2022 319 Application Form - General and Focus Watershed

General Information

Project Name: Flint Creek Riparian Restoration - Phase 2

Sponsor Name: Trout Unlimited, Inc. - Upper Clark Fork Program

Registered with the Secretary of State? Y

Registered with SAM? Y

Duns # 051698132

Does your organization have liability insurance? Y

Primary Contact: Casey Hackathorn

Signatory: Warren Colyer

Title: Upper Clark Fork Program Manager

Title: Western Water and Habitat Program Director

Address: 312 N. Higgins Ave, Suite 200

Address: 312 N. Higgins Ave, Suite 200

City: Missoula State: MT Zip Code: 59802

City: Missoula State: MT Zip Code: 59802

Phone Number: 406-546-5680

Phone Number: 406-540-2185

Email Address: casey.hackathorn@tu.org

Email Address: warren.colyer@tu.org

Signature

Signature

Technical and Administrative Qualifications

Casey Hackathorn will manage partner coordination and implementation of the Flint Creek Project. With over 20 years of project management experience, Casey has led Trout Unlimited's Upper Clark Fork Program for over ten years including developing partner relationships, coordinating restoration strategies, and implementing projects to reconnect and restore priority watersheds and their fisheries. In addition, Tess Scanlon with over 5 years of restoration project experience and Catherine Redfern, with over 14 years of grant management experience, will support the project for TU. Matt Daniels and Ryan Richardson with River Design Group will provide design and construction oversight support in implementing the project. River Design Group's staff has over 200 years of combined restoration experience with more than 400 restoration design projects completed.

Past Projects

Project Name	Grant or Contract Amount	Funding Entity *(entity name/program, contact person, phone, email)*	Completion Date
Flint Creek Riparian Restoration Project	$ 271,336.00	Montana Department of Environmental Quality, Lou Volpe, 406-444-6742	2021
Harvey Creek Integrated Restoration Project	$ 560,000.00	Montana Natural Resource Damage Program, Doug Martin, 406-444-0234	2019
Warm Springs Creek Fish Passage Project	$ 301,895.00	US Fish and Wildlife Service, George Jordan, 406-247-7365, george_jordan@fws.gov	2017

Budget Summary: *Fields outlined in **black** on this page will auto-populate from other sections of the application form. Fields outlined in **red** on this page will not auto-populate. You must manually input the information for fields outlined in **red**.*

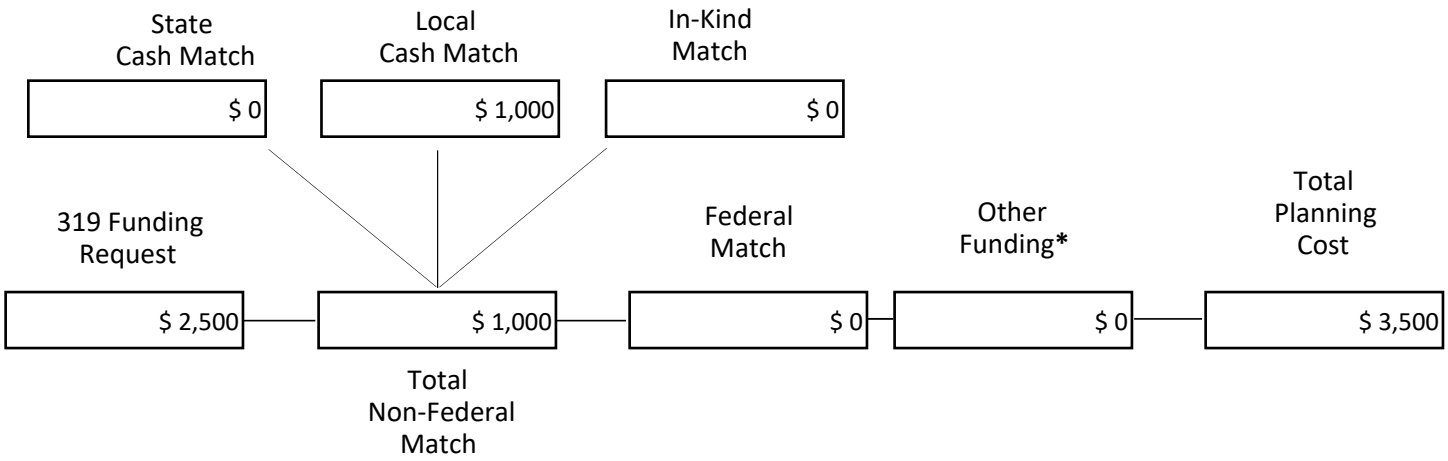
	319 Funding Request	Non-Federal Match	Federal Match	Other Funding	Total Cost
Education and Outreach Project	$ 2,500	$ 1,000	$ 0	$ 0	$ 3,500
Administration	$ 14,668	$ 0	$ 0	$ 0	$ 14,668
Project 1 Name	Flint Creek Riparian Restoration - Phase 2				
Project Planning & Oversight	$ 2,000	$ 40,000	$ 0	$ 0	$ 42,000
Landowner Agreements, O & M	$ 2,000	$ 2,000	$ 0	$ 0	$ 4,000
Project Implementation	$ 122,520	$ 61,760	$ 0	$ 71,340	$ 255,620
Other Activities	$ 0	$ 0	$ 0	$ 0	$ 0
Project Effectiveness Monitoring	$ 3,000	$ 2,000	$ 0	$ 0	$ 5,000
Total	$ 129,520	$ 103,760	$ 0	$ 71,340	$ 304,620
Project 2 Name					
Project Planning & Oversight					$ 0
Landowner Agreements, O & M					$ 0
Project Implementation					$ 0
Other Activities					$ 0
Project Effectiveness Monitoring					$ 0
Total	$ 0	$ 0	$ 0	$ 0	$ 0
Project 3 Name					
Project Planning & Oversight					$ 0
Landowner Agreements, O & M					$ 0
Project Implementation					$ 0
Other Activities					$ 0
Project Effectiveness Monitoring					$ 0
Total	$ 0	$ 0	$ 0	$ 0	$ 0
Project 4 Name					
Project Planning & Oversight				$ 0	$ 0
Landowner Agreements, O & M					$ 0
Project Implementation					$ 0
Other Activities					$ 0
Project Effectiveness Monitoring					$ 0
Total	$ 0	$ 0	$ 0	$ 0	$ 0
Grand Total	$ 146,688	$ 104,760	$ 0	$ 71,340	$ 322,788

Education and Outreach

DEQ recognizes that developing good projects often requires a considerable amount of time and effort up front to build relationships and trust with individual landowners and stakeholder groups. To promote the development of future projects, DEQ is encouraging project sponsors to use up to $5,000 in 319 funding for education and outreach to develop and capitalize on these critical relationships. DEQ encourages applicants to incorporate on-the-ground projects into education and outreach efforts through on-site demonstrations and project tours. 319 funding may not be used to pay for food and beverages, or for honorariums and gifts. Education and outreach activities funded by 319 or used as match for 319 funding must adhere to all of the eligibility requirements outlined in the annual Call for Applications document.

Education and Outreach Deliverables *(Identify the education and outreach activities you will engage in and methods you will use to document their completion.)*

The project offers an excellent opportunity to continue water quality education and outreach efforts in the Flint Creek Valley. In implementation of the project, Trout Unlimited will engage partner organizations to provide education opportunities for local youth and community volunteers to visit the site, learn about the connections between healthy habitat and water quality while assisting with willow cutting and other handwork during implementation and project maintenance. We will also coordinate with the Granite Headwaters Watershed Group to host a project tour for local landowners and other stakeholders to share project lessons-learned, best management practices and future project opportunities. All Education and Outreach activities will be performed with permission of the landowner and coordinated by Trout Unlimited with assistance from the Granite Headwaters Watershed Group and other partner organizations.



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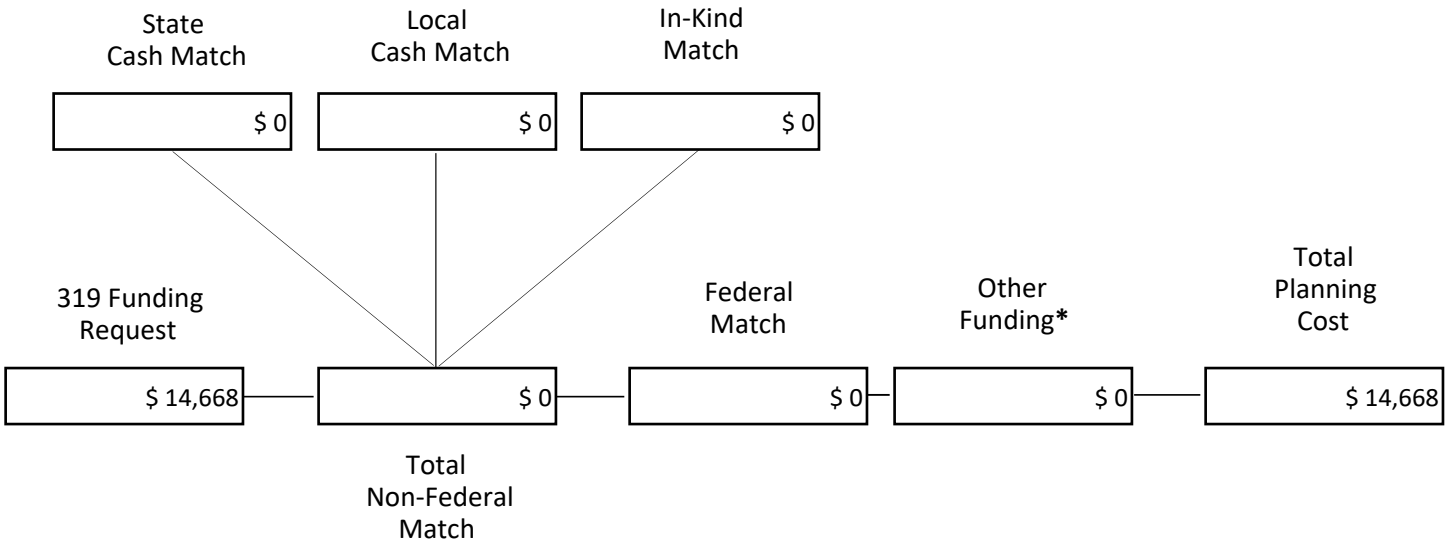
Project Administration

Project administration includes book keeping, invoicing, interim/annual/final report preparation, office supplies, rent, communications, etc. Up to 10% of the total requested 319 funds for your entire application can be used to pay for project administration. However, like all other tasks, payment is by reimbursement for actual expenses incurred.

Project Administration Deliverables *(Include interim/mid-year, annual, and final reports, as well as invoicing and office necessities.)*

Trout Unlimited will oversee and be accountable for the completion of all project administration tasks. Trout Unlimited will prepare and submit billing statements, status reports, annual reports, and a final report. Trout Unlimited shall maintain regular contact as defined by DEQ project manager.



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Project Form

A separate Project Form ***(including providing separate attachments)*** must be submitted for each project included in your application. Use the following examples to help determine when to lump and when to split projects. For additional assistance, contact Mark Ockey at mockey@mt.gov or 406-465-0039.

Splitting Examples (fill out multiple Project Forms)

- Stream restoration work occurring on two separate streams, on parcels owned by two separate individuals
- Two projects with significantly different sets of project partners
- Two projects that address substantially different pollution sources (e.g., one project moves a corral off of a streambank, and another removes mine tailings, with both projects being on the same property)

Lumping Examples

- Contiguous stream restoration work spanning multiple land parcels
- 3 projects that address similar sources of pollution on a single land parcel (e.g., moving a corral off a stream, implementing a grazing management plan, and relocating a manure storage facility out of the floodplain, all on the same ranch)

Project 1 Name	Flint Creek Riparian Restoration - Phase 2

Select the watershed restoration plan (WRP) that your project will help implement.

Flint Creek - Granite Headwaters Watershed Group

Y	Letter of support from author entity attached? *(If no, explain why below.)*

Waterbody name from 2020 List of Impaired Waters	Lower Flint Creek
Probable causes of impairment to be addressed	Streambank erosion, alteration of riparian vegetation
Waterbody name from 2020 List of Impaired Waters	
Probable causes of impairment to be addressed	

OR*

Name of healthy waterbody to be protected	
Description of identified threat to non-impairment status	
Name of healthy waterbody to be protected	
Description of identified threat to non-impairment status	

**While the majority of the available 319 project funding is dedicated to addressing known impairments, EPA is allowing states to use a limited amount of funding to protect non-impaired waters (healthy waters) from becoming impaired.*

Project 1 Location

Upstream End	Latitude	46.57413	Longitude	-113.19420
Downstream End	Latitude	46.57819	Longitude	-113.19056
Centerpoint	Latitude	46.57654	Longitude	-113.19251

Upstream End	Latitude		Longitude	
Downstream End	Latitude		Longitude	
Centerpoint	Latitude		Longitude	

Upstream End	Latitude		Longitude	
Downstream End	Latitude		Longitude	
Centerpoint	Latitude		Longitude	

List the 12-digit Hydrologic Unit Code(s) (HUCs) in which the project area is located

17010202 - Lower Flint Creek

☑ Project site map(s) attached, showing the location of all proposed on-the-grount restoration activities?

Community Participation and Support

Landowner	Contributions to Project	Letter of Support Attached?
Tom Rue	Riparian grazing pasture reduction - ~15 Acres	☑
		☐
		☐
		☐

Partner	Role	Letter of Support Attached?
Montana Natural Resource Damage Program	Funding Partner and Basin-Scale Restoration Planning	☑
Granite Headwaters Watershed Group	Community Engagement	☑
WestSlope Chapter TU	Volunteer and Funding Support	☑
Hellgate Hunters and Anglers	Volunteer Support	☑

Other Community/Stakeholder Support

Trout Unlimited is also working closely with the U.S. Fish and Wildlife Service on Bull Trout recovery actions and Montana Fish, Wildlife and Parks on fisheries restoration priorities in Flint Creek and the Upper Clark Fork Basin.

