United States Department of Agriculture

2022-2025

Gallatin Surface Water Quality CAFO TIP

CAFO along Camp Creek, Gallatin County, Montana, 2016.
Photo: Shawna Taylor

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FY 2022-2025

ABSTRACT

The Project Area includes Camp Creek and Godfrey Creek as well as partial lengths of Hyalite Creek and the East Gallatin River. Camp Creek and Godfrey Creek outlet into the Gallatin River are on the Montana Department of Environmental Quality (MT DEQ) 303d list for E. Coli, nitrogen, phosphorus, and sediment impairment. Lower Hyalite Creek outlets into the East Gallatin River and is on the MT DEQ 303d list for nitrogen impairment (MT DEQ CWAIC, 2020).

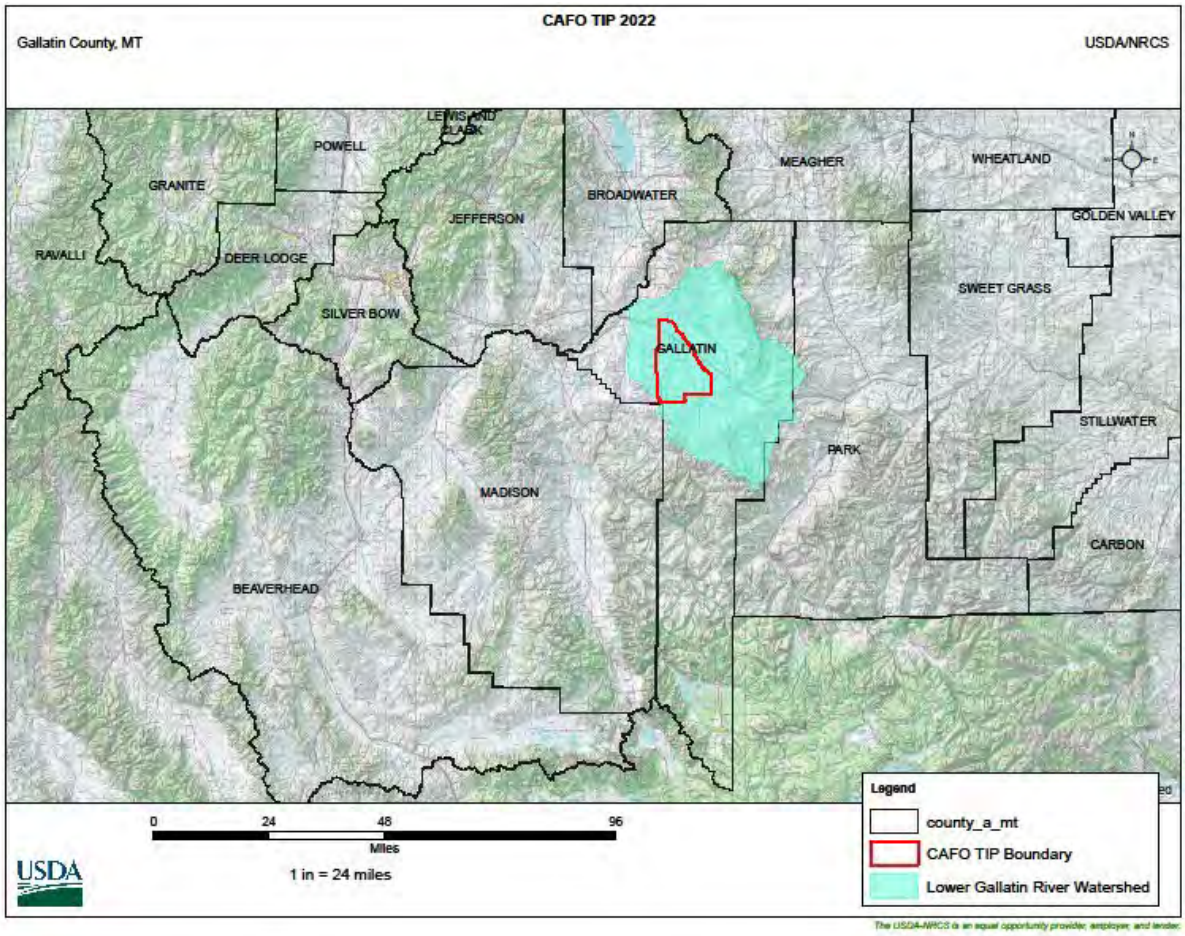

Figure 1. *CAFO project area in Southeastern MT*

The primary resource concern being addressed with this Targeted Implementation Plan (TIP) is surface water quality degradation resulting from nutrients, pathogens, and chemicals from manure being transported to surface water. Secondary resource benefits will be a reduction in concentrated erosion from streambanks and improved livestock production due to better off-stream stockwater quality and distribution. Surface water resource concerns will be mitigated by either removing or relocating 1 to 2 CAFOs per year, with a total goal of 8 being completed over the span of the 4-year project. Prioritization will be given to CAFO facilities with closest proximity to and direct livestock access to surface water. The TIP will commence in FY2022 and end in FY2025.

