rocky Reef Spring Creek runs for approximately 4 miles from a constructed headwaters spring source to the confluence with a floodplain side-channel of the Sun River. With the exception of planned restoration reaches D and E, the majority of the Rocky Reef project is located on upland terrace areas adjacent to the active Sun River floodplain. The area was formerly flood-irrigated (since c. 1908) but has been converted to center pivot sprinkler irrigation beginning in 2006. Ditches carrying water diverted from the Sun River run along the north and south margins of the agricultural land. At present cropping is primarily barley with some areas left un-harvested for upland game bird use.

Historically, the agricultural land adjoining Rocky Reef Spring Creek was flood irrigated and the channel served primarily as a wastewater conveyance. The majority of the channel from its source (beginning about 3 miles west of reach C) was constructed as a ditch. In the original Fort Shaw survey, the western portion of channel was identified as a ditch rather than a natural watercourse. Based on the straightened alignment of the downstream reach (i.e. reach C/ wetland 4) it is probable that this channel was also historically constructed or altered along most of its length to the confluence with the Sun River. These historic alterations and agricultural practices are identified in previous permitting, design, and environmental assessment documents.

2.2.1 Soils

Valley depositional deposits have fine-textured loam surface horizons (**Appendix D**). In reach C the NRCS soils map identifies Lallie silty clay loam (map unit 119) in wetland area 4 east of the farm road, and Ryell-Rivra Complex (map unit 172) in wetland area 2 west of the farm road. Havre loam (96) and Harlem silty clay loams (94) are also mapped in adjoining areas (**Figure 2**).

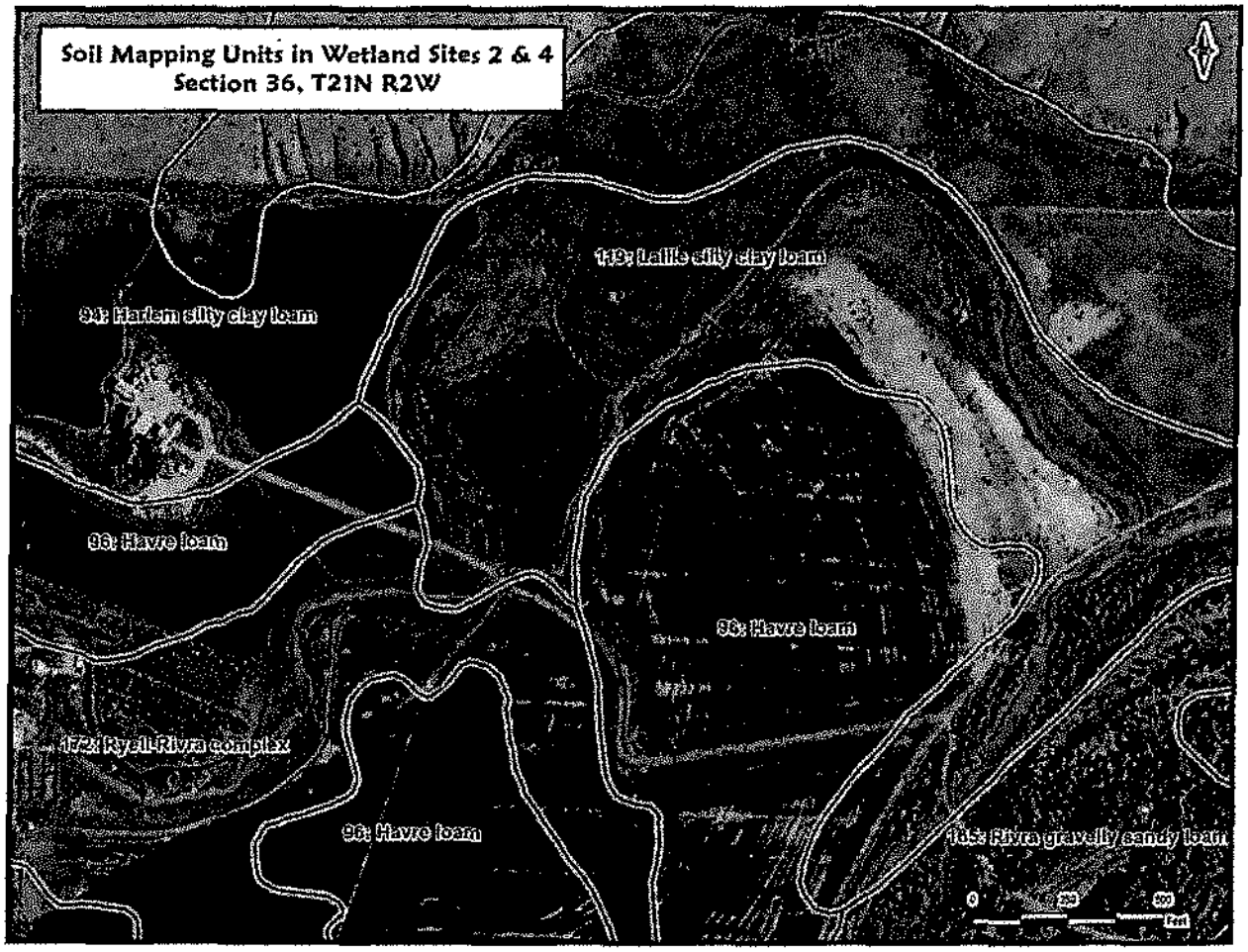
Field observations in excavated portions of the stream restoration area within reach C/wetland 4 suggest that the Ryell-Rivra complex may be the more appropriate classification than the Lallie silty clay loam. Excavated materials contain about 25-30% coarse fragment content from 2 mm-74 mm. Coarse fragments are not typical of soil units such as Lallie, Havre, and Harlem units.

A typical profile for the Ryell-Rivra complex is *0 to 8 inches:* Loam. *8 to 28inches:* Stratified very fine sandy loam to silt loam, *28 to 60 inches:* Extremely gravelly loamy sand. Coarse fragment content >50% within the C horizon is typical of the Ryell-Rivra unit.

Based on field observations of excavated material, soils in reach C and wetlands 2 and 4 might alternatively be mapped as Rivra Gravelly Sandy Loams (Unit 165), which are characterized by both coarse fragments and a seasonally shallow water table. Probable soil classification in reach C and adjoining wetlands would be either Ryell-Rivra Complex (Unit 172) or Rivra Gravelly Sandy Loams (Unit 165).

Sufficient field observation has been made to ascertain soils properties and substrate composition for wetland/channel function and channel stability criteria. In particular, the substrate along the stream alignment in reach C is characterized by thick silt sequences deposited by years of flood irrigation. The deposits overlie a firm gravel surface. Accumulated silt is in excess of 6-ft deep can be observed as thick "muck" in the upper half of reach C. Submerged sediments show reducing, anoxic conditions and are not conducive to supporting salmonid populations.

Figure 2. Soils Mapping Units in Wetlands 2 and 4



2.2.2 Hydrology

Rocky Reef Spring Creek derives flow almost entirely from influent groundwater. Origins of groundwater likely originate from 1) the Sun River regional water table; 2) seasonal up-gradient sources such as natural recharge and return flow from the irrigated Fairfield Bench; and, 3) to a lesser extent, locally applied irrigation water. Since conversion from flood irrigation to pivot irrigation, limited surface water runoff enters the channel directly.

Flow measurements were available for Rocky Reef Spring Creek. Synoptic observations supplied by MFWP suggest flow is seasonal in nature, increasing in the spring and receding in late summer/fall. The 2010 permit and design document planned for flows in reach C of about 5-6.4 cubic feet per second (cfs). Based on observations in 2012 and early 2013, baseflow of 5-7 cfs is typical of the location at North Fort Shaw Road post-construction. Seasonal peaks of 15 to 17.5 cfs have been documented in the project reach C east of the Fort Shaw Road (**Figure 3**). (Note that backwater at the North Fort Shaw Road culvert may account in part for the extent of inundation in the June 8, 2011 photo.)

Figure 3. Reconstructed Reach immediately west of Fort Shaw Rd, June 8, 2011, 15-17 cfs

Groundwater-controlled discharge makes Rocky Reef Spring Creek respond as a spring creek with characteristically attenuated peaks and a prolonged stable baseflow. Historically, flood irrigation may have contributed to surface flow in spring and summer from ditch leakage, groundwater return flow and direct overland runoff. With the conversion to pivots and reduction in diverted water, natural sources of influent groundwater drive the current hydrologic regime.

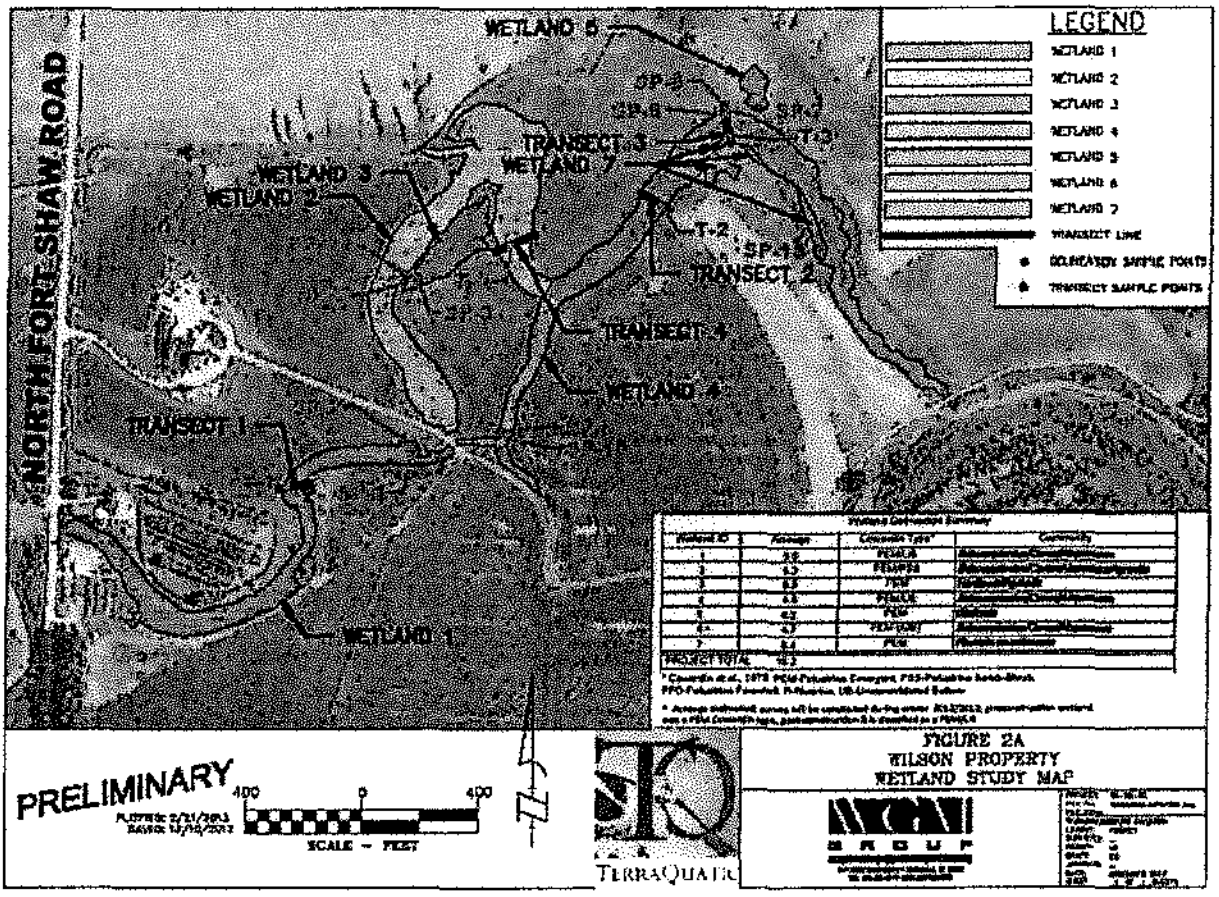
Based on flow measurements, a design discharge of 6 cfs was employed for baseflow conditions in reach C. A "bankfull" discharge of 10 cfs was employed to set floodplain elevation/channel dimension for overtopping flows. Peak flow of17 cfs was modeled to represent peak flow conditions and assess channel stability/sediment flushing.

2.2.3 Wetland and Riparian Vegetation

Vegetation communities associated with restoration reach C and a small area upstream along reach Aare fully documented in the wetland delineation report (WGM 2013). That report serves as the pre-construction, baseline wetland inventory of areas of concern identified in the USCOE Cease and Desist (C&D) Order.

Wetland areas identified in Reach C are shown in **Figures 4& 5**. Wetlands 1 and 4 directly associated with the stream channel alignment total 7.8 acres which includes open water. These areas are palustrine emergent/unconsolidated bottom wetlands occupied by sedge, bulrush and foxtail.

Figure 4. Wetland Delineation in Reach C

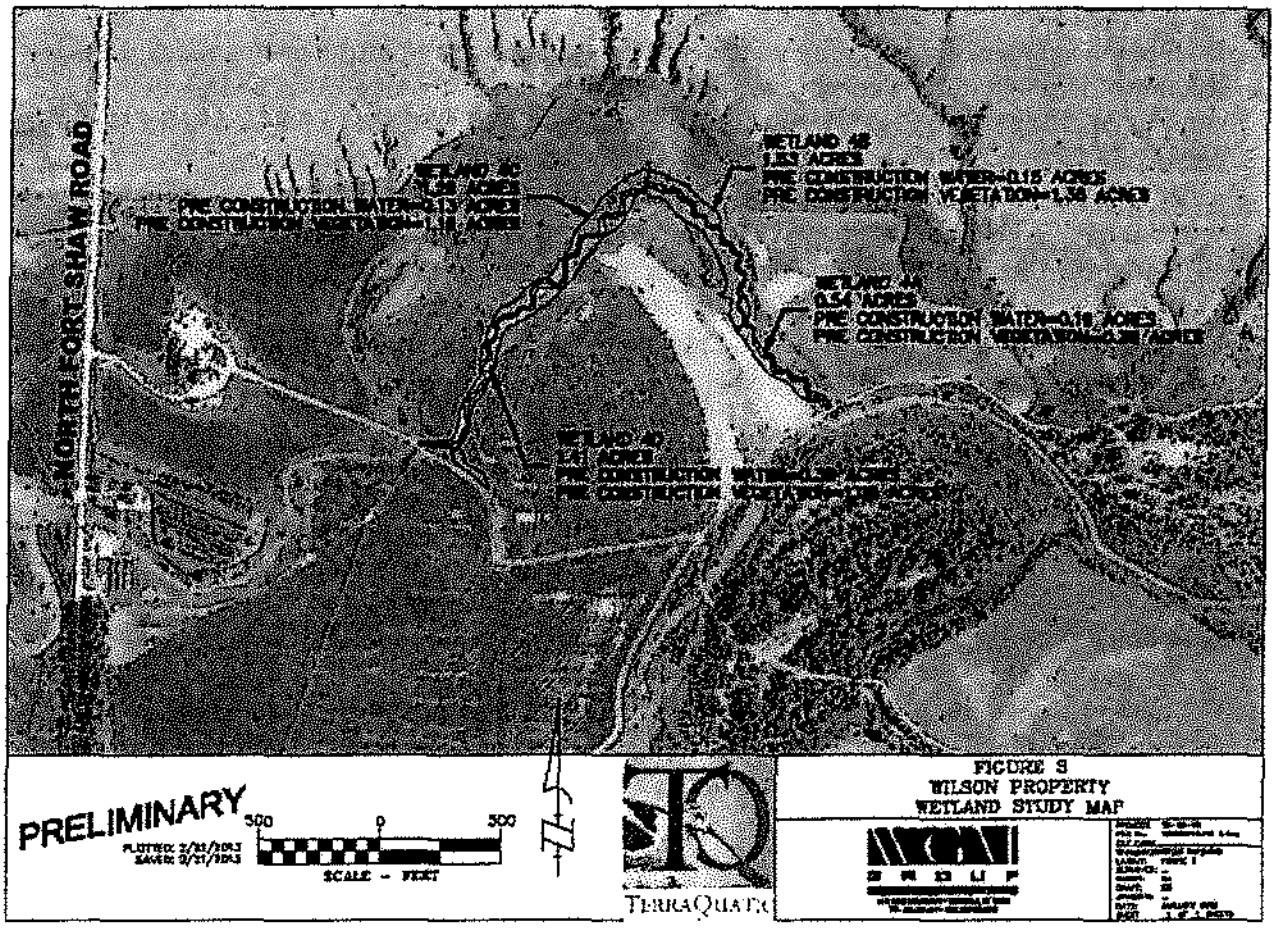


Additional detail on these wetland polygons is found in the wetland delineation report (WGM 2013). Within the partially-restored portion of reach C, the wetland polygon 4 totals 4.8 acres (**Figure 4**). Of this area, pre-construction water surface was 0.84 acres.

For purposes of discussion, wetland 4 was divided into 4 sections (**Figure 5**). The following description reflects the existing state of the stream reach in wetland 4 in mid-construction.

The partially-completed channel restoration in segments 4A, 4B, and 4C, and segment 4D was a mix of partially disturbed area/and partially intact areas. Segments 4A, 4B, and 4C had the design channel grade established; however, final channel shaping/dimension was not completed at the time that the C&D Order was issued. Narrowing channel width and shaping channel geometry with wetland sod mats was envisioned in segments 4A, 4B, and 4C.

Figure 5. Wetland 4 Delineation in Reach C



Wetland in segment 4A was fully constructed with the exception of some remaining wetland sod placement for channel shaping. Pre/post wetland areas were fully replaced and self-mitigating in segment 4A with the exception of final channel narrowing/dimension adjustments. Wetland segment 4A was approximately 0.38 ac and water was 0.16 ac. Preconstruction wetland area was estimated at 0.11 ac from the 2005 photo; final channel shaping would have replaced the remaining 0.05 ac of wetland.

Wetland in segment 4B was partially replaced prior to the 2011 C&D Order. Construction of the associated wetland floodplain was in progress and not completed. Pre-construction wetland acreage was 1.38 acres; open water 0.15 acres. Approximately 70% of the wetland area was

reconstructed and is self-mitigating. Completion of construction would have fully mitigated wetland/floodplain acreage, similar to segment 4A. Wetland area that was not replaced as of the date of the C&D Order amounted to 0.37 Acres.

Wetland in segment 4C was partially replaced. Construction of the associated wetland floodplain was in progress and not completed. Pre-construction wetland acreage was 1.16 acres; open water 0.13 acres. Approximately 30% of the wetland area was reconstructed and is self- mitigating. Completion of this work would have fully mitigated the remaining 0.81 acres of wetland/floodplain.

Wetland in segment 4D was minimally-altered in the upstream portion of this reach. Little or no channel/floodplain construction was completed. The downstream portion had partially completed channel and floodplain. Approximately 20% of wetland/floodplain construction had been completed in the downstream portion. Total wetland in segment 4D was 1.05 ac, open water was 0.36 ac. This area is a mix of altered and undisturbed wetland with about 0.21 ac of wetland having been replaced as of the date of the C&D Order. The remaining 0.84 ac was about 30% unaltered (0.25 ac), and 0.59 ac was altered and in progress of being replaced.

In total, approximately 1.82 ac of wetland was in the process of being replaced but halted by the C&D order. Remaining wetland acreage was either fully replaced or unaltered.

All segments (4A-D) had temporary stockpiles of excavated fill placed along the margin of the stream/floodplain corridor. This fill had not yet been hauled to adjacent upland agricultural fields. Temporary fill stockpiles were located out of jurisdictional wetlands or in the process of being moved from wetland areas at the time of the C&D. All segments (1-4) had excavated cut slopes adjacent to the constructed floodplain corridor. The slope break was bordered by temporary silt fence. The slope breaks had not been reshaped to the final grade.

Pre-and post-restoration stream and wetland areas by segment are shown in **Table 1**. The restoration project has the potential to increase wetland acreage by 0.28 acres due to narrowing of the constructed channel to a width of 7 feet (maximum dimension). Net wetland increase of 0.43 acre are potentially realized if final stream widths averaged 5 ft. Channel design criteria allow for 5-7 ft for target restoration widths (**Section 3.4**). Total channel length pre-construction is 2,859 ft, post construction is 3,291 ft (**Table 1**).

Table 1. Net Wetland and Stream Area Pre- and Post-Restoration

Wetland Segment	Stream-Pre (ac)	Wetland-Pre (ac)	Stream-Post (ac)	Wetland-Post (ac)
4A	0.16	0.38	0.12	0.42
4B	0.15	1.38	0.13	1.40
4C	0.13	1.16	0.11	1.18
4D	0.36	1.05	0.17	1.24
Total	**0.8 (2,859 ft length)**	**3.97**	**0.53**	**4.24 (3,291 ft length)**

3.0 CHANNEL DESIGN

The existing condition and proposed channel planform, profile, and geometry are described in the following sections. Reaches A and B are located to the west of Fort Shaw Road and were constructed in 2010. Reach C is located east of Fort Shaw Road and reflects partially completed construction at the time of the 2011 C&D Order. Reaches D and E were originally planned downstream of reach C in the Sun River floodplain and have not been constructed. The channel design in this proposal is limited to the lower portion of reach C.

3.1 Existing Channel Planform and Profile

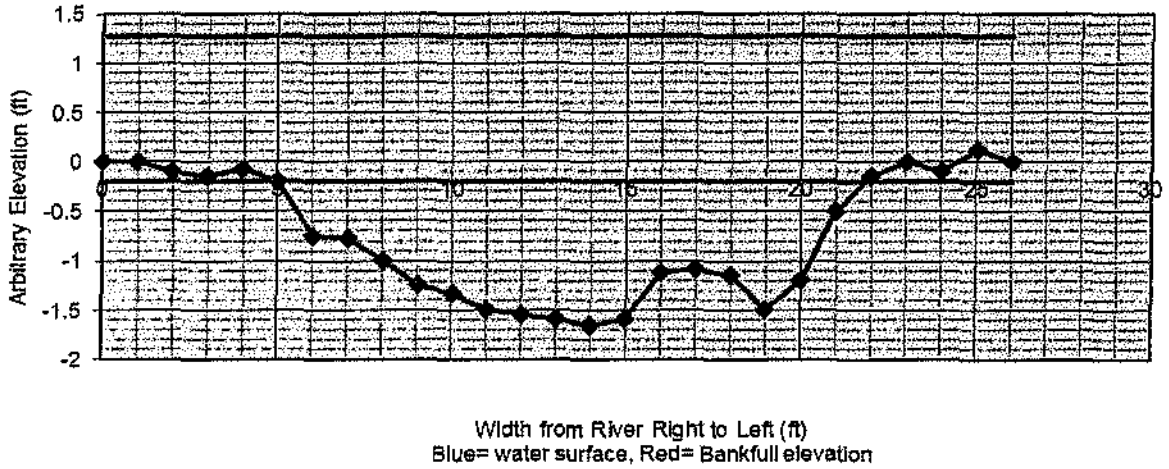
Channel cross-sections and longitudinal profile within reach C were surveyed in late 2012.The existing longitudinal profile, water surface and upper elevation limit of adjoining wetland vegetation are found in plan sheets (**Appendix E, sheets 1-6**).

The channel bed elevation is incised relative to the pre-construction condition by 2 to 3 feet from Sta 0+00 to Sta 28+00. A composite floodplain wetland and partially completed channel cross-section was constructed from 0+00 to 7+00. Between Sta 7+00 and Sta 28+00 the composite cross-section was partially complete, and the channel was largely unaltered by recent activity from Sta 28+00 and Sta50+00. A small portion of the uppermost extent of reach C (Sta 50+00 to 52+00) was narrowed and deepened as part of the restoration effort completed by McNeal, Liknes, and Streamworks.

3.2 Existing Channel Dimensions

A representative cross-section of the partially-constructed reach C is shown in **Figure 6**. In this reach, the channel has been roughed-in and the associated wetland fringe/floodplain has been partially reconstructed. Planned channel dimensions and final profile were not completed at the time of the C&D Order.

Figure 6. Typical Cross-section in Reach C



3.2.1 Channel Geometry

Within reach C/wetland 4 the channel top width ranged from10-25 ft, with typical widths of 12-16 ft. At 6 cfs baseflow, riffle depth was 0.8 to 1.2 ft, pools were 1.5 to 2.5 ft deep. Runs varied in depth from 1 to 2 feet. Width to depth (w/d) ratio observed in constructed reach 4 arranged from10-25. The w/d values were representative of alluvial C channel morphology, equivalent to a wide and shallow gravel channel. Width to depth ratios were high and sediment accumulation in pools and riffles were prevalent. Channel morphology and cross-sections appeared oversized for a spring creek flow regime. The shallow slope and accumulating fines initially suggested a Rosgen "E" channel type might be more appropriate. Reference values for E channel w/d ratios are typically from 4-12 (i.e. narrow and deep).

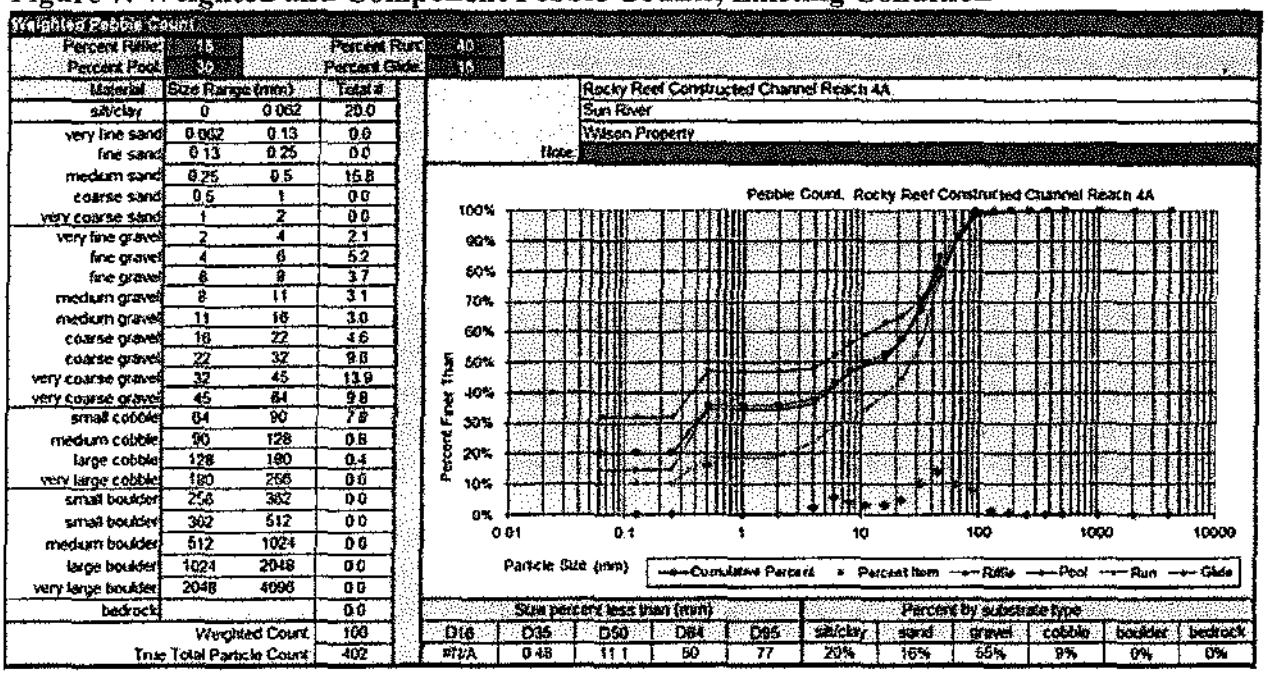
Note that these field observations of existing channel dimensions in this reach did not represent completed cross-sections. Channel dimensions were partially constructed and wetland sod backfill had not been placed to achieve final widths. Portions of the channel were also over-sized to serve as sediment catch basins trapping silt from upstream during construction. Channel cross-sections were to be reshaped and narrowed once upstream construction had been completed in reach C. Work was halted by the C&D Order in December 2011.

3.2.2 Bed Composition

Weighted pebble counts in the partially constructed reach are shown in **Figure 7**. D16 was silt, D50 was 11.1 mm, and D84 was 50 mm. These values are representative of the partially constructed channel over coarse substrate from station 0+00 to Sta 24+00. A significant portion of the channel bed had fine silt accumulations overlying the recently-exposed substrate. Heavy silt accumulations were prevalent in pools and wide channel cross-sections.

Clean gravels were primarily represented in short riffle cross-sections. A representative riffle showed a gravel substrate with D16 = 0.4mm (mediums and), D50 = 26.1 mm, and D84 = 53 mm. Relatively cleaner coarse gravel substrate can generally be expected where channel shear stress is sufficient to sweep fines from the bed. Field observations of fine sediment deposition showed that the roughness and "sheltering" effect of larger bed substrate contributed to accumulation of fines. For example, in riffle cross-sections fines extended to settle into the coarse bed substrate and along channel margins despite elevated velocities.

Figure 7. Weighted and Component Pebble Counts, Existing Condition



Weighted Pebble Count

Percent Riffle	15	Percent Run	40
Percent Pool	30	Percent Glide	15

Material	Size Range (mm)		Total #
silt/clay	0	0.062	20.0
very fine sand	0.062	0.13	0.0
fine sand	0.13	0.25	0.0
medium sand	0.25	0.5	16.8
coarse sand	0.5	1	0.0
very coarse sand	1	2	0.0
very fine gravel	2	4	2.1
fine gravel	4	6	5.2
fine gravel	6	8	3.7
medium gravel	8	11	3.1
medium gravel	11	16	3.0
coarse gravel	16	22	4.6
coarse gravel	22	32	9.8
very coarse gravel	32	45	13.9
very coarse gravel	45	64	9.8
small cobble	64	90	7.9
medium cobble	90	128	0.8
large cobble	128	180	0.4
very large cobble	180	256	0.0
small boulder	256	362	0.0
small boulder	362	512	0.0
medium boulder	512	1024	0.0
large boulder	1024	2048	0.0
very large boulder	2048	4096	0.0
bedrock			0.0
		Weighted Count	100
		True Total Particle Count	402

Rocky Reef Constructed Channel Reach 4A
Sun River
Wilson Property
Note:

Size percent less than (mm)					Percent by substrate type					
D16	D35	D50	D84	D95	silt/clay	sand	gravel	cobble	boulder	bedrock
#N/A	0.48	11.1	50	77	20%	15%	55%	9%	0%	0%

Although construction was incomplete, review of the existing channel planform, profile and geometry was useful to identify potential constraints, limitations, opportunities, and channel performance in reach C. Locally steepened channel slopes demonstrated effects of velocity/shear stress on bed material size distribution. Fines were selectively removed from areas with elevated velocities. Variable cross-section width showed deposition where wide and large pool volumes tended to fill with fines. Notably, reconstructed wetland/floodplain adjoining the channel showed excellent wetland recovery. Saline conditions in hydric areas not covered by wetland sod showed slower recovery and variable coverage by wetland species (mainly sedge).

3.3 Proposed Channel Planform and Profile

Channel design on Rocky Reef Spring Creek offers much flexibility as peak flow/baseflow conditions are attenuated and alluvial processes of scour and fill are unable to routinely mobilize coarse underlying substrate. Low gradient, low shear stress hydraulic conditions mean that channel stability can be maintained over a wide range of possible channel configurations. Conversely, low gradient and low shear stress reduce potential entrainment and mobilization of fine sediments. Depending on local channel geometry and slope, flushing flows may be insufficient to scour fines and maintain clean gravels for spawning.

The principal channel design objective of this proposal is to develop a stable, fully-functioning stream to optimize fisheries habitat and values. Concurrent with this objective is to maintain or improve associated wetland and riparian function. The present design endeavors to fully account for existing wetland function in addition to previous efforts which emphasized channel function and fisheries values.

The proposed planform and profile for reach C is shown in **Appendix F**. The design approach bridges the "unaltered" reach (where work stopped following the C&D Order) with the downstream, partially constructed reach. This approach creates a C channel in the lower portion of reach C. The steeper gradient C channel is designed as a transition reach from the pre-restoration channel to the constructed channel reach. The profile matches the downstream constructed channel grade at Sta 0+00 (culvert/confluence with the Sun River oxbow), and matches the upstream pre-restoration channel grade at Sta 22+00. A remnant channel segment is present and pre-restoration bed elevations are known at the upstream match points.

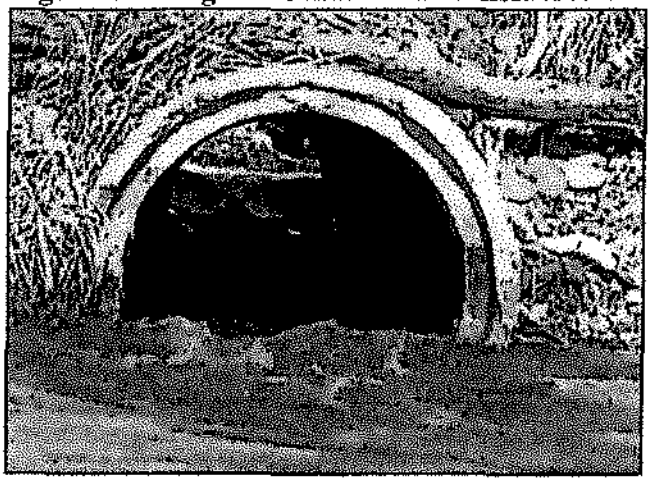
Matching the original grade of the former channel upstream is intended to insure stream and groundwater levels are maintained adjacent to wetland 2 and 4. Maintaining water levels at or near the former elevation is important to preserving existing wetland function and achieving the goal of "no net loss," of wetland area, function and values. The underlying rationale is simple: pre-existing wetland values will be preserved if pre-existing water levels are maintained.

