



FUTURE FISHERIES IMPROVEMENT PROGRAM GRANT APPLICATION

All sections must be addressed, or the application will be considered invalid



I. APPLICANT INFORMATION

A. Applicant Name: Trout Unlimited

Mailing Address: 312 N. Higgins St Suite 200

City: Missoula State: MT Zip: 59802

Telephone: 406-552-2168 E-mail: TScanlon@tu.org

B. Contact Person (if different than applicant): _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____ E-mail: _____

C. Landowner and/or Lessee Name (if different than applicant): Johnson Tuning Fork Ranch

Mailing Address: _____

City: Hall State: MT Zip: 59837-0032

Telephone: 406-899-0444 E-mail: crijohnsonlaw@hotmail.com

II. PROJECT INFORMATION

A. Project Name: Flint Creek Phase 3A Riparian Habitat Restoration Project

River, stream, or lake: Flint Creek

Location: Township: 10N Range: 3W Section: 35

Latitude: 46.569822° Longitude: -113.200827° *Within project (decimal degrees)*

County: Granite

B. Purpose of Project: *(high level, focus on why the project is important)* _____

The purpose of the Flint Creek Riparian Restoration Project Phase 3A is to build upon recent improvements made to riparian and aquatic habitat in Flint Creek through the successful implementation of two recent restoration projects completed on Flint Creek and restore 2,550-linear feet reach of upstream channel and riparian habitat. The project is located on the Johnson Tuning Fork Ranch near Hall, MT. It is part of a multi-phased, long-term effort in the Flint Creek watershed with multiple private landowners and agency partners, including Montana Department of Environmental Quality (DEQ) and Montana Natural Resource Damage Program (NRDP) to engage private landowners in projects that restore and reconnect habitats, conserve streamflows, and improve water quality. The project aims to ultimately restore Flint Creek fish populations and increase fish recruitment to a highly impaired fishery in the Upper Clark Fork River near and upstream of the mouth of Flint Creek.

Several habitat assessments have been completed on Flint Creek, including the *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 (RDG) for NRDP in 2018. These reports describe the vegetative and geomorphic impairments and identify this targeted reach as a high priority for riparian, as well as concepts to restore those impairments.

The project will use three approaches to enhance and protect degraded aquatic and riparian habitat in lower Flint Creek to benefit wild and native fish. Approaches are: (1) restore eroding streambanks using heavy equipment to rebuild eroding streambanks, (2) improve native vegetation communities and bank stabilization by planting willows and other containerized shrubs, in streambanks and floodplain areas, and (3) re-establish a riparian habitat buffer by implementing an alternate grazing management plan.

Flint Creek Riparian Habitat Restoration Project Phase 3A is located upstream from the restoration work completed in Phase 1 in 2021 and Phase 2 in 2023. Funding support from the Future Fisheries Improvement Program for Phase 3A will be used to support construction costs to rebuild and revegetate eroding streambanks. Implementation is anticipated in summer 2025.

- C. Brief Project Description (attach additional information to end of application). Please include the anticipated construction schedule:

The Flint Creek Phase 3A Riparian Habitat Restoration Project is a collaborative project between the private landowner, Johnson Tuning Fork Ranch, NRDP, DEQ, and TU to protect, enhance, and restore a 2,550-feet of impaired habitat and improve water quality in Flint Creek. The project reach is located upstream from completed phases 1 and 2 of the larger Flint Creek restoration project and south of Hall, MT on the Johnson Tuning Fork Ranch, where fish and wildlife habitat is degraded by land use impacts and in a reach that has been previously prioritized for restoration efforts. Land use impacts have reduced the riparian vegetation and habitat buffer. Increased rates of streambank erosion and nutrient run-off processes have reduced water quality and resulted in streambank instability and over-simplified and wood limited instream channel habitat.

The project will use three approaches to address habitat and water quality impairments in lower Flint Creek. These approaches include: (1) rebuild eroding streambanks using large wood and cobble, (2) plant native willows and other shrubs, and (3) re-establish a riparian habitat buffer with the implementation of an alternate grazing management plan. TU and NRDP are working with the private landowner and River Design Group on the restoration design plan that includes the following three project components. Preliminary design plans are complete and based on the initial concepts developed for the Johnson Tuning Fork Ranch in 2018 and refined based on both the lessons learned from phases 1 and 2 as well as data collected and assessed during fall 2023 of bank erosion rates and existing vegetation communities. Banks with high erosion rates lacking vegetation and prioritized for restoration in Phase 3A, as identified in the preliminary design plans. TU is also working with the landowner on a long-term landowner agreement that will include a grazing management and maintenance plan.

Project activities include:

- (1) Riparian Revegetation: Approximately 8,000 thousand unrooted willow cuttings and 500 native, containerized shrubs will be planted to re-establish woody riparian vegetation and diverse plant communities.
- (2) Streambank Restoration: Approximately 1,400 feet of streambanks with measured high rates of bank erosion will be rebuilt using large wood, cobbles, and native vegetation to restore functioning channel geometry and improve fisheries habitat complexity.
- (3) Establishing a Riparian Buffer and Grazing Management Plan: An alternate grazing management plan will be implemented using riparian fencing installed with setback buffer around the project reach.

Expected outcomes include reduced sedimentation and nutrient loading, improved streambank stability and channel habitat complexity, improved floodplain function and groundwater recharge, and increased woody riparian vegetation.

Final Plans will be completed over the winter in 2024-2025. Permits will be submitted by April, 2025. Construction is anticipated in Summer 2025, after July 15.

D. What was the cause of habitat degradation and how will the project correct the cause?

Habitat degradation in the area has largely been the result of past agricultural practices and channel alteration. In particular, the impacts of cattle grazing include reduced woody riparian vegetation, increased erosion and sediment loading into the stream, over-widened stream channel, and decreased pool frequency and depths. The project seeks to correct these impairments through a cost-effective combination of removing grazing pressure, restoring riparian vegetation through the reach, and actively restoring a targeted 1,400 linear feet of streambanks within the reach.

Other issues such as low streamflows and fish passage barriers limit fisheries in Flint Creek as well. Although the proposed project does not focus on these issues directly, this project does improve watershed resiliency to help the watershed address impacts related to water shortages. Furthermore, TU is working in cooperation with FWP and other partners to develop other priority projects that help conserve water and remove barriers to fish passage.

E. Length of stream or size of lake that will be treated (project extent): 2,550 linear stream feet
 Length/size of impact, if larger than project extent (e.g., stream miles opened): _____

F. Project Budget Summary:

Grant Request (Dollars):	\$	60,000
Matching Dollars:	\$	30,000
Matching In-Kind Services*:	\$	2,000

**salaries of government employees are not considered matching contributions*

Other Contributions (not part of this app)	\$	186,700
Total Project Cost:	\$	278,790

G. Attach itemized (line item) budget – see *budget template*

H. Attach project location map(s) that include:

- Extent of the project, including context (relation to major landmark or town)
- Indication of public and private property
- Riparian buffer locations and widths (if applicable) and grazing locations

I. Attach project plans:

- Detailed sketches or plan views with the location and proposed restoration
- Pre-project photographs (GPS location strongly recommended)
- If water leasing or water salvage is involved, attach a supplemental questionnaire (<https://myfwp.mt.gov/getRepositoryFile?objectID=36110>)

J. Attach support letters or statements of (e.g., landowner consent, community or public support). For FWP statement, attach provided template. List any other project partners:

NRDP, DEQ, TU, WestSlope Chapter TU, Johnson Tuning Fork Ranch, USFWS

III. MAINTENANCE AND MONITORING (attach additional information to end of application):

A. A 20-year maintenance commitment is required*. Please confirm that you will ensure this protection and describe your approach. Attach any relevant maintenance plans. Yes No
**If it is a water leasing project, describe the length of the agreement.*

A landowner agreement is in progress. TU is working with the landowner to establish an agreed upon plan for access, monitoring, and maintenance. The landowner is committed to maintaining all improvements. The agreement will provide access for TU to monitor and maintain the project if necessary. A signed agreement will be completed prior to project implementation.

- B. Will grazing be part of or adjacent to the project? If so, describe or attach land management plans, including short term and long term grazing regimes. If the landowner is not the applicant, please describe their involvement in the project. *If you want assistance with grazing plan development, note your need.*

TU is working with the landowner on a landowner agreement that includes a grazing management plan. A maintenance and monitoring plan for the riparian fencing will be established prior to project implementation. The landowner agreement will be a 20-year agreement subject to renewal by TU and the landowner. The riparian fencing will either (a) be built to provide a permanent enclosure around a minimum buffer range of 35-feet from the stream channel OR (b) be built with a larger set back from the stream and used as a riparian grazing unit after a short-term enclosure period after the project is implemented. If the riparian pasture is the direction the landowner decides to take, then sideboards for how many grazing units in the short-duration or rest-rotation riparian pasture will be established prior to project implementation. The enclosure around the restoration project will ensure protection of the project site from cattle grazing and other heavy wildlife browsing for a period of at least 3-4 years.

- C. Will the project be monitored to determine if goals were met? If so, what are the short-term and long-term plans to assess benefits and lessons learned? Were pre-project data collected? Will monitoring information be shared with FWP?

Yes, the project will be monitored per the outlined monitoring plan developed by TU and River Design Group and approved by DEQ Funding Agreement and the Army Corps of Engineers 404 Permit Requirements. Short term data will assess changes in channel morphology, including before and as-built topographical surveys, bank erosion surveys, nutrient load reduction calculations, and vegetation survival assessments. Long term monitoring will look at long-term vegetation survival and natural recruitment, such as monitored improvements in streambank vegetation greenness, as well as fisheries population monitoring in cooperation with MFWP.

Pre-project data collected:
BEHI (bank erosion) rates, bathymetry (cross sections/long pro), vegetation surveys, pre-project photos.

Post Project data to be collected:
BEHI (bank erosion) rates, bathymetry (cross sections/long pro), vegetation surveys, pre-project photos.

IV. PROJECT BENEFITS (attach additional information to end of application):

- A. What species of fish will benefit from this project?

Brown trout, bull trout, westslope cutthroat trout, rainbow trout, mountain whitefish and non-game species.

- B. How will the project protect or enhance wild fish habitat?

The project will protect and enhance wild fish habitat in three major ways:

- 1) The project will improve shade and overhead cover by providing landowners with infrastructure to exclude cattle from grazing from the riparian corridor which will promote woody riparian vegetation.
- 2) The project will improve instream habitat complexity and pool depth through installation of 1,400 feet of vegetated wood matrixes using large wood and willow cuttings.
- 3) The project will reduce sedimentation and nutrient loading to improve water quality for aquatic life, benefitting survival of fish and fish eggs.

C. What is the expected improvement to fish populations, both short term and long term? How might the project translate to angler success?

Yes, the project is intended to improve fish populations in the short and long term and benefit the quality of angling by improving foraging, migration and overwintering habitat for native species, and spawning and rearing habitat for non-native sportfish. Improved habitat should increase survival and population densities over time. The project is located in a high-priority migration corridor for westslope cutthroat trout and bull trout between the Clark Fork River and high-quality spawning habitat in Boulder Creek upstream of the project reach.

The project part of a larger phase of work. Phase 3 will be implemented over the course of 3 or 4 construction seasons, with the long-term goal of implementing continuous habitat restoration projects to expanding the fisheries benefits across a larger scale in lower Flint Creek.

D. Will the project increase public fishing opportunity for wild fish and, if so, how? Is public fishing allowed onsite? Is it allowed by permission? If not, describe how the public would benefit.

While the project is located on private land, Flint Creek is accessible to wade anglers through stream access for those who ask the Tuning Fork Ranch to fish the property. The Tuning Fork Ranch landowner also has a access agreement with FWP for anglers to fish one of their upstream sections located off Highway 1 and up Flint Creek approximately 5 miles.

In addition, improvements to fish populations from the project may improve angling opportunity on the rest of Flint Creek and the Clark Fork River downstream. FWP otolith microchemistry and radio telemetry studies have shown the importance of Flint Creek for recruitment to the Clark Fork River.

E. Aside from angling, what local or large-scale public benefits will be realized from this project?

The project will improve water quality benefiting downstream water users and ecosystem health. It also increases ecosystem resiliency by improving stream health and creating robust riparian habitats along Flint creek. Improved riparian health helps reduce impacts of wildlife and drought on the stream and public and furthermore protects recreation and the recreational economy of tourism and other outdoor activities.

F. Will the project interfere with water or property rights of adjacent landowners? (explain):

No.

- G. Will the project result in the development of commercial recreational use on the site (including paid access)? Explain:

No. The landowners maintain a traditional multi-generational cattle ranch. There are no plans for further recreational development on the property.

- H. Is this project associated with the reclamation of past mining activity?

No.

Each approved project applicant must enter into a written agreement with Montana Fish, Wildlife & Parks specifying terms and duration of the project. The applicant must obtain all applicable permits prior to project construction. A competitive bid process must be followed when using State funds.

V. AUTHORIZING STATEMENT

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.



Applicant Signature: _____ Date: 05/10/2024

Submittal: Applications must be signed and received on or before November 15 and May 15 to be considered for the subsequent funding period. Late or incomplete applications will be rejected.

<p>Mail to: FWP Future Fisheries Fish Habitat Bureau PO Box 200701 Helena, MT 59620-0701</p>	<p>Email: Future Fisheries Coordinator FWPFFIP@mt.gov (electronic submissions must be signed) For files over 10MB, use https://transfer.mt.gov and send to mmcgree@mt.gov</p>
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Flint Creek Phase 3A Riparian Restoration
BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

022-2024

Both tables must be completed or the application will be returned

PROJECT COSTS					CONTRIBUTIONS			
WORK ITEMS (Itemize by Category)	NUMBER OF UNITS	UNIT DESCRIPTION *	COST/UNIT	TOTAL COST	FUTURE FISHERIES REQUEST	MATCH (Cash or Services)**	OTHER (Not part of this application)	TOTAL
Personnel***								
Design	1	Lump Sum	\$40,000.00	\$40,000.00			\$40,000.00	\$ 40,000.00
Permitting	1	Lump Sum	\$8,000.00	\$8,000.00			\$8,000.00	\$ 8,000.00
Project Management/Oversight	1	Lump Sum	\$18,000.00	\$18,000.00			\$18,000.00	\$ 18,000.00
Monitoring	1	Lump Sum	\$5,000.00	\$5,000.00			\$5,000.00	\$ 5,000.00
			<i>Sub-Total</i>	\$ 71,000.00	\$ -	\$ -	\$ 71,000.00	\$ 71,000.00
Travel								
Mileage	2000	miles	\$0.67	\$ 1,340.00			1,250.00	\$ 1,250.00
Per diem				\$ -				\$ -
			<i>Sub-Total</i>	\$ 1,340.00	\$ -	\$ -	\$ 1,250.00	\$ 1,250.00
Construction Materials****								
Logs and brush for streambank structures	1	Lump Sum	\$17,000.00	\$ 17,000.00	17,000.00	-		\$ 17,000.00
Harvest and Deliver willow cuttings	8750	Each	\$2.00	\$ 17,500.00	5,000.00		12,500.00	\$ 17,500.00
Containerized Plants	1	Lump Sum	\$6,200.00	\$ 6,200.00	6,200.00			\$ 6,200.00
				\$ -				\$ -
			<i>Sub-Total</i>	\$ 40,700.00	\$ 28,200.00	\$ -	\$ 12,500.00	\$ 40,700.00
Equipment and Labor								
Site Prep and Access incl. Temporary Roads, BMPs	1	Lump Sum	\$ 10,000	\$ 10,000.00	10,000.00			\$ 10,000.00
Temporary Bypass Channel	1	Lump Sum	\$ 15,000	\$ 15,000.00	15,000.00			\$ 15,000.00
Furnish Cobble for Riffles and Streambank	200	Linear Feet	\$ 50	\$ 10,000		10,000.00	-	
Earthwork	400	CY	\$ 10	\$ 4,000			4,000.00	\$ 4,000.00
Salvage Alluvium from Existing Riffle Construction	400	Cubic Yards	\$ 8	\$ 3,200			3,200.00	
Sod Salvage and Transplant	400	Linear Feet	\$ 30	\$ 12,000			12,000.00	
Install Vegetated Wood Matrix Type 1 Structures	1,500	Square Feet	\$ 3	\$ 3,750			3,750.00	
Install Vegetated Wood Matrix Type 2 Structures	900	Linear Feet	\$ 30	\$ 27,000		20,000.00	7,000.00	
Install Willow Trenches	500	Linear Feet	\$ 40	\$ 20,000			20,000.00	
Install Floodplain Roughness	350	Linear Feet	\$ 10	\$ 3,500			3,500.00	
Livestock Fencing	0.25	Acres	\$ 3,000	\$ 750			750.00	
Planting and Seeding	5,100	Linear Feet	\$ 5.50	\$ 28,050			28,050.00	
	1	LS	\$ 12,500	\$ 12,500	6,800.00		5,700.00	
			<i>Sub-Total</i>	\$ 149,750.00	\$ 31,800.00	\$ 30,000.00	\$ 87,950.00	\$ 29,000.00

Flint Creek Phase 3A Rinarian Restoration
BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

022-2024

Mobilization								
Mobilization	1	LS	\$16,000.00	\$16,000.00			\$16,000.00	\$ 16,000.00
TOTALS			\$ 278,790.00	\$ 60,000.00	\$ 30,000.00	\$ 188,700.00	\$ 157,950.00	

OTHER REQUIREMENTS:

All of the columns in the budget table and the matching contribution table MUST be completed appropriately or the application will be invalid. Please see the example budget sheet for additional clarification.

*Units = feet, hours, inches, etc. Do not use lump sum unless there is no other way to describe the costs.

**Can include in-kind materials. Justification for in-kind labor (e.g. hourly rates used). Do not use government salaries as match. In-kind match consists of TU volunteer to harvest and assist with planting of willow cuttings.

***The Review Panel suggests that design and oversight costs associated with a proposed project not exceed 15% of the total project budget. If design and oversight costs are in excess of 15%, applications must include a justification or minimum of two competitive bids for the cost of undertaking the project.

****The Review Panel recommends a maximum fencing cost of \$1.50 per foot. Additional costs may be the responsibility of the applicant and/or partners.

Additional details:

APPLICATION MATCHING CONTRIBUTIONS				
(do not include requested funds or contributions not associated with the application)				
CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
	\$ -		\$ -	
Landowner		\$ 3,000.00	\$ 3,000.00	Y
Trout Unlimited	\$ 2,000.00		\$ 2,000.00	Y
Montana DEQ	\$ -	\$ 25,000.00	\$ 25,000.00	Y
	\$ -	\$ -	\$ -	
	\$ -	\$ -	\$ -	
	\$ -	\$ -	\$ -	
	\$ -	\$ -	\$ -	
TOTALS	\$ 2,000.00	\$ 28,000.00	\$ 30,000.00	

OTHER CONTRIBUTIONS				
(contributions not associated with the application)				
CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
Montana NRDP	\$ -	\$ 15,000.00	\$ 15,000.00	Y
WestSlope Chapter TU	\$ -	\$ 2,500.00	\$ 2,500.00	N
Trout Unlimited Volunteers	\$ 700.00		\$ 700.00	Y
Landowner	\$ -	\$ 3,500.00	\$ 3,500.00	Y
Montana DEQ	\$ -	\$ 167,000.00	\$ 167,000.00	Y
	\$ -	\$ -	\$ -	
	\$ -	\$ -	\$ -	
TOTALS	\$ 700.00	\$ 188,000.00	\$ 188,700.00	



May 8, 2024

RE: Trout Unlimited's Future Fisheries Grant Funding Request for Flint Creek

Dear Michelle McGree:

Attached is the grant application for the Reach 3 Flint Creek Phase 3A Riparian Habitat Restoration Project. The application describes the budgeting, planning, design, permitting, and construction work required to reclaim approximately 3-acres and 1,400 feet of Flint Creek along Reach 3. Trout Unlimited is committed to providing cost share and securing additional funding if necessary to complete the work proposed in this grant application. This Flint Creek project is a partnership between the private landowners, Trout Unlimited, DEQ, and USFWS.

Please don't hesitate to contact me with questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "Teresa Scanlon".

Teresa Scanlon,
Rock-Flint Project Manager, Trout Unlimited

MONTANA FISH, WILDLIFE & PARKS

Future Fisheries Improvement Program

Appendix: FWP Statement

Project Title: Flint Creek Phase 3A

Please describe the potential impact of the project, including the priorities of the Fisheries Division and the importance to Montana's anglers.

