The following memo summarizes the work completed by the GAI project team to support the 319 grant application TU will be submitting September 18, 2017. This includes a discussion of the project design/plans and responses to comments received from MT DEQ in 2016 and more recently by DEQ on a recent project site visit.

**Project History**

In 2016 the Greater Gallatin Watershed Council GGWC prepared a 319 Grant submittal for Dry Creek which was favorably received by DEQ. However, GGWC withdrew the submittal after determination that obtaining all project stakeholders written support and necessary legal agreements would require a longer time period than had been anticipated. Those agreements are now in place between joint project owners Dry Creek Conservation Partners LLC, Dry Creek Irrigation Company and Lonny Walker and the 2017. This 2017 submittal includes changes to proposed work that have been developed since 2016. Due to staffing issues at GWCC the project application in process was offered to and accepted by TU.

**Project Summary**

The proposed project includes three main project elements: 1) installation of a structure to route the majority of annual flows of Dry creek under the Dry Creek Canal to eliminate downstream dewatering/disconnection of captured Dry Creek flows during the irrigation season; 2) complete bank stabilization on 4,448 feet of severely eroding vertical banklines on a separate property approximately 3 miles upstream of the proposed structure and 3) restore approximately 600 feet of Dry Creek downstream of the proposed bypass structure, (see Figure 1 for project area map). The combined
project will also restore hydrologic connectivity of Dry Creek to the East Gallatin River during the April – October irrigation period, and substantially eliminate bankline erosion
that results in high annual inputs of fine sediment to Dry Creek and the East Gallatin River.

![Figure 1. GGWC Dry Creek 319 Project Proposal area map.](image)

**Project Existing Conditions and Proposed Treatments**

**Hamilton Ranch Bank Stabilization – Owner Dry Creek Conservation Partners LLC**

**Existing Condition**

Dry Cr has a length of 11,300 feet on the Hamilton Ranch and includes 4,448 feet of vertical and severely eroding banklines averaging 4.9 feet in height (range 2-12 feet) Figure 2. As is typical in the area, the channel has historically incised in the post-beaver dominated era. Relative to its channel evolution, the channel is has largely re-established a stable and well-vegetated inset floodplain surface on at least one side of channel. However, where the channel has migrated into historic floodplain terraces there is significant erosion and collapse of vertical silt banks despite a relatively modest runoff regime that is not otherwise highly erosive. The principle bank failure mechanism is cantilever block failure during winter and spring freeze and thaw cycles with modest annual erosion on bank toes that maintain bank verticality. Based on channel planform, the creek has sufficient floodplain surface for hydrologic function.
Left as-is the channel will continue to erode outside terrace toes for decades and continue as a chronic source of fine sediment.

Proposed Action and Expected Results

Figure 2. Location of eroding banklines on the Hamilton Ranch.

Project Design Plans have been completed for the bankline stabilization and are attached to this submittal. The principle bioengineered bank stabilization strategy is detailed in Sheet 2 of the Plans (Figure 3). In addition to bank reconstruction, the project heavily emphasizes woody vegetation plantings. The intent is that lateral migration into the terraces is largely arrested and that further channel evolution occurs between the toe of the re-built banklines and the opposite bank floodplain.

The project will stabilize eroding banklines with bioengineering methods well-tested in the area that include:

- Vertical bank layback of 4,448 feet inclusive of 12,543 cubic yards of excavation. *This large total represents a significant sediment load that will not be recruited to the creek if the channel remained untreated.* This material will be placed in upland locations, graded and seeded.
- All re-sloped banklines will include an inset floodplain bench either 5 or 8 feet wide for a total of 0.68 acres of new inset floodplain area. The foundation of this bench will include a total of 2,680 cubic yards of locally excavated pit run screened for the D50+ gravel/small cobble component.
Figure 3. Typical bankline treatments for Hamilton Ranch.

- The bench foundation will be surfaced with native sod and/or native sod/sapling willows harvested principally from the opposite bank floodplain surface. Several off-channel suitable sod donor areas have been identified for the banklines.
- The as-built stability will be excellent and will significantly arrest the rate of future channel migration.
- Banks that exceed 6’ vertical will be back-sloped with a mid-bank bench for planting upland shrubs.
- Dormant willow stem plantings (approximately 13,344 total) will be installed on benches in two manners per the Plans: 1) vertical stems on the bank toe bench using a hydr-ojet stinger and; 2) bankslope planted willow bundles. The latter strategy promotes willow establishment on the mid- to upper-banks otherwise above the normal zone of bank saturation.
- Mid- and upper-banks will be planted with approximately 3,586 containerized shrubs of varying size endemic to the site: (chokecherry, alder, potentilla, hawthorne, currents, etc).
- All re-sloped banklines will be hydroseeded with native seed mixes and include both tackifier and mulch.
- Project plantings expected to occur over a 3-year period with approximately half of total installations occurring in Year 1 and the remaining half in Years 2 and 3 based on observed success of Year 1 installations, (an adaptive management approach).
• The bench foundation will be surfaced with native sod and/or native sod/sapling willows harvested principally from the opposite bank floodplain surface. Several off-channel suitable sod donor areas have been identified for the banklines.

Based on similar projects utilizing this bankline stabilization technique we anticipate that treatment to be highly effective for decades given the general lack of erosive flood energy combined with increasing structural integrity as the planted riparian vegetation matures.