The transition downstream to the constructed channel creates a steeper gradient (0.29%) section from Sta 22+00 to Sta0+00. Note this approach requires both filling the excavated channel from Sta 4+00 to Sta 28+00, and reconstructing/lowering the wetland floodplain from Sta 7+50 to 22+00.

Lowering this area of wetland floodplain is required to make the channel gradient transition and concurrently maintain wetland floodplain elevation relative to the water table.

Alternatives to the proposed design were considered and discussed with agency staff. These included returning the entire length of the channel to the former grade, or potentially reconstructing an entirely new channel around the site. The elevation profile in this proposed design offers a compromise that makes use of a portion of the constructed lower channel and transitions to the original grade at the upper end. The constructed lower channel and replaced culvert as they presently exist provide a fish-friendly and appropriate transition to the Sun River floodplain. The original culvert was judged a fish barrier (**Figure 8**). The new culvert is 6-foot diameter with a gravel bottom that approximates the constructed channel width.

Figure 8: Original Culvert was considered a fish barrier.

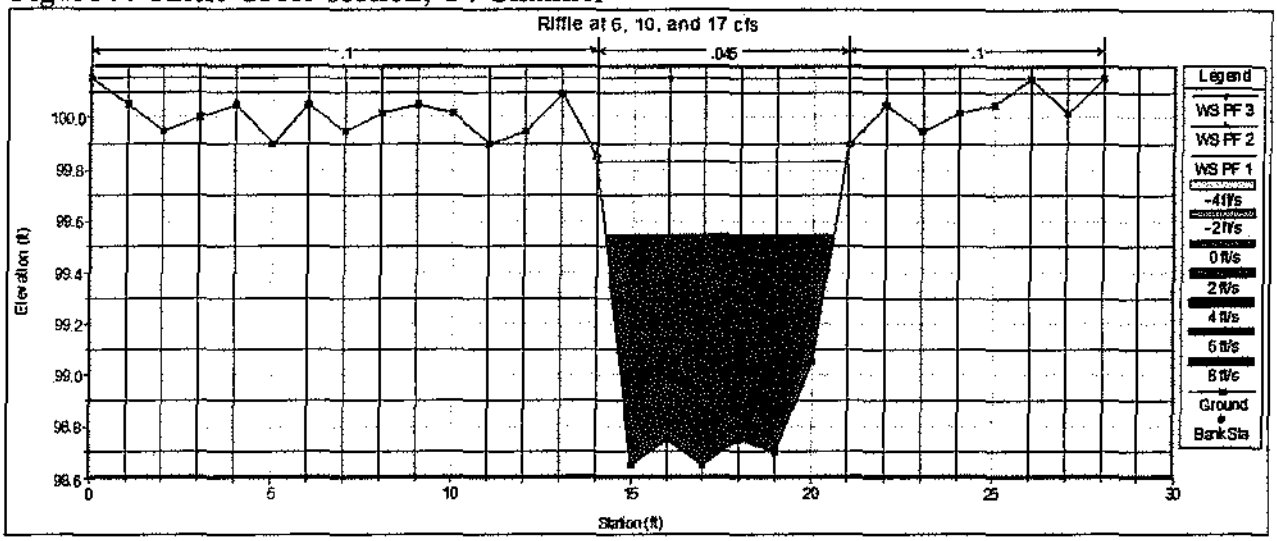


The upstream portion of reach C will not be altered from Sta 28+00 to the confluence with North Fort Shaw Road (Sta 52+00 in existing condition plans) as part of the present design.

3.4 Proposed Channel Dimensions

Proposed riffle and pool cross-sections for the reach between Sta 0+00 and 22+00 are shown in **Figures 9** and **10** with water surfaces shown for 6, 10, and 17 cfs. These are representative of C channel morphology. The cross-sections are designed to maintain water elevations within 6 inches of the adjoining wetland/floodplain, overtop at flow approaching 10 cfs, and have an inundated wetland floodplain at 17 cfs.

Figure 9. Riffle Cross-section, C4 Channel



Hydraulics results for the riffle cross-sections show velocities of1.34 ft/s and 1.47 ft/sec at 6 cfs and 17 cfs respectively (**Tables 2 and 3**). Shear stress values were 0.12 lbs/ft2 and 0.20 lbs ft2 at these same flows.

Figure 10. Pool Cross-section, C4 Channel

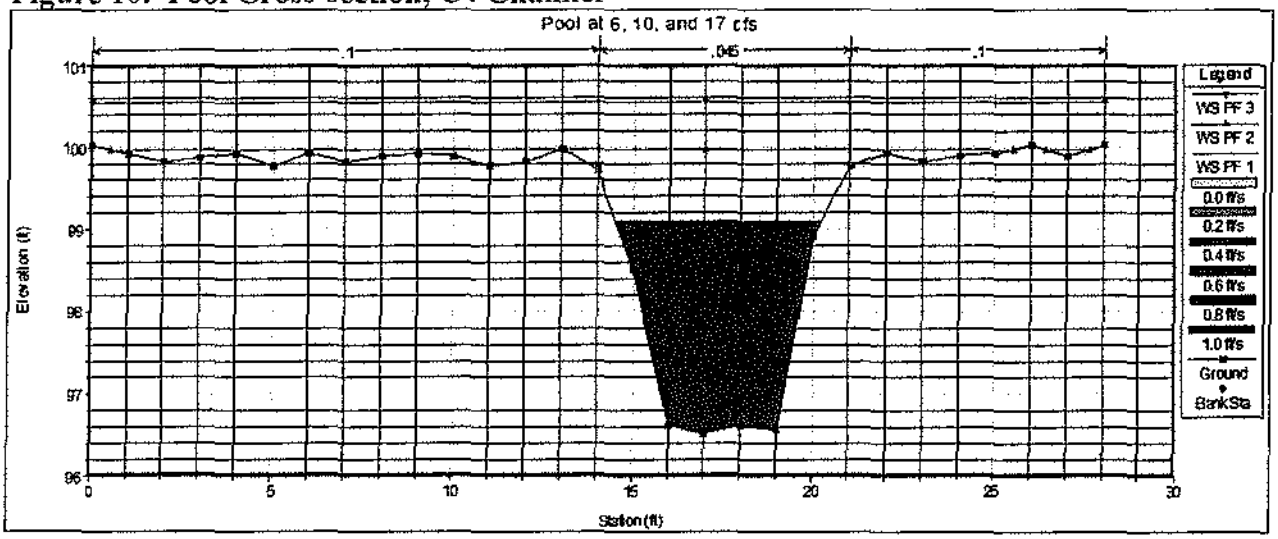


Table 2. Riffle Hydraulics C4 Channel @ 6 cfs

E. G. Elev (ft)	99.57	Element	Channel
Vel Head (ft)	0.03	Wt. n-Val.	0.045
W. S. Elev (ft)	99.54	Reach Len. (ft)	50
Crit W. S. (ft)		Flow Area (sqft)	4.49
E. G. Slope (ft/ft)	0.002961	Area (sqft)	4.49
Q Total (cfs)	6	Flow(cfs)	6
Top Width (ft)	6.32	Top Width (ft)	6.32
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)	1.34
Max Chl Dpth (ft)	0.89	Hydr. Depth (ft)	0.71
Conv. Total (cfs)	110.3	Conv.(cfs)	110.3
Length Wtd. (ft)	50	Wetted Per. (ft)	7
Min Ch El (ft)	98.65	Shear(lb/sqft)	0.12

Table 3. Riffle Hydraulics C4 Channel @ 17 cfs

E. G. Elev (ft)	100.2	Element	Channel
Vel Head (ft)	0.05	Wt. n-Val.	0.045
W. S. Elev (ft)	100.15	Reach Len. (ft)	50
Crit W. S. (ft)		Flow Area (sqft)	8.63
E. G. Slope (ft/ft)	0.00295	Area (sqft)	8.63
Q Total (cfs)	17	Flow(cfs)	16.36
Top Width (ft)	28	Top Width (ft)	7
Vel Total (ft/s)	1.47	Avg. Vel. (ft/s)	1.89
Max Chl Dpth (ft)	1.5	Hydr. Depth (ft)	1.23
Conv. Total (cfs)	313	Conv.(cfs)	301.2
Length Wtd. (ft)	50	Wetted Per. (ft)	7.95
Min Ch El (ft)	98.65	Shear(lb/sqft)	0.2

Hydraulics results for the C4 pool cross-sections show velocities of 0.56 ft/s and 0.58 ft/sec at 6 cfs and 17 cfs respectively (**Tables 4 and 5**). Shear stress values were 0.02 lbs/ft2 at these same flows. Pool hydraulics are controlled in part by downstream riffle elevations and pool turbulence. A slope of 0.0002 was used to represent average pool slope, though these slopes are likely to flatten and approach the riffle to riffle slope (0.29%) at peak flow.

Table 4. Pool Hydraulics C4 Channel @ 6 cfs

E. G. Elev (ft)	99.11	Element	Channel
Vel Head (ft)	0	Wt. n-Val.	0.045
W. S. Elev (ft)	99.1	Reach Len. (ft)	50
Crit W. S. (ft)		Flow Area (sqft)	10.63
E. G. Slope (ft/ft)	0.000226	Area (sqft)	10.63
Q Total (cfs)	6	Flow(cfs)	6
Top Width (ft)	5.7	Top Width (ft)	5.7
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.56
Max Chl Dpth (ft)	2.58	Hydr. Depth (ft)	1.86
Conv. Total (cfs)	399.3	Conv.(cfs)	399.3
Length Wtd. (ft)	50	Wetted Per. (ft)	8.75
Min Ch El (ft)	96.52	Shear(lb/sqft)	0.02

Table 5. Pool Hydraulics C4 Channel @ 17 cfs

E. G. Elev (ft)	100.55	Element	Channel
Vel Head (ft)	0.01	Wt. n-Val.	0.045
W. S. Elev (ft)	100.54	Reach Len. (ft)	50
Crit W. S. (ft)		Flow Area (sqft)	20.29
E. G. Slope (ft/ft)	0.000206	Area (sqft)	20.29
Q Total (cfs)	17	Flow(cfs)	14.83
Top Width (ft)	28	Top Width (ft)	7
Vel Total (ft/s)	0.58	Avg. Vel. (ft/s)	0.73
Max Chl Dpth (ft)	4.02	Hydr. Depth (ft)	2.9
Conv. Total (cfs)	1184.8	Conv.(cfs)	1033.6
Length Wtd. (ft)	50	Wetted Per. (ft)	10.59
Min Ch El (ft)	96.52	Shear(lb/sqft)	0.02

3.5 Spawning Gravel Requirements

Creation of suitable spawning habitat requires establishing appropriate gravel sizes and appropriate channel morphology. The tailout or glide of pools is a preferred spawning feature for trout because of hydraulics, gravel sorting, and surface water/groundwater exchange (**Figure 11**). Creation of functioning pool-riffle complexes including a glide section is a high priority in restoring streams for spawning.

Figure 11. Spawning Site Morphology (Keller & Kondolf 1990)

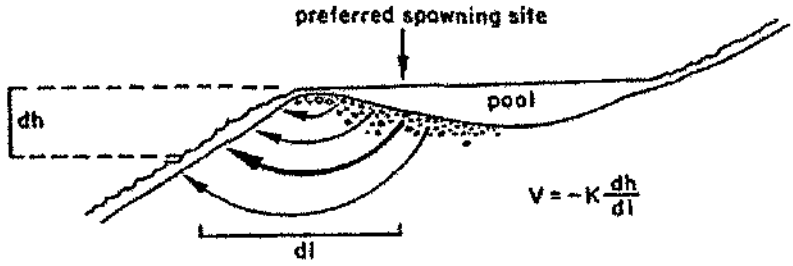


FIGURE 5.—Diagram of groundwater flow through the tail of a pool. The lower elevation of the water surface in the riffle creates a hydraulic gradient that induces downwelling at the tail of the pool; V is Darcy velocity and K is hydraulic conductivity. Vertical scale is greatly exaggerated. (From Keller and Kondolf 1990.)

Gravel size distribution for salmonid spawning has been studied extensively and is well-documented in the literature. Kondolf's work provides an overview of gravel size distribution associated with spawning gravels for salmonids (Kondolf 2000). For rainbow trout, median gravel size is in the range of 15 to 40 mm (**Figure 12**). Fines below 4 or5 mm are generally less than 10% of spawning bed composition. Fine material of sand size or smaller (i.e. 2 mm) degrades spawning potential and embryo survival.

To insure successful spawning, channel design must create appropriate morphology and hydraulics to maintain necessary gravel sizes. A design that flushes fines from the bed, and maintains gravel in the 15-40 mm zone is the objective for pool-riffle sequences.

Figure 12. Spawning Gravel Size Distributions

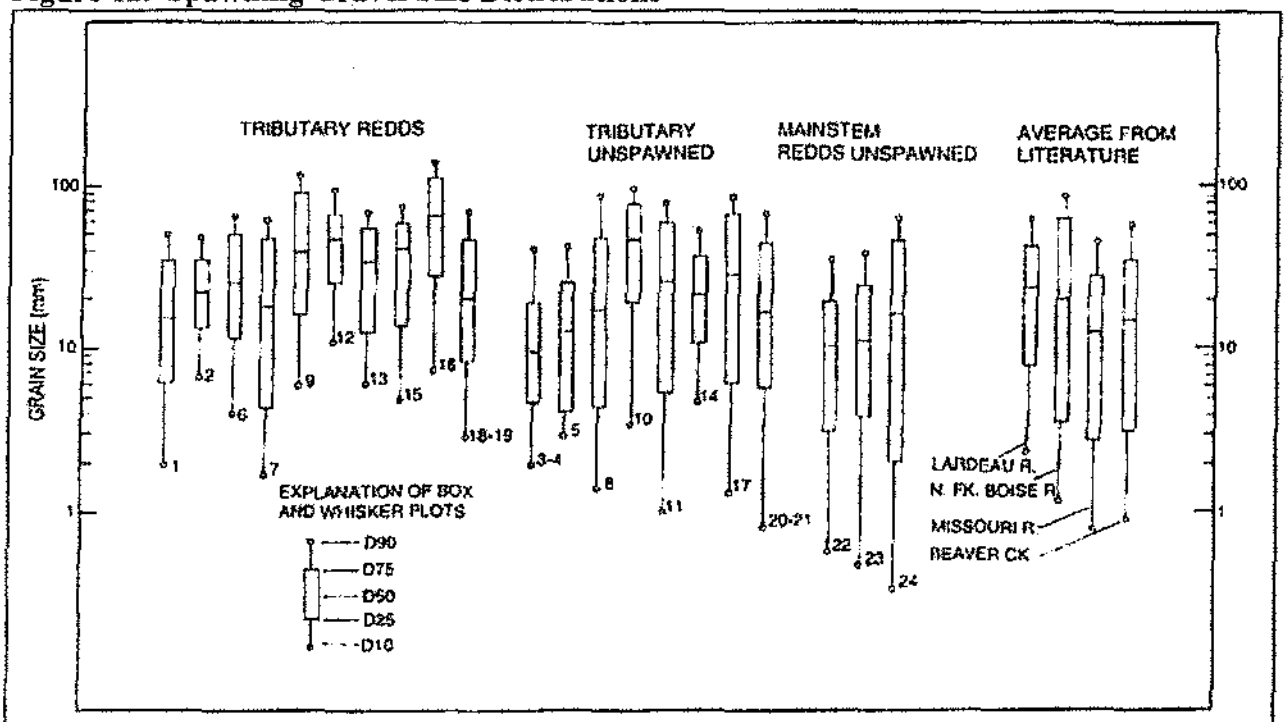


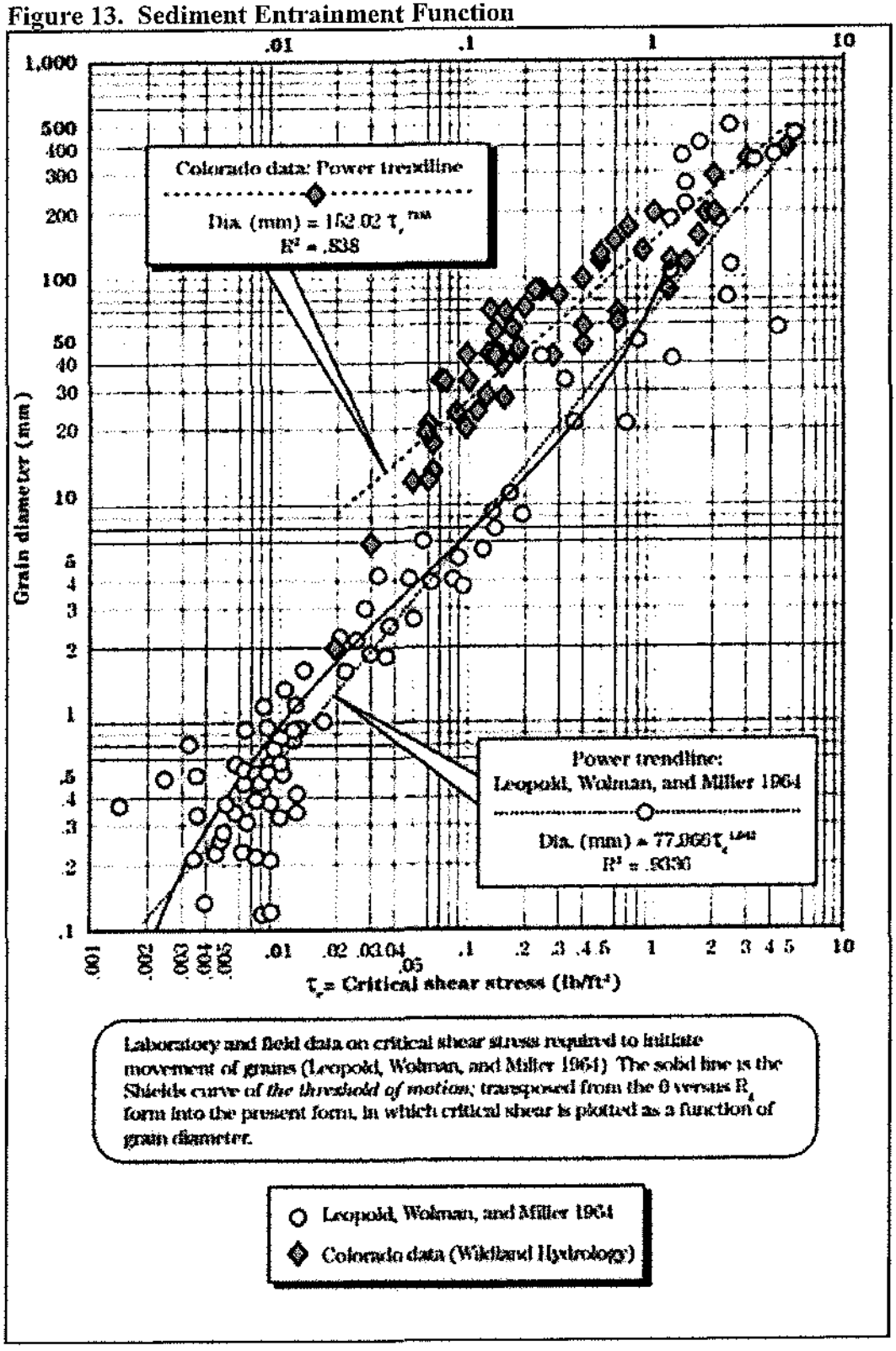
FIGURE 2.—Box-and-whisker plots for rainbow trout spawning gravels from the case study in the Colorado River and tributaries downstream of Glen Canyon Dam, and averages for other rainbow trout spawning gravels. (Summary numerical values are given in Table 2). For each sample, the rectangle (box) encompasses the middle 50% of the sample, from the d_{25} to d_{75} values, termed the "hinges." The median diameter, d_{50}, is represented by a horizontal line through the box. Above and below the box are lines (whiskers) extending to the d_{90} and d_{10} values, a modification of the standard box-and-whisker plot of Tukey (1977). Numbers below the plots refer to samples in Kondolf et al. (1989). Box-and-whisker plots are easier to read than cumulative size distribution curves when several similar distributions are plotted on the same graph.

3.6 Shear Stress, Sediment Entrainment and Channel Stability

Important aspects of channel design are flushing and transport of fine sediments from the reconstructed bed and bed vertical stability during peak flows. Although flow velocity can be used as a surrogate, shear stress (the depth-slope product) drives sediment entrainment and transport.

Attenuated seasonal peak flows and relatively stable baseflows result in a limited range of channel shear stress for Rocky Reef. The absence of pronounced peak flows combined with coarse channel substrate means constructed channel stability is relatively straightforward to evaluate. Entrainment and transport of fines is more challenging to quantify. The traditional Shields entrainment function employs a dimensionless critical shear stress of 0.06 to represent the threshold of sediment entrainment (**Figure13**). Data from Colorado suggest values of shear stress can be lower to mobilize a given size of sediment, particularly in the larger size classes.

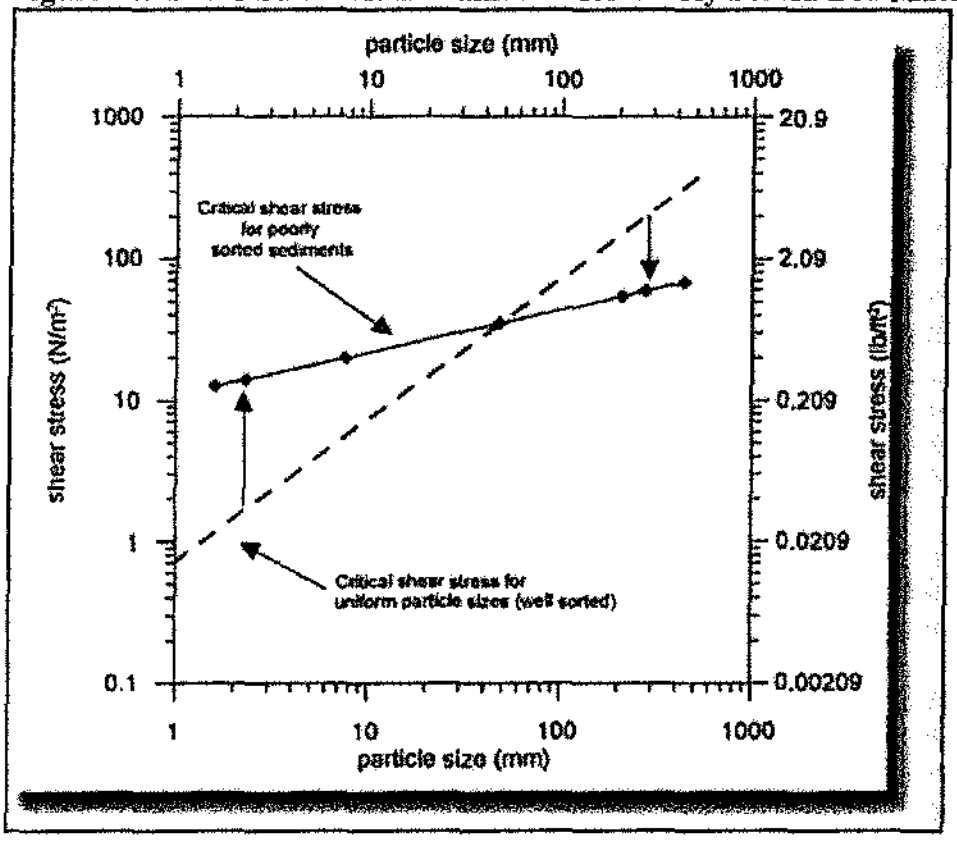
Figure 13. Sediment Entrainment Function



Laboratory and field data on critical shear stress required to initiate movement of grains (Leopold, Wolman, and Miller 1964) The solid line is the Shields curve of *the threshold of motion;* transposed from the θ versus R_* form into the present form, in which critical shear is plotted as a function of grain diameter.

Poorly sorted bed material (e.g. fine sediments embedded in coarse substrate) can also require elevated shear stress to mobilize fines due to the "sheltering" function of coarse bed material (**Figure 14**).

Figure 14. Shear Stress vs. Entrainment for Poorly Sorted Bed Material



A variety of modifications to the entrainment function have been proposed to account for sorting, substrate size, armoring, imbrication, and other factors such as turbulence and temperature.

For design purposes, a pragmatic and simplified approach was taken to evaluate expected performance of the proposed channel cross-section and gradient. Shear stress for proposed cross-sections was calculated as the product of slope, hydraulic radius, and specific weight of water.

$$\tau = \gamma R s \text{ (lbs./sq.ft.)},$$

where τ is the fluid shear stress
γ is the specific gravity of water
(density x gravitational acceleration)
(1.94 slugs x 32.2 ft/sq.sec) = 62.4 lbs./sq.ft.
R is the hydraulic radius (approximately mean depth)
s is the slope of the channel

Shear stress values for the channel (0.0029 ft/ft) are shown for pool and riffle cross-sections at flows of 6 and 17cfs (**Table 6**). Threshold particle size mobilized is estimated using Shield's diagram (**Figure 13**).

Table 6. Estimated Shear Stress and Particle Size Entrainment

Cross-section Type	Shear (lbs/ft2)		Entrainment	
	@ 6 cfs	@ 17 cfs	@ 6 cfs	@ 17 cfs
Riffle (C4)	0.12	0.20	6 mm	12 mm
Pool (C4)	0.02	0.02	2 mm	2-5 mm

Based on traditional shear stress entrainment thresholds, riffle cross-sections in the C4 reach could be expected to mobilize particle sizes of 6 to 12 mm at 6 and 17 cfs respectively. C4 pool cross-sections would mobilize particle sizes of 2 to 2-5 mm at 6and 17 cfs. This suggests that on average riffles will remain free of fine sediments, and pool cross-sections would accumulate sediments greater than 2 mm during baseflow, and experience seasonal flushing of sediments finer than 5 mm during peak flows. Pool flushing will be highly dependent on turbulence and secondary currents during peak flow. Note that pool slope at peak flow will approach 0.29% as the hydraulic gradient flattens.

Factors such as turbulence, bed sorting, and fine sediment cohesiveness would be expected to result in variability from these average values. In particular, flushing of fines may be lower than predicted due to the sheltering effect of coarse substrate as illustrated in **Figure 14**.

For all channel cross-sections shear stress is insufficient to mobilize the D84 of 50 mm. The proposed channel can be expected to have excellent vertical stability. The weighted D50 from the partially completed channel in Reach C was 11.2 mm. Shear stress in the C4 riffle cross-section could be expected to mobilize this size fraction.

4.0 PROPOSED FLOODPLAIN AND WETLAND

In general, construction activity is primarily focused on 1) raising streambed elevation and water surface to target elevations, 2) creating appropriate pool/riffle channel geometry; and, 3) lowering (or raising) adjoining wetland areas as required to achieve appropriate wetland hydrology.

4.1 Target Streambed Elevation, Water Surface Elevation, and Wetland Elevation

The streambed elevation shown in the proposed plan represents the riffle-to-riffle slope (**Appendix F**). Pool features are not shown on the longitudinal profile. Pool/riffle complexes will be constructed and shaped in the field by an experienced restoration contractor.

A key element of the proposed restoration plan is to raise the water surface to an elevation that will support adjoining wetland hydrology. The streambed elevation shown in the plan is intended to be a guideline for placement of riffle elevations on the long profile. The associated

water surface will ultimately be established by shaping the channel cross section and will be controlled in part by channel roughness and downstream facet slope of the run leaving the riffle.

Depending on location along the profile, wetlands adjoining the channel may require either raising or lowering to achieve desired wetland hydrology. Reconstructed wetlands that were lowered as part of the previous restoration effort will need to be raised to reflect the elevated design stream water elevation. Wetland areas that were undisturbed may need to be lowered in some locations to "match" constructed water surface.

In all cases, the target elevation for a constructed wetland elevation relative to the constructed water surface should be within12-16 inches vertical or less of the constructed water surface during low flow conditions. This will insure successful wetland hydrology is established which will support obligate wetland species and maintain function and values.

Please note the "upper limit of wetland" line depicted on the design sheets. This is the elevation where wetland hydrology ceased to exist and the vegetation community transitioned from facultative wetland species to upland species. This line does not represent a recommended constructed wetland elevation. This line represents an elevation at which wetland characteristics are unlikely to be achieved or maintained.

Proper placement of wetland sods relative to the constructed water surface is critical to success of wetlands. Because capillarity of the soils will likely be altered, it is particularly important to place wetland and floodplain sods within 16 inches vertical (or less) of the water surface in the reconstructed wetland areas. This applies equally to wetlands areas being either raised or lowered.

This plan has endeavored to address EPA concerns by raising stream grade. In general, wetland elevation adjustments will only be required from about Sta 9+00 to Sta 18+00. Preference will be given to raising the water surface in lieu of lowering/reconstructing wetlands. Field adjustment of constructed water surface maybe able further minimize any floodplain wetland elevation adjustments.

4.2 Pool/Riffle Geometry

Geometry of pools and riffles will vary according to meander radius, channel shaping, and desired water surface elevation relative to existing or constructed wetland features. Riffle, pool, run and glide features will be constructed by an experienced stream restoration contractor. Typical channel cross sections will vary and will be optimized to create stable hydraulic conditions and habitat. Shaping of the glide/tailout portion of the pool is particularly important to achieve spawning objectives.

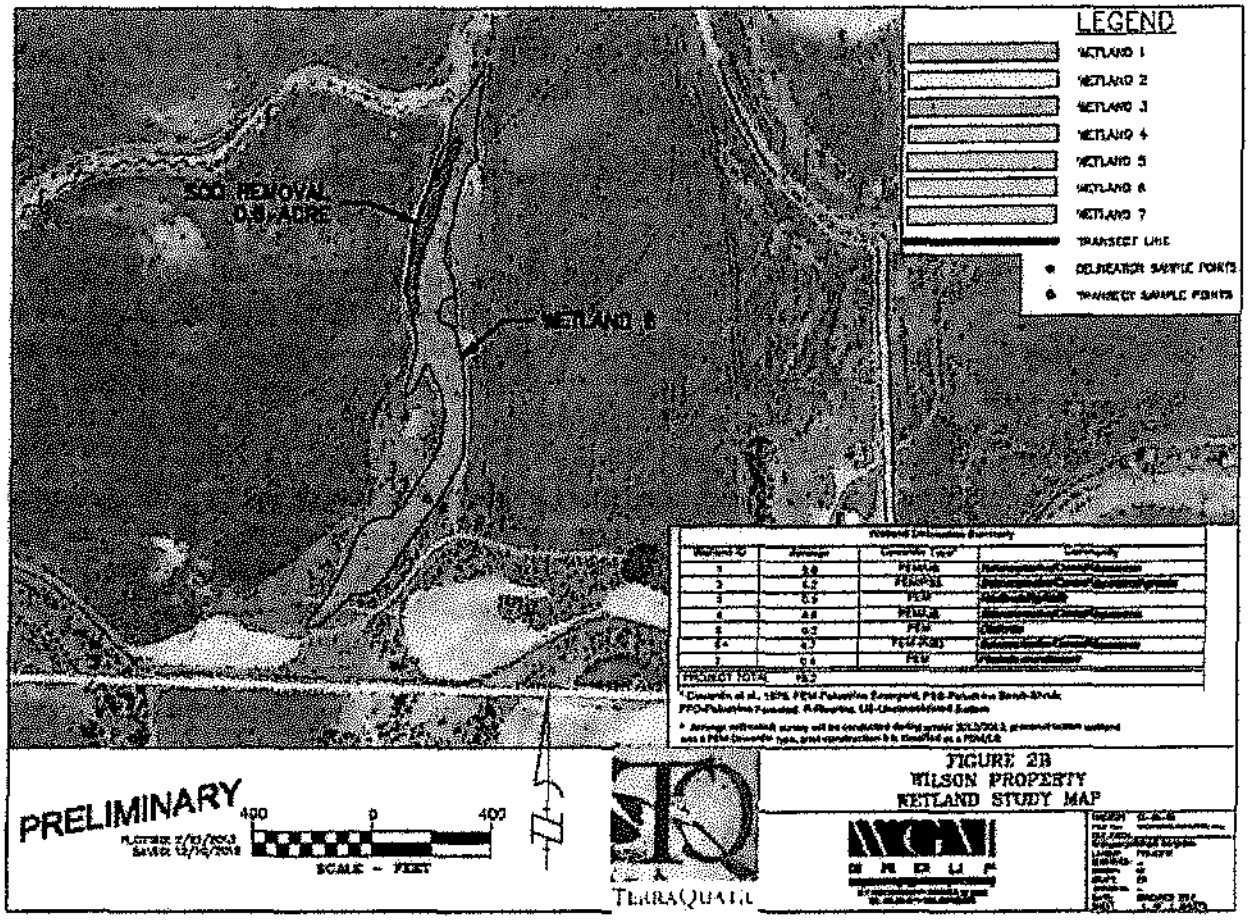
Stockpiled fill will be brought in to set the riffle elevations and raise stream grade. Shaping of the riffle cross-section will include construction of appropriate glide slope, riffle slope, and run where appropriate. In areas where required in-channel fill depths approach 3 feet, shaping of the riffle and associated features will effectively form the pool, and minimal excavation will be required to construct pools to final depths. Suitably-sized spawning gravel materials are

abundant in stockpiled fill. Pool depth will be on the order of 4 feet, but can vary from 3 to 5 feet.

