DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

GREG GIANFORTE, GOVERNOR

1539 ELEVENTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE: (406) 444-2074
FAX: (406) 444-2684

PO BOX 201601
HELENA, MONTANA 59620-1601

FINAL ENVIRONMENTAL ASSESSMENT

Project Name:	Golden Valley County – Musselshell River Bank Restoration
Proposed Implementation Date:	October 2023
Proponent:	Golden Valley County
Location:	46.299160, -109.035991
County:	Golden Valley

I. TYPE AND PURPOSE OF ACTION

The Cushman Bridge spans the Musselshell River and is a major traffic artery that provides critical emergency services access to Cushman, Montana, and other Golden Valley County residents. Following the 2011 flood event, the bridge was washed out and subsequently replaced. Post-flood, the river also abandoned the old channel and began flowing in a new southerly channel that has created a meander bend just west of Cushman Road. This new channel has resulted in a loss of land and is also threatening to bypass the bridge and threaten Cushman Road. Some work has been completed to slow or stop erosion of the southwest bank toward the bridge and Cushman Road; however, the new river channel continues to erode and threaten the bridge and road.

This environmental assessment will examine the likelihood of any negative impacts to the floodway by the proposed bank protection project on the Musselshell River, located just north of Cushman, Montana on Cushman Road off Highway 12 (Section 01, T06N, R21E). The proposed bank protection consists of laying the existing vertical bank back to a 2:1 slope along with the installation of a combination of rock riprap and planted vegetation. The proposed length of the bank protection is just over 400-feet on the south bank of the river and is intended to protect the adjacent agricultural field from continued loss of land from channel bank erosion. The crossing is located at 46°17’55” Latitude and -109°2’11” Longitude.

In addition, as part of the *Multi-Hazard Mitigation Plan, 2021 Update, Golden Valley County, Montana, and Towns of Ryegate & Lavina, Montana*, dated November 2021, the Musselshell Watershed Coalition, working with Golden Valley County, identified Cushman Bridge as being vulnerable to flooding and resulting damages to property and impacts on city services necessary for risk protection during flood season.

The purpose of this project is to realign the river back into the pre-flood channel and stabilize the river banks to reduce erosion, improve aquatic and riparian habitat, improve the hydraulic capability of the river to withstand future flooding, and safeguard downstream critical facilities and infrastructure.

Project objectives include the following:

- Excavate the pre-flood channel and construct new banks with a brush matrix bank treatment, using onsite materials to the extent practicable.
- Realign and divert the river back into the pre-flood channel by installing a large woody debris plug in the post-flood channel.
- Place excess excavation material from the reconstruction of the pre-flood channel into the post-flood channel to create floodplain and wetland areas.
- Install salvaged and locally harvested willow clumps into the new floodplain.
- Regrade the post-flood cutbank to a more stable slope (3:1) and seed to reduce the chance of additional erosion during large flood events.

Procurement of an engineer and preliminary engineering design were completed in 2021 and 2022, respectively. Final engineering design, permitting, and construction contractor procurement were projected to be completed in 2023. These tasks are expected to begin upon Department of Natural Resource and Conservation (DNRC) approval of American Rescue Plan (ARPA) grant funding for the project. Construction of the project was projected to begin in October 2023 with project closeout completed by May 2024.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project. List number of individuals contacted, number of responses received, and newspapers in which notices were placed and for how long. Briefly summarize issues received from the public.

Golden Valley County is providing financial assistance for the project. Pioneer Technical Services completed a preliminary design and cost options for the project in June 2022. Stahly Engineering and Associates has been retained by Golden Valley County to assist with grant management and potentially surveying and engineering services.

No public involvement activities or project notices placed in any newspapers are known to have been completed.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

Examples: cost-share agreement with U.S. Forest Service, 124 Permit, 3A Authorization, Air Quality Major Open Burning Permit.

In addition to the DNRC ARPA grant, Golden Valley County has provided a letter of commitment and $39,868 of matching funds for the project.

A *Joint Application For Proposed Work In Montana's Streams, Wetlands, Floodplains, & Other Water Bodies* is planned to be completed.

Required permits include:

- U.S. Army Corps of Engineer's (USACE) Section 404 – required through the Clean Water Act for all projects that may discharge dredged or fill material into waters of the United States, which included erosion control projects.
- DNRC's Natural Streambed and Land Preservation Act's 310 permit – required for any

activity that physically alters or modified the bed for banks or a perennially-flowing stream.

- Montana Fish, Wildlife and Parks' Stream Protection Act (SPA) 124 permit – required for any project that may affect the beds or banks of any stream in Montana.
- Montana Department of Environmental Quality (DEQ) 318 authorization – require for projects that may cause short-term or temporary violations of state surface water quality standards for turbidity.
- USACE's Federal Rivers and Harbors Act's Section 10 permit – required for any alteration of, or construction activity in any federally listed navigable water of the United States.
- DNRC's Land-Use License or Easement on Navigable Waters – required for any entity proposing a project on lands below the low water mark of navigable waters.
- DEQ's Stormwater Discharge General Permits – required for any construction or other defined activity that has a discharge of storm water into surface waters. Under the Montana Water Quality Act, permit authorization is typically obtained under a Montan Pollutant Discharge Elimination System (MPDES) general permit.
- DNRC's Streamside Management Zone Law – may be required for the harvest of willow matrices located within 50 feet of any stream or water body.
- County Floodplain Administrators' floodplain permits.

Listed permits may be obtained through the Joint Application Form, which applies to the 310 permit, SP124 permit, county floodplains permit, Section 404 permit, 318 permit, and land use licenses and easements.

---

3. ALTERNATIVE DEVELOPMENT:
Describe alternatives considered and, if applicable, provide brief description of how the alternatives were developed. List alternatives that were considered but eliminated from further analysis and why. Include the No Action alternative.

Pioneer Technical Services, Inc. completed a preliminary design and cost opinions for two alternatives. A No Action alternative was not considered. Two alternatives were analyzed for the Cushman Bridge site. The following alternatives summary is from the *Technical Memorandum, Rowton and Cushman Bridge Preliminary Engineering Report*, dated June 3, 2022:

Alternative 1: consists of a similar brush matrix bank treatment as proposed for on the Rowton Property, new bank will be constructed with coarse alluvium, willow cuttings and woody debris. The treatment will also include a small bench (10'-15') with willow cuttings and grading the steep cut bank back to a milder slope (3 horizontal to 1 vertical [3:1]). The brush matrix bank treatment will be placed near bankfull flow elevation and planted with locally harvested willow cuttings.

Alternative 2 (preferred Alternative): would realign the river back into the abandoned channel with the use of a large woody debris plug and new channel banks would be constructed using the brush matrix bank treatment. A large woody debris plug is an embankment placed in the active river channel to divert the flow into a newly constructed or re-activated channel. Large logs and/or root wads will be partially embedded within the embankment with the root ball side exposed to the river. The roughness from the woody debris provides habitat and reduces the erosive forces on the plug to help establish the new channel. Excess material from the re-activated channel excavation will be placed in the

current active channel to create floodplain and wetland areas. Locally harvested willow clumps (large, salvaged willow plants) will be placed in the new floodplain. The existing cut bank to the south will be graded back to a 3:1 slope and seeded to reduce the chance of additional erosion during large flood events.

Both proposed alternatives were based on April 2022 GPS survey data, 2011 LiDAR, and site observations." The Golden Valley County engineer reviewed the alternatives and **recommended the Alternative 2, that consists of reconstruction of the pre-flood channel and realignment of the river back into that channel.**

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

---

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:
Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify direct, indirect, and cumulative effects to soils.

Soils
Based on the preliminary engineering design figures, the NRCS Web Soil Survey mapping application shows that soils within a 4.2-acre area of interest consist of the following:

- Havre-Glendive Complex
  - 4.2 acres, 100.0% of total area
  - Slope: 0-2%
  - Typical soil profile: 0-4 inches, loam
    4-60 inches, stratified fine sandy loam to clay loam
  - Not prime farmland

Fragile, Compactable, or Unstable Soils
Soils within the post-flood channel new meander bend will continue to be susceptible to erosion with the threat of the river bypassing Cushman Bridge and threatening Cushman Road.

Special Reclamation Considerations
The area around Cushman Bridge falls within a mapped Zone AE flood zone and encroachment analysis along with any project permit requirements will need to be taken into consideration during final engineering design.

Unusual Geologic Features
No unusual geologic features have been identified.

Proposed Alternative – Short-term direct, indirect, and cumulative adverse impacts to soil stability.

Soils will experience direct adverse impacts when disturbed during excavation of the pre-flood channel and reconstruction of the riverbank. Surrounding soils have the potential to also be disturbed due to the nature of construction activities and site access necessary to complete the work. Soils within the post-flood channel will be directly disturbed due to the placement and grading of pre-flood excavated soils within that area to create new floodplain and wet areas. Soils along the post-flood channel cutbank will also be directly disturbed since the cutbank will be regraded to a more stable slope that is less susceptible to erosion.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the short-term adverse impacts. Realigning the river back into its pre-flood channel and designing the project to withstand a 100-year storm event will improve the hydraulic capability of the river channel to survive future flooding and reduce erosion and sediment loading to the river. This is expected to protect the overall water quality of the watershed and maintain and improve aquatic life and fish habitat within the river, the newly constructed floodplain, and wetland areas. It is also expected to safeguard downstream critical facilities and infrastructure from future flooding events.

No Action Alternative – Continued direct, indirect, and cumulative adverse impacts to soil quality and stability. Soils within the post-flood cut bank will continue to erode, and the threat of the river bypassing the Cushman Bridge and damaging Cushman Road will continue. The bridge, and potentially road, will continue to be at risk of being washed out from future flooding events. Downstream agricultural land, facilities, and infrastructure will continue to be threatened for future flooding events.

---

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:
Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify direct, indirect, and cumulative effects to water resources.

The project is located on the Musselshell River which is located within the Upper-Middle Musselshell total maximum daily load (TMDL) planning area and is listed as impaired for iron, lead, sediment, and E. coli (Discover DEQ Throughout Montana web mapping application). The contributing drainage basin area is over 80 miles long and over 45 miles in width, encompassing nearly 2,649 square miles. The drainage area originates at an elevation of over 8,500 feet, then drops approximately 5,000 feet to the project site. The majority, over 93%, of the drainage basin is located within the Upper Yellowstone-Central Mountain Region. Six miles downstream a river gaging station exists on the Musselshell River near Lavina, Montana, USGS Station Number 06126050.

The project is within the area covered by Flood Insurance Rate Map (FIRM) 300152 0570 B, Map Number 30037C0570B. This FIRM became effective on November 5, 2021, well before most of the bank erosion took place at the project location. For this reason, Stahly Engineering personnel completed a topographic site and hydraulic survey in July 2023. The hydraulic survey included 9 hydraulic cross sections throughout the length of the project as well as upstream and downstream. The hydraulic cross sections range from 600-feet upstream and 100-feet downstream of the bridge located on Cushman Road, just downstream of the bank restoration project (see attached StreamStats report). It should be noted that during high flows the river bank is completely overtopped, therefore the riprap will extend to the top of the newly constructed bank.

The Montana Bureau of Mine and Geology Ground Water Information Center (GWIC) web mapping

shows that wells within the larger project area are used for domestic and stock water purposes.

Proposed Alternative – Potential direct and temporary adverse impact to surface water quality during construction of the project. Since work will be occurring in and adjacent to a flowing river channel, there is the potential for temporary violations of surface water quality standards for turbidity. These adverse impacts are temporary, short-term and are not expected to have long-term direct, indirect, or cumulative adverse impacts to water quality. Permit requirements are expected to outline activities that must be carried out to protect water quality and minimize sedimentation to the river. It is also expected that the final engineering design will include methods for minimizing adverse impacts to water quality during completion of the project and, in addition to permit requirements, implementation of best management practices (BMPs) to reduce erosion and the unwanted release of soils and/or sediment to the river during construction of the project. No long-term direct, indirect, or cumulative adverse impacts to water quality, quantity, and distribution are expected.

Potential direct and indirect, long-term, cumulative beneficial impacts to water quality. Stabilizing the river into the previously active channel will help reduce sediment loading in the river by reducing the risk of new channels being created by erosion. A brush matrix bank treatment is planned to be used to reconstruct the pre-flood channel and reduce erosion of the newly constructed banks. Locally harvested willows and seed mix are planned to be used within the newly constructed floodplain, wetland, and recontoured post-flood cutbank to stabilize soils and reduce erosion into the river.

No Action Alternative – Continued direct adverse impacts to water quality from sustained erosion of the post-flood channel cut bank and associated sediment loading to the river which is already listed as impaired for sediment.

---

6. AIR QUALITY:

What pollutants or particulate would be produced (i.e., particulate matter from road use or harvesting, slash pile burning, prescribed burning, etc.)? Identify the Airshed and Impact Zone (if any) according to the Montana/Idaho Airshed Group. Identify direct, indirect, and cumulative effects to air quality.

The proposed project is not located in an air quality Nonattainment Area, as set by the U.S. Environmental Protection Agency's National Ambient Air Quality Standards. The project area is not listed as impaired in air quality pollutants per the Montana DEQ Air Quality Nonattainment Status List (Montana DEQ Air Quality website). No permitted air quality sources were identified within 1/2-mile of the project area (NEPAssist).

Proposed Alternative – Potential temporary, short-term, direct, localized adverse impacts to air quality may occur during construction due to ground disturbance caused by construction activities (i.e., dust). The nearest human occupied structures are located just southeast of the project area (Google Earth imagery). U.S. Highway 12 parallels the project work area to the north with Cushman Road located perpendicular to the west. Any air quality impacts are expected to be localized around project work areas and only impact the immediate area surrounding the construction area. It is not expected that any rural residences or motorists traveling along U.S. Highway 12 or Cushman Road will be adversely impacted by dust. Common construction dust suppression techniques (i.e., water application) are expected to be implemented. Long-term adverse impacts are not expected. The project is short-term with construction projected to take two months to complete.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to air quality are expected.

---

7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify direct, indirect, and cumulative effects to vegetation.

The Montana Natural Heritage Program identifies land cover (>3%) within a 1-mile buffer of the project area as the following (total of 5,738.3 acres):

- Big Sagebrush Steppe (45%, 2,609 acres)
- Great Plains Mixedgrass Prairie (28%, 1,634 acres)
- Cultivated Crops (7%, 412 acres)
- Great Plains Floodplain (5%, 279 acres)
- Introduced Upland Vegetation – Annual and Biennial Forbland (3%, 190 acres)
- Great Plains Ponderosa Pine Woodland and Savanna (3%, 188 acres)

The primary agricultural crops grown in Golden Valley County are hay and haylage, winter wheat, and spring wheat (Montana State University, Economic Impact of Agriculture, Golden Valley County).

The Montana Natural Heritage Program provides the following information related to vascular plant species within a 1-mile radius of the project area. Any US Fish and Wildlife Service (USFWS) threated or endangered, United States Forest Service (USFS) sensitive, or Bureau of Land Management (BLM) threatened or sensitive species classifications are also identified below.

Confirmed As Occurring Or Observed Within A 1-Mile Radius Of The Project Area

Potentially Present Species

Montana SSS

- None identified

Montana SOC

- Slim-pod Venus'-looking-glass (*Triodanis leptocarpa*)
- Long-sheath Waterweed (*Elodea bifoliate*)
- Platte Cinquefoil (*Potentilla plattensis*)
- Fleshy Stitchwort (*Stellaria crassifolia*)
- Crawe's Sedge (*Carex crawei*)
- Schweinitz's Flatsedge (*Cyperus schweinitzii*)
- Smooth Goosefoot (*Chenopodium subglabrum*)
- Scribner's Ragwort (*Senecio integerrimus var. scribneri*)
- Floriferous Monkeyflower (*Mimulus floribundus*)
- Silver Bladderpod (*Physaria ludoviciana*)
- Double Bladderpod (*Physaria brassicoides*)

Montana PSOC

- Little Indian Breadroot (*Pediomelum hypogaeum var. hypogaeum*)
- Small Yellow Lady's-slipper (*Cypripedium parviflorum*) – USFS Sensitive

Proposed Alternative – Direct, long-term, localized, nonrecurring adverse impacts to vegetation cover, quantity, and quality. Vegetation present within the pre-flood channel will likely be destroyed or disturbed since soil used as growth media will be excavated then placed within the post-flood channel and graded. Vegetation along the bank of the pre-flood channel may also be disturbed or destroyed during reconstruction of the pre-flood river channel. Vegetation along the post-flood channel cutbank may also be disturbed or destroyed due to regrading of the bank. Large willow plants are proposed to be salvaged and replanted within the newly constructed floodplain and wetland area.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the direct adverse impacts. Locally harvested willow cuttings are proposed to be used as part of the brush matrix bank treatment that will be used to reconstruct the pre-flood channel banks. If properly constructed, it is expected that the willows will naturally reestablish in and along the riverbank. Transplanted willow clumps within the newly constructed floodplain and wetland area are also expected to naturally reestablish. The native seedbank within the excavated soils is also expected to contribute to the natural reestablishment of vegetation within the newly construction floodplain and wetland area. In addition, seed is planned to be placed on the recontoured cutbank and will likely be placed in other disturbed areas as appropriate. With time, vegetation cover, quantity, and quality within disturbed areas are expected to reestablish. Post-construction site conditions are expected to resemble pre-flood conditions and look natural once vegetation established. Post-construction monitoring of vegetation reestablishment and weeds is recommended.

No Action Alternative – Continued direct, indirect, and cumulative adverse impact to vegetation cover, quantity, and quality. The post-flood channel cutbank will continue to erode, result in a loss of land and growth media, and adversely impact not only the riparian vegetation on the immediate bank but potentially adversely impact the upland vegetation. Downstream agricultural land and native land will continue to be threatened by damage from future flooding events.

---

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:
Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify direct, indirect, and cumulative effects to fish and wildlife.

Per Montana Fish, Wildlife and Parks and the USFWS, the project is not located within a wildlife habitat protection area or critical habitat for threatened and endangered species (FWP Wildlife Habitat Protection Area and USFWS Critical Habitat for Threatened and Endangered Species web mapping applications).

According to the Montana Sage Grouse Habitat Conservation Map mapping application, the project is located within sage grouse executive order (EO) general habitat classification area (EO-General Habitat), BLM general habitat management area, and Great Plains Management Zone.

Per the Montana Natural Heritage Program, bat roost (non-cave) important animal habitat (IAH) is confirmed as occurring or observed within a 1-mile radius of the project area.

The Montana Natural Heritage Program provides the following information related to terrestrial, avian, and aquatic life species within a 1-mile radius of the project area. Any USFWS threated or endangered, USFS species of conservation concern (SCC) or sensitive classifications, or BLM threatened or sensitive species classifications are also identified below.

Confirmed As Occurring Or Observed Within A 1-Mile Radius Of The Project Area

Montana Special Status Species (SSS)

- Bald Eagle (*Haliaeetus leucocephalus*) – USFS Sensitive, BLM Sensitive

Montana Species of Concern (SOC)

- Brewer's Sparrow (*Spizella breweri*) – BLM Sensitive
- Greater Sage-Grouse (*Centrocercus urophasianus*) – USFS Sensitive, BLM Sensitive
- Sage Thrasher (*Oreoscoptes montanus*) – BLM Sensitive
- Golden Eagle (*Aquila chrysaetos*) – BLM Sensitive
- Long-billed Curlew (*Numenius americanus*) – BLM Sensitive
- Loggerhead Shrike (*Lanius ludovicianus*) – BLM Sensitive
- Great Blue Heron (*Ardea herodias*)
- Bobolink (*Dolichonyx oryzivorus*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*) – BLM Sensitive
- Northern Redbelly Dace (*Chrosomus eos*)
- Black-tailed Prairie Dog (*Cynomys ludovicianus*) – USFS Sensitive, BLM Sensitive
- Hoary Bat (*Lasiurus cinereus*) – BLM Sensitive
- Spiny Softshell (*Apalone spinifera*) – BLM Sensitive

Montana Potential Species of Concern (PSOC)

- None identified

Other Observed Species

Montana SSS

- None identified

Montana SOC

- Northern Leopard Frog (*Lithobates pipiens*) – USFS Sensitive, BLM Sensitive
- Sharp-tailed Grouse (*Tympanuchus phasianellus*)

Montana PSOC

- Brassy Minnow (*Hybognathus hankinsoni*)

Potentially Present Species

Montana SSS

- None identified

Montana SOC

- Great Plains Toad (*Anaxyrus cognatus*) – USFS Sensitive, BLM Sensitive
- Pinyon Jay (*Gymnorhinus cyanocephalus*)

- Yellow-billed Cuckoo (*Coccyzus americanus*) – USFWS Partial Status Threatened, BLM Threatened
- American White Pelican (*Pelecanus erythrorhynchos*)
- Veery (*Catharus fuscescens*) – BLM Sensitive
- Burrowing Owl (*Athene cunicularia*) – USFS Sensitive, BLM Sensitive
- Green-tailed Towhee (*Pipilo chlorurus*)
- Thick-billed Longspur (*Rhynchophanes mccownii*) – BLM Sensitive
- American Bittern (*Botaurus lentiginosus*) – BLM Sensitive
- Black-billed Cuckoo (*Coccyzus erythropthalmus*) – BLM Sensitive
- Black-necked Stilt (*Himantopus mexicanus*)
- Mountain Plover (*Charadrius montanus*) – BLM Sensitive
- Ferruginous Hawk (*Buteo regalis*) – BLM Sensitive
- Clark's Nutcracker (*Nucifraga columbiana*) – USFS SCC
- White-faced Ibis (*Plegadis chihi*) – BLM Sensitive
- Chestnut-collared Longspur (*Calcarius ornatus*) – BLM Sensitive
- Sprague's Pipit (*Anthus spragueii*) – BLM Sensitive
- Monarch (*Danaus plexippus*)
- Berry's Mountainsnail (*Oreohelix strigosa berryi*)
- Suckley Cuckoo Bumble Bee (*Bombus suckleyi*)
- Merriam's Shrew (*Sorex merriami*)
- Townsend's Big-eared Bat (*Corynorhinus townsendii*) – USFS Sensitive, BLM Sensitive
- Fringed Myotis (*Myotis thysanodes*) – BLM Sensitive
- Dwarf Shrew (*Sorex nanus*)
- Little Brown Myotis (*Myotis lucifugus*)
- Long-eared Myotis (*Myotis evotis*)
- Spotted Bat (*Euderma maculatum*) – USFS Sensitive, BLM Sensitive
- Long-legged Myotis (*Myotis Volans*)
- Eastern Red Bat (*Lasiurus borealis*) – BLM Sensitive
- Preble's Shrew (*Sorex preblei*)
- Greater Short-horned Lizard (*Phrynosoma hernandesi*) – USFS Sensitive, BLM Sensitive
- Plains Hog-nosed Snake (*Heterodon nasicus*) – USFS Sensitive, BLM Sensitive
- Western Milksnake (*Lampropeltis gentilis*) – USFS Sensitive, BLM Sensitive

Montana PSOC

- Eastern Screech-Owl (*Megascops asio*)
- Common Poorwill (*Phalaenoptilus nuttallii*)
- Short-eared Owl (*Asio flammeus*)
- Dickcissel (*Spiza americana*)
- Chimney Swift (*Chaetura pelagica*)
- Barrow's Goldeneye (*Bucephala islandica*)
- Plumbeous Vireo (*Vireo plumbeus*)
- Ovenbird (*Seiurus aurocapilla*)

- Eastern Bluebird (*Sialia sialis*)
- Western Spotted Skunk (*Spilogale gracilis*)
- North American Porcupine (*Erethizon dorsatum*)
- Silver-haired Bat (*Lasionycteris noctivagans*)
- Hayden's Shrew (*Sorex haydeni*)

Proposed Alternative – Temporary, short-term, direct adverse impacts to terrestrial, avian, and aquatic life and habitats within the project area. The project proposes to realign the river back into its pre-flood channel which will require excavating the channel, diverting the post-flood channel into the pre-flood new channel, and filling in the post-flood channel area to create new floodplain and wetland areas. These activities have the potential to destroy or damage habitat within these work areas. In addition, people and heavy equipment will be present during construction of the project which may disturb and disrupt normal fish and wildlife activities within project work areas. Adverse impacts are expected to be short-term with project construction projected to take two months to complete. Similar type terrestrial, avian, and aquatic life habitat is readily available both upstream and downstream during the project.

The project is also located within sage grouse executive order general habitat classification area and a BLM general habitat management area. Therefore, there is also a potential direct adverse impact to sage grouse habitat. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation." The application is available at https://sagegrouse.mt.gov/ProgramMap.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the short-term direct adverse impacts. Realigning the river back into its pre-flood channel and creating new floodplain and wetland areas will restore any disturbed, damaged, or destroyed habitat and create new habitat within the river channel and floodplain/wetland areas. The project is also being designed to withstand a 100-year storm event which will allow for the habitat within the project area to be protected long term as well as improve the hydraulic capability of the river to withstand future flooding events.

No Action Alternative – Potential direct, indirect, and cumulative adverse impacts to terrestrial, avian, and aquatic life and habitat. The post-flood channel cutbank will continue to erode into the river resulting in a loss of land and contributing to sedimentation in the river. This has the potential to impact wildlife, bird, and aquatic life habitat present in the river, along the riverbank, and inland areas susceptible to erosion.

---

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:
Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify direct, indirect, and cumulative effects to these species and their habitat.

The Montana Natural Heritage Program identifies the following federally listed threatened and endangered species, sensitive species, SCC, SOC, or SSS as either confirmed or observed as occurring, other observed species, or potentially present within a 1-mile radius of the project area.

Federally Listed Threatened or Endangered Species

Birds

- Yellow-billed Cuckoo (*Coccyzus americanus*) - USFWS Partial Status Threatened, BLM Threatened, Montana SOC

Mammals

- North American Wolverine (*Gulo gulo luscus*) – USFWS Proposed Threatened

Invertebrates

- Monarch Butterfly (*Danaus plexippus*) – USFWS Candidate Endangered Species, Montana SOC

USFWS Birds of Conservation Concern (BCC)

- Bald Eagle (*Haliaeetus leucocephalus*) – USFWS BCC, BLM Sensitive, Montana SOC
- Bobolink (*Dolichonyx oryzivorus*) – USFWS BCC, Montana SOC
- Franklin's Gull (*Leucophaeus pipixcan*) – USFWS BCC
- Golden Eagle (*Aquila chrysaetos*) – USFWS BCC, BLM Sensitive, Montana SOC
- Lark Bunting (*Calamospiza melanocorys*) – USFWS BCC
- Red-headed Woodpecker (*Melanerpes erythrocephalus*) – USFWS BCC, BLM Sensitive, Montana SOC

Sensitive Species, Species of Conservation Concern (SCC), Species of Special Concern (SOC), or Special Status Species (SSS)

Vascular Plants

- Slim-pod Venus'-looking-glass (*Triodanis leptocarpa*) - Montana SOC
- Long-sheath Waterweed (*Elodea bifoliate*) - Montana SOC
- Platte Cinquefoil (*Potentilla plattensis*) - Montana SOC
- Fleshy Stitchwort (*Stellaria crassifolia*) - Montana SOC
- Crawe's Sedge (*Carex crawei*) - Montana SOC
- Schweinitz's Flatsedge (*Cyperus schweinitzii*) - Montana SOC
- Smooth Goosefoot (*Chenopodium subglabrum*) - Montana SOC
- Scribner's Ragwort (*Senecio integerrimus var. scribneri*) - Montana SOC
- Floriferous Monkeyflower (*Mimulus floribundus*) - Montana SOC
- Silver Bladderpod (*Physaria ludoviciana*) - Montana SOC
- Double Bladderpod (*Physaria brassicoides*) - Montana SOC

Mammals

- Black-tailed Prairie Dog (*Cynomys ludovicianus*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Hoary Bat (*Lasiurus cinereus*) – BLM Sensitive, Montana SOC
- Merriam's Shrew (*Sorex merriami*) – Montana SOC

- Townsend's Big-eared Bat (*Corynorhinus townsendii*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Fringed Myotis (*Myotis thysanodes*) – BLM Sensitive, Montana SOC
- Dwarf Shrew (*Sorex nanus*) – Montana SOC
- Little Brown Myotis (*Myotis lucifugus*) – Montana SOC
- Long-eared Myotis (*Myotis evotis*) – Montana SOC
- Spotted Bat (*Euderma maculatum*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Long-legged Myotis (*Myotis Volans*) – Montana SOC
- Eastern Red Bat (*Lasiurus borealis*) – BLM Sensitive, Montana SOC
- Preble's Shrew (*Sorex preblei*) – Montana SOC

Fish

- Northern Redbelly Dace (*Chrosomus eos*) – Montana SOC

Invertebrates

- Berry's Mountainsnail (*Oreohelix strigosa berryi*) – Montana SOC
- Suckley Cuckoo Bumble Bee (*Bombus suckleyi*) – Montana SOC

Reptiles

- Spiny Softshell (*Apalone spinifera*) – BLM Sensitive, Montana SOC
- Greater Short-horned Lizard (*Phrynosoma hernandesi*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Plains Hog-nosed Snake (*Heterodon nasicus*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Western Milksnake (*Lampropeltis gentilis*) – USFS Sensitive, BLM Sensitive, Montana SOC

Amphibians

- Northern Leopard Frog (*Lithobates pipiens*) –USFS Sensitive, BLM Sensitive, Montana SOC
- Great Plains Toad (*Anaxyrus cognatus*) – USFS Sensitive, BLM Sensitive, Montana SOC

Birds

- Brewer's Sparrow (*Spizella breweri*) – BLM Sensitive, Montana SOC
- Greater Sage-Grouse (*Centrocercus urophasianus*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Sage Thrasher (*Oreoscoptes montanus*) – BLM Sensitive, Montana SOC
- Golden Eagle (*Aquila chrysaetos*) – BLM Sensitive, Montana SOC
- Long-billed Curlew (*Numenius americanus*) – BLM Sensitive, Montana SOC
- Loggerhead Shrike (*Lanius ludovicianus*) – BLM Sensitive, Montana SOC
- Great Blue Heron (*Ardea Herodias*) – Montana SOC
- Bobolink (*Dolichonyx oryzivorus*) – Montana SOC
- Red-headed Woodpecker (*Melanerpes erythrocephalus*) – BLM Sensitive, Montana SOC
- Sharp-tailed Grouse (*Tympanuchus phasianellus*) – Montana SOC
- Pinyon Jay (*Gymnorhinus cyanocephalus*) – Montana SOC

- Yellow-billed Cuckoo (*Coccyzus americanus*) – USFWS Partial Status Threatened, BLM Threatened, Montana SOC
- American White Pelican (*Pelecanus erythrorhynchos*) – Montana SOC
- Veery (*Catharus fuscescens*) – BLM Sensitive, Montana SOC
- Burrowing Owl (*Athene cunicularia*) – USFS Sensitive, BLM Sensitive, Montana SOC
- Green-tailed Towhee (*Pipilo chlorurus*) – Montana SOC
- Thick-billed Longspur (*Rhynchophanes mccownii*) – BLM Sensitive, Montana SOC
- American Bittern (*Botaurus lentiginosus*) – BLM Sensitive, Montana SOC
- Black-billed Cuckoo (*Coccyzus erythropthalmus*) – BLM Sensitive, Montana SOC
- Black-necked Stilt (*Himantopus mexicanus*) – Montana SOC
- Mountain Plover (*Charadrius m*ontanus) – BLM Sensitive, Montana SOC
- Ferruginous Hawk (*Buteo regalis*) – BLM Sensitive, Montana SOC
- Clark's Nutcracker (*Nucifraga columbiana*) – USFS SCC, Montana SOC
- White-faced Ibis (*Plegadis chihi*) – BLM Sensitive, Montana SOC
- Chestnut-collared Longspur (*Calcarius ornatus*) – BLM Sensitive, Montana SOC
- Sprague's Pipit (*Anthus spragueii*) – BLM Sensitive, Montana SOC

Critical Habitat

According to the Montana Sage Grouse Habitat Conservation Map mapping application, the project is located within sage grouse EO general habitat classification area (EO-General Habitat), BLM general habitat management area, and Great Plains Management Zone.

Per the Montana Natural Heritage Program, bat roost (non-cave) IAH is confirmed as occurring or observed within a 1-mile radius of the project area.

Wetlands and Riparian Zones

The National Wetlands Inventory web mapping application identifies riverine and forested/shrub riparian wetlands present within the project area.

Proposed Alternative –

USFWS Federally Listed Threatened or Endangered Species and Critical Habitat

Potential direct adverse impact to Yellow-billed Cuckoo. Per the Montana Natural Heritage Program, this species could potentially be present within a 1-mile radius of the project area. Their habitat includes open woodland, parks, and deciduous riparian woodland. Their nests are found in trees, shrubs, vines, or mature willows an average of 1 to 3 meters above ground amongst tall cottonwood and willow riparian woodlands (Montana Natural Heritage Program). Although the Montana Natural Heritage Program does not identify any observations within the project area, it is recommended that project work areas be visually inspected by a qualified professional for the presence of Yellow-billed Cuckoo prior to the start of construction activities, particularly vegetation removal.

Sensitive Species, Species of Conservation Concern (SCC), Species of Special Concern (SOC), or Special Status Species (SSS)

The project is located within sage grouse EO general habitat classification area and a BLM general habitat management area. The Montana Natural Heritage Program identifies observations of

Greater Sage Grouse within the larger project area. Therefore, there is a potential direct adverse impact to the Greater Sage-Grouse which is a Montana SOC, USFS Sensitive, and BLM Sensitive species. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation." The application is available at https://sagegrouse.mt.gov/ProgramMap.

No direct, indirect, or cumulative adverse impacts to other SCC, SOC, or SSS are expected. During completion of the project, there is similar type habitat readily available both upstream, downstream, and inland of project work areas.

Wetlands and Riparian Zones

Potential direct adverse impacts to riverine and forested/shrub riparian wetlands within the project area since the pre-flood channel will be excavated and banks reconstructed, and the post-flood channel will be filled with the excavated materials and cut bank regraded. Completion of a wetland delineation may be required as part of the U.S. Army Corp of Engineers permitting process. It is recommended that impacts to wetlands and mitigation measures be evaluated during the final engineering design and permitting process.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to federally listed threatened or endangered species, critical habitat, SCC, SOC, or SSS are expected.

---

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

Identify and determine direct, indirect, and cumulative effects to historical, archaeological or paleontological resources.

The Environmental Protection Agency's NEPAssist web mapping application does not identify any National Register of Historic Places within the project area. It is unknown if consultation with the State Historic Preservation Office (SHPO) is planned to be completed prior to construction of the project.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to historical and archaeological sites are expected since the project is occurring within an active river channel. However, if previously unknown cultural or paleontological materials are identified during project-related activities, all work will cease until a professional assessment of such resources can be made.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to historical and archaeological sites.

---

11. AESTHETICS:

Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify direct, indirect, and cumulative effects to aesthetics.

The area surrounding the Cushman Bridge includes agricultural farmland and rural, private residences or businesses. The nearest human occupied structures are rural residence(s) and outbuildings located just southeast of the project area (Google Earth imagery). U.S. Highway 12 parallels the project work area to the north and Cushman Road runs perpendicular is to the east. No

prominent topographic features have been identified. No heavily populated or scenic areas are near the project location. The Musselshell River is not considered a Wild and Scenic River per the National Wild and Scenic Rivers Act (EPA NEPAssist web mapping application).

Proposed Alternative – Potential temporary, short-term, direct adverse impacts on aesthetics due to noise and dust associated with general construction activities. The project will be visible from Cushman Bridge, Cushman Road, and may be visible from Highway 12 and from private land to the south. Agricultural workers in the area may hear noise throughout the duration of the project which is projected to last two months; however, the noise would be similar to that produced by agricultural equipment. Dust generated by construction activities will be localized to project work areas and is not expected to adversely impact any of the surrounding private properties or motorists traveling on Highway 12 or Cushman Road. Common dust suppression techniques (i.e., application of water) associated with construction activities is expected. Given the nature of the work and safety hazards associated with working around water and working at night, it is expected that construction will take place during daylight hours, thus no adverse impacts from light are expected.

No long-term direct, indirect, or cumulative adverse impacts to aesthetics are expected. Any adverse noise and dust impacts will be short-term and will only occur during construction of the project. The project will realign the river into its pre-flood channel and local, native vegetation is planned to be used to reconstruct the riverbank and reestablish vegetation within the newly constructed floodplain and wetland areas. Visual aesthetics may be adversely impacted for a few years until vegetation is established, after which time, it is expected that visual aesthetics will resemble natural, preconstruction conditions.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to aesthetics.

---

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:
Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify direct, indirect, and cumulative effects to environmental resources.

The project is expected to be short-term and performed by contractors and project personnel living and working within Golden Valley County and the surrounding area.

No limited resources that the project would require have been identified.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to demands on limited environmental resources of land, water, air, or energy beyond the expected fuel consumption associated with operation of heavy construction equipment are expected. Willows used for construction of the brush matrix bank treatment are planned to be locally harvested. Excavated large willow clumps are proposed to be salvaged and replanted within the new floodplain and wetland areas. All other equipment and materials necessary to construct the project are expected to be locally available and are also not expected to be limited resources. No other activities nearby that the project would have a short-term or long-term adverse impact on have been identified.

The project is expected to have direct, indirect, and cumulative long-term beneficial impacts to land, water, and energy. Realigning the river back into its pre-flood channel will prevent continued erosion of and loss of land. Preventing the river from bypassing Cushman Bridge will keep the

current bridge in operation and eliminate the threat of river damage to Cushman Road thus preventing the need for the use of energy resources to repair/replace the bridge or road. Designing the project to withstand a 100-year storm event will improve the hydraulic capability of the river to withstand future flooding events which will protect agricultural land, protect water quality from erosion, and safeguard downstream critical facilities and infrastructure so that energy resources do not need to be consumed for repair or replacement due to flood damage.

No Action Alternative – Continued direct adverse impacts to water resources since the post-flood channel cutbank will continue to erode and result in a loss of land. This will continue to contribute to erosion and sedimentation in the Musselshell River and impact water quality. Downriver agricultural land, facilities, and infrastructure will continue to be threatened by future flooding events.