Flint Creek provides significant ecological value. It offers essential spawning habitat for wild brown trout and rainbow trout and a migratory corridor and over-wintering habitat for native westslope cutthroat and bull trout. Evidence from recent Montana FWP studies shows that Flint Creek and its tributaries are a key source of juvenile westslope cutthroat trout recruitment for the Clark Fork River and is also an important spawning migration corridor. The Clark Fork River has a diminished fishery from impacts of past mining and smelting activities as well as other limiting factors. Flint Creek is also a valued recreational fishery with high trout densities that provide high-quality angling opportunities.

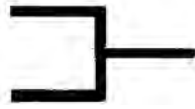
A history of land use practices in the Flint Creek valley including channel modifications, riparian vegetation removal/reduction and sedimentation have adversely affected water quality as well as aquatic and riparian habitat. The proposed restoration project on the Johnson property will address these limiting factors and enhance the ecosystem resiliency of Flint Creek. The proposed project to implement an alternative grazing management plan and to stabilize and revegetate banks and the floodplain should mitigate the adverse impacts of these land use disturbances. This includes reduction of sediment and nutrient loads that impact water quality in Flint Creek.

The Johnson Ranch has also provided fishing access to anglers of Montana on an adjacent property for 20+ years with no compensation. I believe they will also allow limited/controlled access to this portion of Flint Creek after completion of this project, but I have not confirmed this. Thus, the Johnson Ranch has been an excellent partner with MFWP for decades in terms of providing fishing and hunting access (Block Mgmt) and there will likely be significant benefits to the anglers of Montana from supporting this work.

Name of FWP Biologist Brad Liermann Date: 5/14/24

Please attach to the FFIP application and materials and submit according to listed deadlines.

SUPPORT LETTERS



JOHNSON TUNING FORK RANCH
5687 Montana Highway 1
PO Box 9
Hall, MT 59837

May 10, 2024

Montana Fish, Wildlife & Parks Fishery Division
1420 E. Sixth Ave.
P.O. Box 200701
Helena, MT 59620-0701

Re: Trout Unlimited "Flint Creek Phase 3 Habitat Restoration Project"

To the Future Fisheries Improvement Program Review Panel:

My great grandfather, Frank Johnson, homesteaded a tract on Flint Creek in 1876 along a reach near Hall, Montana on which Trout Unlimited proposes a habitat restoration project. Five generations of our family have raised sheep and cattle along Flint Creek and have used the creek for crop irrigation and livestock drinking water. Our family has strived to preserve the banks and bed of the creek through multi-generations, however, the combined effects of flooding, ice scouring and livestock use have increased sedimentation and degraded the stream channel. The Flint Creek corridor provides important fish and wildlife habitat and has allowed for the beneficial uses of creek water for irrigation and stock water.

Flint Creek is important to our ranching operation and to our greater community. As may be attested by the Department of Fish, Wildlife and Parks, our family has traditionally shared the portion of Flint Creek which flows through our ranch with the general public for fishing and hunting as well as overall enjoyment of the natural environment. We routinely receive notes of gratitude from folks from around the world for the opportunity to fish Flint Creek. We believe the streambank stabilization and native vegetation restoration will contribute to the overall improvement of water quality and fish population improvement for the watershed. With it, we will be implementing an alternative grazing management plan for the creek corridor on our property that will protect the project investment and help preserve the water resource for years to come.

As a steering committee member for the local Granite Headwaters Watershed Group, I believe this project aligns with our shared goals of promoting responsible land stewardship and preserving the natural heritage of our community. This project should not only benefit the environment but also contribute to the long-term sustainability of our ranching operations by ensuring clean water and healthy habitats.

We have been working with Trout Unlimited and the Montana Natural Resource Damage Program on planning for this restoration project for several years. We appreciate the effort made

by these entities to involve the landowners and engage the community on this, and other, similar conservation projects.

Our ranch endorses and supports the Flint Creek Phase 3 Habitat Restoration Project. Please consider funding support for this important work. We look forward to the potential to work with you on this project.

Sincerely,
JOHNSON TUNING FORK RANCH



By: Charles R. Johnson, President

May 1st, 2024

Montana Fish, Wildlife, & Parks
Future Fisheries Program
Helena, MT 59601

Dear Future Fisheries Review Committee:

Granite Headwaters Watershed Group (GHWG), an associate committee of the Granite Conservation District (Granite CD), strongly supports Trout Unlimited's proposal to implement the **Flint Creek Phase 3A Habitat Restoration Project**. Our mission is to promote the sustainable use of natural resources in the watershed while protecting the rural character of the area where we live. We think the proposed project aligns with our mission and addresses natural resource improvements that are needed in our watershed.

Our group is comprised of community members and other stakeholders. We have developed relationships and partnered with entities on important projects in the watershed since 2006. Our group authored the state-approved Flint Creek Watershed Restoration Plan in 2014.

The Flint Creek Watershed Restoration Plan identifies Flint Creek streambank erosion as an impairment to water quality. One of the goals in the plan is to "reduce streambank erosion and nutrient loads by restoring and enhancing the riparian zone". Last year, GHWG sent out a residential survey and hosted two public meetings to gather up to date information about natural resource issues and opportunities in our watershed. Again, streambank erosion in lower Flint Creek was identified as a priority concern.

For these reasons, we support TU's Flint Creek Phase 3A Habitat Restoration Project. It is a collaboration between TU and working ranch lands that will restore riparian habitat and eroding stream banks in Flint Creek. This approach will benefit natural resources and the environment and furthermore help achieve one of the goals in the Flint Creek Watershed Restoration Plan. This is the right project in the right place, and we feel that TU has demonstrated they have the "right stuff" to execute it successfully.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael L. Miller", written in a cursive style.

Mike Miller

President, Granite Headwaters Watershed Group



Montana Department of Fish Wildlife & Parks

Future Fisheries Improvement Program

May 9, 2024

Dear Future Fisheries Review Panel,

The WestSlope Chapter of Trout Unlimited would like to express our support of this grant application for the Flint Creek Phase 3 AHabitat Restoration Project that will restore a 1-mile reach of degraded habitat conditions in Flint Creek. Flint Creek is a valuable fishery for our membership that offers good angling opportunities for those seeking to fish within one to two hours from Missoula. It is also an important spawning tributary to the Upper Clark Fork River which is a popular fishing destination for Chapter members.

We support the proposed project that aims to reduce streambank erosion and re-establish a riparian habitat buffer and native vegetation along the stream corridor by reconstructing banks, planting native shrubs, and establishing an alternate grazing management plan with riparian fencing. We know of many projects like the one proposed that have improved fisheries and ecosystem health. We trust Trout Unlimited and the Natural Resource Damage Program to deliver similar outcomes and, as a result of this project, improve degraded water quality and habitat conditions in Flint Creek. In the long-term, these improvements will benefit fisheries and wildlife populations throughout the area, including the Clark Fork River downstream.

We look forward to partnering with Trout Unlimited to engage anglers and other members in this stream restoration project. We will help coordinate volunteers to plant willows and other native shrubs for the project in Flint Creek.

Thank you for your consideration to fund this project and accepting this letter that expresses our support.

Sincerely

Brandon Dwyer

President, WestSlope Chapter of Trout Unlimited

STATE OF MONTANA, NATURAL RESOURCE DAMAGE PROGRAM



May 10, 2024

Re: Letter of Support for Trout Unlimited (TU) Proposal titled: **“Flint Creek Phase 3 Habitat Restoration Project”** Future Fisheries Improvement Project with Department of Fish Wildlife & Parks

Dear Future Fisheries Grant Program Review Committee:

This letter is written to affirm our partnership in and support to the **“Flint Creek Phase 3 Habitat Restoration Project”** application submitted to Montana FWP Future Fisheries Grant Program by Trout Unlimited. The Montana Natural Resource Damage Program (NRDP) is a project partner and contributing funds to the design of this project.

Aquatic and riparian resources of the Upper Clark Fork River Basin (UCFRB) have been injured by hazardous substances, released from mining and mineral-processing operations in the Butte and Anaconda areas. In 1983, the State of Montana (State) filed a lawsuit against the Atlantic Richfield Co. for injuries to the State’s natural resources in the Upper Clark Fork River Basin. The State settled this lawsuit which established the UCFRB Restoration Fund. The UCFRB Restoration Fund is State of Montana money administered by the NRDP and must be used to restore, rehabilitate, replace, or acquire the equivalent of the injured natural resources.

The UCFRB Aquatic and Terrestrial Resources Restoration Plans (Restoration Plans) list Flint Creek as a priority tributary for habitat restoration. Projects such as the Flint Creek Phase 3 Restoration Project will help meet the goals of the Restoration Plans by improving habitat for species such as Bull Trout, Westslope Cutthroat Trout, and Brown Trout and help increase trout recruitment to the mainstem Clark Fork River.

NRDP is excited to support TU’s application by participating in the design of this project. Together, NRDP and TU are pursuing this and other habitat restoration and fish passage projects with private landowners in partnership with Montana Fish, Wildlife, and Parks and other partners in Flint Creek. This collaborative approach is restoring fragmented native fish habitats, improving water quality in a popular recreational fishery, and recruiting fish to a highly impaired reach of the Clark Fork River.

NRDP believes that our support and commitment to the proposed project will significantly increase the success of the project, including improved water quality and enhanced ecosystem resiliency for long-term benefits to fish and wildlife in the UCFRB.

STATE OF MONTANA, NATURAL RESOURCE DAMAGE PROGRAM



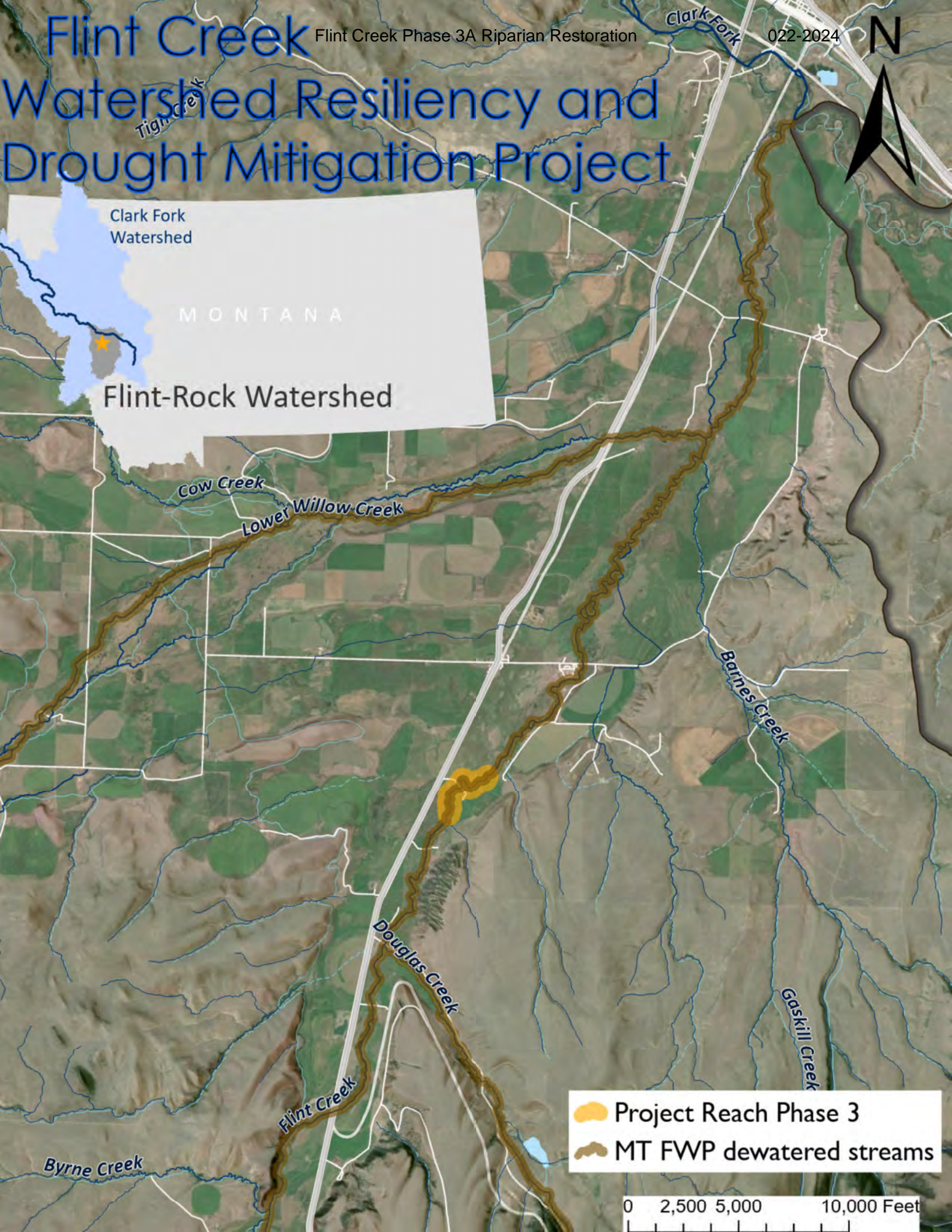
Thank you for considering TU's application. NRDP agrees to the submittal and content of the application. Please do not hesitate to contact me if you have questions or need additional information. We look forward to working with TU to ensure the success of this project and to continue to facilitate water quality and habitat improvement opportunities in the UCFRB.

Sincerely,

A handwritten signature in blue ink that reads 'Douglas D. Mark'.

Acting NRDP Manager
Natural Resource Damage Program

PROJECT MAP



Flint Creek

Flint Creek Phase 3A Riparian Restoration

Clark Fork

022-2024

N

Watershed Resiliency and Drought Mitigation Project

Clark Fork Watershed

MONTANA

Flint-Rock Watershed

Cow Creek

Lower Willow Creek



Barnes Creek

Douglas Creek

Gaskill Creek

Flint Creek

Byrne Creek

-  Project Reach Phase 3
-  MT FWP dewatered streams

0 2,500 5,000 10,000 Feet

**PLANNING
DOCUMENTS
AND RELEVANT
ASSESSMENT**

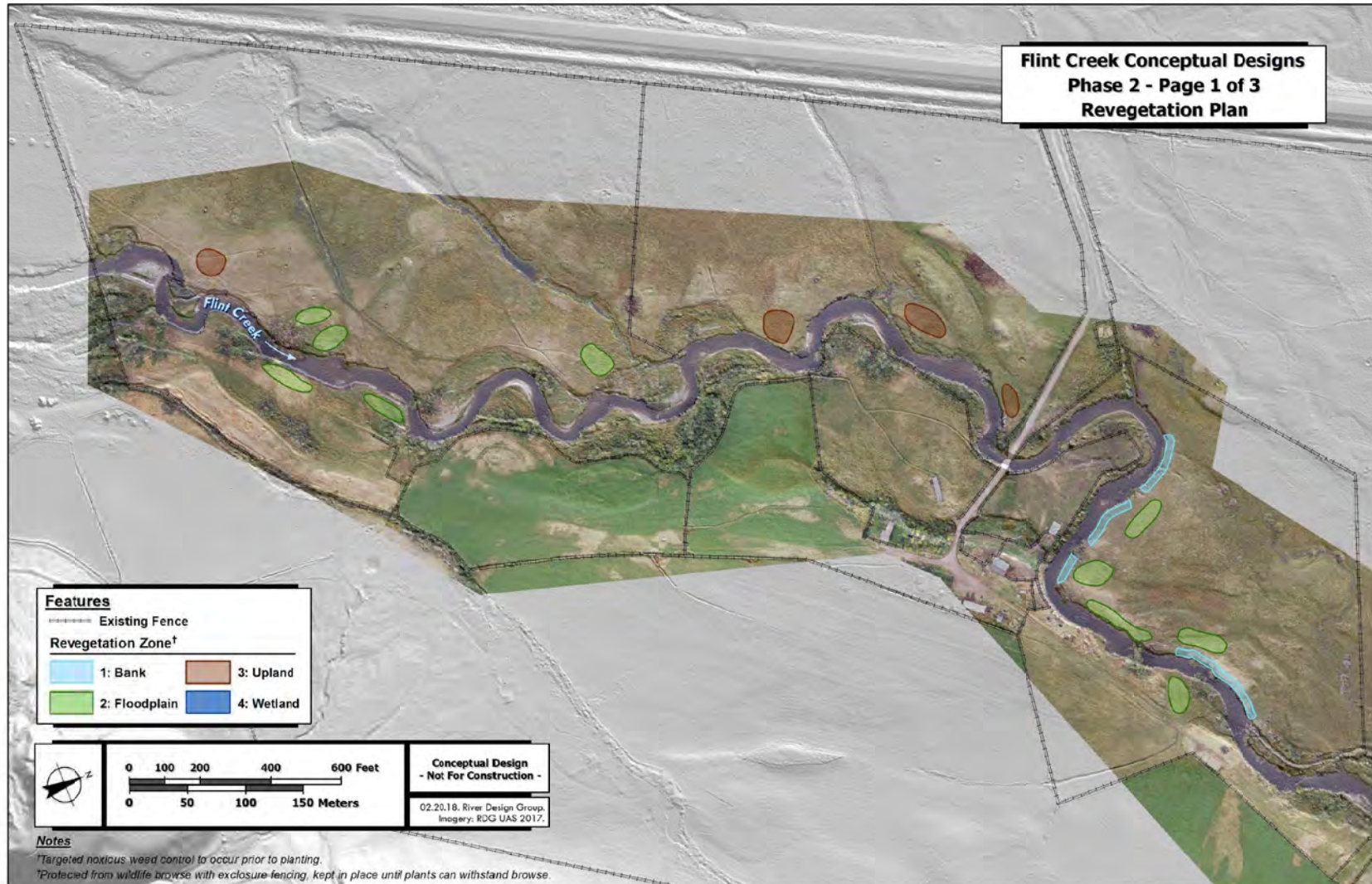
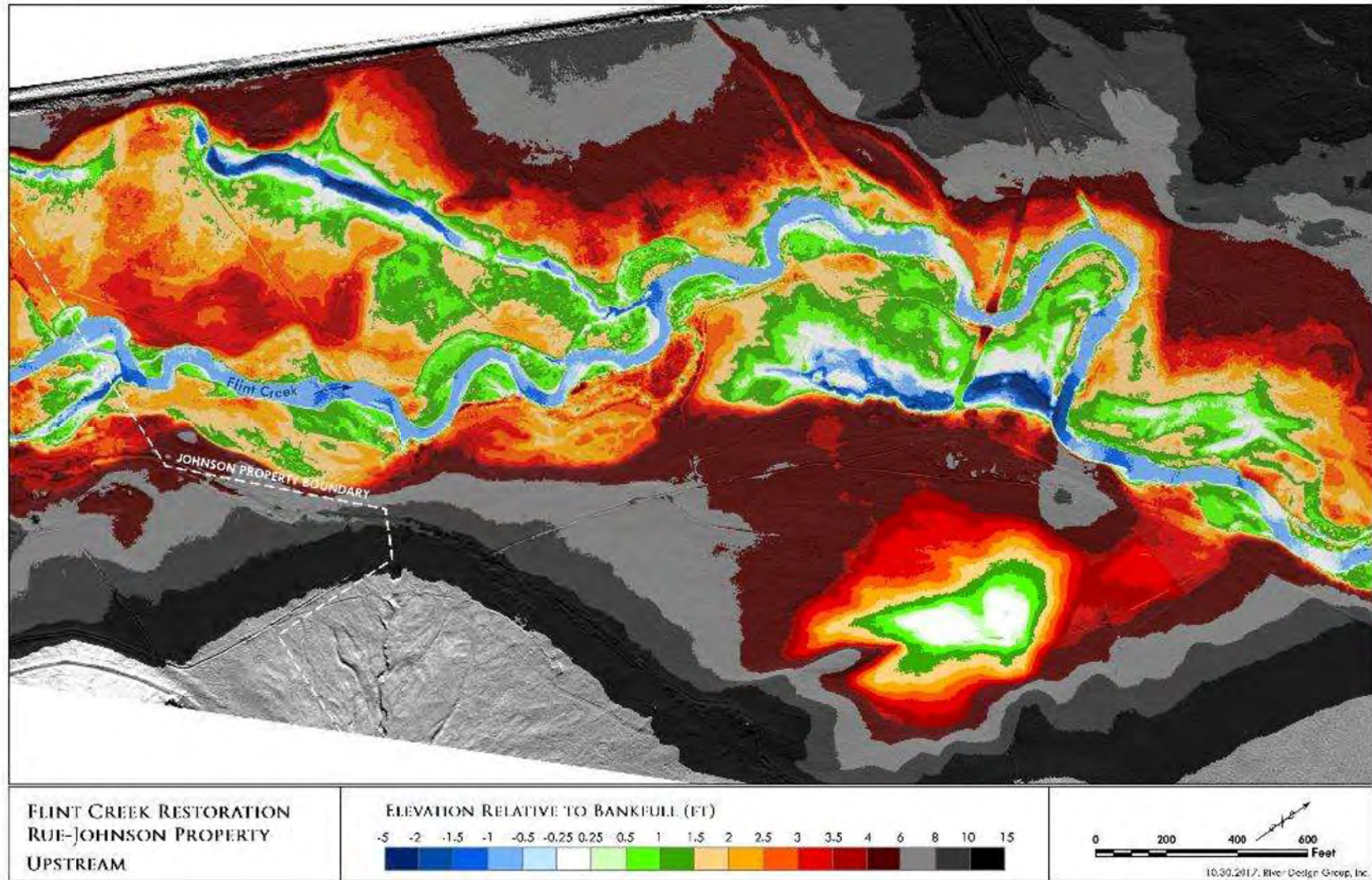
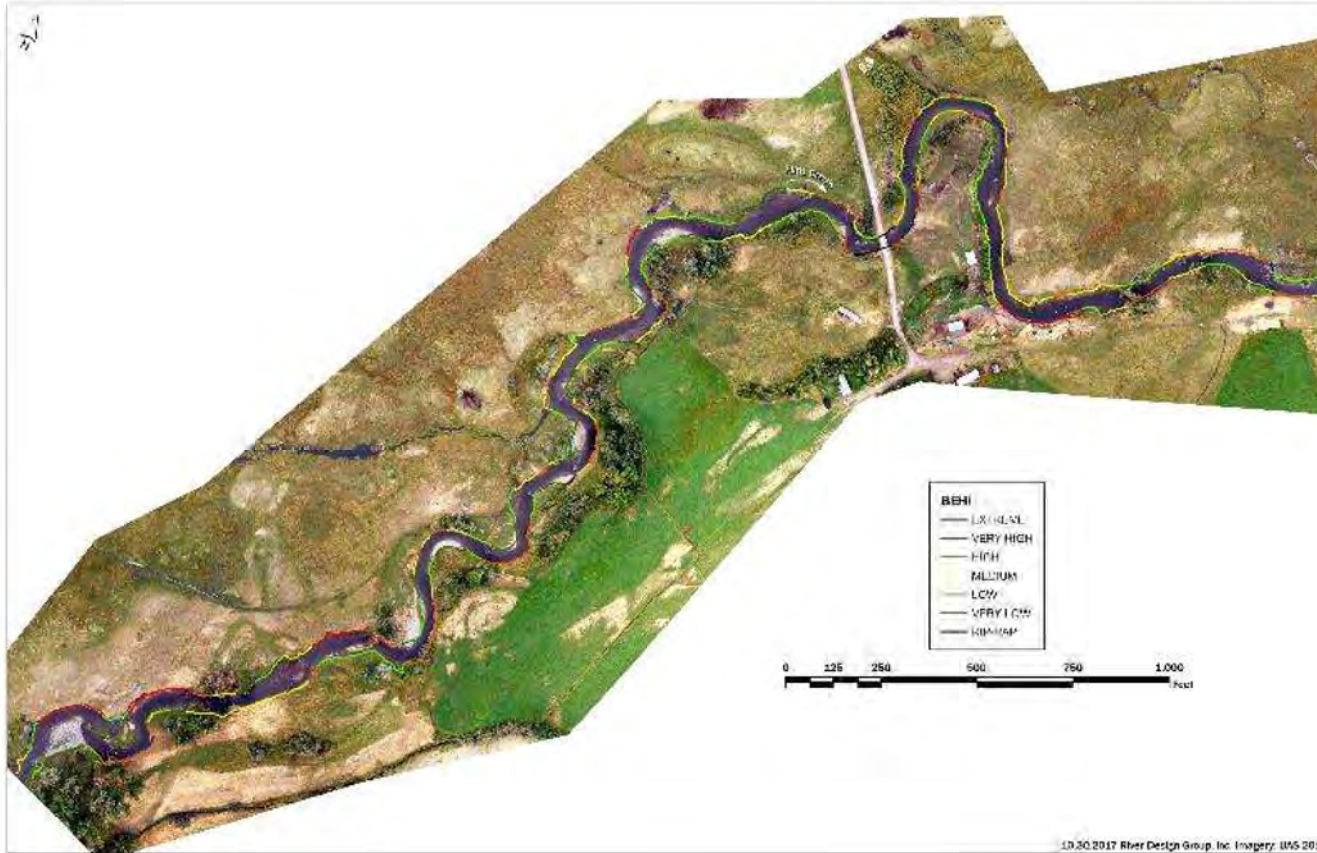