4.3 Wetland 6 Restoration

Removal of wetland sod, creation of open water, and discharge of wetland sod in jurisdictional areas of wetland 6 was identified as a concern by EPA staff. In wetland 6, 0.6 ac of shallow standing water was created in the 4.7 ac wetland (**Figure 15**). The subsequent wetland delineation determined that the presence of open water improved the quality of the wetland in terms of wildlife function.

Figure 15. Wetland 6 Delineation



Restoration of this wetland has been identified as a priority by EPA staff. The proposed resolution of this issue is as follows. Of the 0.6 acre of open water, 0.3 acre of the perimeter will be filled with fine-textured soil to a depth of 4 inches above the water level. This area will be seeded with a mix of *Schoenoplectus acutus* (Hardstem Bulrush) and *Schoenoplectus americanus* (Oleny Threesquare). These species provide excellent waterfowl enhancement and successful establishment could be expected to result in stands of emergent plants over time. Seeds

germinate best in saturated fine grained soils immediately above the water surface. Seeding rate will be 6 lbs PLS/ac.

4.4 Wetland 2 Restoration Adjacent to Farm Road

An upland terrace adjacent to wetland 4 was sloped back immediately upstream of the Farm Road on the right bank. This corresponds to Sta 33+00 to 35+00 on the existing condition plan set (**Appendix E**). This area was reviewed during the wetland delineation, and less than 300 ft2 of wetland disturbance occurred along the floodplain margin. As of summer 2013, this small area had fully recovered original wetland characteristics/function.

5.0 CONSTRUCTION CONSIDERATIONS

Construction considerations include practicability, optimizing efficiency of materials handling, reducing time working in live water, and minimizing duration of downstream sedimentation impacts.

With the exception of the newly created channel bypass segment in reach B, construction of upstream reaches A and B was generally conducted with flow passing through the constructed segment. This facilitated channel shaping and grading at the cost of some downstream sedimentation. Dewatering of the channel during construction was not conducted and is not anticipated for implementation of the present plan. Downstream sedimentation will be minimized by trapping materials in excavated in-stream settling pools. Accumulated fines will be removed during final channel shaping.

Other BMPs include refueling and storage of any petroleum products in upland areas outside of jurisdictional wetlands and seeding any disturbed bare soils with upland or wetland species as appropriate to the location. The channel margin and constructed floodplain will be sod; no bare soils will be left within the ordinary high water mark. Silt fence is not expected to be necessary for any aspect of planned construction activity.

Sufficient material is stockpiled in the area to allow for regrading the channel to the proposed elevation. Wetland sod will be salvaged from within the steam corridor and not be brought in from wetland areas outside the immediate construction area. Intact wetland sods will be preferentially placed along the immediate stream margins and floodplain. If bare soils are present following construction of the floodplain wetland, they will be located along the perimeter of the floodplain and reseeded with wetland species as needed.

Temporary stockpiling of excavated fill will be limited to scalping and immediate replacement of wetland sods during channel construction. Previously stockpiled gravel and soil material will be the primary source of fill to elevate wetland areas and the existing streambed to final constructed elevations. Approximately 4000 CY of this material will be required as fill between Sta 8+00 and 29+00. The majority of this material (3000 CY) will be used between Sta 18+00 and Sta 28+00. Suitably sized spawning gravels were separated by the contractor and screening/washing of these materials will not be necessary.

No temporary roads, work pads, or access ramps will be required to complete construction. The remainder of any stockpiled fill located in wetland or upland areas will be removed and re-graded into upland agricultural fields. Excess material is mostly located between Sta 0+00 and Sta 15+00.

The construction schedule is largely dependent on approval and notice to proceed from agency staff. Fall construction is ideal; total working time is expected to be 6 weeks (**Table 7**). It should be noted that factors such as permit approval and potential delays due to weather or working conditions may require altering the schedule outlined in **Table 7**.

Table 7. Construction Schedule

Item	November	December	January	April/May 2014	August 2014	August 2015	August 2016-8
Permitting	X						
Construction	X	X	X				
Planting				X			
As-built			X				
Monitoring					X	X	X

The contractor Justin Devers is experienced in stream reconstruction/restoration will be available to complete the project. A consultant experienced in stream and wetland restoration will directly supervise all work performed pursuant to the EPA-approved restoration plan. WGM staff, including Sr. Hydrologist Bruce Anderson, are expected to perform this oversight. Any changes to the professional staff, construction contractor, or work schedule will require notification and approval by EPA.

Final channel shaping and pool/riffle morphology will established in the field and some flexibility is required to accomplish project objectives. Any substantive changes or deviations from the design will require approval in advance by EPA. An as-built report and map(s) of the restoration project will be submitted to EPA within six (6) weeks of the completion of final grading and planting.

State Historic Preservation Society (SHPO) and Cultural Resources have been previously addressed for reach C (**Appendix I**). The proposed restoration activities are within the area already addressed by SHPO.

6.0 RIPARIAN AND STREAMSIDE BUFFER

A 50-ft streamside vegetative buffer on either side of the channel was envisioned to protect the reconstructed stream from potential sedimentation and to provide habitat along the channel margins (MFWP Environmental Assessment, 2009) (**Appendix G**). Sod and riparian plantings were planned for the buffer zone, though no detailed planting plan or species were described.

6.1 Proposed Buffer Zone

The proposed buffer zone is shown in **Figures 1-5 (Appendix G)**. The 50-ft corridor is defined as the offset from the edge of the channel on both sides of the stream. The buffer is intended as a corridor of native species including riparian plants immediately adjacent to the stream and herbaceous species on the upland areas.

No agricultural cropping, grazing, cultivating, haying, clearing or roads (except for dedicated stream crossings) will occur within the buffer. Irrigation center pivots travel across the buffer via small wooden timber bridges. Most of the timber structures are functioning adequately, although several spans have limited clearance from the reconstructed channel/floodplain stream. Adequate pads/footings are needed at these locations to raise bridge spans above the channel. This will reduce impacts of pivot travel on constructed wetland areas.

Management tools for the buffer zone may include either mowing for weed control (thistle) or burning to rejuvenate senescent grasses. During the 5-year monitoring period, these activities (if required) would require authorization by EPA. In addition, reach C is under a conservation agreement with USFWS and burning or mowing would require authorization by USFWS in this area.

6.2 Buffer Zone Plantings

The buffer spans a moisture gradient from wetland to dry upland area. With the exception of some limited areas, the riparian/wetland zone immediately adjacent to the reconstructed stream is well-vegetated with herbaceous and forb species. Proposed planting will focus on woody shrub species along the wetland fringe, and herbaceous species in upland areas.

6.2.1 Upland Species

Upland areas within the buffer zone that have experienced past cropping will be planted with a pheasant-friendly seed mix of herbaceous species (**Table 8**). Small burnet and hairy vetch provide seed for chicks. The wheatgrass species have extensive rhizomes that help limit soil erosion. Canby bluegrass and Sandberg bluegrass are small native bunchgrasses that are drought-tolerant and will inter-seed between other species.

Upland soils will be prepared with a chisel plow or harrow as necessary and drill seeded at a rate of 26.5 lbs/acre at 0.5-1.0" depth. Buffer areas currently in barley will first be harvested to remove the competing seed bank and then planted with the buffer species. Upland areas not cropped but already having a strong herbaceous plant community may be left undisturbed. The proposed buffer contains mosaic of cropped areas, site alteration from previous restoration activities, and introduced/native grasses. All cropped areas within the buffer will be planted and remaining areas will be evaluated for planting on a case by case basis in the field. Planting is planned for late spring 2014.

Table 8. Upland Species Mix

STREAMBUFFER SEED MIX1			
Type	**Species**	**Common Name / Root Growth Habit**	**Pounds/Ac**
Grasses	*Elymus (Agropyron) dasystachyum var. riparium ('Sodar')*	Streambank wheatgrass(rhizome)	3
	Pascopyrum (Agropyron) smithii ('Rosanna')	Western wheatgrass (rhizome)	3.5
	Poacanbyi	Canby bluegrass (bunch)	1
	Poasandbergii	Sandberg bluegrass	1
	Triticale aestivum x Secale cereal	Wheat x Cereal Rye Hybrid (sterile hybrid-cover crop)	1
Forbes	*Sanguisorba minor*	Small Burnet	1
	Viciavellosa	Hairy Vetch	1
		TOTAL	**11.50**

1 The USDA (Josh Schreckengost, Great Falls) was consulted to verify suitability for the Fort Shaw area and pheasant habitat enhancement.

6.2.2 Riparian/Transitional Shrub Species

Existing woody species are extremely limited in distribution and density. Isolated silver buffaloberry patches are present in some areas, with limited amounts of other species such as Russian olive. Cottonwood along with the shrub species hawthorn, snowberry, serviceberry and chokecherry could potentially be established in microsites out of wetland areas.

The original stream restoration design envisioned planting of 1,000 shrub species in reaches A-E, although details were not described. The proposed buffer will include 300 woody shrub plantings concentrated in reach C. No plantings are planned for reaches A and B at this time. Shrubs in reach C will be planted in microsites at the transition between wetland and upland areas, generally along the slope break of the reconstructed channel floodplain. Shrubs will be obtained from the State Nursery in Missoula and will be 1-0 or larger bare root stock. hawthorn, silver buffaloberry, and lesser amounts of chokecherry, serviceberry will be planted totaling 300 plants. The earliest delivery date from the nursery is about mid-April.

7.0 WETLAND MONITORING

A key project objective is no net loss of wetland acreage, function or values. The 2013 wetland delineation report defines the baseline condition for wetland acreage, distribution, and function. Annual monitoring will be conducted to evaluate wetland zones downstream of the Farm Road (wetland 2 and 4), and wetland 6 west of Fort Shaw Road.

Established wetland transects T2, T3, T4 will be replicated and the perimeter of wetland boundaries will be re-surveyed to determine wetland acres described in the 2013 delineation. Annual monitoring results will be compared with the 2013 benchmark condition to evaluate any shifts in total wetland acres or function. A wetlands monitoring report will be submitted to EPA for review by September 15 of each year.

The Mitigation Rule and Regulatory Guidance Letter 08-03 require compensatory mitigation areas to be monitored for a minimum of five (5) full years following completion of the

restoration/mitigation work. EPA may consider a written request to reduce the 5-year monitoring requirement following the submittal of at least two (2) consecutive annual monitoring reports which demonstrate that all final performance standards have been met, including verification through an EPA/Corps inspection.

The annual report will include a review of any increases/decreases in wetland acreage or function and values. If any significant deficits in wetland acreage are apparent (i.e. effects exceeding minor sampling error), the wetland report will include recommendations for enhancing or improving wetland coverage. If necessary, an adaptive management approach that allows for appropriate wetland enhancement or replacement/creation is envisioned.

Pursuant to requirements found in the Corps of Engineers Wetlands Delineation Manual, Corps' Regional Supplement, and RGL 08-03, the following performance standards will be applied:

a. For each year of the 5-year monitoring period for the wetland areas, at least 80% of the woody and herbaceous species must be alive and judged to be of moderate or better vigor.
b. The restoration areas must have a minimum vegetation cover (excluding trees) of 25% the first year, 50% the second year, 75% for the third and fourth years, and a minimum of 80% for the fifth year of the monitoring period;
c. A minimum of 50% of the dominant hydrophytic species (Facultative, Facultative Wetland, and/or Obligate Wetland) must be present in wetland vegetative communities by the end of the 5-year monitoring period;
d. Restoration areas (wetland and upland buffer) will have no more than 25% non-native species in all stratigraphic levels (forbs, shrubs, trees) unless determined otherwise by EPA and the Corps; and
e. Invasive species and noxious weeds must be controlled during the monitoring period.

The channel and wetland floodplain design gives consideration to wetland area 2 which does not directly adjoin the stream. The proposed stream channel design maintains pre-existing stream grade and surface water elevations along the perimeter of wetland 2.

It is worth noting that the hydrology of this area has historically been supplemented by irrigation or flooded with wastewater from an irrigation ditch that is no longer in service (c. 2008).

Figure 16: Aerial View of Wetland Area 2 Ditch (2005)

Although the surface water and stream-supported groundwater elevations will be maintained, it should be recognized that changes in irrigation practice may result in a shift in species composition. Potential wetland shifts- particularly in the upgradient N-NW area - are largely or entirely unrelated to stream restoration activities. To insure that no wetland losses occur, irrigation will be maintained via the Birchmeade ditch to those areas originally supported by flood irrigation return flows.

8.0 ATTAINMENT OF OBJECTIVES

The proposed plan endeavors to construct a segment of fully-functioning stream channel and associated wetland that links the unrestored portion of reach C to the partially-constructed portion of reach C. The objective is to minimize potential environmental impacts, create a fully functioning channel, and restore/replace wetlands to insure no net loss of wetland acreage, function, or values.

The proposed plan addresses issues raised by EPA, MFWP, FSA and other agency concerns:

1) Channel elevation, water elevation, and corresponding groundwater elevation are raised to support wetland floodplain hydrology at pre-construction elevations;
2) Potential environmental impact of restoration is minimized by following existing meanders and minimizing disturbance or reconstruction of pre-existing wetlands;
3) A 50-ft vegetated buffer is established through reaches A, B, and C.
4) Wetland 6 is revegetated with bulrush sp.
5) In lieu of a bridge, the replaced culvert at the confluence with the Sun River side channel will remain in place, consistent with views expressed by MFWP and Conservation District staff.
6) Pivot bridge crossings will be re-set/maintained so pivot wheels travel across floodplain without impacting wetland.
7) The restoration plan addresses concerns by FSA over potential wetland impacts.

The plan requires reconstruction/restoration of approximately 2700 feet of channel downstream of the Farm Road to the confluence with the Sun River Oxbow. The stream alignment would generally follow the meander pattern established by Bias/Devers and would require fill to elevate 2,200 feet of partially-completed channel.

Wetland areas in the upper portion of the reconstructed reach would be maintained by raising grade of the streambed/water surface elevation to pre-construction elevations. Wetland areas over the lower 2,200 feet would need to be either lowered or raised to establish appropriate grade and groundwater elevations.

This strategy will accomplish the objectives of 1) no net loss of wetlands, and 2) a fully functioning channel in the reconstructed/restored portion of reach C. Monitoring of wetlands downstream of the Farm Road in reach C will be conducted annually to establish attainment of wetland goals.

9.0 REFERENCES

Keller. E. A. and G. M Kondolf. 1990. Groundwater and Fluvial Processes: Selected Observations. Geological Society of America Special Paper 252: 319-340.

Kondolf, G. M. 2000. Assessing Salmonid Spawning Gravel Quality. Transactions of the American Fisheries Society. 129:262-281.

Revised: 7/2/2008 (310 form 270) Form may be downloaded from: www.dnrc.mt.gov/permits/default.asp	AGENCY USE ONLY: Application # CA-28-10 Date Received 6/17/10 Date Accepted 6/23/10 / Initials TM Date Forwarded to DFWP 6/23/10

JOINT APPLICATION FOR PROPOSED WORK IN MONTANA'S STREAMS, WETLANDS, FLOODPLAINS, AND OTHER WATER BODIES

Use this form to apply for one or all local, state, or federal permits listed below. "Information for Applicant" includes agency contacts and instructions for completing this application. To **avoid delays**, submit all required information, including **a project site map and drawings.** Incomplete applications will result in the delay of the application process. **Other laws may apply.** It is the applicant's responsibility to obtain all permits and landowner permission, when applicable, before beginning work.

✓	PERMIT	AGENCY	FEE
X	310 Permit	Local Conservation District	No Fee
	SPA 124 Permit	Department of Fish, Wildlife and Parks	No Fee
	Floodplain Permit	Local Floodplain Administrator	Varies by city/county ($25 - $500+)
X	Section 404 Permit, Section 10 Permit	U. S. Army Corps of Engineers	Varies ($0 - $100)
	318 Authorization 401 Certification	Department of Environmental Quality	$150 (318); $300 - $10,000 (401)
	Navigable Rivers Land Use License or Easement	Department of Natural Resources and Conservation, Trust Lands Management Division	License $25; Easement $50, plus annual fee

A. APPLICANT INFORMATION

NAME OF **APPLICANT:** Leland F. Wilson
Has the landowner consented to this project? X Yes ☐ No
Mailing Address: 29 Rocky Reef Road Day Phone: 650-810-5892
Physical Address: Evening phone:
City/State/Zip: Fort Shaw, MT 59443 E-Mail: Wilson@vivus.com

NAME OF **LANDOWNER** (if different from applicant): Leland F. Wilson Living Trust
Mailing Address: same Day Phone:
Physical Address: Evening Phone:
City/State/Zip: E-Mail:

NAME OF **CONTRACTOR/AGENT (if one is used):** Allen McNeal
Mailing Address: 101 Lower Gurnett Creek Road Day Phone: 406-465-4604
Physical Address: same Evening Phone:
City/State/Zip: Townsend, MT 59644 E-Mail: mcnealres@mt.net

B. PROJECT SITE INFORMATION

NAME OF **STREAM** or **WATER BODY** at project location Rocky Reef Spring Cr. Nearest TownFt.Shaw
Address/Location:29 Rocky Reef Road Geocode (if available):
____1/4 ____1/4 ____1/4, Section 35 & 36, Township 20N & 21N, Range 2W_____ County Cascade___
Longitude _____, Latitude _____

The state owns the beds of certain state navigable waterways. Is this a state navigable waterway? Yes or No. If yes, send copy of this application to appropriate DNRC land office – see Information for Applicant.

ATTACH A PROJECT SITE MAP OR A SKETCH that includes: 1) the water body where the project will take place, roads, tributaries, landmarks; 2) a circled "X" representing the exact project location. IF NOT CLEARLY STATED ON THE MAP OR SKETCH, **PROVIDE WRITTEN DIRECTIONS TO THE SITE:**

This space is for all Department of Transportation and SPA 124 permits (government projects).
Project Name
Control Number Contract letting date

C. PROJECT INFORMATION

1. **TYPE OF PROJECT** (check all that apply)

X Bridge/Culvert/Ford Construction	X Fish Habitat	☐ Mining
☐ Bridge/Culvert/Ford Removal	☐ Recreation (docks, marinas, etc.)	☐ Dredging
☐ Road Construction/Maintenance	☐ New Residential Structure	☐ Core Drill
X Bank Stabilization/Alteration	☐ Manufactured Home	☐ Placement of Fill
☐ Flood Protection	☐ Improvement to Existing Structure	☐ Diversion Dam
X Channel Alteration	☐ Commercial Structure	☐ Utilities
☐ Irrigation Structure	☐ Wetland Alteration	☐ Pond
☐ Water Well/Cistern	☐ Temporary Construction Access	☐ Debris Removal
☐ Excavation/Pit	☐ Other _____	

2. **PLAN OR DRAWING** of the proposed project **MUST** be attached. **This plan or drawing must include:**

- a plan view (looking at the project from above)
- dimensions of the project (height, width, depth in feet)
- location of storage or stockpile materials
- drainage facilities
- an arrow indicating north
- a cross section or profile view
- an elevation view
- dimensions and location of fill or excavation sites
- location of existing or proposed structures, such as buildings, utilities, roads, or bridges

3. **IS THIS APPLICATION FOR** an annual maintenance permit? ☐ Yes X No
(If yes, an annual plan of operation must be attached to this application – see "Information for Applicant")

4. **PROPOSED CONSTRUCTION DATE.** Include a project timeline. Start date 08__/_15__/_10__
Finish date_12__/_20__/_11__ Is any portion of the work already completed? ☐ Yes X No
(If yes, describe the completed work.)

5. **WHAT IS THE PURPOSE** of the proposed project? To re-vitalize an entire spring creek by creating a healthy, functioning stream over 4 miles long from the spring upwelling at its source to its confluence with the Sun River. The stream channel will be returned to proper dimensions, pattern and profile by narrowing and lengthening the current channel and removing fish migration barriers. Sod transplants, native grass and shrub plantings will create a vegetation buffer the entire length of the stream to ensure filtration from the adjacent agricultural land and to create abundant wildlife habitat. The primary objective of this rehabilitation plan is to create a lasting, self-maintaining natural fish spawning and thermal refuge tributary to the Sun River. Additionally, a self-propagating resident wild trout population will be created within the spring creek along with an abundant and diverse aquatic insect population. An added benefit will be enhanced waterfowl habitat created by oxbow wetlands and additional nesting habitat.

6. **WHAT IS THE CURRENT CONDITION** of the proposed project site? Include a description of the existing vegetation, bank condition, bank slope, and height. What other structures are nearby? The spring creek has historically been severely impacted by agricultural practices; specifically channelization, use as an irrigation conveyance, land leveling, and livestock use. The result has been an extremely over-widened, extremely shallow muck-filled stream that is subject to thermal heating with large areas devoid of healthy aquatic life. Long stream reaches currently are 15-25 feet wide with 2-4 inches of water over a foot of fine silt covering stream gravels and have a 2-6 foot vertical bank on one or both sides. Much of the stream side vegetation is introduced grasses such as smooth brome and there very few shrubs over most of the stream course. The spring creek crosses one county road and 5 internal farm roads. Former irrigation diversion points and pump sites have all been removed from the stream.

7. **PROVIDE A BRIEF DESCRIPTION** of the proposed project. See attachments for more details. The project focus is to create a healthy stream and riparian area by narrowing and deepening the stream channel to create aquatic habitat plus shape high banks, transplant and plant native vegetation to create healthy riparian habitat. Most of the work will occur within the existing stream channel by placing excavated gravels and adjacent sod mats to create new stream banks. Lateral scour pools will be excavated and ¼ to 1/3 of the outside banks of these pools will have dead tree branches/trunks placed within to create pool habitat. A new channel (Reach B) will be constructed in a former location to abandon the current channel which was created to act as a conduit for livestock waste from a confined feeding area. Stream crossings on the internal farm roads will be re-constructed using larger arched culverts in four cases and one will be replaced by a bridge to be built. Bridges will be placed at all pivot tower crossings along the entire stream course. Three spring tributaries will be re-connected to the spring creek using buried pipe to enhance Rocky Reef Spring Creek flows. The stream continues to gain water as it flows towards its confluence with the Sun River, so constructed channel dimensions will widen and deepen accordingly.

8. **PROJECT DIMENSIONS.** How many linear feet of bank will be impacted? How far will the proposed project encroach into and extend away from the water body? Both right and left banks of the stream channel will be worked on over much of its existing 20,463 feet to create a new channel of a proposed 22,530 feet. A riparian buffer of a minimum of 50 feet will be created along the entire stream channel. This buffer can be created in reaches C through E by working within the existing riparian area, but excavation on one or both banks will need to occur to create a low level riparian area in reaches A and B.

9. **VEGETATION.** What type and how much vegetation will be removed or covered with fill material? All useable sods and shrub clumps disturbed by construction will be transplanted on the new stream banks to provide immediate protection. Additional native sedge sods may be collected in the proposed waterfowl enhancement areas (indicated on the base map) to give immediate strength and a root source for future propagation.

10. **MATERIALS.** Describe the materials to be used and how much.

Cubic yards/Linear feet	Size and Type	Source
100,000 square feet	sod	on-site
120 trees/limbs	3" to 1'	on-site
3,400 feet	4" & 6" PVC	commercial

11. **EQUIPMENT.** What equipment is proposed to be used for the work? Where and how will the equipment be used on the stream bank and/or the waterbody? Tracked excavators, tracked skid loader, tracked and wheeled dump trucks, dozer, scrapers. Stream work will be completed with the tracked excavators digging pools and placing sod mats. Skid loaders will be used to gather sod mats and other materials to haul to the excavator. Dump trucks will be used to haul materials (sods, gravels) to or away from the excavators. The dozer will be used to shape existing high banks and contour the riparian area. Scrapers may be used to create the riparian area in reach B.

12. **CONSIDER THE IMPACTS** OF THE PROPOSED PROJECT, EVEN IF TEMPORARY. Describe planned efforts during and after construction to:

- Minimize erosion, sedimentation, or turbidity? All new channel sections will be excavated in the dry with no flowing water in the channel until that reach is completed. In-channel work will be limited to the excavator placing materials and creating pools and banks. Work will begin in the uppermost reaches and proceed down-valley with sediment pulses limited to short sections of the spring creek.
-
- Minimize stream channel alterations? Stream channel alterations are necessary throughout the majority of the project area to create a healthy, functioning stream channel

- Minimize effects to stream flow or water quality caused by materials used or removal of ground cover? Stream flows will not be altered other than by adding additional spring water by re-connecting 3 tributary springs to the channel. Short term turbidity should be minimal and long term water quality will be greatly enhanced by lowering water temperatures and fine sediment. Sod transplants on the stream banks will function immediately to stabilize banks and keep sediments out of the water. Disturbed ground not covered with sod will be planted with native grasses and shrubs.

- Minimize effects on fish and aquatic habitat? Fish populations are minimal in the spring creek currently, but care will be taken to minimize turbidity during construction and maintain a clean work site.

- Minimize risks of flooding or erosion problems upstream and downstream? The spring creek experiences fairly constant flows with no high waters in the spring to worry about flooding. Channel dimensions are designed to be self-sustaining, so there should be no erosion problems.

- Revegetate/protect existing vegetation and control weeds? All useable sods moved for the project will be transplanted along the stream channel. Any disturbed ground without transplants will be seeded to a native grass mixture, the majority of which can be irrigated with center pivots. Pre-project weed control has been initiated and will continue through the project phase.

13. **WHAT ARE THE NATURAL RESOURCE BENEFITS** of the proposed project? Improved water quality, lowered temperature and sediment load, entering the Sun River. Create a cold water refuge and spawning tributary for Sun River trout. Establish a resident trout population and diversify the aquatic insect population. Enhance waterfowl habitat for both resident and migratory birds. Enhance upland wildlife habitat with created riparian buffers.

14. **LIST ALTERNATIVES** to the proposed project. Why was the proposed alternative selected? The landowner has already removed all the past detrimental impacts to the stream corridor, irrigation water conveyance, water removal for irrigation, cultivated farming to the edge of the stream channel, and livestock use. It was determined that the only way to achieve returning the stream to a healthy state in a reasonable time-frame was to re-shape the channel and riparian area to a form that will be self-sustaining.

D. ADDITIONAL INFORMATION FOR SECTION 404, SECTION 10, AND FLOODPLAIN PERMITS. If applying for a Section 404 or Section 10 permit, fill out questions 1-3. If applying for a floodplain permit, fill out questions 3-6. (Additional information is required for floodplain permits -- See "Information for Applicant.")

1. Will the project involve placement of fill material in a wetland? If yes, describe. How much wetland area will be filled? Calculate the area impacted by fill activity or other disturbance. Note: A delineation of the wetland may be required. Fill will be placed within the existing stream channel to narrow and deepen it in order for the stream to function properly. Reaches A and D will have the majority of stream course narrowed in this manner.

2. If there is a plan for compensatory mitigation, describe the location, type, and amount of proposed mitigation. Attach additional sheet if necessary. Extensive oxbow wetlands will be created by narrowing the channel because former channel behind the point bars will not be filled creating low areas in the cross-section. Also, a large oxbow will be established with the creation of a new stream channel in reaches B and E. These abandoned oxbows will have permanent water in them maintained by spring upwellings within the channel.

3. List the names and address of landowners adjacent to the project site. This includes properties adjacent to and across from the project site. (Some floodplain communities require certified adjoining landowner lists).

   Hugh & Rita Sands, 175 N Fort Shaw Road, Fort Shaw, MT 59443 _____

   Lawrence D. Sands, 167 N Fort Shaw Road, Fort Shaw, MT 59443

4. List all applicable local, state, and federal permits and indicate whether they were issued, waived, denied, or pending. Note: All required local, state, and federal permits, or proof of a waiver, must be issued prior to the issuance of a floodplain permit.

5. Floodplain Map Number _____

6. Does this project comply with local planning or zoning regulations? ☐ Yes ☐ No

E. SIGNATURES/AUTHORIZATIONS

Each agency must have original signatures signed in blue ink.

After completing the form, make the required number of copies and **then sign each copy.** Send the copies with original signatures and additional information required directly to each applicable agency.

The statements contained in this application are true and correct. I possess the authority to undertake the work described herein or I am acting as the duly authorized agent of the landowner. I authorize inspection of the project site after notice by inspection authorities.

APPLICANT:
Print Name: Leland F Wilson

Leland Wilson 6/15/10
Signature of Applicant Date

LANDOWNER:
Print Name: Leland F Wilson

Leland Wilson 6/15/10
Signature of Landowner Date

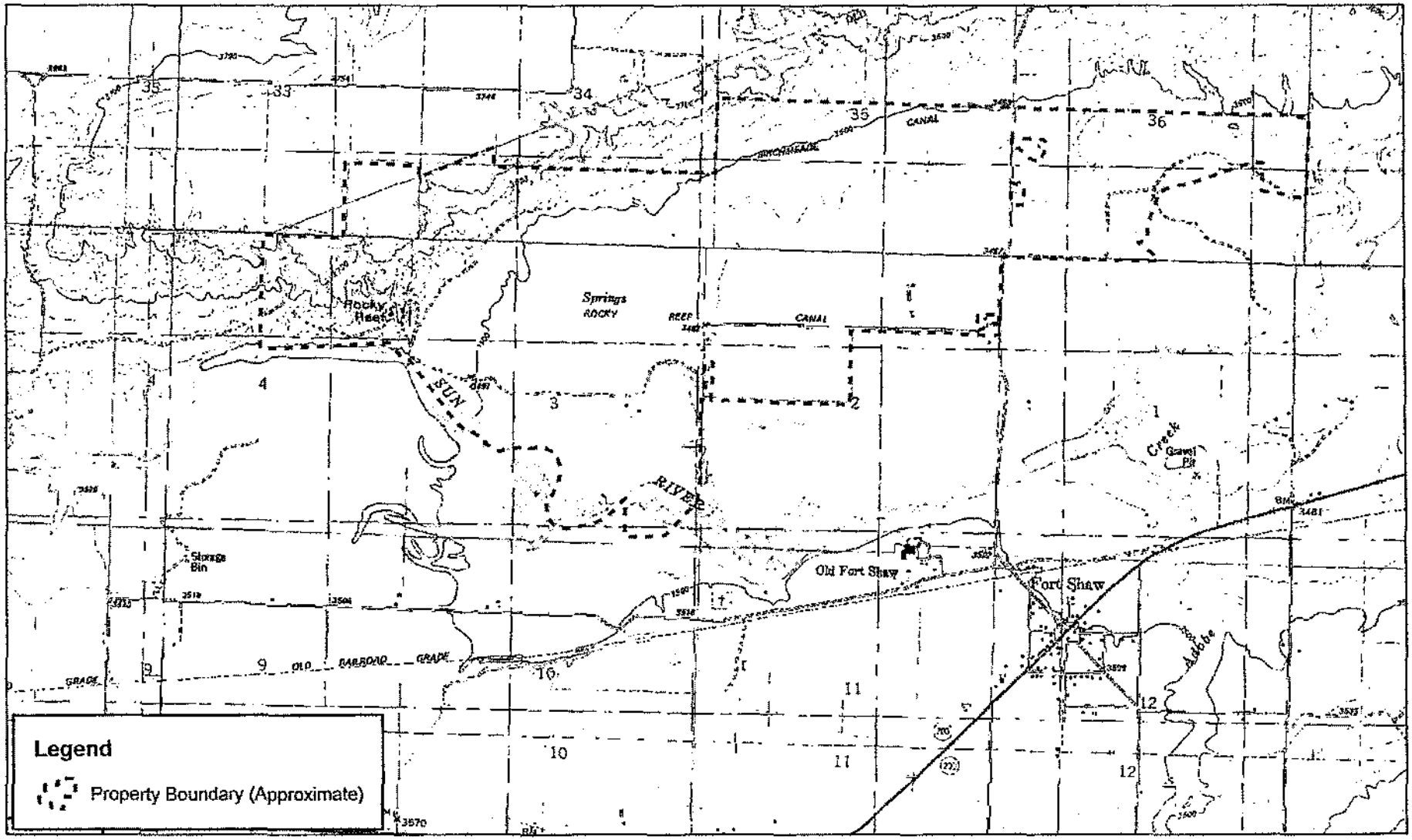
For Leland F Wilson Rev. Living Trust

*CONTRACTOR/AGENT:
Print Name: Allen F. McNeal

Allen F McNeal 6/17/10
Signature of Contractor/Agent Date

*Contact agency to determine if contractor signature is required.