Project Description

Describe the nature and extent of the nonpoint source problem you are trying to address, the root causes of the problem, and your proposed solution.

The focus of this project is to protect, restore and enhance the riparian corridor of approximately one half mile of Flint Creek on private land near Hall, MT to reduce sediment loading to Flint Creek and improve riparian habitat. The project supports a larger effort in the Flint Creek watershed with multiple partners including the Montana Natural Resource Damage Program (NRDP) and Montana Fish, Wildlife and Parks (FWP) to restore fish populations and aquatic habitats in Flint Creek and the Upper Clark Fork River by engaging private landowners in projects that improve and reconnect habitat, restore streamflow, and improve water quality.

Flint Creek is a tributary of the Clark Fork River originating at Georgetown Lake and draining the Philipsburg and Drummond Valleys. DEQ listed Flint Creek in 2012 for impairments including metals and sediments that impact aquatic life, drinking water and recreation uses. Sediment impairments to Flint Creek are a result of streambank erosion, roads and culverts, and upland condition.

Multiple riparian habitat assessments have been completed on Flint Creek including a Riparian Habitat Assessment for Flint Creek and Boulder Creek by Great West Engineering (GWE) for NRDP in 2015 and a reach-focused Flint Creek Assessment and Conceptual Design Report completed by River Design Group for NRDP in 2018. The GWE report identified the reach targeted by this project as a high priority for riparian restoration and the RDG report detailed the both the vegetative and geomorphic impairments causing sedimentation in the reach as well as quantifying bank erosion rates.

The Flint Creek Riparian Restoration Phase 2 Project builds on work completed by Trout Unlimited on the adjacent property in 2021 and includes three approaches targeted to restore natural processes to reduce sedimentation and improve habitat:

1. Grazing Management- the project will implement grazing management improvements through the entire stream corridor on the property including installation of fencing for riparian grazing exclusion/management to protect and improve riparian and floodplain vegetation and wildlife habitat and implement a grazing management plan.

2. Active Revegetation- the project will implement a revegetation plan prepared by River Design Group that includes planting of native containerized woody plants in fenced wildlife exclusion units and seeding with native riparian seed mix.

3. Streambank Restoration- the project will implement a restoration design prepared by RDG to treat approximately 1,200' of eroding streambanks, reconnect a historical meander in a channelized reach, improve riparian vegetation, restore functioning channel geometry, improve fisheries habitat complexity, and reduce bank erosion.

Is this project a continuation of a previous project? If so, please explain the connection.

Trout Unlimited completed a construction of a similar project on the adjacent property in 2021 with support of the DEQ 319 Program, Montana Natural Resource Damage Program, and Montana Fish, Wildlife and Parks as the first phase of a reach-scale restoration effort on Flint Creek upstream of Hall. This project builds on that success by working with the neighboring landowner to extend the habitat restoration and water quality improvements for another 0.5 miles upstream.

Water Quality Benefits and Sustainability

Explain why the project is an appropriate next step for making progress towards removing a pollutant/waterbody combination from Montana's 2020 Impaired Waters List or preventing a healthy waterbody from becoming impaired?

The Flint Creek Riparian Restoration Phase Two Project partially implements Section 3: Project Plan to Restore the Flint Creek Watershed of the Flint Creek Watershed Restoration Plan developed by the Granite Headwaters Watershed Group in 2014. The Project will implement the first goal of the Project Plan to maintain or improve water quality of Flint Creek and reduce sediment/metals/nutrient load from streambank erosion and enhance riparian condition. The project seeks to protect approximately one half mile of Flint Creek riparian corridor, improve riparian vegetation through the reach, and actively restore approximately 1,200' of eroding streambanks within the reach.

Will your project address a major local source of nonpoint source pollution? Explain.

The project will reduce sediment and nutrient contributions from streambank erosion, improve riparian vegetation and habitat, engage Flint Creek landowners and other community members in water quality and stream restoration efforts, and expand on initial efforts to reduce sediment pollution in the watershed. RDG found geomorphic conditions indicative of degradation from a number of sources with high width to depth ratios, shallow pools and fine sediment accumulation in the pools. Similarly, the TMDL describes the reach sampled downstream of the project site and representative of the reach as lacking in riparian vegetation to stabilize banks with long actively eroding banks and meander bends, high width to depth ratios, low pool frequency, low shrub cover and low woody debris. The TMDL seeks a 73% sediment load reduction in Lower Flint Creek from streambank erosion.

Will the project create long-term, sustainable reductions in NPS pollution? Explain.

The goals of the Flint Creek Riparian Restoration Phase 2 Project are to initiate long-term reductions in sediment inputs to Flint Creek by restoring the natural processes to sustain healthy riparian habitat and vegetation and provide the landowner with the tools to protect those conditions into the future. The project will include a landowner agreement defining long-term operation and maintenance responsibilities, project monitoring

Describe how the project will promote self-maintaining, natural, ecological and social processes that protect water quality?

The project will seek to reset conditions in the treatment reach by reducing bank erosion, improving riparian vegetation, reducing grazing pressure, and restoring natural channel geometry. This approach will provide the conditions to accelerate natural geomorphic processes both in the channel and on the adjacent floodplain. Additionally, we will work with the landowner to develop a project agreement and grazing management plan that will sustain this work into the future.

Nonpoint Source Goals and Success Metrics

Nonpoint source pollution goal	Action that will be taken to reach the goal	Metrics used to measure success
Reduce Flint Creek sediment loading	Install vegetated brush bank treatment on eroding banks Install riparian fencing system and implement grazing management plan	Improved BEHI scores and reduced modeled sediment loaded Reduced hoof sheer and bank trampling
Improve riparian vegetation	Install vegetated brush bank treatment on eroding banks Install riparian fencing system and implement grazing management plan Install wildlife browse protected riparian planting units	Percentage of willow cutting survival Reduced livestock browse Increased density and cover of woody riparian vegetation 15 acres of protected riparian habitat
Improve floodplain connection	Restore natural channel geometry	Reduced width to depth ratios and reduced channel incision in treatment reach

Project Education and Outreach

Describe the educational benefits of your project. Will the project inspire additional nonpoint source pollution prevention work within the watershed?

This project will build on the recent success of the Flint Creek restoration project implemented this year on the adjacent property and provide additional opportunities to engage other landowners, community members, and stakeholders on the diverse benefits of riparian habitat protection and improvement. Trout Unlimited will work with the Granite Headwaters Watershed Group to conduct community outreach events and tours following project completion to share lessons learned, landowner perspective, and project successes to increase participation in best management practices and future opportunities to continue improve water quality in the Flint Creek watershed.

Bigger Picture Benefits

NPS pollution projects often have benefits that go beyond simply cleaning up Montana's lakes and streams. Describe your project's benefits to each of the items below. If there are no associated benefits, type "NA" for "not applicable".

Environmental Justice (EJ)

Will the project improve or create public access to a healthy environment?

Yes, the project will improve water quality, wildlife habitat, and fisheries populations that provide community benefits throughout the watershed.

Will the project have a public benefit in a county where 15% or more of the population lives below the poverty level? Counties include: Big Horn, Blaine, Chouteau, Deer Lodge, Garfield, Glacier, Golden Valley, Hill, Lake, Liberty, Lincoln, Meagher, Mineral, Musselshell, Pondera, Powell, Roosevelt, Rosebud, Sanders, Silver Bow, Toole and Wheatland.

No, the project is located in Granite County where 13.6% of the overall population and 24.2% of children live below the poverty level.

Will the project benefit historically underserved populations (e.g. minority populations, people with disabilities)?

No, the project will not specifically benefit underserved populations.

Climate Change

Will the project improve climate change resilience for communities, native plants, wildlife or ecosystems?

The project will build climate change resilience in the treatment reach through improved floodplain connection and function, improved vegetative cover, increased density of native plants, improved riparian and aquatic habitats, and improved ecological function of the stream corridor. The project will specifically improve thermal refugia for aquatic organisms by increasing pool depths, increasing overhead cover, and promoting groundwater storage.

Will the project restore or protect cool, late-season flow?

The project will provide benefits for streamflow and water temperature through increased natural water storage in the treatment reach by improving floodplain connection as well as narrowing channel dimensions, increasing pool depths and increasing overhead cover which reduce the influence of solar radiation.

Impacts to Downstream Communities

Will the project reduce pollutant loading above a permitted point source discharge in a way that could increase assimilative capacity in the the receiving water?

While the project is targeted to reduce sediment loads, these reductions will also result in reduced nutrient loads that could benefit downstream communities.

Will the project help protect a drinking water source?

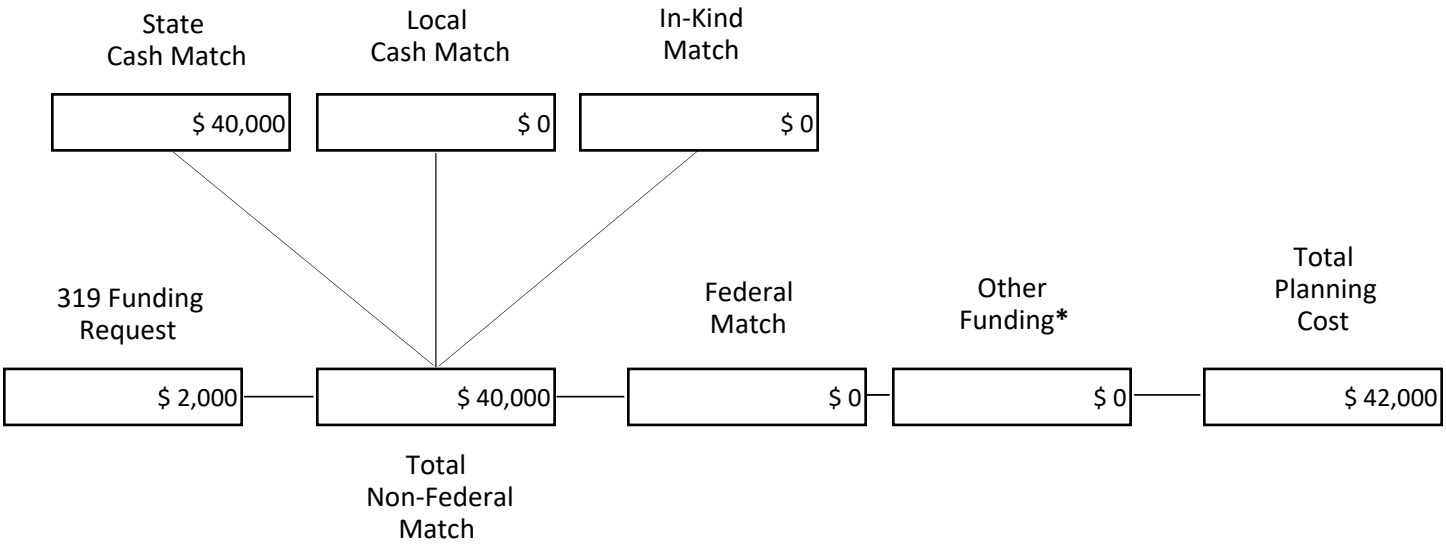
No.

Tasks and Budget

DEQ uses a standard template to develop scopes of work for 319 contracts. The tasks below match up with DEQ standard scope of work template. Some tasks might not be applicable to your project. Please leave the non-applicable tasks blank. If your project doesn't fit the task outline, use the task labeled "Other" to describe your project.

Task 1 - Project Planning Deliverables *(Include such things as completing project designs, conducting site evaluations, obtaining permits, organizing volunteers, conducting scoping meetings, etc. Identify specific deliverables that will be submitted.)*

Trout Unlimited will work with the Montana Natural Resource Damage program and the design engineer, River Design Group, to complete project designs and coordinate them DEQ, the landowner and other project stakeholders. Trout Unlimited with work with the landowner and the engineer to complete project permitting tasks including preparing a Joint Application for stream work, coordinating Montana Natural Streambed Protection Act 310, CWA Section 404 and county floodplain permitting and consultation with the USFWS for work in Bull Trout Critical Habitat. Task deliverables will include draft and final designs and project permits.



Match Source	Montana Natural Resource Damage Program	Secured	✔
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Landowner Agreements, Operation and Maintenance

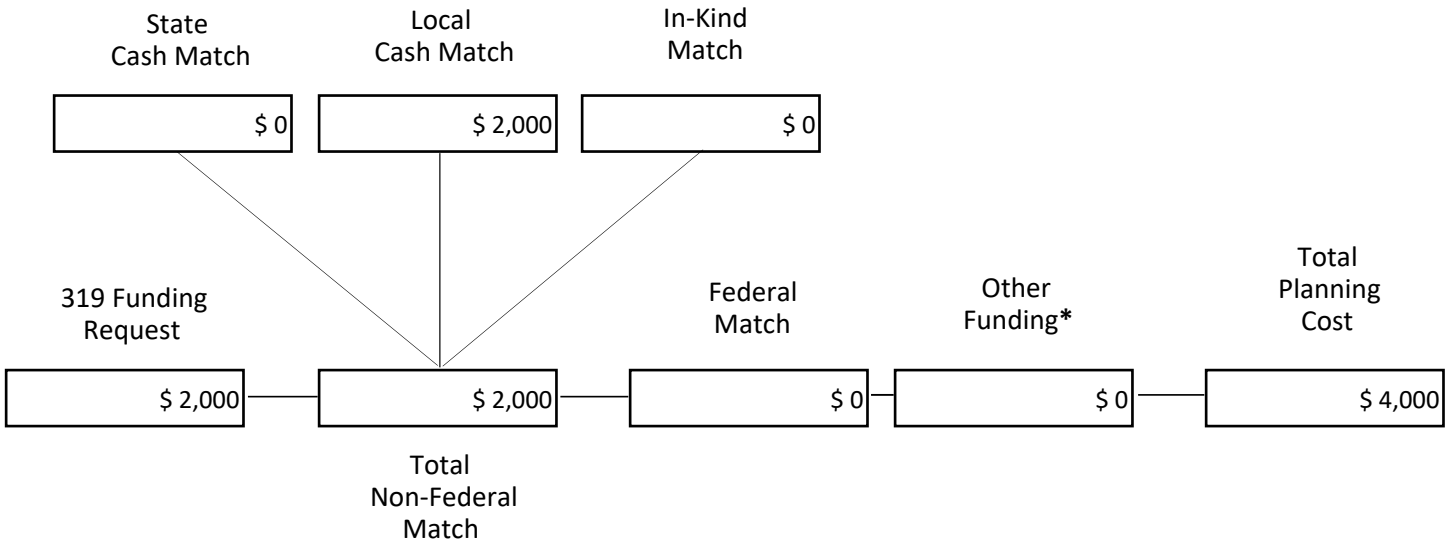
This task only applies to projects involving on-the-ground activities. DEQ periodically evaluates the effectiveness of each on-the-ground project. To accomplish this, DEQ requires a process be in place to allow periodic access to the project site. The landowner agreement should also specify the roles of each project partner in the design, implementation and continued operation of on-the-ground pollution prevention practices. DEQ does not require the use of a specific landowner agreement template. In some situations, existing agreements between the project sponsor and the landowner may be sufficient.