Farming Set Backs

As an additional conservation and sediment reduction measure approximately 750 feet of existing channel bankline is within 50 feet of currently cultivated ground and/or hay pasture. A cropping set back of 50 feet will be established in these areas. In cultivated areas, this corridor will be converted to native grasses. Overland transport of sediment to the stream channel is not currently an issue though converting areas near the stream channel to unmowed or cultivated condition will provide even more assurance that sediment will not enter the channel.

Anticipated Construction Cost

- Permitting (404, 310, SWPPP/NOI) $12,000
- Heavy equipment, construction and materials $135,160
- Revegetation and restoration planting $50,000
- Project management and supervision $15,000

Total: $212,160

The lineal treatment cost with all associated project elements is approximately $48/ft.

Walker Property Fish Passage and Habitat Enhancement – Owner Lonny Walker

Montana Trout Unlimited and the project team secured a $14,626 Fish, Wildlife & Parks Future Fishery Improvement Program grant directly related to implementation of the fish bypass structure and upstream bank stabilization work. The work will occur on the Walker Property where the Dry Creek Canal headgate is located. The work focuses on creating in-channel habitat diversity and extensive shrubby riparian and mesic plantings in a straightened reach of stream directly below the headgate. The successful grant application emphasized the importance of engaging as many landowners as possible on the project as part of a longer-term objective of enhancing stream health in Dry Creek and the East Gallatin River. No 319 funding is being requested for this project element though it is indicated as a matching effort.

Fish and Flow Bypass Structure – Owner Dry Creek Irrigation Company/Lonny Walker
Existing Condition

In the existing condition all Dry Creek flows are intercepted by the Dry Creek Canal during the irrigation period, effectively truncating any connectivity with Dry Creek and the E. Gallatin River during this period (Figures 4 and 5). This creates a de-watered condition in lower Dry Creek for approximately 0.6 miles from mid-April to mid-October. The canal company does not have water rights for this diversion of flows.

Figure 4. Area map of fish bypass location.
Proposed Treatment

In preparation of the year 2016 grant submittal the project team undertook a design feasibility and cost estimate process for installing either a flume or headgate to isolate the canal from Dry Creek on a year-round basis. In conversation with the Dry Creek Canal the project team now is proposing a fish and flow bypass structure to route flows under the Dry Creek canal without a flume or siphon. A preliminary engineering feasibility study indicated that such a project is feasible and will be far more cost-effective than either a flume or siphon.

Elements of the bypass include:

- Ability to route 20-30 cfs of Dry Creek flows under the ditch in an open-bottomed concrete culvert during the irrigation season;
- During the irrigation season Dry Creek typically flows between 4-15 cfs meaning that the overwhelming majority of Dry Creek flows will be isolated from the canal during irrigation season.
- A simple diversion structure will route flows into the bypass channel and culvert when the canal is conveying flows. During non-irrigation periods all flows will flow down Dry Creek.

Proposed treatment Cost

PENDING

Additional Project Details Addressing DEQ Questions Following 2016 Submittal

The following is a narrative directed towards specific questions posed by the DEQ review panel.

Project Landowner Information

The project area is co-owned by Big Blue River LLC and Hamilton Ranch LLC, which Stephen Carlson as managing owner/project client on behalf of both entities.

Current and Future Stream Corridor Management

The entire stream corridor is currently managed for wildlife, aquatic habitat and open space and will be so for the long-term. There is no current or proposed future livestock grazing in the project area.

Beaver
Beaver are periodically present in the upper extent of the project area. The current management regime is beaver tolerant but with some control. Control activities include some removal of nuisance dams (those affecting ranch infrastructure) and holding the population to sustainable levels. A central management issue is the desire to see the entire riparian corridor recover to full potential, with a two-tier riparian canopy, (willow understory and alder and tree-form willow over-story). Managing beaver numbers is important for maintenance of the over-story until the current lower tier willows achieve greater maturity. Additionally, beaver can significantly increase planted riparian shrub mortality so adaptive beaver management strategies are anticipated.

**Anticipated Results of No-action Alternative for 10-20 Years**

Without project action to stabilize banklines the channel thalweg will remain on vertical bank toes for at least 20 years or longer as these boundaries are the path of least stream resistance. Ongoing bank failure from both undermining and gravity failure will persist through that period.

**Channel Migration**

As noted in the project narrative above, a critical project design objective is to limit channel migration into the high terraces. Our geomorphic analysis of the site suggests that the now incised channel, (relative to when it occupied the floodplain at the current top of terrace elevations) has evolved to a sufficient total floodplain width for natural channel evolution without continued migration into the terraces.

**Final Observations**

This project is unique for Gallatin County with respect to a project that addresses two different but serious impairments to water quality with a number of different landowner interests and conservation interests, (bankline project area owners, trout Unlimited, Greater Gallatin Watershed Coalition, Dry Creek Irrigation Company), on a single tributary. Further, the project cost share landowner representative Stephen Carlson is providing cash matches that otherwise a “large needs and means” project like this possible, without costs incurred to Dry Creek Irrigation Company or Lonny Walker. This is a unique “win-win” scenario where water quality is greatly improved, hydrologic connectivity restored to an important tributary to a high value fishery in the East Gallatin River, and needed irrigation infrastructure upgrades provided for members of the agricultural community. This level of cooperation and overlapping of private and public interests is unprecedented in Gallatin Valley and may become a model for future cooperative and beneficial projects in the area.