Hydrometrics, Inc.
Consulting Scientists and Engineers



Rocky Reef Spring Creek Project
Topographic Site Map

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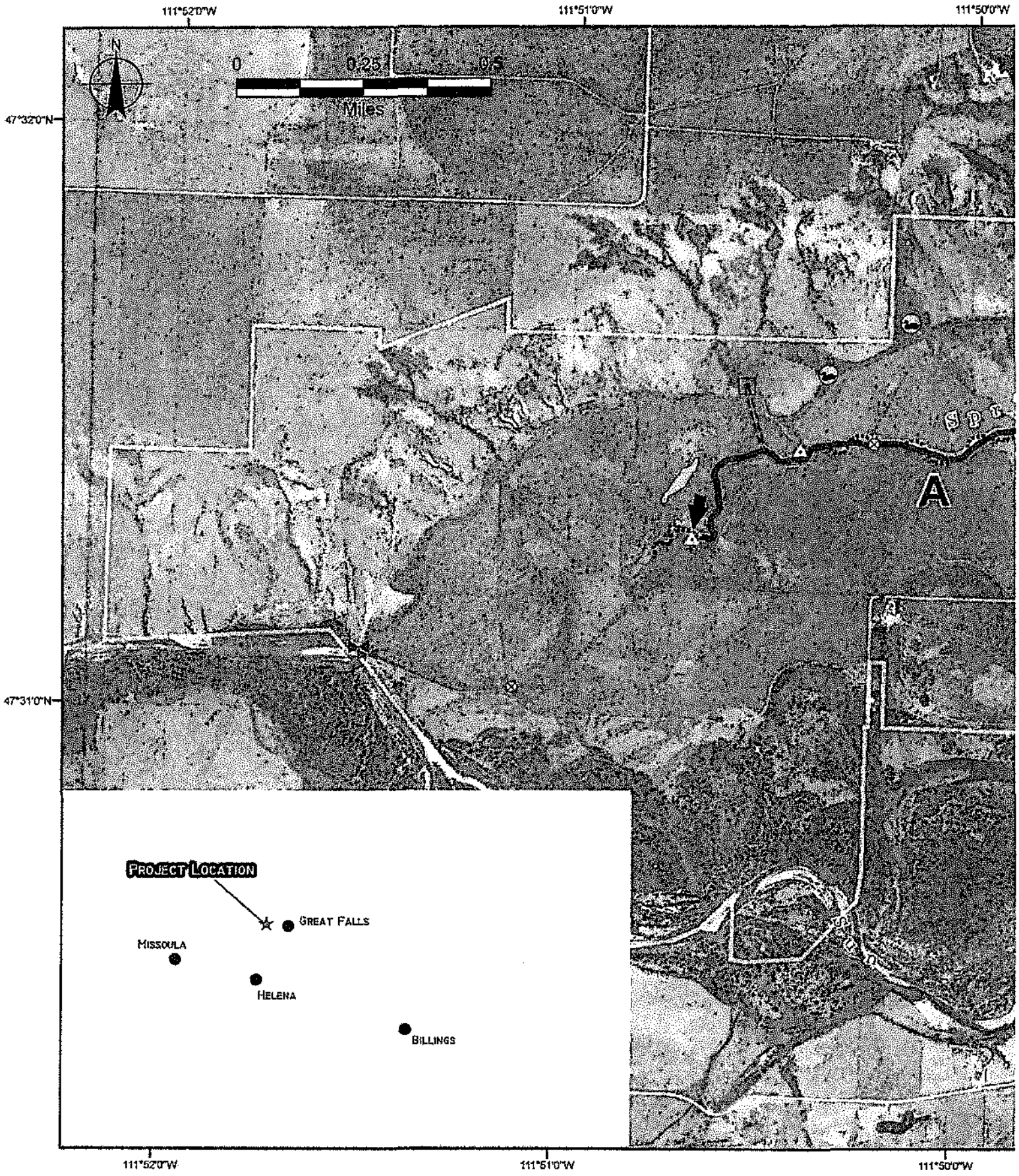

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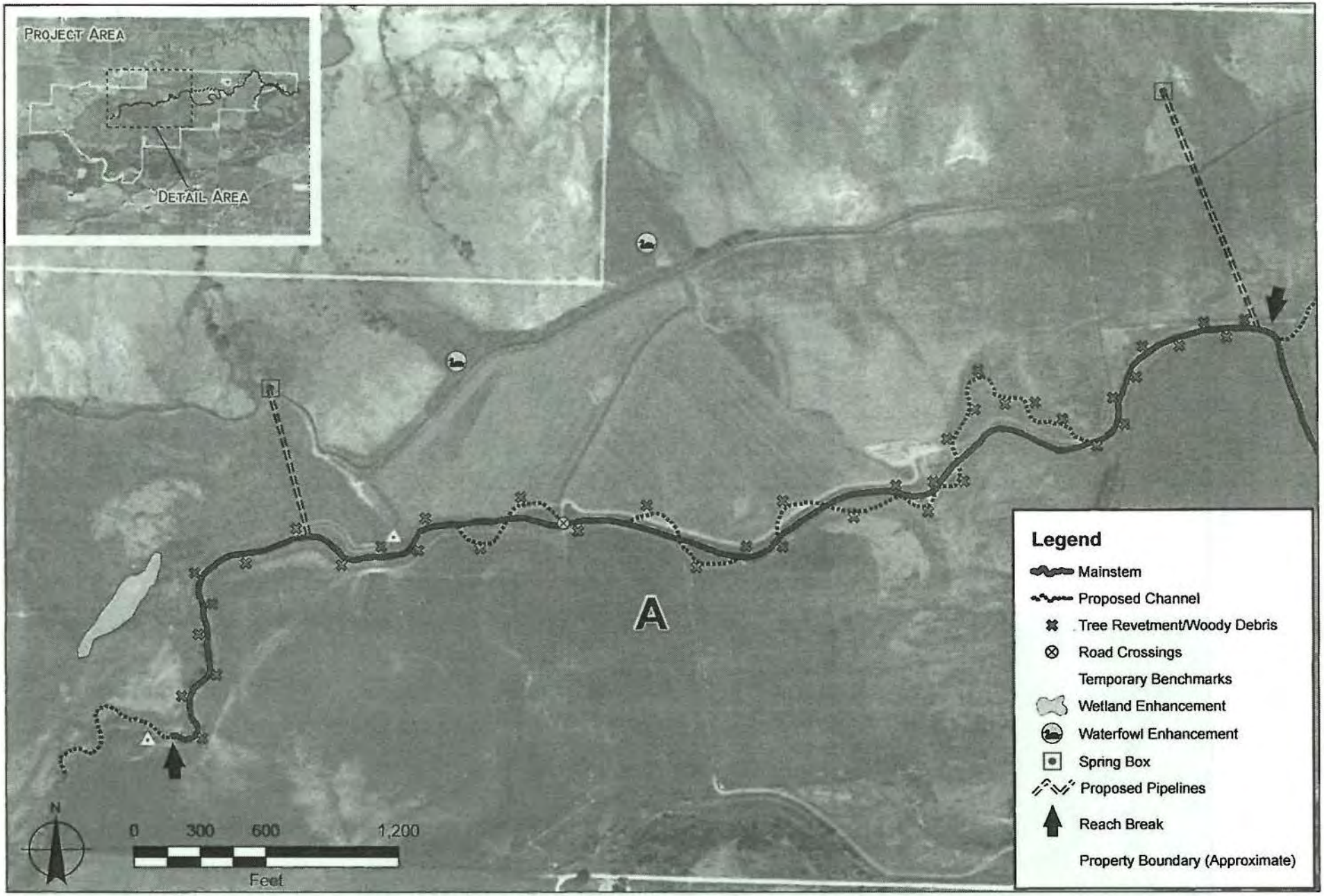
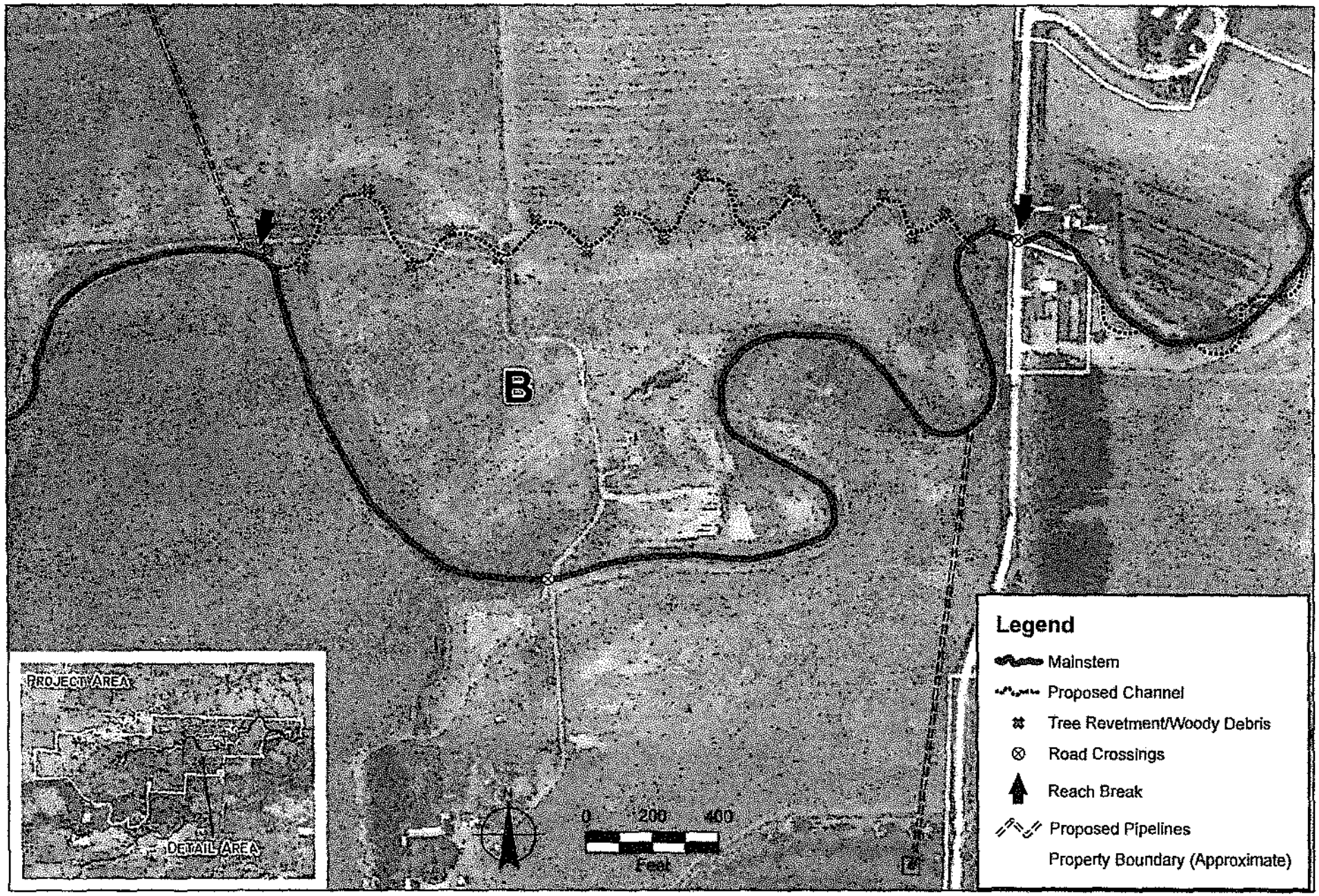


K:\PROJECT\9117\ROCKY REEF SPRING CREEK DETAIL A.MXD

Rocky Reef Spring Creek Project
Existing and Proposed Features GPS Survey
Detail A



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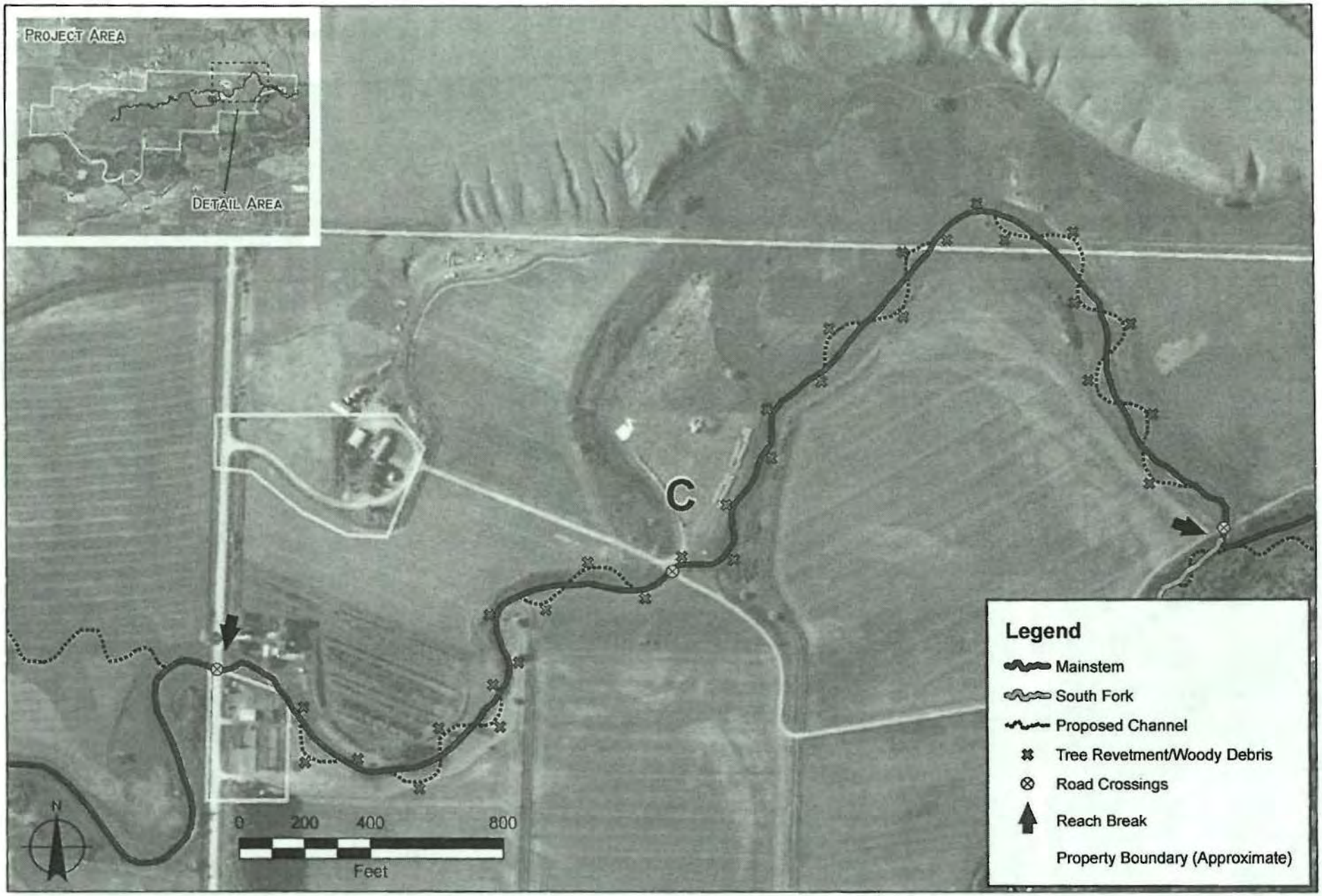
Rocky Reef Spring Creek Project
Existing and Proposed Features GPS Survey
Detail B



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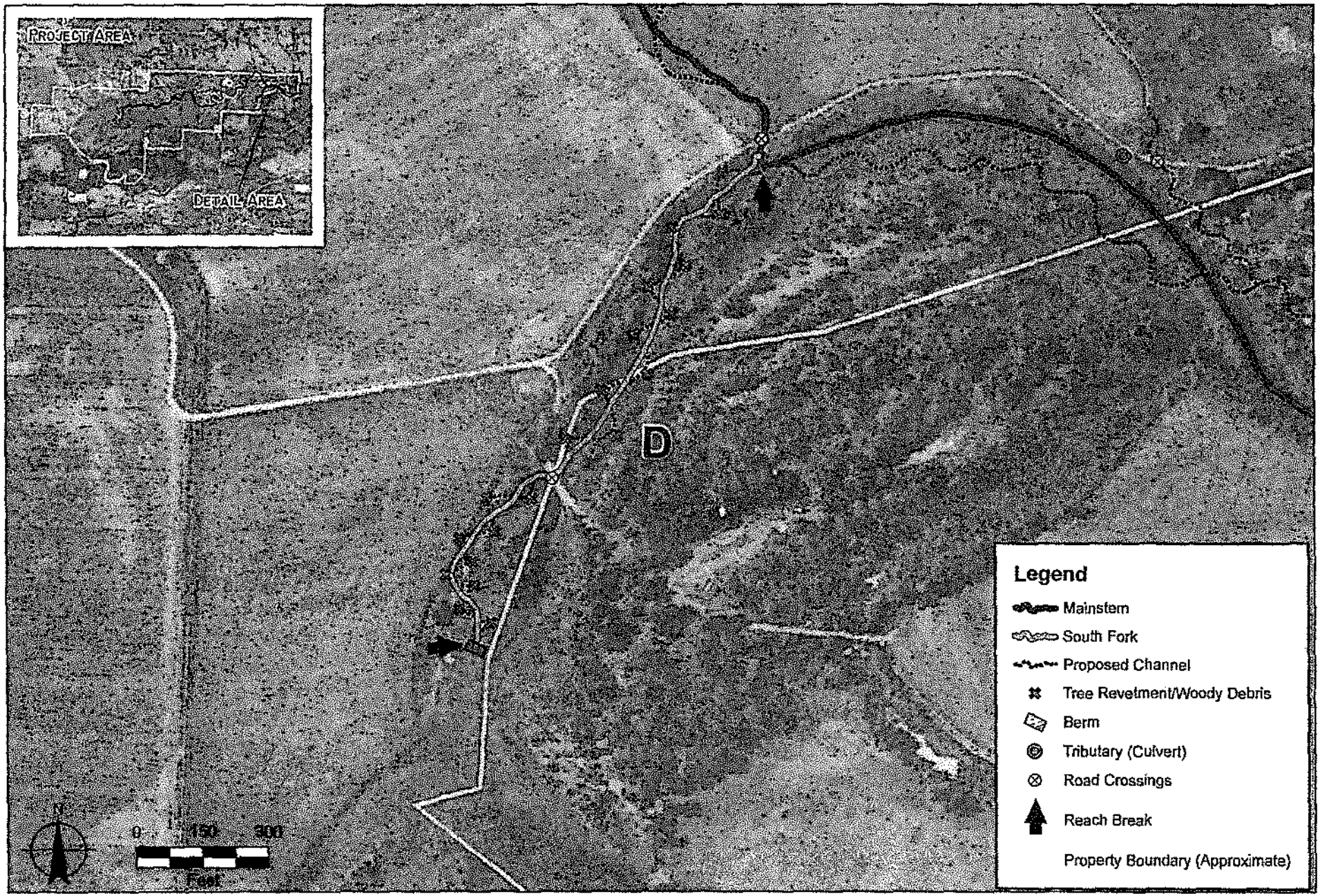
Rocky Reef Spring Creek Project
Existing and Proposed Features GPS Survey
Detail C



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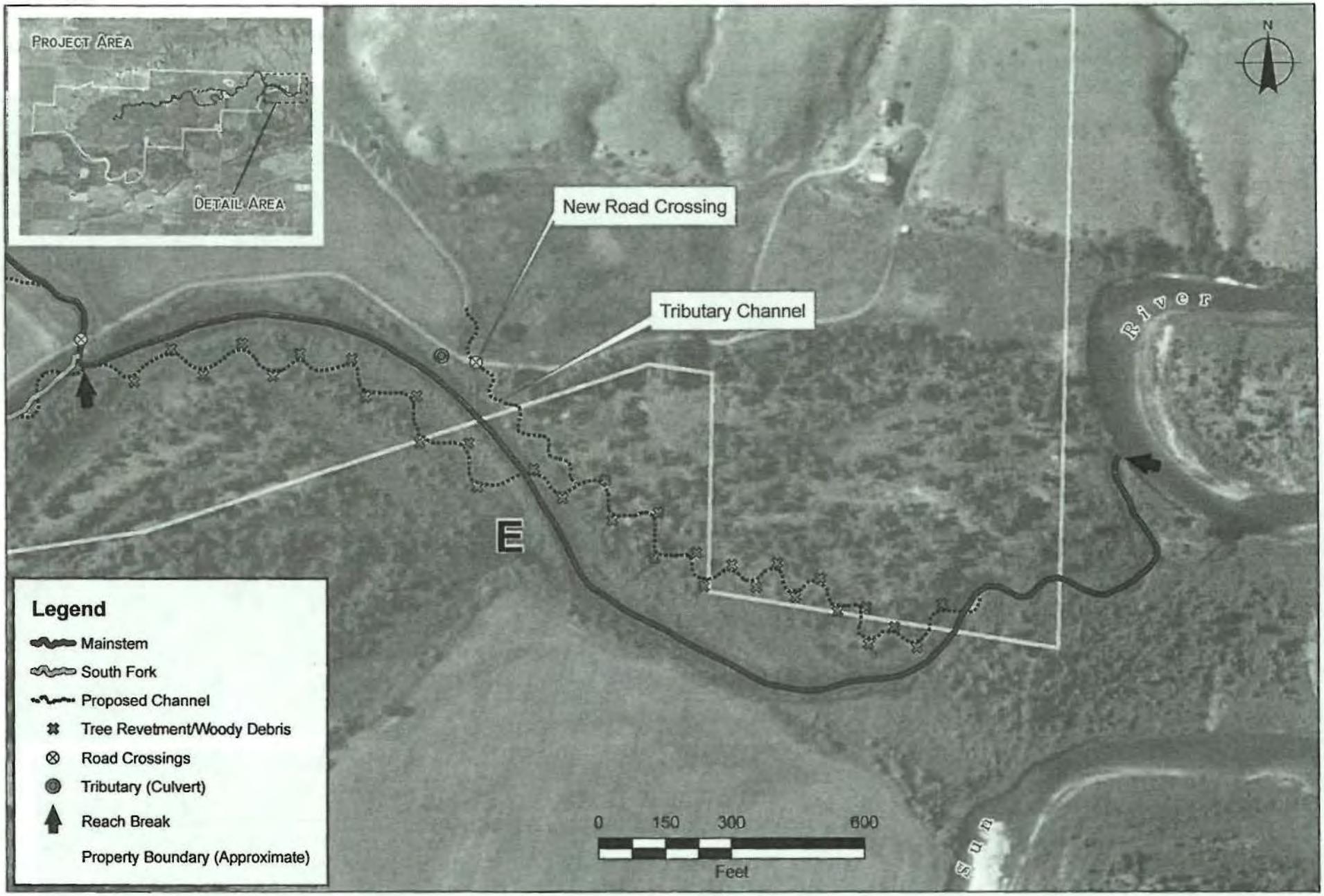
Rocky Reef Spring Creek Project
Existing and Proposed Features GPS Survey
Detail D



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Rocky Reef Spring Creek Project
Existing and Proposed Features GPS Survey
Detail E

Rocky Reef Spring Creek
Design Narrative

Rocky Reef Spring Creek is an upwelling from old Sun River gravels immediately down valley from Rocky Reef (see accompanying location map). The spring flows less than 1 cubic foot per second (cfs), when it originates (see Photo 1), but continually gains water as it flows towards its confluence with the Sun River 3.7 miles down valley where flows are about 13 cfs. The stream is perennial and apparently quite consistent in flow volume as reported by long-time observers. Flow measurements conducted over the last 4 months during and after irrigation season back up these claims of consistency.

Photo 1. Rocky Reef Spring Creek source looking upstream at upwelling

The majority of the upper 2.2 miles of the spring creek is an F5 (Rosgen classification) channel as a result of dredging the channel for use as an irrigation delivery system and over-widening caused by heavy livestock use (see Photo 2). Stream bank fine sediments have covered the underlying stream gravels and in some cases completely filled the existing channel (see Photo 3). A few areas in this upper reach have remained narrow enough to maintain cleansing velocities where a nice mix of medium size gravels can be found on the stream bottom (see Photo 4).

Photo 2. Eighteen feet wide channel, .5 feet deep, about 5 cfs, fine silt bottom

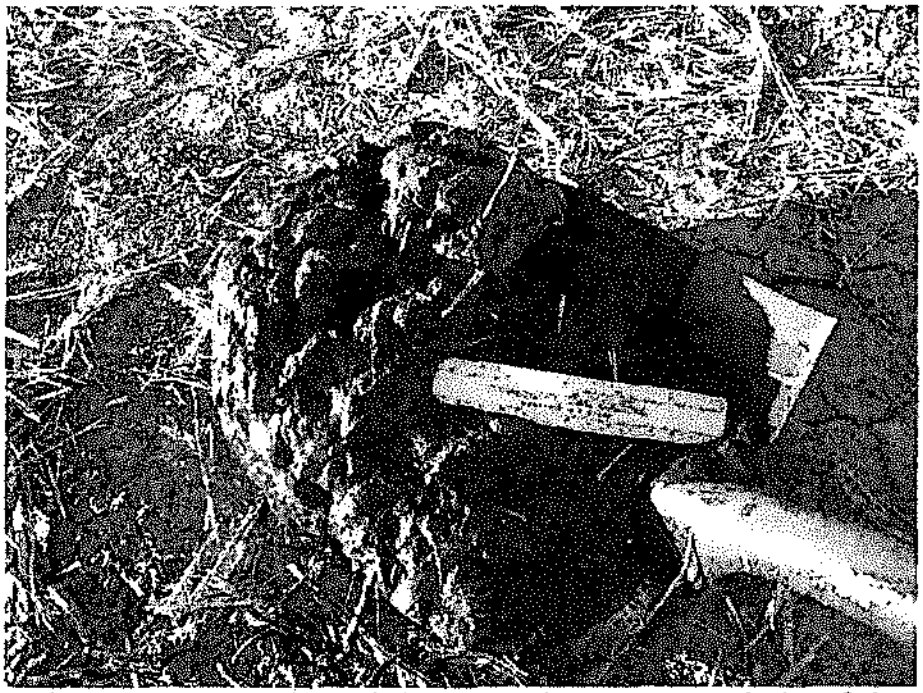


Photo 3. Fine sediment covering existing stream bottom over majority of channel

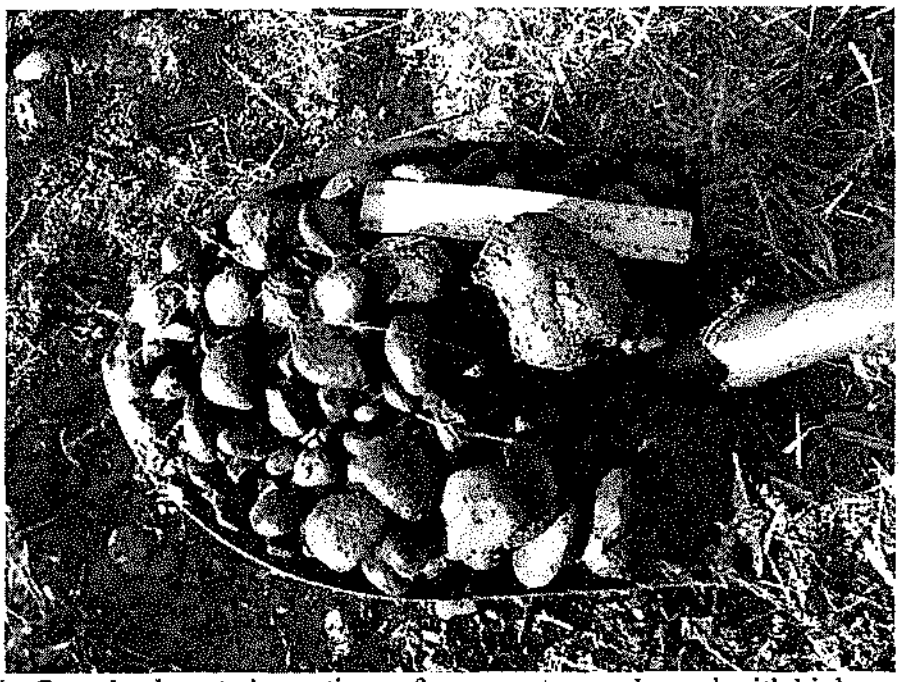


Photo 4. Gravel substrate in portions of narrow stream channel with higher velocity

The entire upper 2.2 miles of stream (from the upwelling to the county road), have historically been used for annual crop or hay production right up to the edge of the stream, leaving very little chance for perennial vegetation. Most of the perennial vegetation on the stream banks is either smooth brome or quackgrass, with some reed canary grass in the stream bottom. There is essentially no woody vegetation on the banks of the channel.

With channel widening (in many places width/depth ratios > 30) and no stream bank shading provided, water temperatures continue to rise as the stream flows downvalley. Water temperature is around 50 F where it comes out of the ground at the source and also in various places as it continues to upwell out of the alluvial gravels, but as it flows through the widened, shallow areas it picks up a great deal of heat. Temperatures up to 62 F were measured during the heat of the summer in some of these wide, shallow areas. The current stream conditions on the upper portion of the channel present few, if any, opportunities for fish to survive, but all of the conditions exist to create a stream with highly productive habitat.

The portion of the stream below the county road to its confluence with the south fork (see accompanying maps) has portions of F5 channel where excess livestock use overwidened the channel while other portions have bank vegetation that kept widths narrower and are a C4 channel type (see Photo 5). These C channel areas have few lateral scour pools, but narrow enough widths to generate velocities to have cleaned the fine sediments through the system. These cleaner gravel areas have velocities in the 1.5 to 1.7 feet/second range and a width/depth ratio of 13-14.

Photo 5. Stream width 6.5 to 7.5 feet, 5 cfs, native sedges and rushes

Riparian vegetation is more native and strongly rooted in the section of stream below the county road. Sedges and rushes dominate much of the bank vegetation with some buffaloberry scattered in the vicinity of the channel. Ground has not been farmed right up to the stream bank, so there are areas with 50 – 100 feet of buffer between the cropland and the water. Sods from anywhere throughout this entire reach will make creating new stream banks easier with these dense rooted sods to transplant.

A few fish have been observed in this reach of stream, but a culvert near the junction of the main-stem with the south fork appears to form a pretty effective barrier. Water velocities at the mouth of the 30 foot culvert have been measured at over 8 feet/second (see Photo 6). This culvert is proposed to be replaced by a constructed bridge over the stream.

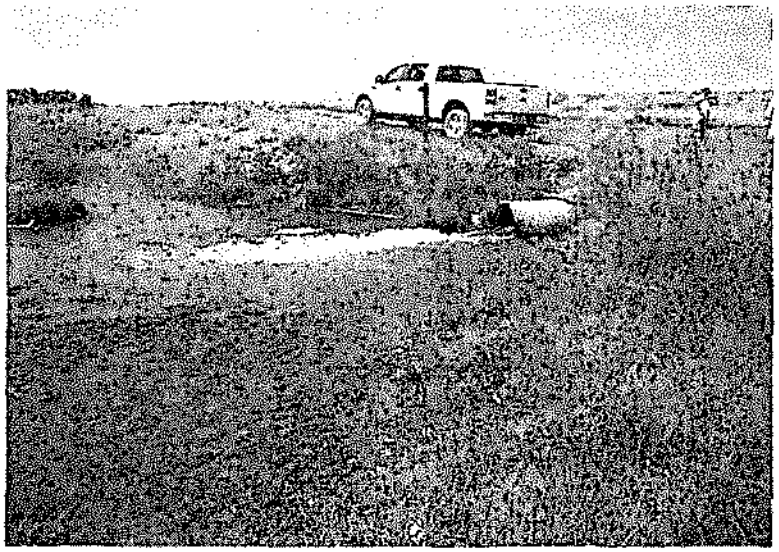


Photo 6. High velocity culvert near junction of main-stem with South Fork

Once the main-stem crosses the road through the fish passage barrier culvert, it joins another spring creek channel coming in from the south (South Fork). The South Fork channel begins at a wetland berm and has a measured flow of 5 cfs at its confluence with the mainstem. Water surface is extremely wide and shallow depths (width/depth >50) as it flows through an old Sun River oxbow (see Photo 7). However, fish have been observed spawning in the narrower, steeper gravel portions of this channel.

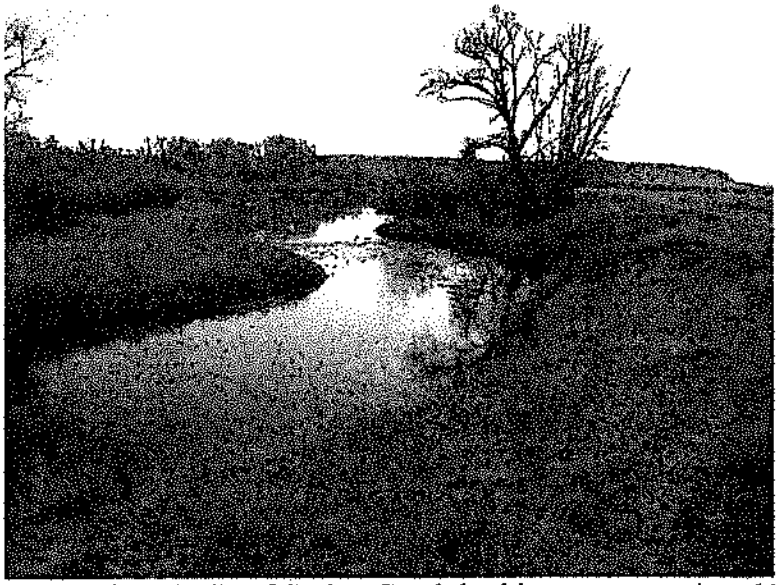


Photo 7. South Fork of Rocky Reef Spring Creek looking upstream (south)

Flows after the confluence of the main-stem and South Fork are about 13 cfs where the channel skirts a cottonwood gallery of the Sun River in the initial stages of recovery from historical winter livestock use. The portion of the stream immediately downstream of the confluence is a silt-filled, marshy channel that is a favorite for beaver activity for over 2,200 feet. The stream immediately below this beaver dam complex flows well for about 900 feet prior to its confluence with the Sun River. For fisheries purposes and to address substantial siltation in the overwidened channel, the proposed project will construct a reconfigured/rerouted spring creek channel. The abandoned channel will remain watered as stillwater waterfowl habitat adding riparian and waterfowl habitat benefits. The proposed relocation of the channel will actually increase the amount of Rocky Reef Spring Creek on DNRC School Trust land and will help rejuvenate some of the Sun River riparian forest.