Task 2 - Landowner Agreements, Operation and Maintenance Deliverables *(Include such things as landowner/ sponsor communication, and draft and final agreements.*

Trout Unlimited will coordinate all project partners, funders, and the landowner to develop a project agreement including and operation and maintenance plan that meets the needs of all parties and ensures that the measures implemented to improve water quality are protected and maintained into the future.

Deliverables will include a draft and final landowner agreement with an operation and maintenance plan including the following elements:

•Project Implementation. Description of parties responsible for project implementation and funding.
• Revegetation of Disturbed Areas. Description of revegetation plans and responsibilities for disturbed areas using appropriate plant species, stocking density, weed and pest control, and protection from grazing/browsing by domestic and wild animals.
• Operation and Maintenance. Description of responsibilities for operating and maintaining all structures, vegetation, management measures, and water quality benefits associated with the project.
• Site Access. Description of the procedure(s) for obtaining access to the project site for the purposes of project planning, implementation, operation and maintenance, and post-implementation monitoring.



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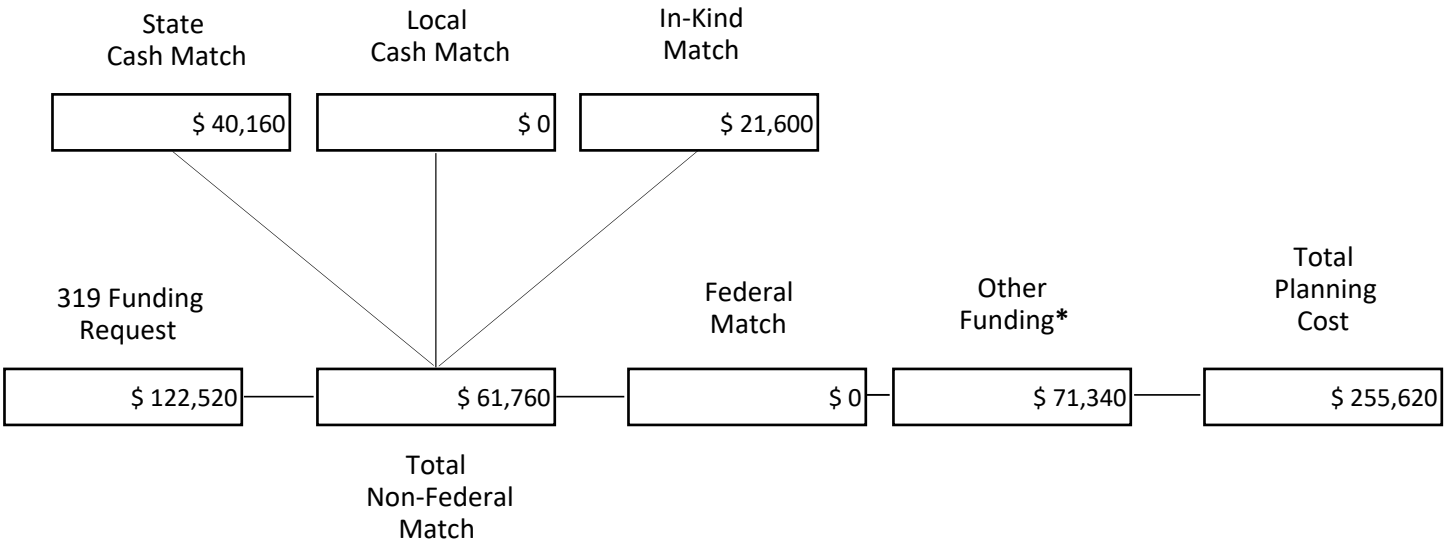
Project Implementation

Task 3 - Project Implementation Deliverables *(Include such things as construction oversight, implementation of on-the-ground restoration practices, preparation and submittal of as-built drawings, etc.)*

Trout Unlimited will contract and coordinate implementation the project with project oversight assistance from the engineer in accordance with the designs, permits, and other project planning documents completed under Task 1. Trout Unlimited will document implementation activities by providing the following deliverables:

• As-built survey, including cross-sections, longitudinal profile, residual pool depth, and pool frequency, noting any deviations from the final design drawings.
• Pre- and post-construction photographs showing the areas of streambank and channel restoration, revegetation, and fencing.



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Match Source	Montana Natural Resource Damage Program	Secured	☑
Match Source	Westslope Chapter TU and Hellgate Hunters and Anglers Volunteers	Secured	☑
Match Source	Private - State - USFS Forestry Projects In-Kind Materials	Secured	☐

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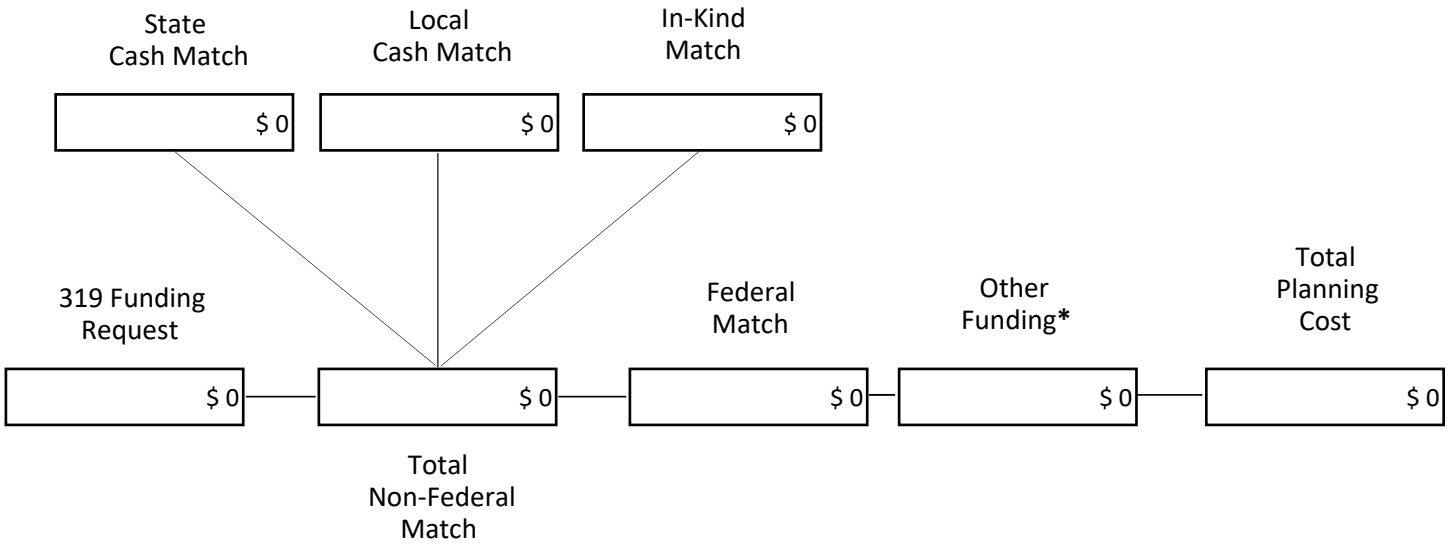
Other Activities

Use this task if the activities you are proposing are outside the scope of the typical design/implement/monitor process. Provide sufficient details to enable application reviewers to successfully compare the nonpoint source pollution reduction benefits of your project to those of other projects in the applicant pool.

Task 4 - Project Deliverables *(Include activities you will complete and the products you will submit to demonstrate completion.)*



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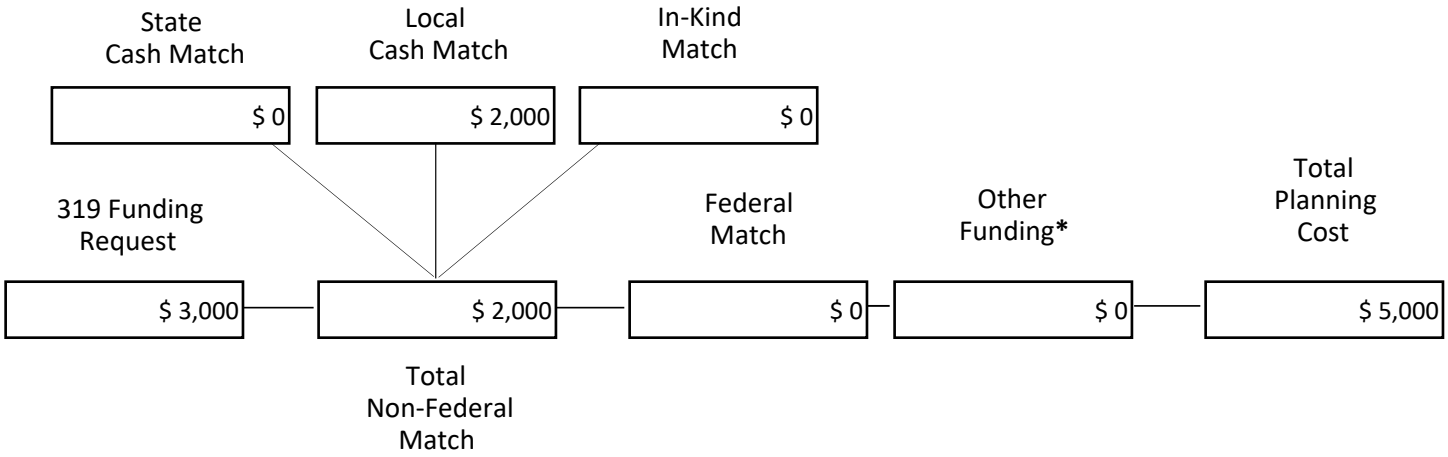
Project Effectiveness Monitoring

The short duration (1-3 years) and limited spatial extent (often just a few hundred yards) of most 319-funded projects frequently precludes the use of traditional water chemistry monitoring as a means of evaluating project effectiveness. Instead, DEQ encourages project sponsors to use simpler, more qualitative tools. Typically, this will include pre- and post-construction photo point monitoring, vegetation mortality measurements, and perhaps modeling to estimate pollution load reductions. Please contact one of the DEQ Nonpoint Source Program staff for guidance relative to your specific project.

Task 5 - Project Effectiveness Monitoring Deliverables *(Identify the specific tools and products you will use to evaluate and demonstrate the effectiveness of your project in reducing nonpoint source pollution.)*

Trout Unlimited will coordinate with the DEQ Project Manager to develop a monitoring plan to evaluate the effectiveness of the project including the following:

- Pre and post-construction BEHI and Near Bank Stress measurements throughout the project area to facilitate calculation of sediment load reductions (in tons of sediment per year).
- Photo-point monitoring that shows pre- and post- implementation, of restoration, protection and enhancement activities.
- Vegetation mortality rate monitoring and an assessment of the success of riparian planting.



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Additional Attachments

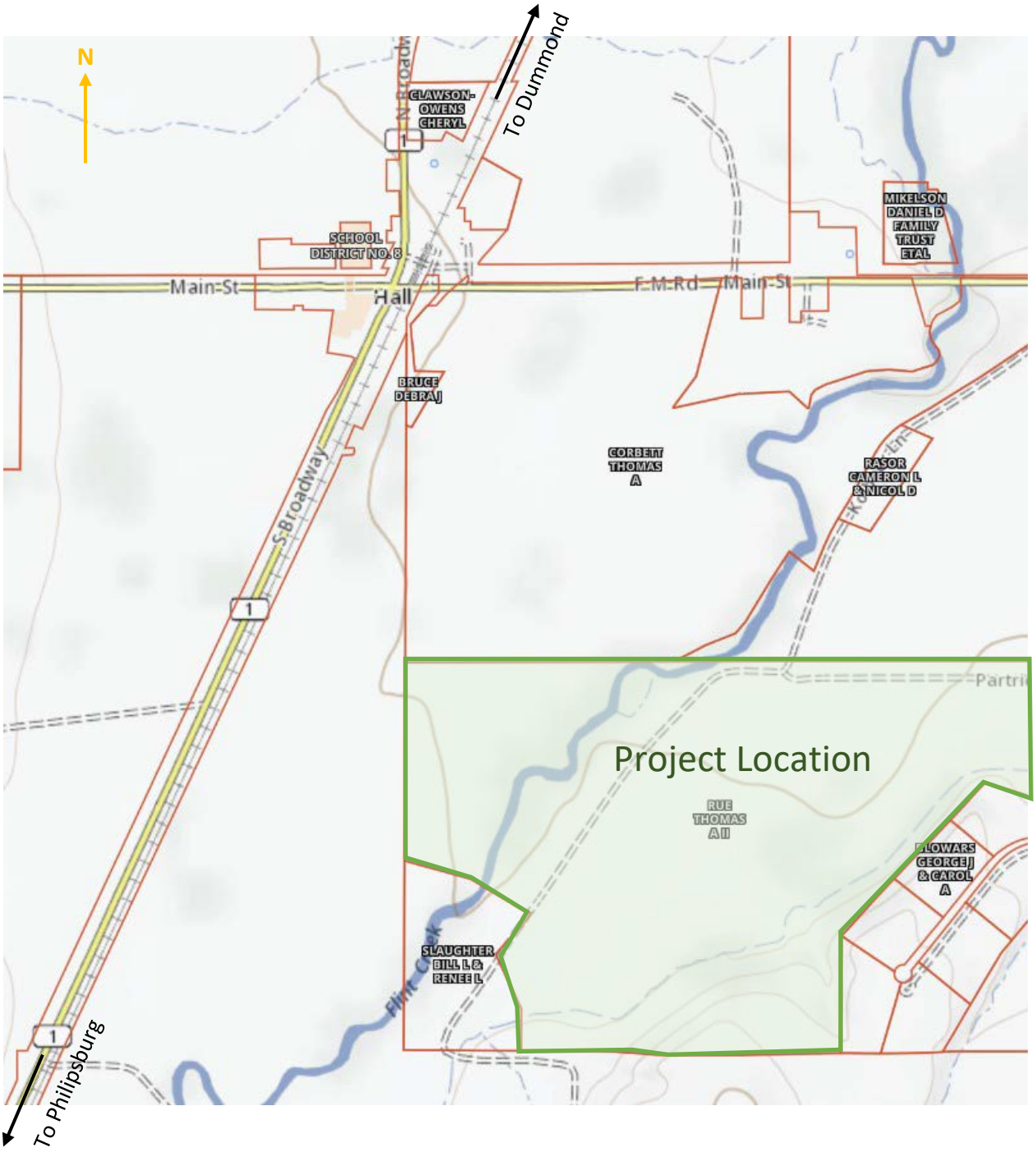
Attach additional items that could help reviewers better understand your project. Items could include site photos, design drawings, site evaluations, permits, etc. Please be conscious of reviewers' time, as they may not have time to read lengthy studies and reports. List all additional attachments below.