OVERVIEW/BACKGROUND

The US Environmental Protection Agency's definition of an Animal Feeding Operation (AFO) contains two requirements. First, livestock must be confined for a minimum of 45 total days in a calendar year; and second, crop or perennial vegetative growth is not sustained on the location (USEPA).

An AFO can further be classified as a CAFO if it is large in size or directly discharges waste to surface waters (USEPA). The distinction between the AFO and CAFO labels is important, as it affects the regulatory status of an agricultural operation. All CAFOs are considered a point-source of pollution under the Clean Water Act and are required to obtain and maintain a National Pollution Discharge Elimination System (NPDES) permit (USEPA). CAFOs can negatively impact surface water quality by loading streams with excessive nutrients and pathogens and potentially harming aquatic environments and drinking water quality.

Any AFO with 1,000 or more beef cattle or 700 or more dairy cattle is classified as a Large CAFO, regardless if access to surface water or discharge of waste exists. Any AFO with 300 to 999 head of beef cattle or 200-699 head of dairy cattle and direct access to surface water or direct discharge of waste is classified as a Medium CAFO. A small AFO with less than 300 head of beef cattle or less than 200 head of dairy cattle that also has the designation as a "significant contributor of pollutants" is classified as a Small CAFO on a case-by-case basis, depending on the permitting authority's definition of "significant contributor of pollutants" (Appendix). Based on the criteria outlined in the NRCS National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook Chapter 2, MT Supplement, the MT NRCS has concluded that any small AFO with direct access to surface water or direct discharge qualifies as a significant contributor of pollutants and is therefore considered a Small CAFO (MT NRCS, 2012).

Gallatin County leads Montana in dairy production. With a milk cow population of 3,500, Gallatin County represents approximately 1/3 of Montana's total milk cow population of 12,000. Gallatin County also accounts for over three times the number of milk cows as compared to the second largest milk cow populated county of Cascade. Gallatin County's beef cattle population is 41,000 which is less than 2% of the Montana beef cattle total of 2.5 million (Montana Ag Stats, 2019).

Table 1. *Percent grazeable acres and cattle population, Gallatin County, MT.*

County	Total Acres	Shrub and Grassland Acres[1]	Percent Grazeable Acres[2]	All Beef and Dairy Cows (2019)[3]
Gallatin	1,684,503	664,947	39	44,500

[1] NASS, Cropscape, 2019. [2]Does not include evergreen forest landuse. [3]Montana Ag Statistics, 2019.

The TIP boundary encompasses approximately 130 square miles located within the western portion of the larger Lower Gallatin River Watershed (Figure 2). Most of this area is under crop production, providing locations for safely spreading manure to meet the requirements of a Comprehensive Nutrient Management Plan (CNMP). The TIP is bordered by the East Gallatin River to the north, follows the Godfrey Creek Watershed's eastern boundary, then encompasses a portion of the Hyalite Creek watershed to Love Lane. The southern TIP border loosely follows the Norris Highway and its western boundary runs along the Madison Plateau and north to the East Gallatin River. Lower Camp Creek and Godfrey Creek Watersheds are mostly contained within the TIP boundary. The Lower GallatinRiver Watershed has been designated by MT DEQ as a priority basin to address water quality issues beginning in 2022.