---

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

Per the Discover DEQ Throughout Montana web mapping application, the project is located within the Musselshell E. coli total maximum daily load (TMDL) area. No other current studies or plans within the project area have been identified. No other current private, state, or federal actions within the project area have been identified.

According to the Montana Natural Heritage Program, there have been a few structured surveys within the project area that include:

- Fish Other Survey (FWP Survey Type) (1991)
- Fish Trapping or Netting Surveys (2003)
- Nocturnal Breeding Amphibian Calling Survey (2005)
- Noxious Weed Road-based Visual Surveys (2005)
- Fish Electrofishing Surveys (2006)
- Riparian Playback Surveys for Cuckoos (2012)
- Long-billed Curlew, Road-based, Point Count (2015)
- Bat Roost (Active Season) Survey (2017)
- Bald Eagle Nest Survey (2022)
- Raptor Nest Survey (2023)

Proposed Alternative – No direct, indirect, or cumulative adverse impacts on other environmental documents pertinent to the area are expected. Eliminating continued erosion of the post-flood channel cut bank may reduce erosion and corresponding sediment load to the river. This may have a direct benefit to reducing sedimentation to the Musselshell River and any future environmental documents.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to other environmental documents pertinent to the area are expected.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:

Identify any health and safety risks posed by the project.

No potential human health and safety risks within the larger area surrounding the project have been identified (Discover DEQ Throughout Montana web mapping application and EPA NEPAssist web mapping application).

Proposed Alternative – Potential direct adverse impact to human health and safety due to safety risks associated with the operation of heavy construction equipment, working on a construction site, and working near an active river are present during construction of the project. Potential adverse impacts to human health and safety are expected to impact project personal only and not impact any nearby residences or businesses. Safety concerns for recreational boaters along the river should be considered during the final engineering design. It is expected that any construction contractor would develop a health and safety plan that identifies human health and safety risks associated with the project and mitigation measures prior to starting construction.

No Action Alternative – Potential direct, indirect, and cumulative adverse impacts to human health and safety from the continued threat of the river bypassing Cushman Bridge and threatening Cushman Road, and threat of damage from future flooding events. Cushman Bridge and Cushman Road are a major traffic artery that provides critical emergency services access to Cushman, Montana, and other Golden Valley residents. Downstream agricultural land, facilities, infrastructure, and any residents/workers present will also continue to be threatened by future flooding events.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Identify how the project would add to or alter these activities.

Over 90% of the land in Golden Valley County is classified as farmland (Montana State University, Economic Impact of Agriculture, Golden Valley County). Based on the 2017 Census for Agriculture for Golden Valley County, there are 683,145-acres of land in farms. In 2017, the total market value of agricultural products sold in Golden Valley County was $18,601,000, of which 28% were crops and 72% were livestock, poultry, and products. Commercial crops and livestock produced on agricultural land within the larger project area and downstream contribute to the industrial, commercial, and agricultural activities and production in Golden Valley County.

Past flooding events have washed out Cushman Bridge and impacted farm to market access for Cushman residents and other residents within Golden Valley County. As part of the 2021 *Multi-Hazard Mitigation Plan, 2021 Update, Golden Valley County, Montana and Towns of Ryegate & Lavina, Montana*, the Musselshell Watershed Coalition, working with Golden Valley County, identified Cushman Bridge as being vulnerable to flooding and resulting damages to property and impacts on city services necessary for risk protection during flood season. Future flooding has the potential for direct, indirect, and cumulative adverse impacts to agricultural property, activities, and production within the project area and downstream.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to industrial, commercial, and agricultural activities and production. The project would result in direct, indirect, and cumulative beneficial impacts. Agricultural land will be improved by designing the project to withstand a 100-year storm event, and the hydraulic capability of the river to withstand future flooding will safeguard downstream facilities and infrastructure. The project will ensure the river does not bypass Cushman Bridge thus preventing damage to Cushman Road and safeguarding a critical access road for Cushman and other Golden Valley Residents.

No Action Alternative – Continued potential direct, indirect, and cumulative adverse impacts to agricultural farmland, Cushman Bridge, and Cushman Road from future flooding events. Cushman Bridge and Cushman Road are a major traffic artery that provides critical commercial services access to Cushman, Montana, and other Golden Valley residents. Downstream agricultural land, facilities, and infrastructure will also continue to be threatened by future flooding events.

---

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

Estimate the number of jobs the project would create, move or eliminate. Identify direct, indirect, and cumulative effects to the employment market.

The population of Golden Valley County in 2022 was 835 (United States Census Bureau). Implementation of the project is expected to use standard construction equipment, materials, and supplies that are expected to be either available within the project area, locally available, or available within the surrounding area. Construction of the project is expected to be performed by existing construction contractors and project personnel living and working within Golden Valley County or the surrounding area.

Proposed Alternative – No direct, indirect, and cumulative adverse impacts to quantity and distribution of employment. Potentially short-term, direct and indirect, localized beneficial impacts to the local employment market and suppliers by creating a job opportunity for contractors and material suppliers. It is not expected that the project would create, move, or eliminate jobs.

No Action Alternative – No direct, indirect, and cumulative adverse impacts to quantity or distribution of employment.

---

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify direct, indirect, and cumulative effects to taxes and revenue.

Over 90% of the land in Golden Valley County is classified as farmland (Montana State University, Economic Impact of Agriculture, Golden Valley County). In 2019, the market value of all property in Golden Valley County was approximately $183 million. The taxable value was approximately $6.7 million. Agricultural property comprised 16.97% ($1,148,476) of the county's taxable value (Montana State University Extension, Economic Impact of Agriculture, Carbon County, January 2021).

Based on Montana Cadastral, property ownership in and around the project area is privately owned agricultural land. Per the Montana Department of Revenue Electronic Property Record Card Application, the 2023 value of the parcel on which the project is located is:

- Type: FARM_R – Farmstead - Rural, market value $522,411, taxable value $9,110.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to local and state tax base and tax revenues. Potential direct, indirect, and cumulative beneficial impacts are expected since the project will prevent further loss of land from erosion and safeguard agricultural properties, and associated tax revenues, from future flooding events.

No Action Alternative – Potential direct, indirect, and cumulative adverse impacts to the local and state tax base and revenues from the loss of taxable agriculture land from erosion and potential loss of, or adverse impacts to, taxable agricultural land from future flooding events.

---

18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify direct, indirect, and cumulative effects of this and other projects on government services

The nearest fire protection, police, and schools are in Lavina which is located approximately 5-miles east of the project location. The project area would be accessed via US Highway 12, Cushman Road, and/or private property.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to demand for government services are expected. Deliveries of equipment and materials necessary to construct the project are either available within the immediate project area or are expected to use existing roadways and follow existing traffic patterns to be delivered. Temporary access roads from existing roadways are expected to be necessary to access project work areas. Given the rural setting of the project, no increases to traffic are expected. Limited traffic control may need to be implemented based on access routes and locations. No changes to fire protection, police, schools, etc. are expected beyond basic fire control measures and equipment expected at any type of construction project (i.e., fire extinguisher, shovels, buckets, extra water).

No Action Alternative – No direct, indirect, and cumulative adverse impacts to demand for government services.

---

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

According to the Montana Sage Grouse Habitat Conservation Map web mapping application, the project is located within sage grouse EO general habitat classification area (EO-General Habitat), BLM general habitat management area, and Great Plains Management Zone. There are no other known State, County, City, USFS, BLM, Tribal, and other zoning or management plans within the project area (Environmental Protection Agency NEPAssist and Montana DEQ Discover DEQ Throughout Montanan web mapping applications).

Proposed Alternative – Potential direct adverse impact to sage grouse EO habitat classification, core area, and BLM priority habitat management areas. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation." The application is

available at https://sagegrouse.mt.gov/ProgramMap.

No Action Alternative – No direct, indirect, and cumulative adverse impacts to locally adopted environmental plans and goals.

---

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:
Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify direct, indirect, and cumulative effects to recreational and wilderness activities.

The area surrounding the project is primarily used for agricultural production and not recreation. No public fishing access sites are within the immediate or larger project area (Montana Fish, Wildlife, and Parks, EXPLORE web mapping application). No wilderness areas are present within the larger project area. The public could potentially access the Musselshell River from Cushman Bridge.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to access to and quality of recreational and wilderness activities are expected. No public recreational areas are accessed through the project area. There is no established public access to the Musselshell River within the project area. The larger project area is primarily used for agricultural crop production and not recreational uses. Any potential recreational boaters on the river may see construction equipment; however, it is not expected that it would impact the quality of their overall recreational experience since several manmade diversion dams are located upriver, the surrounding area is primarily agricultural and not recreational, and the Musselshell River is not a designed Wild and Scenic River.

No Action Alternative – No direct, indirect, and cumulative adverse impact to access to and quality of recreational and wilderness activities.

---

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:
Estimate population changes and additional housing the project would require. Identify direct, indirect, and cumulative effects to population and housing.

According to the Unites States Census Bureau, the population of Golden Valley County in 2022 was 835 with 475 housing units reported in July 2022. In 2021, the population of the nearest town, Lavina was estimated to be 136 individuals with an estimated 87 housing units.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to the density and distribution of the population within Golden Valley County, Montana. Implementation of the project is expected to use standard construction equipment, materials, and supplies that are expected to be either available within the project area, locally available, or available within the surrounding area. Construction of the project is expected to be performed by existing construction contractors and project personnel living and working within Golden Valley County or the surrounding area.; no additional housing is expected.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to density and distribution of population and housing.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

The project area primarily consists of an active river channel surrounded by Big Sagebrush Steppe, Great Plains Mixedgrass Prairie, cultivated crop land, and rural residential (Montana Natural Heritage Program). No federally recognized Tribal land is within the project area. The larger project area was traditionally inhabited or used by the Crow Tribe (Native Land Digital web mapping application).

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to social structures and/or traditional lifestyles or communities are expected. The project is realigning the river back into its pre-flood channel and creating floodplain and wetland areas. Post-construction conditions are expected to look natural once vegetation is reestablished. Current communities and lifestyles are expected to remain as is and not change because of the project.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to social structures and mores.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

No cultural uniqueness and diversity have been identified. The area surrounding the project is primarily cultivated farmland that supports an agriculturally based community.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to any unique quality of the project area, local residents, or nearby communities are expected. The project area is an active river channel. The postconstruction project area will also be an active river channel and is expected to look natural and resemble pre-flood conditions once vegetation reestablishes.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to cultural uniqueness and diversity.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify direct, indirect, and cumulative economic and social effects likely to occur as a result of the proposed action.

Over 90% of the land in Golden Valley County is classified as farmland. Cattle production followed by grain, other livestock, and other crops and hay are the principal source of income on farms in Golden Valley County (Montana State University, Economic Impact of Agriculture, Golden Valley County). Per the 2017 Census of Agriculture for Golden Valley County, 157 farms are present which encompass 683.145-acres of farmland, of which 7,334-acres are irrigated. Land in farms in Golden Valley County consists of 16% cropland, 81% pastureland, 2% woodland, and 1% other.

The total market value of agricultural products sold was $18,601,000, of which $5,195,000 were crops and $13,406,000 were livestock. The per farm average market value of products (crops plus livestock) sold was $118,480.

The agricultural land in proximity to the project area and downstream agricultural land that would be adversely impacted by future flooding events contributes to the overall economics in Golden Valley County. The future use of the immediate project area will continue to be an active river and floodplain/wetland areas. The future use of the larger project area is expected to remain the same as its current use.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to other appropriate social and economic circumstances are expected. Direct, indirect, and cumulative beneficial impacts to Golden Valley residents are expected. Agricultural land will be improved by designing the project to withstand a 100-year storm event, the hydraulic capability of the river to withstand future flooding will safeguard downstream facilities and infrastructure, and therefore help protect the social and economic effects agricultural production has within Golden Valley County.

No Action Alternative – Potential direct, indirect, and cumulative adverse impacts to the agricultural community within Golden Valley County. The hydraulic capability of the river will remain susceptible to flooding, and the surrounding and downstream agricultural land will remain susceptible to flood damage. The loss of agricultural land and production will adversely impact the local agricultural community and economic revenues associated with agriculture in Golden Valley County.

---

25. DRINKING WATER AND/OR CLEAN WATER

Identify potential impacts to water and/or sewer infrastructure (e.g., community water supply, stormwater, sewage system, solid waste management) and identify direct, indirect, and cumulative effects likely to occur as a result of the proposed action.

No water and/or sewer infrastructure has been identified within the project area. Scattered, rural residential properties primarily rely on domestic groundwater supply wells for water (Montana Groundwater Information System web mapping application). Septic systems are commonly used in lieu of sewer infrastructure for rural residences.

Proposed Alternative – No direct, indirect, or cumulative adverse impacts to drinking water and/or clean water are expected since no water and/or sewer infrastructure has been identified within the project area.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to drinking water and/or clean water are expected since no water and/or sewer infrastructure has been identified within the project area. However, the post-flood channel cutbank will continue to erode and contribute sedimentation to the river and result in a loss of land.

---

26. ENVIRONMENTAL JUSTICE

Will the proposed project result in disproportionately high or adverse human health or environmental effects on minority or low-income populations per the Environmental Justice Executive Order 12898? Identify potential impacts to and identify direct, indirect, and cumulative effects likely to occur as a result of the proposed action.

In 2021, the median household income in Golden Valley County was $43,820 which is a 14.5% increase from 2016 to 2021. In 2021, people in poverty were 16.6% which is a 1.7% decrease from 2016 to 2021(Montana Department of Commerce).

Proposed Alternative – No direct, indirect, or cumulative adverse impacts are expected as the project will not result in disproportionately high or adverse human health or environmental effects on minority or low-income populations. Direct, indirect, and cumulative beneficial impacts are expected to affect properties prone to flood damage and Golden Valley residents proportionately. No disproportionate impacts among any portion of the community or users of the irrigation system are expected.

No Action Alternative – No direct, indirect, or cumulative adverse impacts to environmental justice.

EA Prepared By:	**Name:**	Samantha Treu	**Date:**	01/18/2024
	Title:	MEPA/NEPA Program Manager	**Email:**	samantha.treu@mt.gov

V. FINDING

27. ALTERNATIVE SELECTED:

The project preliminary engineering design includes the following:

- Excavate the pre-flood channel and construct new banks using a brush matrix bank treatment using onsite materials to the extent practicable.
- Realign and divert the river back into the pre-flood channel by installing a large woody debris plug in the post-flood channel.
- Place excess excavation material from reconstruction of the pre-flood channel into the post-flood channel to create floodplain and wetland areas.
- Install salvaged and locally harvested willow clumps into the new floodplain.
- Regrade the post-flood cutbank to a more stable slope (3:1) and seed to reduce the chance of additional erosion during large flood events.

28. SIGNIFICANCE OF POTENTIAL IMPACTS:

PUBLIC INVOLVEMENT, AGENCIES, GROUPS, OR INDIVIDUAL CONTACTED

No public involvement activities or project notices placed in any newspapers are known to have been completed.

ALTERNATIVE DEVELOPMENT

In June 2022, Pioneer Technical Services, Inc. completed a preliminary design and cost opinions for two alternatives. A No Action alternative was not considered.

GEOLOGY AND SOIL QUALITY, STABILITY, AND MOISTURE

Short-term direct, indirect, and cumulative adverse impacts to soil stability. Soils will experience direct adverse impacts when disturbed during excavation of the pre-flood channel and reconstruction of the riverbank. Surrounding soils have the potential to also be disturbed due to the nature of construction activities and site access necessary to complete the work. Soils within the post-flood channel will be directly disturbed due to the placement and grading of pre-flood

excavated soils within that area to create new floodplain and wet areas. Soils along the post-flood channel cutbank will also be directly disturbed since the cutbank will be regraded to a more stable slope that is less susceptible to erosion.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the short-term adverse impacts. Realigning the river back into its pre-flood channel and designing the project to withstand a 100-year storm event will improve the hydraulic capability of the river channel to survive future flooding and reduce erosion and sediment loading to the river. This is expected to protect the overall water quality of the watershed and maintain and improve aquatic life and fish habitat within the river, the newly constructed floodplain, and wetland areas. It is also expected to safeguard downstream critical facilities and infrastructure from future flooding events.

WATER QUALITY, QUANTITY, AND DISTRIBUTION

Potential direct and temporary adverse impact to surface water quality during construction of the project. Since work will be occurring in and adjacent to a flowing river channel, there is the potential for temporary violations of surface water quality standards for turbidity. These adverse impacts are temporary, short-term and are not expected to have long-term direct, indirect, or cumulative adverse impacts to water quality. Permit requirements are expected to outline activities that must be carried out to protect water quality and minimize sedimentation to the river. It is also expected that the final engineering design will include methods for minimizing adverse impacts to water quality during completion of the project and, in addition to permit requirements, implementation of best management practices (BMPs) to reduce erosion and the unwanted release of soils and/or sediment to the river during construction of the project. No long-term direct, indirect, or cumulative adverse impacts to water quality, quantity, and distribution are expected.

Potential direct and indirect, long-term, cumulative beneficial impacts to water quality. Stabilizing the river into the previously active channel will help reduce sediment loading in the river by reducing the risk of new channels being created by erosion. A brush matrix bank treatment is planned to be used to reconstruct the pre-flood channel and reduce erosion of the newly constructed banks. Locally harvested willows and seed mix are planned to be used within the newly constructed floodplain, wetland, and recontoured post-flood cutbank to stabilize soils and reduce erosion into the river.

AIR QUALITY

Potential temporary, short-term, direct, localized adverse impacts to air quality may occur during construction due to ground disturbance caused by construction activities (i.e., dust). The nearest human occupied structures are located just southeast of the project area (Google Earth imagery). U.S. Highway 12 parallels the project work area to the north with Cushman Road located perpendicular to the west. Any air quality impacts are expected to be localized around project work areas and only impact the immediate area surrounding the construction area. It is not expected that any rural residences or motorists traveling along U.S. Highway 12 or Cushman Road will be adversely impacted by dust. Common construction dust suppression techniques (i.e., water application) are expected to be implemented. Long-term adverse impacts are not expected. The project is short-term with construction projected to take two months to complete.

VEGETATION COVER, QUANTITY, AND QUALITY

Direct, long-term, localized, nonrecurring adverse impacts to vegetation cover, quantity, and quality. Vegetation present within the pre-flood channel will likely be destroyed or disturbed since soil used as growth media will be excavated then placed within the post-flood channel and graded.

Vegetation along the bank of the pre-flood channel may also be disturbed or destroyed during reconstruction of the pre-flood river channel. Vegetation along the post-flood channel cutbank may also be disturbed or destroyed due to regrading of the bank. Large willow plants are proposed to be salvaged and replanted within the newly constructed floodplain and wetland area.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the direct adverse impacts. Locally harvested willow cuttings are proposed to be used as part of the brush matrix bank treatment that will be used to reconstruct the pre-flood channel banks. If properly constructed, it is expected that the willows will naturally reestablish in and along the riverbank. Transplanted willow clumps within the newly constructed floodplain and wetland area are also expected to naturally reestablish. The native seedbank within the excavated soils is also expected to contribute to the natural reestablishment of vegetation within the newly construction floodplain and wetland area. In addition, seed is planned to be placed on the recontoured cutbank and will likely be placed in other disturbed areas as appropriate. With time, vegetation cover, quantity, and quality within disturbed areas are expected to reestablish. Post-construction site conditions are expected to resemble pre-flood conditions and look natural once vegetation established. Post-construction monitoring of vegetation reestablishment and weeds is recommended.

TERRESTRIAL, AVIAN, AND AQUATIC LIFE AND HABITATS

Temporary, short-term, direct adverse impacts to terrestrial, avian, and aquatic life and habitats within the project area. The project proposes to realign the river back into its pre-flood channel which will require excavating the channel, diverting the post-flood channel into the pre-flood new channel, and filling in the post-flood channel area to create new floodplain and wetland areas. These activities have the potential to destroy or damage habitat within these work areas. In addition, people and heavy equipment will be present during construction of the project which may disturb and disrupt normal fish and wildlife activities within project work areas. Adverse impacts are expected to be short-term with project construction projected to take two months to complete. Similar type terrestrial, avian, and aquatic life habitat is readily available both upstream and downstream during the project.

The project is also located within sage grouse executive order general habitat classification area and a BLM general habitat management area. Therefore, there is also a potential direct adverse impact to sage grouse habitat. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation." The application is available at https://sagegrouse.mt.gov/ProgramMap.

Long-term direct, indirect, and cumulative beneficial impacts outweigh the short-term direct adverse impacts. Realigning the river back into its pre-flood channel and creating new floodplain and wetland areas will restore any disturbed, damaged, or destroyed habitat and create new habitat within the river channel and floodplain/wetland areas. The project is also being designed to withstand a 100-year storm event which will allow for the habitat within the project area to be protected long term as well as improve the hydraulic capability of the river to withstand future flooding events.

UNIQUE, ENDANGERED, FRAGILE, OR LIMITED ENVIRONMENTAL RESOURCES

USFWS Federally Listed Threatened or Endangered Species and Critical Habitat

Potential direct adverse impact to Yellow-billed Cuckoo. Per the Montana Natural Heritage Program, this species could potentially be present within a 1-mile radius of the project area. Their

habitat includes open woodland, parks, and deciduous riparian woodland. Their nests are found in trees, shrubs, vines, or mature willows an average of 1 to 3 meters above ground amongst tall cottonwood and willow riparian woodlands (Montana Natural Heritage Program). Although the Montana Natural Heritage Program does not identify any observations within the project area, it is recommended that project work areas be visually inspected by a qualified professional for the presence of Yellow-billed Cuckoo prior to the start of construction activities, particularly vegetation removal.

Sensitive Species, Species of Conservation Concern (SCC), Species of Special Concern (SOC), or Special Status Species (SSS)

The project is located within sage grouse EO general habitat classification area and a BLM general habitat management area. The Montana Natural Heritage Program identifies observations of Greater Sage Grouse within the larger project area. Therefore, there is a potential direct adverse impact to the Greater Sage-Grouse which is a Montana SOC, USFS Sensitive, and BLM Sensitive species. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation." The application is available at https://sagegrouse.mt.gov/ProgramMap.

No direct, indirect, or cumulative adverse impacts to other SCC, SOC, or SSS are expected. During completion of the project, there is similar type habitat readily available both upstream, downstream, and inland of project work areas.

Wetlands and Riparian Zones

Potential direct adverse impacts to riverine and forested/shrub riparian wetlands within the project area since the pre-flood channel will be excavated and banks reconstructed, and the post-flood channel will be filled with the excavated materials and cut bank regraded. Completion of a wetland delineation may be required as part of the U.S. Army Corp of Engineers permitting process. It is recommended that impacts to wetlands and mitigation measures be evaluated during the final engineering design and permitting process.

AESTHETICS

Potential temporary, short-term, direct adverse impacts on aesthetics due to noise and dust associated with general construction activities. The project will be visible from Cushman Bridge, Cushman Road, and may be visible from Highway 12 and from private land to the south. Agricultural workers in the area may hear noise throughout the duration of the project which is projected to last two months; however, the noise would be similar to that produced by agricultural equipment. Dust generated by construction activities will be localized to project work areas and is not expected to adversely impact any of the surrounding private properties or motorists traveling on Highway 12 or Cushman Road. Common dust suppression techniques (i.e., application of water) associated with construction activities is expected. Given the nature of the work and safety hazards associated with working around water and working at night, it is expected that construction will take place during daylight hours, thus no adverse impacts from light are expected.

No long-term direct, indirect, or cumulative adverse impacts to aesthetics are expected. Any adverse noise and dust impacts will be short-term and will only occur during construction of the project. The project will realign the river into its pre-flood channel and local, native vegetation is planned to be used to reconstruct the riverbank and reestablish vegetation within the newly constructed floodplain and wetland areas. Visual aesthetics may be adversely impacted for a few years until vegetation is established, after which time, it is expected that visual aesthetics will

resemble natural, preconstruction conditions.

HUMAN HEALTH AND SAFETY

Potential direct adverse impact to human health and safety due to safety risks associated with the operation of heavy construction equipment, working on a construction site, and working near an active river are present during construction of the project. Potential adverse impacts to human health and safety are expected to impact project personal only and not impact any nearby residences or businesses. Safety concerns for recreational boaters along the river should be considered during the final engineering design. It is expected that any construction contractor would develop a health and safety plan that identifies human health and safety risks associated with the project and mitigation measures prior to starting construction.

LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS

Potential direct adverse impact to sage grouse EO habitat classification core area and BLM priority habitat management area. Per the Montana Sage Grouse Habitat Conservation Map web map application "Anyone proposing new development activities in sage grouse habitat must submit a development project application for consultation." The application is available at https://sagegrouse.mt.gov/ProgramMap.

---

29. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

This is the final environmental review. DNRC concludes that no significant adverse impacts will occur as a result of the proposed project work, and therefore no additional environmental review is required. This environmental assessment was posted for a 30-day public comment period, this is the final environmental assessment and the environmental review of this project is complete.

☐ EIS ☐ More Detailed EA ☒ No Further Analysis

EA Approved By:	**Name:** Mark W Bostrom **Title:** Division Administrator
Signature: Mark W Bostrom	**Date**: 11/25/2024

Musselshell River Bank Restoration

Write a description for your map.

MONTANA STATE LIBRARY

NATURAL HERITAGE PROGRAM mtnhp.org

1201 11th Ave ▫ P.O. Box 201800 ▫ Helena, MT 59620-1800 ▫ fax 406-444-0266 ▫ phone 406-444-3989

Environmental Summary

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Summarized by:
006N021E001
(Buffered PLSS Section)

Suggested Citation
Montana Natural Heritage Program. Environmental Summary Report.
for Latitude 46.27737 to 46.32128 and Longitude -109.00912 to -109.07342. Retrieved on 10/23/2023.

The Montana Natural Heritage Program is part of the Montana State Library's Natural Resource Information System. Since 1985, it has served as a neutral and non-regulatory provider of easily accessible information on Montana's species and biological communities to inform all stakeholders in environmental review, permitting, and planning processes. The program is part of the NatureServe network that is composed of over 60 member programs across North America that work to provide current and comprehensive distribution and status information on species and biological communities.

MONTANA STATE LIBRARY NATURAL HERITAGE PROGRAM

NATURESERVE

Table of Contents

Introduction to Environmental Summary Report

Environmental Summary Reports from the Montana Natural Heritage Program (MTNHP) provide information on species and biological communities to inform all stakeholders in environmental review, permitting, and planning processes. For information on environmental permits in Montana, please see permitting overviews by the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation, the Index of Environmental Permits for Montana and our Suggested Contacts for Natural Resource Management Agencies. The report for your area of interest consists of introductory and related materials in this PDF and an Excel workbook with worksheets summarizing information managed in the MTNHP databases for: (1) species occurrences; (2) other observed species without species occurrences; (3) other species potentially present based on their range, presence of associated habitats, or predictive distribution model output if available; (4) structured surveys that follow a protocol capable of detecting one or more species; (5) land cover mapped as ecological systems; (6) wetland and riparian mapping; (7) land management categories; and (8) biological reports associated with plant and animal observations. If your area of interest corresponds to a statewide polygon layer (e.g., watersheds, counties, or public land survey sections) information summaries in your report will exactly match those boundaries. However, if your report is for a custom area, users should be aware that summaries do not correspond to the exact boundaries of the polygon they have specified, but instead are a summary across a layer of hexagons intersected by the polygon they specified as shown on the report cover. Summarizing by these hexagons which are one square mile in area and approximately one kilometer in length on each side allows for consistent and rapid delivery of summaries based on a uniform grid that has been used for planning efforts across North America.

In presenting this information, MTNHP is working towards assisting the user with rapidly assessing the known or potential species and biological communities, land management categories, and biological reports associated with the report area. Users are reminded that this information is likely incomplete and may be inaccurate as surveys to document species are lacking in many areas of the state, species' range polygons often include regions of unsuitable habitat, methods of predicting the presence of species or communities are constantly improving, and information is constantly being added and updated in our databases. **Field verification by professional biologists of the absence or presence of species and biological communities in a report area will always be an important obligation of users of our data. Users are encouraged to only use this environmental summary report as a starting point for more in depth analyses and are encouraged to contact state, federal, and tribal resource management agencies for additional data or management guidelines relevant to your efforts. Please see the Appendix for introductory materials to each section of the report, additional information resources, and a list of relevant agency contacts.**

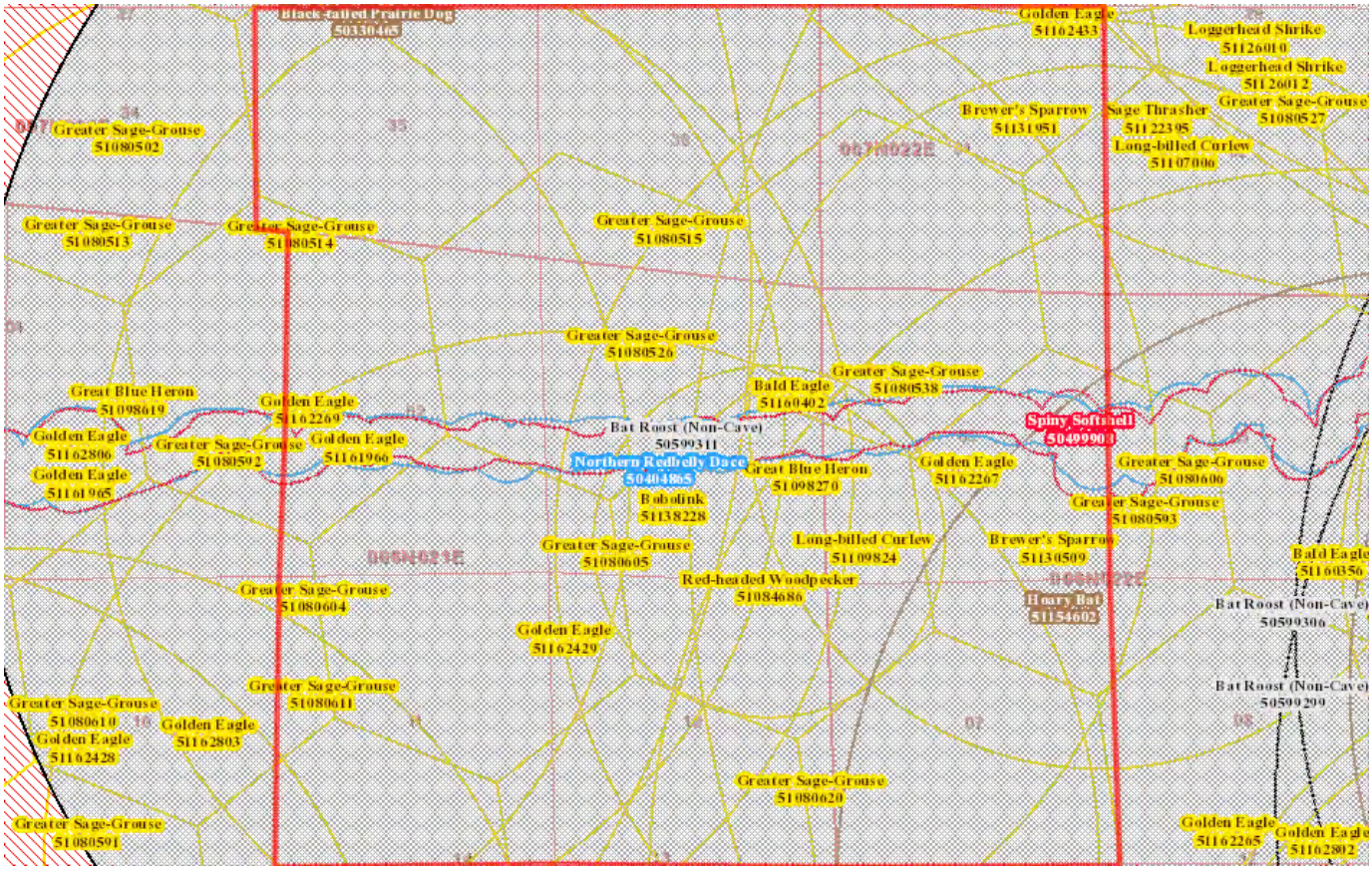
MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Model Icons	Habitat Icons	Range Icons	Num Obs
N Suitable (native range)	C Common	Y Native / Year-round	Count of obs with 'good precision' (<=1000m)
O Optimal Suitability	O Occasional	S Summer	+ indicates additional 'poor precision' obs (1001m-10,000m)
M Moderate Suitability		W Winter	
L Low Suitability		M Migratory	
I Suitable (introduced range)		N Non-native	
		H Historical	

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Native Species

Summarized by: **006N021E001** *(Buffered PLSS Section)*
Filtered by:
Native Species reports are filtered for Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC



Species Occurrences

	USFWS Sec7	# SO	# Obs	Predicted Model	Range
F - Northern Redbelly Dace *(Chrosomus eos)* SOC		1			Y

View in Field Guide **View Predicted Models** **View Range Maps**

Species of Concern - Native Species Global: **G5** State: **S3** FWP SWAP: **SGCN3**

Delineation Criteria Stream reaches and standing water bodies where the species presence has been confirmed through direct capture or where they are believed to be present based on the professional judgement of a fisheries biologist due to confirmed presence in adjacent areas. In order to reflect the importance of adjacent terrestrial habitats to survival, stream reaches are buffered 100 meters, standing water bodies greater than 1 acre are buffered 50 meters, and standing water bodies less than 1 acre are buffered 30 meters into the terrestrial habitat based on PACFISH/INFISH Riparian Conservation Area standards. (Last Updated: Jul 18, 2022)

Predicted Models: N 61% Suitable (native range) (deductive)

B - Brewer's Sparrow *(Spizella breweri)* SOC		2			S M

View in Field Guide **View Predicted Models** **View Range Maps**

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, or territorial adults during the breeding season. Point observation location is buffered by a minimum distance of 100 meters in order to encompass the maximum territory size reported for the species and otherwise is buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 29, 2023)

Predicted Models: M 56% Moderate (inductive), L 44% Low (inductive)

B - Greater Sage-Grouse *(Centrocercus urophasianus)* SOC		14			Y

View in Field Guide **View Predicted Models** **View Range Maps**

USFS: **Sensitive - Known in Forests (BD)**

Species of Concern - Native Species Global: **G3G4** State: **S2** **Species of Conservation Concern in Forests (CG)** BLM: **SENSITIVE** FWP SWAP: **SGCN2** PIF: **1**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, juveniles, or adults on a lek. Point observations are mapped in the center of a one-square mile hexagon to protect the exact locations of leks. The outer edges of this hexagon are then buffered by a distance of 6,400 meters in order to encompass a body of research indicating that females typically nest within this distance of a lek and that lek numbers are negatively impacted by fossil fuel drilling activities within this distance of a lek. If the locational uncertainty associated with the observation is greater than this distance, it is buffered by the locational up to a maximum distance of 10,000 meters. All of the one-square mile hexagons intersecting this buffered area are presented as the Species Occurrence record. (Last Updated: Jan 25, 2023)

Predicted Models: M 50% Moderate (inductive), L 50% Low (inductive)

B - Sage Thrasher *(Oreoscoptes montanus)* SOC

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **3**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, or territorial adults during the breeding season. Point observation location is buffered by a minimum distance of 75 meters in order to encompass the maximum breeding territory size reported for the species and otherwise is buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 29, 2023)

Predicted Models: M 50% Moderate (inductive), L 50% Low (inductive)

B - Golden Eagle *(Aquila chrysaetos)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** USFWS: **BGEPA; MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Delineation Criteria Confirmed nesting area buffered by a minimum distance of 3,000 meters in order to be conservative about encompassing the entire breeding territory and area commonly used for renesting and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Sep 21, 2023)

Predicted Models: M 43% Moderate (inductive), L 57% Low (inductive)

B - Long-billed Curlew *(Numenius americanus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC11** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, or territorial adults during the breeding season. Point observation location is buffered by a minimum distance of 200 meters in order to approximate the breeding territory size reported for the species in Idaho and otherwise is buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 28, 2023)

Predicted Models: M 26% Moderate (inductive), L 74% Low (inductive)

B - Bald Eagle *(Haliaeetus leucocephalus)* SSS

View in Field Guide View Predicted Models View Range Maps

Special Status Species - Native Species Global: **G5** State: **S4** USFWS: **BGEPA; MBTA** USFS: **Sensitive - Known in Forests (BD, BRT, KOOT, LOLO)** BLM: **SENSITIVE** PIF: **2**

Delineation Criteria Confirmed nesting area buffered by a minimum distance of 2,000 meters in order to be conservative about encompassing the breeding territory and area commonly used for renesting. Only nesting observations with a locational uncertainty of 1,000 meters or less will be used to delineate a nesting area. (Last Updated: Sep 05, 2023)

Predicted Models: M 26% Moderate (inductive), L 47% Low (inductive)

M - Black-tailed Prairie Dog *(Cynomys ludovicianus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Delineation Criteria Areas with recent evidence of activity (i.e. burrow entrances) visible on recent National Agricultural Imagery Program (NAIP) aerial color photographic imagery that are within a distance of 200 meters of definitive observations buffered by the locational uncertainty of less than or equal to 1,000 meters. (Last Updated: Jul 03, 2019)

Predicted Models: M 25% Moderate (inductive), L 75% Low (inductive)

B - Loggerhead Shrike *(Lanius ludovicianus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, or territorial adults during the breeding season. Point observation location is buffered by a minimum distance of 300 meters in order to encompass the maximum breeding territory size reported for the species in Alberta and Idaho and otherwise is buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 29, 2023)

Predicted Models: M 14% Moderate (inductive), L 84% Low (inductive)

B - Great Blue Heron *(Ardea herodias)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** USFWS: **MBTA** FWP SWAP: **SGCN3**

Delineation Criteria Confirmed nesting area buffered by a minimum distance of 6,500 meters in order to be conservative about encompassing the areas commonly used for foraging near the breeding colony and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 27, 2023)

Predicted Models: M 9% Moderate (inductive), L 50% Low (inductive)