Figure 5. Conceptual revegetation plan for the lower Flint Creek project area.

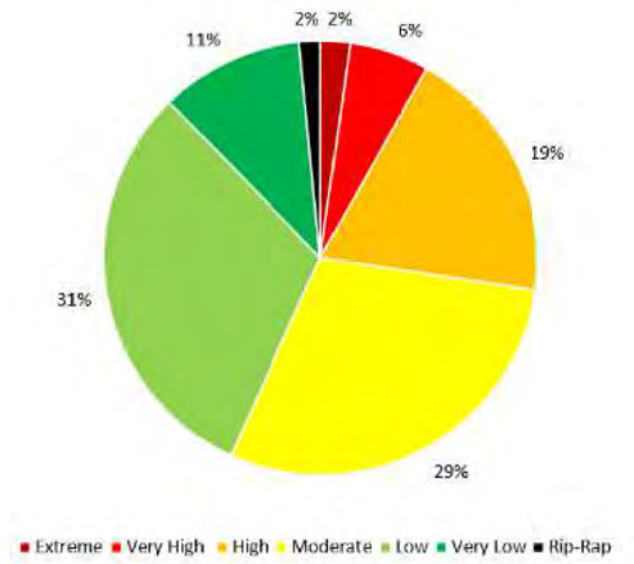
Relative Elevation Model



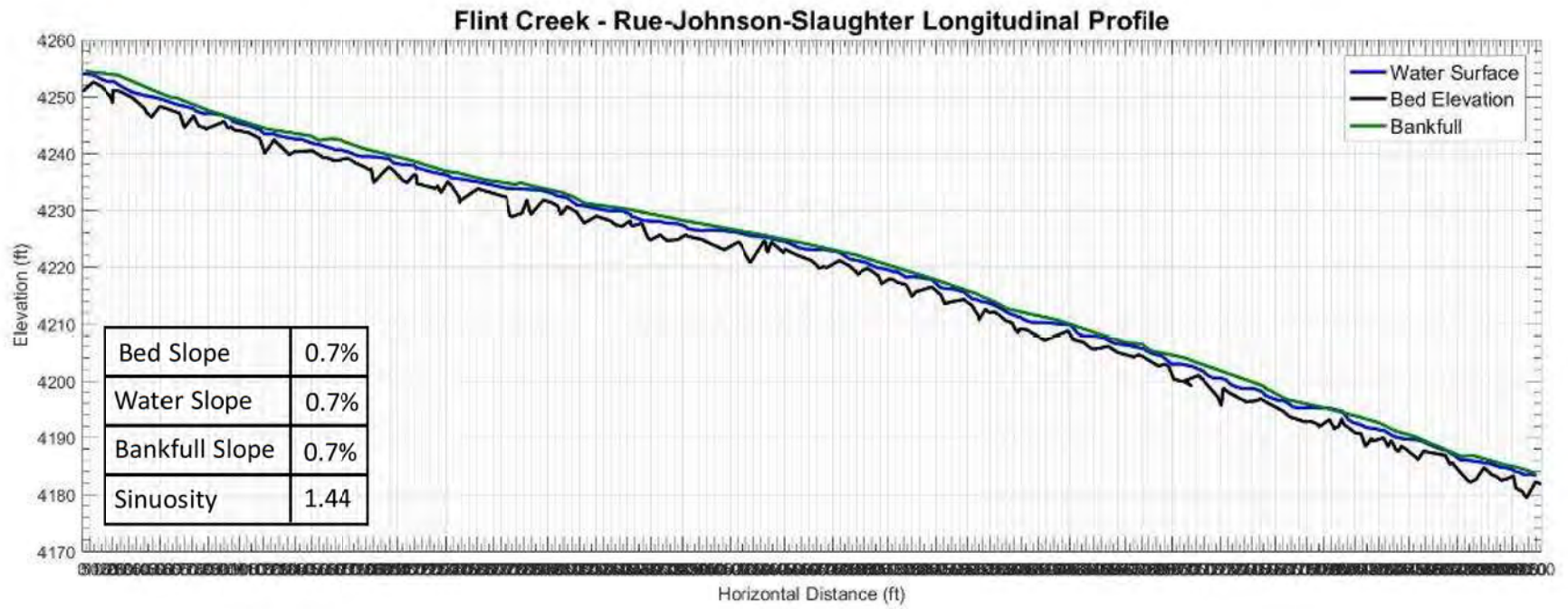
BEHI & Long Pro



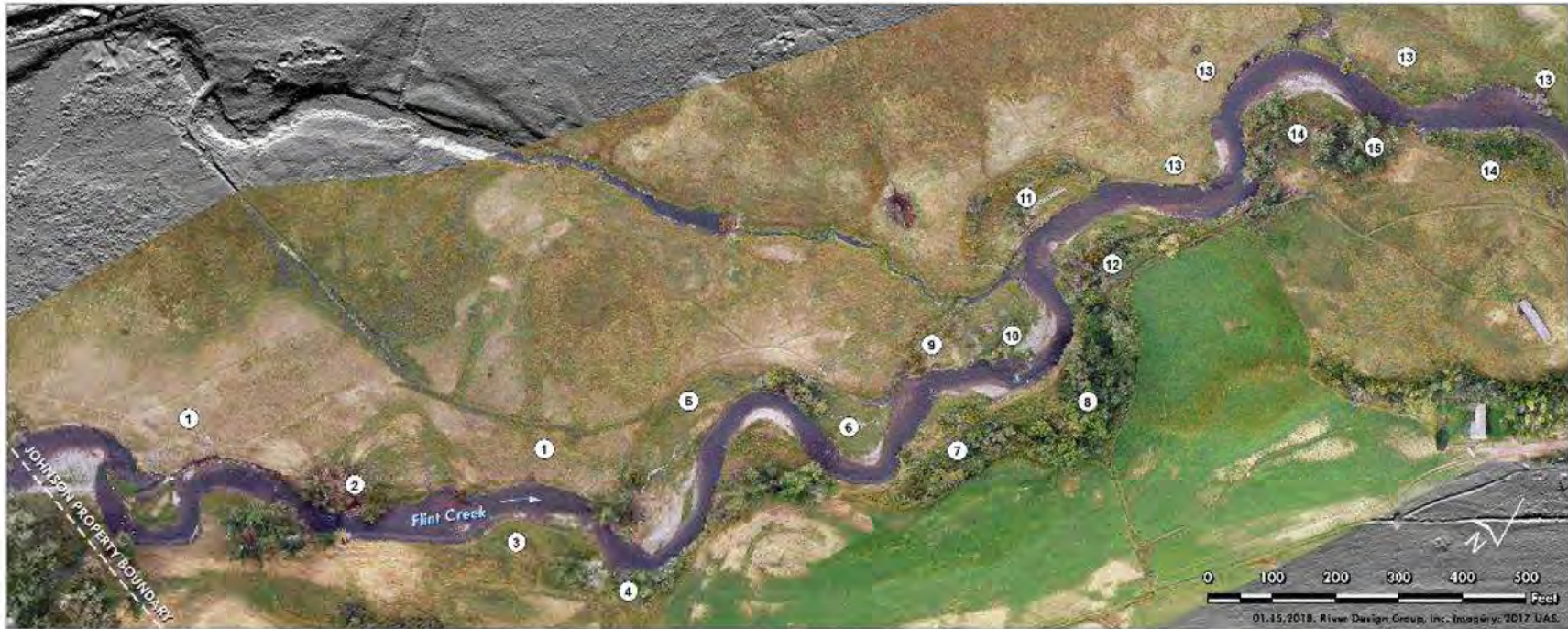
Flint Creek Rue Johnson Upper Site



Long Pro & BEHI



Vegetation Mapping (Rue Johnson)



**FLINT CREEK RESTORATION - JOHNSON PROPERTY
RIPARIAN VEGETATION ASSESSMENT**

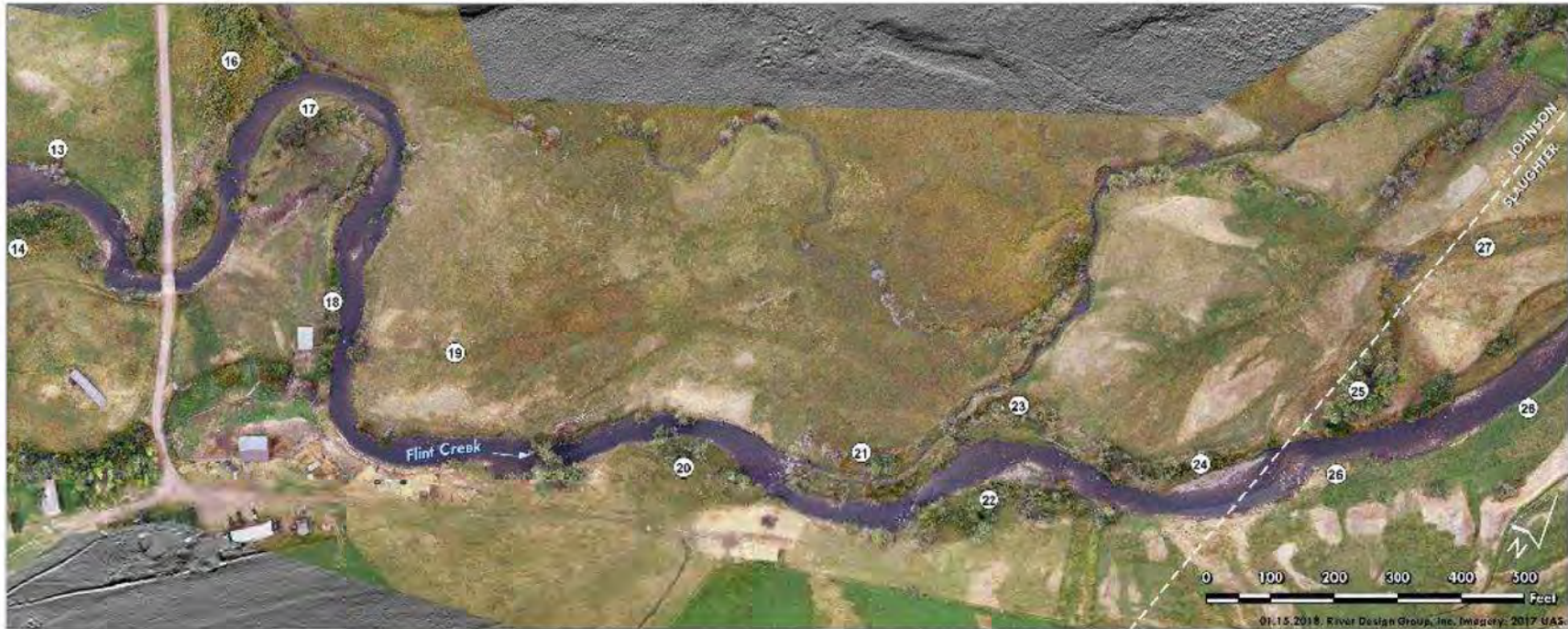
Vegetation Overview

The Flint Creek riparian corridor through the Johnson, Slaughter, and Rue properties is characterized by cattle grazing impacts. While the upstream Johnson and Slaughter ownerships exhibit higher banks and less woody vegetation on streambanks in general than the downstream property, some low elevation areas contain a diverse canopy of native riparian vegetation.

The Rue property riparian landscape exhibits woody and herbaceous vegetation communities consistent of a connected stream and floodplain environment. Multiple species of willow, along with dogwood, cottonwood, aspen, and river birch are common overstory components. High grazing impacts, however, limit seedling and sapling survival, resulting in an even age class distribution skewed toward older individuals.

Number	Description
1	High eroding bank; cattle grazed. Dominated by pasture grasses, Rocky Mountain iris, Canada thistle.
2	Sandbar willow regeneration (5-7 ft. tall), protected from browse with fence and a cottonwood, alder and dogwood thicket.
3	Good floodplain elevation, browsed sedges and rushes.
4	Cottonwood and willow stand in connected floodplain location.
5	Abandoned channel location, dominated by sedge, standing water at time of assessment.
6	Great floodplain elevation, dominant species include sedge, Baltic rush, sandbar willow, cottonwood seedlings. Cattle browse is evident.
7	Thicket of multiple species of willow, browsed on periphery.
8	Mature and healthy cottonwood gallery.
9	Decadent willow stand, Canada thistle in understory.
10	Sandbar willow regeneration, all saplings are browsed. Some alder, and a Canada thistle monoculture on high elevation location.
11	Old meander location with cattail and sedge in understory of decadent willow stand; cottonwood on high spot in interior of meander.
12	Sandbar willow and cottonwood.
13	High streambanks with few and sparse decadent willow and alder. Mostly grazed pasture grasses, Canada thistle, Rocky Mountain iris, tansy, clover. Some grazed sedges in low-lying areas.
14	Mature but browsed thicket of willow, rose, dogwood, alder. Browse is especially severe on willow saplings and vegetation on streambank.

Vegetation Mapping (Rue Johnson)



**FLINT CREEK RESTORATION - JOHNSON/SLAUGHTER PROPERTIES
RIPARIAN VEGETATION ASSESSMENT**

Vegetation Overview

The Flint Creek riparian corridor through the Johnson, Slaughter, and Rue properties is characterized by cattle grazing impacts. While the upstream Johnson and Slaughter ownerships exhibit higher banks and less woody vegetation on streambanks in general than the downstream property, some low elevation areas contain a diverse canopy of native riparian vegetation.

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Number	Description
13	High streambanks with few and sparse deciduous willow and alder. Mostly grazed pasture grasses, Canada thistle, Rocky Mountain iris, tansy, clover. Some grazed sedges in low-lying areas.
14	Mature but browsed thicket of willow, rose, dogwood, alder. Rose is especially dense on willow saplings and vegetation on streambank.
15	Mature cottonwood stand on high elevation location between riparian shrub thickets.
16	Willow stand in great condition, diverse age class represented by 8-16 ft. tall snags.
17	Browsed sedge and sandbar willow saplings on low elevation on inside meander bend; Thicket of bebb and sandbar willow, rose, black currant on interior of meander bend.
18	Large rose, currant and willow shrubs on bank without cattle access.
19	Pasture land, grazed up to streambanks with few and scattered decadent willow individuals.
20	Scattered cottonwood trees, mature individuals and no regeneration. Grazed pasture grasses in understorey.
21	Wetland swale, standing water in areas, with sedges, multiple willow species, and alder.
22	Willow stand in good condition mostly 10-20 ft tall sandbar willow; some bebb willow.
23	Well developed scrub shrub wetland community, elevations are at bankfull.
24	Willow and dogwood community. Willow is mostly sandbar. Grazed on edges of thicket.
25	Mature forested community: Overstorey of cottonwood, with elder, willow, and young cottonwood in understorey.
26	Grazed pasture grasses and Canada thistle.
27	Old meander location, likely is activated at high flows. Dominated by sedges and rushes, and the occasional willow.