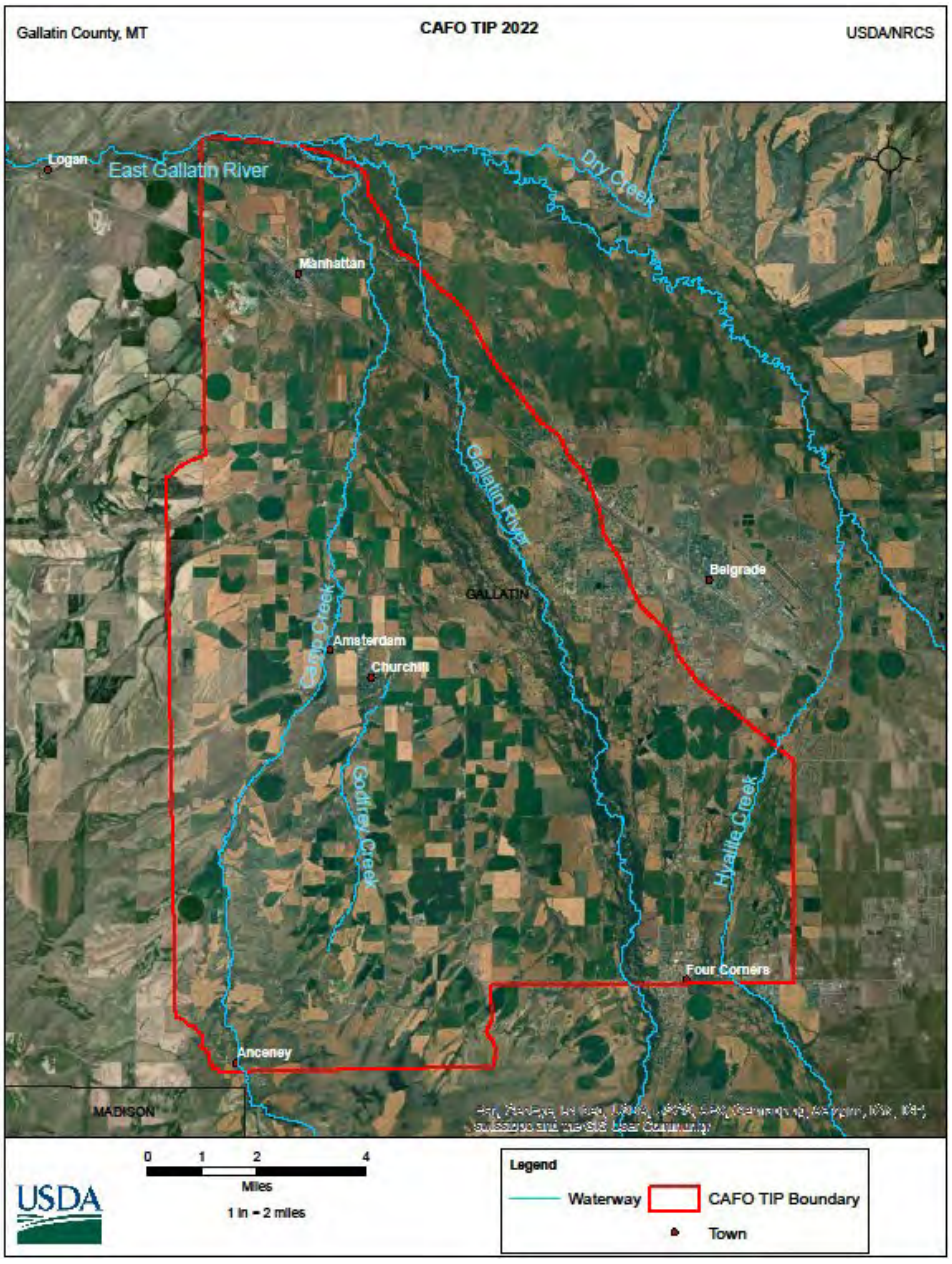

Figure 2. *CAFO project area in Southeastern MT*

Figure 3. *Small CAFO of 60 beef cattle prior to mitigation, 2016.*
Photo: Shawna Taylor

The project area contains an estimated 28 small CAFO sites that are designated as a moderate to high pollution potential. Within the TIP boundary there are an additional 10 to 15 small AFO sites that have been previously treated or are designated as a low to moderate pollution risk. Historically, working cattle corrals and seasonal feeding areas were built directly on surface waterbodies to allow access for livestock water. Many of these locations were constructed over 50 years ago, expanded over time, and are still in use today.

All types and sizes of livestock CAFOs will be considered eligible for this TIP. However, our professional experience suggests that most applications will be for small or medium CAFOs associated with dairy and/or beef production. In the last ten years, the Bozeman NRCS Field office has contracted nine CAFO relocation projects through the Environmental Quality Incentive Program (EQIP) all of them were associated with cattle production.

PROBLEM STATEMENT

The resource concern identified with CAFOs is the negative impact on surface water quality. CAFOs produce waste including manure, urine, excess feed, and dead animals. This waste can contaminate surface waters with nitrogen, phosphorus, sediment, E. coli, and increased biological oxygen demand (BOD) and chemical oxygen demand (COD).