M - Hoary Bat *(Lasiurus cinereus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3G4** State: **S3B** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Delineation Criteria Confirmed area of occupancy based on the documented presence (mistnet captures, definitively identified acoustic recordings, and definitively identified roosting individuals) of adults or juveniles during the active season. Point observation location is buffered by a minimum distance of 3,500 meters in order to be conservative about encompassing the maximum reported foraging distance for the congeneric Lasiurus borealis and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jul 06, 2023)

Predicted Models: M 8% Moderate (inductive), L 92% Low (inductive)

R - Spiny Softshell *(Apalone spinifera)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3**

Delineation Criteria Stream reaches and impounded streams within the species' native range where the species naturally occurs and their presence has been confirmed through direct capture or where they are believed to be present based on the professional judgement of a biologist due to confirmed presence in adjacent areas. In order to reflect the importance of adjacent terrestrial habitats to survival, stream reaches are buffered 100 meters and impounded streams 50 meters into the terrestrial habitat based on PACFISH/INFISH Riparian Conservation Area standards. (Last Updated: Sep 22, 2023)

Predicted Models: L 60% Low (inductive)

B - Bobolink *(Dolichonyx oryzivorus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC10; BCC11; BCC17** FWP SWAP: **SGCN3** PIF: **3**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, or territorial adults during the breeding season. Point observation location is buffered by a minimum distance of 150 meters in order to conservatively encompass male territory size reported for the species and otherwise is buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Jun 30, 2023)

Predicted Models: L 60% Low (inductive)

B - Red-headed Woodpecker *(Melanerpes erythrocephalus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Delineation Criteria Confirmed breeding area based on the presence of a nest, chicks, or territorial adults during the breeding season. Point observation location is buffered by a minimum distance of 165 meters in order to encompass the maximum breeding territory size reported for the species and otherwise is buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Mar 22, 2023)

Predicted Models: L 24% Low (inductive)

O - Bat Roost (Non-Cave) *(Bat Roost (Non-Cave))* **IAH**		1	Not Assessed

Important Animal Habitat - Native Species Global: **GNR** State: **SNR**

Delineation Criteria Confirmed area of occupancy based on the documented presence of adults or juveniles of any bat species at non-cave natural roost sites (e.g. rock outcrops, trees), below ground human created roost sites (e.g. mines), and above ground human created roost sites (e.g., bridges, buildings). Point observation locations are buffered by a distance of 4,500 meters in order to encompass the 95% confidence interval for nightly foraging distance reported for Townsendâ€™s Big-eared Bat (a resident Montana bat Species of Concern) and otherwise by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters. (Last Updated: Oct 22, 2019)

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Model Icons
- N Suitable (native range)
- O Optimal Suitability
- M Moderate Suitability
- L Low Suitability
- I Suitable (introduced range)

Habitat Icons
- C Common
- O Occasional

Range Icons
- Y Native / Year-round
- S Summer
- W Winter
- M Migratory
- N Non-native
- H Historical

Num Obs
Count of obs with 'good precision' (<=1000m)
+ indicates additional 'poor precision' obs (1001m-10,000m)

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Native Species

Summarized by: **006N021E001** *(Buffered PLSS Section)*
Filtered by:
Native Species reports are filtered for Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC

Other Observed Species

	USFWS Sec7	# Obs	Predicted Model	Range
F - Brassy Minnow *(Hybognathus hankinsoni)* PSOC		1		Y
A - Northern Leopard Frog *(Lithobates pipiens)* SOC		2		Y
B - Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC		1		Y

F - Brassy Minnow *(Hybognathus hankinsoni)* PSOC

View in Field Guide | View Predicted Models | View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4**

Predicted Models: N 61% Suitable (native range) (deductive)

A - Northern Leopard Frog *(Lithobates pipiens)* SOC

View in Field Guide | View Predicted Models | View Range Maps

Species of Concern - Native Species Global: **G5** State: **S1,S4** USFS: **Sensitive - Known in Forests (KOOT)** **Sensitive - Suspected in Forests (BRT, LOLO)** BLM: **SENSITIVE** FWP SWAP: **SGCN1**

Predicted Models: M 17% Moderate (inductive), L 57% Low (inductive)

B - Sharp-tailed Grouse *(Tympanuchus phasianellus)* SOC

View in Field Guide | View Predicted Models | View Range Maps

Species of Concern - Native Species Global: **G5** State: **SX,S4** FWP SWAP: **SGCN1** PIF: **2**

Predicted Models: L 100% Low (inductive)

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Model Icons	Habitat Icons	Range Icons	Num Obs
N Suitable (native range)	C Common	Y Native / Year-round	Count of obs with 'good precision' (<=1000m)
O Optimal Suitability	O Occasional	S Summer	+ indicates additional 'poor precision' obs (1001m-10,000m)
M Moderate Suitability		W Winter	
L Low Suitability		M Migratory	
I Suitable (introduced range)		N Non-native	
		H Historical	

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Native Species

Summarized by: **006N021E001** *(Buffered PLSS Section)*
Filtered by:
Native Species reports are filtered for Species with MT Status = Species of Concern, Special Status, Important Animal Habitat, Potential SOC

Other Potential Species

	USFWS Sec7	Predicted Model	Range
M - Merriam's Shrew *(Sorex merriami)* SOC			Y
M - Western Spotted Skunk *(Spilogale gracilis)* PSOC			Y
V - Pediomelum hypogaeum var. hypogaeum *(Little Indian Breadroot)* PSOC			Y
B - Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC			Y
M - Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC			Y
R - Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC			Y
A - Great Plains Toad *(Anaxyrus cognatus)* SOC			Y
B - Yellow-billed Cuckoo *(Coccyzus americanus)* SOC			S M
M - Fringed Myotis *(Myotis thysanodes)* SOC			Y
M - Dwarf Shrew *(Sorex nanus)* SOC			Y
I - Danaus plexippus *(Monarch)* SOC			S
M - North American Porcupine *(Erethizon dorsatum)* PSOC			Y
B - American White Pelican *(Pelecanus erythrorhynchos)* SOC			S M

M - Merriam's Shrew *(Sorex merriami)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G4** State: **S3** FWP SWAP: **SGCN3**
Predicted Models: M 100% Moderate (inductive)

M - Western Spotted Skunk *(Spilogale gracilis)* PSOC

View in Field Guide | View Predicted Models | View Range Maps
Potential Species of Concern - Native Species Global: **G5** State: **SU** FWP SWAP: **SGIN**
Predicted Models: M 100% Moderate (inductive)

V - Pediomelum hypogaeum var. hypogaeum *(Little Indian Breadroot)* PSOC

View in Field Guide | View Predicted Models | View Range Maps
Potential Species of Concern - Native Species Global: **G5T4** State: **S3S4**
Predicted Models: M 82% Moderate (inductive), L 18% Low (inductive)

B - Pinyon Jay *(Gymnorhinus cyanocephalus)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G3** State: **S3** USFWS: **MBTA; BCC10; BCC17** FWP SWAP: **SGCN3**
Predicted Models: M 79% Moderate (inductive), L 21% Low (inductive)

M - Townsend's Big-eared Bat *(Corynorhinus townsendii)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G4** State: **S3** USFS: **Sensitive - Known in Forests (BD, BRT, KOOT, LOLO)** BLM: **SENSITIVE** FWP SWAP: **SGCN3**
Predicted Models: M 60% Moderate (inductive), L 40% Low (inductive)

R - Greater Short-horned Lizard *(Phrynosoma hernandesi)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G5** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3, SGIN**
Predicted Models: M 56% Moderate (inductive), L 44% Low (inductive)

A - Great Plains Toad *(Anaxyrus cognatus)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G5** State: **S2** BLM: **SENSITIVE** FWP SWAP: **SGCN2**
Predicted Models: M 56% Moderate (inductive), L 43% Low (inductive)

B - Yellow-billed Cuckoo *(Coccyzus americanus)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **PS: LT; MBTA** BLM: **THREATENED** FWP SWAP: **SGCN3, SGIN** PIF: **2**
Predicted Models: M 50% Moderate (inductive), L 42% Low (inductive)

M - Fringed Myotis *(Myotis thysanodes)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G4** State: **S3** BLM: **SENSITIVE** FWP SWAP: **SGCN3**
Predicted Models: M 41% Moderate (inductive), L 50% Low (inductive)

M - Dwarf Shrew *(Sorex nanus)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G4** State: **S2S3** FWP SWAP: **SGCN2-3**
Predicted Models: M 37% Moderate (inductive), L 63% Low (inductive)

I - Danaus plexippus *(Monarch)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G4** State: **S2S3** USFWS: **C**
Predicted Models: M 37% Moderate (inductive), L 63% Low (inductive)

M - North American Porcupine *(Erethizon dorsatum)* PSOC

View in Field Guide | View Predicted Models | View Range Maps
Potential Species of Concern - Native Species Global: **G5** State: **S3S4** FWP SWAP: **SGIN**
Predicted Models: M 26% Moderate (inductive), L 74% Low (inductive)

B - American White Pelican *(Pelecanus erythrorhynchos)* SOC

View in Field Guide | View Predicted Models | View Range Maps
Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA** FWP SWAP: **SGCN3** PIF: **3**
Predicted Models: M 26% Moderate (inductive), L 74% Low (inductive)

B - Eastern Screech-Owl *(Megascops asio)* PSOC

Potential Species of Concern - Native Species Global: **G5** State: **S3S4** USFWS: **MBTA** PIF: **3**

Predicted Models: M 24% Moderate (inductive), L 37% Low (inductive)

M - Little Brown Myotis *(Myotis lucifugus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3G4** State: **S3** FWP SWAP: **SGCN3**

Predicted Models: M 19% Moderate (inductive), L 80% Low (inductive)

B - Common Poorwill *(Phalaenoptilus nuttallii)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA** FWP SWAP: **SGIN** PIF: **3**

Predicted Models: M 17% Moderate (inductive), L 83% Low (inductive)

V - Triodanis leptocarpa *(Slim-pod Venus'-looking-glass)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5?** State: **S3** Plant Threat Score: **No Known Threats** CCVI: **Moderately Vulnerable**

Predicted Models: M 14% Moderate (inductive), L 51% Low (inductive)

B - Short-eared Owl *(Asio flammeus)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4** USFWS: **MBTA; BCC11; BCC17** PIF: **3**

Predicted Models: M 14% Moderate (inductive), L 43% Low (inductive)

B - Dickcissel *(Spiza americana)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA**

Predicted Models: M 13% Moderate (inductive), L 50% Low (inductive)

M - Long-eared Myotis *(Myotis evotis)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3**

Predicted Models: M 8% Moderate (inductive), L 92% Low (inductive)

M - Silver-haired Bat *(Lasionycteris noctivagans)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G3G4** State: **S4**

Predicted Models: M 8% Moderate (inductive), L 92% Low (inductive)

M - Spotted Bat *(Euderma maculatum)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3** USFS: **Sensitive - Known in Forests (BD)** BLM: **SENSITIVE** FWP SWAP: **SGCN3, SGIN**

Predicted Models: M 6% Moderate (inductive), L 94% Low (inductive)

M - Long-legged Myotis *(Myotis volans)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4G5** State: **S3**

Predicted Models: M 6% Moderate (inductive), L 93% Low (inductive)

B - Chimney Swift *(Chaetura pelagica)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G4G5** State: **S3S4B** USFWS: **MBTA; BCC11** FWP SWAP: **SGIN** PIF: **3**

Predicted Models: M 6% Moderate (inductive), L 67% Low (inductive)

B - Veery *(Catharus fuscescens)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: M 6% Moderate (inductive), L 61% Low (inductive)

M - Eastern Red Bat *(Lasiurus borealis)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3G4** State: **S3B** BLM: **SENSITIVE**

Predicted Models: M 6% Moderate (inductive), L 54% Low (inductive)

M - Preble's Shrew *(Sorex preblei)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3** FWP SWAP: **SGCN3**

Predicted Models: L 100% Low (inductive)

B - Burrowing Owl *(Athene cunicularia)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **1**

Predicted Models: L 100% Low (inductive)

B - Green-tailed Towhee *(Pipilo chlorurus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 99% Low (inductive)

B - Barrow's Goldeneye *(Bucephala islandica)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4** USFWS: **MBTA** FWP SWAP: **SGIN** PIF: **2**

Predicted Models: L 91% Low (inductive)

R - Plains Hog-nosed Snake *(Heterodon nasicus)* SOC

Species of Concern - Native Species Global: **G5** State: **S2** BLM: **SENSITIVE** FWP SWAP: **SGCN2, SGIN**

Predicted Models: L 90% Low (inductive)

V - Elodea bifoliata *(Long-sheath Waterweed)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4G5** State: **S2?** Plant Threat Score: **No Known Threats**

Predicted Models: L 85% Low (inductive)

V - Potentilla plattensis *(Platte Cinquefoil)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3** Plant Threat Score: **No Known Threats** CCVI: **Highly Vulnerable**

Predicted Models: L 78% Low (inductive)

V - Stellaria crassifolia *(Fleshy Stitchwort)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2** Plant Threat Score: **No Known Threats**

Predicted Models: L 77% Low (inductive)

R - Western Milksnake *(Lampropeltis gentilis)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2** BLM: **SENSITIVE** FWP SWAP: **SGCN2**

Predicted Models: L 76% Low (inductive)

V - Carex crawei *(Crawe's Sedge)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2S3** Plant Threat Score: **Low**

Predicted Models: L 72% Low (inductive)

B - Plumbeous Vireo *(Vireo plumbeus)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S3S4B** USFWS: **MBTA** PIF: **3**

Predicted Models: L 67% Low (inductive)

B - Thick-billed Longspur *(Rhynchophanes mccownii)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC10; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 63% Low (inductive)

I - Oreohelix strigosa berryi *(Berry's Mountainsnail)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5T2** State: **S1S2**

Predicted Models: L 60% Low (inductive)

B - American Bittern *(Botaurus lentiginosus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 60% Low (inductive)

B - Black-billed Cuckoo *(Coccyzus erythropthalmus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3, SGIN** PIF: **2**

Predicted Models: L 60% Low (inductive)

B - Black-necked Stilt *(Himantopus mexicanus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 60% Low (inductive)

B - Ovenbird *(Seiurus aurocapilla)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA** PIF: **3**

Predicted Models: L 60% Low (inductive)

V - Cyperus schweinitzii *(Schweinitz's Flatsedge)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2** Plant Threat Score: **Low**

Predicted Models: L 58% Low (inductive)

V - Chenopodium subglabrum *(Smooth Goosefoot)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3G4** State: **S2** Plant Threat Score: **Unknown** CCVI: **Highly Vulnerable**

Predicted Models: L 57% Low (inductive)

B - Mountain Plover *(Charadrius montanus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3** State: **S2B** USFWS: **MBTA; BCC10; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN2** PIF: **1**

Predicted Models: L 57% Low (inductive)

V - Senecio integerrimus var. scribneri *(Scribner's Ragwort)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5T2T3** State: **S2S3** Plant Threat Score: **No Known Threats** CCVI: **Less Vulnerable**

Predicted Models: L 56% Low (inductive)

B - Ferruginous Hawk *(Buteo regalis)* SOC

Species of Concern - Native Species Global: **G4** State: **S3B** USFWS: **MBTA; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 56% Low (inductive)

B - Clark's Nutcracker *(Nucifraga columbiana)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** USFWS: **MBTA** USFS: **Species of Conservation Concern in Forests (FLAT)** FWP SWAP: **SGCN3** PIF: **3**

Predicted Models: L 53% Low (inductive)

V - Mimulus floribundus *(Floriferous Monkeyflower)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **SH** Plant Threat Score: **No Known Threats** CCVI: **Highly Vulnerable**

Predicted Models: L 51% Low (inductive)

M - Hayden's Shrew *(Sorex haydeni)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S3S4**

Predicted Models: L 50% Low (inductive)

V - Cypripedium parviflorum *(Small Yellow Lady's-slipper)* PSOC

View in Field Guide View Predicted Models View Range Maps

USFS: **Sensitive - Known in Forests (KOOT, LOLO)**
Sensitive - Suspected in Forests (BRT)

Potential Species of Concern - Native Species Global: **G5** State: **S3S4** **Species of Conservation Concern in Forests (CG, HLC)**

Predicted Models: L 49% Low (inductive)

B - White-faced Ibis *(Plegadis chihi)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3B** USFWS: **MBTA** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **2**

Predicted Models: L 49% Low (inductive)

B - Chestnut-collared Longspur *(Calcarius ornatus)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN2** PIF: **2**

Predicted Models: L 47% Low (inductive)

V - Physaria ludoviciana *(Silver Bladderpod)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S2S3** Plant Threat Score: **No Known Threats**

Predicted Models: L 43% Low (inductive)

V - Physaria brassicoides *(Double Bladderpod)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G5** State: **S3** Plant Threat Score: **No Known Threats**

Predicted Models: L 39% Low (inductive)

I - Bombus suckleyi *(Suckley Cuckoo Bumble Bee)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G2G3** State: **S1**

Predicted Models: L 37% Low (inductive)

B - Eastern Bluebird *(Sialia sialis)* PSOC

View in Field Guide View Predicted Models View Range Maps

Potential Species of Concern - Native Species Global: **G5** State: **S4B** USFWS: **MBTA**

Predicted Models: L 29% Low (inductive)

B - Sprague's Pipit *(Anthus spragueii)* SOC

View in Field Guide View Predicted Models View Range Maps

Species of Concern - Native Species Global: **G3G4** State: **S3B** USFWS: **MBTA; BCC11; BCC17** BLM: **SENSITIVE** FWP SWAP: **SGCN3** PIF: **1**

Predicted Models: L 29% Low (inductive)

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Structured Surveys

Summarized by: **006N021E001** *(Buffered PLSS Section)*

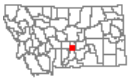
The Montana Natural Heritage Program (MTNHP) records informa. on on the locations where more than 80 different types of well-defined repeatable survey protocols capable of detecting an animal species or suite of animal species have been conducted by state, federal, tribal, university, or private consulting biologists. Examples of structured survey protocols tracked by MTNHP include: visual encounter and dip net surveys for pond breeding amphibians, point counts for birds, call playback surveys for selected bird species, visual surveys of migrating raptors, kick net stream reach surveys for macroinvertebrates, visual encounter cover object surveys for terrestrial mollusks, bat acoustic or mist net surveys, pitfall and/or snap trap surveys for small terrestrial mammals, track or camera trap surveys for large mammals, and trap surveys for turtles. Whenever possible, photographs of survey locations are stored in MTNHP databases.

MTNHP does not typically manage information on structured surveys for plants; surveys for invasive species may be a future exception.

Within the report area you have requested, structured surveys are summarized by the number of each type of structured survey protocol that has been conducted, the number of species detections/observations resulting from these surveys, and the most recent year a survey has been conducted.

A-Nocturnal Calling Amphibian *(Nocturnal Breeding Amphibian Calling Survey)*	**Survey Count**: 1	**Obs Count**: 1	**Recent Survey**: 2005
B-Bald Eagle Nest *(Bald Eagle Nest Survey)*	**Survey Count**: 1	**Obs Count**: 1	**Recent Survey**: 2022
B-Cuckoo Playback Survey *(Riparian Playback Surveys for Cuckoos)*	**Survey Count**: 1	**Obs Count**:	**Recent Survey**: 2012
B-Long-billed Curlew *(Long-billed Curlew, Road-based, Point Count)*	**Survey Count**: 1	**Obs Count**:	**Recent Survey**: 2015
B-Raptor nest *(Raptor Nest Survey)*	**Survey Count**: 33	**Obs Count**: 19	**Recent Survey**: 2023
E-Noxious Weed, Road-based *(Noxious Weed Road-based Visual Surveys)*	**Survey Count**: 4	**Obs Count**: 8	**Recent Survey**: 2005
F-Fish Electrofishing *(Fish Electrofishing Surveys)*	**Survey Count**: 1	**Obs Count**: 8	**Recent Survey**: 2006
F-Fish Other Survey *(Fish Other Survey (FWP Survey Type))*	**Survey Count**: 1	**Obs Count**: 1	**Recent Survey**: 1991
F-Fish Trapping/Netting *(Fish Trapping or Netting Surveys)*	**Survey Count**: 1	**Obs Count**: 5	**Recent Survey**: 2003
M-Bat Roost (Active Season) *(Bat Roost (Active Season) Survey)*	**Survey Count**: 1	**Obs Count**: 1	**Recent Survey**: 2017

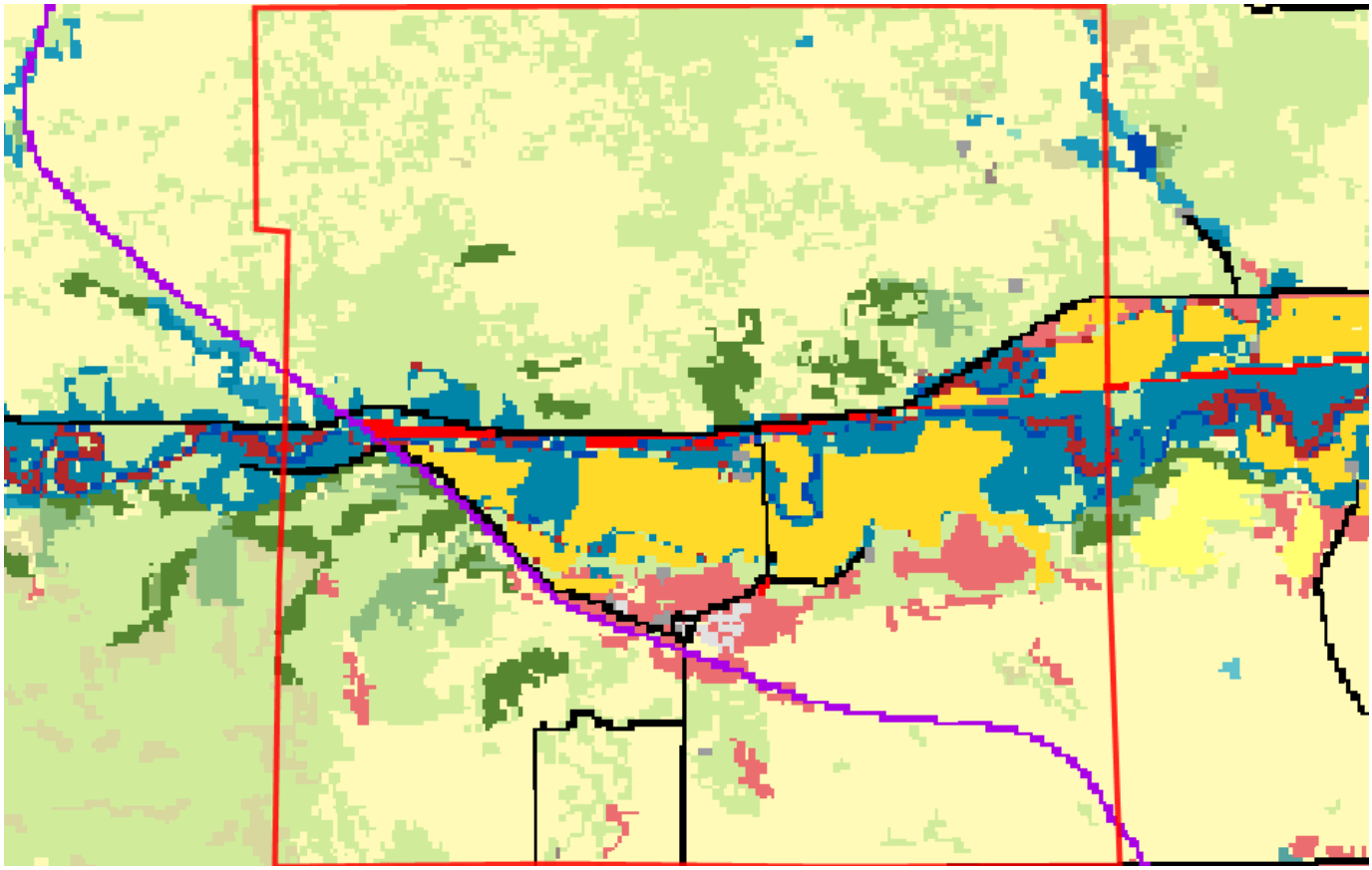
MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**



Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Land Cover

Summarized by: **006N021E001** *(Buffered PLSS Section)*



45% (*2,609 Acres*)

Shrubland, Steppe and Savanna Systems
Sagebrush Steppe
Big Sagebrush Steppe

This widespread ecological system occurs throughout much of central Montana, and north and east onto the western fringe of the Great Plains. In central Montana, where this system occurs on both glaciated and non-glaciated landscapes, it differs slightly, with more summer rain than winter precipitation and more precipitation annually. Throughout its distribution, soils are typically deep and non-saline, often with a microphytic crust. This shrub-steppe is dominated by perennial grasses and forbs with greater than 25% cover. Overall shrub cover is less than 10 percent. In Montana and Wyoming, stands are more mesic, with more biomass of grass, and have less shrub diversity than stands farther to the west, and 50 to 90% of the occurrences are dominated by Wyoming big sagebrush with western wheatgrass (*Pascopyrum smithii*). Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) are indicators of disturbance, but cheatgrassis typically not as abundant as in the Intermountain West, possibly due to a colder climate. The natural fire regime of this ecological system maintains a patchy distribution of shrubs, preserving the steppe character. Shrubs may increase following heavy grazing and/or with fire suppression. In central and eastern Montana, complexes of prairie dog towns are common in this ecological system.

28% (*1,634 Acres*)

Grassland Systems
Lowland/Prairie Grassland
Great Plains Mixedgrass Prairie

The system covers much of the eastern two-thirds of Montana, occurring continuously for hundreds of square kilometers, interrupted only by wetland/riparian areas or sand prairies. Soils are primarily fine and medium-textured. The growing season averages 115 days, ranging from 100 days on the Canadian border to 130 days on the Wyoming border. Climate is typical of mid-continental regions with long severe winters and hot summers. Grasses typically comprise the greatest canopy cover, and western wheatgrass (*Pascopyrum smithii*) is usually dominant. Other species include thickspike wheatgrass (*Elymus lanceolatus*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*). Near the Canadian border in north-central Montana, this system grades into rough fescue (*Festuca campestris)* and Idaho fescue (*Festuca idahoensis*) grasslands. Remnants of shortbristle needle and thread *(Hesperostipa curtiseta)* dominated vegetation are found in northernmost Montana and North Dakota, and are associated with productive sites, now mostly converted to farmland. Forb diversity is typically high. In areas of southeastern and central Montana where sagebrush steppe borders the mixed grass prairie, common plant associations include Wyoming big sagebrush-western wheatgrass (*Artemisia tridentata* ssp. *wyomingensis/ Pascopyrum smithii*). Fire and grazing are the primary drivers of this system. Drought can also impact it, in general favoring the shortgrass component at the expense of the mid-height grasses. With intensive grazing, cool season exotics such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and Japanese brome (*Bromus japonicus*) increase in dominance; both of these rhizomatous species have been shown to markedly decrease species diversity. Previously cultivated acres that have been re-vegetated with non-native plants have been transformed into associations such as Kentucky bluegrass (*Poa pratensis*)/western wheatgrass *(Pascopyrum smithii)* or into pure crested wheatgrass (*Agropyron cristatum)* stands.

7% (*412 Acres*)

Cultivated Crops

These areas used for the production of crops, such as corn, soybeans, small grains, sunflowers, vegetables, and cotton, typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming. Other areas include more stable land cover of orchards and vineyards.

5% (*279 Acres*)

Wetland and Riparian Systems

Floodplain and Riparian

Great Plains Floodplain

This system occurs along the Missouri and Yellowstone Rivers and their larger tributaries, including parts of the Little Missouri, Clarkâ€™s Fork Yellowstone, Powder, Tongue, Bighorn, Milk, and Musselshell rivers. These are the big perennial rivers of the region, with hydrologic dynamics largely driven by snowmelt and rainfall originating in their headwater watersheds, rather than local precipitation events. In the absence of disturbance, periodic flooding of fluvial and alluvial soils and channel migration will create depressions and backwaters that support a mosaic of wetland and riparian vegetation, whose composition and structure is sustained, altered and redistributed by hydrology. Dominant communities within this system range from floodplain forests to wet meadows to gravel/sand flats, linked by underlying soils and flooding regimes. In the western part of the systemâ€™s range in Montana, the overstory dominant species is black cottonwood (*Populus balsamifera ssp. trichocarpa*) with narrowleaf cottonwood *(Populus angustifolia)* and eastern cottonwood (*Populus deltoides)* occurring as co-dominants in the riparian/floodplain interface near the mountains. Further east, narrowleaf cottonwood and Plains cottonwood become dominant. In relatively undisturbed stands, willow (*Salix* species), redosier dogwood (*Cornus sericea*) and common chokecherry (*Prunus virginiana*) form a thick, multi-layered shrub understory, with a mixture of cool and warm season graminoid species below.

In Montana, many occurrences are now degraded to the point where the cottonwood overstory is the only remaining natural component. The hydrology of these floodplain systems has been affected by dams, highways, railroads and agricultural ditches, and as a result, they have lost their characteristic wetland /riparian mosaic structure. This has resulted in a highly altered community consisting of relict cottonwood stands with little regeneration. The understory vegetation is dominated by non-native pasture grasses, legumes and other introduced forbs, or by the disclimax western snowberry (*Symphoricarpos occidentalis*) and rose (*Rosa* species) shrub community.

3% (*190 Acres*)

Recently Disturbed or Modified

Introduced Vegetation

Introduced Upland Vegetation - Annual and Biennial Forbland

Land cover is significantly altered/disturbed by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are knapweed, oxeye daisy, Canada thistle, leafy spurge, pepperweed, and yellow sweetclover.

3% (*188 Acres*)

Forest and Woodland Systems

Conifer-dominated forest and woodland (xeric-mesic)

Great Plains Ponderosa Pine Woodland and Savanna

These ponderosa pine (*Pinus ponderosa*) occurrences differ from the Rocky Mountain Ponderosa Pine Woodland and Savanna systems in that they are typically found within the matrix of the Great Plains grassland systems. They are often surrounded by mixed-grass prairie, in places where available soil moisture is higher or soils are more coarse and rocky. Elevation ranges from 1,189 meters (3,900 feet) in southeastern Montana to 1,646 m (5,400 feet) in north-central Montana. Occurrences are usually on east- and north-facing aspects. These woodlands can be physiognomically variable, ranging from very sparse patches of trees on drier sites, to nearly closed-canopy forest stands on north slopes or in draws where available soil moisture is higher.

Additional Limited Land Cover

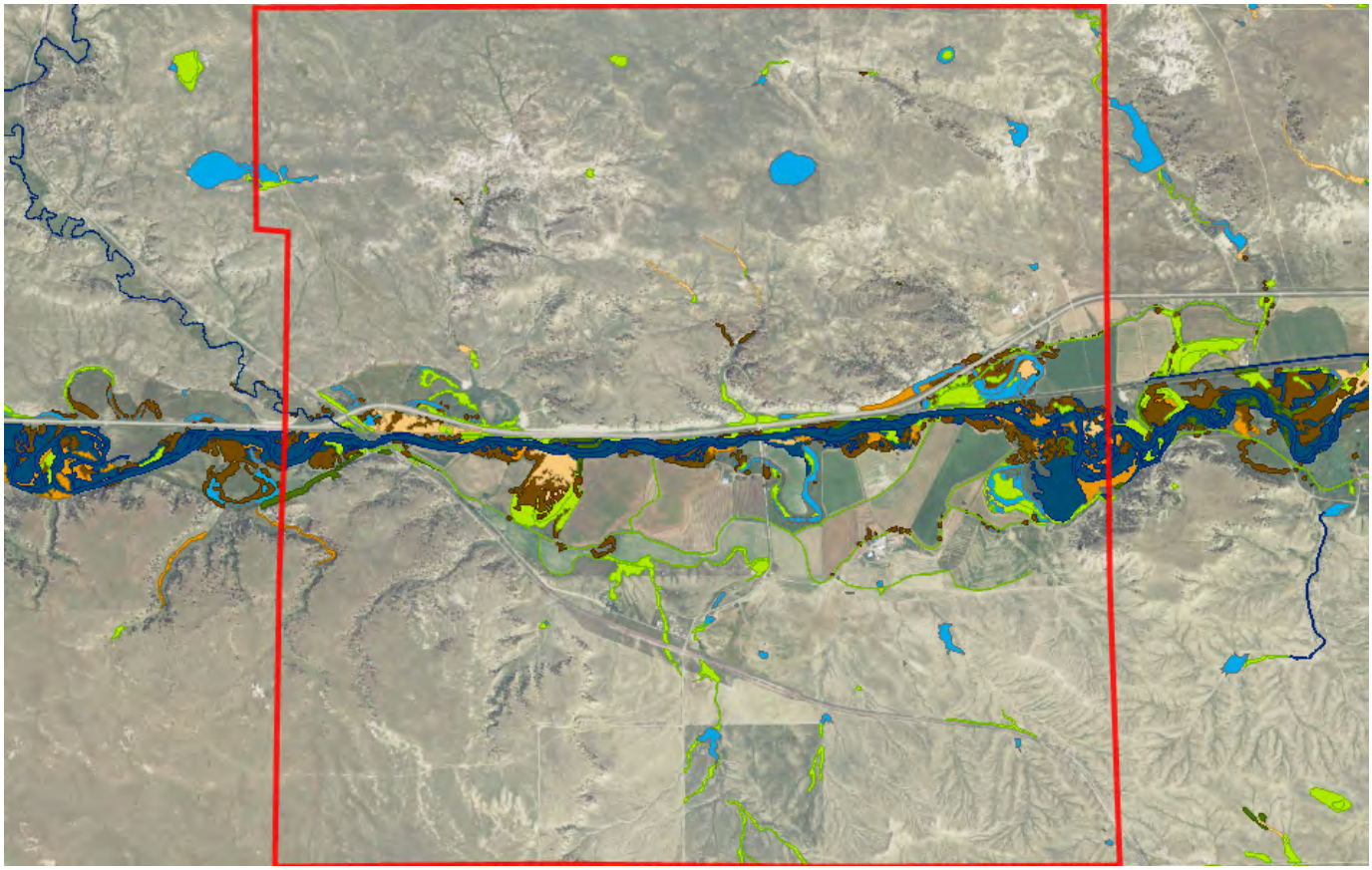
1% (*68 Acres*) Rocky Mountain Foothill Woodland-Steppe Transition
1% (*65 Acres*) Other Roads
1% (*54 Acres*) Railroad
1% (*48 Acres*) Great Plains Sand Prairie
1% (*42 Acres*) Major Roads
1% (*39 Acres*) Introduced Riparian and Wetland Vegetation
1% (*36 Acres*) Open Water
<1% (*27 Acres*) Commercial / Industrial
<1% (*19 Acres*) Great Plains Riparian
<1% (*13 Acres*) Low Intensity Residential
<1% (*12 Acres*) Developed, Open Space
<1% (*2 Acres*) Great Plains Cliff and Outcrop
<1% (*1 Acres*) Great Plains Open Freshwater Depression Wetland

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Wetland and Riparian

Summarized by: **006N021E001** *(Buffered PLSS Section)*



Wetland and Riparian Mapping

Explain

P - Palustrine

AB - Aquatic Bed

P - Palustrine, AB - Aquatic Bed
Wetlands with vegetation growing on or below the water surface for most of the growing season.

F - Semipermanently Flooded	43 Acres	
(no modifier)	**12 Acres**	**PABF**
h - Diked/Impounded	**31 Acres**	**PABFh**
x - Excavated	**<1 Acres**	**PABFx**

US - Unconsolidated Shore

P - Palustrine, US - Unconsolidated Shore
Wetlands with less than 75% areal cover of stones, boulders, or bedrock. AND with less than 30% vegetative cover AND the wetland is irregularly exposed due to seasonal or irregular flooding and subsequent drying.

A - Temporarily Flooded	15 Acres	
(no modifier)	**12 Acres**	**PUSA**
h - Diked/Impounded	**3 Acres**	**PUSAh**
C - Seasonally Flooded	1 Acres	
h - Diked/Impounded	**1 Acres**	**PUSCh**

EM - Emergent

P - Palustrine, EM - Emergent
Wetlands with erect, rooted herbaceous vegetation present during most of the growing season.

A - Temporarily Flooded	81 Acres	
(no modifier)	**65 Acres**	**PEMA**
h - Diked/Impounded	**6 Acres**	**PEMAh**
x - Excavated	**10 Acres**	**PEMAx**
C - Seasonally Flooded	10 Acres	
(no modifier)	**3 Acres**	**PEMC**
h - Diked/Impounded	**7 Acres**	**PEMCh**
F - Semipermanently Flooded	4 Acres	
(no modifier)	**4 Acres**	**PEMF**

SS - Scrub-Shrub

P - Palustrine, SS - Scrub-Shrub
Wetlands dominated by woody vegetation less than 6 meters (20 feet) tall. Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

A - Temporarily Flooded	10 Acres	
(no modifier)	**10 Acres**	**PSSA**

R - Riverine (Rivers)

3 - Upper Perennial

UB - Unconsolidated Bottom

R - Riverine (Rivers), 3 - Upper Perennial, UB - Unconsolidated Bottom

H - Permanently Flooded	41 Acres	

(no modifier) **41 Acres** **R3UBH** *Stream channels where the substrate is at least 25% mud, silt or other fine particles.*

US - Unconsolidated Shore

R - Riverine (Rivers), 3 - Upper Perennial, US - Unconsolidated Shore
Shorelines with less than 75% areal cover of stones, boulders, or bedrock and less than 30% vegetation cover. The area is also irregularly exposed due to seasonal or irregular flooding and subsequent drying.

A - Temporarily Flooded 46 Acres
(no modifier) **46 Acres** **R3USA**

C - Seasonally Flooded 29 Acres
(no modifier) **29 Acres** **R3USC**

4 - Intermittent

SB - Stream Bed

R - Riverine (Rivers), 4 - Intermittent, SB - Stream Bed
Active channel that contains periodic water flow.