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

Environmental Services Contract #SPB-12-2177V

Task Order 1.28



Prepared for
Natural Resource Damage Program
Montana Department of Justice
1301 East Lockey
Helena, MT 59620

Prepared by
Watershed Consulting, LLC
P.O. Box 17287
Missoula, MT 59808

with

Great West Engineering, Inc.
2501 Belt view Drive
Helena, MT 59604



Figure 1. Project Area

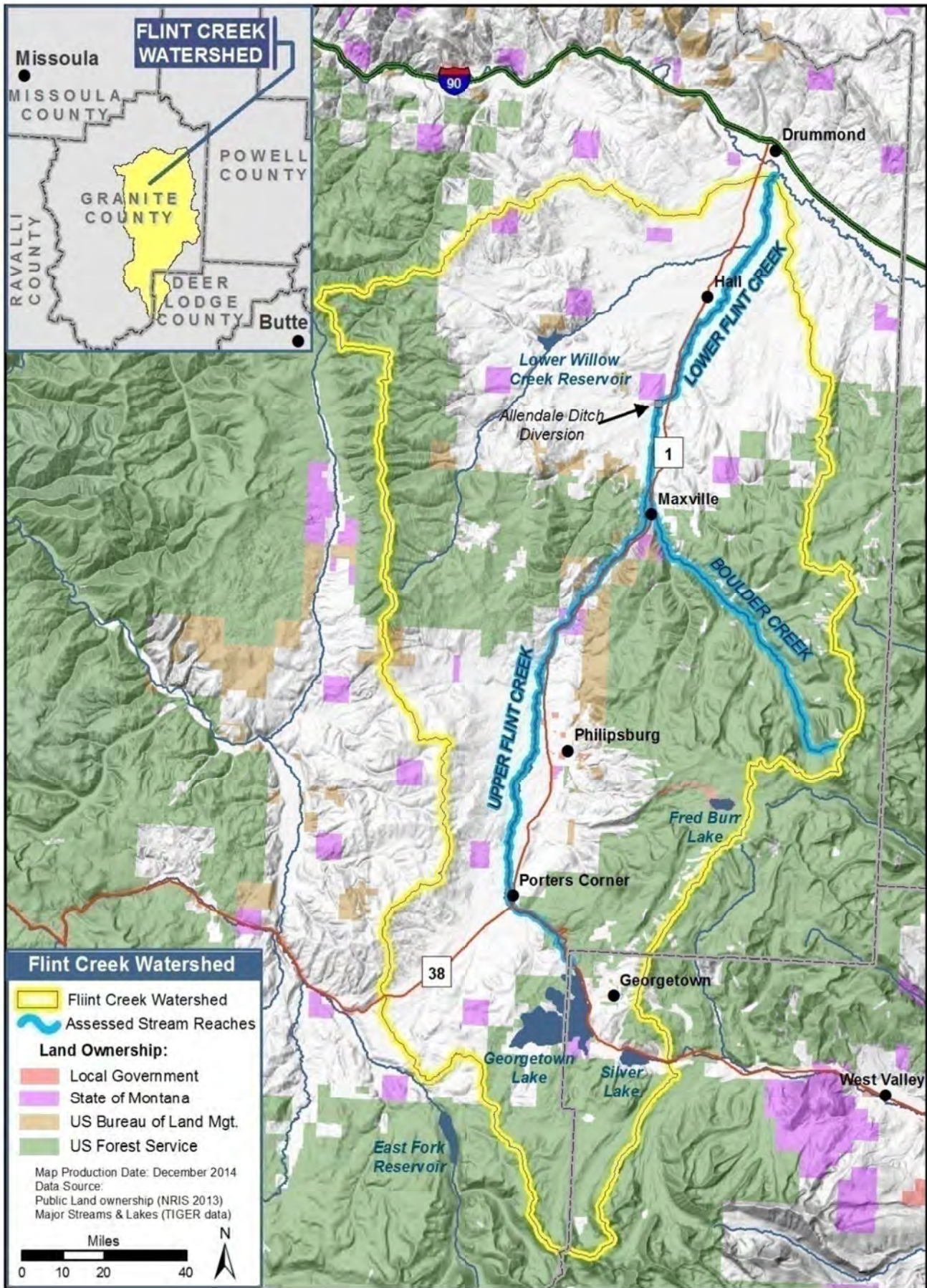
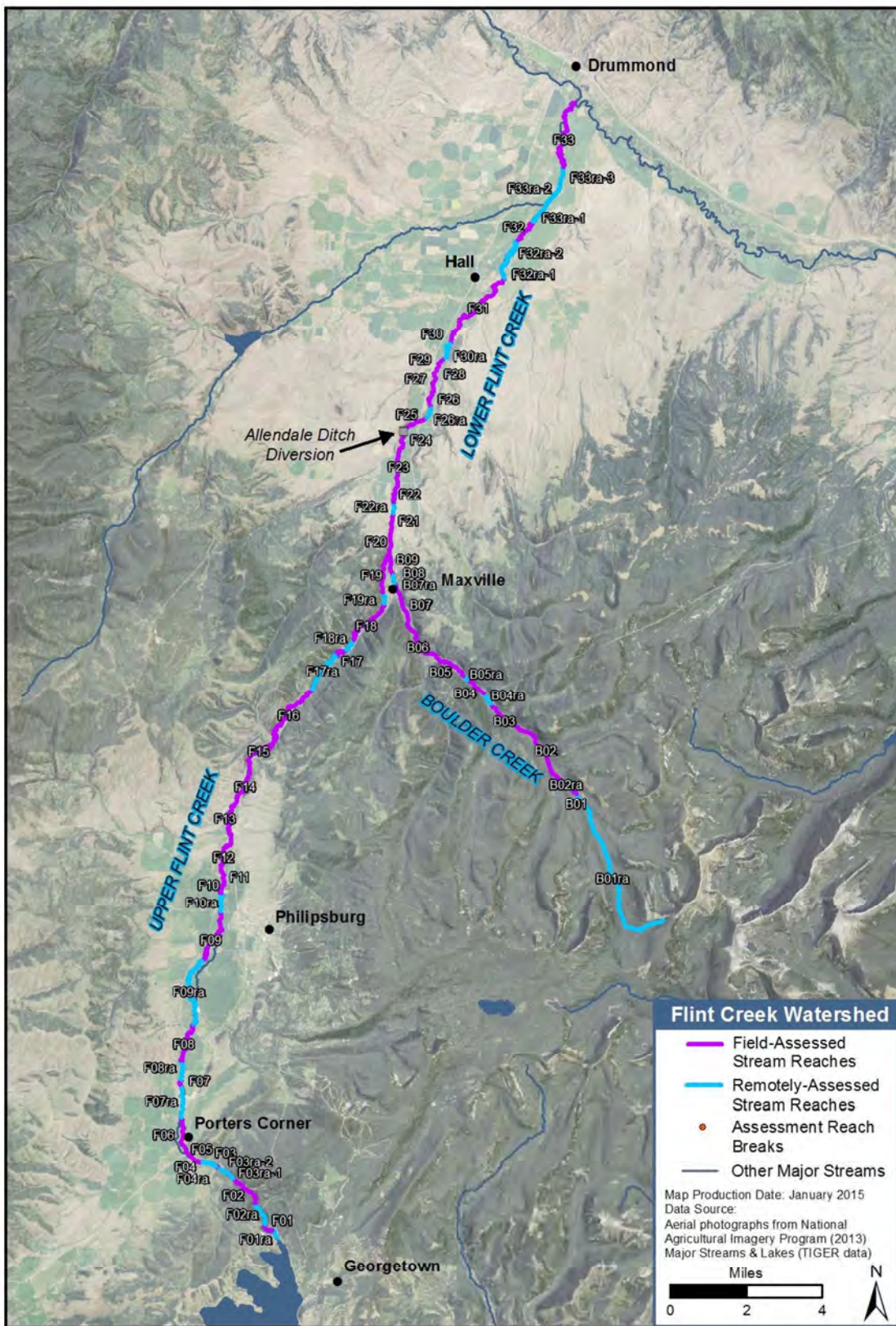


Figure 2. Remote and field assessed subreaches



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

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		

ENGINEERS COST ESTIMATE

Preliminary Construction Cost Estimate

Flint Creek Phase 3A

5/9/2024

	Construction Cost Items	Quantity	Units	Unit Cost	Cost
1	Mobilization	1	Lump Sum	\$ 16,000	\$ 16,000
2	Work Area Access	1	Lump Sum	\$ 10,000	\$ 10,000
3	Temporary Bypass Channel	1	Lump Sum	\$ 15,000	\$ 15,000
4	Furnish Cobble for Riffles and Streambanks	200	Cubic Yards	\$ 50	\$ 10,000
5	Earthwork	400	Cubic Yards	\$ 10	\$ 4,000
6	Salvage Alluvium from Existing Channel	400	Cubic Yards	\$ 8	\$ 3,200
7	Riffle Construction	400	Linear Feet	\$ 30	\$ 12,000
8	Sod Salvage and Transplant	1,000	Square Feet	\$ 2	\$ 2,000
9	Install Vegetated Wood Matrix Type 1 Structures	900	Linear Feet	\$ 30	\$ 27,000
10	Install Vegetated Wood Matrix Type 2 Structures	500	Linear Feet	\$ 40	\$ 20,000
11	Install Willow Trenches	350	Linear Feet	\$ 10	\$ 3,500
12	Install Floodplain Roughness	0.25	Acres	\$ 3,000	\$ 750
13	Livestock Fencing	5,100	Linear Feet	\$ 7	\$ 35,700
14	Planting	500	Lump Sum	\$ 25	\$ 12,500
			CONSTRUCTION SUBTOTAL		\$ 171,650
	Owner Supplied Wood	1	Lump Sum	20,000	\$ 20,000
	Owner Supplied Willow Cuttings	8,750	Each	2	\$ 17,500
	Owner Supplied Containerized Plants	500	Each	20	\$ 10,000
			OWNER SUPPLIED ITEMS SUBTOTAL		\$ 47,500
				20% Contingency	\$ 43,830
			GRAND TOTAL		\$ 262,980

EXISTING CONDITIONS PHOTOS









North East Elevation

☉ 231°SW (T) ● 46.569814, -113.202417 ±4 m ▲ 1278 m



03 Oct 2023, 2:01:01 PM



South East Elevation

☼ 330°NW (T) ● 46.569913, -113.199945 ±11 m ▲ 1275 m



03 Oct 2023, 1:58:04 PM

West Elevation

☀ 87°E (T) ● 46.570419, -113.201896 ±4m ▲ 1277m



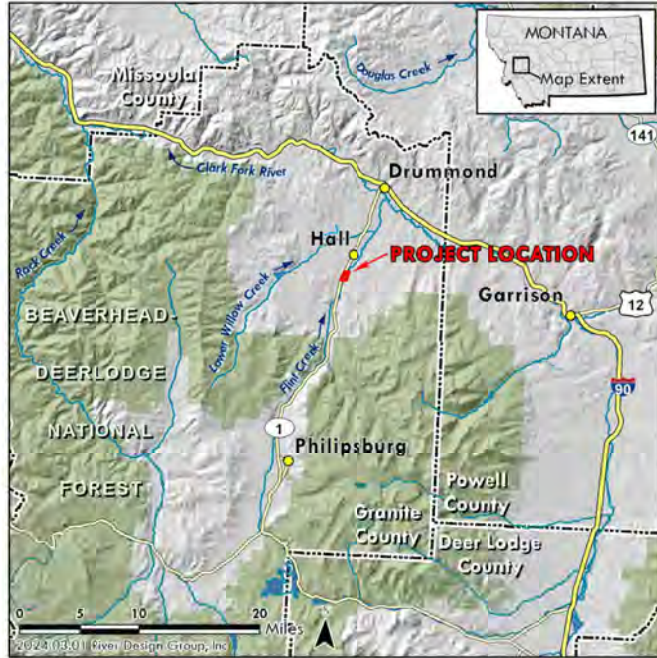
20 Mar 2024, 12:30:05 PM

ENGINEERING DESIGN PLANS

FLINT CREEK PHASE 3 RESTORATION PROJECT

PRELIMINARY DESIGN PLAN SET

FLINT CREEK PHASE 3 VICINITY MAP



LEGAL DESCRIPTION:
S02, S03, S10, AND S35, T 09 N, R 13 W, GRANITE COUNTY, MONTANA

PROJECT PARTNERS



PROJECT DESCRIPTION

THE STATE OF MONTANA NATURAL RESOURCE DAMAGE PROGRAM HAS IDENTIFIED THE FLINT CREEK WATERSHED AS A PRIORITY AREA FOR RESTORATION. THE UPDATED UPPER CLARK FORK RIVER BASIN AQUATIC AND TERRESTRIAL RESOURCES PLAN (NRDP 2019) OUTLINES KEY OBJECTIVES FOR LOWER FLINT CREEK RELATED TO INSTREAM FLOW, FISH PASSAGE AND RIPARIAN HABITAT. IN ADDITION, FLINT CREEK IS LISTED AS IMPAIRED FOR METALS AND SEDIMENT UNDER SECTION 303(D) OF THE CLEAN WATER ACT.

IN 2018, CONCEPTUAL DESIGNS WERE DEVELOPED FOR THREE MILES OF FLINT CREEK ON THE CORBETT, RUE, SLAUGHTER AND JOHNSON PROPERTIES IN THE LOWER FLINT CREEK VALLEY UPSTREAM OF HALL, MT. IN 2024, CONCEPTUAL DESIGNS WERE DEVELOPED FOR AN ADDITIONAL MILE OF FLINT CREEK ON THE CONN PROPERTY LOCATED UPSTREAM. IN SPRING 2021, THE PHASE 1 RESTORATION PROJECT WAS IMPLEMENTED ON THE CORBETT PROPERTY. IN FALL 2023, THE PHASE 2 RESTORATION PROJECT WAS IMPLEMENTED ON THE RUE AND SLAUGHTER PROPERTIES.

THE PURPOSE OF THE PHASE 3 PROJECT IS TO IMPROVE STREAM AND FLOODPLAIN FUNCTION FOR A TWO-MILE REACH OF FLINT CREEK BY IMPLEMENTING RESTORATION STRATEGIES FOR STREAMBANK RESTORATION, MEANDER REACTIVATION, SIDE CHANNEL CONSTRUCTION AND REVEGETATION. GRAZING MANAGEMENT STRATEGIES ARE BEING PURSUED SEPARATELY BETWEEN TROUT UNLIMITED AND THE LANDOWNERS.

DRAWING INDEX

1.0 COVER PAGE	5.3 PHASE 3A CROSS SECTIONS	7.0 PHASE 3C RESTORATION PLAN	8.1 PHASE 3D PLAN AND PROFILE	9.0 VEGETATED WOOD MATRIX DETAIL
1.1 GENERAL NOTES	5.4 PHASE 3A WORK ISOLATION DETAILS 1	7.1 PHASE 3C PLAN AND PROFILE	8.2 PHASE 3D GRADING PLAN 1	9.1 WILLOW TRENCH DETAIL
2.0 EXISTING CONDITIONS	5.5 PHASE 3A WORK ISOLATION DETAILS 2	7.2 PHASE 3C GRADING PLAN 1	8.3 PHASE 3D CROSS SECTIONS 1	9.2 FLOODPLAIN ROUGHNESS AND WILLOW TRENCH DETAIL
3.0 PHASING PLAN	6.0 PHASE 3B RESTORATION PLAN	7.3 PHASE 3C CROSS SECTIONS 1	8.4 PHASE 3D GRADING PLAN 2	9.3 ENGINEERED RIFFLE DETAIL
4.0 ACCESS, STAGING, AND SURVEY CONTROL	6.1 PHASE 3B PLAN AND PROFILE	7.4 PHASE 3C GRADING PLAN 2	8.5 PHASE 3D CROSS SECTIONS 2	9.4 TYPICAL CHANNEL CROSS SECTIONS
4.1 WETLANDS AND VEGETATION PRESERVATION	6.2 PHASE 3B GRADING PLAN 1	7.5 PHASE 3C CROSS SECTIONS 2	8.6 PHASE 3D WORK ISOLATION DETAILS 1	
4.2 WORK AREA ISOLATION PLAN	6.3 PHASE 3B CROSS SECTIONS 1	7.6 PHASE 3C GRADING PLAN 3	8.7 PHASE 3D WORK ISOLATION DETAILS 2	
5.0 PHASE 3A RESTORATION PLAN	6.4 PHASE 3B GRADING PLAN 2	7.7 PHASE 3C CROSS SECTIONS 3	8.8 PHASE 3D WORK ISOLATION DETAILS 3	
5.1 PHASE 3A PLAN AND PROFILE	6.5 PHASE 3B CROSS SECTIONS 2	7.8 PHASE 3C WORK ISOLATION DETAILS 1	8.9 PHASE 3D WORK ISOLATION DETAILS 4	
5.2 PHASE 3A GRADING PLAN	6.6 PHASE 3B WORK ISOLATION DETAILS 1	7.7 PHASE 3C WORK ISOLATION DETAILS 2	8.10 PHASE 3D WORK ISOLATION DETAILS 5	
	6.7 PHASE 3B WORK ISOLATION DETAILS 2	8.0 PHASE 3D RESTORATION PLAN	8.11 PHASE 3D WORK ISOLATION DETAILS 6	

NOT FOR CONSTRUCTION



COVER PAGE
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

PROJECT NUMBER
RDG-23-229
DRAWING NUMBER
1.0
Drawing 1 of 48

M:\Projects\2023\RDG-23-229-Flint-Creek-Phase-3\CAD\Flint-Creek-Phase-3\CAD\Flint-Creek-Phase-3\Cover and Details.dwg May 10, 2024

REUSE OF DRAWINGS

THESE DRAWINGS, THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, ARE THE PROPERTY OF RIVER DESIGN GROUP, INC. (RDG) AND ARE NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF RDG. LIKEWISE, THESE DRAWINGS MAY NOT BE ALTERED OR MODIFIED WITHOUT AUTHORIZATION OF RDG. DRAWING DUPLICATION IS ALLOWED IF THE ORIGINAL CONTENT IS NOT MODIFIED.

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS IN THE FIELD PRIOR TO CONSTRUCTION. IF NECESSARY, ADJUSTMENTS TO THE DRAWINGS WILL BE MADE AS DIRECTED BY THE ENGINEER.
2. TOPOGRAPHY SHOWN ON THE DRAWINGS IS BASED ON MERGED LIDAR AND BATHYMETRIC SURVEY DATA. BATHYMETRIC SURVEY WORK PERFORMED IN OCTOBER 2023 AND ~~2024~~ BY RDG USING SURVEY GRADE GPS. AERIAL LIDAR DATA WERE COLLECTED IN OCTOBER 2016 BY THE US ARMY CORPS OF ENGINEERS.
3. UTILITIES IDENTIFIED ON THE DRAWINGS ARE APPROXIMATE AND DO NOT REPRESENT ABSOLUTE HORIZONTAL AND VERTICAL LOCATIONS. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE UTILITY LOCATE SERVICE PRIOR TO CONSTRUCTION TO IDENTIFY UTILITY LOCATIONS.
4. THE OWNER WILL PROVIDE COPIES OF APPLICABLE PERMITS REQUIRED TO PERFORM THE WORK PRIOR TO THE START OF CONSTRUCTION.
5. THE CONTRACTOR SHALL COMPLY WITH ALL SAFETY REQUIREMENTS DESCRIBED IN THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL PROTECT ALL TREES AND LAND AREAS NOT LOCATED WITHIN THE PROJECT CONSTRUCTION, STAGING OR CONSTRUCTION LIMITS. EXERCISE CARE IN AREAS NOT MARKED TO AVOID DAMAGE TO EXISTING VEGETATION.
7. THE ENGINEER WILL PROVIDE SURVEY CONTROL AND GRADING SURFACES FOR EQUIPMENT WITH GPS MACHINE CONTROL CAPABILITY. THE CONTRACTOR SHALL PROVIDE SURVEY STAKING AND LAYOUT FOR CONSTRUCTION.
8. VERTICAL TOLERANCE FOR CONSTRUCTION COMPLIANCE WILL BE 0.3 FEET. HORIZONTAL TOLERANCE WILL BE 1.0 FEET.
9. THE CONTRACTOR SHALL CONFIRM QUANTITIES SHOWN ON THE DRAWINGS AND FOR OWNER-SUPPLIED MATERIALS.
10. EARTHWORK QUANTITIES REPORTED ON THE DRAWINGS ARE NEAT LINE QUANTITIES CALCULATED FROM THE DIFFERENCE BETWEEN THE FINISHED GROUND SURFACE AND EXISTING GROUND SURFACE.
11. THE VOLUME OF MATERIAL REQUIRED FOR FILL SURFACES MAY VARY DEPENDING ON COMPACTION AND MOISTURE CONTENT.
12. EARTHWORK QUANTITIES DO NOT INCLUDE SUBGRADE EXCAVATION QUANTITIES UNLESS NOTED OTHERWISE.
13. SLOPES DESIGNATED AS 2:1, 1.5:1, ETC., ARE THE RATIOS OF HORIZONTAL DISTANCE TO VERTICAL DISTANCE.
14. DIMENSIONS ARE GIVEN IN FEET AND TENTHS OF A FOOT.
15. EXCAVATION, TRENCHING, SHORING, AND SHIELDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK, THESE DRAWINGS ARE NOT INTENDED TO PROVIDE MEANS OR METHODS OF CONSTRUCTION.