- [x] Rue Property Concept Proposal, River Design Group, 10-20-2021
- [x] Site Conditions Photos and Figures
- [x] Excerpts from Riparian Habitat Assessment for Flint Creek and Boulder Creek, Great West Engineering, 2015
- [ ]
- [ ]
- [ ]

Additional information that could assist reviewers in evaluating the project's potential impact on NPS pollution.

Project Map

Flint Creek Riparian Restoration Project – Phase 2
Project Map



Flint Creek Riparian Restoration Project – Phase 2
Project Map

Riparian Habitat Exclosure and Active Revegetation

Bank and Channel Treatment Reach

Letters Of Support

October 27, 2021

Mark Ockey
Water Quality Planning Bureau
Department of Environmental Quality
Helena, MT 59620-0901

Dear Mr. Ockey,

Please accept this letter supporting Trout Unlimited's Flint Creek Riparian Restoration Project proposal. As the project landowner, I am excited to work with your program to improve the wildlife and fisheries habitat on our property while improving water quality downstream. We have been working with Trout Unlimited and the Montana Natural Resource Damage Program to begin planning for restoration of Flint Creek through our property and improve our grazing management. I am hopeful that these planning efforts can become a reality with your funding support.

Thank you for your consideration of this proposal and we look forward to working with you on this project.

Sincerely,

Tom Rue

Granite Headwaters Watershed Group

PO Box 926 Philipsburg, MT 59858 406-859-3291 ext. 101

Montana Department of Environmental Quality
319 Nonpoint Source Funding Program
P.O. Box 200901
Helena, MT 59620-0901

The Granite Headwaters Watershed Group, formed in 2006, is a local citizen and stakeholder group concerned with interests of Flint Creek and Upper Rock Creek. The mission of Granite Headwaters is to promote the responsible use of the watershed's natural, human and socio-economic resources to protect and enhance the rural lifestyles valued by our communities. GHWG developed the Watershed Restoration Plan for the Flint Creek watershed, in conjunction with other collaborating entities.

Trout Unlimited is requesting funding necessary to complete active revegetation and streambank restoration activities on Flint Creek, as well as capacity building through public outreach and community education. GHWG has worked with Trout Unlimited in the past, most notably on the investigation and planning efforts at the Rumsey Millsite and floodplain area on Fred Burr Creek, where mercury and other heavy metals have been detected in high concentrations in both soil and surface water.

The financial support for the development and implementation of this planning effort and project will help conserve, develop, and improve riparian and water resources in the Flint Creek watershed, and serve as a potential demonstration project for future efforts in the area. Securing funding for this project is instrumental to the progress in this watershed.

GHWG appreciates this funding opportunity and your ongoing work in the Flint Creek watershed. If you have any questions, please contact our office which is colocated with the Conservation District, (406) 858-3291, or me personally at the number below. Thank you for your consideration to complete these important projects and planning efforts.

Sincerely,

Michael L. Miller, President
Granite Headwaters Watershed Group
(406) 859-3105

DEPARTMENT OF JUSTICE
NATURAL RESOURCE DAMAGE PROGRAM

AUSTIN KNUDSEN
ATTORNEY GENERAL

1720 9TH AVENUE

STATE OF MONTANA

(406) 444-0205 (OFFICE)
(406) 444-0236 (FAX)

PO BOX 201425
HELENA, MONTANA 59620-1425

October 28, 2021

Montana Department of Environmental Quality
Nonpoint Source Pollution Program
PO Box 200901
Attention: Eric Trum
Helena, MT 59620-0901

Mr. Trum,

The Montana Natural Resource Damage Program (NRDP) is writing in support of Trout Unlimited's 319 Grant Application for the Flint Creek Riparian Restoration Project on the Roe property on Flint Creek. NRDP, through its *Upper Clark Fork Basin Aquatic and Terrestrial Restoration Plans* (Updated February 2019), is committed to the identified dollar match of $44,500 for riparian revegetation, $40,000 in project design, and $25,000 in project construction oversight via funding allocated to the improvement of the riparian areas of Flint Creek. NRDP fully supports the incorporation of the project components identified for funding through the 319 program.

Sincerely,

Douglas H. Martin
NRDP Restoration Program Manager

Montana Fish, Wildlife & Parks

To whom it may concern:

Montana Fish, Wildlife and Parks considers Flint Creek a high priority fishery. It serves as both a recreational fishing destination and as a tributary which produces juvenile recruitment for the Clark Fork River. Flint Creek receives moderate angling pressure and, in this reach, generally maintains approximately 3-500 catchable fish per mile. These densities are high enough to provide very high quality angling opportunities for this size of stream. Flint Creek has also been found to provide a significant number of juvenile trout to the Clark Fork River via a tributary recruitment study completed by Montana Fish, Wildlife and Parks in 2016.

The proposed restoration work on the Rue property appears to address important limiting factors to this reach. Livestock grazing and channel alterations have negatively impacted fish habitat in this reach by simplifying the habitat and removing natural stream channel function. Revegetation of adjacent banks and floodplain should significantly improve fish habitat via bank stabilization and temperature reduction. Developing a grazing management plan will also assist in maintaining quality riparian vegetation into the future. Bank stabilization using proper hydrologic techniques will likely aid in developing additional fish habitat as well as developing stabile habitats that can be successfully revegetated. This revegetation is the key to long term stability and health of this reach. Overall, Montana Fish, Wildlife and Parks feels this is a good project that will benefit the fisheries in an important drainage. Please feel free to contact me with any questions.

Sincerely,

Brad Liermann, Fisheries Biologist
Montana Fish, Wildlife and Parks
406-825-5225

United States Department of the Interior
Fish and Wildlife Service
Montana Ecological Services Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
Phone: (406) 449-5225; Fax: (406) 449-5339

Casey Hackathorn
Upper Clark Fork Program Manager
Trout Unlimited
312 N. Higgins Ave Suite 200
Missoula, MT 59802

October 28, 2021

To Whom It May Concern:

The U.S. Fish and Wildlife Service (Service) has reviewed the 319 Application for the Flint Creek Riparian Restoration – Phase 2 project. The Service fully supports the actions outlined in the proposal. The segment of Flint Creek affected by the proposed action is essential for the recovery of bull trout because it provides foraging, migration, and overwintering habitats for bull trout. The Bull Trout Recovery Plan, and Columbia Headwaters Recovery Unit Implementation Plan for Bull Trout, describe three primary threats to bull trout recovery (Habitat, Demographic, and Nonnatives). This proposal directly addresses one of those primary habitat threats specifically identified for Flint Creek (riparian management). The proposed action will improve habitat conditions by reducing the amount of eroding streambanks and increasing the amount of riparian vegetation by improving grazing management practices. Improving habitat conditions along Flint Creek is an important step for providing a functional migratory corridor. Therefore, the Service fully supports your efforts.

We appreciate Trout Unlimited's efforts to recover threatened bull trout and conserve other native fish. If you have questions or comments related to this letter, please contact Dan Brewer at dan_brewer@fws.gov or (406) 329-3951.

Sincerely,

for Jodi L. Bush
Office Supervisor

WestSlope Chapter
Trout Unlimited
Missoula, Montana

October 28, 2021

Mark Ockey
Water Quality Planning Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Dear Mr. Ockey,

The WestSlope Chapter Trout Unlimited is a local non-profit conservation group focused on conserving, protecting, and restoring cold water fisheries in the Missoula area. We'd like to offer this letter of support for Trout Unlimited's Flint Creek Riparian Restoration Project- Phase 2 proposal for 319 Nonpoint Source Project funding. Our membership, comprised of over 900 passionate anglers, actively enjoys the fisheries supported by Flint Creek and the Clark Fork River and we are excited by the opportunity to partner on a volunteer project that will benefit these resources.

Our volunteer chapter has partnered with TU staff on several successful watershed restoration efforts in western Montana including Ninemile Creek, Rattlesnake Creek and Rock Creek. We are excited to see the continuation of TU's efforts to restore fish populations in Flint Creek and we look forward to the resulting volunteer opportunities for our members.

Thank you for your consideration and we look forward to working to make this project a success.

Sincerely,

Mark Kuipers, President

Hellgate Hunters & Anglers
P.O. Box 7792
Missoula, MT 59807

October 28, 2021

Mark Ockey
Water Quality Planning Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620

Dear Mr. Ockey,

I write on behalf of Hellgate Hunters & Anglers, a Western Montana-based rod and gun club, to express our support for Trout Unlimited's Flint Creek Riparian Restoration Project. This is an incredibly valuable fishery for our membership and other users. Consequently, we look forward to partnering with Trout Unlimited to engage anglers and local users on this stream restoration project, which will boost water quality and fish and wildlife habitat in the Clark Fork watershed.

Please note our continued support for this project. Thank you for the opportunity to comment.

Sincerely,

Walker Conyngham
President
Hellgate Hunters & Anglers

Supplemental Information

RDG
RIVER DESIGN GROUP

Date:	October 20, 2021
To:	Casey Hackathorn, Trout Unlimited
From:	Matt Daniels, P.E. River Design Group, Inc.
Subject:	Project Proposal Lower Flint Creek – Rue Property

1. Introduction and Background

The State of Montana Natural Resource Damage Program (NRDP) has identified the Flint Creek Watershed as a priority area for restoration (NRDP 2012). River Design Group, Inc. (RDG) was contracted by NRDP to complete an assessment and develop conceptual restoration designs for approximately 242 acres along a three-mile segment of lower Flint Creek upstream of Hall, Montana (Figure 1). This memorandum summarizes results of the assessment and identifies potential conservation and restoration opportunities the Rue property along lower Flint Creek.

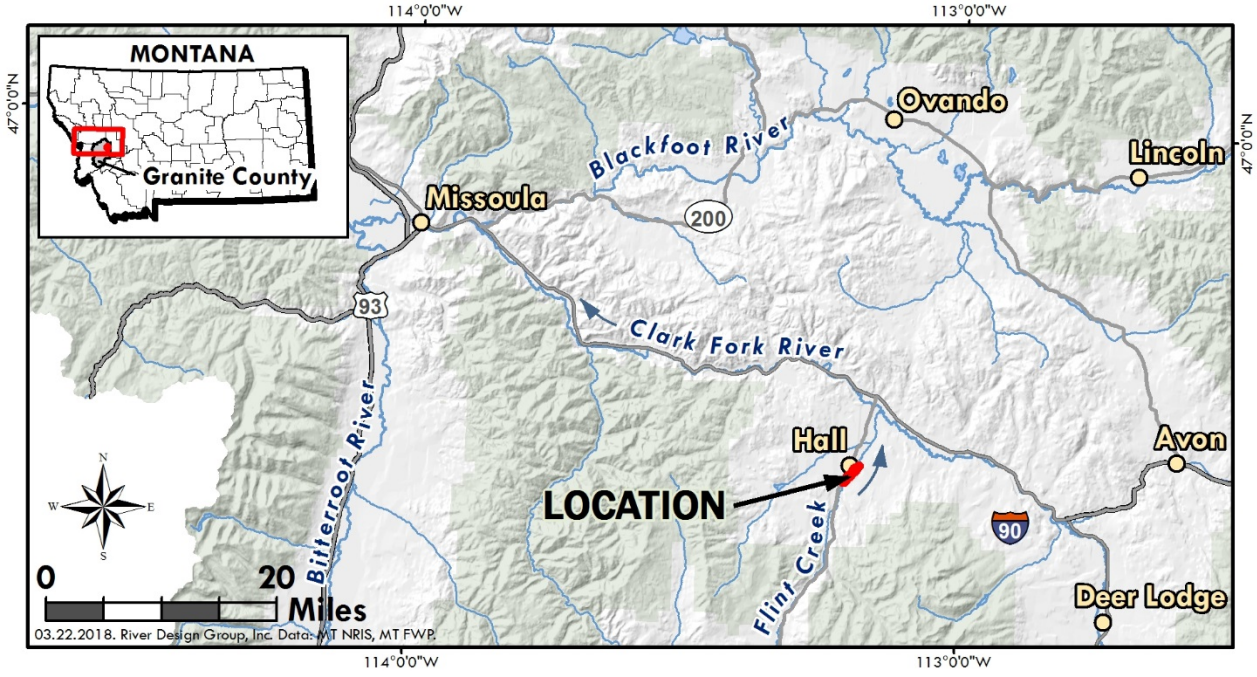


Figure 1. Project vicinity map for Lower Flint Creek restoration.