C - Seasonally Flooded <1 Acres
(no modifier) **<1 Acres** **R4SBC**

Rp - Riparian

1 - Lotic

SS - Scrub-Shrub
(no modifier) **15 Acres** **Rp1SS**

Rp - Riparian, 1 - Lotic, SS - Scrub-Shrub
This type of riparian area is dominated by woody vegetation that is less than 6 meters (20 feet) tall. Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

FO - Forested
(no modifier) **70 Acres** **Rp1FO**

Rp - Riparian, 1 - Lotic, FO - Forested
This riparian class has woody vegetation that is greater than 6 meters (20 feet) tall.

EM - Emergent
(no modifier) **19 Acres** **Rp1EM**

Rp - Riparian, 1 - Lotic, EM - Emergent
Riparian areas that have erect, rooted herbaceous vegetation during most of the growing season.

2 - Lentic

SS - Scrub-Shrub
(no modifier) **3 Acres** **Rp2SS**

Rp - Riparian, 2 - Lentic, SS - Scrub-Shrub
This type of riparian area is dominated by woody vegetation that is less than 6 meters (20 feet) tall. Woody vegetation includes tree saplings and trees that are stunted due to environmental conditions.

FO - Forested
(no modifier) **10 Acres** **Rp2FO**

Rp - Riparian, 2 - Lentic, FO - Forested
This riparian class has woody vegetation that is greater than 6 meters (20 feet) tall.

EM - Emergent
(no modifier) **2 Acres** **Rp2EM**

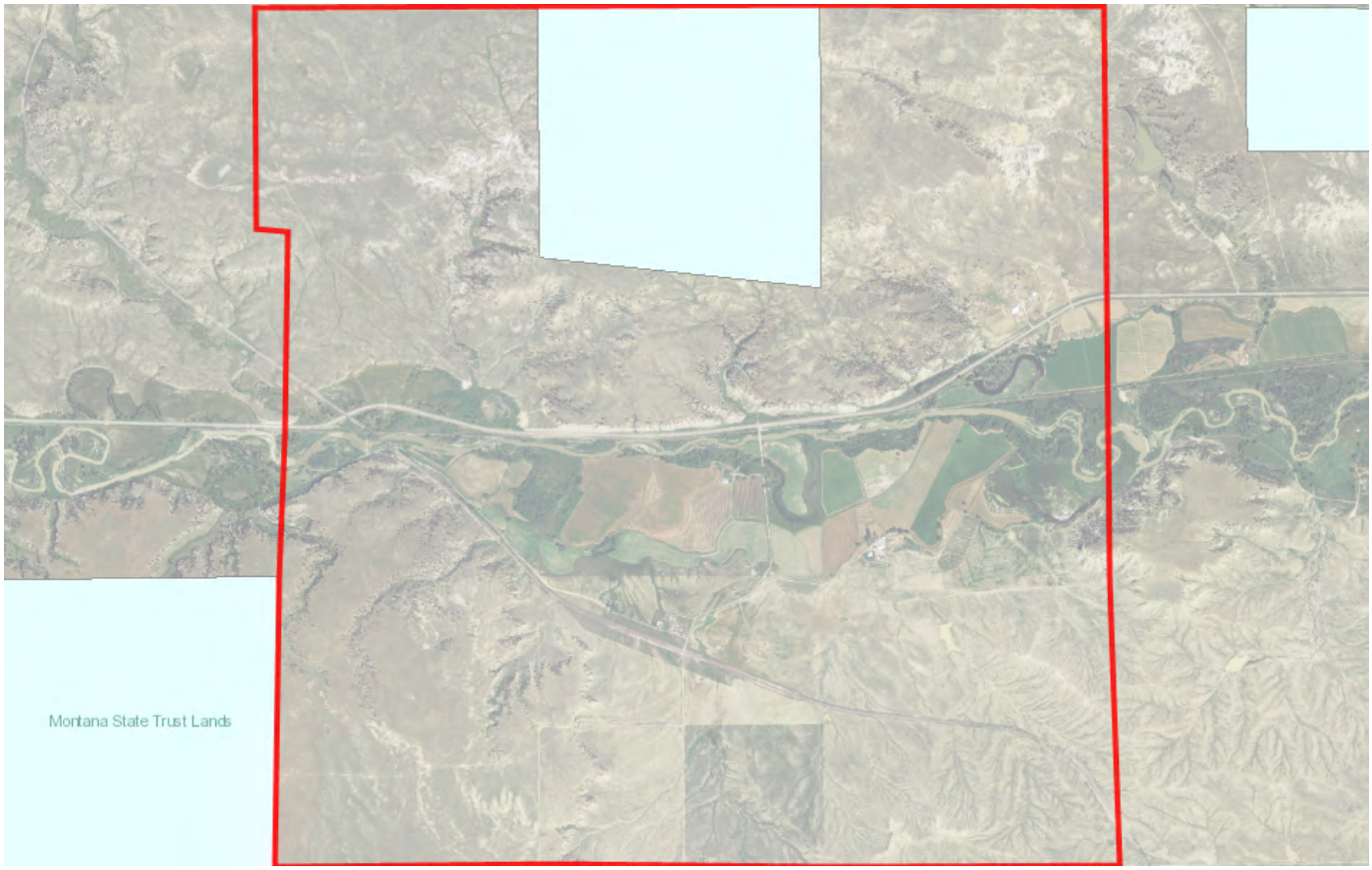
Rp - Riparian, 2 - Lentic, EM - Emergent
Riparian areas that have erect, rooted herbaceous vegetation during most of the growing season.

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Land Management

Summarized by: **006N021E001** *(Buffered PLSS Section)*



Land Management Summary *Explain*

	Ownership	Tribal	Easements	Other Boundaries (possible overlap)
Public Lands	**605 Acres (11%)**			
State	**605 Acres (11%)**			
Montana State Trust Lands	**605 Acres (11%)**			
MT State Trust Owned	**605 Acres (11%)**			
Private Lands or Unknown Ownership	**5,137 Acres (89%)**			

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Biological Reports

Summarized by: **006N021E001** *(Buffered PLSS Section)*

Within the report area you have requested, cita ons for all reports and publica ons associated with plant or animal observa ons in Montana Natural Heritage Program (MTNHP) databases are listed and, where possible, links to the documents are included.

The MTNHP plans to include reports associated with terrestrial and aqua c communi es in the future as allowed for by staff resources. If you know of reports or publica ons associated with species or biological communi es within the report area that are not shown in this report, please let us know: mtnhp@mt.gov

Tobalske, Claudine and Linda Vance. 2017.***Predicting the distribution of Russian Olive stands in eastern Montana valley bottoms using NAIP imagery***. Report to the US EPA. Montana Natural Heritage Program. Helena, MT. 40pp.

MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the **Montana State Library's Natural Resource Information System**

Model Icons
- Suitable (native range)
- Optimal Suitability
- Moderate Suitability
- Low Suitability
- Suitable (introduced range)

Habitat Icons
- Common
- Occasional

Range Icons
- Non-native

Num Obs
Count of obs with 'good precision' (<=1000m)
+ indicates additional 'poor precision' obs (1001m-10,000m)

Latitude	Longitude
46.27737	-109.00912
46.32128	-109.07342

Invasive and Pest Species

Summarized by: **006N021E001** *(Buffered PLSS Section)*

	# Obs	Predicted Model	Range

Aquatic Invasive Species

V - Myriophyllum spicatum *(Eurasian Water-milfoil)* N2A/AIS

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Aquatic Invasive Species - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: L 49% Low (inductive)

V - Butomus umbellatus *(Flowering-rush)* N2A/AIS

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Aquatic Invasive Species - Non-native Species Global: **G5** State: **SNA**
Predicted Models: L 39% Low (inductive)

V - Nymphaea odorata *(American Water-lily)* AIS

View in Field Guide | View Predicted Models | View Range Maps
Aquatic Invasive Species - Non-native Species Global: **G5** State: **SNA**
Predicted Models: I 95% Suitable (introduced range) (deductive)

F - Common Carp *(Cyprinus carpio)* AIS — 1

View in Field Guide | View Predicted Models | View Range Maps
Aquatic Invasive Species - Non-native Species Global: **G5** State: **SNA**
Predicted Models: I 61% Suitable (introduced range) (deductive)

Noxious Weeds: Priority 1A

V - Centaurea solstitialis *(Yellow Starthistle)* N1A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 1A - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: M 68% Moderate (inductive), L 32% Low (inductive)

V - Isatis tinctoria *(Dyer's Woad)* N1A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 1A - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: M 28% Moderate (inductive), L 43% Low (inductive)

V - Taeniatherum caput-medusae *(Medusahead)* N1A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 1A - Non-native Species Global: **G4G5** State: **SNA**
Predicted Models: L 53% Low (inductive)

Noxious Weeds: Priority 1B

V - Lythrum salicaria *(Purple Loosestrife)* N1B

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 1B - Non-native Species Global: **G5** State: **SNA**
Predicted Models: M 19% Moderate (inductive), L 41% Low (inductive)

V - Polygonum x bohemicum *(Bohemian Knotweed)* N1B

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 1B - Non-native Species Global: **GNA** State: **SNA**
Predicted Models: L 24% Low (inductive)

Noxious Weeds: Priority 2A

V - Rhamnus cathartica *(Common Buckthorn)* N2A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: M 13% Moderate (inductive), L 48% Low (inductive)

V - Ventenata dubia *(Ventenata)* N2A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: M 6% Moderate (inductive), L 94% Low (inductive)

V - Hieracium praealtum *(Kingdevil Hawkweed)* N2A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: M 6% Moderate (inductive), L 73% Low (inductive)

V - Lepidium latifolium *(Perennial Pepperweed)* N2A

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: L 61% Low (inductive)

V - Myriophyllum spicatum *(Eurasian Water-milfoil)* N2A/AIS

View in Field Guide | View Predicted Models | View Range Maps
Noxious Weed: Priority 2A - Aquatic Invasive Species - Non-native Species Global: **GNR** State: **SNA**
Predicted Models: L 49% Low (inductive)

V - Butomus umbellatus *(Flowering-rush)* N2A/AIS

Noxious Weed: Priority 2A - Aquatic Invasive Species - Non-native Species Global: **G5** State: **SNA**

Predicted Models: L 39% Low (inductive)

Noxious Weeds: Priority 2B

V - Linaria dalmatica *(Dalmatian Toadflax)* N2B 2

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **G5** State: **SNA**

Predicted Models: M 52% Moderate (inductive), L 48% Low (inductive)

V - Centaurea stoebe *(Spotted Knapweed)* N2B 3

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 52% Moderate (inductive), L 32% Low (inductive)

V - Euphorbia virgata *(Leafy Spurge)* N2B 1

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 37% Moderate (inductive), L 63% Low (inductive)

V - Acroptilon repens *(Russian Knapweed)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 37% Moderate (inductive), L 55% Low (inductive)

V - Centaurea diffusa *(Diffuse Knapweed)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 30% Moderate (inductive), L 70% Low (inductive)

V - Lepidium draba *(Whitetop)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 30% Moderate (inductive), L 70% Low (inductive)

V - Tamarix ramosissima *(Salt Cedar)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 26% Moderate (inductive), L 74% Low (inductive)

V - Cirsium arvense *(Canada Thistle)* N2B 5

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **G5** State: **SNA**

Predicted Models: M 19% Moderate (inductive), L 81% Low (inductive)

V - Convolvulus arvensis *(Field Bindweed)* N2B 3

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 19% Moderate (inductive), L 59% Low (inductive)

V - Cynoglossum officinale *(Common Hound's-tongue)* N2B 1

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 17% Moderate (inductive), L 59% Low (inductive)

V - Tanacetum vulgare *(Common Tansy)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 60% Low (inductive)

V - Potentilla recta *(Sulphur Cinquefoil)* N2B

View in Field Guide View Predicted Models View Range Maps

Noxious Weed: Priority 2B - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 59% Low (inductive)

Regulated Weeds: Priority 3

V - Elaeagnus angustifolia *(Russian Olive)* R3 3

View in Field Guide View Predicted Models View Range Maps

Regulated Weed: Priority 3 - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 26% Moderate (inductive), L 69% Low (inductive)

V - Bromus tectorum *(Cheatgrass)* R3

View in Field Guide View Predicted Models View Range Maps

Regulated Weed: Priority 3 - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 100% Low (inductive)

Biocontrol Species

I - Aphthona lacertosa *(Brown-legged Leafy Spurge Flea Beetle)* BIOCNTRL

View in Field Guide View Predicted Models View Range Maps

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 81% Moderate (inductive), L 19% Low (inductive)

I - Oberea erythrocephala *(Red-headed Leafy Spurge Stem Borer)* BIOCNTRL

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: M 61% Moderate (inductive), L 39% Low (inductive)

I - Mecinus janthiniformis *(Dalmatian Toadflax Stem-boring Weevil)* BIOCNTRL

View in Field Guide View Predicted Models View Range Maps

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 100% Low (inductive)

I - Cyphocleonus achates *(Knapweed Root Weevil)* BIOCNTRL

View in Field Guide View Predicted Models View Range Maps

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 88% Low (inductive)

I - Aphthona nigriscutis *(Black Dot Leafy Spurge Flea Beetle)* BIOCNTRL

View in Field Guide View Predicted Models View Range Maps

Biocontrol Species - Non-native Species Global: **GNR** State: **SNA**

Predicted Models: L 61% Low (inductive)

Introduction to Montana Natural Heritage Program

PO Box 201800 • 1201 11th Avenue • Helena, MT 59620-1800 • fax 406.444.0266 • phone 406.444.3989 • mtnhp.org

Introduction

The Montana Natural Heritage Program (MTNHP) is Montana's source for reliable and objective information on Montana's native species and habitats, emphasizing those of conservation concern. MTNHP was created by the Montana legislature in 1983 as part of the Natural Resource Information System (NRIS) at the Montana State Library (MSL). MTNHP is "a program of information acquisition, storage, and retrieval for data relating to the flora, fauna, and biological community types of Montana" (MCA 90-15-102). MTNHP's activities are guided by statute as well as through ongoing interaction with, and feedback from, principal data source agencies such as Montana Fish, Wildlife, and Parks, the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation, the Montana University System, the US Forest Service, and the US Bureau of Land Management. Since the first staff was hired in 1985, the Program has logged a long record of success, and developed into a highly respected, service-oriented program. MTNHP is widely recognized as one of the most advanced and effective of over 60 natural heritage programs that are distributed across North America.

Vision

Our vision is that public agencies, the private sector, the education sector, and the general public will trust and rely upon MTNHP as the source for information and expertise on Montana's species and habitats, especially those of conservation concern. We strive to provide easy access to our information to allow users to save time and money, speed environmental reviews, and make informed decisions.

Core Values

- We endeavor to be a single statewide source of accurate and up-to-date information on Montana's plants, animals, and aquatic and terrestrial biological communities.
- We actively listen to our data users and work responsively to meet their information and training needs.
- We strive to provide neutral, trusted, timely, and equitable service to all of our information users.
- We make every effort to be transparent to our data users in setting work priorities and providing data products.

Confidentiality

All information requests made to the Montana Natural Heritage Program are considered library records and are protected from disclosure by the Montana Library Records Confidentiality Act (MCA 22-1-11).

Information Managed

Information managed at the Montana Natural Heritage Program is botanical, zoological, and ecological information that describes the distribution (e.g., observations, structured surveys, range polygons, predicted habitat suitability models), conservation status (e.g., global and state conservation status ranks, including threats), and other supporting information (e.g., accounts and references) on the biology and ecology of species and biological communities.

Data Use Terms and Conditions

- Montana Natural Heritage Program (MTNHP) products and services are based on biological data and the objective interpretation of those data by professional scientists. MTNHP does not advocate any particular philosophy of natural resource protection, management, development, or public policy.
- MTNHP has no natural resource management or regulatory authority. Products, statements, and services from MTNHP are intended to inform parties as to the state of scientific knowledge about certain natural resources, and to further develop that knowledge. The information is not intended as natural resource management guidelines or prescriptions or a determination of environmental impacts. MTNHP recommends consultation with appropriate state, federal, and tribal resource management agencies and authorities in the area where your project is located.
- Information on the status and spatial distribution of biological resources produced by MTNHP are intended to inform parties of the state-wide status, known occurrence, or the likelihood of the presence of those resources. **These products are not intended to substitute for field-collected data, nor are they intended to be the sole basis for natural resource management decisions.**
- MTNHP does not portray its data as exhaustive or comprehensive inventories of rare species or biological communities. **Field verification of the absence or presence of sensitive species and biological communities will always be an important obligation of users of our data.**
- MTNHP responds equally to all requests for products and services, regardless of the purpose or identity of the requester.
- Because MTNHP constantly updates and revises its databases with new data and information, products will become outdated over time. Interested parties are encouraged to obtain the most current information possible from MTNHP, rather than using older products. We add, review, update, and delete records on a daily basis. Consequently, we strongly advise that you update your MTNHP data sets at a minimum of every four months for most applications of our information.
- MTNHP data require a certain degree of biological expertise for proper analysis, interpretation, and application. Our staff is available to advise you on questions regarding the interpretation or appropriate use of the data that we provide. See Contact Information for MTNHP Staff
- The information provided to you by MTNHP may include sensitive data that if publicly released might jeopardize the welfare of threatened, endangered, or sensitive species or biological communities. This information is intended for distribution or use only within your department, agency, or business. Subcontractors may have access to the data during the course of any given project, but should not be given a copy for their use on subsequent, unrelated work.
- MTNHP data are made freely available. Duplication of hard-copy or digital MTNHP products with the intent to sell is prohibited without written consent by MTNHP. Should you be asked by individuals outside your organization for the type of data that we provide, please refer them to MTNHP.
- MTNHP and appropriate staff members should be appropriately acknowledged as an information source in any third-party product involving MTNHP data, reports, papers, publications, or in maps that incorporate MTNHP graphic elements.
- Sources of our data include museum specimens, published and unpublished scientific literature, field surveys by state and federal agencies and private contractors, and reports from knowledgeable individuals. MTNHP actively solicits and encourages additions, corrections and updates, new observations or collections, and comments on any of the data we provide.
- MTNHP staff and contractors do not enter or cross privately-owned lands without express permission from the landowner. However, the program cannot guarantee that information provided to us by others was obtained under adherence to this policy.

Suggested Contacts for Natural Resource Management Agencies

As required by Montana statute (MCA 90-15), the Montana Natural Heritage Program works with state, federal, tribal, nongovernmental organizations, and private partners to ensure that the latest animal and plant distribution and status information is incorporated into our databases so that it can be used to inform a variety of permitting and planning processes and management decisions. We encourage you to contact state, federal, and tribal resource management agencies in the area where your project is located and review the permitting overviews by the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation and the Index of Environmental Permits for Montana for guidelines relevant to your efforts. In particular, we encourage you to contact the Montana Department of Fish, Wildlife, and Parks for the latest data and management information regarding hunted and high-profile management species and to use the U.S. Fish and Wildlife Service's Information Planning and Consultation (IPAC) website regarding U.S. Endangered Species Act listed Threatened, Endangered, or Candidate species.

For your convenience, we have compiled a list of relevant agency contacts and links below:

Montana Fish, Wildlife, and Parks

Fish Species	Zachary Shattuck zshattuck@mt.gov (406) 444-1231 or Eric Roberts eroberts@mt.gov (406) 444-5334
American Bison Black-footed Ferret Black-tailed Prairie Dog Bald Eagle Golden Eagle Common Loon Least Tern Piping Plover Whooping Crane	Kristian Smucker KSmucker@mt.gov (406) 444-5209
Grizzly Bear Greater Sage Grouse Trumpeter Swan Big Game Upland Game Birds Furbearers	Brian Wakeling brian.wakeling@mt.gov (406) 444-3940
Managed Terrestrial Game Data	Cara Whalen– MFWP Data Analyst cara.whalen@mt.gov (406) 444-3759
Fisheries Data and Nongame Animal Data	Ryan Alger – MFWP Data Analyst ryan.alger@mt.gov (406) 444-5365
Wildlife and Fisheries Scientific Collector's Permits	https://fwp.mt.gov/buyandapply/commercialwildlifeandscientificpermits/scientific Kristina Smucker for Wildlife ksmucker@mt.gov (406) 444-5209 Dave Schmetterling for Fisheries dschmetterling@mt.gov (406) 542-5514
Fish and Wildlife Recommendations for Subdivision Development	Charlie Sperry csperry@mt.gov (406) 444-3888 See https://fwp.mt.gov/conservation/living-with-wildlife/subdivision-recommendations
Regional Contacts  	Region 1 (Kalispell) (406) 752-5501 fwprg12@mt.gov Region 2 (Missoula) (406) 542-5500 fwprg22@mt.gov Region 3 (Bozeman) (406) 577-7900 fwprg3@mt.gov Region 4 (Great Falls) (406) 454-5840 fwprg42@mt.gov Region 5 (Billings) (406) 247-2940 fwprg52@mt.gov Region 6 (Glasgow) (406) 228-3700 fwprg62@mt.gov Region 7 (Miles City) (406) 234-0900 fwprg72@mt.gov

Montana Department of Agriculture
General Contact Information: https://agr.mt.gov/About/Office-Locations/Office-Locations-and-Field-Offices
Noxious Weeds: https://agr.mt.gov/Noxious-Weeds

Montana Department of Environmental Quality
Permitting and Operator Assistance for all Environmental Permits: https://deq.mt.gov/Permitting

Montana Department of Natural Resources and Conservation
Overview of, and contacts for, licenses and permits for state lands, water, and forested lands: https://dnrc.mt.gov/Permits-Services

Stream Permitting (310 permits) and an overview of various water and stream related permits (e.g., Stream Protection Act 124, Federal Clean Water Act 404, Federal Rivers and Harbors Act Section 10, Short-term Water Quality Standard for Turbidity 318 Authorization, etc.).
https://dnrc.mt.gov/Licenses-and-Permits/Stream-Permitting

Wildfire Resources: https://dnrc.mt.gov/Forestry/Wildfire

Bureau of Land Management

Montana Field Office Contacts:

Billings	(406) 896-5013
Butte	(406) 533-7600
Dillon	(406) 683-8000
Glasgow	(406) 228-3750
Havre	(406) 262-2820
Lewistown	(406) 538-1900
Malta	(406) 654-5100
Miles City	(406) 233-2800
Missoula	(406) 329-3914

United States Army Corps of Engineers
Montana Regulatory Office for federal permits related to construction in water and wetlands
https://www.nwo.usace.army.mil/Missions/Regulatory-Program/Montana/ (406) 441-1375

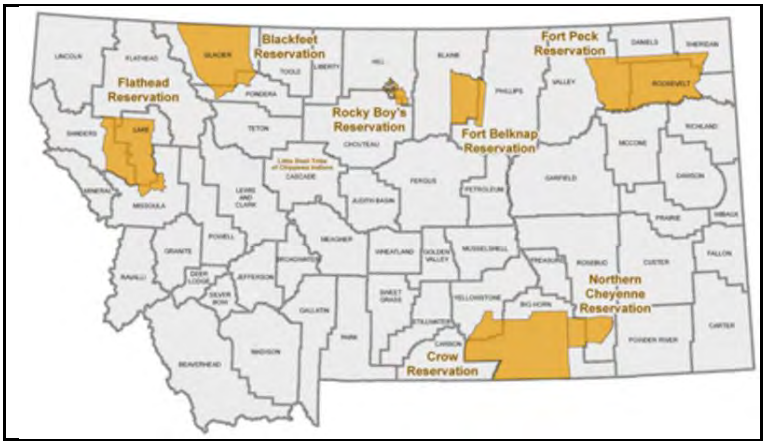
United States Environmental Protection Agency
Environmental information, notices, permitting, and contacts https://www.epa.gov/mt
Gateway to state resource locators https://www.envcap.org/srl/index.php

United States Fish and Wildlife Service
Information Planning and Conservation (IPAC) website: https://ipac.ecosphere.fws.gov
Montana Ecological Services Field Office: https://www.fws.gov/office/montana-ecological-services (406) 449-5225

United States Forest Service

Regional Office – Missoula, Montana Contacts			
Wildlife Program Leader	Tammy Fletcher	tammy.fletcher2@usda.gov	(406) 329-3086
Wildlife Ecologist	Cara Staab	cara.staab@usda.gov	(406) 329-3677
Aquatic Ecologist	Justin Jimenez	justin.jimenez@usda.gov	(435) 370-6830
TES Program	Lydia Allen	lydia.allen@usda.gov	(406) 329-3558
Interagency Grizzly Bear Coordinator	Scott Jackson	scott.jackson@usda.gov	(406) 329-3664
Regional Botanist	Amanda Hendrix	amanda.hendrix@usda.gov	(651) 447-3016
Regional Vegetation Ecologist	Mary Manning	marry.manning@usda.gov	(406) 329-3304
Invasive Species Program Manager	Michelle Cox	michelle.cox2@usda.gov	(406) 329-3669

Tribal Nations



[Assiniboine & Gros Ventre Tribes – Fort Belknap Reservation]

[Assiniboine & Sioux Tribes – Fort Peck Reservation]

[Blackfeet Tribe - Blackfeet Reservation]

[Chippewa Creek Tribe - Rocky Boy's Reservation]

[Crow Tribe – Crow Reservation]

[Little Shell Chippewa Tribe]

[Northern Cheyenne Tribe – Northern Cheyenne Reservation]

[Salish & Kootenai Tribes - Flathead Reservation]

Natural Heritage Programs and Conservation Data Centers in Surrounding States and Provinces

[Alberta Conservation Information Management System]
[British Columbia Conservation Data Centre]
[Idaho Natural Heritage Program]
[North Dakota Natural Heritage Program]
[Saskatchewan Conservation Data Centre]
[South Dakota Natural Heritage Program]
[Wyoming Natural Diversity Database]

Invasive Species Management Contacts and Information

Aquatic Invasive Species

[Montana Fish, Wildlife, and Parks Aquatic Invasive Species staff]
[Montana Department of Natural Resources and Conservation's Aquatic Invasive Species Grant Program]
[Montana Invasive Species Council (MISC)]
[Upper Columbia Conservation Commission (UC3)]

Noxious Weeds

[Montana Weed Control Association Contacts Webpage]
[Montana Biological Weed Control Coordination Project]
[Montana Department of Agriculture - Noxious Weeds]
[Montana Weed Control Association]
[Montana Fish, Wildlife, and Parks - Noxious Weeds]
[Montana State University Integrated Pest Management Extension]
[Integrated Noxious Weed Management after Wildfires]
[Fire Management and Invasive Plants]

Introduction to Native Species

Within the report area you have requested, separate summaries are provided for: (1) Species Occurrences (SO) for plant and animal Species of Concern, Special Status Species (SSS), Important Animal Habitat (IAH) and some Potential Plant Species of Concern; (2) other observed non Species of Concern or Species of Concern without suitable documentation to create Species Occurrence polygons; and (3) other non-documented species that are potentially present based on their range, predicted suitable habitat model output, or presence of associated habitats. Each of these summaries provides the following information when present for a species: (1) the number of Species Occurrences and associated delineation criteria for construction of these polygons that have long been used for considerations of documented Species of Concern in environmental reviews; (2) the number of observations of each species; (3) the geographic range polygons for each species that the report area overlaps; (4) predicted relative habitat suitability classes that are present if a predicted suitable habitat model has been created; (5) the percent of the report area that is mapped as commonly associated or occasionally associated habitat as listed for each species in the Montana Field Guide; and (6) a variety of conservation status ranks and links to species accounts in the Montana Field Guide. Details on each of these information categories are included under relevant section headers below or are defined on our Species Status Codes page. In presenting this information, the Montana Natural Heritage Program (MTNHP) is working towards assisting the user with rapidly determining what species have been documented and what species are potentially present in the report area. We remind users that this information is likely incomplete as surveys to document native and introduced species are lacking in many areas of the state, information on introduced species has only been tracked relatively recently, the MTNHP's staff and resources are restricted by budgets, and information is constantly being added and updated in our databases. **Thus, field verification by professional biologists of the absence or presence of species and biological communities will always be an important obligation of users of our data.**

If you are aware of observation datasets that the MTNHP is missing, please report them to the Program Botanist apipp@mt.gov or Senior Zoologist dbachen@mt.gov If you have animal or plant observations that you would like to contribute, you can also submit them via Excel spreadsheets, geodatabases, iNaturalist, or a Survey123 form. Various methods of data submission are reviewed in this playlist of videos: https://www.youtube.com/playlist?list=PLRaydtZpHu2qOHPoSPq9cnM9uXGmEXACx

Observations

The MTNHP manages information on several million animal and plant observations that have been reported by professional biologists and private citizens from across Montana. The majority of these observations are submitted in digital format from standardized databases associated with research or monitoring efforts and spreadsheets of incidental observations submitted by professional biologists and amateur naturalists. At a minimum, accepted observation records must contain a credible species identification (i.e. appropriate geographic range, date, and habitat and, if species are difficult to identify, a photograph and/or notes on key identifying features), a date or date range, observer name, locational information (ideally with latitude and longitude in decimal degrees), notes on numbers observed, and species behavior or habitat use (e.g., is the observation likely associated with reproduction). Bird records are also required to have information associated with date-appropriate breeding or overwintering status of the species observed. MTNHP reviews observation records to ensure that they are mapped correctly, occur within date ranges when the species is known to be present or detectable, occur within the known seasonal geographic range of the species, and occur in appropriate habitats. MTNHP also assigns each record a locational uncertainty value in meters to indicate the spatial precision associated with the record's mapped coordinates. Only records with locational uncertainty values of 10,000 meters or less are included in environmental summary reports and number summaries are only provided for records with locational uncertainty values of 1,000 meters or less.

Species Occurrences

The MTNHP evaluates plant and animal observation records for species of higher conservation concern to determine whether they are worthy of inclusion in the Species Occurrence (SO) layer for use in environmental reviews; observations not worthy of inclusion in this layer include long distance dispersal events, migrants observed away from key migratory stopover habitats, and winter observations. An SO is a polygon depicting what is known about a species occupancy from direct observation with a defined level of locational uncertainty and any inference that can be made about adjacent habitat use from the latest peer-reviewed science. If an observation can be associated with a map feature that can be tracked (e.g., a wetland boundary for a wetland associated plant) then this polygon feature is used to represent the SO. Areas that can be inferred as probable occupied habitat based on direct observation of a species location and what is known about the foraging area or home range size of the species may be incorporated into the SO. Species Occurrences generally belong to one of the following categories:

Plant Species Occurrences

A documented location of a specimen collection or observed plant population. In some instances, adjacent, spatially separated clusters are considered subpopulations and are grouped as one occurrence (e.g., the subpopulations occur in ecologically similar habitats, and their spatial proximity likely allows them to interbreed). Tabular information for multiple observations at the same SO location is generally linked to a single polygon. Plant SO's are only created for Species of Concern and Potential Species of Concern.

Animal Species Occurrences

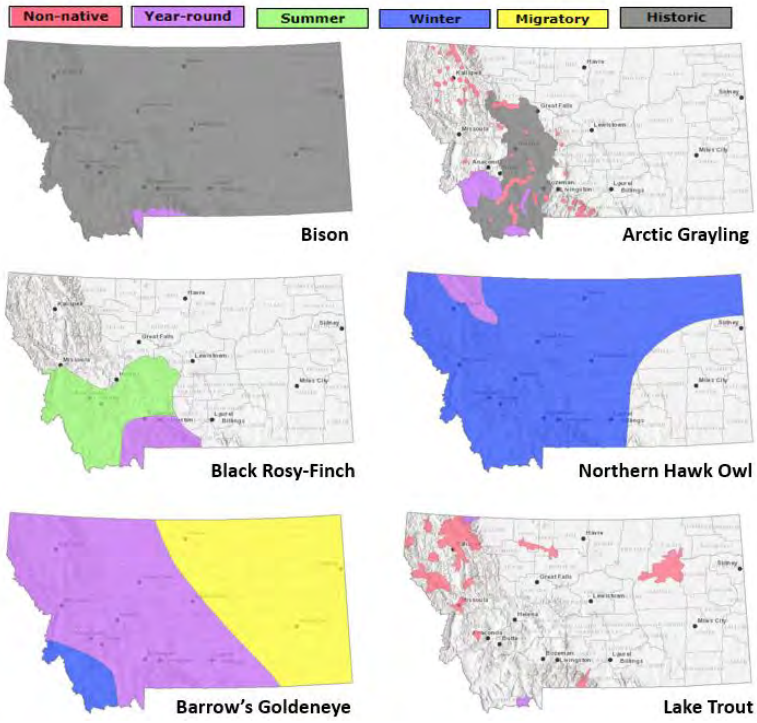
The location of a verified observation or specimen record typically known or assumed to represent a breeding population or a portion of a breeding population. Animal SO's are generally: (1) buffers of terrestrial point observations based on documented species' home range sizes; (2) buffers of stream segments to encompass occupied streams and immediate adjacent riparian habitats; (3) polygonal features encompassing known or likely breeding populations (e.g., a wetland for some amphibians or a forested portion of a mountain range for some wide-ranging carnivores); or (4) combinations of the above. Tabular information for multiple observations at the same SO location is generally linked to a single polygon. Species Occurrence polygons may encompass some unsuitable habitat in some instances in order to avoid heavy data processing associated with clipping out habitats that are readily assessed as unsuitable by the data user (e.g., a point buffer of a terrestrial species may overlap into a portion of a lake that is obviously inappropriate habitat for the species). Animal SO's are only created for Species of Concern and Special Status Species (e.g., Bald Eagle).

Other Occurrence Polygons

These include significant biological features not included in the above categories, such as Important Animal Habitats like bird rookeries and bat roosts, and peatlands or other wetland and riparian communities that support diverse plant and animal communities.

Geographic Range Polygons

Geographic range polygons are still under development for most plant and invertebrate species. Native year-round, summer, winter, migratory and historic geographic range polygons as well as polygons for introduced populations have been defined for most vertebrate animal species for which there are enough observations, surveys, and knowledge of appropriate seasonal habitat use to define them (see examples to left). These native or introduced range polygons bound the extent of known or likely occupied habitats for non-migratory and relative sedentary species and the regular extent of known or likely occupied habitats for migratory and long-distance dispersing species; polygons may include unsuitable intervening habitats. For most species, a single polygon can represent the year-round or seasonal range, but breeding ranges of some colonial nesting water birds and some introduced species are represented more patchily when supported by data. Some ranges are mapped more broadly than actual distributions in order to be visible on statewide maps (e.g., fish).



Predicted Suitable Habitat Models

Predicted habitat suitability models have been created for plant and animal Species of Concern and are undergoing development for non-Species of Concern. For species for which models have been completed, the environmental summary report includes simple rule-based associations with streams for aquatic species and seasonal habitats for game species as well as mathematically complex Maximum Entropy models (Phillips et al. 2006, Ecological Modeling 190:231-259) constructed from a variety of statewide biotic and abiotic layers and presence only data for individual species for most terrestrial species. For the Maximum Entropy models, we reclassified 90 x 90-meter continuous model output into suitability classes (unsuitable, low, moderate, and optimal) then aggregated that into the one square mile hexagons used in the environmental summary report; this is the finest spatial scale we suggest using this information in management decisions and survey planning. Full model write ups for individual species that discuss model goals, inputs, outputs, and evaluation in much greater detail are posted on the MTNHP's Predicted Suitable Habitat Models webpage. Evaluations of predictive accuracy and specific limitations are included with the metadata for models of individual species. **Model outputs should not be used in place of on-the-ground surveys for species. Instead model outputs should be used in conjunction with habitat evaluations to determine the need for on-the-ground surveys for species.** We suggest that the percentage of predicted optimal and moderate suitable habitat within the report area be used in conjunction with geographic range polygons and the percentage of commonly associated habitats to generate lists of potential species that may occupy broader landscapes for the purposes of landscape-level planning.

Associated Habitats

Within the boundary of the intersected hexagons, we provide the approximate percentage of commonly or occasionally associated habitat for vertebrate animal species that regularly breed, overwinter, or migrate through the state; a detailed list of commonly and occasionally associated habitats is provided in individual species accounts in the Montana Field Guide We assigned common or occasional use of each of the ecological

systems mapped in Montana by: (1) using personal knowledge and reviewing literature that summarizes the breeding, overwintering, or migratory habitat requirements of each species; (2) evaluating structural characteristics and distribution of each ecological system relative to the species' range and habitat requirements; (3) examining the observation records for each species in the state-wide point observation database associated with each ecological system; and (4) calculating the percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system to get a measure of numbers of observations versus availability of habitat. Species that breed in Montana were only evaluated for breeding habitat use, species that only overwinter in Montana were only evaluated for overwintering habitat use, and species that only migrate through Montana were only evaluated for migratory habitat use. In general, species were listed as associated with an ecological system if structural characteristics of used habitat documented in the literature were present in the ecological system or large numbers of point observations were associated with the ecological system. However, species were not listed as associated with an ecological system if there was no support in the literature for use of structural characteristics in an ecological system, even if point observations were associated with that system. Common versus occasional association with an ecological system was assigned based on the degree to which the structural characteristics of an ecological system matched the preferred structural habitat characteristics for each species as represented in the scientific literature. The percentage of observations associated with each ecological system relative to the percent of Montana covered by each ecological system was also used to guide assignment of common versus occasional association.

We suggest that the percentage of commonly associated habitat within the report area be used in conjunction with geographic range polygons and the percentage of predicted optimal and moderate suitable habitat from predictive models to generate lists of potential species that may occupy broader landscapes for the purposes of landscape-level planning. Users of this information should be aware that land cover mapping accuracy is particularly problematic when the systems occur as small patches or where the land cover types have been altered over the past decade. Thus, particular caution should be used when using the associations in assessments of smaller areas (e.g., evaluations of public land survey sections).