STANDARD OF PRACTICE

PERFORMANCE EXPECTATIONS AND INDUSTRY STANDARDS FOR THE DESIGN OF RESTORATION PROJECTS VARY DEPENDING ON PROJECT GOALS AND THE CONSEQUENCES OF PROJECT FAILURE. BECAUSE RIVERS ARE NATURALLY DYNAMIC SYSTEMS, EXPECTATIONS FOR PROJECT STABILITY CAN BE EXPRESSED IN THE CONTEXT OF DYNAMIC EQUILIBRIUM, WHEREBY PROJECT ELEMENTS AND RESTORATION TREATMENTS ARE EXPECTED TO REMAIN QUASI-STABLE, BUT CHANGE IN AN ECOLOGICALLY BENEFICIAL MANNER AS A RESULT OF DESIRED DISTURBANCES FROM NATURAL RIVER PROCESSES. WHEN PROJECTS ARE BUILT PRIMARILY FOR HABITAT, STABILITY DESIGN CRITERIA ARE SELECTED TO MAXIMIZE DYNAMIC EQUILIBRIUM AND ALLOW FOR NATURAL RIVER PROCESSES TO OCCUR (TYPICALLY A 25-YEAR FLOW/ 4 PERCENT EXCEEDANCE EVENT OR LESS). WHEN PROJECTS HAVE THE POTENTIAL TO CAUSE DAMAGE OR JEOPARDIZE PUBLIC SAFETY DUE TO FAILURE, STABILITY DESIGN CRITERIA ARE SELECTED TO REDUCE THE RISK OF FAILURE (TYPICALLY A 100-YEAR FLOW/ 1 PERCENT EXCEEDANCE EVENT, OR GREATER). FOR THIS PROJECT, THE 25-YEAR FLOW HAS BEEN SELECTED FOR STABILITY DESIGN CRITERIA.

GENERAL SYMBOLS

- SITE ACCESS TAG
- MATERIAL ITEM TAG
- WATER ELEVATION
- SURVEY CONTROL POINT
- SLOPE
- CHANNEL FLOW DIRECTION
- EXISTING CONTOUR LABEL
- PROPOSED CONTOUR LABEL
- EXISTING ALIGNMENT
- PROPOSED ALIGNMENT
- GRADING EXTENTS
- CADASTRAL PROPERTY LINE
- IMPROVED ACCESS ROAD
- UNIMPROVED ACCESS ROAD
- STAGING AREA
- REPOSITORY
- EMERGENT WETLAND
- SCRUB-SHRUB WETLAND
- FORESTED WETLAND

ABBREVIATIONS

APPROX	APPROXIMATE
BKF	BANKFULL
CFS	CUBIC FEET PER SECOND
CH	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CY	CUBIC YARDS
DBH	DIAMETER AT BREST HEIGHT
DEG	DEGREE
DIA	DIAMETER
E	EASTING
EA	EACH
EL	ELEVATION
ELEV.	ELEVATION
EXTG	EXISTING
GRAD.	GRADATION
H	HORIZONTAL
HOR	HORIZONTAL
HORIZ.	HORIZONTAL
I.E.	INVERT ELEVATION
INV.	INVERT ELEVATION
LBS	POUNDS
LF	LINEAL FEET
MHHW	MEAN HIGHER HIGH WATER
MLLW	MEAN LOWER LOW WATER
MIN	MINIMUM
N	NORTHING
NTS	NOT TO SCALE
O.C.	ON CENTER
OZ	OUNCE
PC	POINT OF CURVATURE
PT	POINT OF TANGENCY
PVC	POLY VINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
RD.	ROAD
STA	STATION
THRU	THROUGH
TW	THALWEG
TYP.	TYPICAL
V	VERTICAL
VER	VERTICAL
VERT.	VERTICAL



GENERAL NOTES
 FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

PROJECT NUMBER
RDG-23-229

DRAWING NUMBER
1.1

M:\Projects\2023\RDG-23-229 Flint Creek Phase 3A\Flint Creek Phase III_Planet_Cover and Details.dwg May 10, 2024



IMAGE: MAXAR 2024

1 EXISTING CONDITIONS PLAN VIEW

1" = 1000'

FEATURE LEGEND	
SYMBOL	
	PHASE 1 REACH: 2,650 LF (2021)
	PHASE 2 REACH: 4,250 LF (2023)
	PHASE 3 REACH: 11,600 LF (2025-XXXX)
	CADASTRAL PROPERTY LINE

FLINT CREEK EXISTING CONDITIONS

THE JOHNSON AND CONN PROPERTIES ARE LOCATED APPROXIMATELY TWO MILES SOUTHEAST OF HALL, MT. BOTH PROPERTIES ARE LOCATED UPSTREAM OF THE PHASE 2 PROJECT COMPLETED IN 2023. CATTLE RANCHING HAS BEEN THE PREDOMINANT LAND USE ON BOTH PROPERTIES, AND RIPARIAN CONDITIONS REFLECT THE IMPACTS OF GRAZING. OTHER ADJACENT LAND USES ARE RESIDENTIAL AND AGRICULTURAL.

FLINT CREEK IS A GRAVEL-BED, MEANDERING, RIFFLE-POOL STREAM TYPE WITH A CONNECTED FLOODPLAIN (C4 STREAM TYPE). HYDROLOGY IS HEAVILY INFLUENCED BY IRRIGATION WITHDRAWALS AND IRRIGATION DITCH RETURN FLOWS. VEGETATION IS DOMINATED BY PASTURE GRASSES INTERMIXED WITH REMNANT PATCHES OF WILLOWS AND COTTONWOODS. BANK EROSION RATES VARY WITH THE MOST SEVERE EROSION OCCURRING ALONG TERRACES AND ON STREAMBANKS LACKING WOODY VEGETATION. STREAMBED SUBSTRATE IS COARSE WITH MODERATE ARMORING AND EMBEDDEDNESS. AQUATIC HABITAT IS AFFECTED BY INFREQUENT POOLS, FINE SEDIMENT LOADING AND LACK OF COMPLEXITY.

FLINT CREEK GEOMORPHIC CHARACTERISTICS

DRAINAGE AREA	352 SQ. MILES
MEAN ANNUAL PRECIPITATION	23 INCHES
FOREST COVER	60% FORESTED
BASEFLOW DISCHARGE	< 10 CFS
BANKFULL DISCHARGE	350 - 400 CFS
25-YEAR DISCHARGE (4% EXCEEDANCE)	1,200 - 1,400 CFS
STREAM GRADIENT	0.006 FT/FT
STREAMBED D50	2-INCH GRAVEL
STREAMBED D84	4-INCH COBBLE
EXISTING STREAM TYPE	C4
POTENTIAL STREAM TYPE	C4



RDG
311 S.W. Jefferson Avenue
Whitefish, MT 59907
406.862.4927

EXISTING CONDITIONS
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

PROJECT NUMBER
RDG-23-229

DRAWING NUMBER

2.0

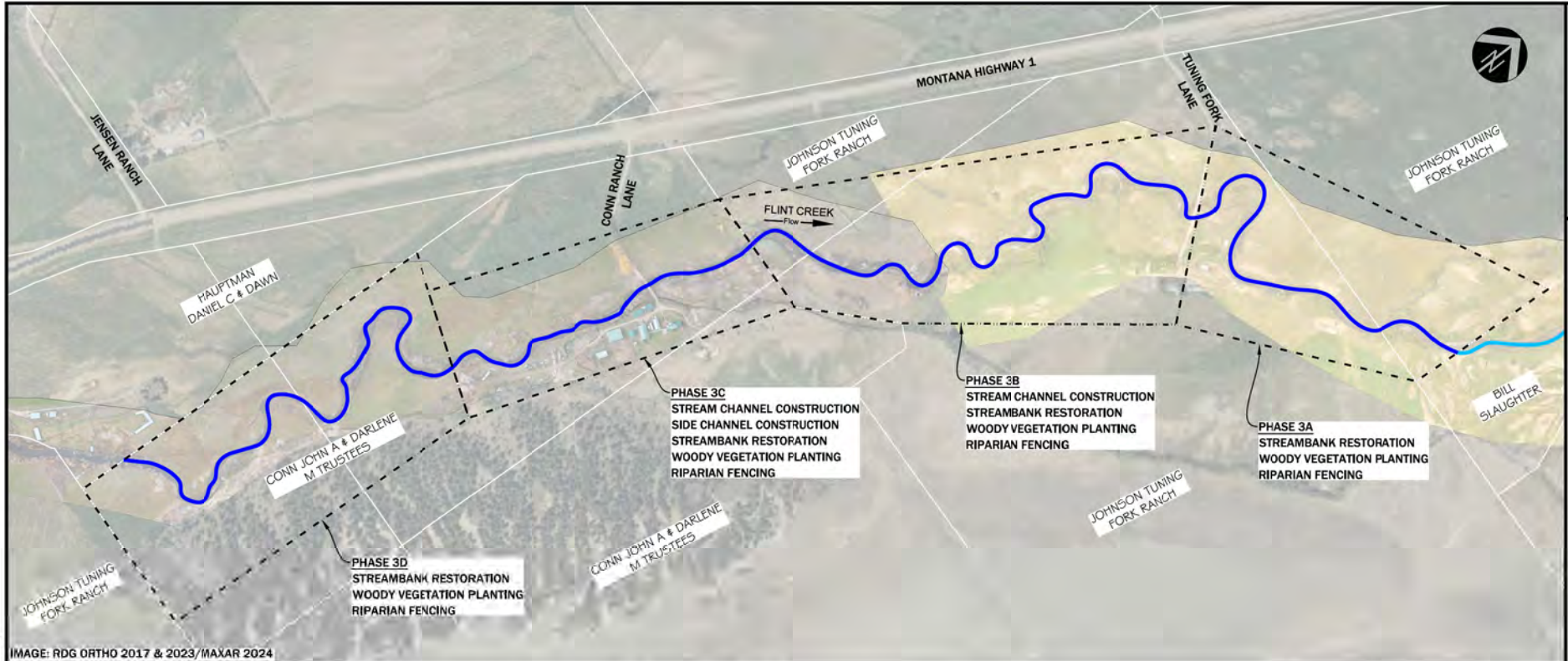


IMAGE: RDG ORTHO 2017 & 2023/MAXAR 2024

**1 PHASING PLAN
PLAN VIEW**

1" = 600'

FEATURE LEGEND	
SYMBOL	
	PHASE 2 REACH
	PHASE 3 REACH
	CADASTRAL PROPERTY LINE

RESTORATION STRATEGIES AND ACTIONS

THE PROPOSED RESTORATION PLAN INCLUDES MEANDER REACTIVATION, STREAMBANK RESTORATION, SIDE CHANNEL CONSTRUCTION AND REVEGETATION. THE PLAN ADDRESSES LIMITING FACTORS RELATED TO STREAMBANK STABILITY, FINE SEDIMENT LOADING AND AQUATIC HABITAT. STREAMBANK STRUCTURES ARE PROPOSED FOR ACTIVE CHANNEL MARGINS WITH SPARSE VEGETATION AND OBSERVED BANK EROSION. STREAMBANKS WILL BE RE-GRADED TO GENTLE SLOPES, ENHANCED WITH FLOODPLAIN ROUGHNESS AND REVEGETATED WITH CONTAINERIZED PLANTS. SURPLUS FILL MATERIAL WOULD BE EXPORTED TO AN UPLAND REPOSITORY.

THE REVEGETATION PLAN INCLUDES STRATEGIES FOR PLANTING, SEEDING AND BROWSE PROTECTION. THE PLAN ADDRESSES ESTABLISHMENT OF NATIVE PLANT COMMUNITIES IN WETLAND, FLOODPLAIN, STREAMBANK AND UPLAND AREAS. PLANTING UNITS WERE PLACED THROUGHOUT THE PROJECT AREA WITH THE GOALS OF INCREASING CONNECTIVITY FOR HABITAT BETWEEN EXISTING RIPARIAN VEGETATION COMMUNITIES AND INCREASING THE OVERALL QUANTITY AND DIVERSITY OF WOODY VEGETATION. 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.

PHASE	PHASE LENGTH	STREAMBANK RESTORATION LENGTH	FENCING	EXPECTED CONSTRUCTION DATE
PHASE 3A	2,550 LF	1,372 LF	5,094 LF	2025
PHASE 3B	3,625 LF	3,857 LF	6,813 LF	2026
PHASE 3C	1,950 LF	2,019 LF	2,100 LF	2027
PHASE 3D	3,400 LF	3,025 LF	2,800 LF	2027



PHASING PLAN
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
RDG-23-229

DRAWING NUMBER
3.0

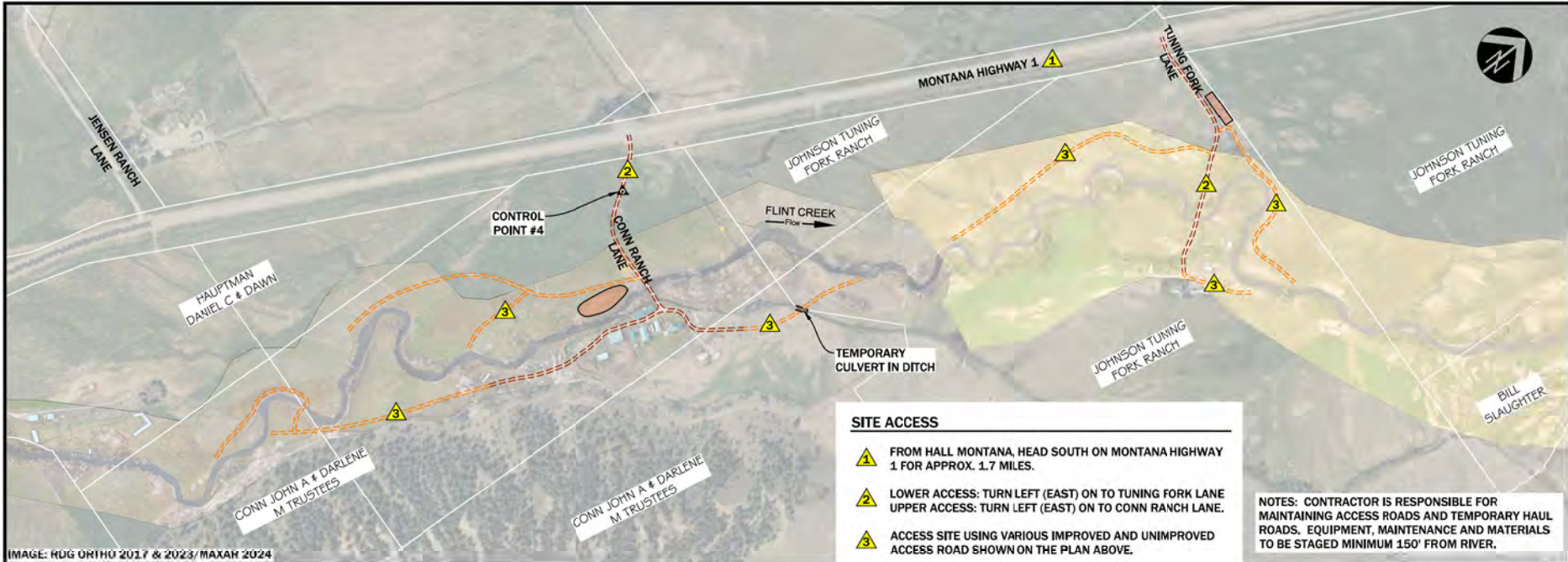


IMAGE: RDG ORTHO 2017 & 2023/ MAXAH 2024

SITE ACCESS

- 1** FROM HALL MONTANA, HEAD SOUTH ON MONTANA HIGHWAY 1 FOR APPROX. 1.7 MILES.
- 2** LOWER ACCESS: TURN LEFT (EAST) ON TO TUNING FORK LANE UPPER ACCESS: TURN LEFT (EAST) ON TO CONN RANCH LANE.
- 3** ACCESS SITE USING VARIOUS IMPROVED AND UNIMPROVED ACCESS ROAD SHOWN ON THE PLAN ABOVE.

NOTES: CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS ROADS AND TEMPORARY HAUL ROADS. EQUIPMENT, MAINTENANCE AND MATERIALS TO BE STAGED MINIMUM 150' FROM RIVER.

1 ACCESS, STAGING AND SURVEY CONTROL PLAN VIEW

1" = 400'

PROJECT DATUM	
THE PROJECT COORDINATES ARE BASED ON THE FOLLOWING:	
HORIZONTAL PROJECTION:	MONTANA STATE PLANE
UNITS:	US SURVEY FEET
HORIZONTAL DATUM:	NAD83 (CORS96 2002.00)
VERTICAL DATUM:	NAVD88 (GEOID 128)
TOPOGRAPHY SHOWN ON THE DRAWINGS IS BASED ON MERGED LIDAR AND BATHYMETRIC SURVEY DATA. BATHYMETRIC SURVEY WORK PERFORMED IN OCTOBER 2023 AND BY RDG USING SURVEY GRADE GPS. AERIAL LIDAR DATA WERE COLLECTED IN OCTOBER 2016 BY THE US ARMY CORPS OF ENGINEERS.	

FEATURE LEGEND	
SYMBOL	
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	STAGING AREA
	SURVEY CONTROL POINT
	CADASTRAL PROPERTY LINE



IMAGE: MAXAR 2024

2 SURVEY CONTROL OVERVIEW PLAN VIEW

1" = 2000'

CONTROL POINTS				
POINT NUMBER	NORTHING	EASTING	POINT ELEVATION	RAW DESCRIPTION
1	873179.102'	1044013.357'	4168.346'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
4	865227.068'	1035987.518'	4267.444'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
300	871957.574'	1043064.120'	4179.187'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
796	873195.441'	1043994.273'	4169.077'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"



ACCESS, STAGING AND SURVEY CONTROL
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	U	Preliminary Design	333

PROJECT NUMBER
HDG-23-229

DRAWING NUMBER
4.0

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IMAGE: RDG ORTHO 2017 & 2023/MAXAR 2024

1 WETLANDS AND VEGETATION PRESERVATION PLAN VIEW

1" = 400'

FEATURE LEGEND

SYMBOL

- IMPROVED ACCESS ROAD
- UNIMPROVED ACCESS ROAD
- STAGING AREA
- EMERGENT WETLAND
- SCRUB-SHRUB WETLAND
- FORESTED WETLAND



WETLANDS AND VEGETATION PRESERVATION
FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

PROJECT NUMBER
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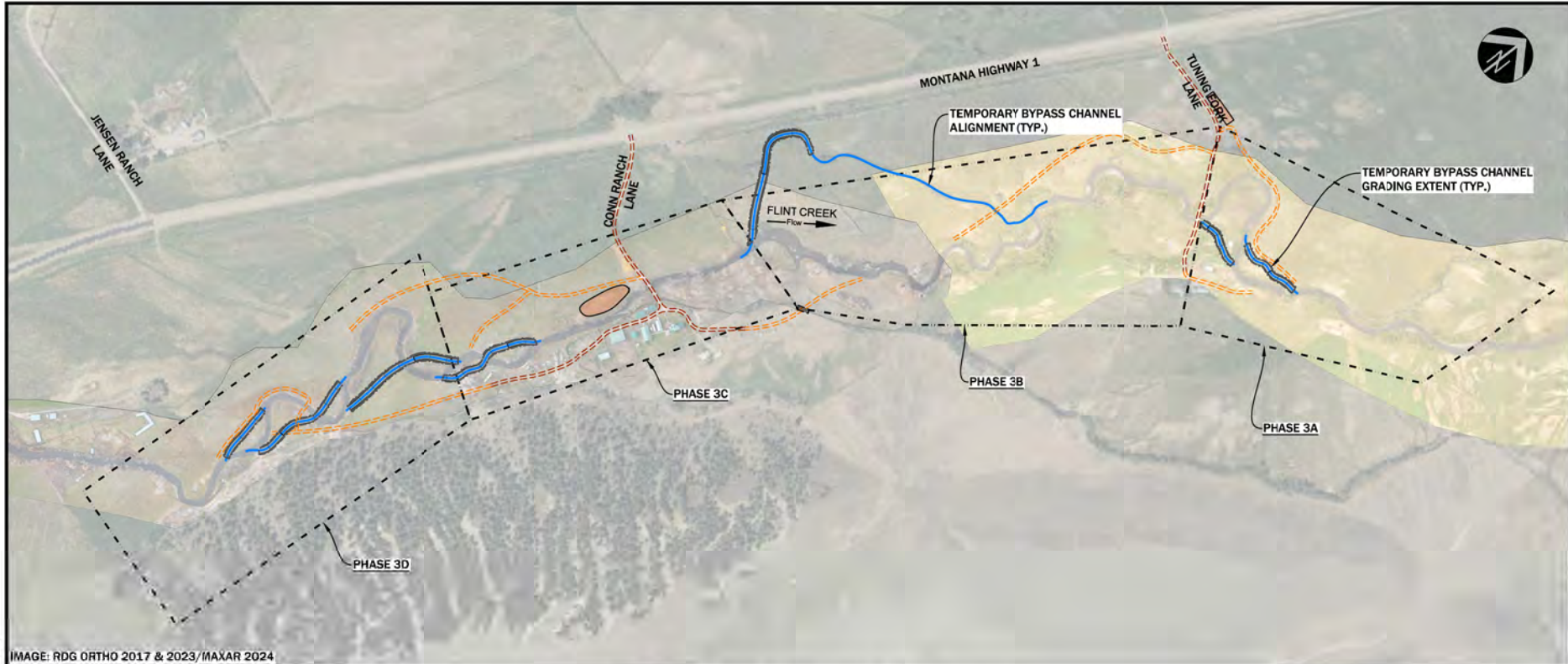


IMAGE: RDG ORTHO 2017 & 2023/MAXAR 2024

**1 WORK AREA ISOLATION PLAN
PLAN VIEW**

1" = 600'

FEATURE LEGEND	
SYMBOL	
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	STAGING AREA

WORK AREA ISOLATION

PHASE 3A
WORK AREAS WILL BE DEWATERED BY BUILDING COFFERDAMS AROUND WORK AREAS AND DIVERTING FLOW TO THE OPPOSITE SIDE OF THE CREEK.