The Final Upper Clark Fork Basin Aquatic and Terrestrial Resources Plan (NRDP 2012) outlines key objectives for lower Flint Creek as outlined below:

- Improve water quantity through flow augmentation (e.g., water right purchases, water leases, and irrigation efficiency improvements);
- Reduce fish entrainment at irrigation diversions;
- Improve fish passage throughout the reach; and
- Riparian habitat improvements including fencing/protection, woody shrub and tree plantings, and off-site watering.

In addition, landowners have identified objectives that coincide with NRDP's overarching goals for Flint Creek as outlined below:

- Improve fish habitat;
- Improve terrestrial habitat for waterfowl and other wildlife; and
- Maintain a functional ranch operations and grazing leases.

2. Site Assessment and Summary of Existing Conditions

In 2016 and 2017, vegetation and geomorphic field assessments were completed for the project area. Results of the assessments were used to characterize existing conditions and identify impairments affecting stream and floodplain function. The potential condition for lower Flint Creek in the study area is a meandering, riffle-pool stream type with a connected floodplain that supports emergent wetland, willow and cottonwood vegetation communities. Limiting factors influencing the potential condition include:

- Geomorphic Limiting Factors
    - Altered flow regime from impoundments and irrigation management
    - Low channel sinuosity from channel manipulation
    - High bank erosion rates from lack of stability
    - Over-widened riffles and shallow pools
- Vegetation Limiting Factors
    - Insufficient wetland and riparian buffers from ranch operations and grazing
    - Lack of woody vegetation and riparian diversity
    - Competition from pasture grasses, noxious weeds and non-native species
- Aquatic Habitat Limiting Factors
    - Fish entrainment in irrigation ditches
    - Over-wide riffles and shallow pools
    - Gravel substrate embedded with fine sediment
    - Lack of instream cover, habitat diversity and complexity

3. Conceptual Restoration Plan

Conservation and restoration opportunities were identified to address the limiting factors identified in the assessment. The restoration plan addresses grazing management, revegetation and stream channel habitat. Restoration plan elements are illustrated and described in more detail in the following sections.

3.1. Grazing Management Plan

The grazing management plan includes recommendations for fencing and off-channel stock water locations. The grazing management plan represents a conceptual layout and is subject to revision based on stakeholder and landowner input. The plan addresses protection of sensitive riparian and wetland areas from grazing to allow native plant communities to become established. Fence locations were established based on the estimated channel migration zone, which represents a corridor that the stream channel is likely to occupy over the long term. By allowing native vegetation to become established in the floodplain and along the streambanks, stream channel stability will improve, and bank erosion will be reduced to more natural rates.

The grazing management plan identifies areas for continuous grazing, rotational grazing and grazing exclusion. In continuous grazing areas, no limit is placed on the duration or amount of grazing. In rotational grazing areas, access should be limited to 5 days of grazing followed by a 30-day period where the area can recover without grazing. In exclosure areas, no grazing should be conducted. Exclosure areas are sensitive to grazing and consist of the streambanks, channel migration zone and wetlands. The proposed fence type is four-strand barbed wire livestock fencing with 6-foot timber posts. The top and bottom strands of the livestock fence would be smooth wire for wildlife passage

The grazing management plan is a passive restoration approach that, if implemented as a stand-alone plan, only partially addresses the range of limiting factors identified in the assessment. Other limiting factors such as competition from pasture grasses and streambank stability would need to be addressed with comprehensive revegetation and streambank strategies as described in other plans in the following sections.

3.2. Revegetation Plan

The revegetation plan includes recommendations for planting, seeding and browse protection. As a conceptual layout, the revegetation plan is subject to revision based on stakeholder and landowner input. The plan includes approximately 500 plants in multiple planting. Planting units would be enclosed in 8-foot high metal wire or rigid plastic polypropylene mesh fencing to limit browse by wildlife. Planting units would vary in size from 0.004 acres to 0.95 acres and would be protected with wildlife fence.

The plan addresses establishment of native plant communities in wetland, floodplain, streambank and upland areas. Planting units were placed throughout the area with the goals of increasing connectivity for habitat between existing riparian vegetation communities and increasing the overall quantity and diversity of woody vegetation. Weed mats would be installed at the base of each plant to reduce competition from pasture grasses and weeds. Preservation

areas were also identified to highlight where existing vegetation communities are thriving, and the planting units were placed to help increase connectivity between the preservation areas.

The revegetation plan is a passive restoration approach that, if implemented as a stand-alone plan, only partially addresses the range of limiting factors identified. Other limiting factors such as streambank stability and aquatic habitat would need to be addressed with a comprehensive channel restoration plan and grazing management plan as described in the other sections.

3.3. Channel Restoration Plan

The channel restoration plan includes recommendations for streambank structures, meander re-activation, and off-channel habitat enhancement. The channel restoration plan represents a conceptual layout and is subject to revision based on stakeholder and landowner input. The channel restoration plan addresses 1,000 linear feet of eroding streambanks.

The plan addresses limiting factors related to channel planform, streambank stability and aquatic habitat. Proposed treatment locations are based on impairments observed in the field during the assessment. Streambank structures would be constructed on active channel margins with sparse vegetation and observed bank erosion. Types of streambank structures would be vegetation and wood-based structures including large wood structures and vegetated brush bank structures. Streambanks would be re-graded to gentle slopes, enhanced with floodplain roughness and revegetated with containerized plants. Surplus fill material would be used to fill ditches, narrow the channel and construct points bars. Meander bends abandoned by channel avulsions or channel straightening would be re-activated to increase channel sinuosity.

The success of the channel restoration plan is dependent upon implementation of a comprehensive grazing management plan and revegetation plan as described in previous sections. If implemented as a stand-alone plan, the channel restoration plan only partially addresses the range of limiting factors identified, and long-term stability of the treatments could be at risk.

4 Budgetary Cost Estimate

Concept Level Project Cost Estimate
Flint Creek - Rue Property near Hall, MT
10/20/2021

	Construction Cost Items	Quantity	Units	Unit Cost	Cost
1	Mobilization and Demobilization	1	Lump Sum	$ 25,000	$ 25,000
2	Site Prep, River Access, BMPs, Channel Activation, Reclamation	30	Hours	$ 240	$ 7,200
3	Furnish Logs and Brush for Streambank Structures	1,233	Trees	$ 35	$ 43,155
4	Furnish Willow Cuttings for Streambank Structures	14,400	Cuttings	$ 1.50	$ 21,600
5	Furnish Cobble for Riffles	370	Cubic Yards	$ 40	$ 14,815
5	Furnish Pit Run for Streambank Fill	240	Cubic Yards	$ 20	$ 4,800
6	Excavate New Channel and Backfill Old Channel	3,000	Cubic Yards	$ 10	$ 30,000
7	Riffle Construction	200	Linear Feet	$ 15	$ 3,000
8	Sod Salvage and Placement	4,800	Square Feet	$ 2.00	$ 9,600
9	Install Large Wood Structures	4	Structures	$ 2,000	$ 8,000
10	Install Vegetated Brush Bank Structures	1,200	Linear Feet	$ 30	$ 36,000
11	Install Willow Trenches	240	Linear Feet	$ 15	$ 3,600
12	Install Floodplain Roughness in Former Channel	0.10	Acres	$ 3,500	$ 350
13	Furnish and Install Containerized Plants and Weed Mats	500	Each	$ 25	$ 12,500
14	Furnish and Install Fencing	4,000	Linear Feet	$ 8	$ 32,000
			CONSTRUCTION SUBTOTAL		$ 251,620
			FINAL DESIGN		$ 40,000
			CONSTRUCTION OVERSIGHT		$ 25,000
			GRAND TOTAL		**$ 316,620**

Assumptions for Construction Cost Estimates

1. Costs are based on restoration concepts dated July 2017.
2. Mobilization and demobilization assumed to be $5/mile per piece of equipment
3. Assumed excavator rate of $175 per hour loader rate of $150/hr skid steer rate of $75/hr and labor rate of $65/hr.
4. Tree and rock costs have not been confirmed with local suppliers and may vary from estimate.
5. Structure installation costs based on past project data.
6. Estimate in 2021 dollars. Escalation may apply for future costs.

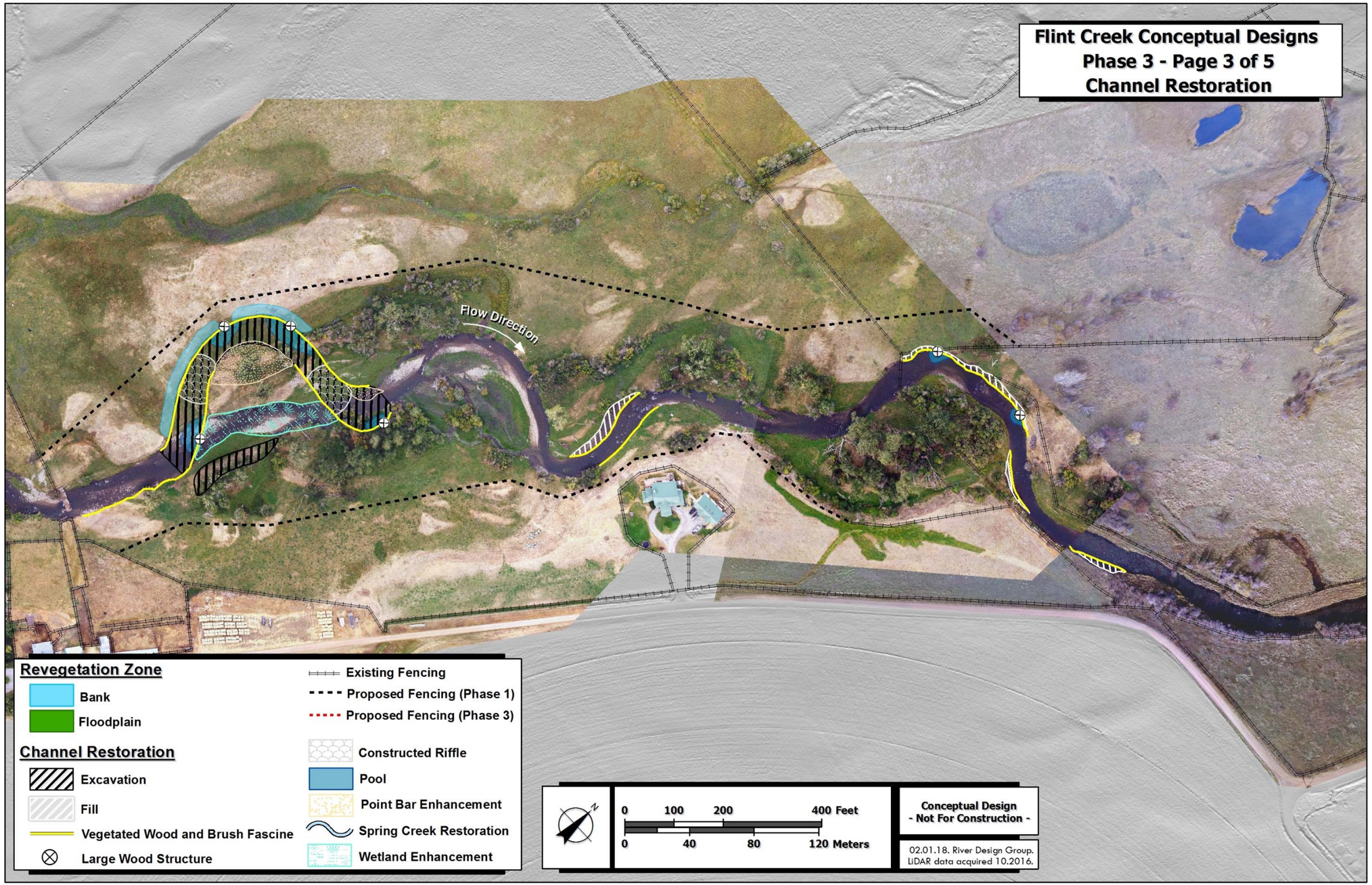


Figure 2. Conceptual restoration plan for the Rue property.