Introduction to Land Cover

Land Use/Land Cover is one of 15 Montana Spatial Data Infrastructure framework layers considered vital for making statewide maps of Montana and understanding its geography. The layer records all Montana natural vegetation, land cover and land use, classified from satellite and aerial imagery, mapped at a scale of 1:100,000, and interpreted with supporting ground-level data. The baseline map is adapted from the Northwest ReGAP (NWGAP) project land cover classification, which used 30m resolution multi-spectral Landsat imagery acquired between 1999 and 2001. Vegetation classes were drawn from the Ecological System Classification developed by NatureServe (Comer et al. 2003). The land cover classes were developed by Anderson et al. (1976). The NWGAP effort encompasses 12 map zones. Montana overlaps seven of these zones. The two NWGAP teams responsible for the initial land cover mapping effort in Montana were Sanborn and NWGAP at the University of Idaho. Both Sanborn and NWGAP employed a similar modeling approach in which Classification and Regression Tree (CART) models were applied to Landsat ETM+ scenes. The Spatial Analysis Lab within the Montana Natural Heritage Program was responsible for developing a seamless Montana land cover map with a consistent statewide legend from these two separate products. Additionally, the Montana land cover layer incorporates several other land cover and land use products (e.g., MSDI Structures and Transportation themes and the Montana Department of Revenue Final Land Unit classification) and reclassifications based on plot-level data and the latest NAIP imagery to improve accuracy and enhance the usability of the theme. Updates are done as partner support and funding allow, or when other MSDI datasets can be incorporated. Recent updates include fire perimeters and agricultural land use (annually), energy developments such as wind, oil and gas installations (2014), roads, structures and other impervious surfaces (various years): and local updates/improvements to specific ecological systems (e.g., central Montana grassland and sagebrush ecosystems). Current and previous versions of the Land Use/Land Cover layer with full metadata are available for download from the Montana State Library's GIS Data List More information on the land cover layer is available at: https://msl.mt.gov/geoinfo/msdi/land_use_land_cover/

Within the report area you have requested, land cover is summarized by acres of Level 1, Level 2, and Level 3 Ecological Systems.

Literature Cited

Anderson, J.R. E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. U.S. Geological Survey Professional Paper 964.

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Introduction to Wetland and Riparian

Within the report area you have requested, wetland and riparian mapping is summarized by acres of each classification present. Summaries are only provided for modern MTNHP wetland and riparian mapping and not for outdated (NWI Legacy) or incomplete (NWI Scalable) mapping efforts; described here. MTNHP has made all three of these datasets and associated metadata available for separate download on the Montana Wetland and Riparian Framework web page.

Wetland and Riparian mapping is one of 15 Montana Spatial Data Infrastructure framework layers considered vital for making statewide maps of Montana and understanding its geography. The wetland and riparian framework layer consists of spatial data representing the extent, type, and approximate location of wetlands, riparian areas, and deep water habitats in Montana.

Wetland and riparian mapping is completed through photointerpretation of 1-m resolution color infrared aerial imagery acquired from 2005 or later. A coding convention using letters and numbers is assigned to each mapped wetland. These letters and numbers describe the broad landscape context of the wetland, its vegetation type, its water regime, and the kind of alterations that may have occurred. Ancillary data layers such as topographic maps, digital elevation models, soils data, and other aerial imagery sources are also used to improve mapping accuracy. Wetland mapping follows the federal Wetland Mapping Standard and classifies wetlands according to the Cowardin classification system of the National Wetlands Inventory (NWI) (Cowardin et al. 1979, FGDC Wetlands Subcommittee 2013). Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands differently than the NWI. Similar coding, based on U.S. Fish and Wildlife Service conventions, is applied to riparian areas (U.S. Fish and Wildlife Service 2009). These are mapped areas where vegetation composition and growth is influenced by nearby water bodies, but where soils, plant communities, and hydrology do not display true wetland characteristics. **These data are intended for use at a scale of 1:12,000 or smaller. Mapped wetland and riparian areas do not represent precise boundaries and digital wetland data cannot substitute for an on-site determination of jurisdictional wetlands.**

See detailed overviews, with examples, of both wetland and riparian classification systems and associated codes as a storymap and companion guide

Literature Cited

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, FWS/OBS-79/31. Washington, D.C. 103pp.

Federal Geographic Data Committee. 2013. Classification of wetlands and deepwater habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Fish and Wildlife Services. 2009. A system for mapping riparian areas in the western United States. Division of Habitat and Resource Conservation, Branch of Resource and Mapping Support, Arlington, Virginia.

Introduction to Land Management

Within the report area you have requested, land management information is summarized by acres of federal, state, and local government lands, tribal reservation boundaries, private conservation lands, and federal, state, local, and private conservation easements. Acreage for "Owned", "Tribal", or "Easement" categories represents non-overlapping areas that may be totaled. However, "Other Boundaries" represents managed areas such as National Forest boundaries containing private inholdings and other mixed ownership which may cause boundaries to overlap (e.g. a wilderness area within a forest). Therefore, acreages may not total in a straight-forward manner.

Because information on land stewardship is critical to effective land management, the Montana Natural Heritage Program (MTNHP) began compiling ownership and management data in 1997. The goal of the Montana Land Management Database is to manage a single, statewide digital data set that incorporates information from both public and private entities. The database assembles information on public lands, private conservation lands, and conservation easements held by state and federal agencies and land trusts and is updated on a regular basis. Since 2011, the Information Management group in the Montana State Library's Digital Library Division has led the Montana Land Management Database in partnership with the MTNHP.

Public and private conservation land polygons are attributed with the name of the entity that owns it. The data are derived from the statewide Montana Cadastral Parcel layer Conservation easement data shows land parcels on which a public agency or qualified land trust has placed a conservation easement in cooperation with the landowner. The dataset contains no information about ownership or status of the mineral estate. For questions about the dataset or to report errors, please contact the Montana Natural Heritage Program at (406) 444-5363 or mtnhp@mt.gov. You can download various components of the Land Management Database and view associated metadata at the Montana State Library's GIS Data List at the following links:

Public Lands
Conservation Easements
Private Conservation Lands
Managed Areas

Map features in the Montana Land Management Database or summaries provided in this report are not intended as a legal depiction of public or private surface land ownership boundaries and should not be used in place of a survey conducted by a licensed land surveyor. Similarly, map features do not imply public access to any lands. The Montana Natural Heritage Program makes no representations or warranties whatsoever with respect to the accuracy or completeness of this data and assumes no responsibility for the suitability of the data for a particular purpose. The Montana Natural Heritage Program will not be liable for any damages incurred as a result of errors displayed here. Consumers of this information should review or consult the primary data and information sources to ascertain the viability of the information for their purposes.

Introduction to Invasive and Pest Species

Within the report area you have requested, separate summaries are provided for: Aquatic Invasive Species, Noxious Weeds, Agricultural Pests, Forest Pests, and Biocontrol species that have been documented or potentially occur there based on the predicted suitability of habitat. Definitions for each of these invasive and pest species categories can be found on our Species Status Codes page.

Each of these summaries provides the following information when present for a species: (1) the number of observations of each species; (2) the geographic range polygons for each species, if developed, that the report area overlaps; (3) predicted relative habitat suitability classes that are present if a predicted suitable habitat model has been created; (4) the percent of the report area that is mapped as commonly associated or occasionally associated habitat as listed for each species in the Montana Field Guide; and (5) links to species accounts in the Montana Field Guide. Details on each of these information categories are included under relevant section headers under the Introduction to Native Species above or are defined on our Species Status Codes page. In presenting this information, the Montana Natural Heritage Program (MTNHP) is working towards assisting the user with rapidly determining what invasive and pest species have been documented and what species are potentially present in the report area. We remind users that this information is likely incomplete as surveys to document introduced species are lacking in many areas of the state, information on introduced species has only been tracked relatively recently, the MTNHP's staff and resources are limited, and information is constantly being added and updated in our databases. **Thus, field verification by professional biologists of the absence or presence of species will always be an important obligation of users of our data.**

If you are aware of observation or survey datasets for invasive or pest species that the MTNHP is missing, please report them to the Program Coordinator bmaxell@mt.gov Program Botanist apipp@mt.gov or Senior Zoologist dbachen@mt.gov If you have animal or plant observations that you would like to contribute, you can also submit them via Excel spreadsheets, geodatabases, iNaturalist, or a Survey123 form. Various methods of data submission are reviewed in this playlist of videos:
https://www.youtube.com/playlist?list=PLRaydtZpHu2qOHPoSPq9cnM9uXGmEXACx

Additional Information Resources

- MTNHP Staff Contact Information
- Montana Field Guide
- MTNHP Species of Concern Report - Animals and Plants
- MTNHP Species Status Codes - Explanation
- MTNHP Predicted Suitable Habitat Models (for select Animals and Plants)
- MTNHP Request Information page
- Montana Cadastral
- Montana Code Annotated
- Montana Fisheries Information System
- Montana Fish, Wildlife, and Parks Subdivision Recommendations
- Montana GIS Data Layers
- Montana GIS Data Bundler
- Montana Greater Sage-Grouse Project Submittal Site
- Montana Ground Water Information Center
- Montana Index of Environmental Permits, 21st Edition (2018)
- Montana Environmental Policy Act (MEPA)
- Montana Environmental Policy Act Analysis Resource List
- Laws, Treaties, Regulations, and Agreements on Animals and Plants
- Montana Spatial Data Infrastructure Layers
- Montana State Historic Preservation Office Review and Compliance
- Montana Stream Permitting: a guide for conservation district supervisors and others
- Montana Water Information System
- Montana Web Map Services
- National Environmental Policy Act
- Penalties for Misuse of Fish and Wildlife Location Data (MCA 87-6-222)
- U.S. Fish and Wildlife Service Information for Planning and Consultation (Section 7 Consultation)
- Web Soil Survey Tool

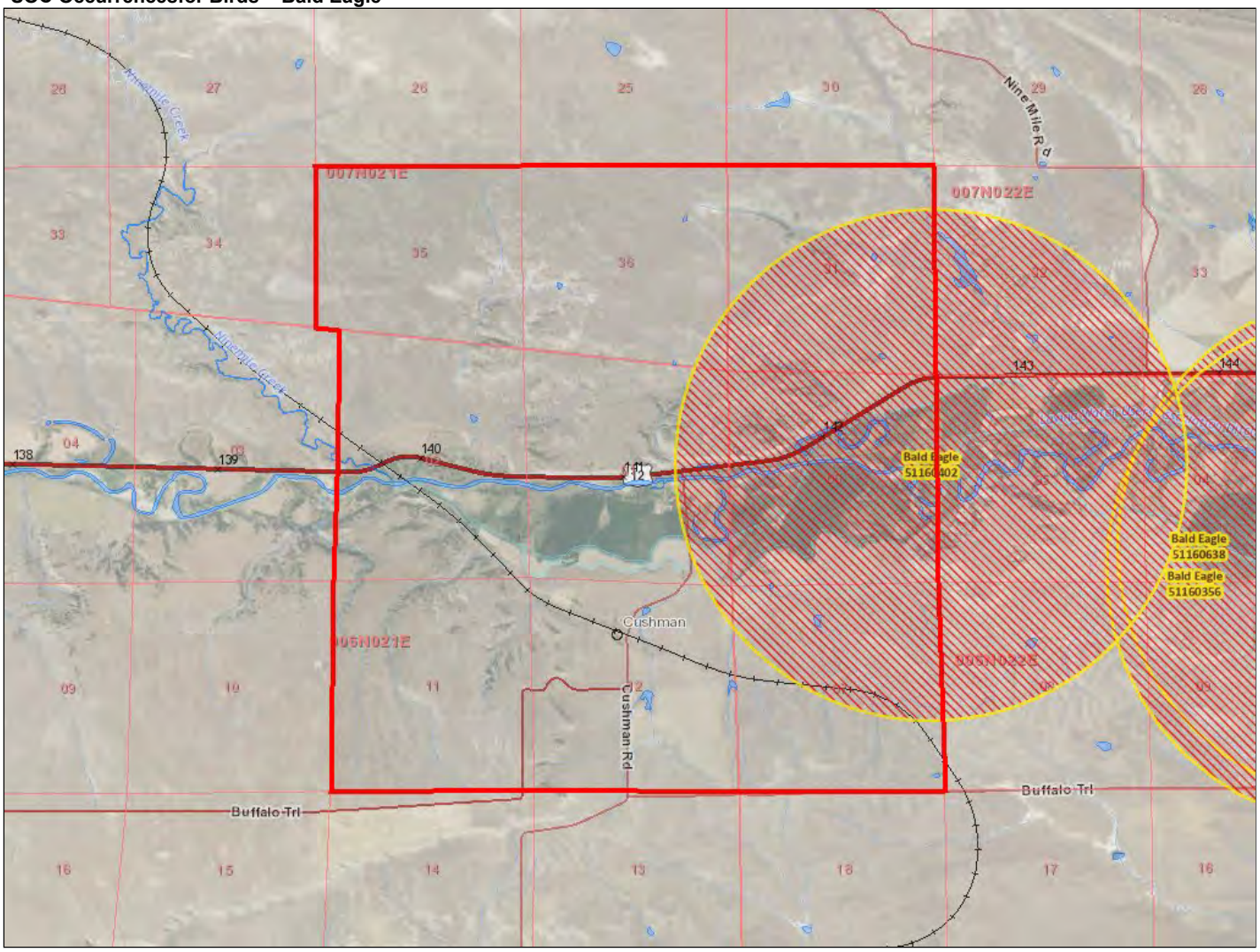
MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the Montana State Library's Natural Resource Information System.

Latitude	Longitude
46.26109	-108.93678
46.33747	-109.14564

Montana SOC Occurrences Report

SOC Occurrencesfor Birds = Bald Eagle

Report generated 10/23/2023 10:50:23 AM



Birds - Bald Eagle *(Haliaeetus leucocephalus)*

SO Count: 3 **Obs Count**: 15 **Earliest Obs**: 2010 **Recent Obs**: 2023

Special Status Species
Native Species
Global Rank: G5
State Rank: S4

Agency Status
USFWS: BGEPA; MBTA
USFS: Sensitive - Known in Forests (BD, BRT, KOOT, LOLO)
BLM: SENSITIVE
FWP SWAP:
PIF: 2

Delineation Criteria
Confirmed nesting area buffered by a minimum distance of 2,000 meters in order to be conservative about encompassing the breeding territory and area commonly used for renesting. Only nesting observations with a locational uncertainty of 1,000 meters or less will be used to delineate a nesting area.

Last Updated
Sep 05, 2023

SO ID: 51160356	**Acres**: 3,095	**Obs Count**: 2	**Earliest Obs**: 2012	**Recent Obs**: 2023
SO ID: 51160402	**Acres**: 3,105	**Obs Count**: 1	**Earliest Obs**: 2022	**Recent Obs**: 2022
SO ID: 51160638	**Acres**: 3,095	**Obs Count**: 12	**Earliest Obs**: 2010	**Recent Obs**: 2022

Citation for this report:
Montana SOC Occurrences Report
SOC Occurrencesfor Birds = Bald Eagle
Within Lat/Long: (46.26109,-108.93678) to (46.33747,-109.14564)
Natural Heritage Map Viewer. Montana Natural Heritage Program.
Retrieved on October 23, 2023, from https://mtnhp.org/MapViewer/SOReport.aspx

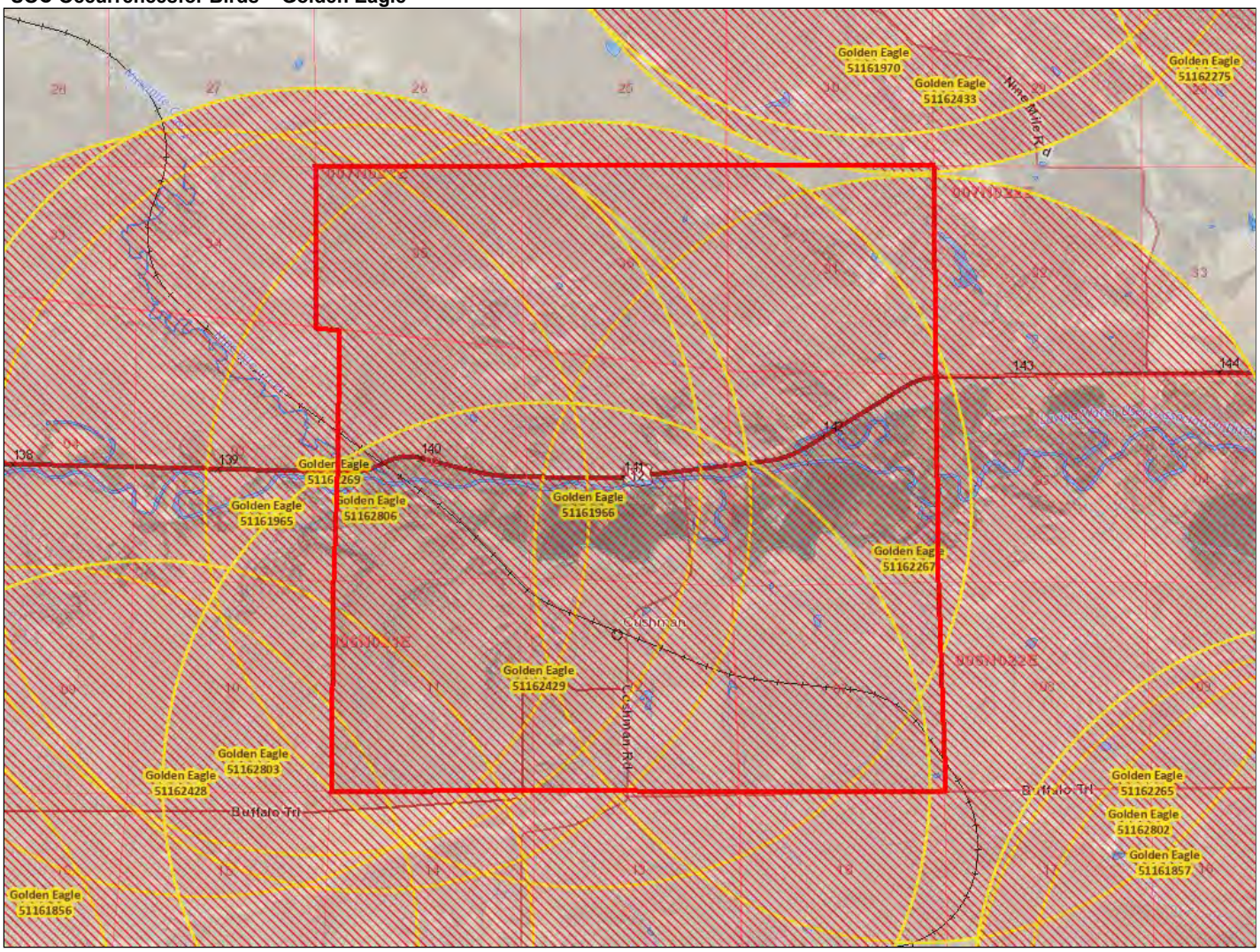
MONTANA STATE LIBRARY
NATURAL HERITAGE PROGRAM
A program of the Montana State Library's Natural Resource Information System.

Latitude	Longitude
46.26109	-108.93678
46.33747	-109.14564

Montana SOC Occurrences Report

SOC Occurrencesfor Birds = Golden Eagle

Report generated 10/23/2023 10:51:39 AM



Birds - Golden Eagle *(Aquila chrysaetos)*

SO Count: 20 **Obs Count**: 38 **Earliest Obs**: 2000 **Recent Obs**: 2023

Species of Concern
Native Species
Global Rank: G5
State Rank: S3

Agency Status
USFWS: BGEPA; MBTA
USFS:
BLM: SENSITIVE
FWP SWAP: SGCN3
PIF:

Delineation Criteria
Confirmed nesting area buffered by a minimum distance of 3,000 meters in order to be conservative about encompassing the entire breeding territory and area commonly used for renesting and otherwise buffered by the locational uncertainty associated with the observation up to a maximum distance of 10,000 meters.

Last Updated
Sep 21, 2023

SO ID: 51161856	**Acres**: 6,972	**Obs Count**: 8	**Earliest Obs**: 2016	**Recent Obs**: 2023
SO ID: 51161857	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2000	**Recent Obs**: 2000
SO ID: 51161866	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2000	**Recent Obs**: 2000
SO ID: 51161965	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2017	**Recent Obs**: 2017
SO ID: 51161966	**Acres**: 6,972	**Obs Count**: 2	**Earliest Obs**: 2000	**Recent Obs**: 2011
SO ID: 51161970	**Acres**: 6,987	**Obs Count**: 2	**Earliest Obs**: 2016	**Recent Obs**: 2023
SO ID: 51161972	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2000	**Recent Obs**: 2000
SO ID: 51162129	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2012	**Recent Obs**: 2012
SO ID: 51162265	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2019	**Recent Obs**: 2019
SO ID: 51162267	**Acres**: 6,987	**Obs Count**: 5	**Earliest Obs**: 2016	**Recent Obs**: 2023
SO ID: 51162269	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2014	**Recent Obs**: 2014
SO ID: 51162271	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2017	**Recent Obs**: 2017
SO ID: 51162272	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2016	**Recent Obs**: 2016
SO ID: 51162275	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2023	**Recent Obs**: 2023
SO ID: 51162428	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2018	**Recent Obs**: 2018
SO ID: 51162429	**Acres**: 6,987	**Obs Count**: 2	**Earliest Obs**: 2016	**Recent Obs**: 2017
SO ID: 51162433	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2000	**Recent Obs**: 2000
SO ID: 51162802	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2018	**Recent Obs**: 2018
SO ID: 51162803	**Acres**: 6,987	**Obs Count**: 1	**Earliest Obs**: 2017	**Recent Obs**: 2017
SO ID: 51162806	**Acres**: 6,972	**Obs Count**: 5	**Earliest Obs**: 2016	**Recent Obs**: 2023

Citation for this report:
Montana SOC Occurrences Report
SOC Occurrencesfor Birds = Golden Eagle
Within Lat/Long: (46.26109,-108.93678) to (46.33747,-109.14564)
Natural Heritage Map Viewer. Montana Natural Heritage Program.
Retrieved on October 23, 2023, from https://mtnhp.org/MapViewer/SOReport.aspx

Soil Map—Golden Valley County Area, Montana
(Musselshell River Bank)

Map Scale: 1:963 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Golden Valley County Area, Montana
Survey Area Data: Version 20, Aug 30, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2021—Oct 3, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

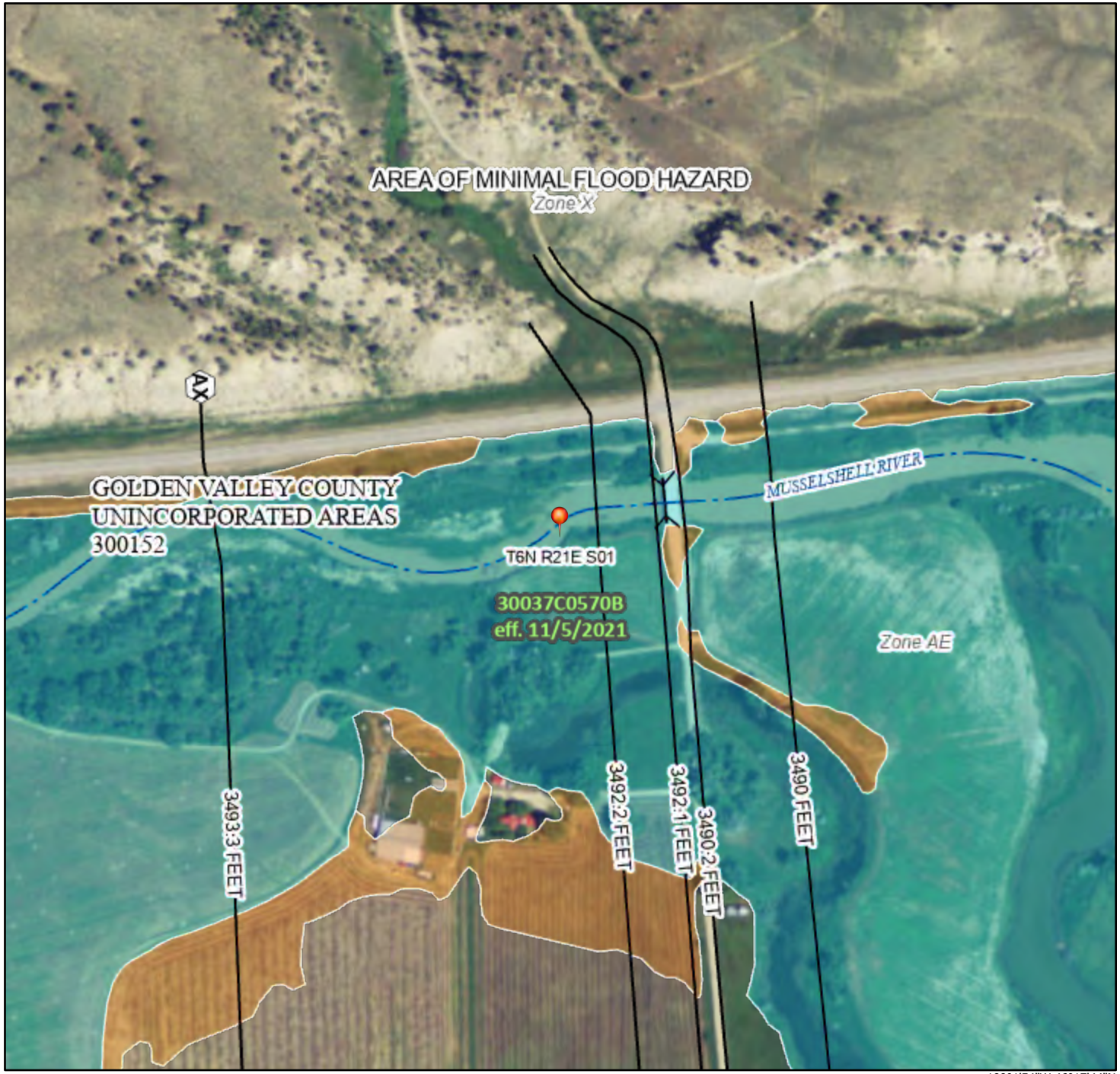
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
111A	Havre-Glendive complex, 0 to 2 percent slopes, occasionally flooded	4.2	100.0%
Totals for Area of Interest		**4.2**	**100.0%**

National Flood Hazard Layer FIRMette

FEMA

109°2'32"W 46°18'9"N



109°1'54"W 46°17'44"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

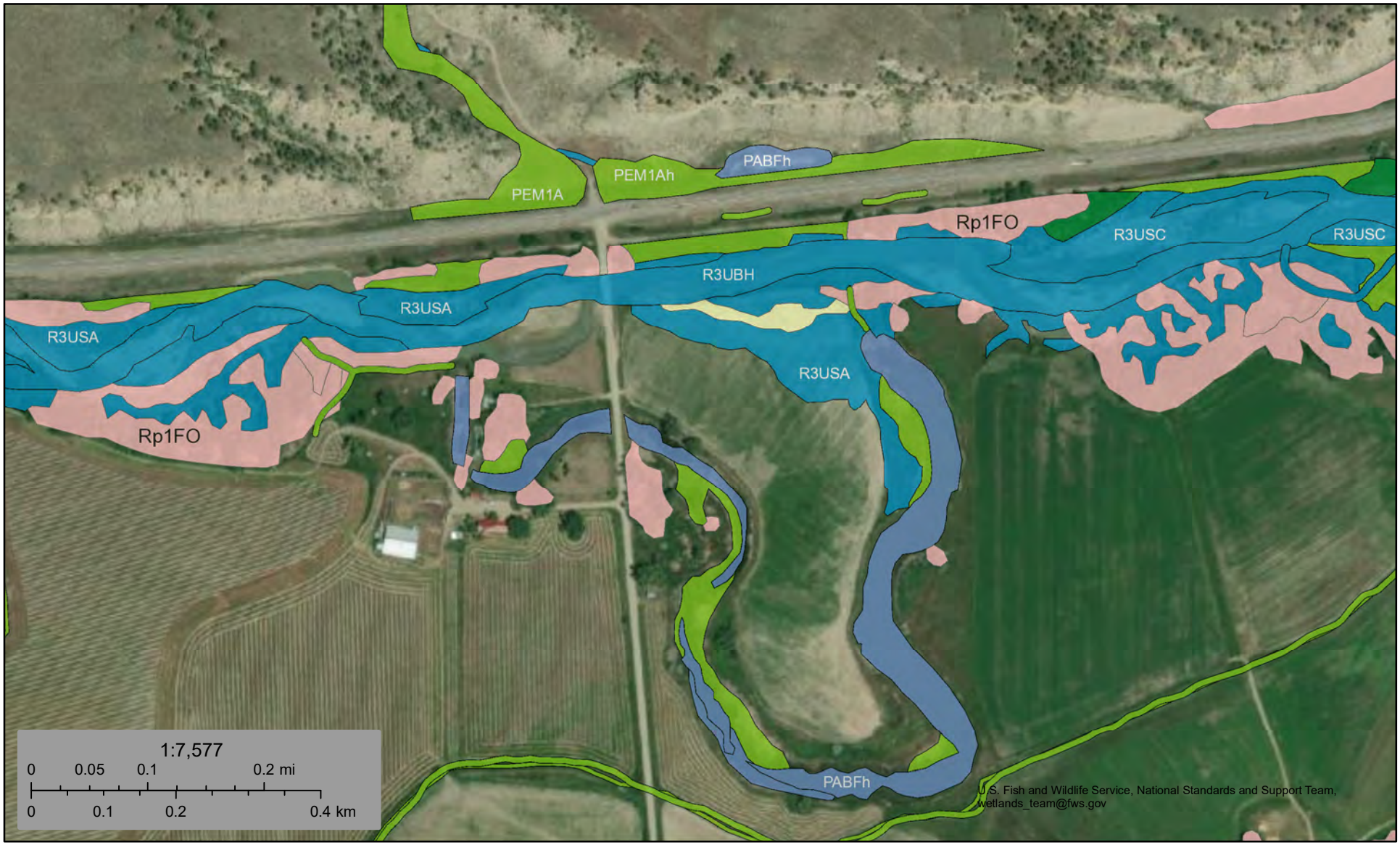
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/18/2023 at 12:18 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

U.S. Fish and Wildlife Service
National Wetlands Inventory

Musselshell Riverbank Restoration



May 18, 2023

Wetlands

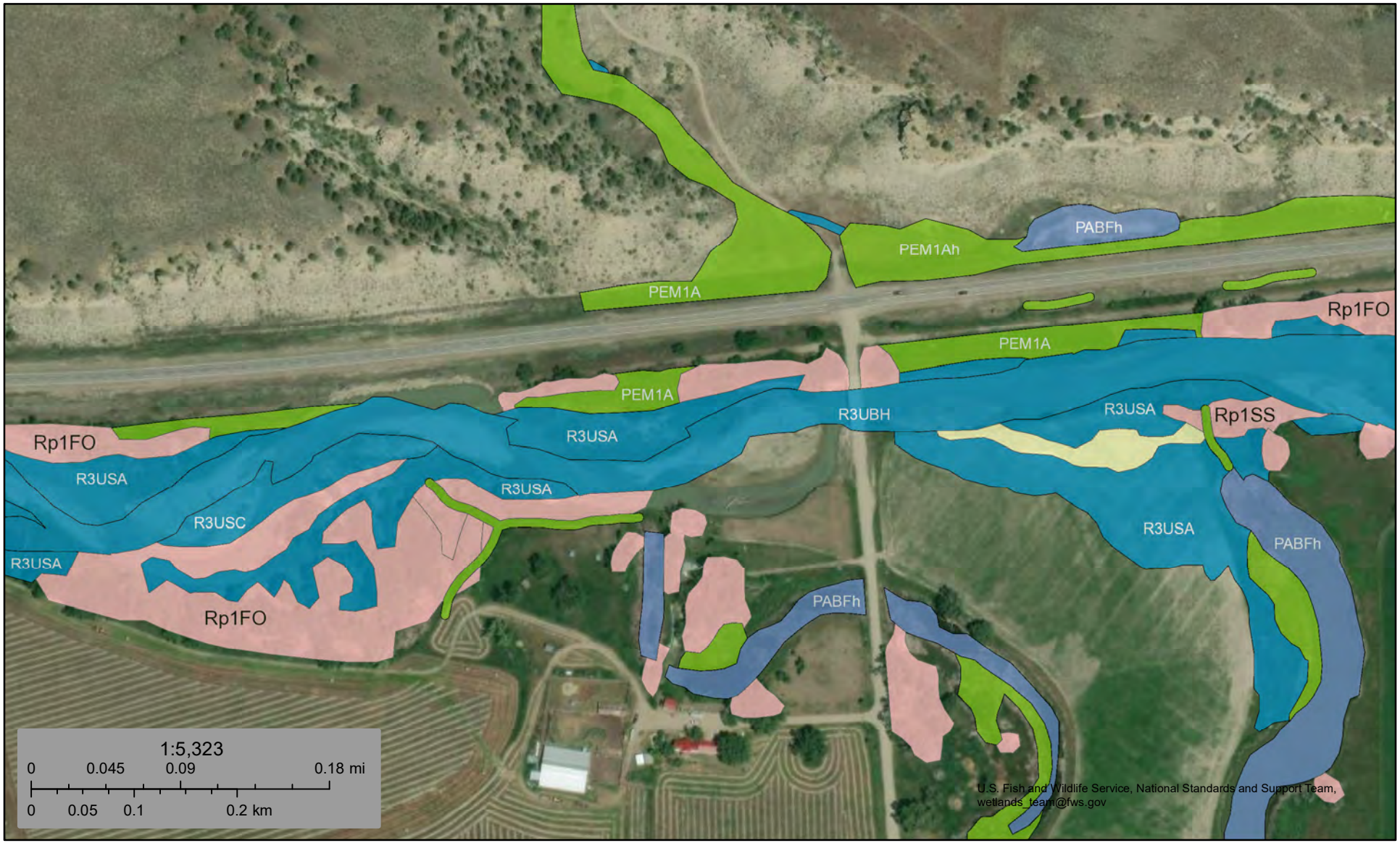
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

U.S. Fish and Wildlife Service
National Wetlands Inventory

GVC_Musselshell River



November 10, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Golden Valley County, Montana

Local office

Montana Ecological Services Field Office

(406) 449-5225
(406) 449-5339

585 Shephard Way, Suite 1
Helena, MT 59601-6287

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
North American Wolverine Gulo gulo luscus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5123	Proposed Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Lark Bunting *Calamospiza melanocorys* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 15
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or

attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

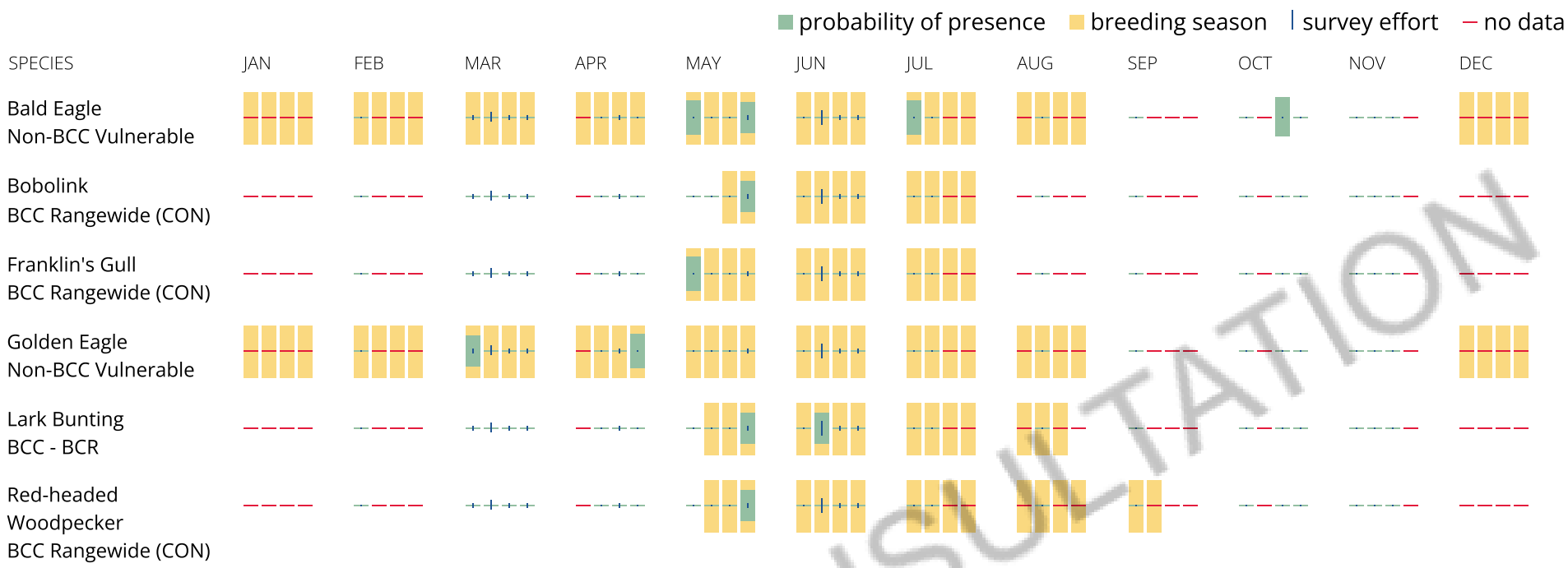
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NEPAssist Report

GVC_Musselshell River

Input Coordinates: 46.300598,-109.041001,46.300598,-109.030884,46.298004,-109.030884,46.298004,-109.041001,46.300598,-109.041001

Project Area	0.09 sq mi
Within an Ozone 1-hr (1979 standard) Non-Attainment/Maintenance Area?	no
Within an Ozone 8-hr (1997 standard) Non-Attainment/Maintenance Area?	no
Within an Ozone 8-hr (2008 standard) Non-Attainment/Maintenance Area?	no
Within an Ozone 8-hr (2015 standard) Non-Attainment/Maintenance Area?	no
Within a Lead (2008 standard) Non-Attainment/Maintenance Area?	no
Within a SO2 1-hr (2010 standard) Non-Attainment/Maintenance Area?	no
Within a PM2.5 24hr (2006 standard) Non-Attainment/Maintenance Area?	no
Within a PM2.5 Annual (1997 standard) Non-Attainment/Maintenance Area?	no
Within a PM2.5 Annual (2012 standard) Non-Attainment/Maintenance Area?	no
Within a PM10 (1987 standard) Non-Attainment/Maintenance Area?	no
Within a CO Annual (1971 standard) Non-Attainment/Maintenance Area?	no
Within a NO2 Annual (1971 standard) Non-Attainment/Maintenance Area?	no
Within a Federal Land?	no
Within an impaired stream?	yes
Within an impaired waterbody?	no
Within a waterbody?	no
Within a stream?	yes
Within an NWI wetland?	Available Online
Within a Brownfields site?	no
Within a Superfund site?	no
Within a Toxic Release Inventory (TRI) site?	no
Within a water discharger (NPDES)?	yes
Within a hazardous waste (RCRA) facility?	no
Within an air emission facility?	no
Within a school?	no
Within an airport?	no
Within a hospital?	no
Within a designated sole source aquifer?	no
Within a historic property on the National Register of Historic Places?	no
Within a Land Cession Boundary?	yes
Within a tribal area (lower 48 states)?	no
Within the service area of a mitigation or conservation bank?	no
Within the service area of an In-Lieu-Fee Program?	yes
Within a Public Property Boundary of the Formerly Used Defense Sites?	no
Within a Munitions Response Site?	no
Within an Essential Fish Habitat (EFH)?	no
Within a Habitat Area of Particular Concern (HAPC)?	no
Within an EFH Area Protected from Fishing (EFHA)?	no
Within a Bureau of Land Management Area of Critical Environmental Concern?	no
Within an ESA-designated Critical Habitat Area per U.S. Fish & Wildlife Service?	no
Within an ESA-designated Critical Habitat river, stream or water feature per U.S. Fish & Wildlife Service?	no

Created on: 11/9/2023 2:04:51 PM

Layers

Get started

You can explore maps, add layers, and more without signing in. To save your work, sign in before creating your map.