As described elsewhere in this application, the major causes of the current stream impairments can be attributed to past agricultural practices dating back to the subdividing of the spring creek lands by soldiers from Fort Shaw in the late 1800's. The stream course has been dredged, straightened, widened, and re-routed to accommodate flood irrigation practices on land leveled right to the edge of the stream channel. The channel itself has been used as an irrigation water conveyance system for diverted Sun River water. Livestock have had unlimited access to the stream for watering and grazing purposes, which has added to the siltation and widening of the existing channel. Road crossings (culverts) have been perched in the channel causing excessive sedimentation in the upstream, dammed portion of the stream. All of the above stream degradations have resulted in a stream channel that is extremely overwidened, silt filled, resulting in

excessive temperature loading and no fish habitat of any kind. Upper reaches of this habitat degraded channel appear to be complete fish barriers.

All of the historic agricultural impacts to the stream have been removed already or will be removed from the stream as a result of this proposed project. Farming will still be conducted adjacent to the stream corridor, but a buffer of at least 50 feet will be established on each side of the stream where native grasses and shrubs will be planted to act as a buffer to sediment movement and as excellent wildlife habitat. No livestock will be allowed to graze on the property, so existing fencing is being removed as it is not necessary. No Sun River water will be diverted into the spring creek and none of the spring creek water will be used for irrigation. Irrigation of the fields is now accomplished with center pivots, which will all have pivot tower bridge crossings of the stream channel as a result of this project (see Photo 8). The only sediment potentially added to this stream channel after project completion will be from wildlife and waterfowl use of the spring creek.

Photo 8. Pivot tower bridge for stream channel crossing near station 93+00

Re-construction will be used to return the spring creek to a viable, healthy, functioning stream channel with fish passage from its upwelling to its confluence with the Sun River. Sinuosity will be added where appropriate to achieve greater channel length and diversity. The stream will be shortened somewhat in reach B (see attached map) to return it to an historic channel and achieve better sediment transport with higher gradients. Total channel length will be increased from 3.9 miles to almost 4.5 miles. Proposed channel elevations throughout the length of the stream appear to have medium sized gravels at appropriate elevations allowing most, if not all, of the current and proposed stream channel to have very habitat friendly gravel substrates. These gravels will be self-cleaning in the riffles by keeping stream widths narrow, water deeper, with water velocities in the 1.5 to 1.7 feet/second range.

Stream widths and depths will increase as it gains water from upwellings as it flows down-valley (see attached typical cross-sections). Habitat diversity will be created by

excavating lateral scour pools from 2-3 feet deep in the upper reaches of the stream and up to 4-5 feet deep in the lower stream reaches (see attached typical constructed profiles). Sod transplants and willow clump plantings will be used to create immediately stable streambanks during construction. A native grass mixture will be seeded and native shrubs will be planted in any disturbed ground not vegetated with the sod transplants. Survival of these plantings will be enhanced by the irrigation from the center pivots in reaches A-C during the growing season. Stream banks will be low enough in reaches D-E that these vegetation plantings should be sub-irrigated.

Flows in Rocky Reef Spring Creek have been monitored during the last few months with a Marsh McBirney flow meter at various locations throughout the drainage, from the spring source to near its confluence with the Sun River. Those familiar with the long-term flow regime of the spring creek say flows remain relatively constant throughout the year. Measurements recorded during the last few months, both during and after the irrigation season, show little variation in flow volumes from time to time at the same location.

Design widths and depths will gradually increase as the stream progresses down valley based on the increased discharges recorded for the various locations. There is a measured .8 cfs at the spring source with flows increasing to about 2.2 cfs 2,700 feet down valley from the source. Up-wellings continue to add to stream volume so that by the time it reaches the county road there is about 5 cfs. At the confluence of the two channels, there is about 6.2 cfs in the main-stem channel and another 5+ cfs in the South Fork.

There are two additional springs coming from the north (see attached maps) that are cut off from the main stem channel by the Birch-Meade Canal that will be re-connected to the spring creek via buried pipe across the farm fields. These two springs can add a measured .8 cfs to the main-stem and reports indicate that these streams will flow more during the summer months. Consequently, stream width and depth will be related to position in the drainage.

There really are no reference reaches on Rocky Reef Spring Creek, although there is one area in reach C that has good, clean gravels due to channel narrowing by native sedges and rushes (see Photo 9). Stream flows in this area are about 6 cfs and widths are 6.5 to 7.5 feet. No scour pools are evident in this area, but there have been fish noted in the riffles. Velocities within this area (station 150+00 to 153+00) are within the 1.5 to 1.7 feet/second recommended as design velocities for the re-constructed channel.

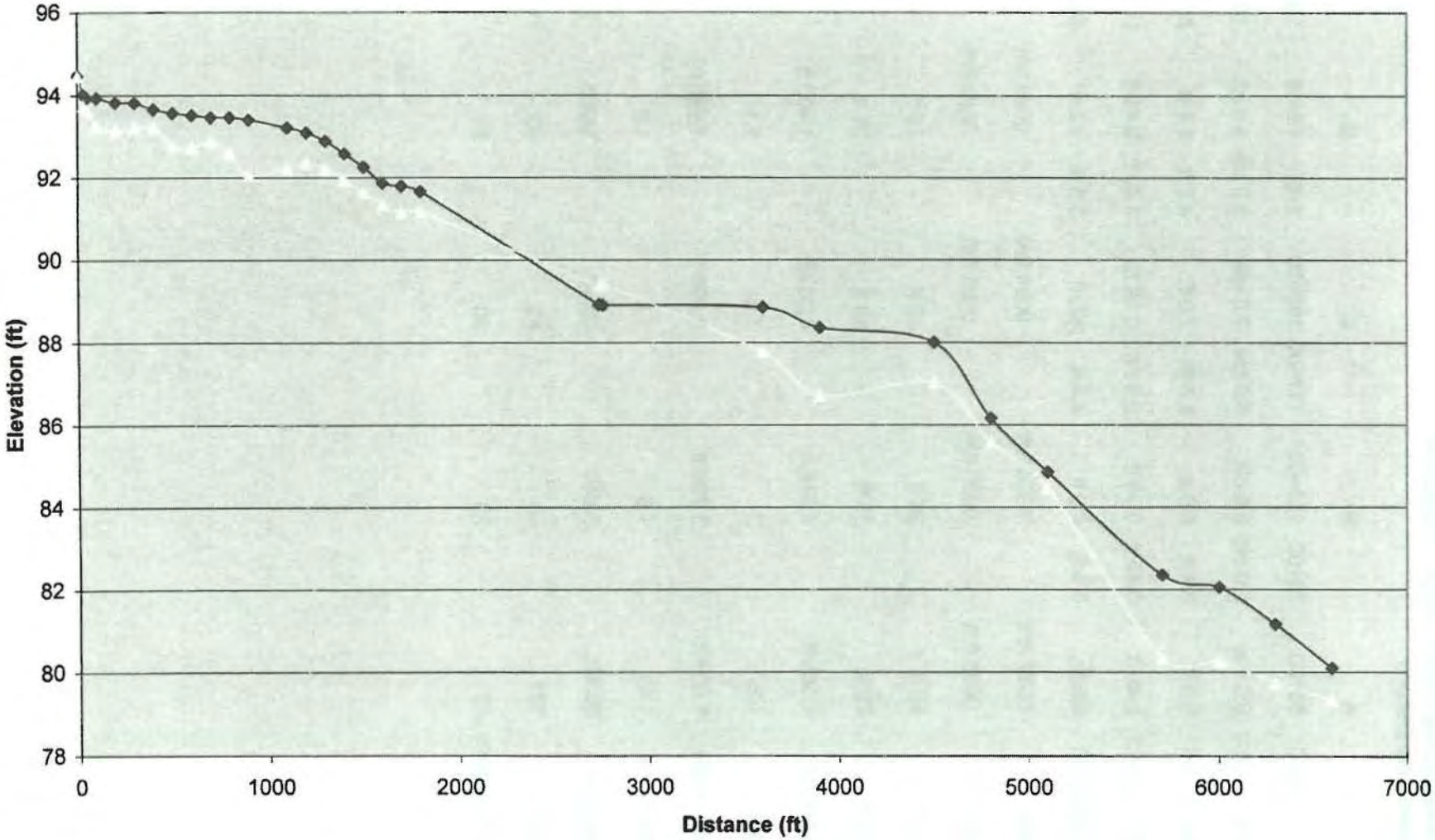
Photo 9. Section of Reach C with clean gravels due to narrow width and slope

As described above, all of the re-constructed channel will have at least a 50 foot riparian buffer planted to native vegetation (grasses and shrubs) which will be totally dedicated to wildlife use and will act as an excellent filter strip for adjacent crop land. Most of reaches A-C will be irrigated during the growing season with passes of the center pivots, which will help ensure plant establishment and future healthy production. Reaches D and E are in a recovering cottonwood bottomland forest of the Sun River and proposed stream channel work should help to enhance these bottomland habitats. There will be no domestic livestock grazing of any kind on the property, so all the stream corridor will be dedicated to stream health and wildlife use.

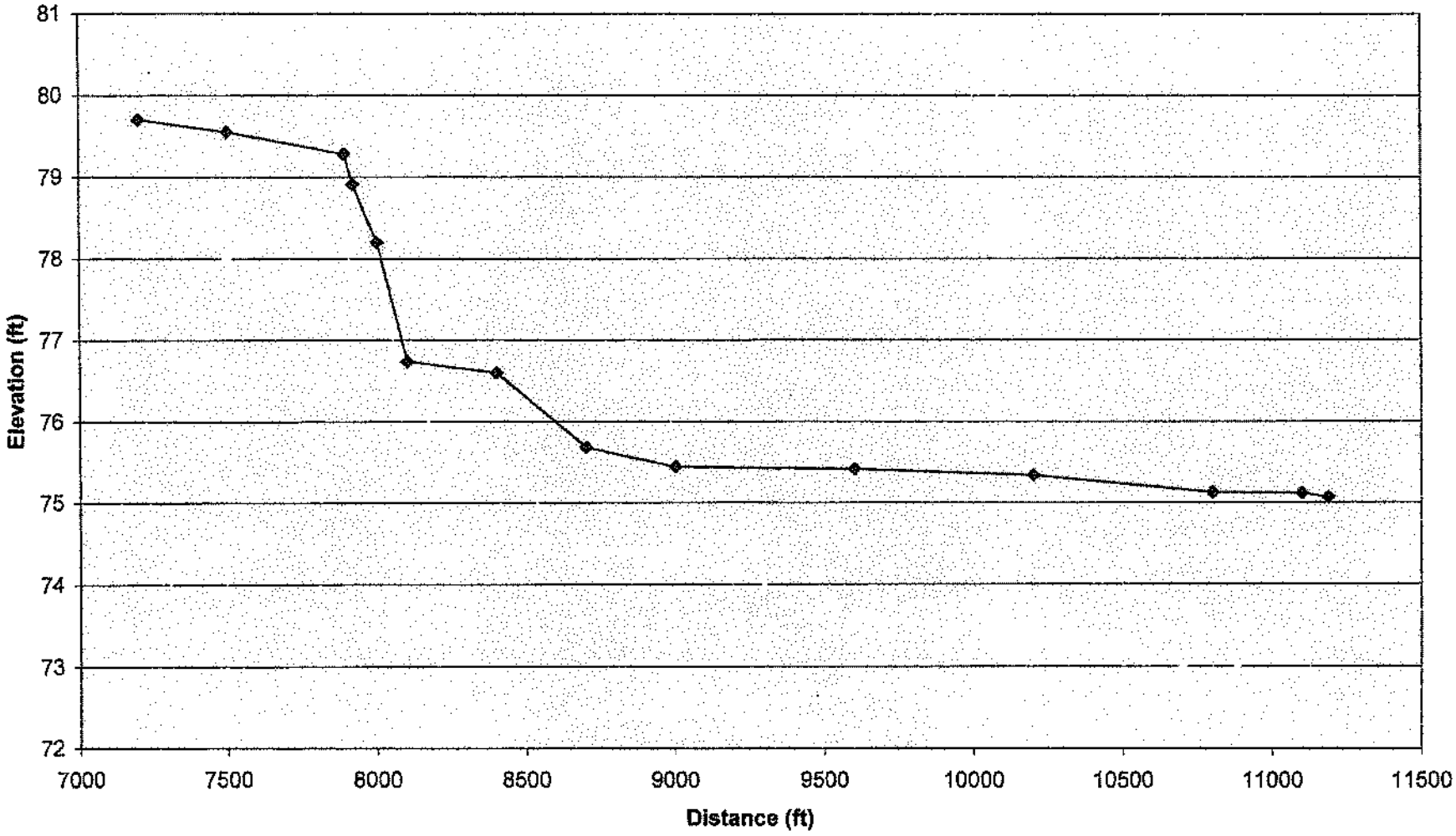
Rocky Reef Spring Creek Design Parameters
at representative stations

Reach		A		B		C		D		E
Station	2+00	60+00	78+00	111+00	117+00	160+00	1+00	13+00	165+00	190+00
Discharge	1.0 cfs	5.0 cfs	5.0 cfs	6.0 cfs	6.0 cfs	7.0 cfs	3.0 cfs	5.0 cfs	13.0 cfs	15.0 cfs
BKF width	2.9 ft	5.9 ft	5.9 ft	6.5 ft	6.5 ft	7.0 ft	4.7 ft	5.9 ft	9.3 ft	10.3 ft
av. Riffle D	0.24 ft	0.49 ft	0.49 ft	0.54 ft	0.54 ft	0.59 ft	0.40 ft	0.49 ft	0.77 ft	0.85 ft
pool maxD	2.0 ft	3.5 ft	3.5 ft	4.0 ft	4.0 ft	4.0 ft	3.0 ft	3.5 ft	5.0 ft	5.0 ft
riffle slope		.0027 ft/ft		.0024 ft/ft		.0034 ft/ft		.0045 ft/ft		.0039 ft/ft
pool slope		.0005 ft/ft		.0005 ft/ft		.0005 ft/ft		.0005 ft/ft		.0005 ft/ft
riffle length		38 ft		38 ft		42 ft		25 ft		30 ft
pool length		25 ft		25 ft		28 ft		25 ft		30 ft
existing length		6,555 ft		4,545 ft		4,863 ft		1,400 ft		3,100 ft
existing K		1.2		2		1.5		1.1		1.2
proposed length		7,580 ft		3,700 ft		5,595 ft		1,980 ft		3,672 ft
proposed K		1.4		1.6		1.8		1.5		1.5
riffle/pool ratio		60/40		60/40		60/40		50/50		50/50
total pools		131		59		80		40		61
pools w/ structure		40		20		30		20		30

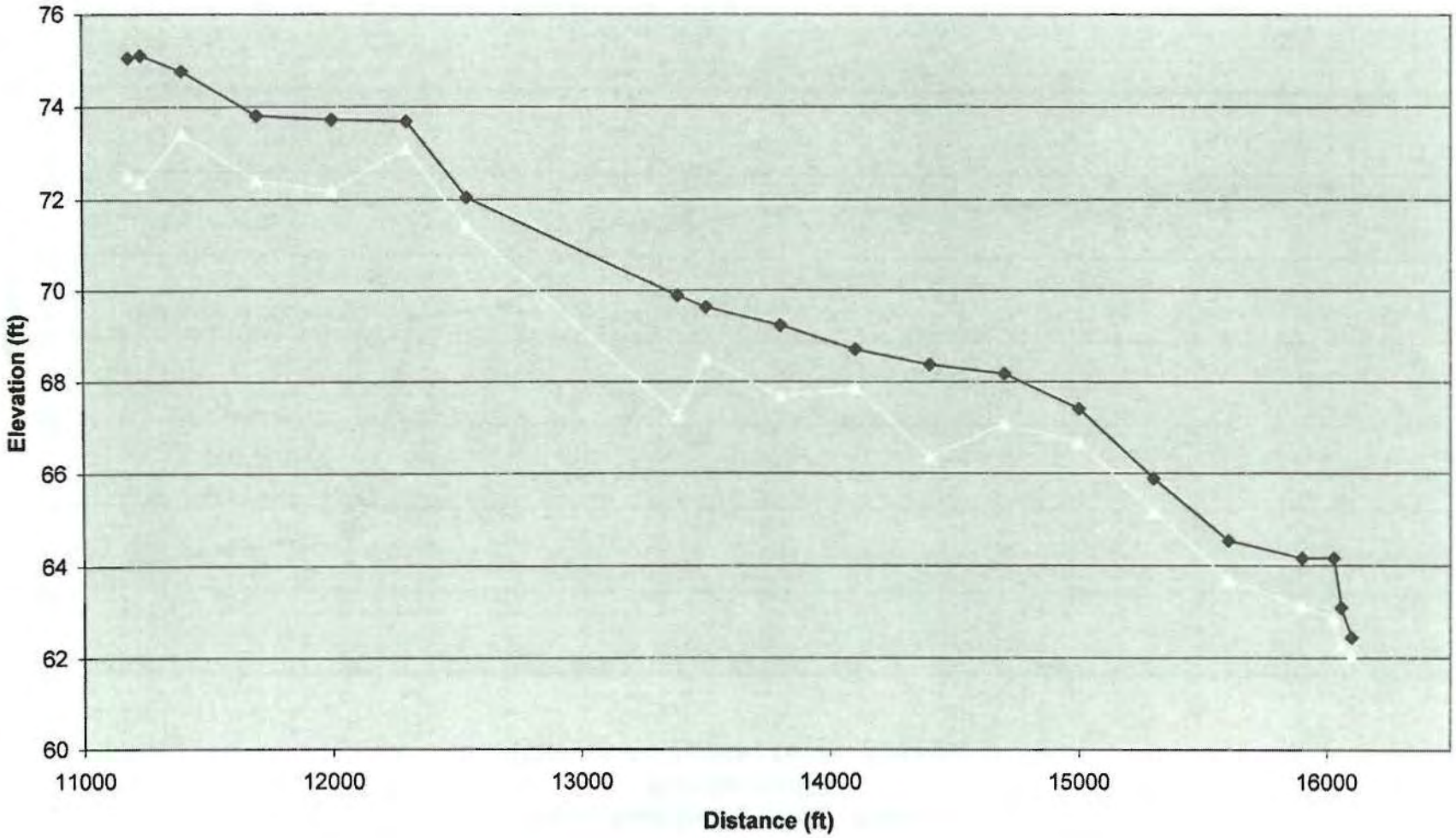
Rocky Reef Spring Creek - Reach A
Existing Profile
(Blue-Water Surface, Yellow-Thalweg)



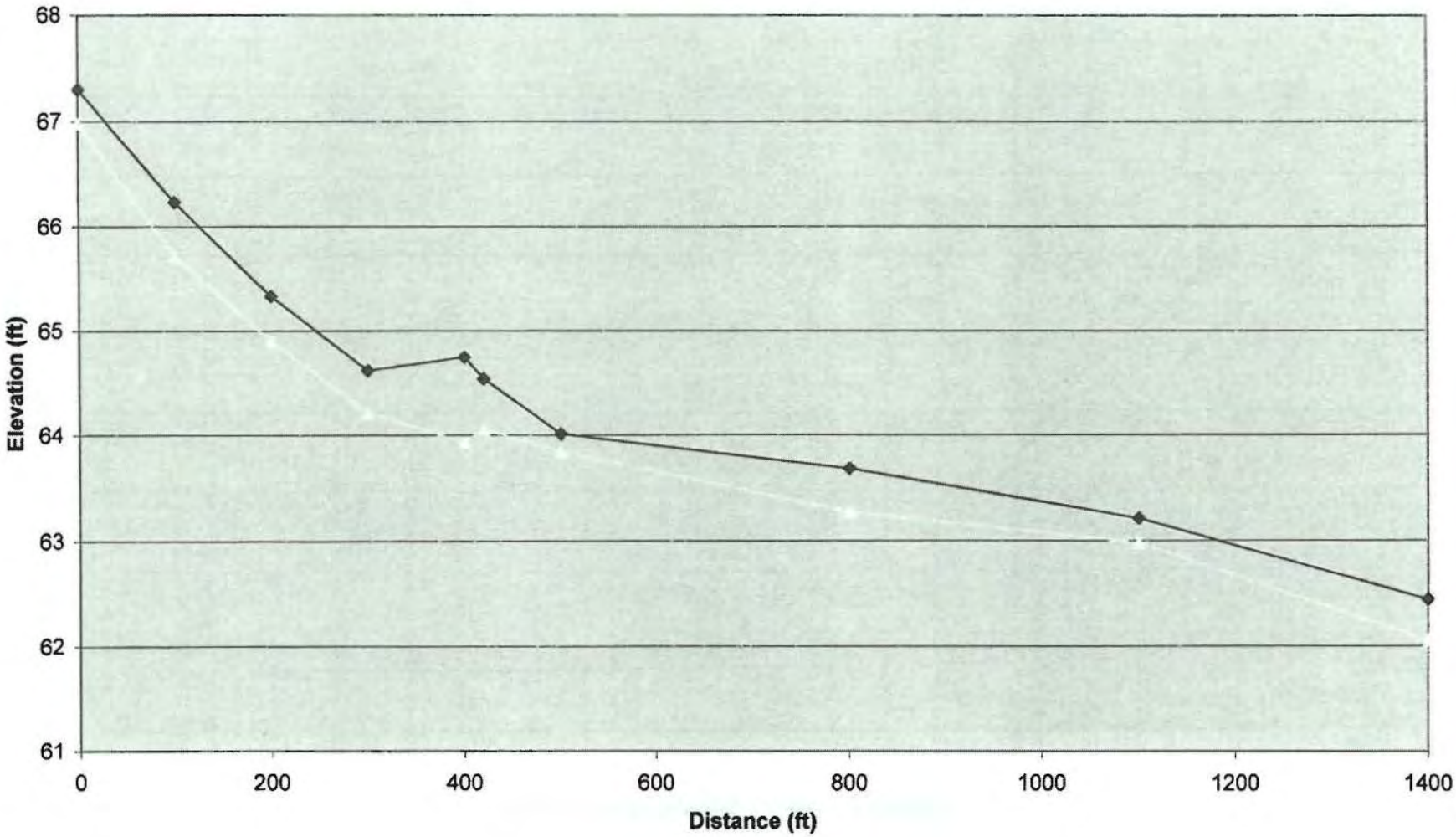
Rocky Reef Spring Creek - Reach B
Existing Profile
(Blue - Water Surface, Yellow - Thalweg)

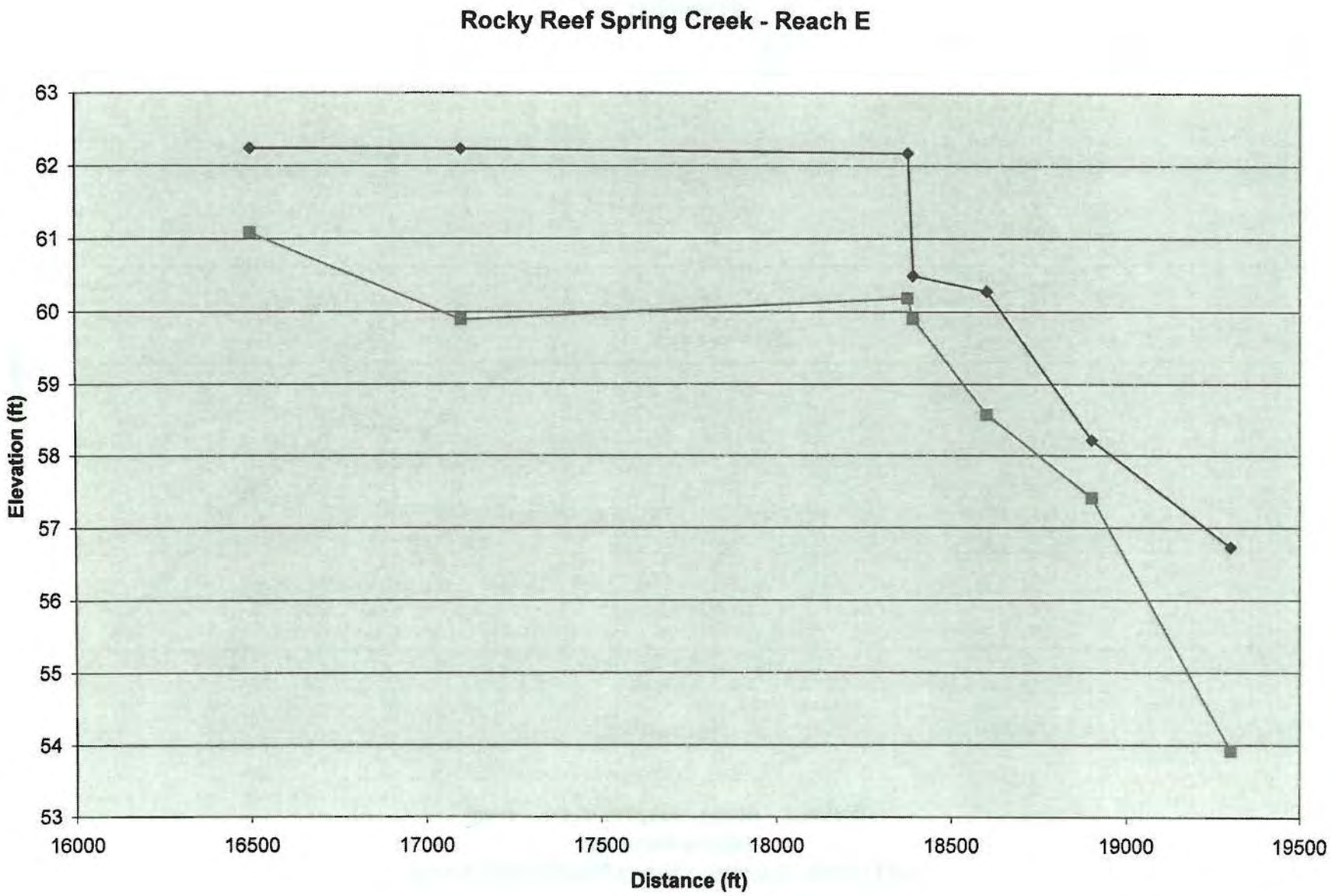


Rocky Reef Spring Creek - Reach C
Existing Profile
(Blue - Water Surface, Yellow - Thalweg)



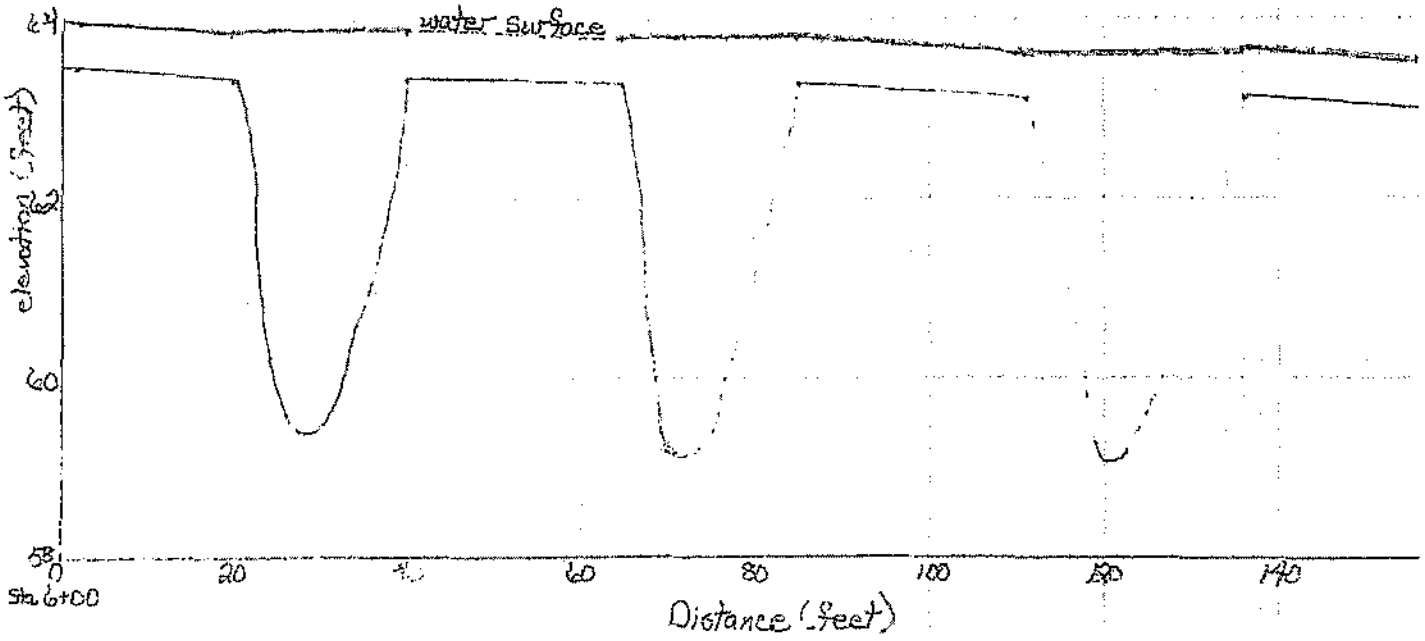
Rocky Reek Spring Creek - Reach D (South Fork)
Existing Profile
(Blue - Water Surface, Yellow - Thalweg)



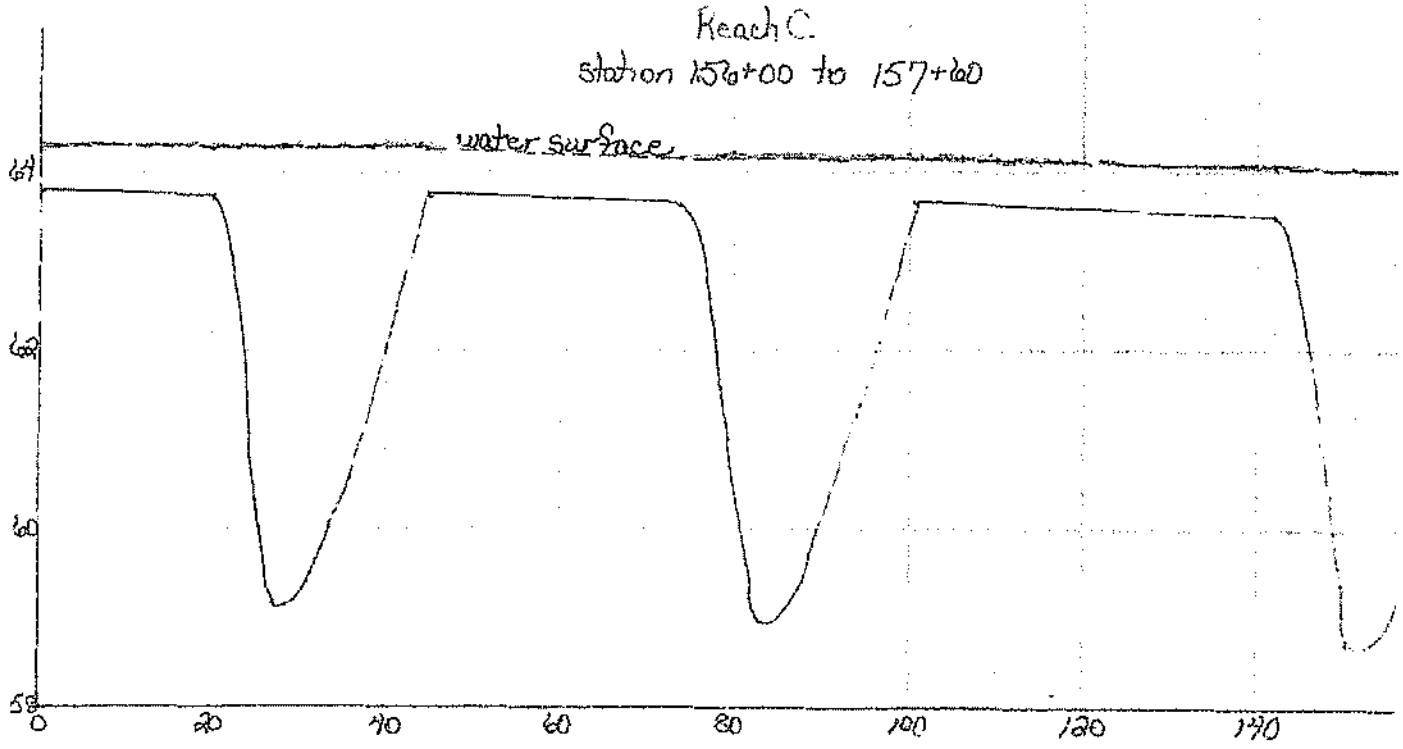

Rocky Reef Spring Creek - Reach E
63
62
61
60
59
58
57
56
55
54
53
Elevation (ft)
16000
16500
17000
17500
18000
18500
19000
19500
Distance (ft)