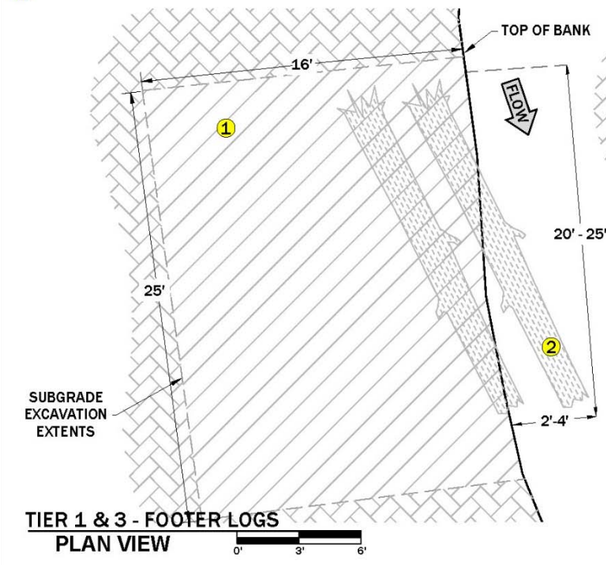
CONSTRUCTION NOTES

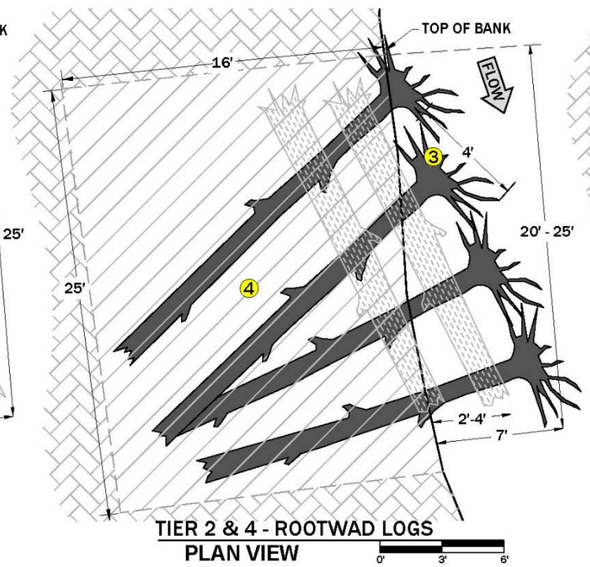
1. EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS.
2. PLACE TIER 1 FOOTER LOGS IN THE STREAMBANK POINTING DOWNSTREAM PER THE ORIENTATION SHOWN ON THE DRAWINGS.
3. PLACE TIER 2 ROOTWAD LOGS ON TOP OF FOOTER LOGS WITH ROOTWADS POINTING UPSTREAM. PLACEMENT SHALL BEGIN AT THE UPSTREAM END AND THE UPSTREAM ROOTWAD SHALL BE FLUSH WITH THE TOP OF BANK LINE. SUBSEQUENT ROOTWADS SHALL BE PLACED IN A DOWNSTREAM DIRECTION WITH GRADUALLY INCREASING PROJECTION INTO THE CHANNEL AS SHOWN ON THE DRAWINGS. ADJACENT ROOTWADS SHALL BE TOUCHING OR OVERLAPPING.
4. BACKFILL STREAMBANK TO THE TOP OF ROOTWAD LOGS WITH STREAMBANK FILL PER THE GRADATION SHOWN ON THE DRAWINGS.
5. WASH FINES AND WATER FROM ONSITE INTO THE STREAMBANK FILL TO SEAL THE VOIDS IN THE BACKFILL.
6. PLACE TIER 3 FOOTER LOGS IN THE STREAMBANK POINTING DOWNSTREAM PER THE ORIENTATION SHOWN ON THE DRAWINGS.
7. PLACE TIER 4 ROOTWAD LOGS ON TOP OF FOOTER LOGS WITH ROOTWADS POINTING UPSTREAM. PLACEMENT SHALL BEGIN AT THE UPSTREAM END AND THE UPSTREAM ROOTWAD SHALL BE FLUSH WITH THE TOP OF BANK LINE. SUBSEQUENT ROOTWADS SHALL BE PLACED IN A DOWNSTREAM DIRECTION WITH GRADUALLY INCREASING PROJECTION INTO THE CHANNEL AS SHOWN ON THE DRAWINGS. ADJACENT ROOTWADS SHALL BE TOUCHING OR OVERLAPPING.
8. PLACE TIER 5 DEFLECTOR LOGS WITHIN THE MATRIX OF LOGS. LOGS SHALL BE WOVEN BETWEEN OTHER LOGS TO PREVENT MOVEMENT. DEFLECTOR LOGS SHALL POINT DOWNSTREAM AND MAY EXTEND UP TO TWO FEET ABOVE THE TOP OF BANK ELEVATION.
9. PLACE TIER 5 BRUSH RANDOMLY WITHIN THE MATRIX OF LOGS. BRUSH SHALL BE WOVEN BETWEEN OTHER LOGS TO PREVENT MOVEMENT. BRUSH MAY EXTEND UP TO TWO FEET ABOVE THE TOP OF BANK ELEVATION.
10. BACKFILL STREAMBANK TO THE TOP OF ROOTWAD LOGS WITH STREAMBANK FILL PER THE GRADATION SHOWN ON THE DRAWINGS.
11. WASH FINES AND WATER FROM ONSITE INTO THE STREAMBANK FILL TO SEAL THE VOIDS IN THE BACKFILL.
12. GRADE THE TOP OF BANK TO MATCH FINISHED GROUND ELEVATIONS.

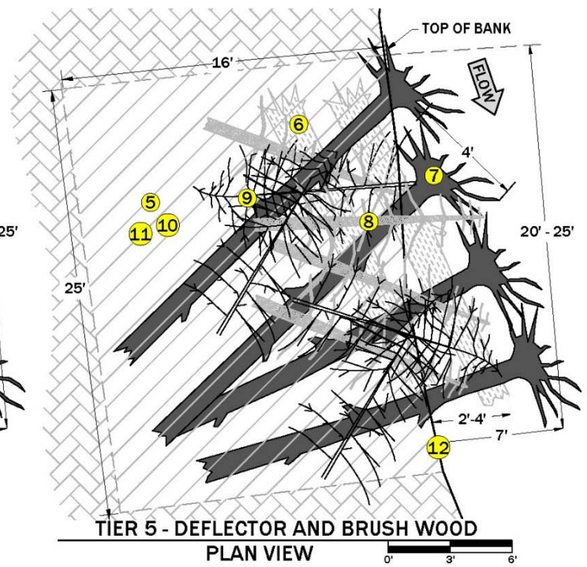
STREAMBANK FILL GRADATION*

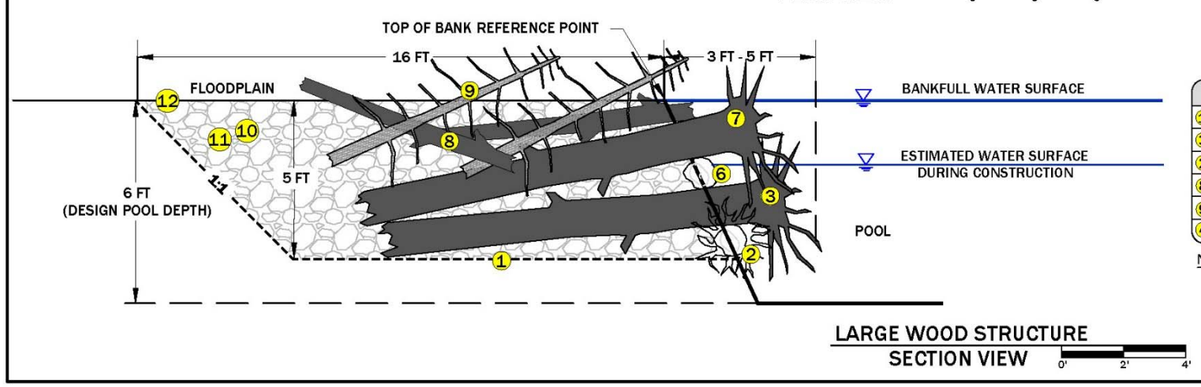
SIZE	% PASSING	SIZE CLASS
6-INCH	100	D100
4-INCH	90 - 100	D95
2-INCH	50 - 80	D65
1-INCH	30 - 50	D35
FINES	10 - 30	D15

*GRADATION MAY BE ACHIEVED BY MIXING WITH EXCAVATED MATERIAL









MATERIAL SCHEDULE (PER STRUCTURE)

ITEM	QUANTITY	DIA. (IN)	LENGTH (FT)	ROOTWAD (Y/N)
1 CY OF SUBGRADE EXCAVATION	65			
3 7 LARGE WOOD	8	12-18	15-20	YES-3 FT DIA. MIN.
2 6 MEDIUM WOOD	6	8-12	15-20	NO
8 SMALL WOOD	10	3-6	8-10	OPTIONAL
9 BRUSH	10	1-3	8-10	OPTIONAL
4 10 CY OF STREAMBANK FILL	50			

NOTE: USE OF BALLAST AND PUMPING MAY BE NECESSARY TO PLACE WOOD IN DEEP WATER.

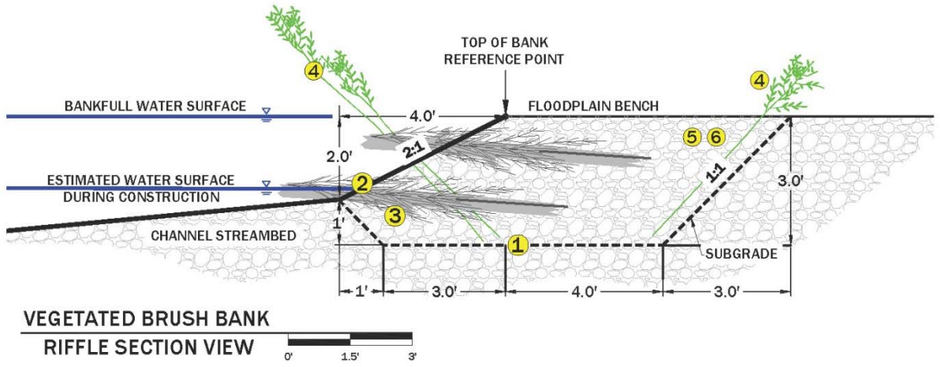
RDG RIVER DESIGN GROUP
236 Wisconsin Avenue Whitefish, MT 59937 ht:406.862.4927 fax:406.862.4963
311 SW Jefferson Avenue Corvallis, OR 97333 ht:541.738.2920 fax:541.738.8524

LARGE WOOD STRUCTURE DETAIL

NO.	DATE	BY	DESCRIPTION	CHK
1		TC	FINAL DESIGN	MD

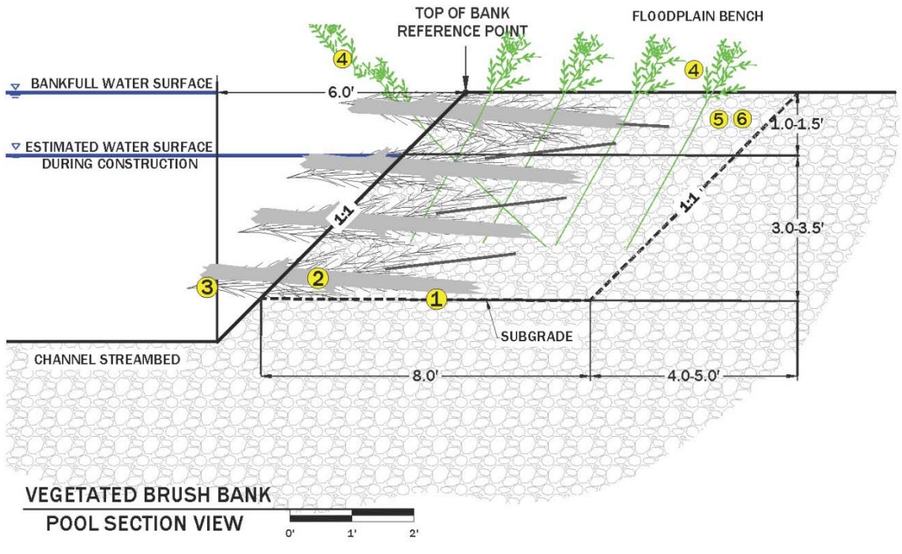
PROJECT NUMBER
RDG-20-006

SHEET NUMBER
7.0



VEGETATED BRUSH BANK
RIFFLE SECTION VIEW

0' 1.5' 3'



VEGETATED BRUSH BANK
POOL SECTION VIEW

0' 1' 2'

CONSTRUCTION NOTES

1. EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS.
2. PLACE SMALL LOGS IN THE STREAMBANK AT SKEWED ANGLE TO THE STREAMBANK. LOGS SHALL BE PLACED BELOW THE TOP OF BANK ELEVATION. LOGS MAY OVERLAP. NO CUT ENDS SHALL BE EXPOSED.
3. PLACE BRUSH WITHIN THE MATRIX OF SMALL LOGS. BRUSH SHALL BE PLACED BELOW TOP OF BANK LINE.
4. PLACE CUTTINGS INTO THE LOG/BRUSH MATRIX WITH THE STEMS IN CONTACT WITH THE BASEFLOW WATER TABLE AND THE LEAVES AT OR ABOVE THE BANKFULL WATER SURFACE ELEVATION.
5. BACKFILL STREAMBANK WITH STREAMBANK FILL PER THE GRADATION SHOWN ON THE DRAWINGS.
6. WASH FINES AND WATER FROM ONSITE INTO THE STREAMBANK FILL TO SEAL THE VOIDS IN THE BACKFILL.