Learn more about Map Viewer

USFWS Critical Habitat

Add

USFWS Critical Habitat

Properties

Use the selector above to switch between layers in the map.

Information

Symbology

USFWS Critical Habitat

Critical Habitat - Polygon Features - Final

Critical Habitat - Linear Features - Final

Critical Habitat - Polygon Features - Proposed

Critical Habitat - Linear Features - Proposed

Appearance

Blending

Normal

Transparency

FWP MENU

RESTRICTIONS AND CLOSURES

WILDLIFE MANAGEMENT AREAS

HATCHERIES

WILDLIFE HABITAT PROTECTION AREA SEARCH

Select a Wildlife Habitat Protection Area on the map to view information. Or search for a Wildlife Habitat Protection Area from the dropdown below.

Visit a Wildlife Habitat Protection Area

Select a Wildlife Habitat Protection Area

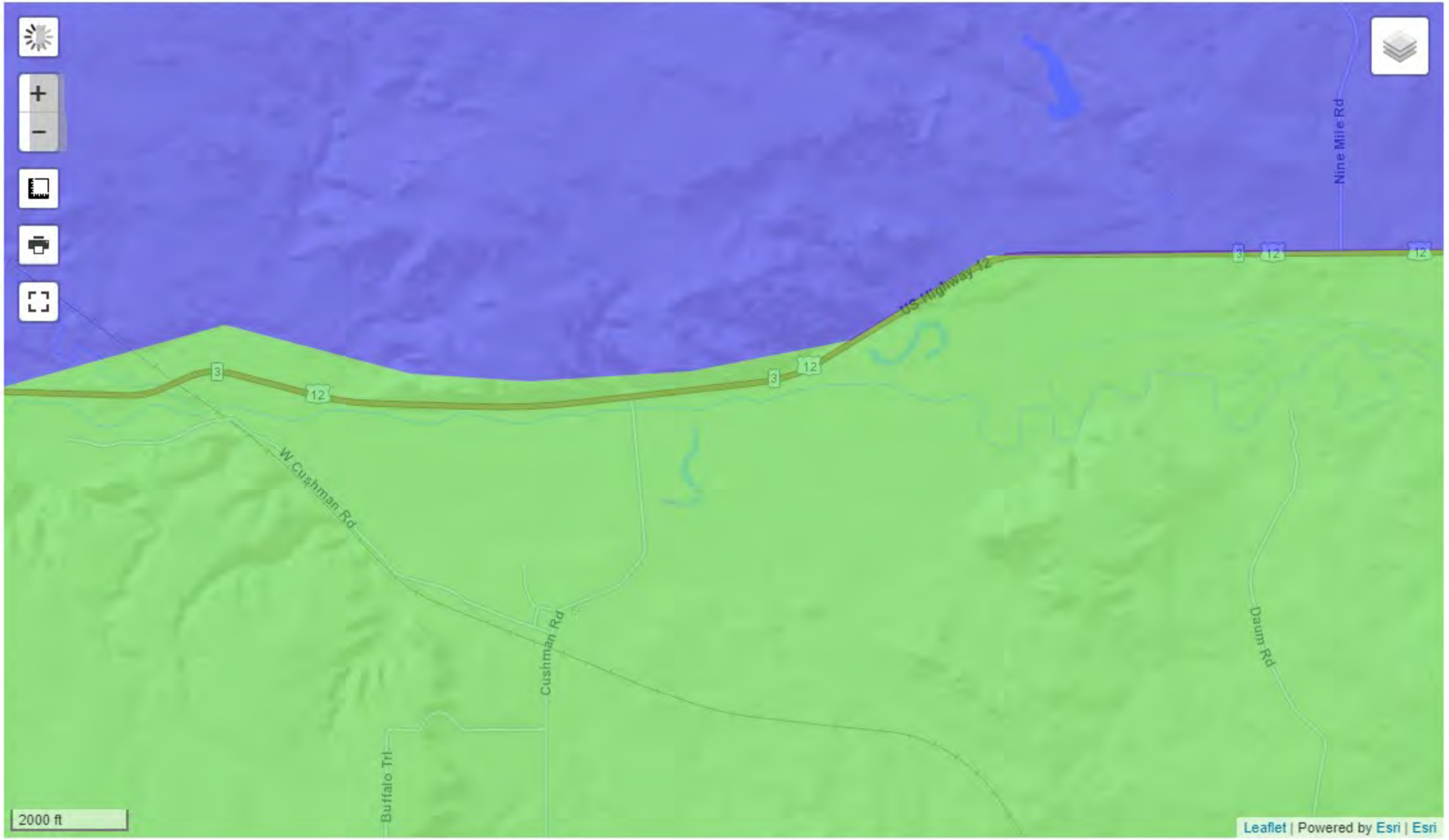
Find by Activities

Select an Activity

Find by Hunting / Trapping Opportunities

If your project is close to designated sage grouse habitat or BLM Priority area, or if you are unsure your project is within designated sage grouse habitat or BLM Priority area, please submit your project for review as permitting agencies will be checking to see if your project is located within these designated sage grouse habitats. If your permitting agency requires evidence that your project is outside of designated sage grouse habitat, we recommend that you log in and start a project application and take a screenshot of your project's location.

If your project is close to designated sage grouse habitat or BLM Priority area, or if you are unsure your project is within designated sage grouse habitat or BLM Priority area, please submit your project for review as permitting agencies will be checking to see if your project is located within these designated sage grouse habitats. If your permitting agency requires evidence that your project is outside of designated sage grouse habitat, we recommend that you log in and start a project application and take a screenshot of your project's location.



Property Record Card

Summary

Primary Information

Property Category: RP
Subcategory: Agricultural and Timber Properties
Geocode: 53-1515-01-4-04-01-0001
Assessment Code: 7407000000
Primary Owner:
JANSEN JANET S
409 JANSEN RD
LAVINA, MT 59046-7150
PropertyAddress: 10 CUSHMAN RD
LAVINA, MT 59046
COS Parcel:
NOTE: See the Owner tab for all owner information
Certificate of Survey:
Subdivision:
Legal Description:
S01, T06 N, R21 E, ALL SOUTH OF RR R/W,LESS 1.06 AC IN SE4SE4SW4
Last Modified: 10/3/2023 6:07:35 PM

General Property Information

Neighborhood: 253.001
Property Type: FARM_R - Farmstead - Rural
Living Units: 2
Levy District: 53-1410-41RD
Zoning:
Ownership %: 100
Linked Property:
No linked properties exist for this property
Exemptions:
No exemptions exist for this property
Condo Ownership:
General: 0
Limited: 0

Property Factors

Topography:
Fronting:
Utilities:
Parking Type:
Access:
Parking Quantity:
Location:
Parking Proximity:

Land Summary

Land Type	Acres	Value
Grazing	118.283	9,132.00
Fallow	0.000	00.00
Irrigated	193.657	242,856.00
Continuous Crop	0.000	00.00
Wild Hay	0.000	00.00
Farmsite	1.000	2,003.00
ROW	0.000	00.00
NonQual Land	0.000	00.00
Total Ag Land	312.940	253,991.00
Total Forest Land	0.000	00.00
Total Market Land	0.000	00.00

Deed Information:

Deed Date	Book	Page	Recorded Date	Document Number	Document Type
10/18/2023	D	11315	10/20/2023	85487	Quit Claim Deed
3/29/2007	D	07912			
6/28/2006	D	07763			

1/6/1997	D	05941			
12/9/1996	D	05913			
10/9/1996	D	05898			
10/9/1996	D	05902			

Owners

Party #1

Default Information: JANSEN JANET S
409 JANSEN RD
Ownership %: 100
Primary Owner: "Yes"
Interest Type: Conversion
Last Modified: 6/20/2011 2:16:32 PM

Other Names

Name **Type**

Other Addresses

Appraisals

Appraisal History

Tax Year	Land Value	Building Value	Total Value	Method
2023	253991	268420	522411	COST
2022	233971	228200	462171	COST
2021	233971	228200	462171	COST

Market Land

Market Land Info

No market land info exists for this parcel

Dwellings

Existing Dwellings

Dwelling Type	Style	Year Built
SFR	10 - Old Style	1890
SFR	10 - Old Style	1920

Dwelling Information

Residential Type: SFR
Year Built: 1890
Effective Year: 1960
Story Height: 1.5
Grade: 5
Class Code: 3110
Year Remodeled: 1963
Style: 10 - Old Style
Roof Material: 5 - Metal
Roof Type: 3 - Gable
Attic Type: 0
Exterior Walls: 1 - Frame
Exterior Wall Finish: 3 - Masonite
Degree Remodeled:

Mobile Home Details

Manufacturer:
Model:
Serial #:
Width: 0
Length: 0

Basement Information

Foundation: 2 - Concrete
Basement Type: 2 - Part
Finished Area: 0
Quality:
Daylight: N

Heating/Cooling Information

Type: Central
Fuel Type: 3 - Gas
System Type: 5 - Forced Air
Heated Area: 0

Living Accomodations

Bedrooms: 3
Full Baths: 1
Addl Fixtures: 3

Family Rooms: 0 **Half Baths:** 1

Additional Information

Fireplaces: **Stacks:** 0 **Stories:**
Openings: 0 **Prefab/Stove:** 0
Garage Capacity: 0 **Cost & Design:** 0 **Flat Add:** 0
% Complete: 0 **Description:** **Description:**

Dwelling Amenities

View: **Access:**

Area Used In Cost

Basement: 268 **Additional Floors:** 0 **Attic:** 0
First Floor: 1070 **Half Story:** 803 **Unfinished Area:** 0
Second Floor: 0 **SFLA:** 1873

Depreciation Information

CDU: **Physical Condition:** Average (7) **Utility:** Average (7)
Desirability: **Property:** Fair (6)
Location: Fair (6)

Depreciation Calculation

Age: 62 **Pct Good:** 0.6 **RCNLD:** 152780

Additions / Other Features

Additions

Lower	First	Second	Third	Area	Year	Cost
	19 - Garage, Frame, Finished			1032	0	54654
	33 - Deck, Wood			171	0	2782
	14 - Porch, Frame, Enclosed			24	0	2001

There are no other features for this dwelling

Dwelling Information

Residential Type: SFR **Style:** 10 - Old Style
Year Built: 1920 **Roof Material:** 1 - Wood Shingle
Effective Year: 1960 **Roof Type:** 3 - Gable
Story Height: 1.5 **Attic Type:** 0
Grade: 4 **Exterior Walls:** 1 - Frame
Class Code: 3110 **Exterior Wall Finish:** 6 - Wood Siding or Sheathing
Year Remodeled: 1948 **Degree Remodeled:**

Mobile Home Details

Manufacturer: **Serial #:** **Width:** 0
Model: **Length:** 0

Basement Information

Foundation: 2 - Concrete **Finished Area:** 0 **Daylight:** N
Basement Type: 0 - None **Quality:**

Heating/Cooling Information

Type: Central **System Type:** 5 - Forced Air
Fuel Type: 3 - Gas **Heated Area:** 0

Living Accomodations

Bedrooms: 3 **Full Baths:** 1 **Addl Fixtures:** 3
Family Rooms: 0 **Half Baths:** 0

Additional Information

Fireplaces: **Stacks:** 0 **Stories:**
Openings: 0 **Prefab/Stove:** 0
Garage Capacity: 0 **Cost & Design:** 0 **Flat Add:** 0
% Complete: 0 **Description:** **Description:**

Dwelling Amenities

View: **Access:**

Area Used In Cost

Basement: 0 **Additional Floors:** 0 **Attic:** 0
First Floor: 764 **Half Story:** 294 **Unfinished Area:** 0
Second Floor: 0 **SFLA:** 1058

Depreciation Information

CDU:
Desirability:
Physical Condition: Fair (6)
Property: Fair (6)
Location: Fair (6)
Utility: Fair (6)

Depreciation Calculation

Age: 62 **Pct Good:** 0.5 **RCNLD:** 71810

Additions / Other Features

Additions

Lower	First	Second	Third	Area	Year	Cost
	69 - Garage, Frame, Unfinished			288	0	16167
	14 - Porch, Frame, Enclosed			120	0	10007

There are no other features for this dwelling

Other Buildings/Improvements

Outbuilding/Yard Improvement #1

Type: Ag **Description:** AAL1 - Lean-to, 1 story, pole frame
Quantity: 2 **Year Built:** 1969 **Grade:** L
Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 28 **Length:** 100 **Size/Area:** 2800
Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #2

Type: Ag **Description:** AAB2 - Standard Barn
Quantity: 1 **Year Built:** 1911 **Grade:** L
Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 31 **Length:** 100 **Size/Area:** 3100
Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #3

Type: Ag **Description:** AASF - Shed, agricultural, frame
Quantity: 1 **Year Built:** 1970 **Grade:** L
Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 10 **Length:** 6 **Size/Area:** 60
Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #4

Type: Ag **Description:** AASF - Shed, agricultural, frame
Quantity: 1 **Year Built:** 1920 **Grade:** L
Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 5 **Length:** 8 **Size/Area:** 40
Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #5

Type: Ag **Description:** AASF - Shed, agricultural, frame
Quantity: 1 **Year Built:** 1900 **Grade:** L

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 14 **Length:** 12 **Size/Area:** 168

Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #6

Type: Ag **Description:** AASF - Shed, agricultural, frame

Quantity: 1 **Year Built:** 1900 **Grade:** L

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 15 **Length:** 12 **Size/Area:** 180

Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #7

Type: Ag **Description:** AAR1 - Granary

Quantity: 1 **Year Built:** 1912 **Grade:** L

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 20 **Length:** 16 **Size/Area:** 320

Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #8

Type: Ag **Description:** AAL1 - Lean-to, 1 story, pole frame

Quantity: 1 **Year Built:** 1970 **Grade:** L

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 28 **Length:** 100 **Size/Area:** 2800

Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #9

Type: Ag **Description:** RRG3 - Garage, frame, detached, unfinished

Quantity: 1 **Year Built:** 1949 **Grade:** 3

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: **Length:** **Size/Area:** 480

Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #10

Type: Ag **Description:** RRG3 - Garage, frame, detached, unfinished

Quantity: 1 **Year Built:** 1900 **Grade:** 1

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: **Length:** **Size/Area:** 318

Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #11

Type: Ag **Description:** AAP2 - Pole Frame Bldg, 4 sides closed, wood

Quantity: 1 **Year Built:** 1910 **Grade:** L

Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 61 **Length:** 24 **Size/Area:** 1464
Height: **Bushels:** **Circumference:**

Outbuilding/Yard Improvement #12

Type: Ag **Description:** AAP1 - Pole Frame Bldg, 4 sides closed, metal
Quantity: 1 **Year Built:** 1997 **Grade:** A
Condition: **Functional:** **Class Code:** 3110

Dimensions

Width/Diameter: 16 **Length:** 20 **Size/Area:** 320
Height: **Bushels:** **Circumference:**

Commercial

Existing Commercial Buildings
No commercial buildings exist for this parcel

Ag/Forest Land

Ag/Forest Land Item #1

Acre Type: FSA - Farmsite on agricultural land **Irrigation Type:**
Class Code: 2001 **Timber Zone:**

Productivity

Quantity: 0 **Commodity:** N/A
Units:

Valuation

Acres: 1 **Per Acre Value:** 2003
Value: 2003

Ag/Forest Land Item #2

Acre Type: G - Grazing **Irrigation Type:**
Class Code: 1601 **Timber Zone:**

Productivity

Quantity: 0.216 **Commodity:** Grazing Fee
Units: AUM/Acre

Valuation

Acres: 18.256 **Per Acre Value:** 59.53
Value: 1087

Ag/Forest Land Item #3

Acre Type: G - Grazing **Irrigation Type:**
Class Code: 1601 **Timber Zone:**

Productivity

Quantity: 0.219 **Commodity:** Grazing Fee
Units: AUM/Acre

Valuation

Acres: 5.564 **Per Acre Value:** 60.31
Value: 336

Ag/Forest Land Item #4

Acre Type: G - Grazing **Irrigation Type:**

Class Code: 1601
Timber Zone:

Productivity

Quantity: 0.254
Commodity: Grazing Fee
Units: AUM/Acre

Valuation

Acres: 18.807
Per Acre Value: 70
Value: 1316

Ag/Forest Land Item #5

Acre Type: G - Grazing
Irrigation Type:
Class Code: 1601
Timber Zone:

Productivity

Quantity: 0.26
Commodity: Grazing Fee
Units: AUM/Acre

Valuation

Acres: 7.51
Per Acre Value: 71.56
Value: 537

Ag/Forest Land Item #6

Acre Type: G - Grazing
Irrigation Type:
Class Code: 1601
Timber Zone:

Productivity

Quantity: 0.312
Commodity: Grazing Fee
Units: AUM/Acre

Valuation

Acres: 68.146
Per Acre Value: 85.94
Value: 5856

Ag/Forest Land Item #7

Acre Type: I - Irrigated
Irrigation Type:
Class Code: 1101
Timber Zone:

Productivity

Quantity: 4.035
Commodity: Alfalfa
Units: Tons/Acre

Valuation

Acres: 28.792
Per Acre Value: 973.13
Value: 28018

Ag/Forest Land Item #8

Acre Type: I - Irrigated
Irrigation Type:
Class Code: 1101
Timber Zone:

Productivity

Quantity: 4.667
Commodity: Alfalfa
Units: Tons/Acre

Valuation

Acres: 74.816
Per Acre Value: 1247.81
Value: 93356

Ag/Forest Land Item #9

Acre Type: I - Irrigated
Irrigation Type:
Class Code: 1101
Timber Zone:

Productivity

Quantity: 4.9
Commodity: Alfalfa
Units: Tons/Acre

Valuation

Acres: 90.049
Per Acre Value: 1349.06
Value: 121482

FISHMT MENU

- FISHMT HOME
- EXPLORE
- STOCKING
- DATA
- REGULATIONS
- LICENSES
- REPORT YOUR CATCH
- SPECIES
- CONTACT
- SUPPORT

EXPLORE

Waterbody Search

Enter Waterbody Name

MORE OPTIONS

FWP Fishing Access Site Search

Enter an FWP Fishing Access Site Name

MORE OPTIONS

53-1515-01-4-04-01-0001

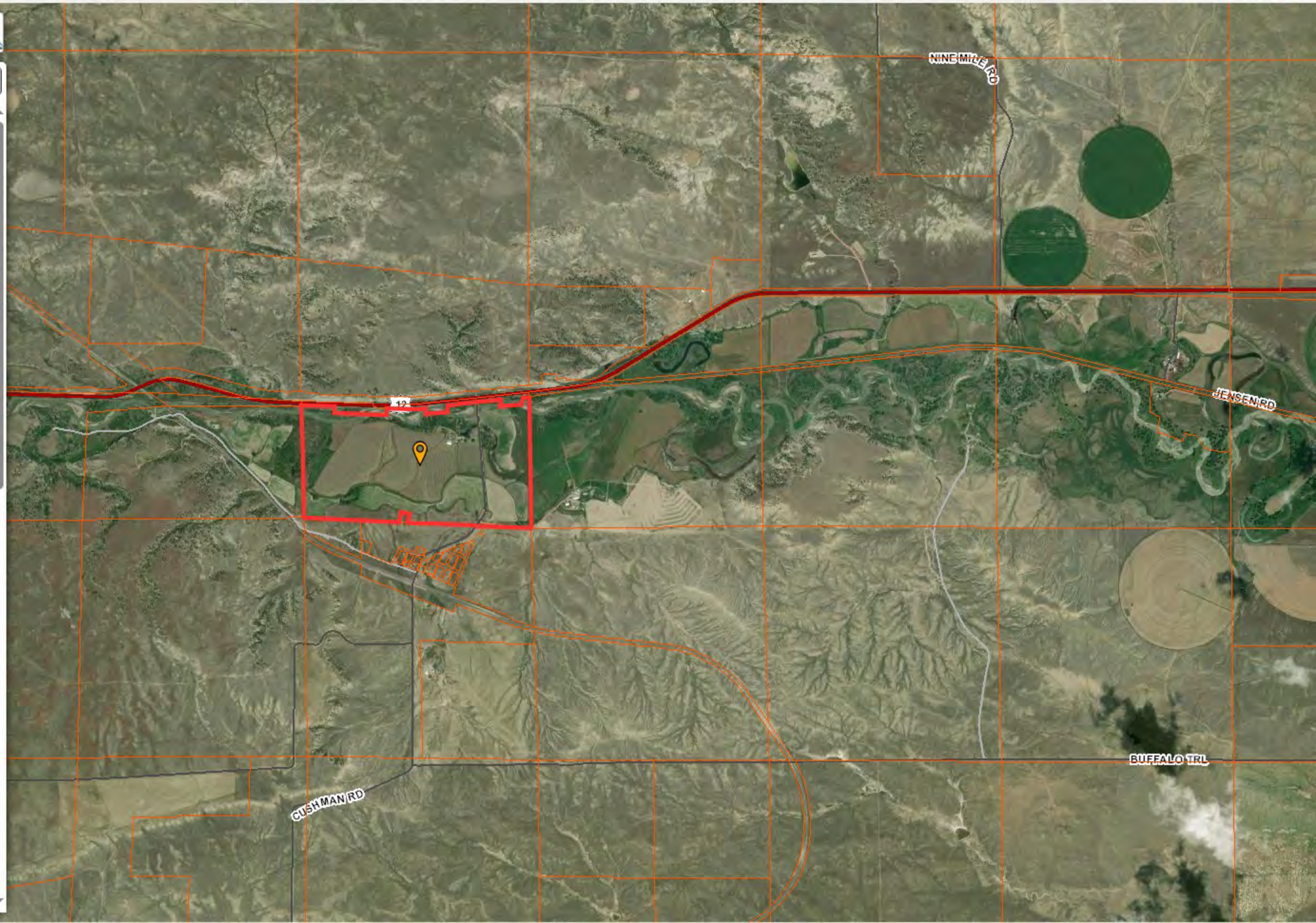
53-1515-01-4-04-01-0001

General Information	
Property Number	53-1515-01-4-04-01-0001
Assessment Code	7407000000
County	Golden Valley
Levy District	53-1410
Neighborhood	253.001
Situs Address	10 CUSHMAN RD, LAVINA, MT 59046
Legal Description	S01, T06 N, R21 E, ALL SOUTH OF RR R/W,LESS 1.06 AC IN SE4SE4SW4
Owner Name	JANSEN JANET S
Property Last Updated	10/3/2023

Value History		
Year	Market Value	Taxable Value
2021	$462,171	$8,134
2022	$462,171	$8,134
2023	$522,411	$9,110

Property Characteristics			
Type	FARM_R - Farmstead - Rural		
Living Units	2		
Topography		Utilities	
Access			
Location			
Fronting			
Parking		Parking Qty.	
Parking Proximity			

Residential Dwellings			
SFR	10 - Old Style	3110 - Improvements on Ag Land	



CONSTRUCTION DRAWINGS

MUSSELSHELL RIVERBANK RESTORATION

GOLDEN VALLEY COUNTY

CUSHMAN, MONTANA

SHEET INDEX

PROJECT VICINITY

PROJECT LOCATION

PROJECT CONTACTS:

Owner/Developer	Project Engineer
Golden Valley County Dean Blomquist 861-5201	Stahly Engineering & Associates Nate Peressini 522-8594

PERMIT SET

ENGINEER OF RECORD: NATE PERESSINI ,PE

QUALITY CONTROL REVIEWER: ARNE WIEBE

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526

ISSUE/REVISION									
No.	DATE	DESCRIPTION	EOR	QCR
1	11/16/2023	PERMIT SET	NTP	HAW

MUSSELSHELL RIVERBANK RESTORATION

GOLDEN VALLEY COUNTY

TITLE

SHEET
T1.0

TECHNICAL SPECIFICATIONS

ALL WORK SHALL BE DONE IN ACCORDANCE WITH MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS (MPWSS) 7TH EDITION.

SOME ITEMS OF MPWSS ARE HIGHLIGHTED FOR IMPORTANCE BELOW. TECHNICAL SPECIFICATIONS ARE AMENDED TO INCLUDE THE NOTES BELOW:

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

SECTION 01090 REFERENCES

SECTION 01300 SUBMITTALS

SECTION 01400 CONTRACTOR QUALITY CONTROL & OWNER QUALITY ASSURANCE
1. QUALITY CONTROL SUBMITTALS AND TESTING REQUIREMENTS ARE SHOWN ON THIS SHEET.
2. GOLDEN VALLEY COUNTY IS THE OWNER AND MAY PERFORM QUALITY ASSURANCE TESTS.

SECTION 01500 CONSTRUCTION AND TEMPORARY FACILITIES

SSECTION 02110 GEOTEXTILES
1. SOIL STABILIZATION / SEPARATION FABRIC TO BE GEOTEX 801 NONWOVEN GEOTEXTILE BY PROPEX OR APPROVED EQUAL.

SECTION 02910 SEEDING

CONSTRUCTION NOTES

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES AND/OR FACILITIES ARE DEPICTED BASED ON INFORMATION PROVIDED BY OTHERS AND SHOULD BE CONSIDERED APPROXIMATE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THIS INFORMATION.
2. PRIOR TO ANY EXCAVATION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING, OR HAVING LOCATED, ALL UNDERGROUND FACILITIES SHOWN OR INDICATED IN THE PLANS AND/OR CONTRACT DOCUMENTS. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN EXCAVATING NEAR UNDERGROUND FACILITIES.
3. ANY DAMAGE TO ABOVE OR BELOW GROUND UTILITIES AND/OR FACILITIES SHALL BE IMMEDIATELY REPORTED TO THE UTILITY COMPANY AND THE ENGINEER. ALL SHOWN OR MARKED UTILITIES OR FACILITIES DAMAGED BY THE CONTRACTOR OR ITS SUBCONTRACTOR SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
4. OWNER HAS OBTAINED THE FOLLOWING STREAM PERMITS FOR THE PROJECT: 404 PERMIT, SPA PERMIT, 318 AUTHORIZATION, AND FLOODPLAIN PERMIT.
5. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL ADDITIONAL PERMITS FOR CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY ITEMS DAMAGED DURING CONSTRUCTION.
7. RESTORE ALL SURFACED AREAS DAMAGED DURING CONSTRUCTION TO EQUAL OR BETTER CONDITIONS AS DETERMINED BY THE ENGINEER.
8. ALL AREAS NOT LANDSCAPED OR ANY NON-SURFACED AREAS DISTURBED DURING CONSTRUCTION ARE TO BE RESTORED TO THE ORIGINAL GRADE, PREPARED FOR SEEDING AND SEED APPLIED ACCORDING TO THE OWNER.
9. MAXIMUM GRADING SLOPES TO BE 1.5:1.
10. THE CONTRACTOR SHALL, AT HIS OPTION, EITHER MINIMIZE THE INFILTRATION OF NATURAL WATER INTO EXCAVATIONS AND/OR REMOVE NATURAL WATER FROM EXCAVATIONS AS REQUIRED TO FACILITATE CONSTRUCTION OF THE WORK. ALL REQUIRED PERMITS FOR DEWATERING SHALL BE OBTAINED AND MANAGED BY THE CONTRACTOR.
11. CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL EXCESS EMBANKMENT.
12. EXCAVATION INCLUDES QUANTITY NECESSARY FOR INSTALLATION OF RIP RAP.

LEGEND

	EXISTING	NEW
CONTROL POINT	△	
OVERHEAD ELECTRICAL	OHE	
CONTOURS (1 FT. INTERVALS)	3189	3190
EDGE OF GRAVEL		
METAL FENCE		

ESTIMATED QUANTITIES

DESCRIPTION	QUANTITY	UNIT
EXCAVATION	2,305	CUYD
FURNISH AND INSTALL CLASS II RIP RAP	1,140	CUYD
PERMANENT EROSION CONTROL GEOTEXTILE	1,630	SQYD
TEMPORARY STRAW WATTLES	433	LF

MINIMUM QUALITY CONTROL SUBMITTALS AND TESTING REQUIREMENTS

MATERIALS SUBMITTALS REQUIRED

PRODUCT	PARTY RESPONSIBLE FOR SUBMITTAL	REQUIRED SUBMITTALS PRIOR TO MOBILIZATION	REQUIRED SUBMITTALS DURING CONSTRUCTION
EMBANKMENT IN PLACE; ON-SITE	CONTRACTOR	PROCTOR	ONE REPRESENTATIVE SAMPLE FOR EACH TYPE OF MATERIAL ENCOUNTERED
TYPE II RIPRAP	CONTRACTOR	SUBMITTAL REQUIRED TO MEET MDT SPECIFICATIONS	ONE REPRESENTATIVE SAMPLE OF MATERIAL IMPORTED TO SITE

ON-SITE MATERIALS TESTING

PRODUCT	PARTY RESPONSIBLE TO OBTAIN TESTS	TEST FREQUENCY	TEST REQUIREMENT & STANDARD
TRENCH EXCAVATION, BACKFILL AND COMPACTION	CONTRACTOR	ONE TEST PER 200 LINEAR FEET	TEST PER AASHTO T310. OBTAIN 95% BY AASHTO T99
EMBANKMENT IN PLACE; ON-SITE	CONTRACTOR	ONE TEST PER 300 LINEAR FEET PER 12" FILL	TEST PER AASHTO T310. OBTAIN 95% BY AASHTO T99

*ADDITIONAL TESTS REQUIRED FOR EVERY BACKFILL MATERIAL CHANGE.

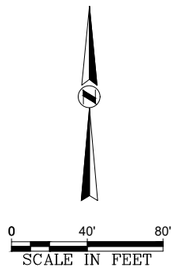
STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com
2223 MONTANA AVE. STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526

ISSUE/REVISION			
No.	DATE	DESCRIPTION	EOR / QCR
1	11/16/2023	PERMIT SET	NTP / HAW

MUSSELSHELL RIVERBANK RESTORATION
GOLDEN VALLEY COUNTY

SPECIFICATIONS

SHEET
C1.0



CONTROL POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	747132.21'	2085802.77'	3490.45'	CP / RPC SEA CONTROL
2	747584.10'	2085755.32'	3494.06'	CP / RPC SEA CONTROL
3	747654.79'	2085244.07'	3493.16'	CP / RPC SEA CONTROL
4	747076.44'	2085542.23'	3490.82'	CP / RPC SEA CONTROL

SURVEY NOTES
1. DATE OF SURVEY– JULY 20, 2023
2. NO UTILITY LOCATE MARKS WERE SHOWN BASED ON LOCATE MARKINGS IN RESPONSE TO 811 UTILITY LOCATE TICKET #2308680
3. A BOUNDARY SURVEY WAS NOT CONDUCTED AS A PART OF THIS SURVEY.

BASIS OF BEARING
MONTANA STATE PLANE 2500, NAD83(2011), INTERNATIONAL FEET
PROJECTED TO GROUND UNITS AT (CP#1):

NORTH LATITUDE– 46°17'53.911201"
WEST LONGITUDE– 109°02'08.54693"
ORTHOMETRIC HEIGHT– 3,448.802'
CONVERGENCE ANGLE– 1.42034722°

VERTICAL DATUM
NAVD88(GEOID18)

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601–4055

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442–8594

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522–9526

ISSUE/REVISION										
No.	DATE	DESCRIPTION	EOR	QCR						
1	11/16/2023	PERMIT SET	NTP	HAW						

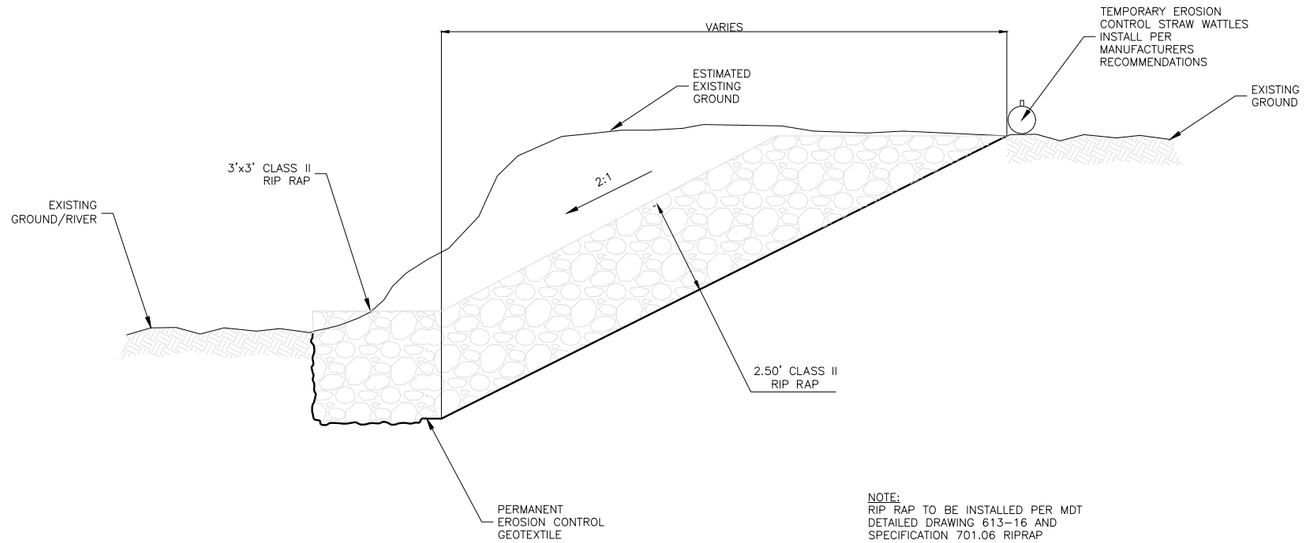
MUSSELSHELL RIVERBANK RESTORATION

GOLDEN VALLEY COUNTY

EXISTING CONDITIONS

SHEET
C1.1

Docusign Envelope ID: C1194835-9F00-46B2-B06D-1AE8E8AE7339



NOTE:
RIP RAP TO BE INSTALLED PER MDT DETAILED DRAWING 613-16 AND SPECIFICATION 701.06 RIPRAP

RIP RAP TYPICAL SECTION

NO SCALE

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526

ISSUE/REVISION

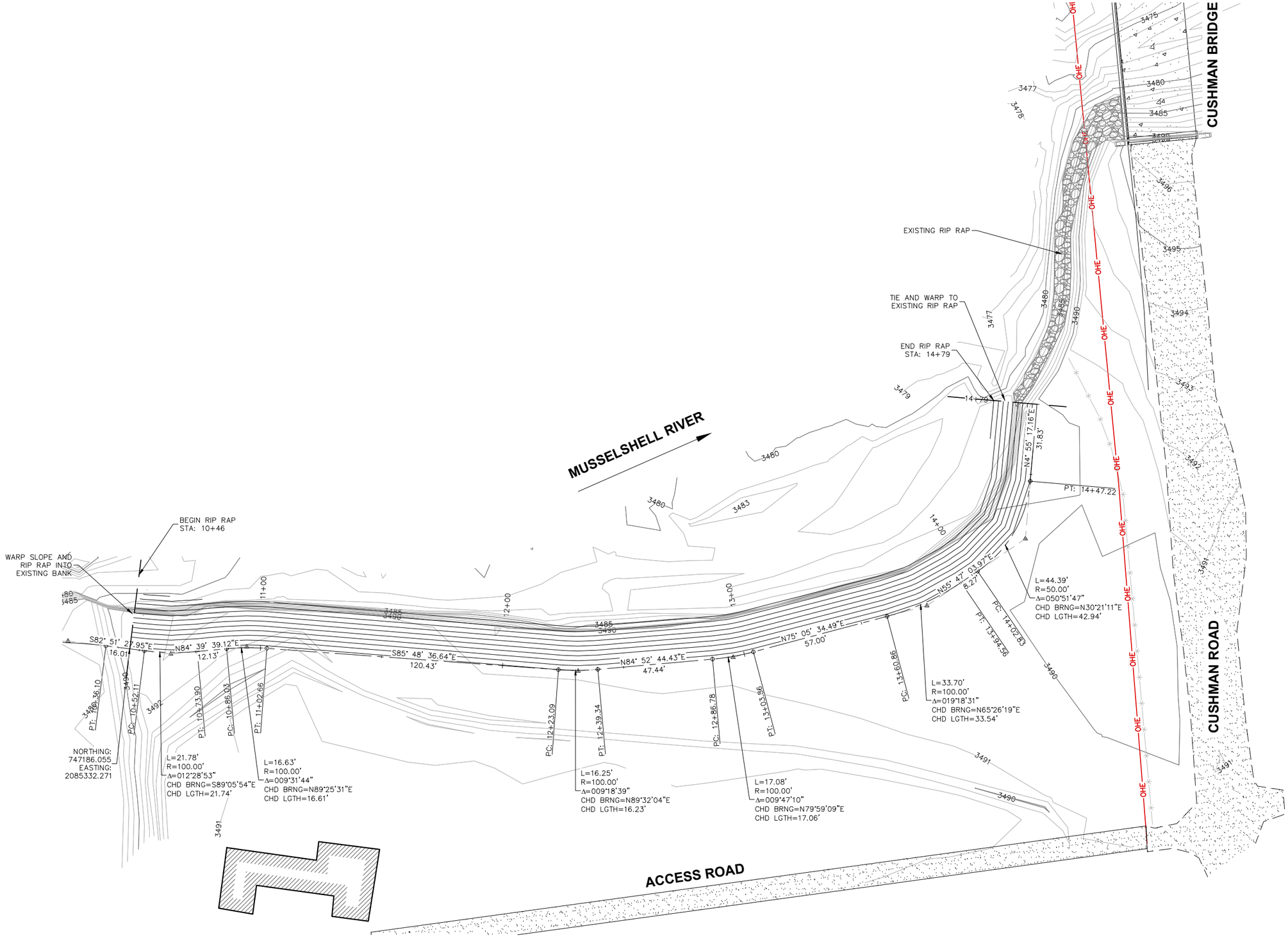
No.	DATE	DESCRIPTION	EOR	QCR
1	11/16/2023	PERMIT SET	NTP	HAW