Proposed water surface and stream bottom profile

Reach D
South Fork, station 6+00 to 7+60

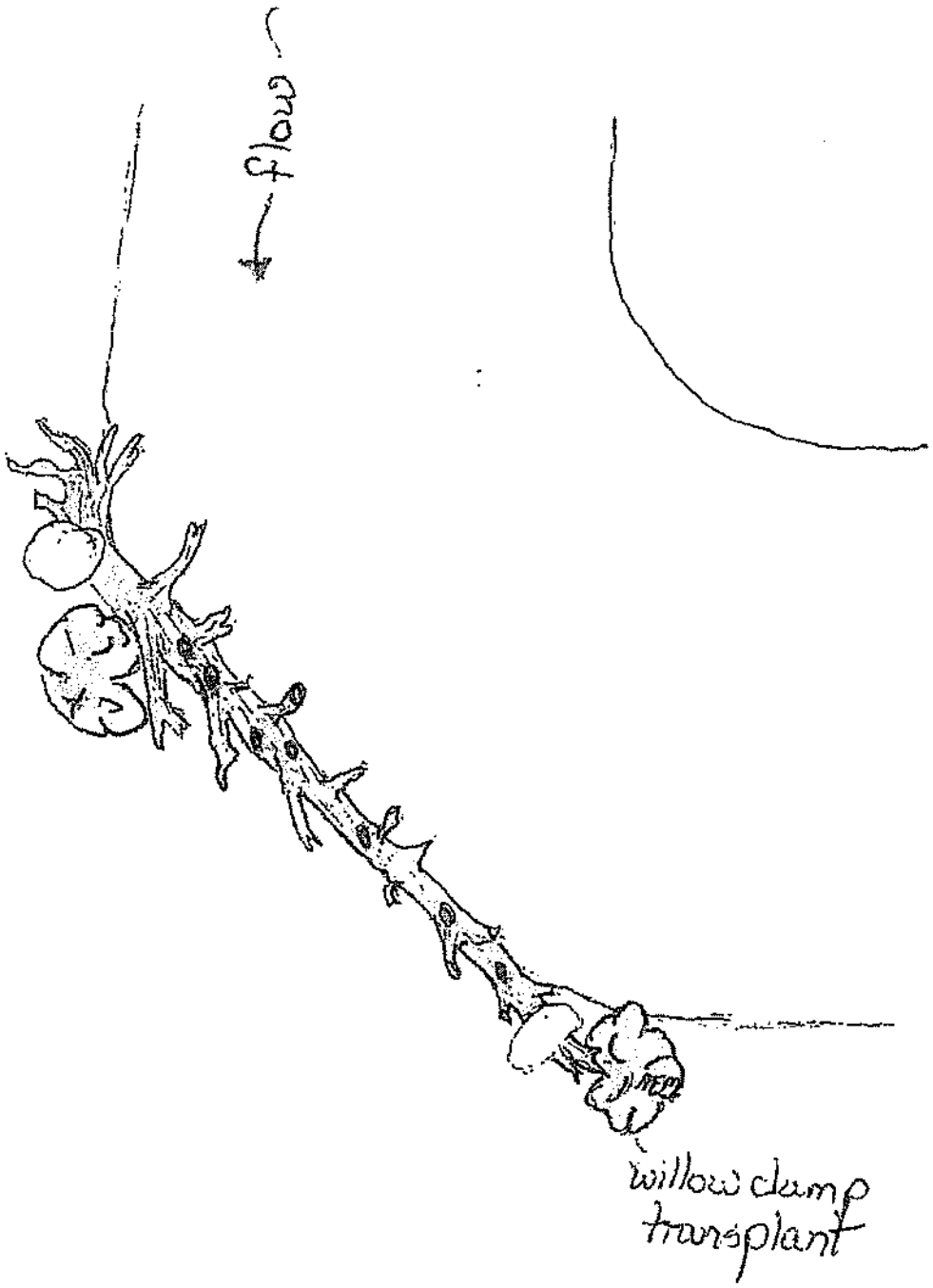


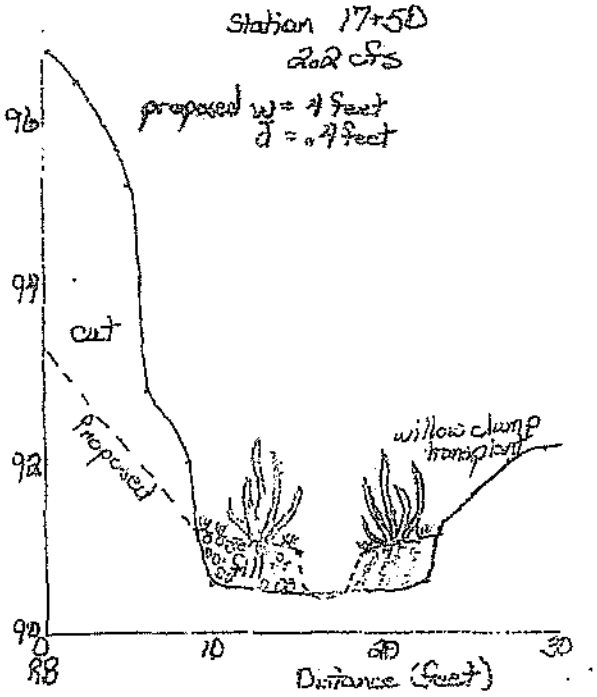
Reach C.
station 156+00 to 157+60

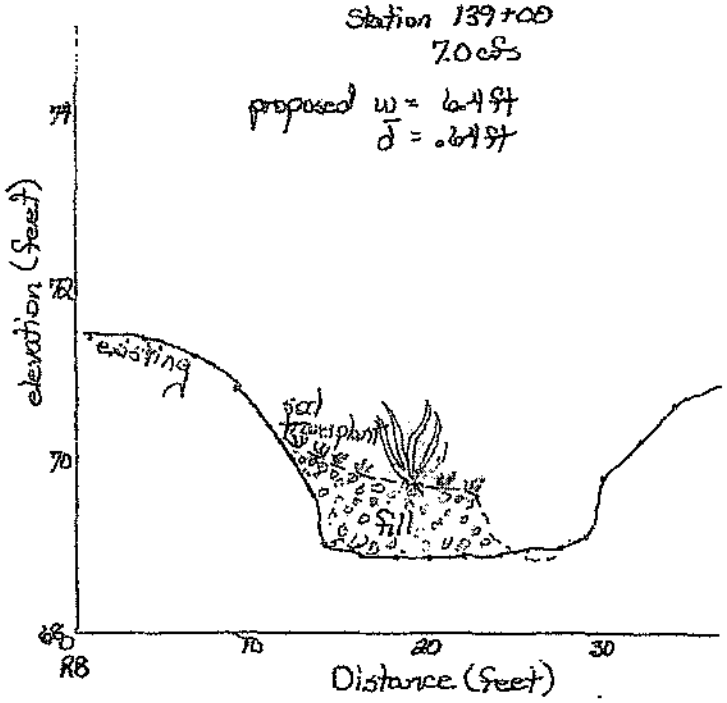


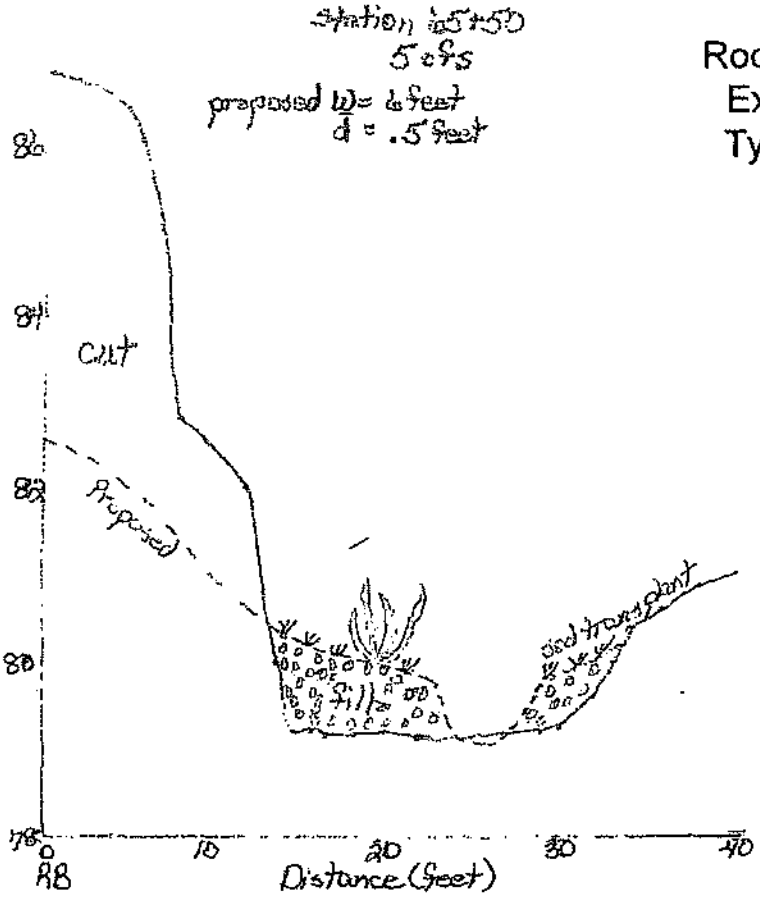
Rocky Reef Spring Creek Design Detail

Tree Revetment/Woody Debris Habitat





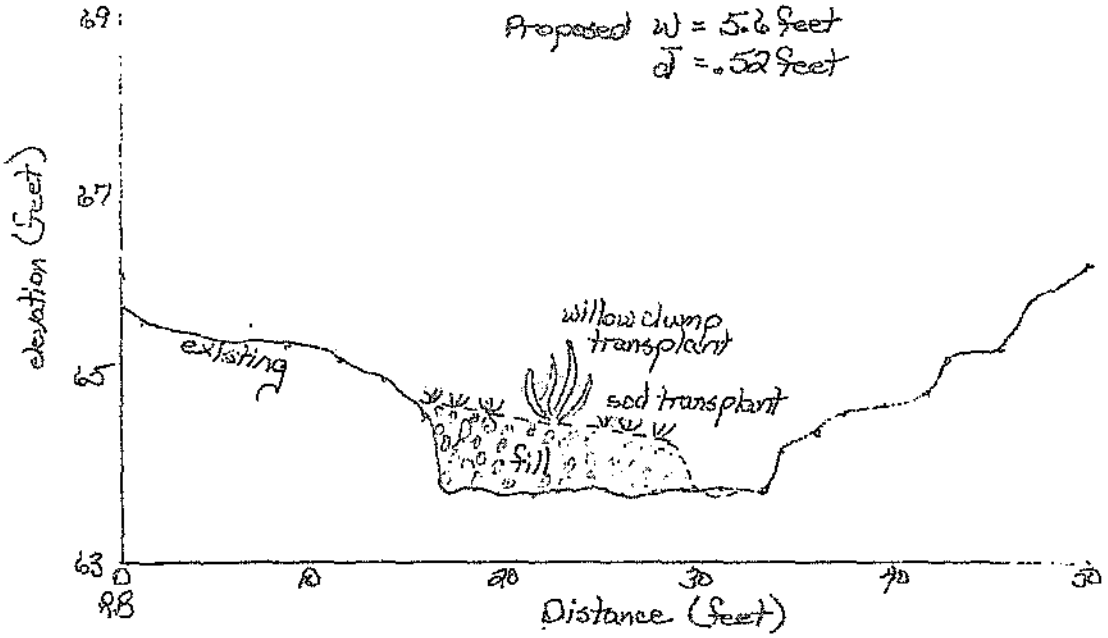




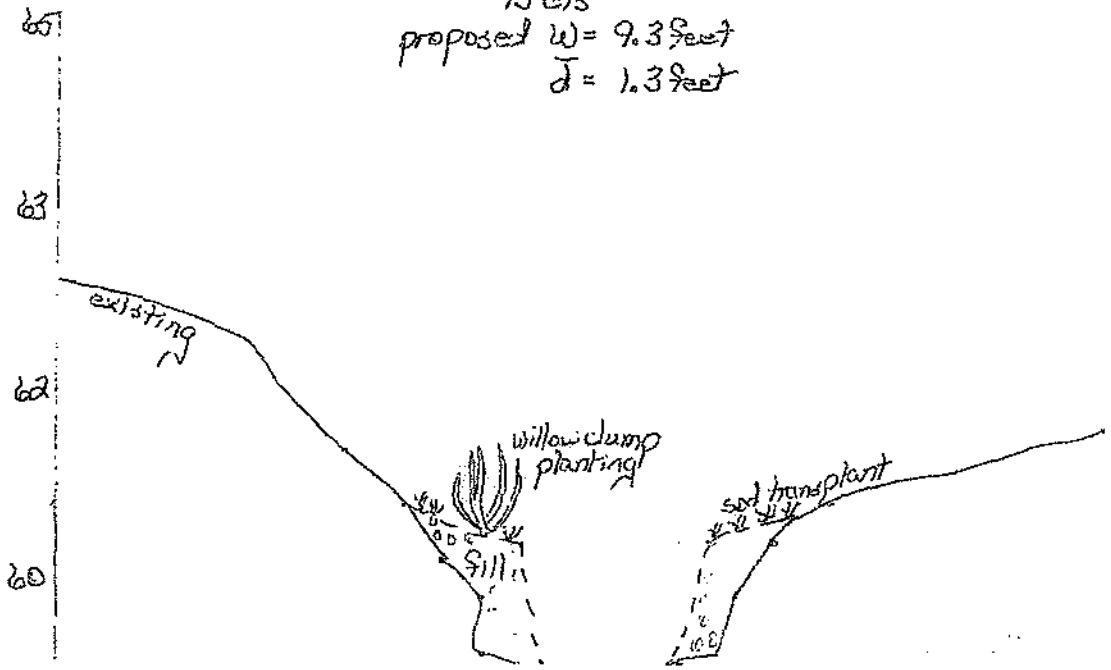
Rocky Reef Spring Creek
Existing and Proposed
Typical Cross-sections

Existing and Proposed Typical Cross-sections

South Fork
Station 5+00
Proposed w = 5.6 feet
d = .52 feet



Mainstem
Station 186+00
13 cfs
proposed w = 9.3 feet
d = 1.3 feet



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626-9705

REPLY TO
ATTENTION OF

December 2, 2011

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Regulatory Branch
Montana State Program
Corps No. **NWO-2010-1307-MTH**

Subject: Cease and Desist for Unauthorized Work – Rocky Reef Spring Creek and Wetlands

Mr. Leland F. Wilson
29 Rocky Reef Road
Fort Shaw, Montana 59443

and

Mr. Justin Devers
Environmental and Aquatic Design
210 North Lane
Dillon, Montana 59725

Dear Sirs:

This letter concerns your drainage and fill activities conducted in Rocky Reef Spring Creek and adjacent wetlands located in Sections 35 and 36, Township 20 and 21 North, Range 2 West, in Cascade County, Montana.

The Corps of Engineers is responsible for administering Section 404 of the Clean Water Act (33 USC 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Section 404 of the Clean Water Act regulates the discharge of dredged or fill material in waters of the United States, including wetlands.

Based upon on-site observations made by the Corps during a site inspection on December 1, 2011, you have discharged unauthorized dredged or fill material into waters of the United States. **You are hereby directed to cease and desist any further work involving the discharge of fill material into waters of the United States.**

During our December 1, 2011 inspection it was determined that approximately 4-miles of stream channel bed and adjacent wetland and riparian areas had been impacted by excavation and subsequent sidecasting of excavated material into adjacent wetlands. The work is not in compliance with your Nationwide Permit 27 verification provided by this office on August 10, 2010, and is not

as shown on the design plans submitted in support of that application. Therefore, no permit was in place for the work observed on December 1, 2011.

Current regulations provide for subsequent enforcement procedures in the form of administrative and/or legal action based on an evaluation of the circumstances surrounding a violation. By undertaking unauthorized activities, responsible parties are potentially subject to substantial civil and/or criminal fines and penalties authorized under Section 309 (g) of the Clean Water Act.

To identify the appropriate action, an investigation of this case is underway. It is requested that you provide a written explanation describing when the work begun, name of the contractor (if any) who completed the work, extent of drainage ditches and associated fills discharged within waters of the United States, purpose of the discharge, why Section 404 authorization was not obtained, any planned discharges of fill material into waters of the United States, and any additional information you believe may assist our investigation. Please send the information to the letterhead address by **December 20, 2011**. Include the following in your response:

1. Identification of all parties, including equipment operators, associated with the work completed to date.
2. Identification of the source of all fill material, type of fill material, amount of and location of all fill material.
3. Identification of locations where stream material was removed from the stream channel, size and depth of the excavated areas, quantities of material excavated, and identification of the specific location(s) the excavated material was placed.
4. Identification of the dates the unauthorized dredging and sidecasting work occurred.

This case will be submitted to Region 8 - U.S. Environmental Protection Agency (EPA) for their review for potential enforcement action in accordance with agreements between the Department of the Army and the U.S. Environmental Protection Agency concerning Federal enforcement for the Section 404 Program of the Clean Water Act. If you have any questions concerning this letter, Helena Regulatory Office personnel can meet with you or provide any background information you might need. If you have any questions, contact Vicki Sullivan at (406) 441-1375.

Sincerely,

Todd Tillinger
Montana Program Manager

Copies Furnished:

Arturo Palomares, Director
Technical Enforcement Program
US Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Mr. David LaGrone, Enforcement Coordinator
U.S. Army Corps of Engineers
1616 Capital Avenue, Suite 9000
Omaha, Nebraska 68102

Mr. Jeff Ryan
Montana Department of Environmental Quality
PO Box 200901
Helena, MT 59620-0901

Cascade County Conservation District
12 Third Street NW, Suite 300
Great Falls, MT 59404

Mr. George Liknes
Montana Department of Fish, Wildlife & Parks
4600 Giant Springs Road
Great Falls, Montana 59405-0901

Mr. Mike Sullivan
Department of Natural Resources and Conservation
Real Estate Management Bureau
1625 11th Avenue
Helena, MT 59620

Cascade County Floodplain Administrator
Attn: Charlie Sheets
PO BOX 5021
Great Falls, MT 59403

2010-01301-mrl VICM

Cascade County Conservation District

LOCAL COMMON SENSE CONSERVATION

12 Third Street NW, Suite 300
Great Falls, Montana 59404
Email: cccd@3rivers.net

Fax: 406-727-4810
406-727-3603, ext. 125
www.cascadecd.org

COE-HLNA

DEC 19 2011

December 16, 2011

Leland F. Wilson
164 East Creek Drive
Menlo, CA 94025

RE: **EXCEEDS SCOPE OF PERMIT CA-28-10/ ALLEGED VIOLATION**
Alleged Violation of the Natural Streambank and Land Preservation Act (SB310)
Rocky Reef Spring Creek at 29 Rocky Reef Road, Fort Shaw, Sections35/36, T21N, R2W, Cascade County, MT

Dear Mr. Wilson:

On November 30, 2011, the Cascade County Conservation District was notified that you may have exceeded the scope of your SB310 permit CA-28-10. An on-site investigation of the complaint was held on December 7, 2011 with several agencies and interested parties attending. Your agent was directed to install erosion control measures immediately to prevent sediment from entering the waterway.

The District Board of Supervisors met on December 12, 2012 at 3:00 PM in the USDA Conference Room, Mountain West Bank, Upper Level. Discussion concerning your project was held with Justin Deaver, Mike Bias, Spencer Pearson. As per your request because you were unable to attend this meeting, the CCCD Board did not make a decision regarding the alleged violation. However you are directed to have erosion control measures installed on the project immediately and you are hereby instructed to **cease** all activity the stream at this location (Rocky Reef Spring Creek at 29 Rocky Reef Road, Fort Shaw, Sections35/36, T21N, R2W, Cascade County, MT) until the matter can be addressed.

If you are found to be in violation of the Natural Streambed and Land Preservation Act, you and your contractor are subject to a civil penalty an amount not to exceed $500 per violation, and each day of violation constitutes a separate violation. Montana Code Annotated 75-7-123. In addition, this Conservation District has the authority under Montana Code Annotated 75-7-122 and -123 to take you to court to collect the civil penalties imposed against you and to require mitigation or abatement.

The Board of Supervisors will meet on January 9 2011 at 3:15 PM at the USDA Conference Room, Mountain West Bank, Upper Level. Your attendance is required to discuss resolving this alleged violation. If you cannot attend the meeting, please contact the District Office at 727-3603, extension 140, as soon as possible. Thank you.

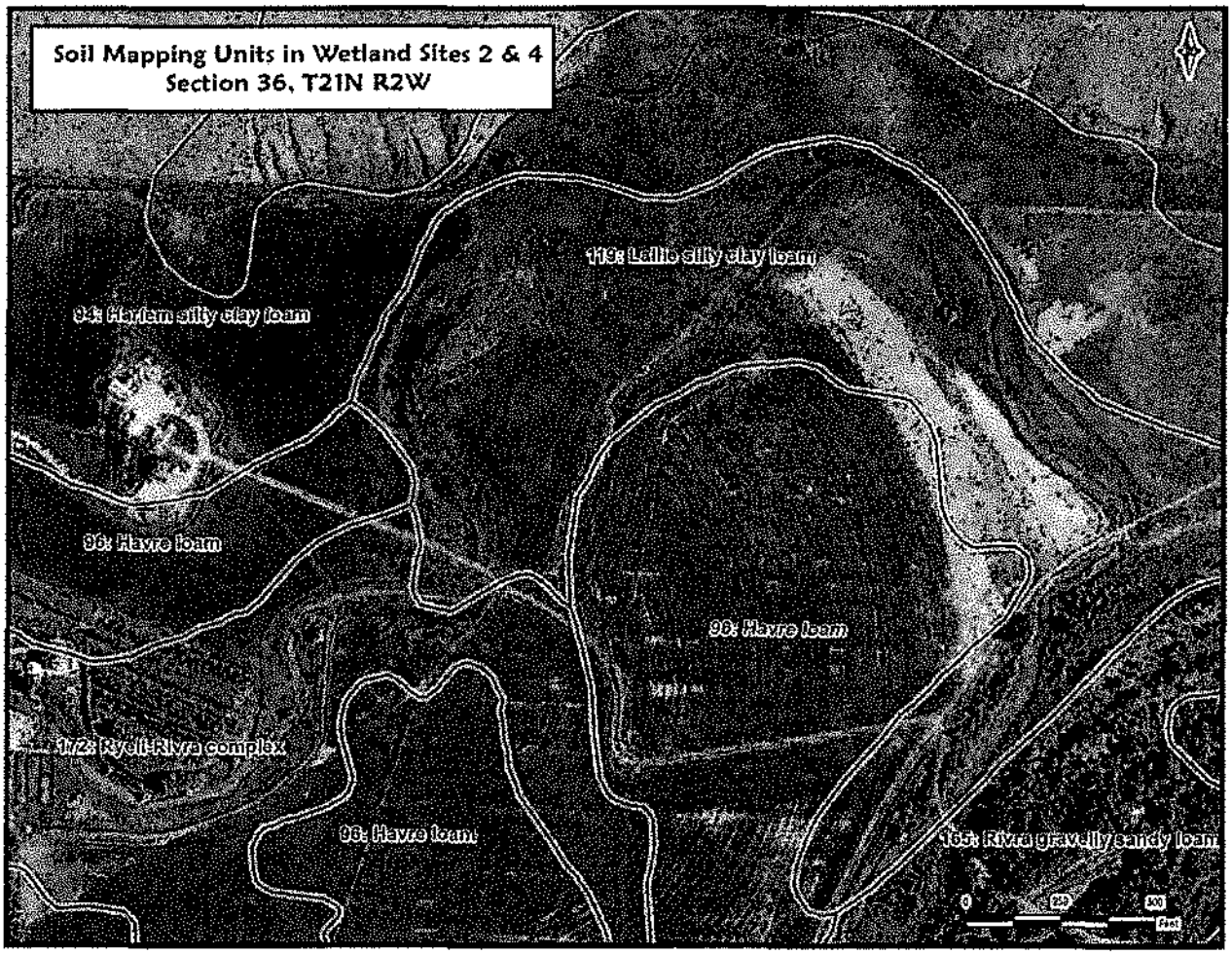
Sincerely,

Tonya Merryman

Tonya Merryman
CCCD Technician

Cc: Brian Hopkins, Deputy County Attorney
George Likness, MFWP
Cascade County Planning Board
Jeff Ryan, DEQ Enforcement Division
Vickie Sullivan, Army Corps of Engineers
John Chase, CCCD Chairman

NRCS Soil Mapping Units – Wetlands east of North Fort Shaw Rd



Soil Mapping Unit Data from NRCS Soil Survey, Map Unit Description Soil Report, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

NRCS Soil Unit Descriptions

94—Harlem silty clay loam

Map Unit Setting

Elevation: 3,300 to 3,800 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 110 to 135 days

Map Unit Composition

Harlem and similar soils: 90 percent
Minor components: 10 percent

Description of Harlem

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare, None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 7.9 mmhos/cm)
Sodium adsorption ratio, maximum: 10.0
Available water capacity: Moderate (about 9.0 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Clayey (Cy) 10-14" p.z. (R052XN162MT)

Typical profile

0 to 8 inches: Silty clay loam
8 to 40 inches: Stratified clay to silt loam
40 to 60 inches: Stratified silty clay loam to fine sandy loam

Minor Components

Havre

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Ryell

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

96—Havre loam

Map Unit Setting

Elevation: 2,800 to 3,700 feet
Mean annual precipitation: 11 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 135 days

Map Unit Composition

Havre and similar soils: 90 percent
Minor components: 10 percent

Description of Havre

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None, Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)
Available water capacity: High (about 9.7 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Typical profile

0 to 8 inches: Loam
8 to 60 inches: Stratified fine sandy loam to clay loam

Minor Components

Korent

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Rivra

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Shallow to Gravel (SwGr) RRU 46-C 13-19" p.z. (R046XC507MT)

Ryell

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

119—Lallie silty clay loam

Map Unit Setting

Elevation: 3,300 to 3,700 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 34 to 45 degrees F
Frost-free period: 110 to 135 days

Map Unit Composition

Lallie and similar soils: 90 percent
Minor components: 10 percent

Description of Lallie

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None, Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
Available water capacity: High (about 10.8 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: Draft Subirrigated (Sb) RRU 46-C 13-19" p.z. (R046XC512MT)

Typical profile

0 to 2 inches: Silty clay loam
2 to 60 inches: Silty clay

Minor Components

Lallie, clay loam

Percent of map unit: 6 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Subirrigated (Sb) RRU 46-C 13-19" p.z. (R046XC512MT)

Benz

Percent of map unit: 2 percent
Landform: Alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) 10-14" p.z. (R052XN162MT)

Marvan

Percent of map unit: 2 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Clayey (Cy) 10-14" p.z. (R052XN162MT)

165—Rivra gravelly sandy loam

Map Unit Setting

Elevation: 3,100 to 4,800 feet
Mean annual precipitation: 11 to 19 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 135 days

Map Unit Composition

Rivra and similar soils: 90 percent
Minor components: 10 percent

Description of Rivra

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 to 42 inches
Frequency of flooding: None, Frequent
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: Shallow to Gravel (SwGr) 10-14" p.z. (R052XN176MT)

Typical profile

0 to 8 inches: Gravelly sandy loam
8 to 60 inches: Extremely gravelly sand

Minor Components

Korent

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Ryell

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Glendive

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Riverwash

Percent of map unit: 1 percent

Hanly

Percent of map unit: 1 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

172—Ryell-Rivra complex

Map Unit Setting

Elevation: 3,300 to 3,600 feet
Mean annual precipitation: 11 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 110 to 135 days

Map Unit Composition

Ryell and similar soils: 50 percent
Rivra and similar soils: 35 percent
Minor components: 15 percent

Description of Ryell

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None, Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Typical profile

0 to 8 inches: Loam
8 to 28 inches: Stratified very fine sandy loam to silt loam
28 to 60 inches: Extremely gravelly loamy sand

Description of Rivra

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 to 42 inches
Frequency of flooding: None, Frequent
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

(continued next page)

Description of Rivra

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 to 42 inches
Frequency of flooding: None, Frequent
Frequency of ponding: None
Available water capacity: Very low (about 2.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: Shallow to Gravel (SwGr) 10-14" p.z. (R052XN176MT)

Typical profile

0 to 8 inches: Gravelly sandy loam
8 to 60 inches: Extremely gravelly sand

Minor Components

Glendive

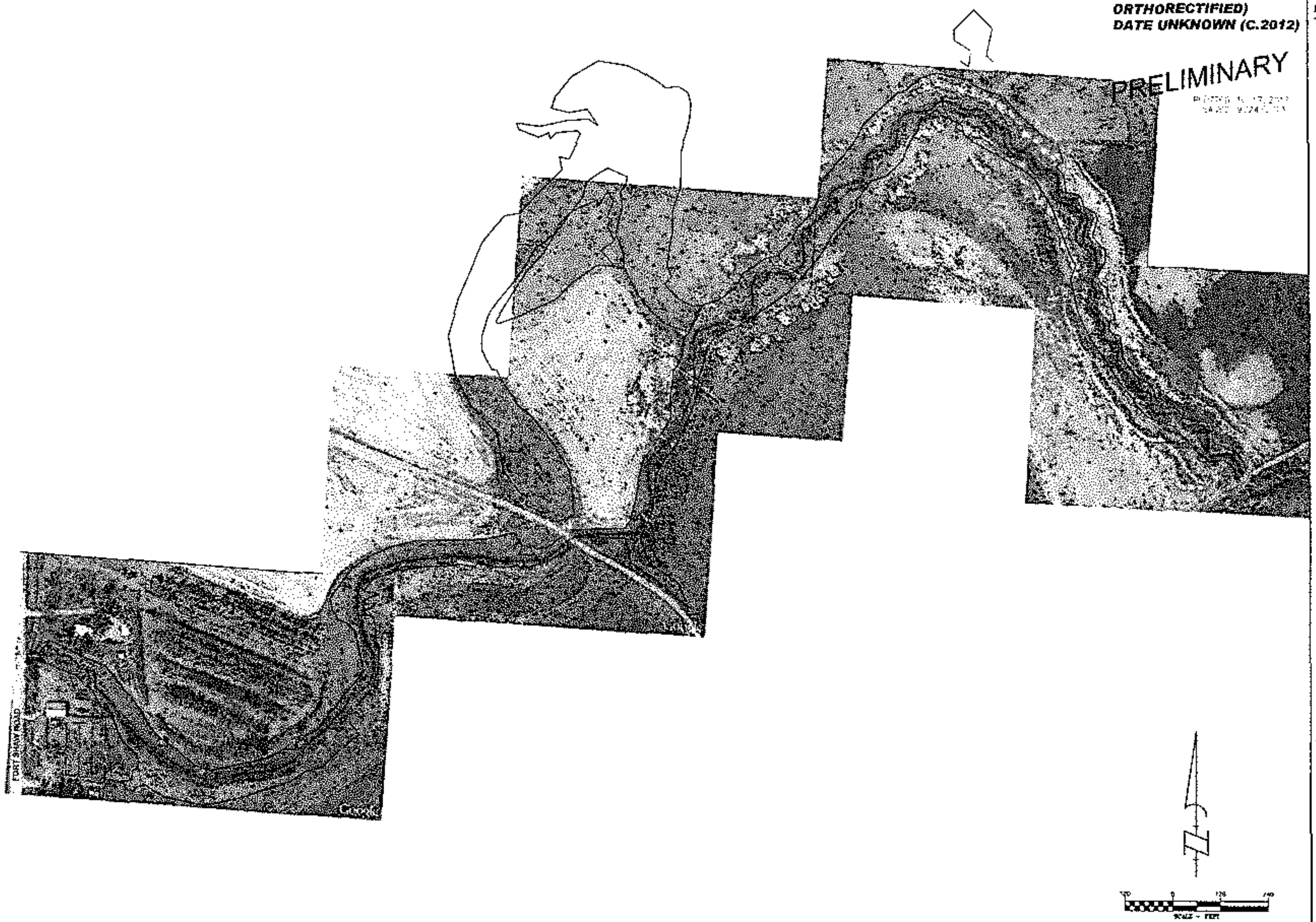
Percent of map unit: 8 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

Havre

Percent of map unit: 7 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R052XN161MT)

NOTE: IMAGERY APPROXIMATE (NOT ORTHORECTIFIED) DATE UNKNOWN (C.2012)