The average 1200 lb beef cow will excrete 125 lbs of manure in one day, containing 15 pounds of solid material. Likewise, the average 1375 lb lactating dairy cow will excrete 150 lbs of manure in one day, containing 20 pounds of solid material (AWMFH, 2008). To illustrate the potential negative impact one CAFO can have, consider the following example; if a CAFO holds 100 beef cows for 180 days, 22,500 pounds of total manure, including 2700 pounds of solid material, can potentially enter the watershed each year. Over 20 years, this one CAFO could potentially load 450,000 pounds of total manure, including 54,000 pounds of solid material.

Waste from these facilities requires a high level of management for safe storage, treatment, and utilization. Whether waste is stored as liquids or solids, it is essential to use well-designed, operated, and maintained structures to ensure the waste does not contaminate streams, wetlands, or wells. In addition, when waste is applied to cropland, proper application is needed via a nutrient management plan to ensure phosphorus (P), nitrogen (N), and pathogens from that waste do not contaminate surface and ground water resources.

Water contaminated with nitrate-nitrogen above 10 ppm poses a health risk for humans and young livestock who use those waters for drinking. Surface waters contaminated with P can experience algal blooms (eutrophication) and subsequent oxygen depletion. Organics in surface waters can also cause oxygen depletion due to increased BOD, decreasing the availability of oxygen for aquatic life. Several aquatic species of concern (SOC) are present in the project area (MTNHP, 2020). Species of note include invertebrates: Hooked Snowfly, Alberta Snowfly, Western Pearlshell and fish: Westslope Cutthroat Trout. Threats to these species' habitats are primarily in the form of degraded water quality: increased stream temperature, sedimentation, reduced dissolved oxygen, and eutrophication. Improvements in water quality, in the form of sediment or pollutant mitigation, constitute marked habitat improvements for several SOC in the project area.

Surface water contaminated with pathogens represents a health risk to recreationists or communities using that water for drinking. In addition to nutrients and pathogens, CAFO waste may include cleaning compounds, hormones, medicines, heavy metals, pesticides, and excessive salts.

GEOGRAPHIC SCOPE

The geographic scope of the TIP is intended to support and compliment partner efforts in the Lower Gallatin TMDL planning area. As a group effort, past and future projects will have a cumulative positive impact on water quality.

TMDLs (Total Maximum Daily Load) identify pollution sources of surface water and create thresholds for various contaminants. More importantly, TMDLs create a written plan for pollution reduction. Often, these TMDLs are developed in response to a reported water quality issue, such as detected N, P, sediment, E. coli, and more. Without the development of a TMDL for a given waterbody, it can be impossible to accurately determine the definitive source of any given impairment. Impairments may result from multiple sources including CAFOs, municipal wastewater treatment, septic systems, mining operations, water erosion from cropland, and more.