MUSSELSHELL RIVERBANK RESTORATION

GOLDEN VALLEY COUNTY

TYPICAL SECTION

SHEET
C1.2



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526

ISSUE/REVISION									
No.	DATE	DESCRIPTION	EOR	QCR					
1	11/16/2023	PERMIT SET	NTP	HAW					

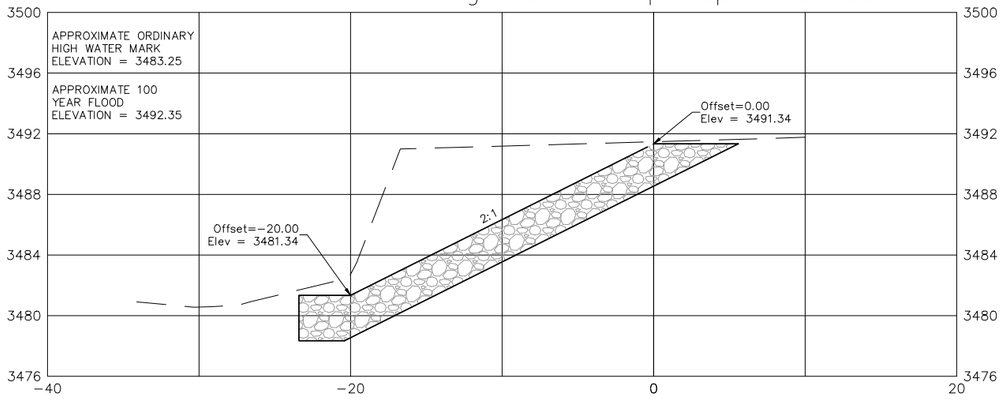
MUSSELSHELL RIVERBANK RESTORATION
GOLDEN VALLEY COUNTY

SITE PLAN

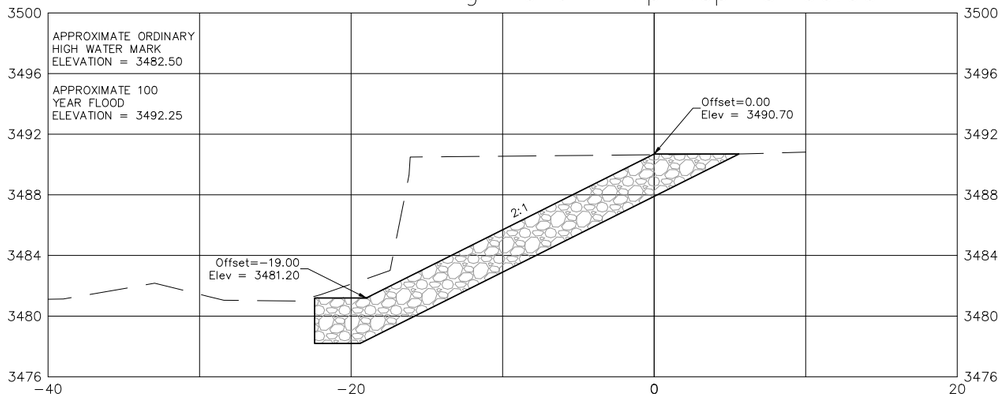
SHEET
C2.0

0 5' 10'
SCALE IN FEET

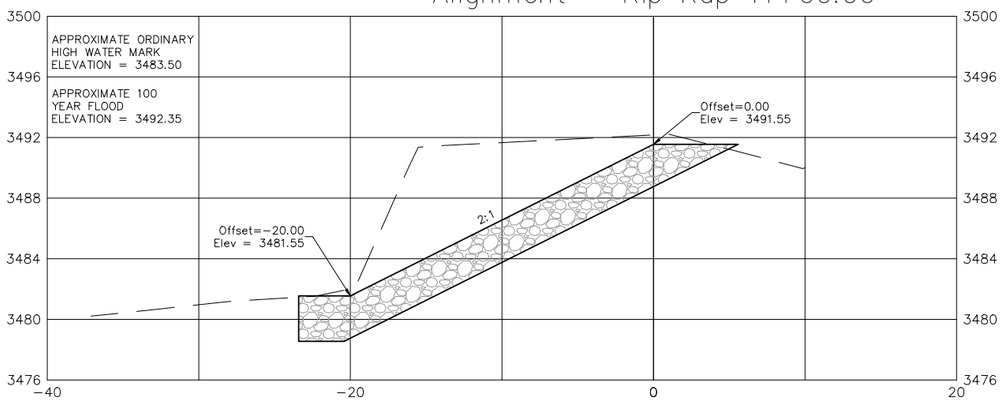
Alignment – Rip Rap 11+50.00



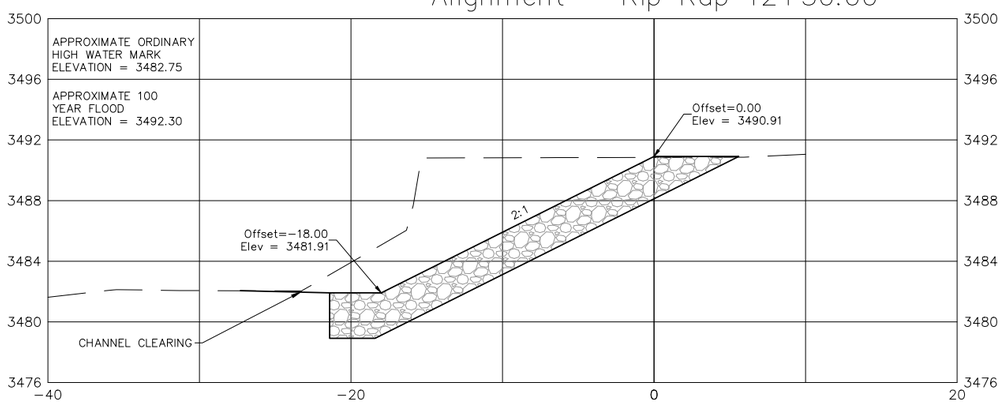
Alignment – Rip Rap 13+00.00



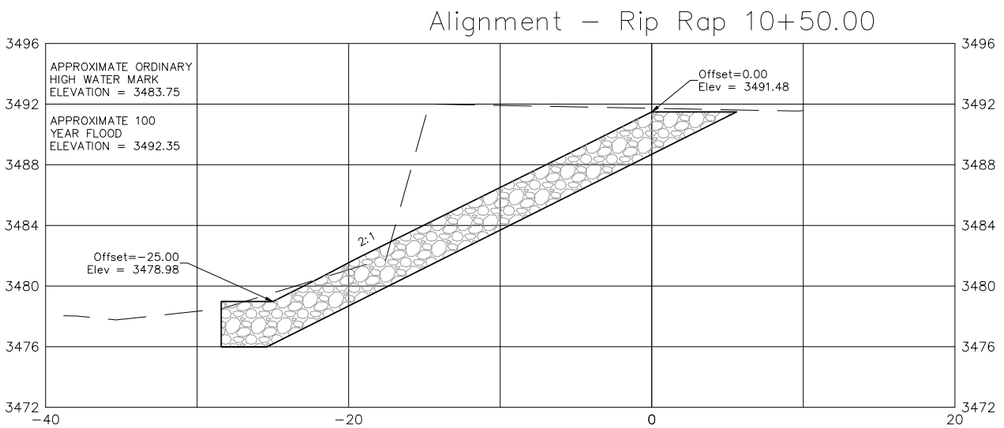
Alignment – Rip Rap 11+00.00



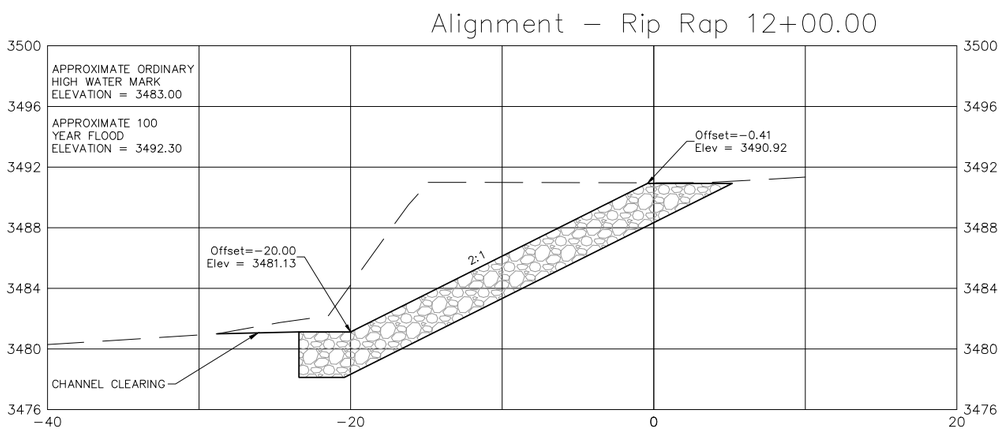
Alignment – Rip Rap 12+50.00



Alignment – Rip Rap 10+50.00



Alignment – Rip Rap 12+00.00



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526

ISSUE/REVISION										
No.	DATE	DESCRIPTION	EOR	QCR						
1	11/16/2023	PERMIT SET	NTP	HAW						

MUSSELSHELL RIVERBANK RESTORATION

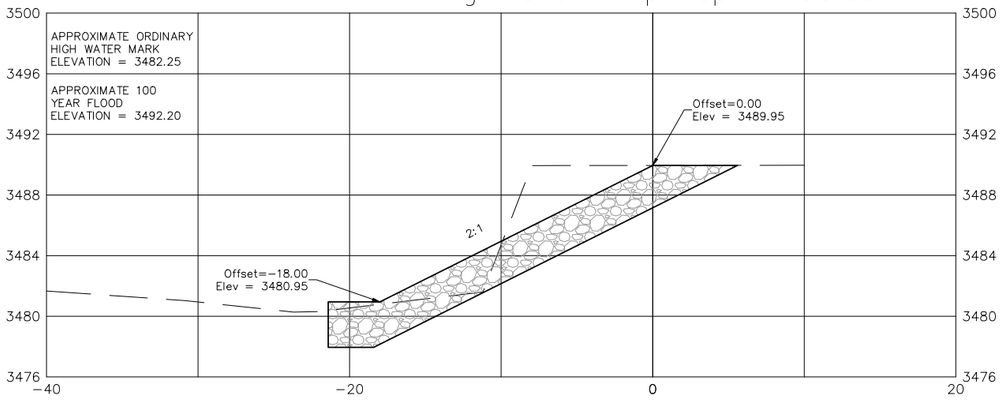
GOLDEN VALLEY COUNTY

CROSS SECTIONS

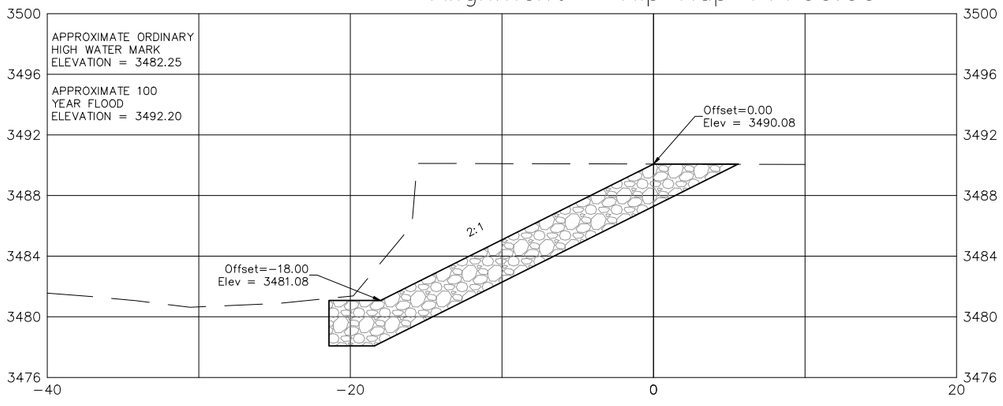
SHEET
C3.0

0 5' 10'
SCALE IN FEET

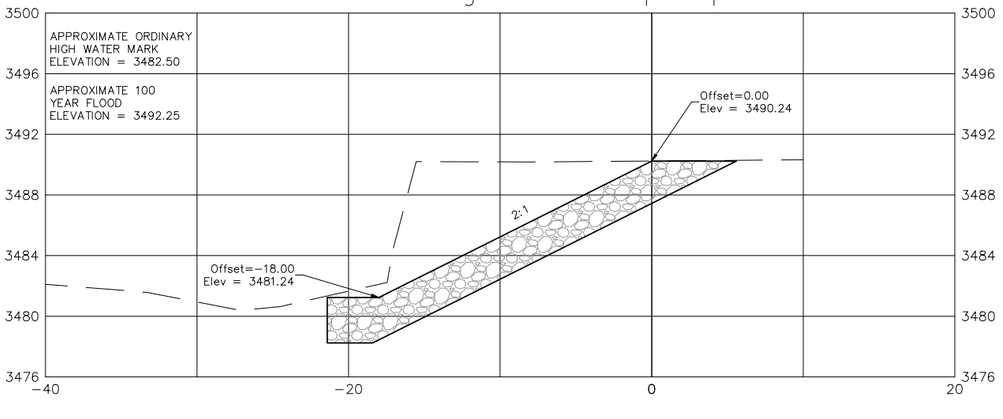
Alignment – Rip Rap 14+50.00



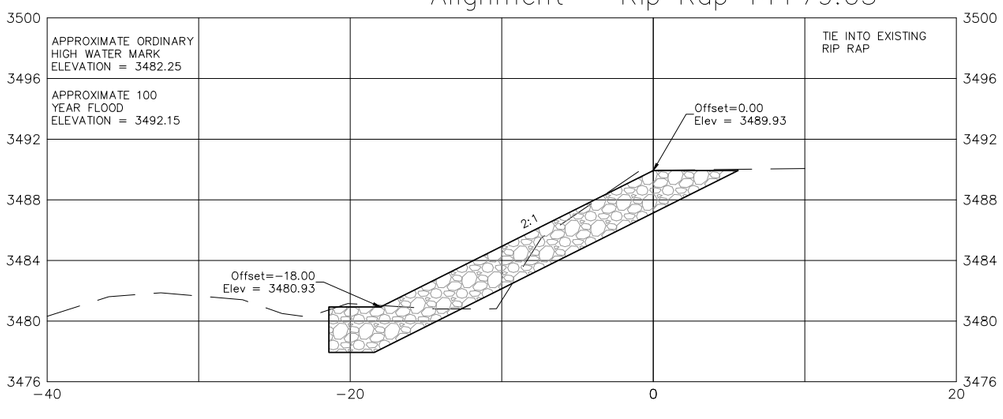
Alignment – Rip Rap 14+00.00



Alignment – Rip Rap 13+50.00



Alignment – Rip Rap 14+79.05



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601−4055

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442−8594

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522−9526

ISSUE/REVISION

No.	DATE	DESCRIPTION	EOR	QCR
1	11/16/2023	PERMIT SET	NTP	HAW

MUSSELSHELL RIVERBANK RESTORATION

GOLDEN VALLEY COUNTY

CROSS SECTIONS

SHEET
C3.1

Revised: 5/12/2021 310 Form 270 and Instructions may be downloaded from: http://dnrc.mt.gov/licenses-and-permits/stream-permitting	**CD/AGENCY USE ONLY** Application # Click to enter text. Date Received Date Date Accepted Date Initials Initials Date FW: to FWP Date

This space is for all Department of Transportation and SPA 124 permits (government projects).

Project Name Click to enter text.

Control Number Click to enter text. Contract Letting Date Date

MEPA/NEPA Compliance ☐Yes ☐No If yes, #C5 of this application does not apply.

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

This is a standardized application to apply for one or all local, state, or federal permits listed below.

- Refer to instructions to determine which permits apply and submit a signed application to each applicable agency.
- Incomplete applications will result in the delay of the application process.
- The applicant is responsible for obtaining all necessary permits and landowner permission before beginning work.
- **Other laws may apply.**

	PERMIT	AGENCY	FILL OUT SECTIONS	FEE
	310 Permit	Local Conservation District	A - E and G	Inquire locally
X	SPA 124 Permit	Department of Fish, Wildlife and Parks	A - E and G	No fee
	318 Authorization 401 Certification	Department of Environmental Quality	A - E and G	$250 (318); $400 - $20,000 (401)
	Navigable Rivers Land Use License, Lease, or Easement	Department of Natural Resources and Conservation, Trust Lands Management Division	A - E and G	$50, plus additional fee
	Section 404 Permit, Section 10 Permit	U. S. Army Corps of Engineers (USACE)	A - G F1-8	Varies ($0 - $100)
X	Floodplain Permit	Local Floodplain Administrator	A - G	Varies by city/county ($25 - $500+)

A. APPLICANT INFORMATION

APPLICANT NAME (person responsible for project)**:** Golden Valley County
Has the landowner consented to this project? ☒ Yes ☐ No
Mailing Address: PO Box 10 Ryegate, MT 59074
Physical Address: 107 Kemp St. Ryegate, MT 59074
Cellphone: N/A Home Phone: (406) 568-2231 E-Mail: N/A

LANDOWNER NAME (if different from applicant): Janet – Cushman Land Trust
Mailing Address: 409 Jansen Road, Lavina, MT 59046
Physical Address: 409 Jansen Road, Lavina, MT 59046
Cellphone: N/A Home Phone: N/A E-Mail: N/A

CONTRACTOR/COMPANY NAME (if applicable): Stahly Engineering & Associates
PRIMARY CONTACT NAME: Nate Peressini, P.E.
Mailing Address: 851 Bridger Drive, Suite 1, Bozeman, MT 59715
Physical Address: 851 Bridger Drive, Suite 1, Bozeman, MT 59715
Cellphone: N/A Home Phone: (406) 522-8594 E-Mail: nperessini@seaeng.com

B. PROJECT SITE INFORMATION

1. NAME OF **STREAM** or **WATER BODY** at project location Musselshell River
   Project Address/Location: Cushman, MT Nearest Town Cushman, MT
   County Golden Valley County Geocode: 53-1515-01-4-04-01-0001
   NW1/4 of the SE 1/4 of, Section 01 Township 06N, Range 21E
   Latitude 46°17'55.44"N Longitude 109° 2'10.22"W Refer to section B1 in the instructions.

2. Is the proposed activity within **SAGE GROUSE** areas designated as general, connected, or core habitat?
   Yes ☒ No ☐ Attach consultation letter if required. Refer to section B2 in the instructions.

3. Is this a **STATE NAVIGABLE WATERWAY**? The state owns beds of certain navigable waterways**.**
   Yes ☐ No☒ If yes, send a copy of this application to the appropriate DNRC land office. Refer to section B3 in the instructions.

4. **WHAT IS THE CURRENT CONDITION** of the proposed project site? Describe the existing bank condition, bank slope, height, nearby structures, and wetlands. What vegetation is present? Refer to section B4 in the instructions.

Due to the migration of the Musselshell River, the banks have become nearly vertical and unstable. The banks are currently at a height of 8-10' This migration of the stream has resulted in loss of land and continues to have negative impacts to the surrounding area. Further migration of the stream could potentially undermine the Cushman bridge and road.

C. PROPOSED PROJECT OR ACTIVITY INFORMATION

1. **TYPE OF PROJECT** (check all that apply) Refer to section C1 in the instructions.

☐ **Agricultural and Irrigation Projects:** Diversions, Headgates, Flumes, Riparian fencing, Ditches, etc.

☐ **Buildings/Structures:** Accessory Structures, Manufactured Homes, Residential or Commercial Buildings, etc.

☒ **Channel/Bank Projects:** Stabilization, Restoration, Alteration, Dredging, Fish Habitat, Vegetation or Tree Removal, or any other work that modifies existing channels or banks.

☐ **Crossings/Roads:** Bridge, Culvert, Fords, Road Work, Temporary Access, or any project that crosses over or under a stream or channel.

☐ **Mining Projects:** All mining related activity, including; Placer Mining, Aggregate Mining, etc.

☐ **Recreation related Projects:** Boat Ramps, Docks, Marinas, etc.

☐ **Other Projects:** Cistern, Debris Removal, Excavation/Pit/Pond, Placement of Fill, drilling or directional boring, Utilities, Wetland Alteration. Other project type not listed here _____

_____

2. IS THIS APPLICATION FOR an annual maintenance permit? ☐ Yes ☒ No
(If yes attach annual plan of operation to this application) – Refer to section C2 in the instructions.

3. WHY IS THIS PROJECT NECESSARY? STATE THE PURPOSE OR GOAL of the proposed project. Refer to section C3 in the instructions.

The purpose of the proposed project would reduce/limit the erosion potential as well as improve aquatic and riparian habitat by stabilizing a vertical cutbank with angular riprap.

4. PROVIDE A BRIEF DESCRIPTION of the proposed project plan and how it will be accomplished. Refer to section C4 in the instructions.

Restoration of approximately 400 linear feet of riverbank by laying back a near vertical cutbank and placing angular riprap to stabilize the bank from future erosion.

5. **WHAT OTHER ALTERNATIVES were considered to accomplish the stated purpose of the project?** Why was the proposed alternative selected? Refer to section C5 in the instructions.

Alternatives included "do nothing" which is not an option, as the river continues to migrate, overtaking more farmland and approaching an existing county road and bridge. This alternative was selected as the least impact to the river with most cost-effective protection for the riverbank.

6. **NATURAL RESOURCE BENEFITS OR POTENTIAL IMPACTS. Please complete the information below to the best of your ability**.

* Explain any temporary or permanent changes in erosion, sedimentation, turbidity, or increases of potential contaminants. What will be done to minimize those impacts?

The river channel will be armored in its current alignment, therefore not changing the flow path of the river. Riprap will be utilized to mitigate erosion of the bank in the future, therefore reducing turbidity during high flows.

- Will the project cause temporary or permanent impacts to fish and/or aquatic habitat? What will be done to protect the fisheries?

Riprap will be installed to mitigate site disturbance, re-vegetate disturbed areas, and maintain channel for fish passage.

- What will be done to minimize temporary or permanent impacts to the floodplain, wetlands, or riparian habitat?

The proposed project will be done so that the disturbed area is only what is necessary to armor the segment of bank. The project includes laying back a vertical cut bank allowing more flow through the floodplain, creating a positive impact to the area and its surroundings.

- What efforts will be made to decrease flooding potential upstream and downstream of project?

The riverbank is to be armored to mitigate further migration and negative impacts to the surrounding area. The bank in this area has been largely unstable for years and will not change the flows of the channel.

- Explain potential temporary or permanent changes to the water flow or to the bed and banks of the waterbody. What will be done to minimize those changes?

The existing bed of the river will be largely unchanged with the bank being laid back to a 2:1 slope and armored with riprap. To minimize changes, there will be no fill placed in the river, with only excavation taking place and riprap installed in its place.

- How will existing vegetation be protected and its removal minimized? Explain how the site will be revegetated. Include weed control plans.

Vegetation disturbance will be minimized by restricting excavation and construction activities to the directly adjacent banks, only disturbing what is necessary for construction. All equipment will be weed washed prior to mobilization to the project site.

D. CONSTRUCTION DETAILS

1. PROPOSED CONSTRUCTION DATES. Include a project timeline. Start date 3/20/2024
Finish date 5/29/2024 How long will it take to complete the project? 2 months Is any portion of the work already completed? ☐ Yes ☒ No (If yes, describe previously completed work.)
Refer to section D1 in the instructions.
N/A

2. PROJECT DIMENSIONS. Describe length and width of the project. Refer to section D2 in the instructions.

The project will lay back a vertical cut bank approximately 20 feet away from the riverbank and around 400 linear feet of bank and armor with riprap.

3. EQUIPMENT. List all equipment that will be used for this project. How will the equipment be used on the bank and/or in the water? Note: All equipment used in the water must be clean, drained and dry. Refer to section D3 in the instructions.

Standard equipment anticipated to be an excavator, dozer, skid steer, and haul trucks. Project documents include special provision stating that all equipment must be clean and free of weeds prior to mobilizing to the job site.

Will equipment from out of state be used? YES ☐ NO ☐ UNKNOWN ☒
Will the equipment cross west over the continental divide to the project site? YES ☐ NO ☐ UNKNOWN ☒
Will equipment enter the Flathead Basin? YES ☐ NO ☐ UNKNOWN ☒

4. MATERIALS. Provide the total quantity and source of materials proposed to be used or removed. Note: This may be modified during the permitting process therefore it is **recommended you do not purchase materials until all permits are issued.** List soil/fill type, cubic yards and source, culvert size, rip-rap size, any other materials to be used or removed on the project. Refer to section D4 in the instructions.

Cubic yards/Linear feet	Size and Type	Source
1,140 cubic yard	Class II Riprap	Local Source

E. REQUIRED ATTACHMENTS

1. **PLANS AND/OR DRAWINGS** of the proposed project. **Include**:
   - Plan/Aerial view
   - an elevation or cross section view
   - dimensions of the project (height, width, depth in feet)
   - location of storage or stockpile materials dimensions and location of fill or excavation sites
   - drainage facilities
   - location of existing/proposed structures, such as buildings, utilities, roads, or bridges
   - an arrow indicating north
   - Site photos

2. **ATTACH A VICINITY MAP OR A SKETCH** which includes: The water body where the project is located, roads, tributaries, other landmarks. Place an "X" on the project location. Provide written directions to the site. This is a plan view (looking at the project from above).

3. **ATTACH ANNUAL PLAN OF OPERATION if requesting a Maintenance 310 Permit.**

4. **ATTACH AQUATIC RESOURCE MAP.** Document the location and boundary of all waters of the U.S. in the project vicinity, including wetlands and other special aquatic sites. Show the location of the ordinary high-water mark of streams or waterbodies. **if requesting a Section 404 or Section 10 Permit.** Ordinary high-water mark delineation included on plan or drawings and/or a separate wetland delineation.

F. ADDITIONAL INFORMATION FOR U.S. ARMY CORPS OF ENGINEERS (USACE) SECTION 404, SECTION 10 AND FLOODPLAIN PERMITS.

Section F should only be filled out by those needing Section 404, Section 10, and/or Floodplain permits. Applicants applying for Section 404 and/or Section 10 permits complete F 1- 8. Applicants applying for Floodplain permits, complete all of Section F. Refer to section F in the instructions.

FOR QUESTIONS RELATING TO SECTION F, QUESTIONS 1-8 PLEASE CONTACT THE USACE BY TELEPHONE AT 406-441-1375 OR BY E-MAIL MONTANA.REG@USACE.ARMY.MIL.

1. Identify the specific **Nationwide Permit(s)** that you want to use to authorize the proposed activity. Refer to section F1 in the instructions.

NWP – 13 Bank Stabilization (Non-reporting)

2. Provide the **quantity of materials** proposed to be used in waters of the United States. What is the length and width (or square footage or acreage) of impacts that are occurring within waters of the United States? How many cubic yards of fill material will be placed below the ordinary high-water mark, in a wetland, stream, or other waters of the United States? Note: Delineations are required of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Refer to section F2 in the instructions.

Just over 400 linear feet of bank is to be armored and less than 1 cubic yard of material will be installed per running foot of the project. It is estimated that less than 300 cubic yards of riprap will be installed below the O.H.W.M. No wetland will be impacted with this project as the vast majority of the project will lay back a vertical cut bank. Materials will be removed in order to install this riprap, therefore no encroachment will take place on the existing river alignment.

3. How will the proposed project avoid or minimize **impacts to waters of the United States?** Attach additional sheets if necessary. Refer to section F3 in the instructions.

The existing bed of the river will be largely unchanged with the bank being laid back to a 2:1 slope and armored with riprap. To minimize changes, there will be no fill placed in the river, with only excavation taking place and riprap installed in its place.

4. Will the project impact greater than 0.10-acre of wetland and/or more than 300 linear feet of stream or other waters? If yes, describe how the applicant is going to **compensate (mitigation bank, in-lieu fee program, or permittee responsible)** for these unavoidable impacts to waters of the United States. Refer to section F4 in the instructions.

No wetlands will be impacted with this project and will impact just over 400 linear feet of bank. Below the allowed 500 linear feet of bank within NWP – 13.

5. Is the activity proposed within any component of the **National Wild and Scenic River System**, or a river that has been officially designated by Congress as a **"study river"**? Refer to section F5 in the instructions.

☐ Yes ☒ No

6. Does this activity require permission from the USACE because it will alter or temporarily or permanently occupy or use a **USACE authorized civil works project? (Examples include USACE owned levees, Fort Peck Dam, and others)**? Refer to section F6 in the instructions.

☐ Yes ☒ No

7. List the **ENDANGERED AND THREATENED SPECIES** and **CRITICAL HABITAT(s)** that might be present in the project location. Refer to section F7 in the instructions.

According to the IPaC this area includes endangered species are North American Wolverine and Monarch Butterfly with no critical habitats.

8. List any **HISTORIC PROPERTY(S)** that are listed, determined to be eligible or are potentially eligible (over 50 years old) for listing on the National Register of Historic Places." Refer to section F8 in the instructions.

Only adjacent farm field will be impacted with this project.

9. List **all applicable local, state, and federal** permits and indicate whether they were issued, waived, denied, or pending. Note: All required local, state, and federal permits, or proof of waiver must be issued prior to the issuance of a floodplain permit. Refer to section F9 in the instructions.

SPA124 Permit – Pending
318 Authorization – Pending
Floodplain Permit – Pending
404 Permit – NWP – 13 Bank Stabilization (Non-reporting)

10. List the **NAMES AND ADDRESSES OF LANDOWNERS** adjacent to the project site. This includes properties adjacent to and across from the project site. (Some floodplain communities require certified adjoining landowner lists).
NAME OF **Adjacent Landowner**: Green Hilles Ranch, LLC PO Box 277. Lavina, MT 59046

11. **Floodplain Map Number** 30037C0590B Refer to section F11 in the instructions.

12. Does this project comply with **local planning or zoning regulations**? Refer to section F12 in the instructions.
☒ Yes ☐ No

G. SIGNATURES/AUTHORIZATIONS

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

The statements contained in this application are true and correct. The applicant possess' the authority to undertake the work described herein or is acting as the duly authorized agent of the landowner. The applicant understands that the granting of a permit does not include landowner permission to access land or construct a project. Inspections of the project site after notice by inspection authorities are hereby authorized. Refer to section G in the instructions.

APPLICANT (Person responsible for project):
Print Name: Golden Valley County

Dean Blumenthal 12/15/23
Signature of Applicant Date

LANDOWNER:
Print Name: Janet – Cushman Land Trust

12/5/2023
Signature of Landowner Date

*CONTRACTOR'S PRIMARY CONTACT (if applicable):
Print Name: Nate Peressini, P.E.

Nate Peressini 12/20/23
Signature of Contractor/Agent Date

*Contact agency to determine if contractor signature is required.

HYDRAULICS REPORT:

MUSSELSHELL BANK RIVERBANK RESTORATION

OCTOBER 2023

PREPARED FOR

GOLDEN VALLEY COUNTY
107 KEMP STREET
PO BOX 10
RYEGATE, MT 59074

PREPARED BY

STAHLY ENGINEERING
851 BRIDGER DRIVE, SUITE 1
BOZEMAN, MT 59715
(406) 522-8594

Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594
www.seaeng.com

Musselshell Bank Restoration – Musselshell River

Introduction

This report covers the hydraulic study conducted to determine the likelihood of any negative impacts to the floodway by the proposed bank protection project on the Musselshell River just north of Cushman, Montana on Cushman Road off Highway 12 (Section 01, T06N, R21E). The proposed bank protection consists of laying the existing vertical bank back to a 2:1 slope along with the installation of a combination of rock riprap and planted vegetation. The proposed length of the bank protection is just over 400-feet on the south bank of the river and is intended to protect the adjacent agricultural field from continued loss of land from channel bank erosion. The crossing is located at 46°17'55" Latitude and -109°2'11" Longitude. The photo below was taken from Cushman Road looking upstream at the vertical cutbank.

Hydrology

The contributing drainage basin area is over 80 miles long and over 45 miles in width, encompassing nearly 2,649 square miles. The drainage area originates at an elevation of over 8,500 feet, then drops approximately 5,000 feet to the project site. The majority, over 93%, of the drainage basin is located within the Upper Yellowstone-Central Mountain Region (UYCMR) and was delineated and flows were calculated using the USGS StreamStats Application. This application utilizes Montana Regression Equations to calculate peak runoff. A copy of these results is included with this report.

Six miles downstream a river gaging station exists on the Musselshell River near Lavina, Montana, USGS Station Number 06126050. This gaging station was utilized to estimate peak flow runoff at an ungaged site on a gaged stream. The gage adjusted estimate flows calculated within UYCMR were used in the following analysis. Calculations for the gage adjustment are included with this report.

The following is a summary of the peak flows for the drainage basin:

Design Flood	StreamStats UYCMR Flow (cfs)	06126050 Gage Adjusted Flow (cfs)
Q_5	1,990	2,785
Q_{10}	3,800	4,252
Q_{25}	7,250	6,757
Q_{50}	10,700	9,170
Q_{100}	15,000	12,151
Q_{200}	20,100	15,685
Q_{500}	28,200	21,621

Hydraulics

The project is within the area covered by Flood Insurance Rate Map (FIRM) 300152 0570 B, Map Number 30037C0570B. This FIRM became effective on November 5, 2021, well before most of the bank erosion took place at the project location. For this reason, Stahly Engineering personnel completed a topographic site and hydraulic survey in July 2023. The hydraulic survey included 9 hydraulic cross sections throughout the length of the project as well as upstream and downstream. The hydraulic cross sections range from 600-feet upstream and 100-feet downstream of the bridge located on Cushman Road, just downstream of the bank restoration project. At the beginning of this project there is a home structure approximately 100-feet from the existing vertical cut bank. The only additional information used in the model was the existing roadway centerline and hydraulic opening of the mentioned bridge on Cushman Road. An exhibit with the cross sections is included with this report.

The US Army Corps of Engineers Hydrologic Engineering Center – River Analysis Program (HEC-RAS) version 6.4 was utilized to analyze the existing conditions, which does include the downstream 117-foot bearing to bearing single span concrete bridge. Both abutments are comprised of driven steel piles, concrete caps, and 1.5:1 riprap slope. As-built plans for this bridge are included with this report. The purpose of this study is to show that the proposed bank stabilization will cause no adverse impacts upstream or downstream. This will be done by determining a Base Flood Elevation

(BFE) of the existing conditions and comparing it to the proposed conditions. This calculated BFE will also be compared to the BFE elevation provided on the FIRM as a means to verify accuracy of the model.

Information gathered from the previously mentioned site visit, site photos and aerial imagery were used to determine roughness coefficients (Manning's n-values). Outside of the channel the floodplain consists of brush, willows, and some trees. For this reason, the over bank areas were modeled using an n-value of 0.07. The channel is estimated to have an n-value of 0.035 as it is clean and straight but with stones and weeds.

As mentioned previously, the proposed conditions include laying back the vertical cut bank to a slope of 2:1 and armoring the newly sloped bank with rock riprap and planted vegetation for a length of just over 400-feet. It should be noted that during high flows this bank is completely overtopped, therefore the riprap will extend to the top of the newly constructed bank.

Results

The following tables summarize the results for the 100-year base flood for both the existing and proposed conditions. Both the existing and proposed conditions have the same BFE in this location when compared to the FIRM which has an elevation of 3492.2-feet in the middle of the project. A FIRMETTE is included with this report.

X-Section	Reach Length (ft)	100-year Water Surface Elev. (ft)			Channel Velocity (ft/sec)		
		Existing	Proposed	Difference	Existing	Proposed	Difference
600	111	3492.31	3492.31	0	6.77	6.77	0
500	124	3492.46	3492.45	-0.01	4.81	4.82	+0.01
400	155	3492.34	3492.34	0	4.31	4.26	-.05
300	117	3492.28	3492.29	+0.01	3.88	3.77	-0.11
200	93	3492.21	3492.21	0	4.10	4.08	-0.02
100	86	3491.95	3491.95	0	5.73	5.73	0
30	50	3491.29	3491.29	0	7.72	7.72	0
Bridge	-	-	-	-	-	-	-
-30	82	3497.13	3497.13	0	16.09	16.09	0
-100	0	3486.10	3486.10	0	15.95	15.95	0

As expected, the HEC-RAS results show, for all intents and purposes, there is no measurable difference in the flood water elevation or velocity after construction of bank stabilization countermeasures. The slight changes are deemed insignificant given the accuracies of the model itself. The overall purpose of the analysis was to evaluate change in the BFE of the existing and proposed models with the construction of the bank stabilization project. Overall, the proposed project at this location should have no adverse impacts upstream or downstream. Therefore, this project is in accordance with the floodplain regulations set by the State of Montana and Golden Valley County. The results from the HEC-RAS model are included.

Riprap Sizing

Riprap was sized per the Federal Highway Administration Publication Hydraulic Engineering Circular No. 23 “Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance-Third Edition Volume 1.” Riprap sizing calculations used twice the average channel velocity, to account for local effects, the specific gravity of rock riprap, the depth of flow through the channel, along with the abutment type to determine a D50 material size for the riprap. This calculation is included with this report and determined a D50 value of 1.115 feet or Class II riprap.