PHASE 3B
WORK AREAS WILL BE DEWATERED BY DIVERTING FLINT CREEK INTO A TEMPORARY BYPASS CHANNEL THAT CONNECTS TO AN EXISTING DITCH. UPON COMPLETION OF INSTREAM WORK, THE TEMPORARY BYPASS CHANNEL WILL BE RECLAIMED.

PHASE 3C AND 3D
WORK AREAS WILL BE DEWATERED BY DIVERTING FLINT CREEK INTO TEMPORARY BYPASS CHANNELS. UPON COMPLETION OF INSTREAM WORK, TEMPORARY BYPASS CHANNELS WILL BE RESTORED TO FUNCTION AS SEASONAL SIDE CHANNELS. A TEMPORARY BRIDGE WILL BE USED TO CROSS THE TEMPORARY BYPASS CHANNEL DURING CONSTRUCTION.

FLOW CONDITIONS DURING IN-WATER WORK WINDOW

THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW IDENTIFIED BY THE U.S. FISH AND WILDLIFE SERVICE AND MONTANA FISH, WILDLIFE AND PARKS DURING THE CONSULTATION PROCESS. IT IS EXPECTED THAT THE CONSTRUCTION WINDOW WILL BE DURING THE LOWEST SEASONAL FLOWS BETWEEN JULY AND OCTOBER. MEAN DAILY FLOW CONDITIONS ARE EXPECTED TO BE BETWEEN 10 CFS AND 100 CFS.

FISH SALVAGE OPERATIONS

WORK AREA ISOLATION WILL EMPLOY MEASURES TO MINIMIZE STRANDING OF FISH WITHIN WORK AREAS AND ABANDONED CHANNELS, FISH SALVAGE OPERATIONS WILL BE CONDUCTED BY THE PROJECT PARTNERS. FISH SALVAGE OPERATIONS WILL BE CONDUCTED IN FLINT CREEK IMMEDIATELY FOLLOWING STREAMFLOW DIVERSION INTO TEMPORARY BYPASS CHANNELS. AFTER COMPLETION OF CONSTRUCTION, FISH SALVAGE OPERATIONS WILL BE CONDUCTED IN THE TEMPORARY BYPASS CHANNELS IMMEDIATELY FOLLOWING REINTRODUCTION OF FLOW BACK INTO THE FLINT CREEK CHANNEL. WATER DIVERSIONS SHALL OCCUR INCREMENTALLY IN ORDER TO ALLOW FISH TO EVACUATE DEWATERED AREAS. FISH SALVAGE OPERATIONS SHALL BE PERFORMED BY QUALIFIED BIOLOGISTS USING ELECTRO-FISHING AND SEINING EQUIPMENT.



WORK AREA ISOLATION PLAN
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
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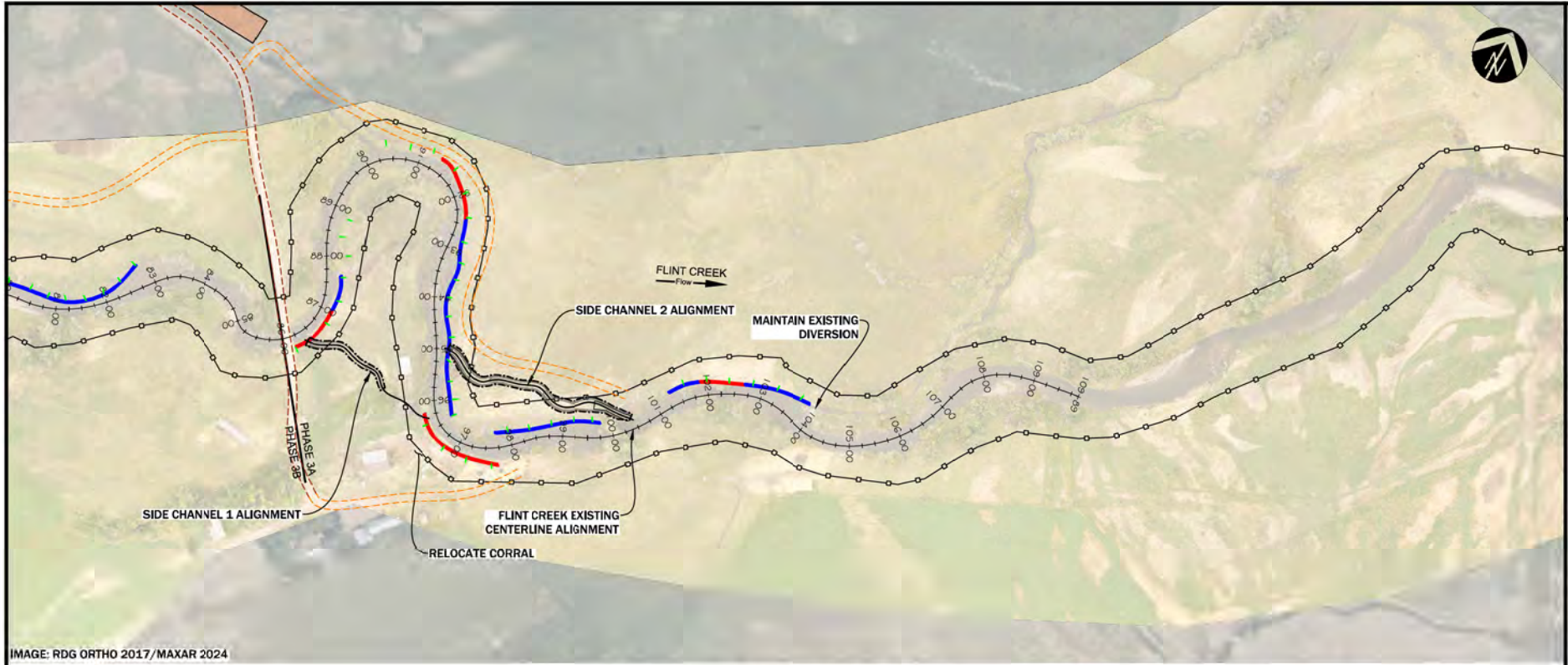


IMAGE: RDG ORTHO 2017/MAXAR 2024

1 PHASE 3A RESTORATION PLAN
PLAN VIEW
 1" = 200'

DRAWING LEGEND	
SYMBOL	
	VEGETATED WOOD MATRIX TYPE 1
	VEGETATED WOOD MATRIX TYPE 2
	FLOODPLAIN ROUGHNESS
	WILLOW TRENCH
	ENGINEERED RIFFLE
	CATTLE FENCE

VEGETATED WOOD MATRIX TYPE 1 QUANTITIES	
ITEM	QUANTITY
VEGETATED WOOD MATRIX TYPE 1	867 LF
CATEGORY 3 WOOD	1,734 EA
CATEGORY 4 WOOD	1,734 EA
WILLOW CUTTINGS	4,335 EA
RIFFLE ROCK FILL	434 CY

VEGETATED WOOD MATRIX TYPE 2 QUANTITIES	
ITEM	QUANTITY
VEGETATED WOOD MATRIX TYPE 2	505 LF
CATEGORY 2 WOOD	1,010 EA
CATEGORY 3 WOOD	1,515 EA
CATEGORY 4 WOOD	1,515 EA
WILLOW CUTTINGS	2,525 EA
RIFFLE ROCK FILL	379 CY

WILLOW TRENCH QUANTITIES	
ITEM	QUANTITY
WILLOW TRENCH	380 LF
CATEGORY 4 WOOD	380 EA
WILLOW CUTTINGS	1,900 EA



PHASE 3A RESTORATION PLAN
 FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
RDG-23-229

DRAWING NUMBER
5.0

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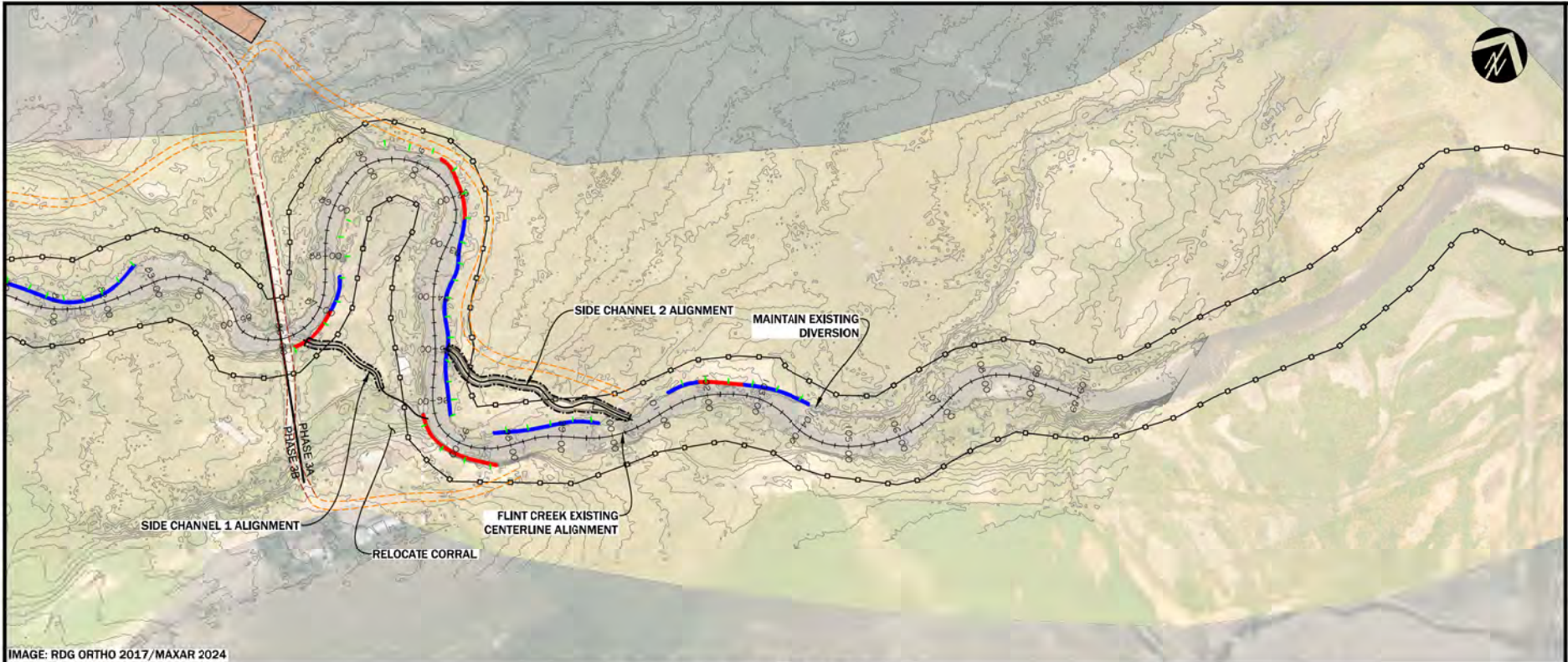
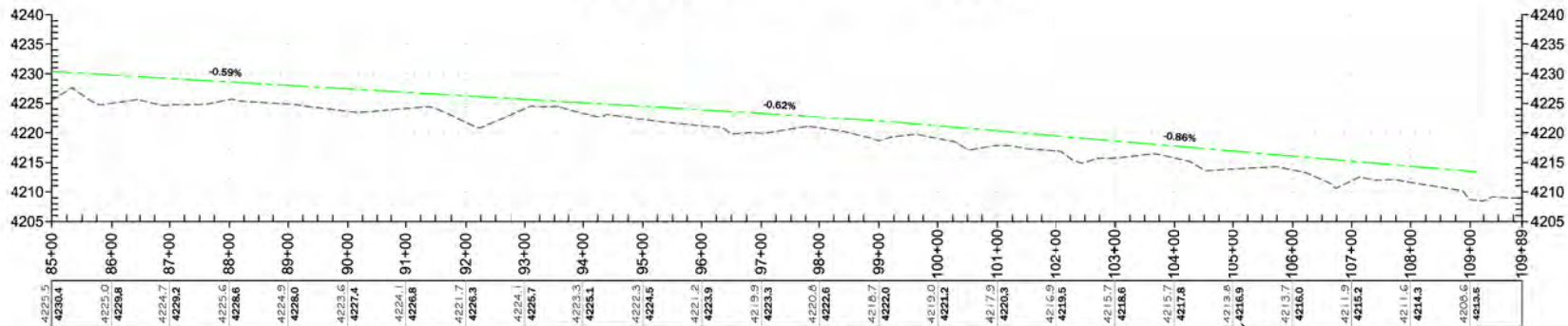


IMAGE: RDG ORTHO 2017/MAXAR 2024

1 PHASE 3A RESTORATION PLAN
PLAN VIEW

1" = 200'



2 FLINT CREEK EXISTING CENTERLINE
PROFILE VIEW

HOR: 1" = 200'
VERT: 1" = 20'

LEGEND

---	EXISTING THALWEG
---	BANKFULL



PHASE 3A PLAN AND PROFILE
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

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RDG-23-229
DRAWING NUMBER
5.1
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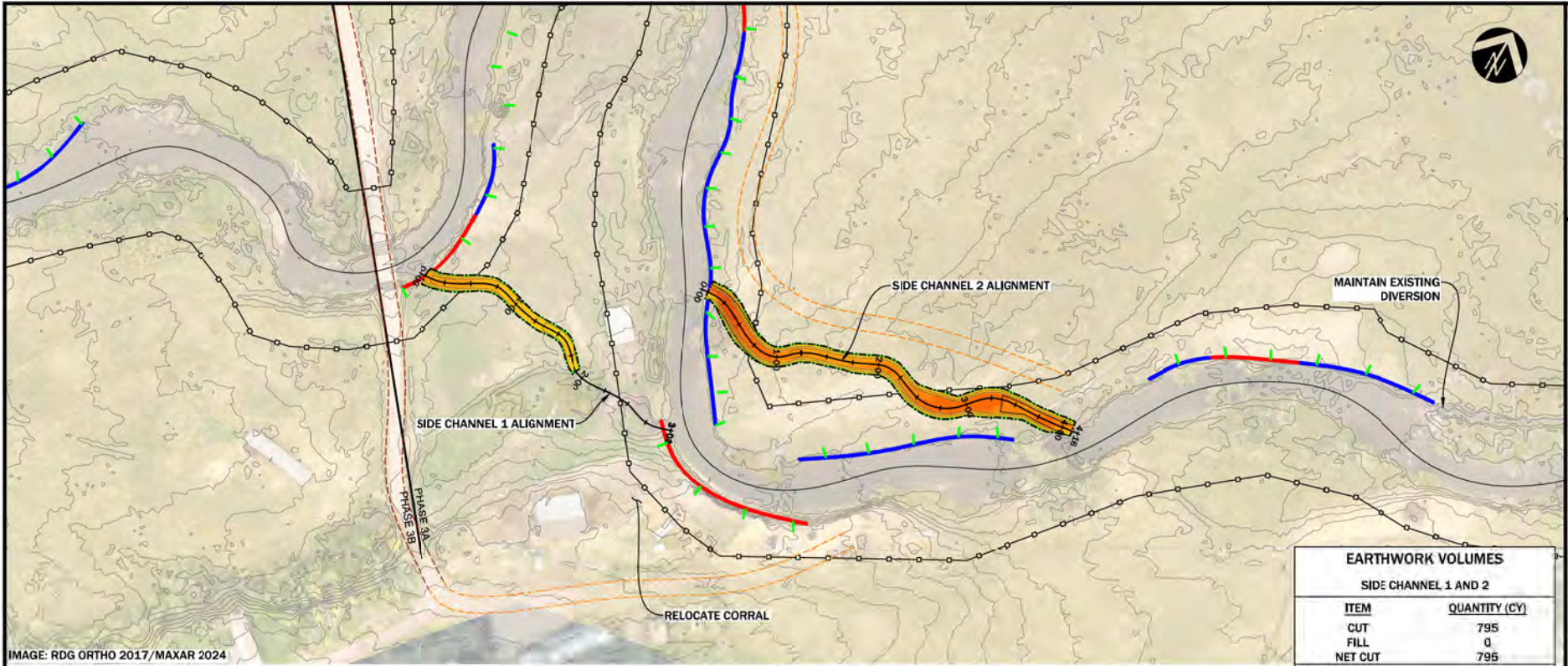
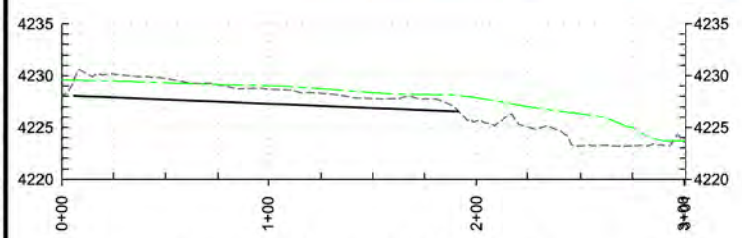
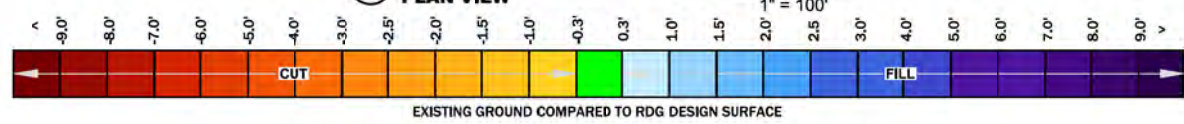


IMAGE: RDG ORTHO 2017/MAXAR 2024

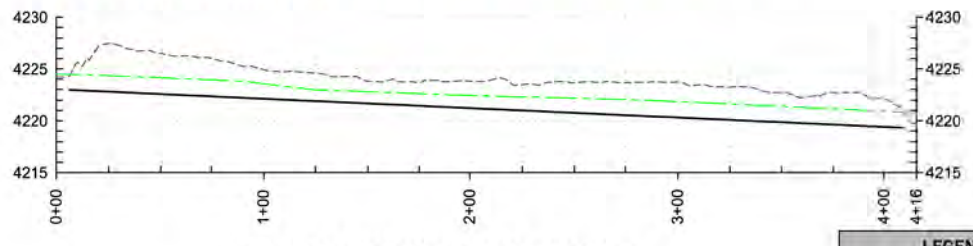
EARTHWORK VOLUMES	
SIDE CHANNEL 1 AND 2	
ITEM	QUANTITY (CY)
CUT	795
FILL	0
NET CUT	795

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

1 PHASE 3A GRADING PLAN
PLAN VIEW



HOR: 1" = 60'
VERT: 1" = 12'



HOR: 1" = 60'
VERT: 1" = 12'