PRELIMINARY



WGM GROUP
1111 EAST BROADWAY
MISSOULA, MONTANA 59802
TEL 406-728-4611
FAX 406-728-2476
WWW.WGMGROUP.COM

PROJECT OVERVIEW

WILSON SPRING CREEK - EXISTING CONDITIONS

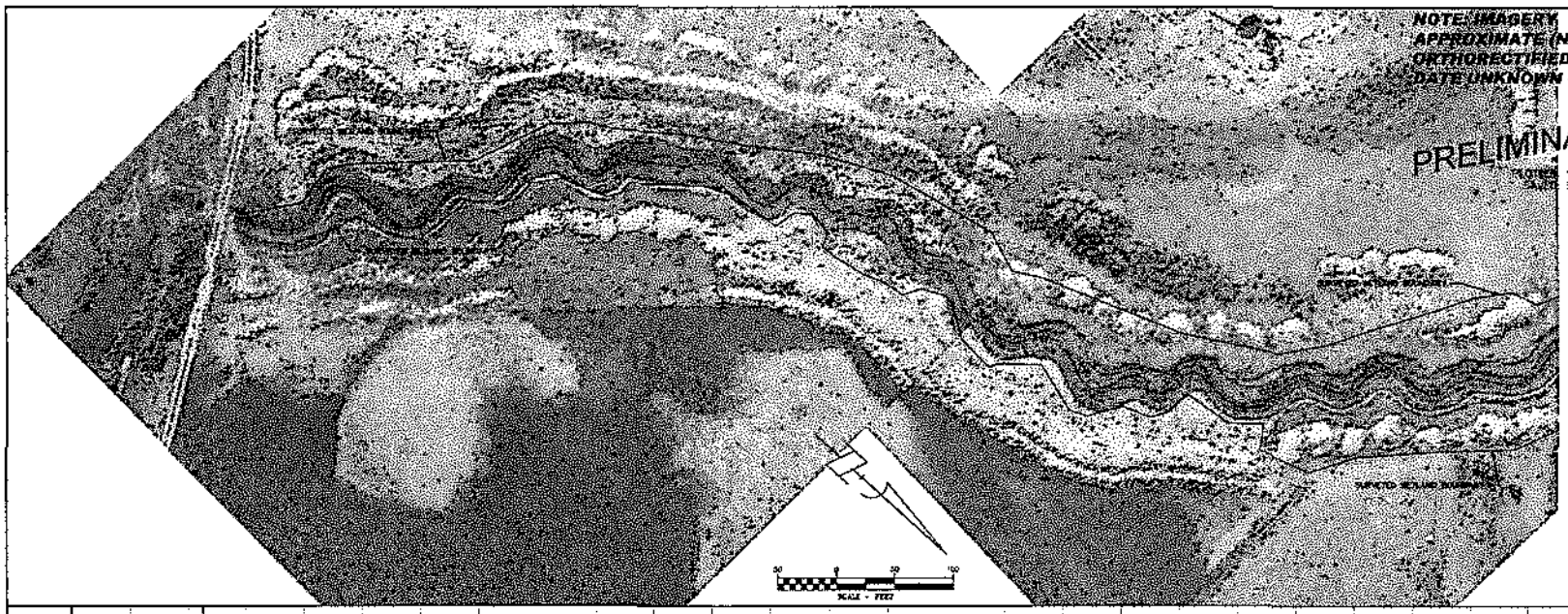
FORT SHAW, MONTANA

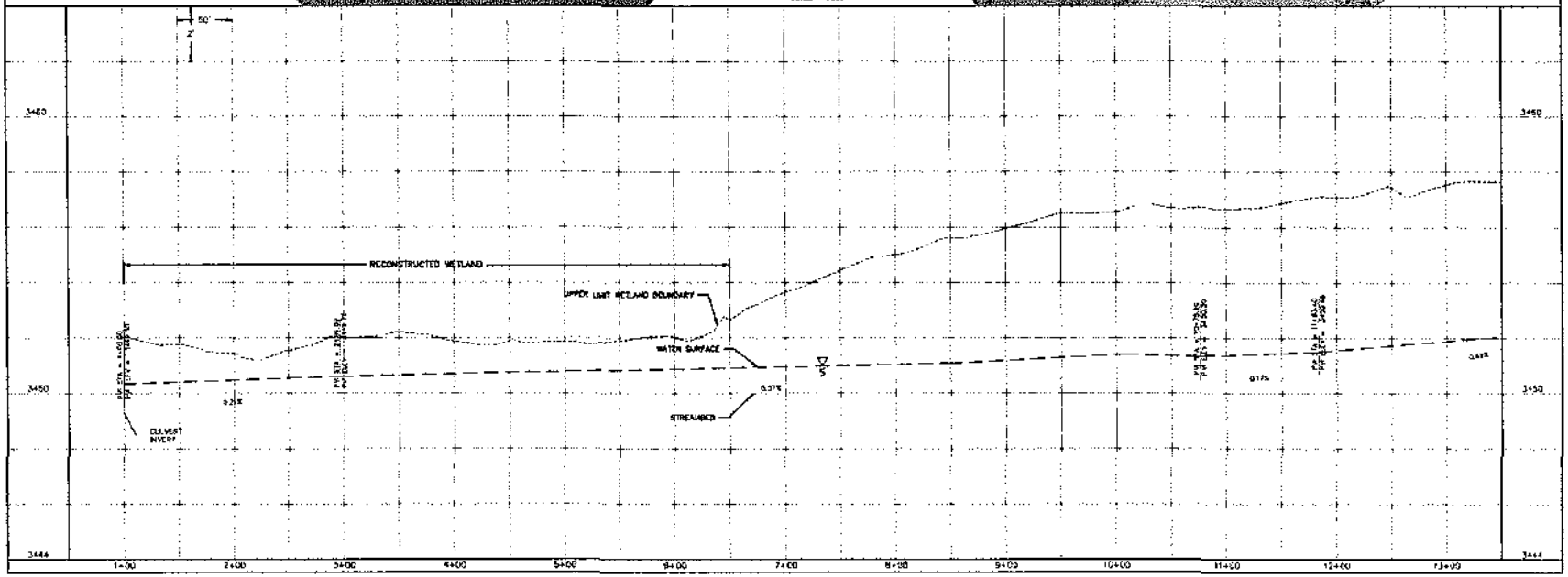
REVISIONS
NO. DESCRIPTION DATE

PROJECT: 12-08-08

SEPTEMBER 2013

SHEET 1 OF 6





WGM GROUP
1111 EAST BROADWAY
MISSOULA, MONTANA 59802
TEL: 406-728-4611
FAX: 406-728-2476
WWW.WGMGROUP.COM

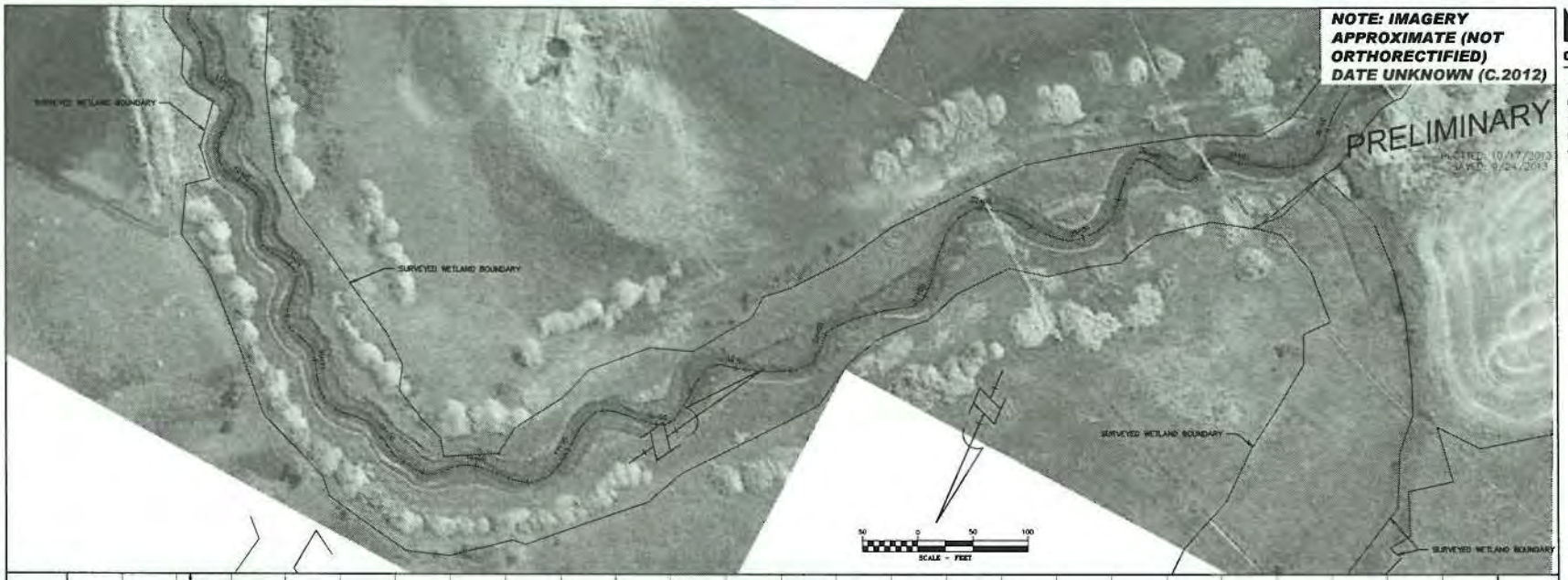
EXISTING CONDITIONS
WILSON SPRING CREEK - EXISTING CONDITIONS
FORT SHAW, MONTANA

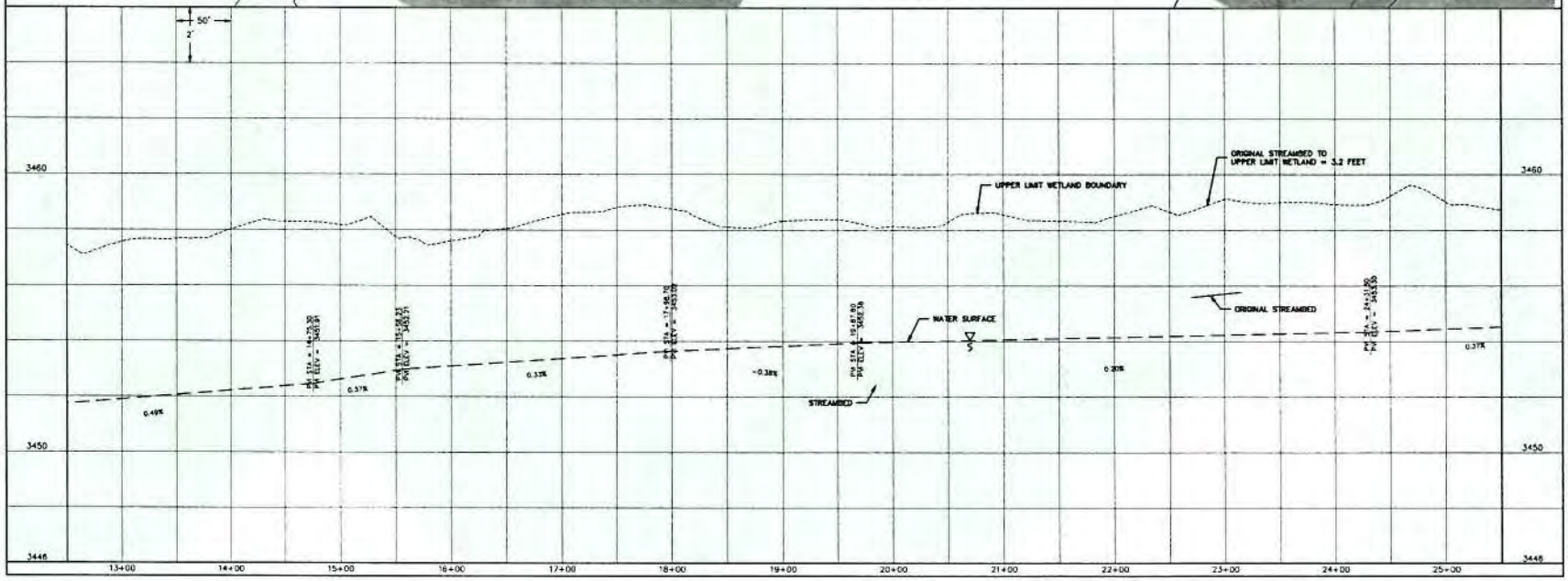
REVISIONS
NO. DESCRIPTION DATE

PROJECT 12-08-08
FILE No. 120808EXISTING CONDITIONS.dwg
CAD PATH
LAYOUT SHT2
SURVEYED JAB
DESIGN DKA
DRAFT EP
APPROVE
DATE

SEPTEMBER 2013

SHEET 2 OF 6





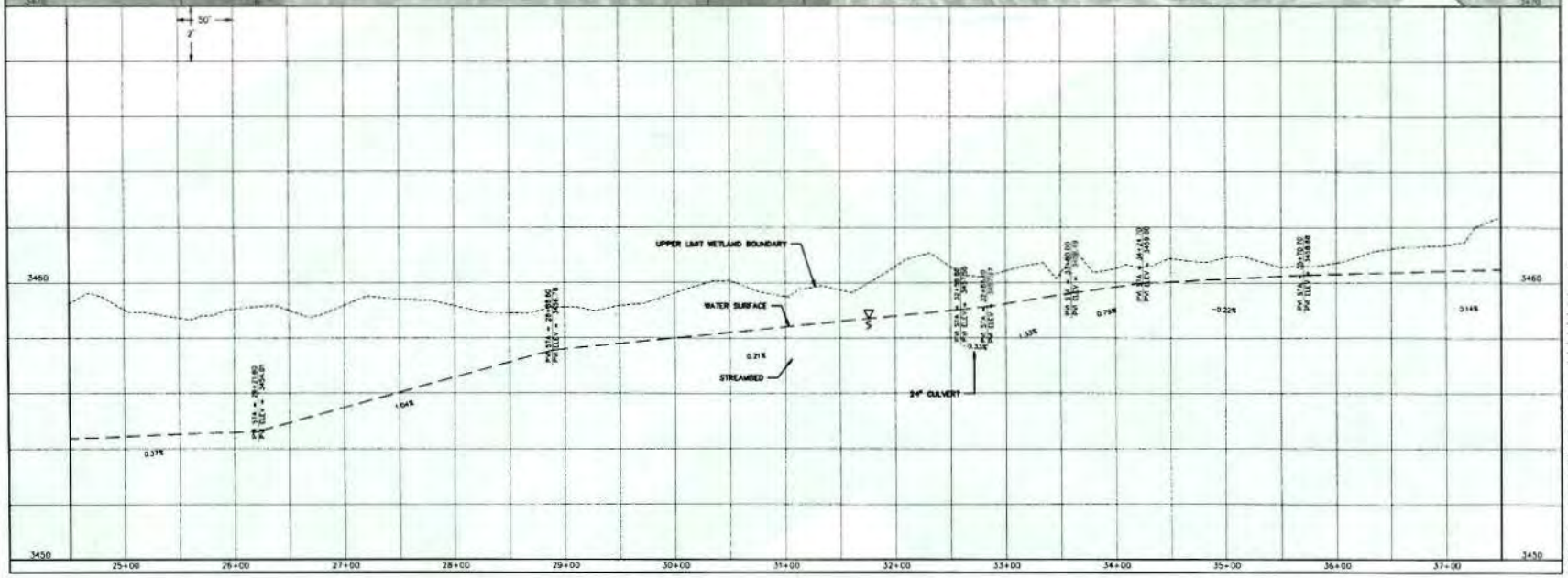
WGM GROUP
1111 EAST BROADWAY
MISSOULA, MONTANA 59802
TEL 406-728-4611
FAX 406-728-2476
WWW.WGMGROUP.COM

EXISTING CONDITIONS
WILSON SPRING CREEK - EXISTING CONDITIONS
FORT SHAW, MONTANA

REVISIONS:

NO.	DESCRIPTION	DATE

PROJECT: 12-08-09
FILE No: 120809CXISTING CONDITIONS.dwg
FILE PATH:
LAYOUT: SHT3
SURVEYED: JAD
DESIGN: BKA
DRAFT: EDI
APPROVED:
DATE: SEPTEMBER 2013



WGM GROUP
1111 EAST BROADWAY
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EXISTING CONDITIONS
WILSON SPRING CREEK - EXISTING CONDITIONS
FORT SHAW, MONTANA

REVISIONS:

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SEPTEMBER 2013

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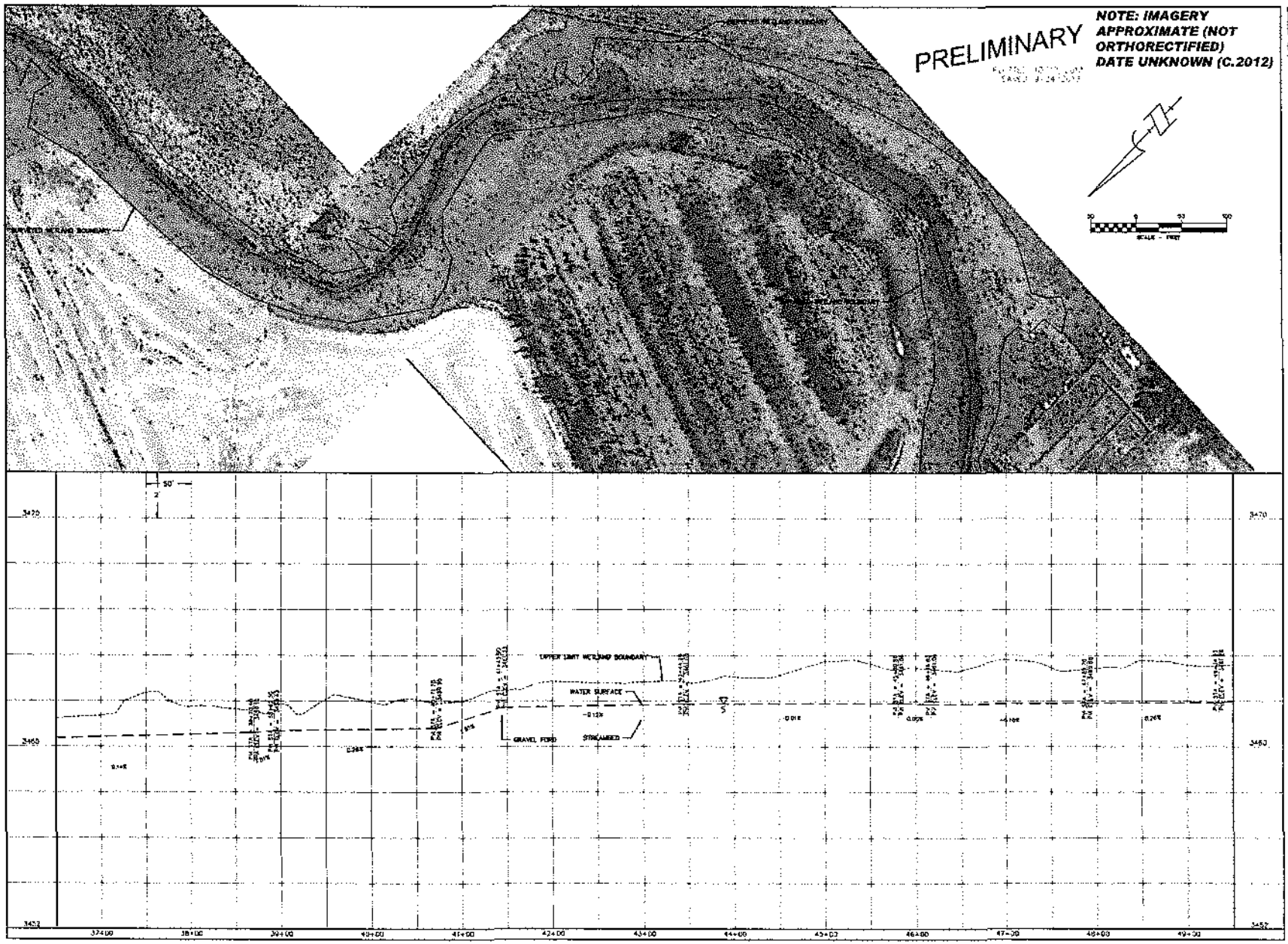

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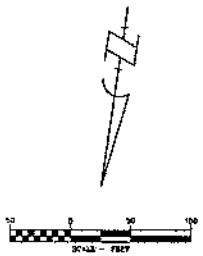

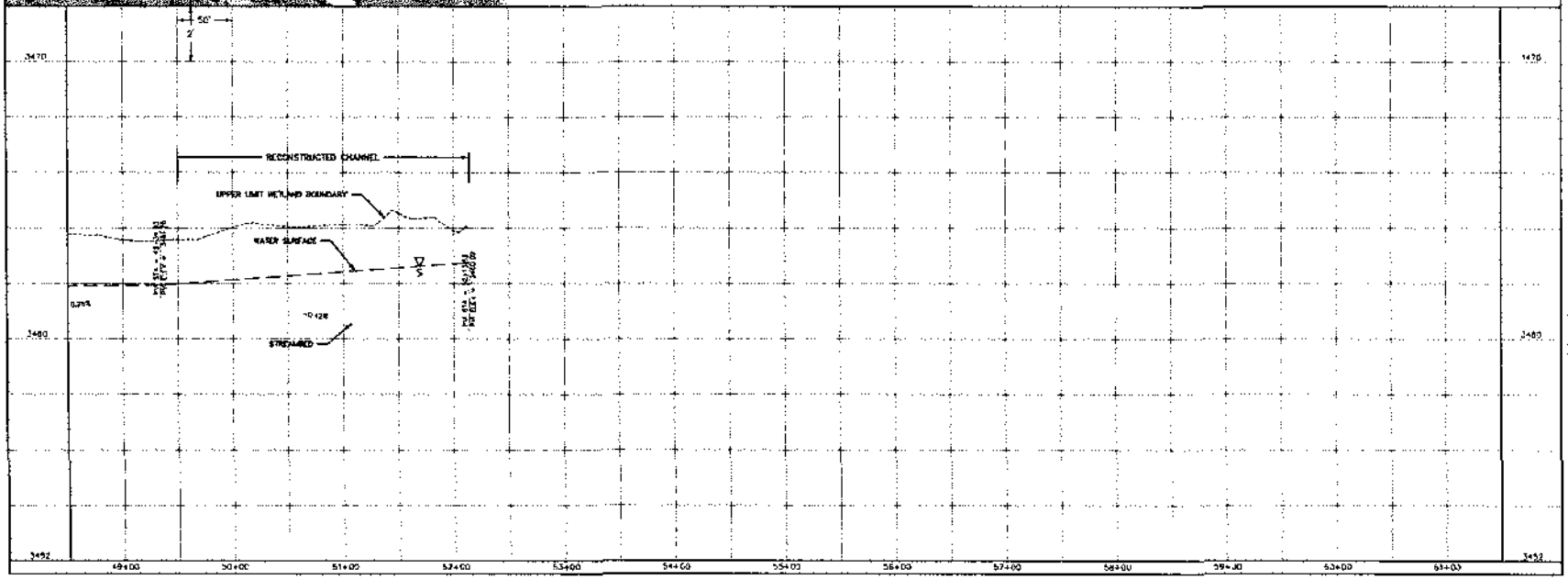

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APPROVED
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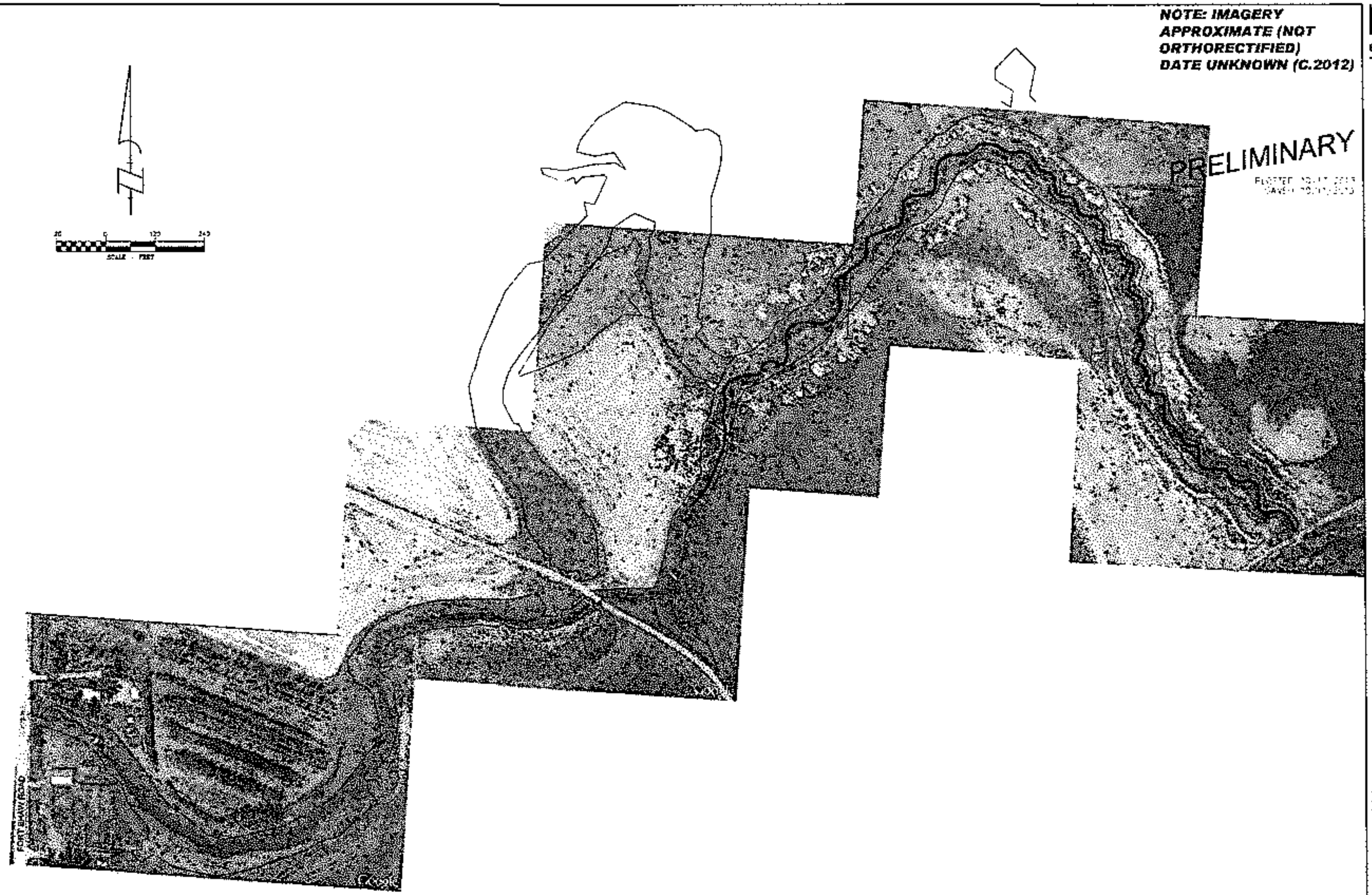

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PROJECT OVERVIEW
WILSON SPRING CREEK - CHANNEL MATCHING OPTION
FORT SHAW, MONTANA

REVISIONS
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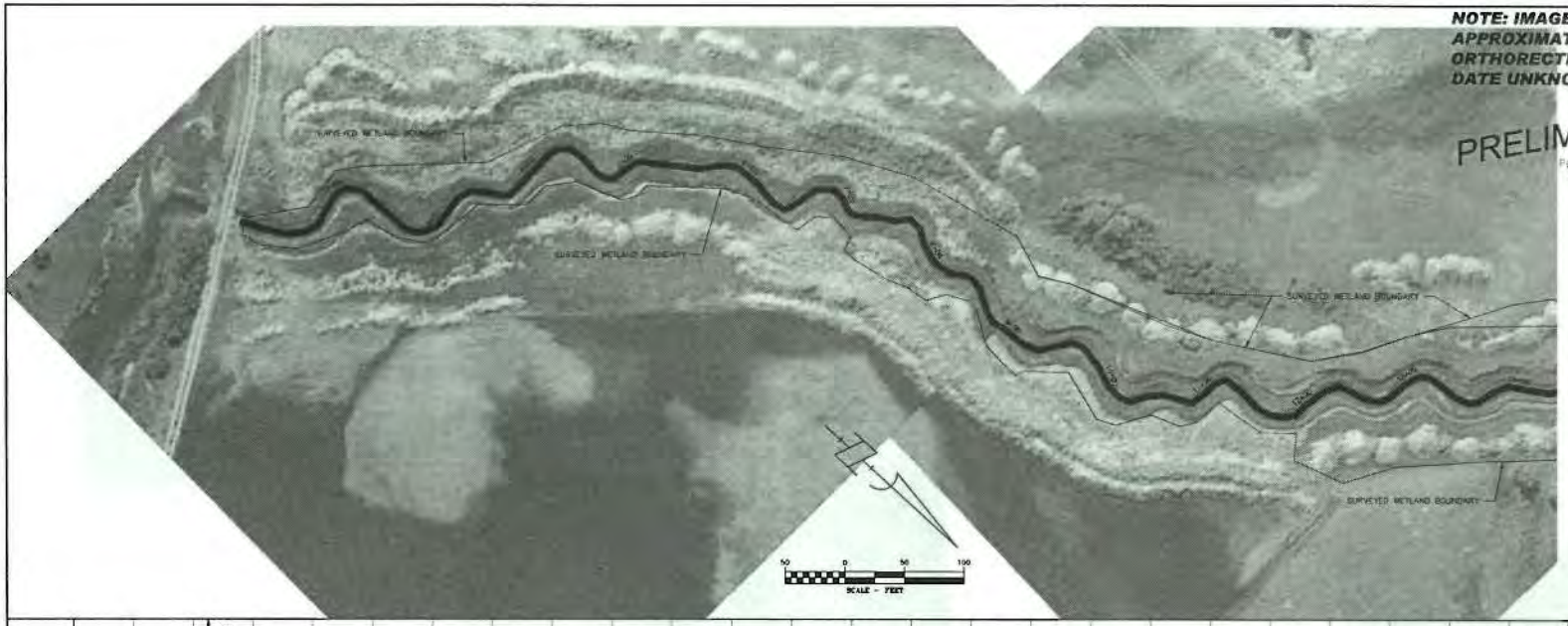

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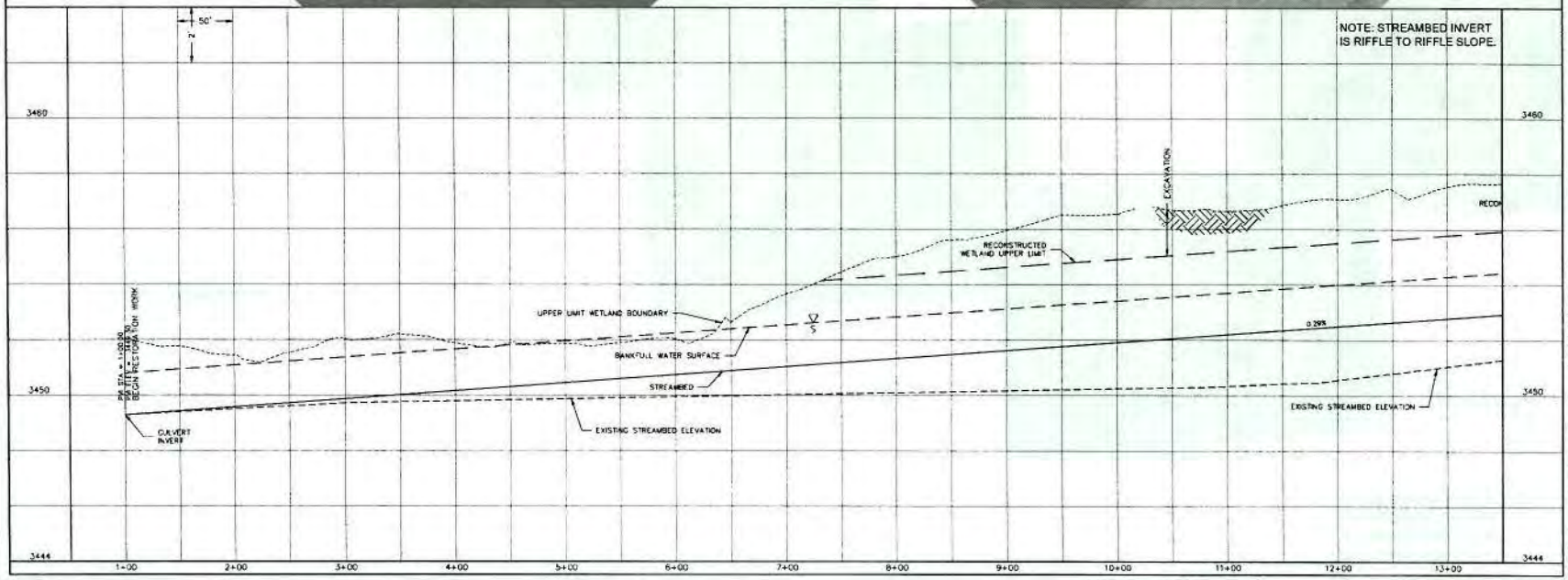

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RESTORATION PLAN
WILSON SPRING CREEK - CHANNEL MATCHING OPTION
FORT SHAW, MONTANA

REVISIONS
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SEPTEMBER 2013

SHEET 2 OF 4

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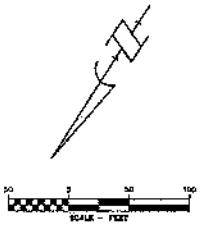

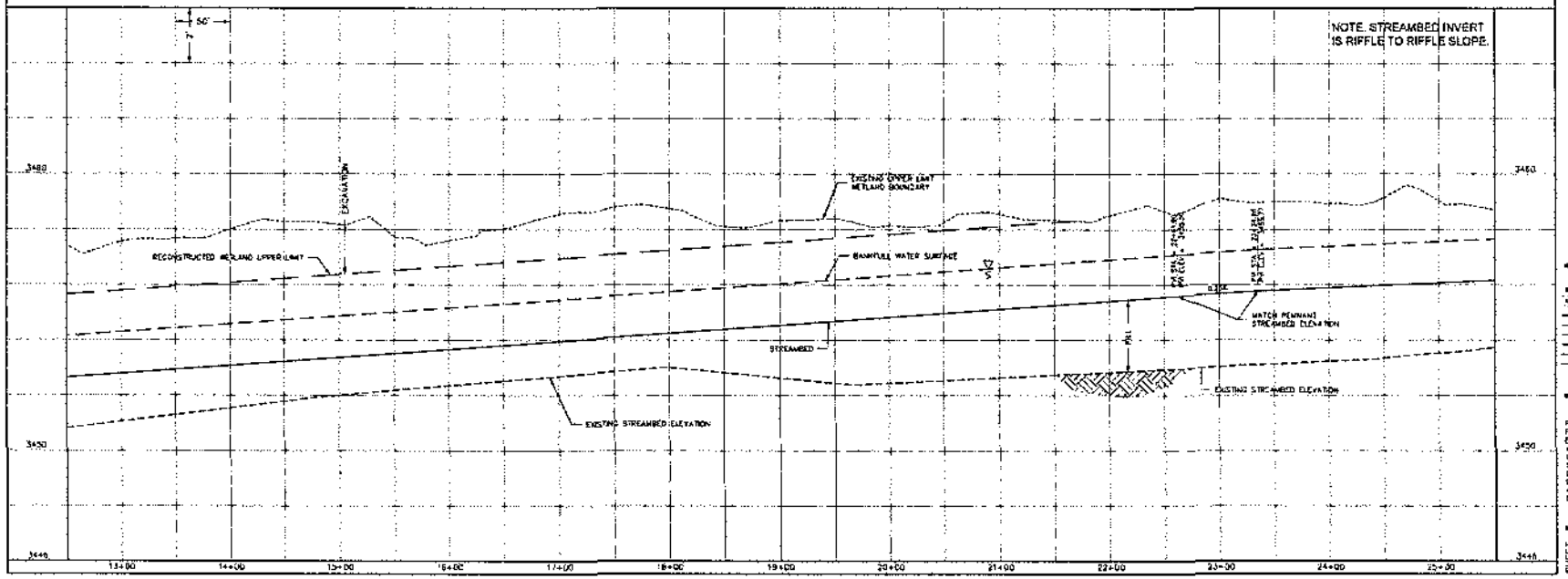

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RESTORATION PLAN
WILSON SPRING CREEK - CHANNEL MATCHING OPTION
FORT SHAW, MONTANA