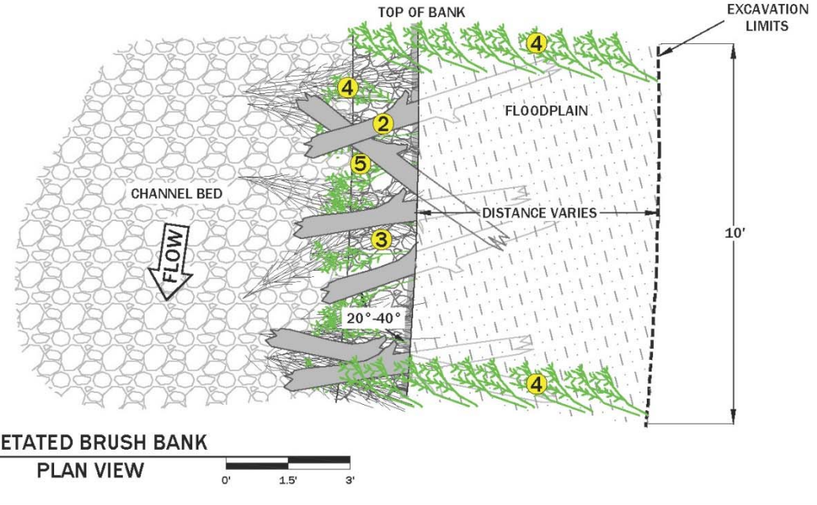
STREAMBANK FILL GRADATION*

SIZE	PERCENT PASSING	SIZE CLASS
6-INCH	100	D100
4-INCH	90 - 100	D95
2-INCH	50 - 80	D65
1-INCH	30 - 50	D35
FINES	10 - 30	D15

*GRADATION MAY BE ACHIEVED BY MIXING WITH EXCAVATED MATERIAL

MATERIAL SCHEDULE (PER 10 LINEAR FEET)

ITEM	RIFFLE QUANTITY	POOL QUANTITY	DIA. (IN)	LENGTH (FT)
1 CY OF SUBGRADE EXCAVATION	10	15		
6 CY OF STREAMBANK FILL	5	10		
2 SMALL LOGS	3	5	3-6	8-10
3 BRUSH	7	10	1-3	8-10
4 WILLOW CUTTINGS	20	20	0.75-1.5	6-8



VEGETATED BRUSH BANK
PLAN VIEW

0' 1.5' 3'

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue
Whitefish, MT 59937
tel: 406.862.4927
fax: 406.862.4963
311 SW Jefferson Avenue
Corvallis, OR 97333
tel: 541.738.2920
fax: 541.738.8524

VEGETATED BRUSH BANK STRUCTURE DETAIL

NO.	DATE	BY	DESCRIPTION	CHK
1		TC	FINAL DESIGN	MD

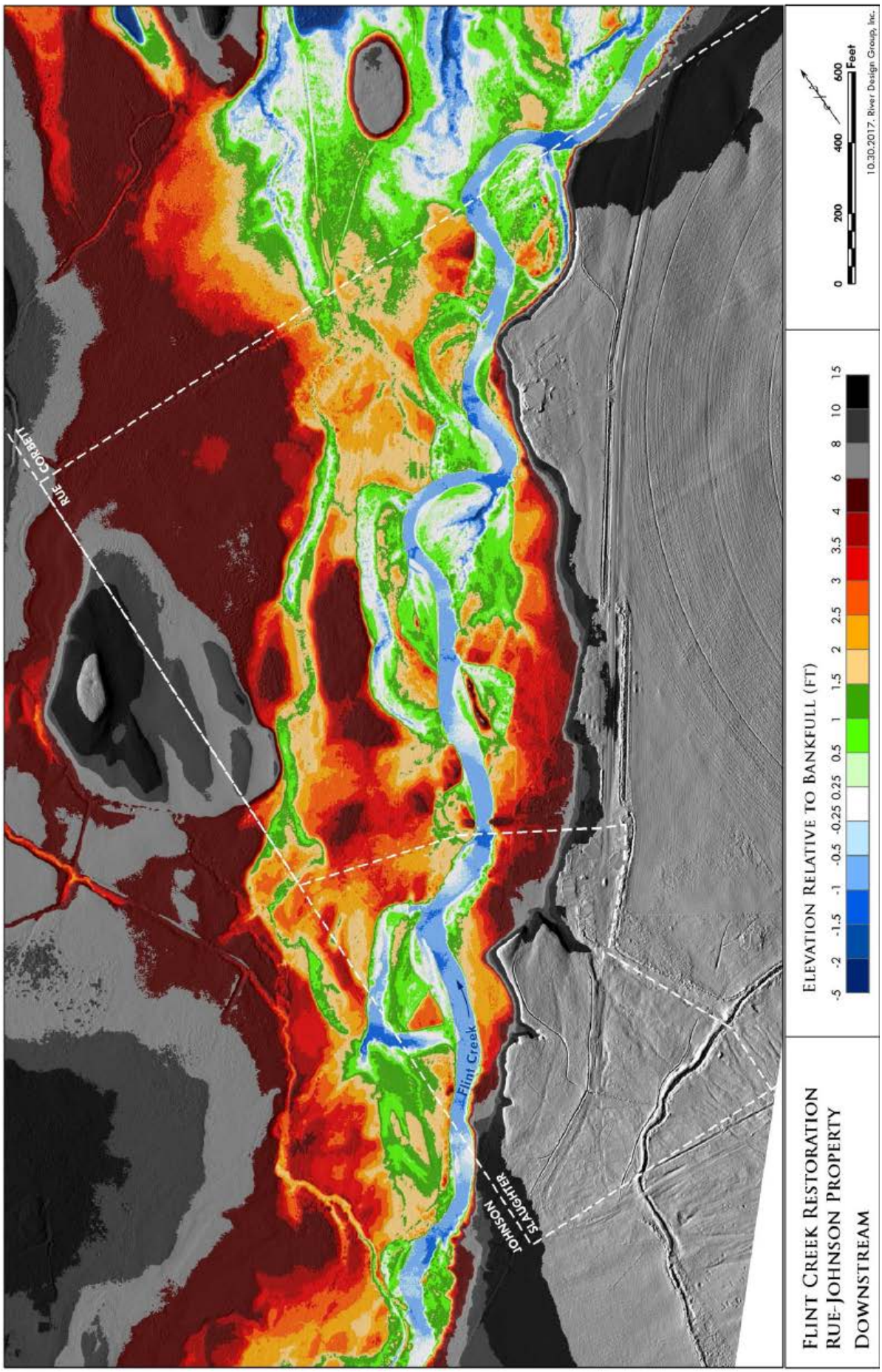
PROJECT NUMBER
RDG-20-006

SHEET NUMBER
7.1

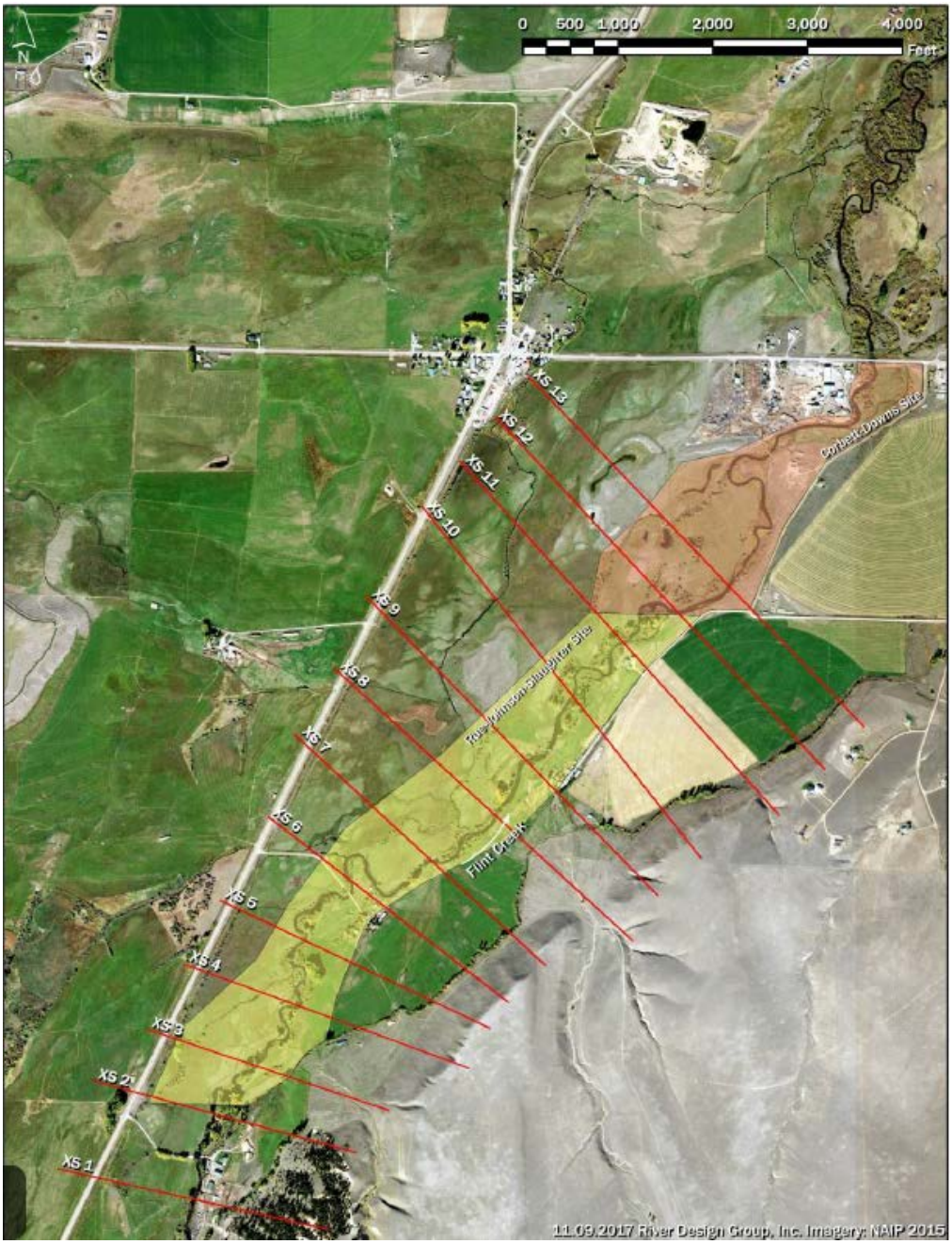
Flint Creek Riparian Restoration – Phase 2
Site Conditions

Right bank looking upstream at upper end of site.

Left bank looking downstream at upper end of site.


Flint Creek Restoration
Rue-Johnson Property
Downstream
Elevation Relative to Bankfull (ft)
-5 -2 -1.5 -1 -0.5 -0.25 0.25 0.5 1 1.5 2 2.5 3 3.5 4 6 8 10 15
0 200 400 600 Feet
10.30.2017. River Design Group, Inc.
Flint Creek
Rue
Corbett
Johnson
Slaughter

Flint Creek Riparian Restoration – Phase 2
Site Conditions



Cross-Section Summary Table														
Metrics	XS 1	XS 2	XS 3	XS 4	XS 5	XS 6	XS 7	XS 8	XS 9	XS 10	XS 11	XS 12	Riffle	Pool
Bankfull Width (ft)	53.6	41.7	36.9	45.3	57.7	30.6	54.8	32.4	64.6	62.7	64.5	52.9	53.9	44.1
Mean Depth (ft)	1.6	1.9	2.9	1.5	3.4	3.2	1.5	2.5	1.5	2.2	0.8	1.3	1.4	2.9
Max Depth (ft)	2.6	2.7	5.8	2.1	5.3	5.0	2.4	4.0	2.3	4.3	1.9	1.9	2.3	4.9
Bankfull Area (sq ft)	83.5	78.3	107.7	68.9	197.7	98.1	80.6	80.7	95.3	138.9	50.6	69.7	75.3	124.6
Width/Depth Ratio	34.4	22.2	12.6	29.6	16.8	9.5	37.0	13.0	43.7	28.3	81.0	39.8	41.1	16.0
Hydraulic Radius	1.5	1.8	2.7	1.5	3.2	2.9	1.4	2.3	1.4	2.2	0.8	1.3	1.4	2.7
Bankfull Elevation (ft)	4249.9	4242.3	4242.2	4235.2	4234.5	4226.0	4222.6	4218.8	4206.5	4204.3	4197.9	4184.7	NA	NA
Flood-Prone Width	>120	>80	NA	>90	NA	NA	>110	NA	>140	NA	>120	>140	>115	NA
Entrenchment Ratio	>2	>2	NA	>2	NA	NA	>2	NA	>2	NA	>2	>2.2	>2	NA
Geomorphic Unit	Riffle	Riffle	Pool	Riffle	Pool	Pool	Riffle	Pool	Riffle	Pool	Riffle	Riffle	Riffle	Pool

Flint Creek Riparian Restoration – Phase 2
Site Conditions

Point bar showing natural willow and cottonwood recruitment potential

Browse on riffle bank.

Flint Creek Riparian Restoration – Phase 2
Site Conditions

Aspen stand with high regeneration potential within proposed riparian fencing.

Riparian Habitat Assessment for Flint Creek and Boulder Creek Granite County, Montana

Environmental Services Contract #SPB-12-2177V

Task Order 1.28




Prepared for
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Figure 1. Project Area