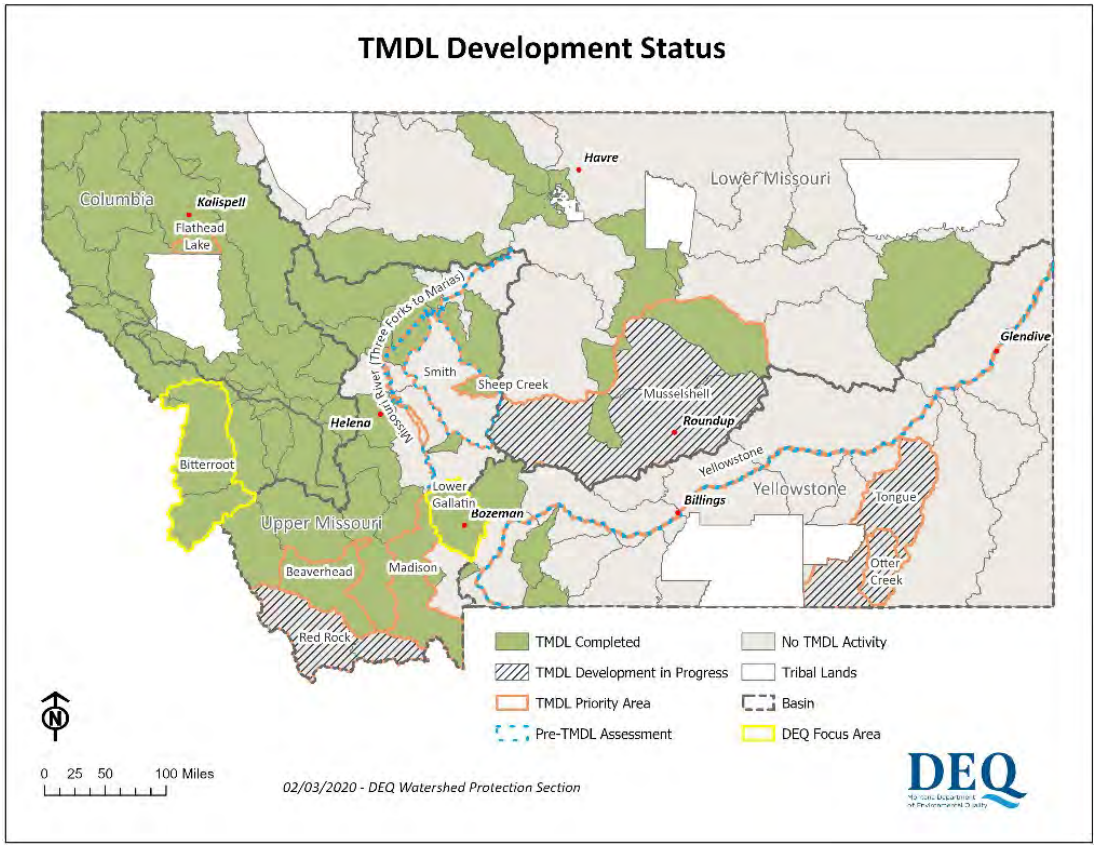

Figure 4. *Montana TMDL Development Status (MT DEQ, 2020).*

The Lower Gallatin Planning Area TMDL and Framework Water Quality Improvement Plan addresses problems with sediment, nutrients, and pathogens within its 15 impaired tributaries. Of the 15 impaired tributaries, the 2022 TIP boundary partially includes Hyalite Creek (nutrient impairment) and the East Gallatin River (nutrient impairment) and fully encompasses potential CAFO's in the Godfrey Creek (nutrient, sediment, pathogen impairments) and the Camp Creek (nutrient, sediment, pathogen impairments) watersheds. Among likely pollution sources, multiple agricultural impacts including livestock access are listed by DEQ as a source for water quality impairments within the TIP boundary (MT DEQ CWAIC, 2020).

In addition to the DEQ Lower Gallatin Planning Area TMDL and Framework Water Quality Improvement Plan publication, the Greater Gallatin Watershed Council sponsored and developed the Lower Gallatin Watershed Restoration Plan. Within this Restoration Plan,

the large scale of the Lower Gallatin River watershed has been divided into smaller areas: East, West, North and Bozeman (Figure 5). This TIP boundary lies within the Western delineation.