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SEPTEMBER 2013

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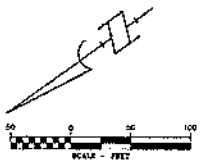

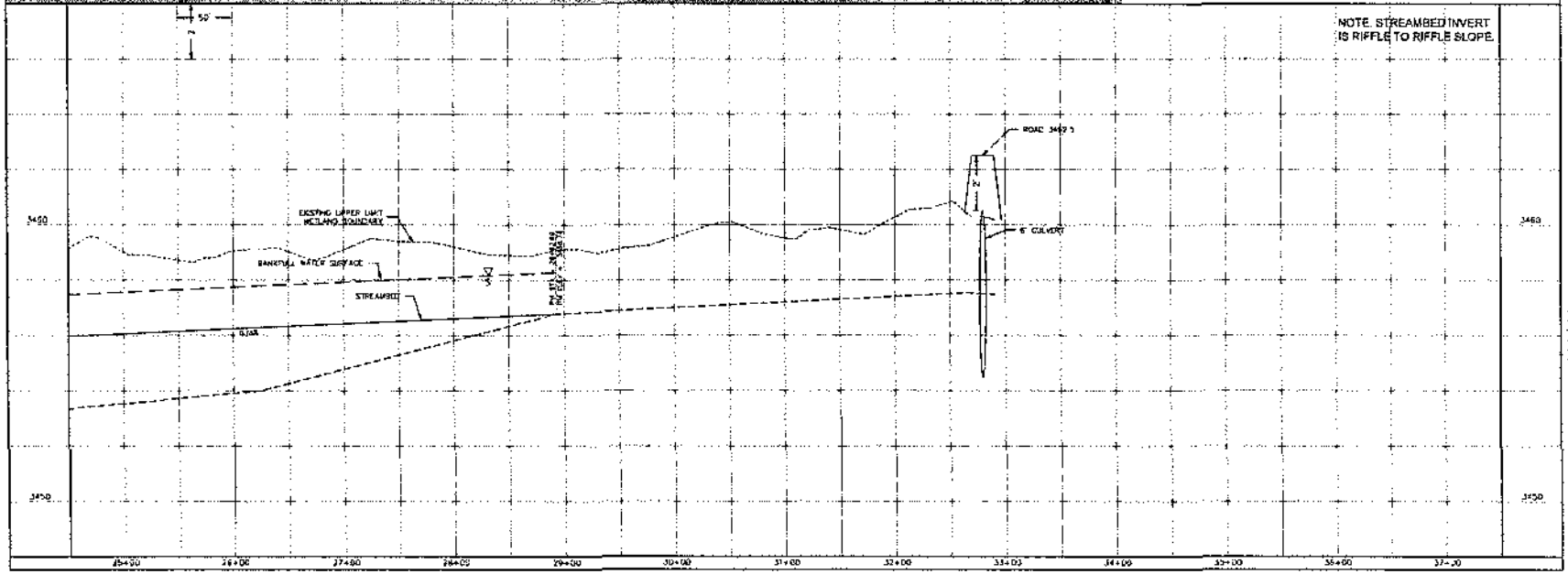

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FORT SHAW, MONTANA

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SHEET 4 OF 4

Montana Fish, Wildlife & Parks

January 29, 2010
1420 East 6th Ave.
P.O. Box 200701
Helena, MT 59620-0701

Environmental Quality Council
Montana Department of Environmental Quality
Montana Department of Fish, Wildlife and Parks
Fisheries Bureau
Endangered Species Coordinator
Great Falls Office
Montana State Library, Helena
MT Environmental Information Center
Montana Audubon Council
Montana Wildlife Federation, P.O. Box 1175, Helena, MT 59624
Wayne Hadley, 1016 Eastside Road, Deer Lodge, MT 59722
Montana River Action, 304 N 18th Ave., Bozeman, MT 59715
Cascade County Conservation District, 12 3rd Street NW, Upper Level, Great Falls, MT 59404
U.S. Army Corp of Engineers, Helena
U.S. Fish and Wildlife Service, Helena
State Historic Preservation Office, Helena
Leland Wilson, 29 Rocky Reef Road, Fort Shaw, MT 59443
Missouri River Flyfishers, P.O. Box 1885, Great Falls, MT 59403
Pat Barnes Missouri River Chapter TU, P.O. Box 275, Helena, MT 59604
Ducks Unlimited, P.O. Box 183, Elliston, MT 59728

Ladies and Gentlemen:

Please find enclosed an Environmental Assessment (EA) prepared for the Future Fisheries Improvement Program. The Program tentatively plans to provide partial funding to a stream restoration project on Rocky Reef Spring Creek (formally unnamed), a tributary to the Sun River located near the community of Fort Shaw. The intent of the project is to enhance spawning, rearing and adult habitat for salmonids in this spring creek and increase recruitment of fish to the Sun River. This proposed project is located on property owned by Leland Wilson approximately 1 mile north of the community of Fort Shaw in Cascade County.

Please submit any comments that you have by 5:00 P.M., March 3, 2010 to the Department of Fish, Wildlife and Parks in Helena at the address listed above. Completion of this project is contingent upon approval being granted by the Fish, Wildlife and Parks Commission. If you have any questions, feel free to contact me at (406) 444-2432. Please note that this draft EA will be considered as final if no substantive comments are received by the deadline listed above.

Sincerely,

Mark Lere, Program Officer
Habitat Protection Section
Fisheries Bureau
e-mail: mlere@mt.gov

ENVIRONMENTAL ASSESSMENT
Fisheries Division
Montana Fish, Wildlife and Parks
Rocky Reef Spring Creek Channel Restoration Project

General Purpose: The 1995 Montana Legislature enacted statute 87-1-272 through 273 that directs the Department to administer a Future Fisheries Improvement Program. The program involves providing funding for physical projects to restore degraded fish habitat in rivers and lakes for the purpose of improving wild fisheries. The legislature established an earmarked funding account to help accomplish this goal.

The Future Fisheries Improvement Program is proposing to provide partial funding to a project calling for the restoration of approximately 3.9 miles of Rocky Reef Spring Creek (formally unnamed), a tributary to the Sun River. Restoration would involve increasing channel sinuosity, narrowing and deepening over-widened portions of the channel, creating riffle-pool habitat, transplanting sods on newly constructed stream banks and replacing a series of undersized culverts with larger sized pipes. A vegetative buffer of a minimum of 50 feet would be established on each side of the newly restored channel. The intent of the project is to enhance fish habitat in this spring creek and provide for additional recruitment of fish to the Sun River. The project site is located approximately one mile north of the community of Fort Shaw in Cascade County (Attachment 1).

I. Location of Project: This project will be conducted on Rocky Reef Spring Creek (formally unnamed), a tributary to Sun River, located approximately one mile north of the community of Fort Shaw within Township 20 North, Range 2 West, Section 3 and Township 21 North, Range 2 West, Sections 34, 35 and 36 in Cascade County.

II. Need for the Project: One goal within Montana Fish, Wildlife and Parks six-year operations plan for the fisheries program is to "restore and enhance degraded fisheries habitats" by implementing habitat restoration projects and administering the Future Fisheries Improvement Program to restore important habitats on private and public lands. This proposed project would help meet this goal.

Rocky Reef Spring Creek emerges approximately ¼ mile east of the Rocky Reef geologic dike on the north side of the Sun River and flows approximately 3.9 miles to its confluence with the river. Stream flow gradually increases throughout its length and ultimately discharges approximately 12 to 13 cubic feet per second into the Sun River. Although there are a few anecdotal reports of limited spawning activity in the spring creek, only a few trout currently reside in the stream. Agricultural practices in the past century have severely degraded the aquatic and riparian habitat of the stream, including channelization, livestock overgrazing, inadequate road crossings, dewatering and sedimentation from irrigation return flows. A majority of the upper 2.2 miles of the stream were dredged for use as an irrigation delivery system in the past. Currently, fine sediment covers most of the underlying stream gravel, with few areas remaining narrow enough to maintain cleansing flow velocities. Several existing road crossing currently act as barriers to upstream migrating fish. No riparian shrubs are found on the banks of the existing channel. This proposed project intends to create hydraulic conditions that

would provide for the transport of fine sediment, improve habitat conditions to enhance the fisheries, remove all the migration barriers and improve wetland habitat adjacent to the spring creek.

III. Scope of the Project:

This proposed project calls for restoring the spring creek to a viable and proper functioning stream channel with migratory connectivity from its initial upwelling to its confluence with the Sun River (Attachment 2). Sinuosity would be added where gradient conditions allow, achieving greater stream length and diversity. In reaches where gradients are too flat, the stream would be shortened somewhat to return it to its historic channel and enhance fine sediment routing. Overall, total stream length would be increased from 3.9 miles to approximately 4.5 miles. Over-widened and shallow portions of the channel would be narrowed and deepened to create conditions where riffles could maintain gravel substrates (Attachment 3). Pool habitat would be enhanced by excavating lateral scour pools from 2 to 3 feet deep in the upper stream reaches and up to 5 feet deep in the lower reaches. Design widths and depths for the channel would gradually increase as the stream progresses down valley based on increasing discharge. Reaches where the old channel becomes abandoned would remain as off-channel ponds to enhance habitat for waterfowl. Sod transplants and willow clumps would be planted to create stable banks immediately following channel construction. All disturbed areas not covered by sod transplants would be seeded with a native grass mixture and planted with native shrubs. Plant survival would be enhanced using an existing pivot irrigation system to water newly planted vegetation. A vegetative buffer of at least 50 feet would be established to protect the riparian corridor. Four undersized culverts would be replaced with larger, properly sized pipes and a fifth undersized culvert would be replaced with a bridge. Recent changes in land use activities surrounding this spring creek include the removal of all livestock from the farm and the conversion of all irrigation to pivot sprinklers that now use water diverted from the Sun River. No water is being, or will be diverted from the spring creek. This project is expected to cost $445,206.00. Of this total, the Future Fisheries Improvement Program would be contributing up to $70,530.00.

IV. Environmental Impact Checklist:

Please see attached checklist.

V. Explanation of Impacts to the Physical Environment

1. Terrestrial and aquatic life and habitats.

Improving overall aquatic habitat conditions within this spring creek and restoring migratory connectivity with the Sun River is expected to enhance the resident fisheries, including rainbow trout and brown trout. Additionally, restoration of the stream is expected to enhance recruitment of fish to the Sun River. Habitat for riparian dependent wildlife also would be improved by enhancing the riparian vegetative community along the stream margin.

2. Water quantity, quality and distribution.

Presently, this spring creek displays elevated water temperatures and excessive fine sediment accumulations due to the over-widened and shallow nature of the channel and to the lack of woody riparian vegetation. The proposed restoration project is expected to reduce water temperatures and increase the sediment transport capability of the channel. Short-term increases in turbidity will occur during project construction. To minimize turbidity, the operation of equipment in the active stream channel will be minimized to the extent practicable. Work would be conducted in the dry on reaches where new channel construction is proposed. The Department of Environmental Quality will be contacted to determine narrative conditions required to meet short-term water quality standards and protect aquatic biota (318 authorization). A 310 permit (Natural Streambed and Land Preservation Act) will be obtained from the local conservation district and the U.S. Army Corp of Engineers will be contacted to determine the need to meet 404 provisions of the Clean Water Act.

3. Geology and soil quality, stability and moisture.

Soils along the stream margin and in areas of new channel construction would be disturbed during restoration activities, but would be stabilized following proposed sod transplanting and re-vegetation efforts. Re-vegetation efforts would involve placement of salvaged sod and seeding with native sedges and grasses, as well as planting native riparian shrubs. Soils would be further stabilized with the establishment of a 50-foot vegetative buffer along both sides of the stream.

4. Vegetation cover, quantity and quality.

Riparian vegetation and cover would be disturbed during the period of construction. However, proposed re-vegetation efforts, in conjunction with a riparian vegetative buffer, would result in an overall improvement to the riparian vegetative community.

5. Aesthetics.

In the short term, aesthetics would be adversely impacted due to ground disturbance and the presence of heavy construction equipment. In the long term, returning this degraded spring creek back to a more natural configuration would enhance aesthetics. In addition, the riparian vegetative community would be enhanced by riparian plantings and by the establishment of a vegetative buffer within the streamside corridor.

9. Historic and archaeological sites

The proposed project may require an individual Army Corp of Engineers 404 permit. Therefore, the State Historic Preservation Office will be contacted to determine the need for compliance with the federal historic preservation regulations. The project will not begin until a cultural clearance is granted.

VI. Explanation of Impacts on the Human Environment.

7. Access to & quality of recreational activities.

Presently, this spring creek contributes no appreciable recruitment of salmonids to Sun River. The proposed project is expected to increase recruitment to downstream waters and enhance the recreational fisheries found there.

VII. Discussion and Evaluation of Reasonable Alternatives.

1. No Action Alternative

If no action is taken, this spring creek will remain degraded and the fisheries potential for the stream, as well as for recruitment to the Sun River, will remain below potential. The riparian habitat also will remain degraded. Recreational opportunities associated with fish and wildlife resources will remain reduced and aesthetics will continue to be impaired.

2. The Proposed Alternative

The proposed alternative is designed to restore approximately 3.9 miles of degraded channel on a spring creek tributary to the Sun River. The project would improve overall aquatic habitat for salmonids and improve the vegetative community within the riparian corridor. This alternative is expected to improve fish and wildlife habitat and aesthetics within the project area and would enhance recruitment of fish to downstream waters.

VIII. Environmental Assessment Conclusion Section

1. Is an EIS required? No.

We conclude from this review that the proposed activities will have a positive impact on the physical and human environment.

2. Level of public involvement.

The proposed project was reviewed and supported by the public review panel of the Future Fisheries Improvement Program. The proposed project also will be reviewed by the Fish, Wildlife and Parks Commission and funding will be contingent upon their approval. The Environmental Assessment (EA) is being distributed to all individuals and groups listed on the cover letter. The EA also will be published on Montana Fish, Wildlife and Parks webpage: fwp.mt.gov.

3. Duration of comment period?

Public comment will be accepted through 5:00 PM on March 3, 2010.

4. Person responsible for preparing the EA.

Mark Lere, Program Officer
Habitat Protection Section
Fisheries Bureau
Montana Department of Fish, Wildlife and Parks
1420 East 6th Avenue
Helena, MT 59620
Telephone: (406) 444-2432
e-mail: mlere@mt.gov

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
1420 E 6th Ave, PO BOX 200701, Helena, MT 59620-0701
(406) 444-2535

ENVIRONMENTAL ASSESSMENT

Project Title Rocky Reef Spring Creek Channel Restoration Project

Division/Bureau Fisheries Bureau -Future Fisheries Improvement
Description of Project The Future Fisheries Improvement Program is proposing to provide partial funding for a project calling for the restoration of approximately 3.9 miles of Rocky Reef Spring Creek (formally unnamed), a tributary to the Sun River. The intent of the project is to enhance fish habitat in the spring creek and provide for additional recruitment of juvenile fish to Sun River. The project site is located approximately one mile north of the community of Fort Shaw in Cascade County.

POTENTIAL IMPACT ON PHYSICAL ENVIRONMENT

	MAJOR	MODERATE	MINOR	NONE	UNKNOWN	COMMENTS ON ATTACHED PAGES
1. Terrestrial & aquatic life and habitats			X			X
2. Water quality, quantity & distribution			X			X
3. Geology & soil quality, stability & moisture			X			X
4. Vegetation cover, quantity & quality			X			X
5. Aesthetics			X			X
6. Air quality				X		
7. Unique, endangered, fragile, or limited environmental resources				X		
8. Demands on environmental resources of land, water, air & energy				X		
9. Historical & archaeological sites					X	X

POTENTIAL IMPACTS ON THE HUMAN ENVIRONMENT

	MAJOR	MODERATE	MINOR	NONE	UNKNOWN	COMMENTS ON ATTACHED PAGES
1. Social structures & mores				X		
2. Cultural uniqueness & diversity				X		
3. Local & state tax base & tax revenue				X		
4. Agricultural or industrial production				X		
5. Human health				X		
6. Quantity & distribution of community & personal income				X		
7. Access to & quality of recreational and wilderness activities			X			X
8. Quantity & distribution of employment				X		
9. Distribution & density of population & housing				X		
10. Demands for government services				X		
11. Industrial & commercial activity				X		
12. Demands for energy				X		
13. Locally adopted environmental plans & goals				X		
14. Transportation networks & traffic flows				X		

Other groups or agencies contacted or which may have overlapping jurisdiction Cascade County Conservation District, US Fish and Wildlife Service, US Army Corp of Engineers, Montana Department of Environmental Quality, State Historic Preservation Office
Individuals or groups contributing to this EA Allen McNeal, McNeal Resources, George Liknes, MFWP
Recommendation concerning preparation of EIS No EIS required.
EA prepared by: Mark Lere
Date: January 20, 2009

WGM GROUP

50' CHANNEL BUFFER EXHIBIT

WILSON SPRING CREEK

FORT SHAW, MONTANA

OCTOBER 2013

SHEET 1 OF 5

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50' CHANNEL BUFFER EXHIBIT
WILSON SPRING CREEK
FORT SHAW, MONTANA

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SHEET 2 OF 5

50' CHANNEL BUFFER EXHIBIT

WILSON SPRING CREEK

FORT SHAW, MONTANA

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50' CHANNEL BUFFER EXHIBIT
WILSON SPRING CREEK
FORT SHAW, MONTANA

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50' CHANNEL BUFFER EXHIBIT

WILSON SPRING CREEK

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SHEET 5 OF 5

A CLASS III CULTURAL RESOURCE INVENTORY OF THE ROCKY REEF SPRING CREEK HABITAT IMPROVEMENT PROJECT, CASCADE COUNTY, MONTANA

Conducted for

Montana Department of Fish, Wildlife and Parks
Helena, Montana

by

David Ferguson

GCM Services, Inc.
P. O. Box 3047
Butte, Montana 59701

October 29, 2010

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INTRODUCTION

The Montana Department of Fish, Wildlife and Parks (FWP), Helena, Montana contracted with GCM Services, Butte, Montana to conduct a Class III cultural resource inventory of a spring creek channel reconstruction project in Cascade County. The survey area lies on the north side of the Sun River Valley, about one mile north of Fort Shaw, Montana. The spring fed stream is unnamed on the USGS 7.5 minute topographic quadrangle, Ft Shaw (1983). It is a tributary of the Sun River and is named Rocky Reef Spring Creek for purposes of this project. The purpose of the project is to restore the creek and create trout habitat.

The project area lies on private land in Section 3, T20N R2W, and Sections 34 and 35, T21N R2W. A segment of the project in Section 36, T21N R2W lies on state school trust land. Patrick Rennie (2010) of Montana Department of Natural Resources and Conservation (DNRC) conducted a cultural inventory of the state lands. Rennie's report is accessioned as Montana State Historic Preservation Office (SHPO) project 2010100501.

David Ferguson conducted the pedestrian inventory of the staked project corridor, accompanied by George Liknes of Montana Fish, Wildlife and Parks. The linear distance along the "Rocky Reef" spring creek, the two feeder pipelines and a segment of slough bank restoration totals about 18,500 ft (3.5 miles). The inventory area, based on a 100 ft wide survey corridor, thus encompasses roughly 42.4 acres. Figure 1 is a map based on the USGS 1:24,0000 topographic map *Fort Shaw, Montana* (1983), showing the project area. The inventory consisted of walking the project corridor as indicated on map Figure 1. Also included are two gathering pipelines routes that will convey surface water from nearby spring sources to the creek to avoid losing that water into the Birch-Meade Canal irrigation system (24CA1303). The goal of the inventory was to locate and record all cultural resources over 50 years old within the project area.

PHYSICAL SETTING

The project area lies in the Sun River Valley, on recent terraces made of river gravel and sandy loam. It is unlikely that the project landforms are old enough to harbor prehistoric cultural remains, given the severe flood episodes of the Sun River in 1964 and in the early 1980s. The project area is almost entirely on lands that disturbed by cultivation. These fields, currently cultivated for malt barley, appear to have been mechanically leveled for irrigation. Furthermore, the current owner had recently attempted to dig a new stream channel for the creek, resulting in significant disturbance for about one mile of the proposed rehabilitation segment.

The landforms containing the project area are probably late Holocene in age. Sediments within the terraces consist primarily of fine silt and sand, with large stream tumbled gravels. The area is probably subject to periodic flooding, and much of it is currently marshy. Vegetation along the streams, aside from the cropland, consists of primarily of dense grasses and riparian vegetation, with intermittent dense stands of sedges, rushes, willows and cottonwood trees. Surface visibility was generally poor. Figures 2-9 are photographs of the project area.

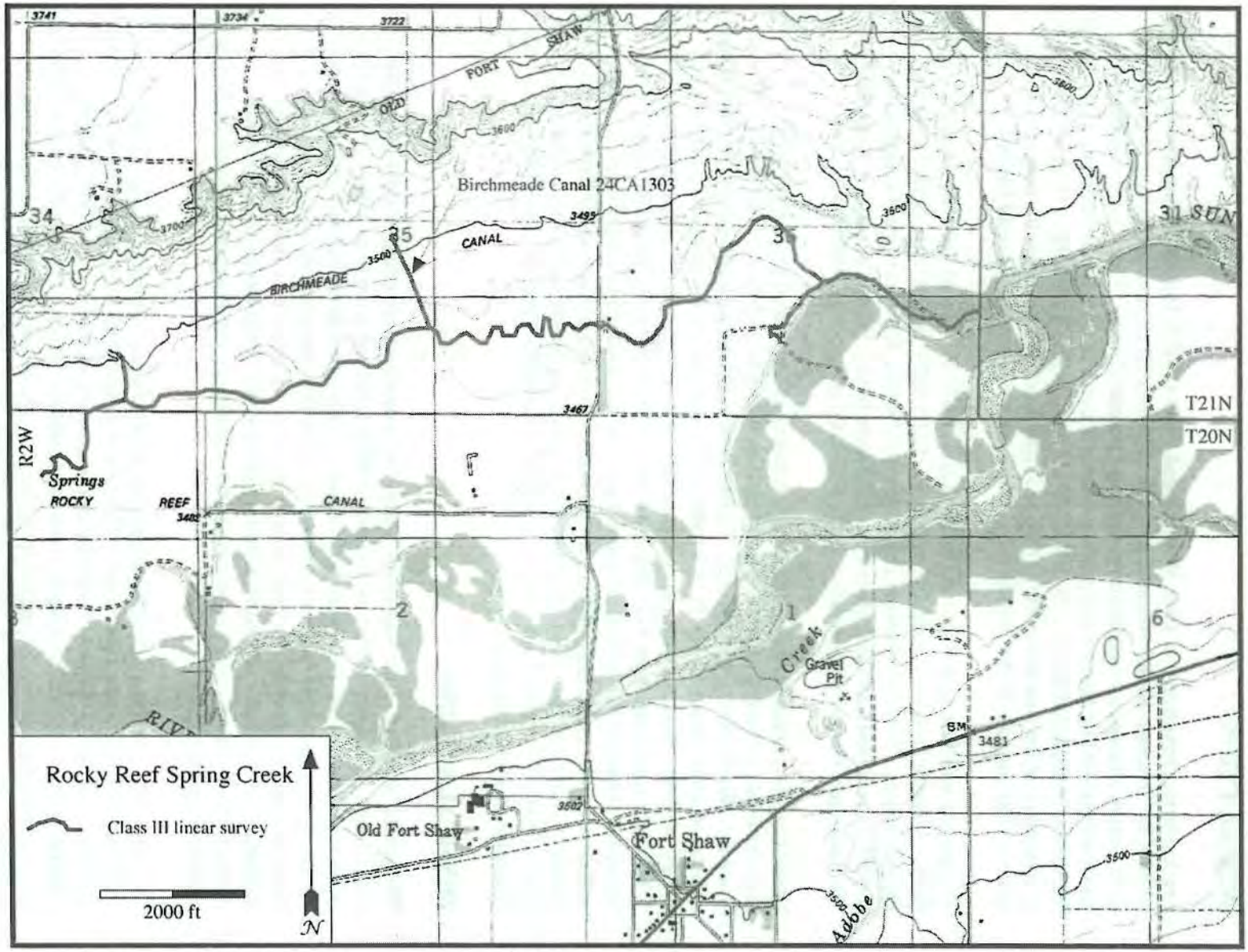

Figure 1. Map depicting the general location of the project area. The figure is based on the USGS 7.5-minute topographic map, *Fort Shaw* (1983).

Figure 2. Photograph of project area looking northeast from west end. The earthwork is from landowner's attempt to dig the creek channel.

Figure 3. Photograph facing southeast at future creek channel location through barley field.

Figure 4. Pipeline crossing point on Birch Meade Canal, 24CA1303, looking southeast.

Figure 5. Photograph of Birch-Meade canal looking east at pipeline crossing pointing S½ Section 35.

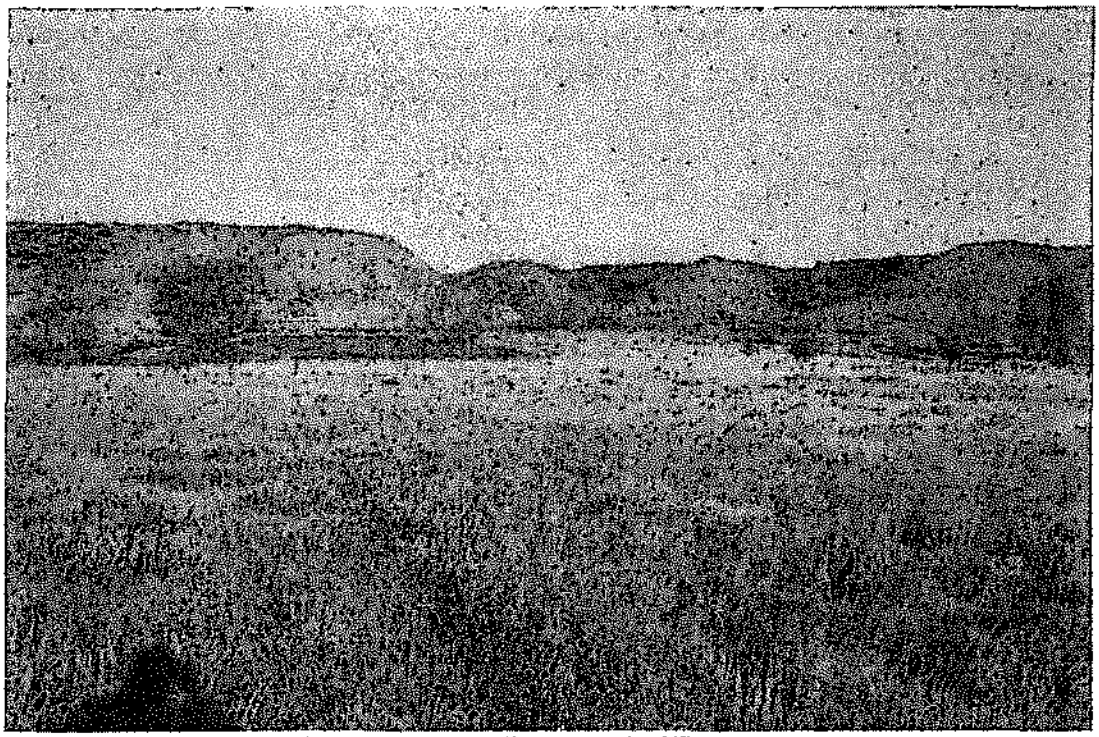

Figure 6. Photograph facing north at pipeline route in SE Section 34.

Figure 7. Looking southwest at slough bank rehabilitation area in S1/2 Section 36.

Figure 8. Looking east in SE Section 36 at proposed creek channel to slough.

Figure 9. Looking south at spring tributary that will be piped across the Birch-Meade Canal and into the Rocky Reef Spring Creek.

RESEARCH METHODS

Prior to the fieldwork, Cultural Resource Annotated Bibliography System (CRABS) and Cultural Resource Information Systems (CRIS) file search reports were requested from the Montana State Historic Preservation Office (Murdo 2010). The file searches indicated that no cultural resource inventories had previously been conducted within the sections that contain the project area. One historic irrigation canal (24CA1303) is on record within the project area. The Birch-Meade canal is listed as a National Register eligible property with consensus determination from the SHPO. The current project will cross the Birch-Meade canal with two small pipelines conveying spring water from the foot of the bench on the north side of the valley to the spring creek. Currently the spring water collects in marshy areas against the canal bank and enters the canal system. There will be no adverse effect to site 24CA1303 as a result of the pipeline construction.

RESULTS OF FIELDWORK

An intensive pedestrian inventory was conducted of all the land within the project area. Sources of subsurface exposure were limited to excavated materials from the landowner's attempt to dig the creek channel. These excavations were examined. Ground surface visibility was generally very poor. The inventory was conducted with the aid of a GPS unit, the 7.5 minute topographic map, and an aerial photograph based map provided by FWP. Weather conditions were good.

CONCLUSIONS

No new cultural properties were identified within the project area during the inventory. One historic irrigation canal (24CA1303) is on record within the project area. One historic irrigation canal (24CA1303) is on record within the project area. The Birch-Meade canal is listed as a National Register eligible property with consensus determination from the SHPO. The current project will cross the Birch-Meade canal with two small pipelines conveying spring water from the foot of the bench on the north side of the valley to the spring creek. Currently, the spring water collects in marshy areas against the canal bank and enters the canal system. There will be no adverse effect to site 24CA1303 as a result of the pipeline construction. No further work is recommended

REFERENCE

Murdo, Damon
2010 CRABS and CRIS file search conducted October 14, 2010. (SHPO Project #: 2010101408).

Rennie, Patrick
2010 Cultural Resources Inventory of Proposed Fishery Restoration Work in Portions of Section 36, T21N R2W: Cascade County, Montana. Report prepared by Patrick Rennie (DNRC, Helena) for the DNRC and DFWP (Helena, MT). SHPO accession no. 2010100501.

456-10

Montana Fish, Wildlife & Parks

SHPO

MT Fish Wildlife & Parks
600 North Park Avenue
P.O. Box 200701
Helena, MT 59620-0701

November 1, 2010

RECEIVED
MONTANA SHPO
DATE 22 Nov 2010 SIGNED

Mark Baumler
SHPO
PO box 201202
Helena, MT 59620-1202

Dear Mark:

The Department of Fish, Wildlife, and Parks is proposing to do reconstruction on the Rocky Reef Spring creek. Attached is a cultural resource inventory report of the project area not on DNRC land. Patrick Rennie has previously inventoried and consulted with the SHPO on the DNRC property. No cultural resources were identified within the project area therefore it appears that the proposed project will have a low likely hood of impacting cultural resources.
Please review the cultural resource inventory report and provide us with your comments.
Thank you,

Sincerely,

Paul Valle
Montana Fish Wildlife and Parks

Attachment

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

DIVISION OF TRUST LAND MANAGEMENT
BRIAN SCHWEITZER, GOVERNOR
1625 ELEVENTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-2074
TELEFAX NUMBER (406) 444-2684

PO BOX 201601
HELENA, MONTANA 59620-1601

2010100501
RECEIVED
OCT 05 2010
BY: SHPO

October 4, 2010

• Stan
• DNRC
Fishery
Restoration
SUN RIVER,
CA CO CHAP/FISH

Montana State Historic Preservation Office
Attn: Dr. Stan Wilmoth
P.O. Box 201202
Helena, MT 59620-1202

RE: Cultural Resources Inventory of Proposed Fishery Restoration Work in Portions of Section 36, T21N R2W: Cascade County, Montana. Report prepared by Patrick Rennie (DNRC, Helena) for the DNRC and DFWP (Helena, MT). Report dated October, 2010.

Dear Stan:

Enclosed for your review and files please find a copy of the above referenced report. That report details the results of a cultural resources inventory of 8 acres of state land in Cascade County. Despite a detailed examination of the state owned portion of the project area, no cultural or paleontologic resources were identified. The DNRC is seeking concurrence of the SHPO that there should be **No Effect** to heritage properties on state land if the proposed fishery restoration project proceeds as planned.

Thank you in advance for your time, and if you have any questions or concerns regarding the above referenced report or project please let me know.

Sincerely,

Patrick

Patrick J. Rennie
DNRC Archaeologist

CONCUR
MONTANA SHPO
DATE 10/5/2010 SIGNED

encl.