LEGEND	
	EXISTING GRADE
	BANKFULL
	FINISHED GRADE



PHASE 3A GRADING PLAN
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

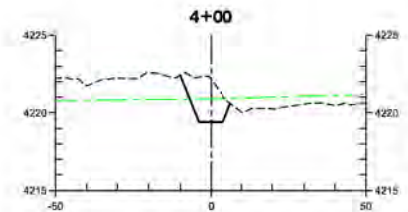
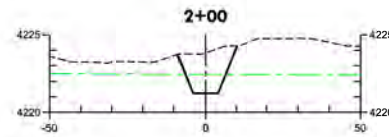
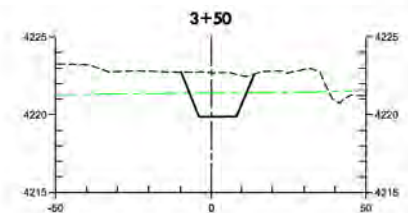
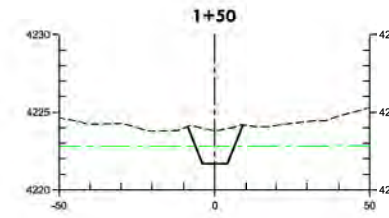
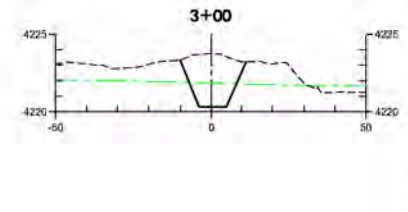
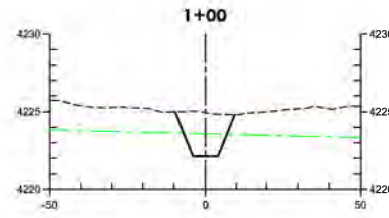
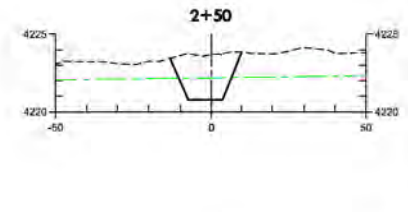
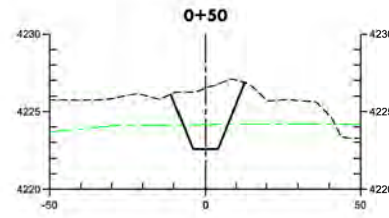
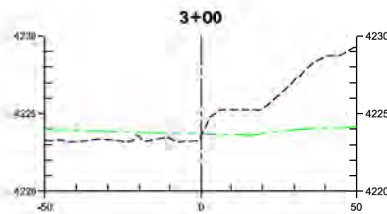
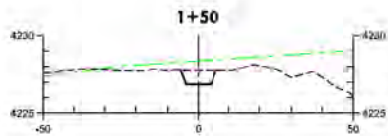
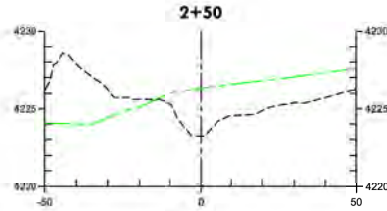
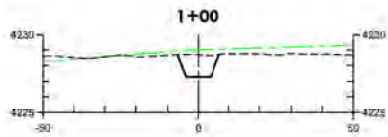
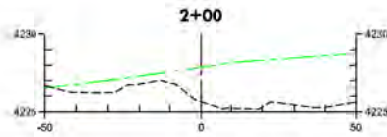
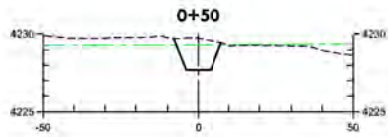
NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

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PHASE 3A CROSS SECTIONS
 FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA



1 SIDE CHANNEL 1 ALIGNMENT CROSS SECTIONS

HOR: 1" = 40'
 VERT: 1" = 8'

1 SIDE CHANNEL 2 ALIGNMENT CROSS SECTIONS

HOR: 1" = 40'
 VERT: 1" = 8'

LEGEND	
	EXISTING GRADE
	BANKFULL
	FINISHED GRADE

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

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 RDG-23-229

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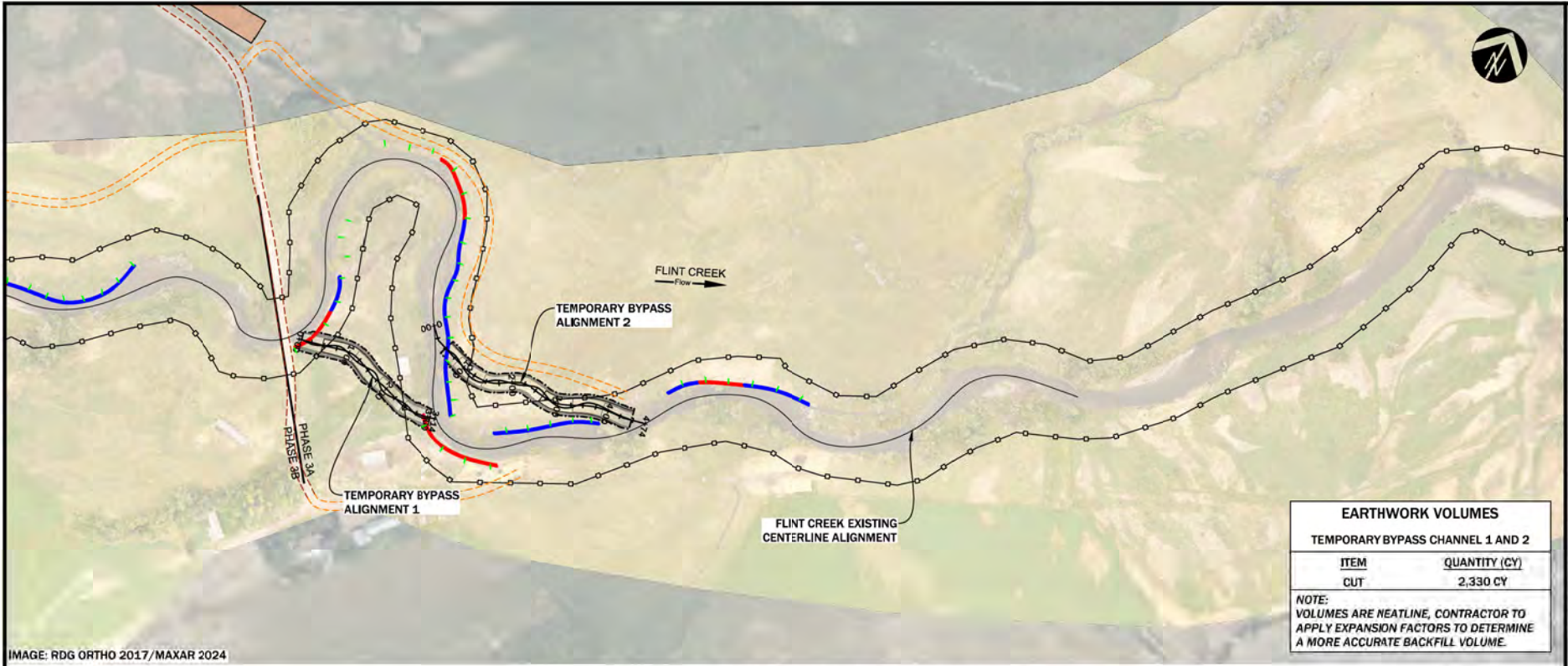
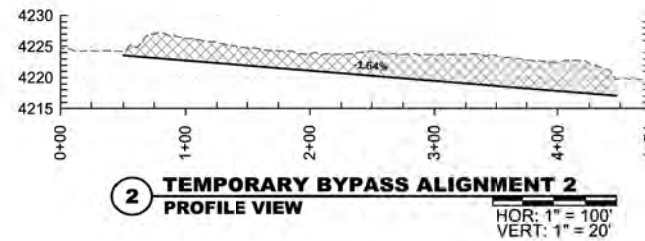
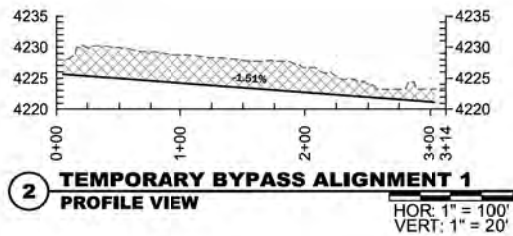


IMAGE: RDG ORTHO 2017/MAXAR 2024

EARTHWORK VOLUMES	
TEMPORARY BYPASS CHANNEL 1 AND 2	
ITEM	QUANTITY (CY)
CUT	2,330 CY

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

1 PHASE 3A WORK ISOLATION PLAN
PLAN VIEW
1" = 200'



LEGEND	
---	EXISTING GRADE (EG)
—	FINISHED GRADE (FG)
▨	CUT
■	FILL



PHASE 3A WORK AREA
ISOLATION DETAILS 1
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

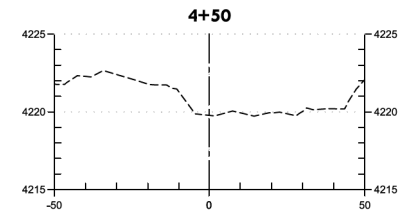
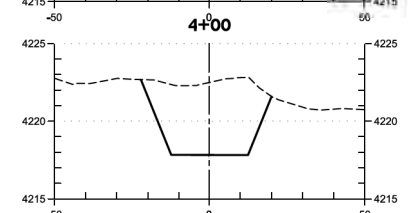
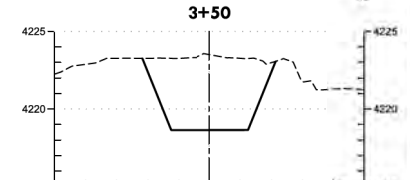
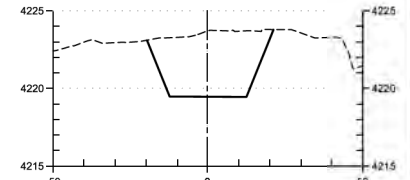
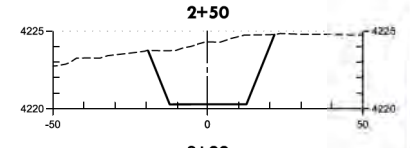
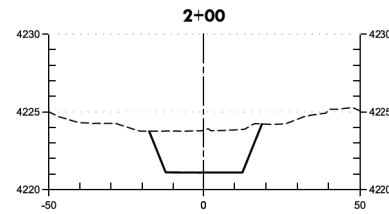
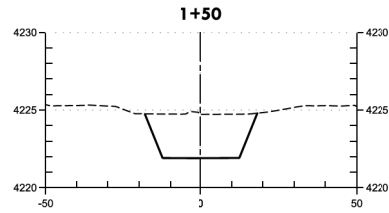
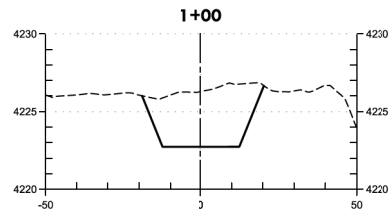
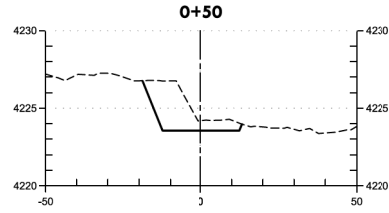
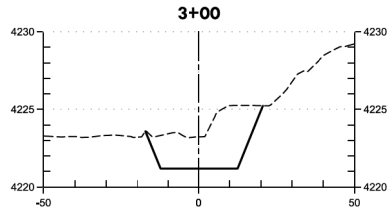
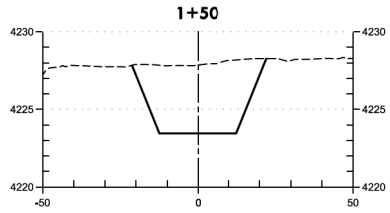
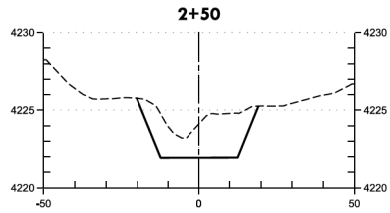
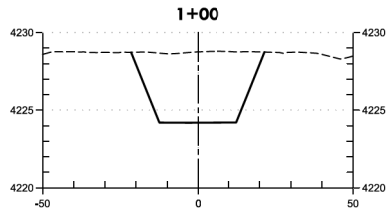
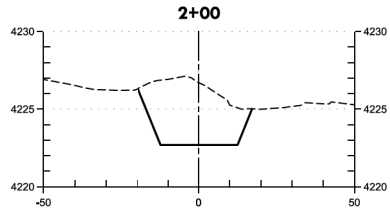
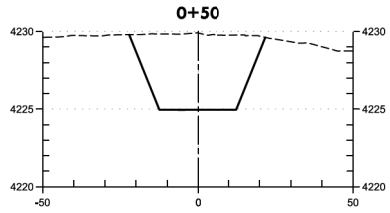
NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

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**PHASE 3A WORK AREA
ISOLATION DETAILS 2**
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA



**1 TEMPORARY BYPASS ALIGNMENT 1
CROSS SECTIONS**

HOR: 1" = 40'
VERT: 1" = 8'

**2 TEMPORARY BYPASS ALIGNMENT 2
CROSS SECTIONS**

HOR: 1" = 40'
VERT: 1" = 8'

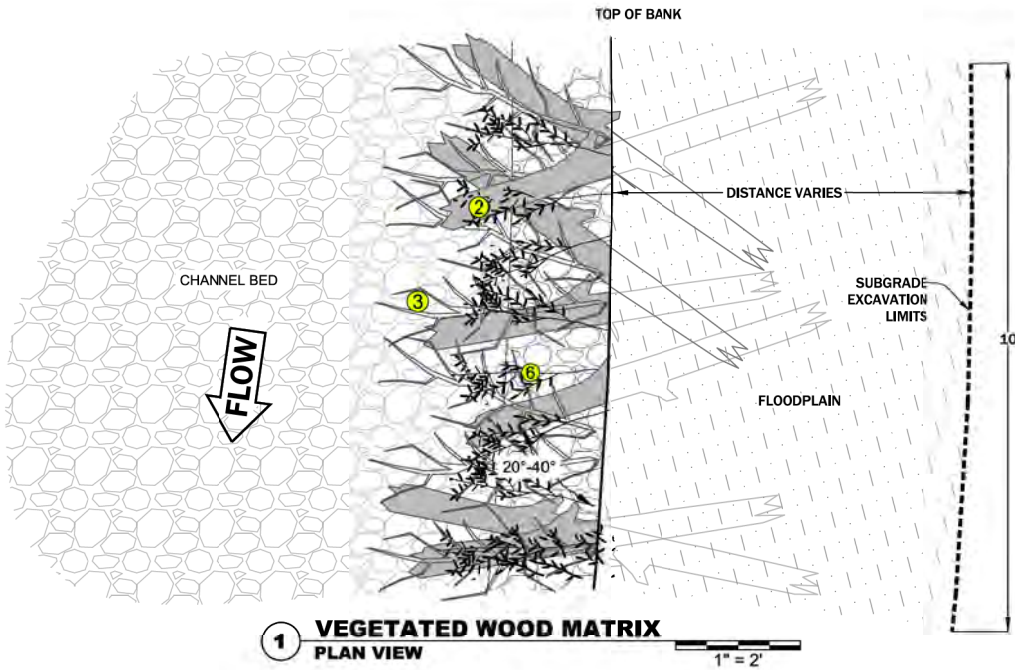
LEGEND	
	EXISTING GRADE (EG)
	FINISHED GRADE (FG)

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	

PROJECT NUMBER
RDG-23-229

DRAWING NUMBER
5.5

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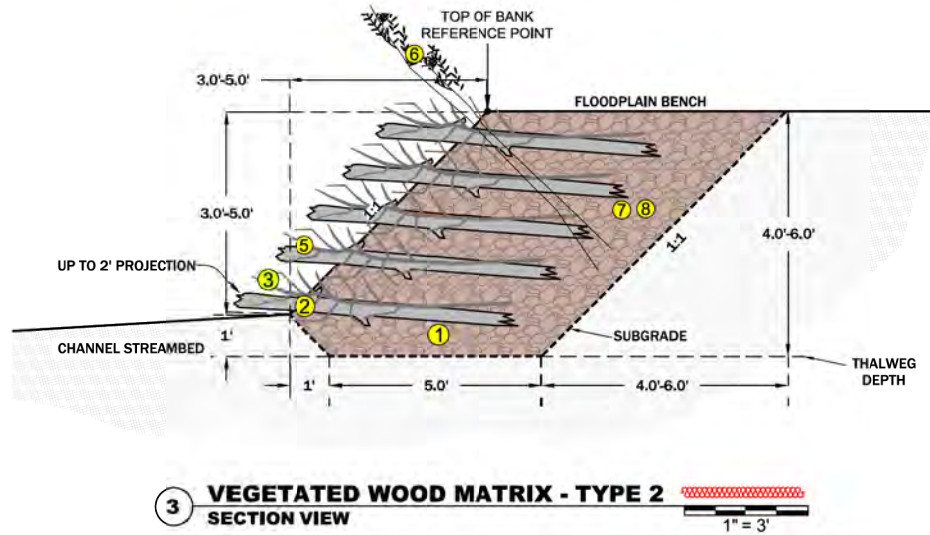
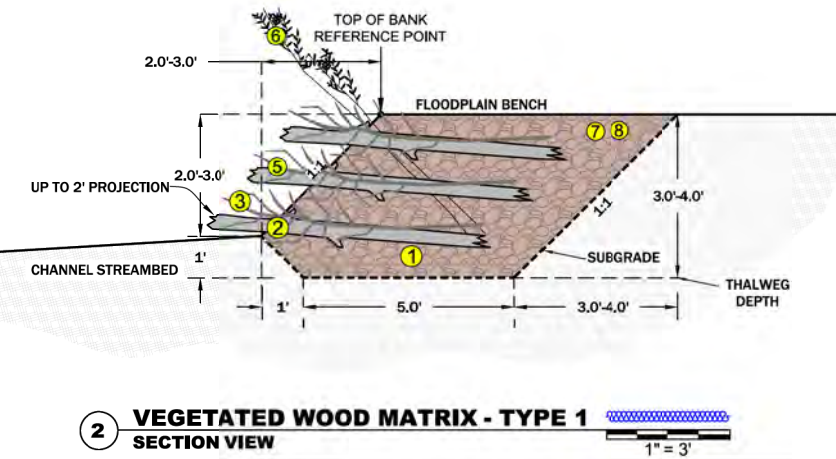
MATERIAL SCHEDULE (PER LINEAR FOOT)				
ITEM	TYPE 1 QTY.	TYPE 2 QTY.	DIA. (IN)	LENGTH (FT)
1	1	1.5		
7 8	.5	.75		
7 8	.5	.75	SEE GRAD.	
5	2	3	3-6	8-10
2	0	2	6-12	8-10
3	2	3	1-3	8-10
6	5	5	0.5	6-8

RIFFLE ROCK FILL GRADATION	
SIZE (IN)	PERCENT PASSING
8	100
6	80-90
4	60-70
3	40-50
2	20-30
FINES	
	0-10

NOTE: MIX SALVAGED AND IMPORTED TO ACHIEVE SPECIFIED GRADATION

CONSTRUCTION NOTES

- EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS AND PLACE 50/50 NATIVE MATERIAL AND RIFFLE ROCK FILL MIX TO DEPTHS SHOWN (SEE SPECIFIED GRADATIONS).
- PLACE LOGS (CATEGORY 2 AND 3 WOOD) IN THE STREAMBANK AT SKEWED ANGLE TO THE STREAMBANK. LOGS MAY OVERLAP. NO CUT ENDS SHALL BE EXPOSED.
- PLACE BRUSH (CATEGORY 4 WOOD) WITHIN THE MATRIX OF LOGS. BRUSH SHALL BE PLACED BELOW TOP OF BANK LINE.
- PLACE 0.5 FT LAYER OF 50/50 NATIVE MATERIAL AND RIFFLE ROCK FILL MIX ON LOG/BRUSH MATRIX AND COMPACT.
- REPEAT STEPS 2 THROUGH 4 UNTIL THE DESIRED TOP OF BANK ELEVATION IS ACHIEVED.
- PLACE CUTTINGS INTO THE LOG/BRUSH MATRIX WITH THE STEMS IN CONTACT WITH THE BASEFLOW WATER TABLE AND THE LEAVES AT OR ABOVE THE TOP OF BANK ELEVATION.
- BACKFILL STREAMBANK WITH A 50/50 MIX OF NATIVE MATERIAL AND RIFFLE ROCK FILL.
- WASH FINES AND WATER FROM ONSITE INTO THE STREAMBANK FILL TO SEAL THE VOIDS IN THE BACKFILL.