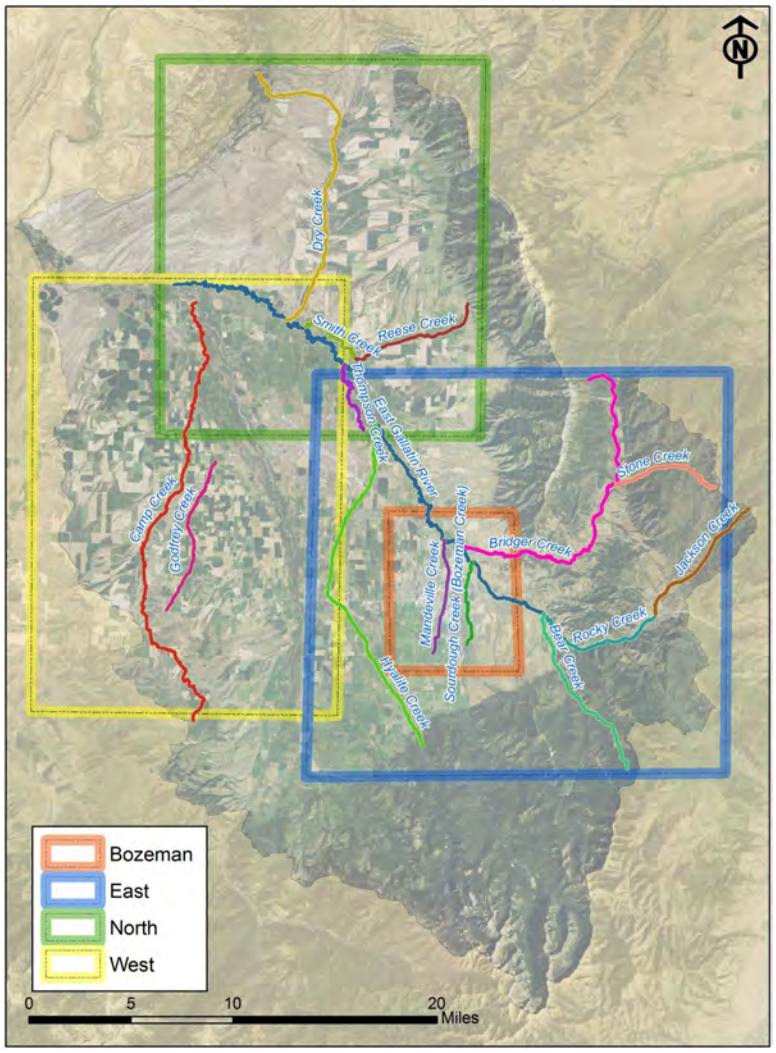

Figure 5. *Lower Gallatin Watershed Restoration Plan areas (MT DEQ, 2020). The TIP boundary lies within the West area.*

Rather than focusing on one Lower Gallatin River tributary, the TIP boundary includes multiple tributaries within the West area largely due to the anticipated scattered and unpredictable producer participation. While EQIP funding of the TIP is designed to cover approximately 75% of the cost of mitigation, there is still a cost to the producer. Unlike other suites of conservation practices, the producer will see no immediate improvement to their income statement and cash flow upon implementation. For example, a producer who installs irrigation improvements through EQIP may see decreased electrical pumping costs and increased crop yield. In contrast, livestock producers who move a corral off a stream will have upfront cost outlays with no immediate cash return, such as increased milk prices or improved weaning weights.

Capital improvement projects such as this certainly increase the value of the property and boost the balance sheet. They may also improve the ease of livestock handling, decrease standing water and disease pressure, and more. However, these issues alone do not encourage producers to address CAFO issues when there is no immediate economic reward. As a result, it's difficult to predict a small geographic area of producers who will choose to participate as it depends on financial readiness and intrinsic motivation that vary greatly from one producer to the next.

GOALS AND OBJECTIVES

The goal of this TIP is to relocate or remove 1 to 2 CAFOs per year in the TIP boundary. With a total goal of 8 CAFOs over the project timeline of 4 years, resulting in decreased nutrient and pathogen loading to surface water.

All projects must be a CAFO with a demonstrated surface water quality resource concern and be located within the Project Area to be considered. In addition, CAFOs with manure (or liquid equivalent) production of over 100 tons per year will be given higher ranking to focus the work on projects with greater loading potential.

Figures 6 through 8 give an example of a CAFO relocation completed with NRCS EQIP funding in 2015. Figure 6 shows the Small CAFO with access to surface water prior to relocation. Figure 7 shows the same location after the CAFO has been removed and relocated and the site revegetated. Figure 8 shows the location of the new AFO (no longer a CAFO) with no access to surface water.

Figure 6. *CAFO with access to surface water prior to relocation.*

Figure 7. *Original CAFO site after revegetation and removal of livestock.*

Figure 8. *New AFO facility after relocation to alternate site.*

Note there is no access to surface water.

ALTERNATIVES

There are two viable alternatives to consider:

1) No Action – This alternative means that no action will be taken and the CAFOs will continue to operate and be managed as they currently are. In this alternative, livestock will continue to have direct access to surface water resulting in excess nutrients entering the streams and rivers in the target area. Additionally, this alternative allows runoff from these sites to enter surface water. In nearly all cases, manure spreading will not take place within the scope of a Comprehensive Nutrient Management Plan (CNMP) that balances manure application with plant nutrient consumption.

2) CAFO closure or relocation and manure management – This alternative involves closure or relocating corrals and/or feedlots that allow livestock to have direct access or directly discharge into surface water. A Comprehensive Nutrient Management Plan (CNMP) will be written and followed to ensure that applied manure is not contributing to excess nutrients in surface waters. Development of a CNMP is required by national NRCS policy (General Manual Title 190 Part 405.10).

PROPOSED SOLUTION AND ACTION

CAFO facilities located on or near water bodies can have a negative impact on overall water quality. The CAFO TIP will fund livestock producers to utilize NRCS practices to relocate, retrofit, or remove their existing corrals and/or confinement facilities to eliminate any direct livestock contact or discharge to a water body. The combination of engineering and management practices will allow these producers to appropriately manage their confined livestock and manure production in an environmentally sound way. The financial assistance provided by NRCS can help offset the economic risk involved with any major infrastructure change or reorganization.