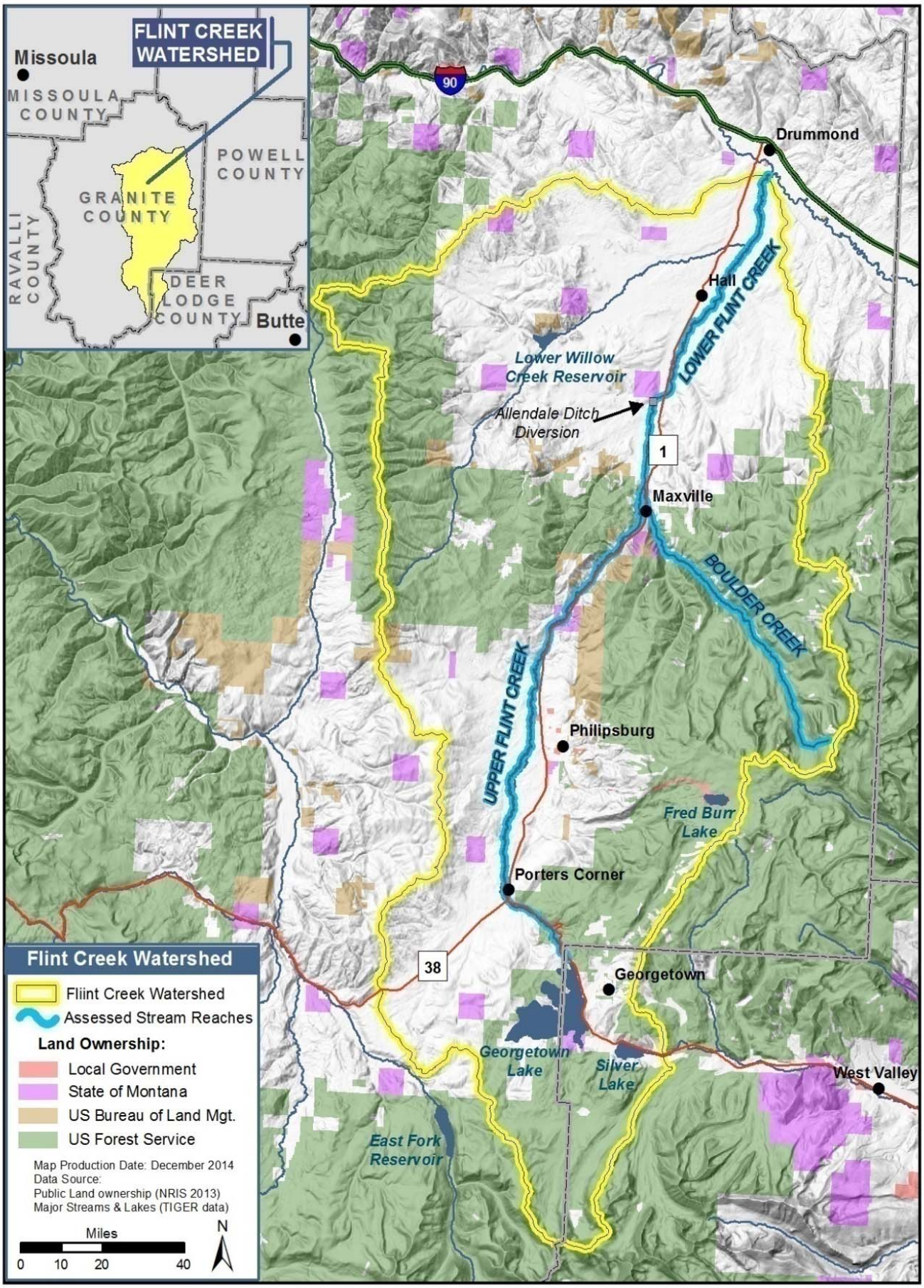
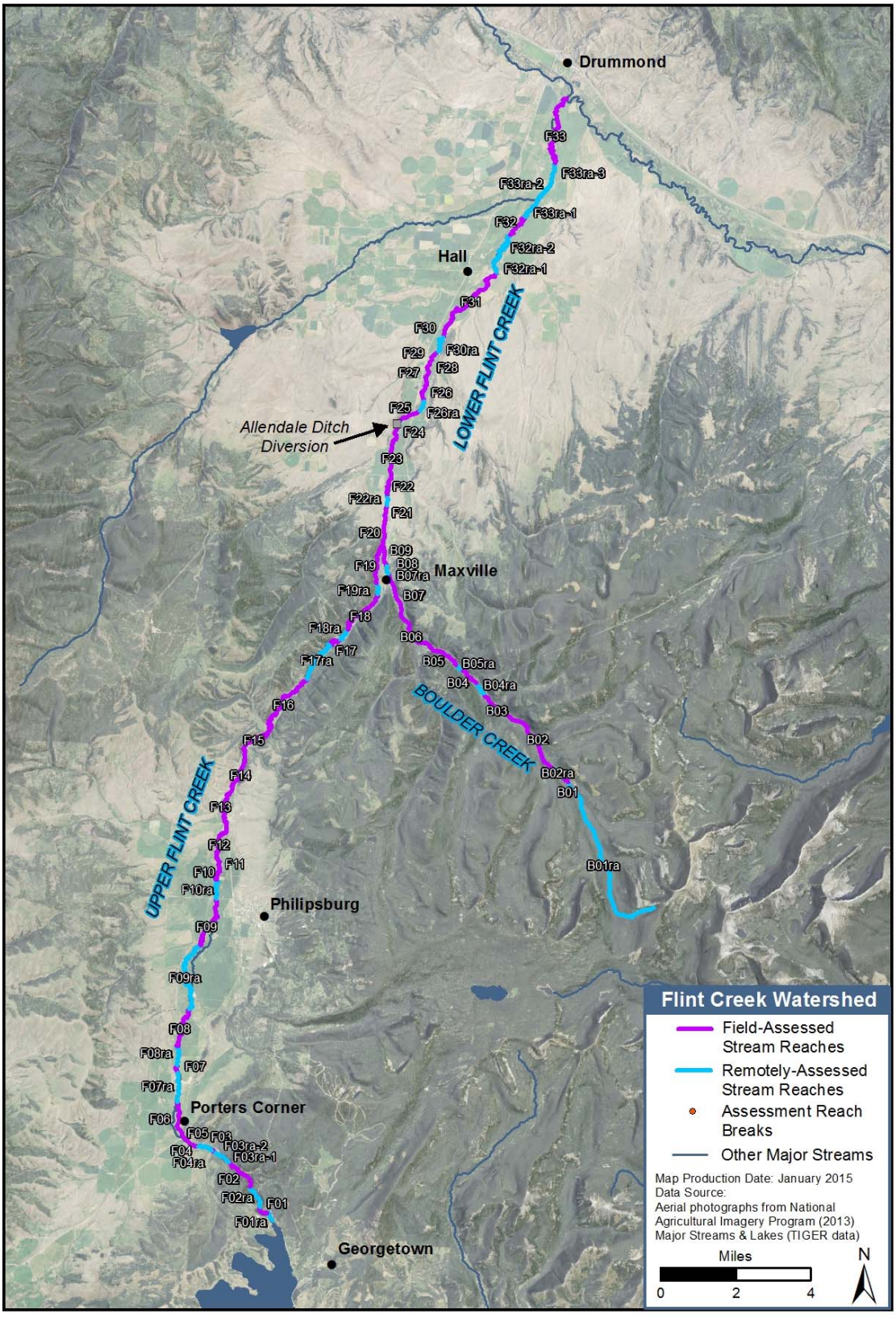


Figure 2. Remote and field assessed subreaches



intermixed with mature and sapling woody riparian vegetation including alder, willows and cottonwood galleries in the lower extent of the subreach. The riparian area is fenced but some browse was observed from horses and mules on the property, as well as wildlife. Browse intensity overall was light and cottonwood and willow regeneration was high.

One irrigation diversion was noted on site, which was determined to likely be a high entrainment concern. Armored banks, decreased understory cover and a lack of woody debris in the channel were noted as limiting factors for fish habitat.

Restoration Potential

- Conservation of streamside fencing
- Stabilization of high and bare banks on river right with bioengineering techniques, willow staking

Armored bank on river right to protect property at F30.

Typical bank conditions in F30

4.1.46 **Subreach F31**

Percentage of Linear Bank Erosion (%)	Erosion rating	NRCS Score (%)	NRCS rating	Fish Habitat Score (%)	Fish Habitat Rating	Restoration Priority Ranking
16	Moderately High	53	At Risk	57	Fair	High

Subreach F31 is 14,771 feet in length and is classified as a Rosgen C4c channel type based on a width/depth ratio of 19.4 and gravel dominated channel bed with some cobbles, as calculated in the field and a slope of 0.6%, and sinuosity of 1.4, which were calculated from aerial imagery in GIS.

This subreach is comprised of several ownerships with similar riparian and fish habitat characteristics and similar restoration priority concerns. Grazing patterns are consistent

throughout the ownerships and have significant impacts on the riparian vegetative community. The stream has moderate to high levels of lateral bank erosion, particularly on outside meander bends. These conditions have led the stream to be over-widened in many areas, perpetuated by cattle-trampled banks and minimal woody riparian vegetation. Lacking robust vegetation, banks of outside bends were regularly found cleaving off and falling into the stream. Mid-channel bars indicate a stream out of balance with its sediment and in places excessive algae was noted growing in the channel.

In the downstream-most ownership by the lumber operation, streambanks are heavily rip-rapped to protect structures and the stream may have been straightened in the past. Banks in this southernmost ownership do not exhibit the active erosion observed upstream and are stable. The stream has ready access to its floodplain on the river right.

The corrals just east of the Tuning Fork road crossing is a heavy cattle-use area with active bank erosion throughout and, in places, high eroding banks and no woody riparian vegetation. Between the Tuning Fork road and this high use area, a small length of riparian fencing on both banks provides some relief from grazing pressures and riparian vegetation is dramatically improved. This fencing is likely installed due to concern over downstream structures near the stream.

Bank vegetation is dominated by escaped pasture grasses, with sporadic clumps of willows and river birch. Rose and hawthorne are also present throughout, an indication of the heavy browse pressure in this subreach. Cottonwood stands are small and far between, comprised primarily of mature individuals with heavy cattle use underneath them. Downstream of these cottonwood stands, piles of woody debris against banks are providing some stabilization as well as improving fish habitat conditions. Fish habitat is otherwise fair throughout this subreach, with a noticeable lack of overhanging vegetation and deep pool habitat.

Two irrigation diversions were found in this subreach. The uppermost diversion was closed and determined to be old, but still leaking water and likely posing an entrainment problem. The lower diversion, also showing its age was determined to be a high risk for entrainment.

Restoration Potential

- Riparian fencing or fencing of cottonwood and willow stands to promote regeneration
- Grazing management including off-site water, decreased intensity on riparian areas
- Fish screens or removal of diversions

Heavy cattle use area in F31

View upstream near lumber operation and rip-rapped banks in F31

4.1.47 **Subreach F32ra-1**

Percentage of Linear Bank Erosion (%)	Erosion rating	NRCS Score (%)	NRCS rating	Fish Habitat Score (%)	Fish Habitat Rating	Restoration Priority Ranking
NA	NA	92	Sustainable	NA	NA	Moderate

Subreach F32ra-1 is 4,162 feet in length and located primarily within one ownership, with one small inholding at its uppermost extent. This subreach was classified as a Rosgen C4c channel with a channel bed substrate of gravel, slope of 0.3%, sinuosity of 1.5 and an estimated width/depth ratio of 13.9, as interpreted from aerial imagery and GIS.

Land owners in this subreach appear to have left the riparian area in a largely natural state, with a high density of large woody riparian shrubs dominating most of the subreach length widths range from over 100 feet to over 500 feet.

Other than the dense riparian buffer, the main distinguishing feature of this subreach is a narrower channel, likely due to the stabilizing impact of riparian vegetation. In contrast to the bankfull width, however, long riffle sections are noticeably shallow from the August 2013 imagery used for this interpretation. Stream depths are impacted by an irrigation diversion at the top of the reach, which was determined to be impassable for fish in its current configuration because of a lack of fish bypass structure.

Restoration Potential

- Conservation/Preservation of existing riparian vegetation (easement?)
- Improve fish passage at diversion

9.0 APPENDIX 3: SUBREACH EROSION SUMMARY DATA

SubReach ID	Reach Length (ft)	Linear Bank Erosion (ft)	Total Bank Erosion (ft^2)	Percentage of Linear Bank Erosion (%)	Primary Erosion Source
F01ra	1486	NA	NA	NA	NA
F01	1752	304.5	9775	8.69	HS
F02ra	3701	NA	NA	NA	NA
F02	5682	364.5	1117.5	3.21	NBS
F03ra-1	2228	NA	NA	NA	NA
F03ra-2	388	NA	NA	NA	NA
F03	774	91	173	5.88	NBS
F04ra	2872	NA	NA	NA	NA
F04	1532	147	534.5	4.80	I
F05	1569	60	250	1.91	I
F06	6073	2863	5619	23.57	LS-P/LS-B
F07ra	5197	NA	NA	NA	NA
F07	1638	653	960	19.93	RI
F08ra	4025	NA	NA	NA	NA
F08	9561	3766	9309.5	19.70	LS-P/LS-B
F09ra	17987	NA	NA	NA	NA
F09	12820	3630	5480	14.16	LS-P/LS-B
F10ra	4317.6	NA	NA	NA	NA
F10	3017	435	601.5	7.21	CR
F11	2217	137	159	3.09	CR
F12	9258	1521	2029	8.21	CR/LS-P
F13	9150	1704	2433.5	9.31	CR/LS-P
F14	5947	1476	8840	12.41	RI
F15	8690	2663	5127.5	15.32	RI
F16	15002	4736	23906	15.78	HS/RI
F17ra	10632.1	NA	NA	NA	NA
F17	3528	773	860	10.95	CR
F18ra	2715.5	NA	NA	NA	NA
F18	9480	492	8037.5	2.59	NBS, RI
F19ra	2106.3	NA	NA	NA	NA
F19	6221	0	0	0.00	none
F20	3454	1.5	15	0.02	CR
F21	2292	80	40	1.75	CR
F22ra	1670.9	NA	NA	NA	NA
F22	3212	418	731.5	6.51	LS-P/LS-B
F23	5577	1449	4754.5	12.99	LS-P/LS-B
F24	3451	515	2384	7.46	RD/HS
F25	3045	1388	2319.5	22.80	LS-P/LS-B
F26ra	1613.8	NA	NA	NA	NA
F26	3168	950	875	15.00	CR
F27	2634	70	139	1.33	LS-P
F28	1020	298	511	14.61	LS-P/LS-B
F29	1945	422	884	10.85	CR/LS-B
F30ra	3385.8	NA	NA	NA	NA
F30	1628	159	114.5	4.88	CR
F31	14771	4663	9670	15.78	CR/LS-B
F32ra-1	4161.9	NA	NA	NA	NA
F32ra-2	5696.5	NA	NA	NA	NA
F32	5134	1679	3165.5	16.35	CR/LS-B
F33ra-1	5033.7	NA	NA	NA	NA
F33ra-2	3972.9	NA	NA	NA	NA
F33ra-3	2855.0	NA	NA	NA	NA
F33	14783	4906	12647	16.59	CR/LS-B

SubReach ID	Reach Length (ft)	Linear Bank Erosion (ft)	Total Bank Erosion (ft^2)	Percentage of Linear Bank Erosion (%)	Primary Erosion Source
B01ra	26762	NA	NA	NA	NA
B01	1215	245	775	10.08	RD
B02ra	2321	NA	NA	NA	NA
B02	10152	30	67.5	0.15	I
B03	6502	30.5	81	0.23	CR
B04ra	1871	NA	NA	NA	NA
B04	2979	771	1036	12.94	NC
B05ra	1330	NA	NA	NA	NA
B05	4952	846	1624	8.54	CR
B06	8155	317	669	1.94	NBS
B07	6034	196	496	1.62	HS
B07ra	1303	NA	NA	NA	NA
B08	779	59	81	3.79	CR
B09	2600	10	5	0.19	NBS

Code	Description	Code	Description
RD	Road Erosion	I	Geomorphic incision
BR	Bridge Erosion	NC	New channel has formed in area that lack riparian vegetation
CR	Cropland Encroachment: Lack of Riparian Veg	C	Corrals
LS-B	Livestock Browse: Lack of Riparian Veg	RE	Recreation Access
LS-P	Physical Livestock Erosion	RI	Riparian buffer removed, lack of veg
TP	Trampled by livestock, no real height of erosion	NBS	
HS	Hillside erosion, channel cutting into valley walls		