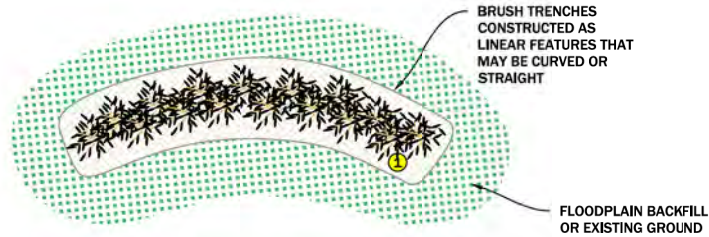


VEGETATED WOOD MATRIX DETAIL
 FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA

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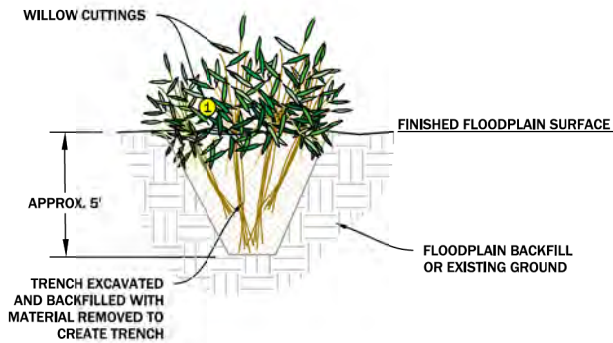
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1 **WILLOW TRENCH PLAN VIEW** NTS



2 **WILLOW TRENCH PROFILE VIEW** NTS



3 **WILLOW TRENCH SECTION VIEW** NTS

GENERAL NOTES

1. CONSTRUCTION OF WILLOW TRENCHES WILL OCCUR FOLLOWING APPROVAL OF FINISHED GRADE SURFACES BY THE CONSTRUCTION MANAGER, AND CONCURRENT WITH INSTALLATION OF THE FLOODPLAIN TREATMENTS.
2. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY THE CONSTRUCTION MANAGER.
3. CONTRACTOR SHALL MARK THE UPSTREAM AND DOWNSTREAM EXTENTS OF THE LOCATIONS OF THE VEGETATED BRUSH TRENCHES.

NOTES ON WILLOW TRENCH INSTALLATION

1. WILLOW TRENCHES WILL BE CONSTRUCTED WITHIN THE FLOODPLAIN AT THE DIRECTION OF THE CONSTRUCTION MANAGER.
2. CONSTRUCTION OF WILLOW TRENCHES WILL OCCUR AFTER OCTOBER 1ST AND BEFORE THE END OF THE CONSTRUCTION SEASON.
3. CONTRACTOR SHALL MARK THE UPSTREAM AND DOWNSTREAM EXTENTS OF THE LOCATIONS OF THE CONSTRUCTED CHANNEL STREAMBED STRUCTURES.
4. CONTRACTOR SHALL MARK AND ENGINEER SHALL APPROVE THE GENERAL CONSTRUCTION LOCATION FOR EACH VEGETATED BRUSH TRENCH PRIOR TO CONSTRUCTION.
5. A TRENCH WILL BE CONSTRUCTED APPROXIMATELY 5' DEEP AND EXTEND THE LENGTH OF THE STAKED TREATMENT LOCATION. LIVE WILLOW CUTTINGS WILL BE PLACED IN THE TRENCH SUCH THAT THEY ARE INTERMIXED AND ORIENTED AT A NEAR VERTICAL ANGLE.
6. THE TRENCH WILL THEN BE BACKFILLED WITH THE SAME MATERIAL REMOVED TO CREATE THE TRENCH AND SHOULD MATCH THE ELEVATION OF THE SURROUNDING FLOODPLAIN GRADE.

WILLOW TRENCH MATERIAL SCHEDULE (PER LINEAR FOOT)			
ITEM	DIA. (IN)	QUANTITY	
⑤ CATEGORY 4 WOOD	1-3	1	
⑥ WILLOW CUTTINGS	0.5	5	



EXAMPLE OF A WILLOW TRENCH INSTALLATION



WILLOW TRENCH DETAIL
FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA

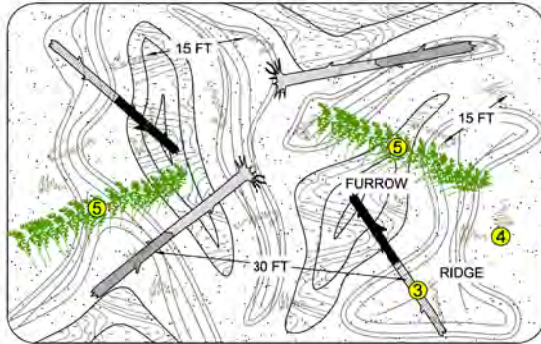
NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

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9.1

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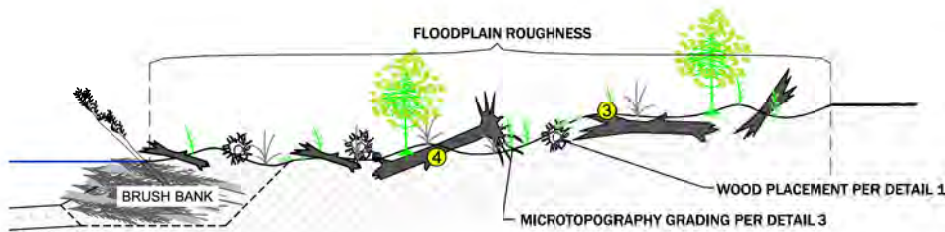


1 FLOODPLAIN ROUGHNESS WOOD PLACEMENT
NTS

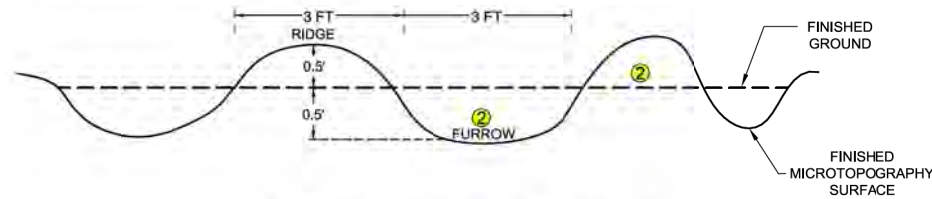
CONSTRUCTION NOTES

- 1 CONSTRUCT FLOODPLAIN ROUGHNESS AFTER FINISHED GRADING AND AFTER PLACEMENT OF VEGETATIVE FILL FOR GROWTH MEDIA. CONSTRUCT FLOODPLAIN ROUGHNESS PRIOR TO SEEDING, PLANTING AND FENCING.
- 2 GRADE FURROWS AND RIDGES INTO THE FINISHED GROUND SURFACE.
- 3 PARTIALLY BURY SMALL LOGS (CATEGORY 3 WOOD) INTO FURROWS AND RIDGES AT SPACING OF 30 FEET AND A DEPTH OF TWO FEET WITH ONE HALF THE LOG LENGTH BELOW THE SURFACE.
- 4 PARTIALLY BURY BRUSH (CATEGORY 4 WOOD) INTO FURROWS AND RIDGES AT SPACING OF 15 FEET AND A DEPTH OF TWO FEET WITH ONE HALF THE BRUSH LENGTH BELOW THE SURFACE.
- 5 VEGETATED BRUSH TRENCHES WILL BE CONSTRUCTED WITHIN THE FLOODPLAIN AT THE DIRECTION OF THE CONSTRUCTION MANAGER. A TRENCH WILL BE CONSTRUCTED APPROXIMATELY 5' DEEP AND EXTEND THE LENGTH OF THE STAKED TREATMENT LOCATION. LIVE WILLOW CUTTINGS AND BRUSH WILL BE PLACED IN THE TRENCH SUCH THAT THEY ARE INTERMIXED AND ORIENTED AT A NEAR VERTICAL ANGLE. THE TRENCH WILL THEN BE BACKFILLED WITH THE SAME MATERIAL REMOVED TO CREATE THE TRENCH AND SHOULD MATCH THE ELEVATION OF THE SURROUNDING FLOODPLAIN GRADE.

FLOODPLAIN ROUGHNESS WOOD PLACEMENT SCHEDULE (PER ACRE)							
ITEM	DIA. (IN)	LENGTH (FT)	ROOTWAD	LIMBS	SPACING	BURIAL	RATE
3	3 - 6	8 - 10	OPTIONAL	YES	30 FT	50%	50/ACRE
4	1 - 3	8 - 10	OPTIONAL	YES	15 FT	50%	150/ACRE



2 FLOODPLAIN ROUGHNESS TYPICAL CROSS SECTION
NTS



3 MICROTOPOGRAPHY GRADING SECTION VIEW
NTS



FLOODPLAIN ROUGHNESS DETAIL
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

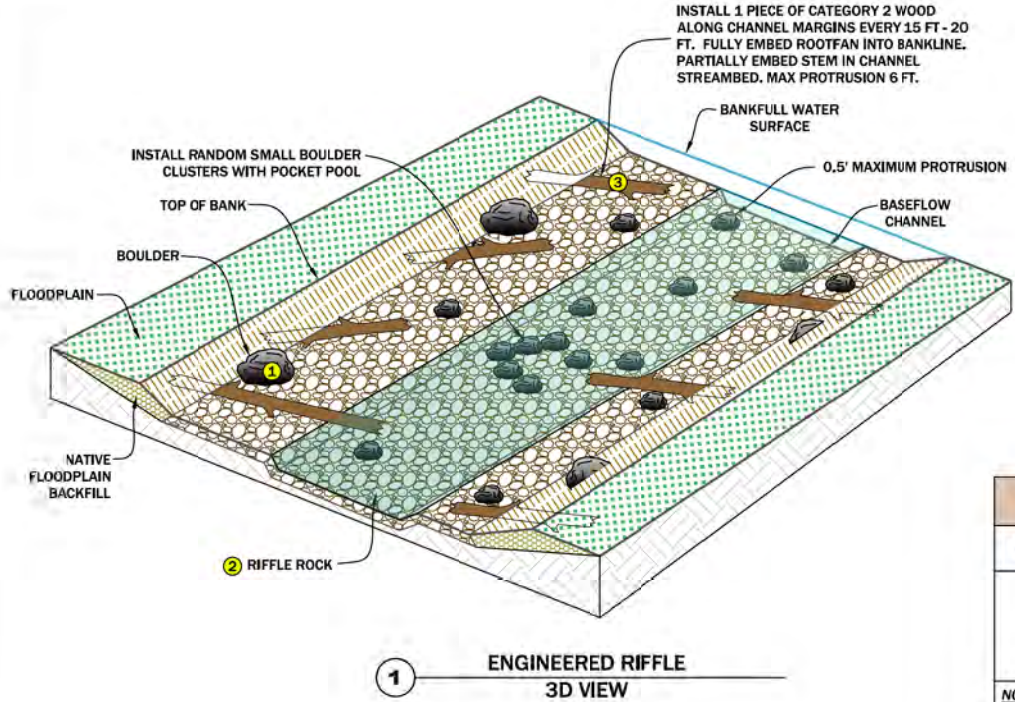
NO.	DATE	BY	DESCRIPTION	CHK
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9.2

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1 ENGINEERED RIFLE 3D VIEW

NOTES ON CONSTRUCTED CHANNEL STREAMBED INSTALLATION

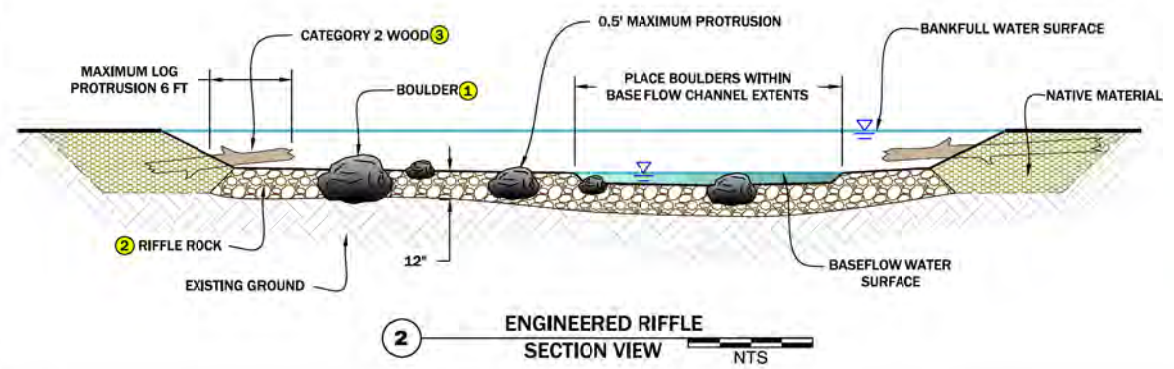
1. DURING CONSTRUCTION OF THE ENGINEERED RIFLE, THE ENGINEER SHALL VERIFY THE RIFLE LAYOUT AND CONDUCT PERIODIC INSPECTION OF ELEVATIONS AND MATERIAL PLACEMENT.
2. PREPARE THE SUBGRADE BY EXCAVATING THE RIFLE FOOTPRINT ONE FOOT BELOW FINISHED GRADE ELEVATION. STOCKPILE SALVAGED ALLUVIUM FOR USE IN RIFLE CONSTRUCTION.
3. PLACE BOULDERS ON THE SUBGRADE SURFACE PRIMARILY WITHIN THE LOW FLOW CHANNEL AS SHOWN ON THE DRAWINGS. BOULDER PROTRUSION ABOVE FINISHED RIFLE GRADE SHALL NOT EXCEED 0.5 FEET. BOULDERS MAY BE PLACED IN CLUSTERS OR AS STAND ALONE BOULDERS TO FACILITATE FISH PASSAGE.
4. INSTALL CHANNEL MARGIN WOOD (CATEGORY 2 WOOD) TO PROVIDE AQUATIC HABITAT COMPLEXITY AND ROUGHNESS. CHANNEL MARGIN WOOD SHALL PROJECT NO GREATER THAN 6 FEET INTO THE CHANNEL IN VARIOUS ORIENTATIONS TO FLOW. CHANNEL MARGIN WOOD SHALL BE EMBEDDED INTO THE CHANNEL STREAMBED A MINIMUM OF ONE-HALF THE LOG LENGTH AS SHOWN ON THE DRAWINGS.
5. MIX SALVAGED ALLUVIUM WITH IMPORTED ROCK TO ACHIEVE THE GRADATION SPECIFIED ON THE DRAWINGS.
6. PLACE THE RIFLE ROCK MIXTURE AND WASH FINES INTO STREAMBED TO SEAL THE VOIDS. RIFLE ROCK SHALL BE PLACED IN A LAYER 12 INCHES DEEP TO ACHIEVE FINISHED GRADE.

RIFLE ROCK FILL GRADATION

SIZE (IN)	PERCENT PASSING
8	100
6	80-90
4	60-70
3	40-50
2	20-30
FINES	0-10

NOTE: MIX SALVAGED AND IMPORTED TO ACHIEVE SPECIFIED GRADATION

MATERIAL SCHEDULE (PER 10 LINEAR FEET)			
ITEM	DIA.	LENGTH	QUANTITY (EA)
1 BOULDERS	12" - 18"		8 EA
2 RIFLE ROCK	SEE GRAD.		13 CY
3 CATEGORY 2 WOOD	6" - 12"	10' - 12'	0.5 EA



2 ENGINEERED RIFLE SECTION VIEW NTS



TYPICAL CONSTRUCTED STREAMBED THROUGH A RIFLE FEATURE



ENGINEERED RIFLE DETAIL
FLINT CREEK PHASE 3 RESTORATION PROJECT
HALL, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/14/24	LJ	Preliminary Design	333

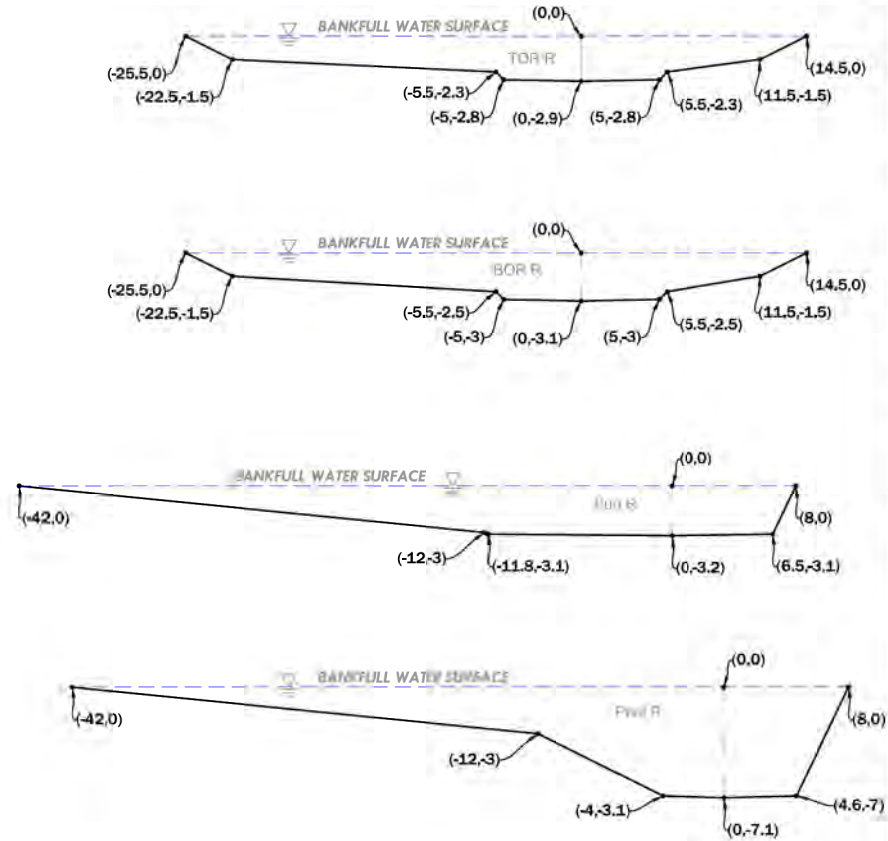
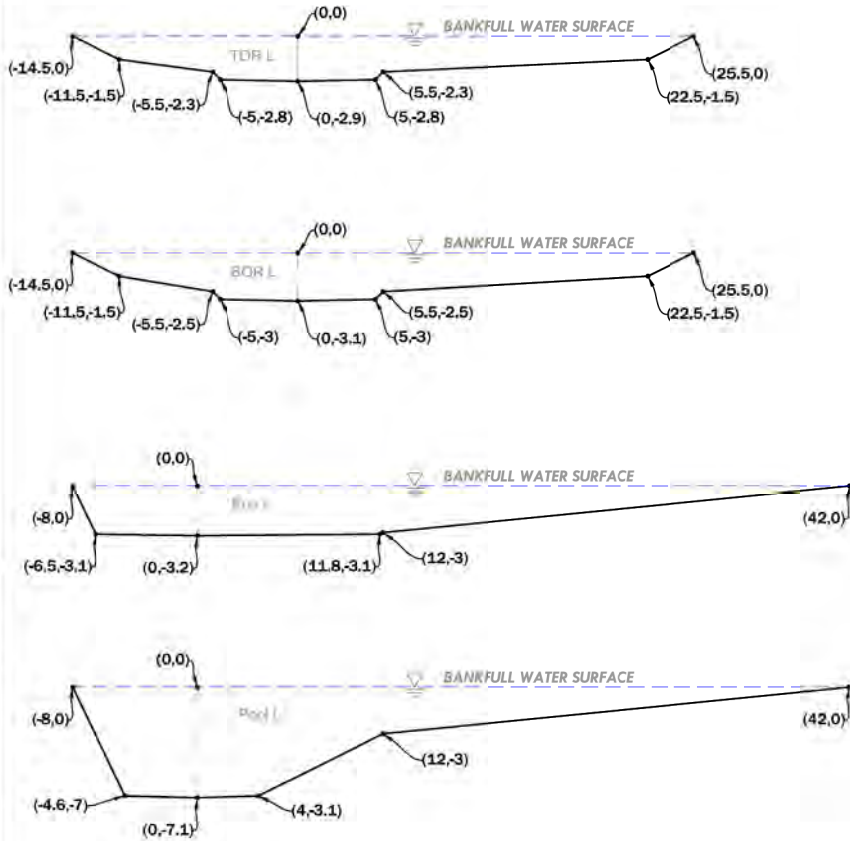
PROJECT NUMBER
RDG-23-229

DRAWING NUMBER
9.3

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TYPICAL CHANNEL CROSS SECTIONS
 FLINT CREEK PHASE 3 RESTORATION PROJECT
 HALL, MONTANA

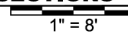


NOTE: COORDINATES ARE REFERENCED FROM TOP OF BANK THALWEG

CHANNEL SHAPING DESIGN CRITERIA

PARAMETER / FEATURE	RIFFLE	POOL
WIDTH	40 FT	50 FT
MEAN DEPTH	2 FT	1.9 FT
MAX. DEPTH	3 FT	6 FT
XS AREA	80 SQ-FT	96 SQ-FT
WIDTH:DEPTH	22	NA

1 TYPICAL CHANNEL CROSS SECTIONS



NO.	DATE	BY	DESCRIPTION
1	05/14/24	U	Preliminary Design

PROJECT NUMBER
 HDG-23-229

DRAWING NUMBER
9.4

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