Montana Feedlot Annualized Runoff Model (MontFARM) is a water quality risk assessment tool for evaluating the surface water pollution potential of an AFO/CAFO site (MT NRCS, 2011). It estimates annual pollutant loading for common nutrient and organic measures, then converts the annual loading to a severity index on a scale of 0 (extremely low risk) to 100 (extremely high risk) based on input data. For reference, any CAFO with direct access to surface water scores 100 on the MontFARM index. MontFARM will be utilized to evaluate pre- and post-relocation risk assessment index values related to the facility's annual loadings of 5-day Biological Oxygen Demand (BOD5), Total Nitrogen, Total Phosphorus, and Chemical Oxygen Demand (COD). All selected projects shall meet NRCS surface water planning quality criteria with a post-relocation MontFARM index of less than 19 upon completion.

CORE AND AUXILIARY PRACTICES

All projects will use the same set of core NRCS conservation practices with auxiliary practices (Table 2) available depending on the resource concern.

***Table 2**. Conservation practices for CAFO relocations or removals.*

Core Practices	Auxiliary Practices
Critical Area Planting (342)	Access Road (560)
Fence (382)	Nutrient Management (590
Heavy Use Area Protection (561)	Pumping Plant (533)
Livestock Confinement Facility (770)	Roof Runoff Structure (558)
Livestock Pipeline (516)	Waste Facility Closure (360)
Livestock Shelter Structure (576)	Water Well (642)
Obstruction Removal (500), i.e.feedlot fence	-
Precision Land Forming (462)	-
Vegetated Treatment Area (635)	-
Watering Facility (614)	-

A Certified Nutrient Management Plan (CNMP) will be developed for every project. This plan ensures the producer is provided the information needed to apply their manure in an environmentally safe manner. Environment Technical Note MT-8 will be referenced for the required procedures and information contained within the CNMP (MT NRCS, 2017). Nutrient Management (590) could be used to assist the producer with their manure application and soil testing.

PARTNERSHIPS

Partnering entities include the Gallatin Conservation District, Gallatin Local Water Quality District, Greater Gallatin Watershed Council, Montana DEQ (Department of Environmental Quality) and the Gallatin Valley Land Trust.

Montana DEQ has prioritized the Lower Gallatin Watershed as a priority basin to address water quality impairments beginning in 2022. With this designation the MT-DEQ will prioritize $500,000 per year in 319 grants, available to partner organizations to address water quality concerns in the Lower Gallatin Watershed. DEQ has provided valuable information regarding stream data for nutrients and sediment. Their Total Maximum Daily Load (TMDL) and 303d information was valuable in this TIP development. The Lower Gallatin Watershed Restoration Plan sponsored by the Greater Gallatin Watershed Council and DEQ was also valuable in providing information for this TIP.

This TIP will benefit from the Gallatin Conservation District's 223 grant money in support of limiting livestock access to surface water through fence and off-stream watering systems. Past 223 grants have

resulted in expending over $18,000 in support of limiting livestock access to surface water and currently up to $1,000 cost share is available for each eligible project through the Conservation District.

Gallatin Valley Land Trust has partnered with NRCS to prioritize environmental improvements through the RCPP EQIP program within the Lower Gallatin Watershed.

From 2017 through 2020, the Camp Creek and Godfrey Creek watersheds have received over 3.2 million dollars through the NRCS National Water Quality Initiative (NWQI) for improvements benefiting water quality. Much of this money has addressed sediment and excess nutrient water quality concerns stemming from cropped land. Although improved irrigation efficiency and nutrient management on cropland are key practices to improving water quality, livestock impacts to surface water must be prioritized to meet water quality goals. NWQI funding in these watersheds ends in 2021, leaving numerous CAFO's unaddressed and contributing to surface water impairments. This TIP would efficiently build on NWQI outreach momentum and continue improving water quality through CAFO closures and relocations.

The Gallatin Water Quality District and Gallatin Conservation District have been collecting water quality and flow measurement data for the past 5 years. These activities will continue to provide information on changes that are occurring in the watershed.

These partners play a critical role in promotion and outreach to encourage participation in this TIP. It is with strong partnerships focused on a common goal, that water quality improvements will have the greatest impact.

IMPLEMENTATION AND PROGRESS

Implementation of this TIP will begin in FY2022 and it will be completed by FY2025. EQIP funds will be used to implement practices listed on the list of core and auxiliary practices. The NRCS will implement this project through EQIP contracts with landowners and operators. The budget will vary based on landowner participation. It is anticipated that 1 to 2 landowners will participate each year. The local field office will complete the planning and application process, the area office agronomist will complete the CNMP, and the state office RPIT engineer will complete engineering portion of each project.

The amount of funds needed for each project will vary based on the size of the CAFO to be relocated and the practices that are needed to address the resource concerns. It is estimated the average for each contract will be $175,000 with a total annual budget shown in the table 3: The estimated cost for the entire length of the TIP is $1.4 Million The current FY EQIP Program Guide will be used for each year the TIP is funded.

Table 3. *Fiscal year budget*

FY 2022	FY2023	FY2024	FY2025
$175,000	$525,000	$525,000	$175,000

PROGRESS EVALUATION AND ASSESSMENT

Success of the Big or Small Treat Them All CAFO TIP will be evaluated by the overall number of CAFOs successfully mitigated to a MontFARM index score of less than 19. The goal is to contract 1 to 2 projects per year, with a total of 8 projects completed over the 4-year span of the TIP. We recognize this does not completely address all possible CAFO issues within the TIP boundary. However, we also recognize that any CAFO mitigation will contribute to cleaner surface water. It is our hope that through this TIP we can continue to build on the positive impacts made over the past few years through the NWQI.

Direct surface water quality monitoring and testing will not occur, however MontFARM evaluations of numerous prior CAFO relocation projects in Montana have shown a near tenfold reduction in annual loadings of 5-day Biological Oxygen Demand (BOD5), Total Nitrogen, Total Phosphorus, and ChemicalOxygen Demand (COD). Similar results are expected for any future CAFO mitigation projects. Reductionsin pollutant loading of this magnitude will have significant positive effects on surface water quality. As with any project involving NRCS technical or financial assistance, National Environmental Policy Act (NEPA) concerns will be addressed through environmental evaluations that include cultural resources and threatened and endangered species reviews.

Tables 4 and 5 give several recent MontFARM pre- and post-relocation values. MontFARM pre- and post- relocation reports from a recent project are included in the Appendix. Note that all values are model-generated estimates of annual loading and not empirically measured quantities.

Table 4. *Annual MontFARM loading values for previous MT NRCS CAFO projects prior to mitigation.*

Facility	Total N (lbs)	Total P (lbs)	COD (lbs)	BOD5 (lbs)	MontFARM Index Value
A	308	71	3010	669	100
B	36	12	648	144	100
C	11	4	204	45	100
D	53	18	952	212	100
E	66	22	1167	259	100

Table 5. *Annual MontFARM loading values for previous MT NRCS CAFO projects after mitigation.*

Facility	Total N (lbs)	Total P (lbs)	COD (lbs)	BOD5 (lbs)	MontFARM Index Value
A	5	2	88	20	12
B	3	1	50	11	8
C	2	1	29	6	5
D	4	1	73	16	12
E	5	2	86	19	12

Photo monitoring will be completed on all project sites with an emphasis on documenting the recovery of the vegetative cover near the protected water body. Figures 9 and 10 show an example of a CAFO relocation along Camp Creek in Gallatin County where the livestock were removed from the creek and the riparian area was replanted to perennial grasses and trees.

Figures 9 and 10. *CAFO with direct stream access prior to mitigation (left), and after mitigation (right) with livestock excluded and riparian area reseeded to perennial grass and trees. Photos: Shawna Taylor.*

OUTCOMES

Each completed project will result in:

1) A 10-fold reduction in nutrient loading, or the equivalent of one dump truck of manure not entering surface water annually.
2) An estimated ¼ mile of stabilized streambank from the removal of uncontrolled livestock access. This will reduce the sediment load to surface water, leading to reduced turbidity and increased surface water clarity.

RANKING AND PRIORITIZATION QUESTIONS

PRIORITIZATION QUESTIONS

See state priority screening tool for questions 1 through 3.

LOCAL RANKING QUESTIONS

1. Do livestock have direct access or contact to surface water?
2. Proximity of facility to surface water, answer one:
   a. 0-50 feet:
   b. 51-150 feet:
   c. 151 feet or greater:
3. Does the facility currently produce (last calendar year) more than 100 tons of manure(or liquid equivalent) annually according to MMP software values?
4. Upon completion, will the relocated facility be located outside of the 25-year floodplain?
5. Will a vegetative treatment area (VTA) be installed as part of the application?
6. Is the proposed project on land that is permanently protected through a conservationeasement or are the acres under an agreement to proceed with a conservation easement?

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APPENDIX

1. Regulatory Definitions of Large CAFOs, Medium CAFO, and Small CAFOS
2. TMDL Map
3. MontFARM examples