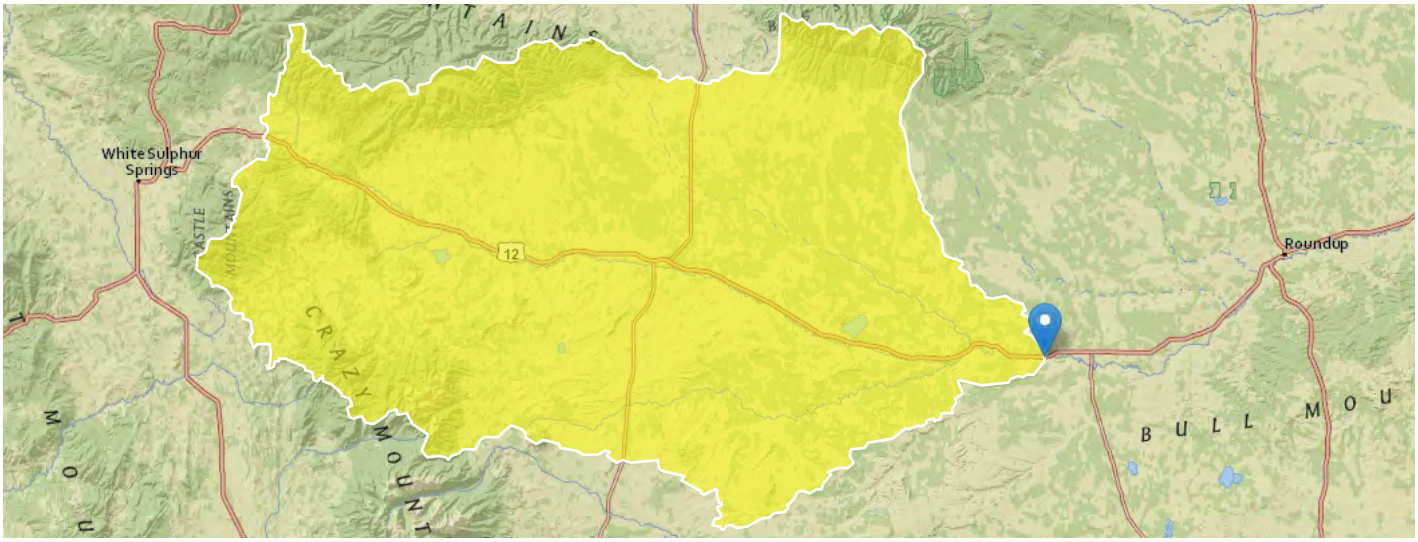
Stahly Engineering & Associates, Inc.

Nate T Peressini, P.E.
Project Engineer

Enclosures:
- Musselshell Bank Restoration StreamStats (6 Pages)
- USGS Station No. 06126050 (32 Pages)
- Hydrology Calculations (1 Page)
- Cross Section Location (1 Page)
- Downstream As-Builts (9 Pages)
- Musselshell FIRMETTE (1 Page)
- HEC-RAS Results (11 Pages)
- Riprap Sizing (1 Page)

Musselshell Bank Restoration - StreamStats Report

Region ID: MT
Workspace ID: MT20231027134714687000
Clicked Point (Latitude, Longitude): 46.29906, -109.03643
Time: 2023-10-27 07:47:39 -0600



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CHANWD_RS	Channel width determined from remotely sensed data sources, including aerial imagery	0	feet
CONTDA	Area that contributes flow to a point on a stream	2649.4	square miles
EL6000	Percent of area above 6000 ft	16.3	percent
ET0306MOD	Spring (March-June) mean monthly evapotranspiration (2001-2011), MODIS	1.39	inches
SLOP30_30M	Percent area with slopes greater than 30 percent from 30-meter DEM.	8.9	percent
WACTCH	Width of active channel	0	feet
WBANKFULL	Width of channel at bankfull	0	feet

Peak-Flow Statistics

Peak-Flow Statistics Parameters [6.8 Percent (181 square miles) EC Plains Region BasinC 2015 5019F]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	2649.4	square miles	0.11	2560
ET0306MOD	Mean_Monthly_EvapTrans_Mar_to_Jun_MODIS	1.39	inches	0.9	1.57
SLOP30_30M	Slopes gt 30pct from 30m DEM	8.9	percent	0	31.9

Peak-Flow Statistics Parameters [93.2 Percent (2470 square miles) UpYellow CentMount Region BasinC 2015 5019F]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	2649.4	square miles	0.39	2040
EL6000	Percent above 6000 ft	16.3	percent	0	100

Peak-Flow Statistics Parameters [6.8 Percent (181 square miles) EC Plains Region Active Channel SIR 2020 5142]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
WACTCH	Width Of Active Channel	0	feet	2	91

Peak-Flow Statistics Parameters [6.8 Percent (181 square miles) EC Plains Region Bankfull SIR 2020 5142]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
WBANKFULL	Width Of Bankfull Channel	0	feet	3.5	220

Peak-Flow Statistics Parameters [6.8 Percent (181 square miles) EC Plains Region Aerial Photo SIR 2020 5142]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CHANWD_RS	Channel_Width_remotely_sensed	0	feet	2.7	47.4

Peak-Flow Statistics Parameters [93.2 Percent (2470 square miles) UpYllw CentMount Region Act Channel SIR 2020 5142]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
WACTCH	Width Of Active Channel	0	feet	1	150

Peak-Flow Statistics Parameters [93.2 Percent (2470 square miles) UpYllw CentMount Region Bankfull SIR 2020 5142]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
WBANKFULL	Width Of Bankfull Channel	0	feet	2.5	170

Peak-Flow Statistics Parameters [93.2 Percent (2470 square miles) UpYllw CentMount Region Aerial Photo SIR 2020 5142]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CHANWD_RS	Channel_Width_remotely_sensed	0	feet	2.3	191.9

Peak-Flow Statistics Disclaimers [6.8 Percent (181 square miles) EC Plains Region BasinC 2015 5019F]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [6.8 Percent (181 square miles) EC Plains Region BasinC 2015 5019F]

Statistic	Value	Unit
66.7-percent AEP flood	323	ft^3/s
50-percent AEP flood	573	ft^3/s
42.9-percent AEP flood	743	ft^3/s
20-percent AEP flood	1990	ft^3/s
10-percent AEP flood	3800	ft^3/s
4-percent AEP flood	7250	ft^3/s
2-percent AEP flood	10700	ft^3/s
1-percent AEP flood	15000	ft^3/s
0.5-percent AEP flood	20100	ft^3/s
0.2-percent AEP flood	28200	ft^3/s

Peak-Flow Statistics Disclaimers [93.2 Percent (2470 square miles) UpYellow CentMount Region BasinC 2015 5019F]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [93.2 Percent (2470 square miles) UpYellow CentMount Region BasinC 2015 5019F]

Statistic	Value	Unit
66.7-percent AEP flood	3670	ft^3/s
50-percent AEP flood	4580	ft^3/s

Statistic	Value	Unit
42.9-percent AEP flood	5160	ft^3/s
20-percent AEP flood	8540	ft^3/s
10-percent AEP flood	12200	ft^3/s
4-percent AEP flood	17500	ft^3/s
2-percent AEP flood	21600	ft^3/s
1-percent AEP flood	25700	ft^3/s
0.5-percent AEP flood	29900	ft^3/s
0.2-percent AEP flood	35600	ft^3/s

Peak-Flow Statistics Disclaimers [6.8 Percent (181 square miles) EC Plains Region Active Channel SIR 2020 5142]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [6.8 Percent (181 square miles) EC Plains Region Active Channel SIR 2020 5142]

Statistic	Value	Unit
Active chan width 66.7 percent AEP flood	0	ft^3/s
Active Channel Width 50-percent AEP flood	0	ft^3/s
Active chan width 42.9 percent AEP flood	0	ft^3/s
Active Channel Width 20-percent AEP flood	0	ft^3/s
Active Channel Width 10-percent AEP flood	0	ft^3/s
Active Channel Width 4-percent AEP flood	0	ft^3/s
Active Channel Width 2-percent AEP flood	0	ft^3/s
Active Channel Width 1-percent AEP flood	0	ft^3/s
Active Channel Width 0.5-percent AEP flood	0	ft^3/s
Active Channel Width 0.2-percent AEP flood	0	ft^3/s

Peak-Flow Statistics Disclaimers [6.8 Percent (181 square miles) EC Plains Region Bankfull SIR 2020 5142]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [6.8 Percent (181 square miles) EC Plains Region Bankfull SIR 2020 5142]

Statistic	Value	Unit
Bankfull width 66.7 percent AEP flood	0	ft^3/s
Bankfull Width 50-percent AEP flood	0	ft^3/s
Bankfull width 42.9 percent AEP flood	0	ft^3/s
Bankfull Width 20-percent AEP flood	0	ft^3/s
Bankfull Width 10-percent AEP flood	0	ft^3/s
Bankfull Width 4-percent AEP flood	0	ft^3/s
Bankfull Width 2-percent AEP flood	0	ft^3/s
Bankfull Width 1-percent AEP flood	0	ft^3/s
Bankfull Width 0.5-percent AEP flood	0	ft^3/s
Bankfull Width 0.2-percent AEP flood	0	ft^3/s

Peak-Flow Statistics Disclaimers [6.8 Percent (181 square miles) EC Plains Region Aerial Photo SIR 2020 5142]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [6.8 Percent (181 square miles) EC Plains Region Aerial Photo SIR 2020 5142]

Statistic	Value	Unit
Rem sens chan width 66.7 percent AEP fld	0	ft^3/s
Rem_sens_chan_width_50_percent_AEP_flood	0	ft^3/s
Rem sens chan width 42.9 percent AEP fld	0	ft^3/s
Rem_sens_chan_width_20_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_10_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_4_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_2_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_1_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_0_5_pct_AEP_flood	0	ft^3/s
Rem_sens_chan_width_0_2_pct_AEP_flood	0	ft^3/s

Peak-Flow Statistics Disclaimers [93.2 Percent (2470 square miles) UpYllw CentMount Region Act Channel SIR 2020 5142]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [93.2 Percent (2470 square miles) UpYllw CentMount Region Act Channel SIR 2020 5142]

Statistic	Value	Unit
Active chan width 66.7 percent AEP flood	0	ft^3/s
Active Channel Width 50-percent AEP flood	0	ft^3/s
Active chan width 42.9 percent AEP flood	0	ft^3/s
Active Channel Width 20-percent AEP flood	0	ft^3/s
Active Channel Width 10-percent AEP flood	0	ft^3/s
Active Channel Width 4-percent AEP flood	0	ft^3/s
Active Channel Width 2-percent AEP flood	0	ft^3/s
Active Channel Width 1-percent AEP flood	0	ft^3/s
Active Channel Width 0.5-percent AEP flood	0	ft^3/s
Active Channel Width 0.2-percent AEP flood	0	ft^3/s

Peak-Flow Statistics Disclaimers [93.2 Percent (2470 square miles) UpYllw CentMount Region Bankfull SIR 2020 5142]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [93.2 Percent (2470 square miles) UpYllw CentMount Region Bankfull SIR 2020 5142]

Statistic	Value	Unit
Bankfull width 66.7 percent AEP flood	0	ft^3/s
Bankfull Width 50-percent AEP flood	0	ft^3/s
Bankfull width 42.9 percent AEP flood	0	ft^3/s
Bankfull Width 20-percent AEP flood	0	ft^3/s
Bankfull Width 10-percent AEP flood	0	ft^3/s
Bankfull Width 4-percent AEP flood	0	ft^3/s
Bankfull Width 2-percent AEP flood	0	ft^3/s
Bankfull Width 1-percent AEP flood	0	ft^3/s
Bankfull Width 0.5-percent AEP flood	0	ft^3/s
Bankfull Width 0.2-percent AEP flood	0	ft^3/s

Peak-Flow Statistics Disclaimers [93.2 Percent (2470 square miles) UpYllw CentMount Region Aerial Photo SIR 2020 5142]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [93.2 Percent (2470 square miles) UpYllw CentMount Region Aerial Photo SIR 2020 5142]

Statistic	Value	Unit
Rem sens chan width 66.7 percent AEP fld	0	ft^3/s
Rem_sens_chan_width_50_percent_AEP_flood	0	ft^3/s
Rem sens chan width 42.9 percent AEP fld	0	ft^3/s
Rem_sens_chan_width_20_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_10_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_4_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_2_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_1_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_0_5_pct_AEP_flood	0	ft^3/s
Rem_sens_chan_width_0_2_pct_AEP_flood	0	ft^3/s

Peak-Flow Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
66.7-percent AEP flood	3440	ft^3/s
50-percent AEP flood	4310	ft^3/s
42.9-percent AEP flood	4860	ft^3/s
20-percent AEP flood	8090	ft^3/s
10-percent AEP flood	11600	ft^3/s
4-percent AEP flood	16800	ft^3/s
2-percent AEP flood	20900	ft^3/s
1-percent AEP flood	25000	ft^3/s
0.5-percent AEP flood	29200	ft^3/s
0.2-percent AEP flood	35100	ft^3/s
Active chan width 66.7 percent AEP flood	0	ft^3/s
Active Channel Width 50-percent AEP flood	0	ft^3/s
Active chan width 42.9 percent AEP flood	0	ft^3/s
Active Channel Width 20-percent AEP flood	0	ft^3/s
Active Channel Width 10-percent AEP flood	0	ft^3/s
Active Channel Width 4-percent AEP flood	0	ft^3/s
Active Channel Width 2-percent AEP flood	0	ft^3/s
Active Channel Width 1-percent AEP flood	0	ft^3/s
Active Channel Width 0.5-percent AEP flood	0	ft^3/s
Active Channel Width 0.2-percent AEP flood	0	ft^3/s
Bankfull width 66.7 percent AEP flood	0	ft^3/s
Bankfull Width 50-percent AEP flood	0	ft^3/s
Bankfull width 42.9 percent AEP flood	0	ft^3/s
Bankfull Width 20-percent AEP flood	0	ft^3/s
Bankfull Width 10-percent AEP flood	0	ft^3/s
Bankfull Width 4-percent AEP flood	0	ft^3/s
Bankfull Width 2-percent AEP flood	0	ft^3/s
Bankfull Width 1-percent AEP flood	0	ft^3/s

Statistic	Value	Unit
Bankfull Width 0.5-percent AEP flood	0	ft^3/s
Bankfull Width 0.2-percent AEP flood	0	ft^3/s
Rem sens chan width 66.7 percent AEP fld	0	ft^3/s
Rem_sens_chan_width_50_percent_AEP_flood	0	ft^3/s
Rem sens chan width 42.9 percent AEP fld	0	ft^3/s
Rem_sens_chan_width_20_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_10_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_4_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_2_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_1_percent_AEP_flood	0	ft^3/s
Rem_sens_chan_width_0_5_pct_AEP_flood	0	ft^3/s
Rem_sens_chan_width_0_2_pct_AEP_flood	0	ft^3/s

Peak-Flow Statistics Citations

Sando, Roy, Sando, S.K., McCarthy, P.M., and Dutton, D.M.,2016, Methods for estimating peak-flow frequencies at ungaged sites in Montana based on data through water year 2011: U.S. Geological Survey Scientific Investigations Report 2015–5019–F, 30 p. (https://doi.org/10.3133/sir20155019)

Chase, K.J., Sando, R., Armstrong, D.W., and McCarthy, P., 2021, Regional regression equations based on channel-width characteristics to estimate peak-flow frequencies at ungaged sites in Montana using peak-flow frequency data through water year 2011 (ver. 1.1, September 2021): U.S. Geological Survey Scientific Investigations Report 2020–5142, 49 p. (https://doi.org/10.3133/sir20205142)

Channel-width Methods Weighting

No method weighting results returned.

Application Version: 4.18.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

StreamStats Data-Collection Station Report

Gage Information

Name	Value
USGS Station Number	**06126050 (https://waterdata.usgs.gov/monitoring-location/06126050)**
Station Name	Musselshell River near Lavina MT
Station Type	Gaging Station, continuous record
Latitude	46.29231
Longitude	-108.89270833
NWIS Latitude	46.29231389
NWIS Longitude	-108.8927083
Is regulated?	true
Agency	United States Geological Survey
NWIS Discharge Period of Record	03/27/1992 - 10/29/2011

Physical Characteristics

Filter By Statistic Group: Select Filter By Citation: Select

Basin Dimensional Characteristics

Characteristic Name	Value	Units	Citation
Compactness Ratio	2.14646300466	dimensionless	**157**
Contributing Drainage Area	2947	square miles	**157**
Drainage Area	2970	square miles	**193**
Basin Perimeter	413.03313042	miles	**157**

Precipitation Statistics

Characteristic Name	Value	Units	Citation
Mean Annual Precipitation	17.7094534327	inches	**157**

Land Cover Characteristics

Characteristic Name	Value	Units	Citation
Percent_Forest_from_NLCD2001	14	percent	**157**
LC01CRPHAY	16.3469535931	percent	**157**

Characteristic Name	Value	Units	Citation
LC01WETLND	2.30786904132	percent	**157**
Percent_Developed_from_NLCD2001	0.874267158758	percent	**157**
IRRIGAT_MT	2.45249122383	percent	**157**
LAKESNHDH	0.218867545329	percent	**157**

Topographical Characteristics

Characteristic Name	Value	Units	Citation
Percent_above_5000_ft	40.3409318754	percent	**157**
Percent above 6000 ft	15	percent	**157**
Latitude of Basin Centroid	46.41191	decimal degrees	**157**
Longitude of Basin Centroid	-109.84329	decimal degrees	**157**
Maximum Basin Elevation	9243.6594452	feet	**157**
Mean Basin Elevation	4978.40184739	feet	**157**
Minimum Basin Elevation	3402.82342516	feet	**157**
Relief	5840.83602004	feet	**157**
N Facing Slopes gt 30pct from 30m DEM	3	percent	**157**
Slopes gt 30pct from 30m DEM	8	percent	**157**
Mean Basin Slope from 30m DEM	10.622584	percent	**157**
Percent_Above_7000_ft	4.59352934266	feet	**157**
Slopes_gt_50pct_from_30m_DEM	2	percent	**157**
Percent_above_5500_ft	24.9902460818	feet	**157**
Percent_above_6500_ft	8.68559878207	feet	**157**
Percent_Upstream_Reservoirs_2011	14.23	percent	**157**

Temperature Statistics

Characteristic Name	Value	Units	Citation
Mean Annual Temperature	41.9457596	degrees F	**157**
Mean April Temperature	40.4268188	degrees F	**157**
Mean AugustTemperature	62.886506	degrees F	**157**
Mean January Temperature	21.9347222	degrees F	**157**
Mean February Temperature	26.1207446	degrees F	**157**
Mean March Temperature	32.1442709	degrees F	**157**
Mean May Temperature	49.0439606	degrees F	**157**
Mean June Temperature	57.280424	degrees F	**157**

Characteristic Name	Value	Units	Citation
Mean July Temperature	63.54266	degrees F	**157**
Mean September Temperature	53.124458	degrees F	**157**
Mean October Temperature	43.4042618	degrees F	**157**
Mean November Temperature	30.28373942	degrees F	**157**
Mean December Temperature	23.2300544	degrees F	**157**

Climate Characteristics

Characteristic Name	Value	Units	Citation
Mean_Monthly_EvapTrans_Mar_to_Jun_MODIS	1.36597	inches	**157**
ET0710MOD	0.921889	inches	**157**

Streamflow Statistics Filter By Statistic Group: Select Filter By Citation: Select Show Only Preferred

Peak-Flow Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Weighted 66.7-percent AEP flood	966	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Weighted 20-percent AEP flood	3020	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.
Weighted 10-percent AEP flood	4580	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Weighted 4-percent AEP flood	7230	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.
Weighted 2-percent AEP flood	9770	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Weighted 1-percent AEP flood	12900	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.
Weighted 0.5-percent AEP flood	16600	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Weighted 0.2-percent AEP flood	22800	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.
Weighted 42.9-percent AEP flood	1650	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Weighted 50-percent AEP flood	1410	cubic feet per second	✓	71					**159**	Statistic Date Range 10/1/1940 - 9/30/2011 Other Remarks Peak flow frequency estimates using mixed-station record extension. Peak-flow records were synthesized for 72 percent of record for water years 1941-2011.
Regulated 50-percent AEP flood	854	cubic feet per second	✓	20			626	1150	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 66.7-percent AEP flood	629	cubic feet per second	✓	20			441	842	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Regulated 42.9-percent AEP flood	976	cubic feet per second	✓	20			730	1330	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 20-percent AEP flood	1760	cubic feet per second	✓	20			1300	2610	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 10-percent AEP flood	2730	cubic feet per second	✓	20			1930	4530	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 4-percent AEP flood	4590	cubic feet per second	✓	20			3010	8920	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Regulated 2-percent AEP flood	6610	cubic feet per second	✓	20			4070	14500	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 1-percent AEP flood	9370	cubic feet per second	✓	20			5420	23000	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 0.5-percent AEP flood	13100	cubic feet per second	✓	20			7120	36100	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Regulated 0.2-percent AEP flood	20100	cubic feet per second	✓	20			10000	64200	**147**	Statistic Date Range 10/1/1991 - 9/30/2011 Other Remarks Analysis period of record considered regulated
Controlled Peak Years with Historic adj	0.135	years							**147**	

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Log_Mean_of_Controlled_Annual_Peaks	2.978	Log base 10							**147**	
Log_Skew_of_Controlled_Annual_Peaks	1.385	Log base 10							**147**	
Regional_Skew_of_Controlled_Peaks	66	Log base 10							**147**	
Log_STD_of_Controlled_Annual_Peaks	0.342	Log base 10							**147**	

Base Flow Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Number of years to compute BFI	7	years	✓	7		**87**	
Average BFI value	0.552	dimensionless	✓	7		**87**	
Std dev of annual BFI values	0.099	dimensionless	✓	7		**87**	

April Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_April_1_Percent_Duration	718	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_April_2_Percent_Duration	585	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_5_Percent_Duration	398	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_10_Percent_Duration	229	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_20_Percent_Duration	129	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_30_Percent_Duration	64	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_40_Percent_Duration	49	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_50_Percent_Duration	34	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_60_Percent_Duration	27	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_70_Percent_Duration	20	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_80_Percent_Duration	14	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_April_90_Percent_Duration	7.1	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_95_Percent_Duration	3.7	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_98_Percent_Duration	1.7	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_99_Percent_Duration	1.1	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

May Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_May_1_Percent_Duration	1710	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_2_Percent_Duration	1550	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_5_Percent_Duration	890	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_10_Percent_Duration	644	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_May_20_Percent_Duration	342	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_30_Percent_Duration	266	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_40_Percent_Duration	222	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_50_Percent_Duration	178	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_60_Percent_Duration	137	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_70_Percent_Duration	96	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_80_Percent_Duration	64	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_90_Percent_Duration	32	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_95_Percent_Duration	16	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_98_Percent_Duration	6.7	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_May_99_Percent_Duration	3.5	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

June Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_June_1_Percent_Duration	3740	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_2_Percent_Duration	3130	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_5_Percent_Duration	1660	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_10_Percent_Duration	1120	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_20_Percent_Duration	437	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_30_Percent_Duration	341	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_40_Percent_Duration	244	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_June_50_Percent_Duration	197	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_60_Percent_Duration	160	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_70_Percent_Duration	124	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_80_Percent_Duration	87	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_90_Percent_Duration	50	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_95_Percent_Duration	32	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_98_Percent_Duration	21	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_99_Percent_Duration	17	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

July Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_July_1_Percent_Duration	1390	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_2_Percent_Duration	1190	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_5_Percent_Duration	853	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_10_Percent_Duration	540	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_20_Percent_Duration	365	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_30_Percent_Duration	306	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_40_Percent_Duration	261	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_50_Percent_Duration	233	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_60_Percent_Duration	207	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_70_Percent_Duration	168	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_July_80_Percent_Duration	106	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_90_Percent_Duration	48	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_95_Percent_Duration	27	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_98_Percent_Duration	15	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_99_Percent_Duration	11	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

August Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_August_1_Percent_Duration	617	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_2_Percent_Duration	556	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_5_Percent_Duration	440	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_August_10_Percent_Duration	378	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_20_Percent_Duration	259	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_30_Percent_Duration	221	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_40_Percent_Duration	191	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_50_Percent_Duration	159	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_60_Percent_Duration	118	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_70_Percent_Duration	65	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_80_Percent_Duration	23	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_90_Percent_Duration	12	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_95_Percent_Duration	5.9	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_August_98_Percent_Duration	2.4	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_99_Percent_Duration	1.2	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

September Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_September_1_Percent_Duration	654	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_2_Percent_Duration	588	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_5_Percent_Duration	414	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_10_Percent_Duration	289	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_20_Percent_Duration	186	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_September_30_Percent_Duration	142	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_40_Percent_Duration	96	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_50_Percent_Duration	71	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_60_Percent_Duration	48	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_70_Percent_Duration	24	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_80_Percent_Duration	16	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_90_Percent_Duration	7.7	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_95_Percent_Duration	3.5	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_September_98_Percent_Duration	0.93	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_99_Percent_Duration	0.09	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

October Flow-Duration Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_October_1_Percent_Duration	385	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_2_Percent_Duration	347	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_5_Percent_Duration	277	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_10_Percent_Duration	159	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_20_Percent_Duration	126	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_30_Percent_Duration	94	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_October_40_Percent_Duration	73	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_50_Percent_Duration	58	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_60_Percent_Duration	47	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_70_Percent_Duration	35	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_80_Percent_Duration	15	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_90_Percent_Duration	7.1	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_95_Percent_Duration	3.4	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_98_Percent_Duration	1.1	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_99_Percent_Duration	0.33	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Seasonal Flow Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Jul_to_Oct_1_Day_2_Yr_Low_Flow_Ctrld	22.9	cubic feet per second	✓	0			8.78	64.8	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_1_Day_5_Yr_Low_Flow_Ctrld	1.4	cubic feet per second	✓	0			0.32	3.92	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_1_Day_10_Yr_Low_Flow_Ctrld	0.11	cubic feet per second	✓	0			0.01	0.46	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_1_Day_20_Yr_Low_Flow_Ctrld	0	cubic feet per second	✓	0					**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Jul_to_Oct_3_Day_2_Yr_Low_Flow_Ctrld	23.8	cubic feet per second	✓	0			9.87	60.9	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_3_Day_5_Yr_Low_Flow_Ctrld	1.92	cubic feet per second	✓	0			0.49	4.93	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_3_Day_10_Yr_Low_Flow_Ctrld	0.22	cubic feet per second	✓	0			0.03	0.77	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_3_Day_20_Yr_Low_Flow_Ctrld	0	cubic feet per second	✓	0					**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Jul_to_Oct_7_Day_2_Yr_Low_Flow_Ctrld	26.2	cubic feet per second	✓	0			11.4	63.4	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_7_Day_5_Yr_Low_Flow_Ctrld	2.49	cubic feet per second	✓	0			0.68	6.09	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_7_Day_10_Yr_Low_Flow_Ctrld	0.34	cubic feet per second	✓	0			0.05	1.12	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_7_Day_20_Yr_Low_Flow_Ctrld	0	cubic feet per second	✓	0					**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Jul_to_Oct_20_Day_2_Yr_Low_Flow_Ctrld	34.9	cubic feet per second	✓	0			15.1	86.8	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_20_Day_5_Yr_Low_Flow_Ctrld	5.1	cubic feet per second	✓	0			1.66	11.9	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_20_Day_10_Yr_Low_Flow_Ctrld	1.43	cubic feet per second	✓	0			0.32	3.79	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_20_Day_20_Yr_Low_Flow_Ctrld	0.43	cubic feet per second	✓	0			0.06	1.37	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Jul_to_Oct_30_Day_2_Yr_Low_Flow_Ctrld	38.3	cubic feet per second	✓	0			18.1	86.5	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_30_Day_5_Yr_Low_Flow_Ctrld	6.87	cubic feet per second	✓	0			2.49	14.7	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_30_Day_10_Yr_Low_Flow_Ctrld	2.25	cubic feet per second	✓	0			0.59	5.41	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_30_Day_20_Yr_Low_Flow_Ctrld	0.8	cubic feet per second	✓	0			0.15	2.24	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Variance	Lower 90% Prediction Interval	Upper 90% Prediction Interval	Citation	Comments
Jul_to_Oct_14_Day_10_Yr_Low_Flow_Ctrld	0.91	cubic feet per second	✓	0			0.18	2.66	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_14_Day_20_Yr_Low_Flow_Ctrld	0.23	cubic feet per second	✓	0			0.03	0.84	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_14_Day_2_Yr_Low_Flow_Ctrld	32	cubic feet per second	✓	0			12.8	88.2	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Jul_to_Oct_14_Day_5_Yr_Low_Flow_Ctrld	3.82	cubic feet per second	✓	0			1.12	9.72	**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Monthly Flow Statistics

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_April_Mean_Flow	86	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_Mean_Flow	267	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_June_Mean_Flow	429	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_Mean_Flow	284	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_Mean_Flow	170	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_Mean_Flow	116	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_Mean_Flow	79	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_April_STD	119	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_May_STD	222	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Statistic Name	Value	Units	Preferred?	Years of Record	Standard Error, percent	Citation	Comments
Controlled_June_STD	624	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_July_STD	239	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_August_STD	142	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_September_STD	134	cubic feet per second	✓	18		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.
Controlled_October_STD	80	cubic feet per second	✓	17		**161**	Statistic Date Range 10/1/1991 - 9/30/2008 Other Remarks Analysis period of record considered regulated.

Citations

ID	Citation
157	**McCarthy, P.M., Sando, Roy, Sando, S.K., and Dutton, D.M., 2016, Methods for estimating streamflow characteristics at ungaged sites in western Montana based on data through water year 2009: U.S. Geological Survey Scientific Investigations Report 2015–5019–G, 19 p. (https://doi.org/10.3133/sir20155019)**
193	**Imported from NWIS file (http://waterdata.usgs.gov/nwis/si)**
159	**Sando, S.K., Sando, Roy, McCarthy, P.M., and Dutton, D.M., 2016, Adjusted peak-flow frequency estimates for selected streamflow-gaging stations in or near Montana based on data through water year 2011: U.S. Geological Survey Scientific Investigations Report 2015–5019–D, 12 p. (https://doi.org/10.3133/sir20155019)**
87	**Wolock, D.M., 2003, Base-flow index grid for the conterminous United States: U.S. Geological Survey Open-File Report 03-263, digital data set (https://water.usgs.gov/GIS/metadata/usgswrd/XML/bfi48grd.xml)**
147	**Sando, S.K., McCarthy, P.M., and Dutton, D.M., 2016, Peak-flow frequency analyses and results based on data through water year 2011 for selected streamflow-gaging stations in or near Montana: U.S. Geological Survey Scientific Investigations Report 2015–5019–C, 27 p. (https://doi.org/10.3133/sir20155019https://doi.org/10.3133/sir20155019)**

ID	Citation
161	**McCarthy, P.M., 2016, Streamflow characteristics based on data through water year 2009 for selected streamflow-gaging stations in or near Montana: U.S. Geological Survey Scientific Investigations Report 2015–5019–E, 10 p. (https://doi.org/10.3133/sir20155019)**

ESTIMATING FLOOD FREQUENCY ON GAGED STREAMS
Methods for Estimating Flood Frequency in Montana Based on Data through Water Year 2011
Ungaged Sites on Gaged Streams
Musselshell Bank Restoration
Upper Yellowstone-Central Mountain Region

PEAK FLOW EVENT	WEIGHTED GAGE (CFS)	exp_T	UNGAGED (CFS)
Q2	-	0.896	-
Q5	3020	0.761	2785
Q10	4580	0.697	4252
Q25	7230	0.634	6757
Q50	9770	0.595	9170
Q100	12900	0.561	12151
Q200	16600	0.532	15685
Q500	22800	0.498	21621

Drainage area at ungaged	2649	Square Miles
Drainage area of gage	2947	Square Miles

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS

www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

MUSSELSHELL BANK RESTORATION
CROSS SECTION LOCATION

GOLDEN VALLEY COUNTY,
MONTANA

DESIGNED: NTP
DRAWN: NTP
CHECKED: KLT
DATE: 10-27-2023

SHEET
1

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B1

AS-BUILTS

MONTANA
DEPARTMENT OF TRANSPORTATION

BRIDGE PLANS AND QUANTITIES

FEDERAL AID PROJECT NO. BR 9019(11) P.E.
BR 9019(12) CONSTRUCTION

MUSSELSHELL R - 2 KM NE OF CUSHMAN

GOLDEN VALLEY COUNTY

LIST OF DRAWINGS

SHEET NO.	DWG. NO.	TITLE
B2	21231	GENERAL LAYOUT AT STA. 12+08.00
B3	21232	FOOTING PLAN
B4	21233	BENTS NO. 1 & NO. 2
B5	21234	BENT DETAILS
B6	21235	SLAB DETAILS AND ERECTION PLAN
B7	21236	TYPE MTS PRESTRESSED CONCRETE BEAM
B8	21237	SLAB AND DIAPHRAGM DETAILS FOR TYPE MTS BEAM
B9	SBR-W740 (REVISED 2-1-11)	STANDARD BRIDGE RAIL TYPE W740

ESTIMATED BRIDGE PLAN QUANTITIES

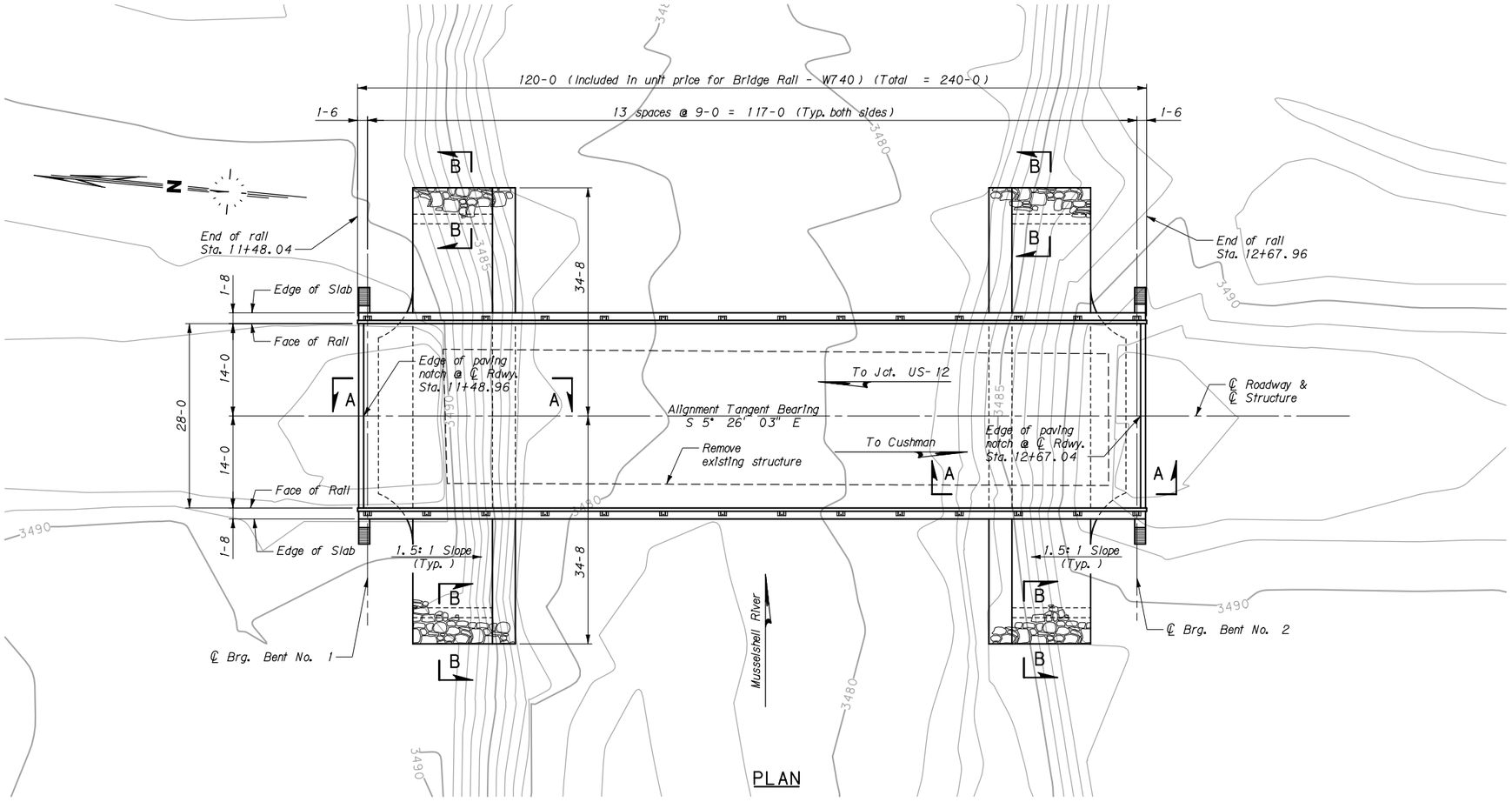
BRIDGE I.D. NUMBER L19203026+0.2001 LOCATION	LENGTH IN FEET	PRESTRESSED BEAMS TYPE MTS-54 (LN. FT.)	TRANSVERSE DECK GROOVING (YD^2)	CLASS SD CONCRETE (YD^3)	CLASS DD-BRIDGE CONCRETE (YD^3)	REINFORCING STEEL		16" X 1/2" WALL THICKNESS STEEL PIPE PILES		PILE CUTTING SHOE (EACH)	PILE - PREBORE (LN. FT.)	DYNAMIC LOAD TEST (EACH)	BRIDGE RAIL W740 (LN. FT.)
						REGULAR (LB)	EPOXY (LB)	FURNISH (LN. FT.)	DRIVE (LN. FT.)				
BENT NO. 1					26.0	2068	402	95	*29*	4	*77*	1	
BENT NO. 2					26.0	2068	402	131	*109*	4			
SUPERSTRUCTURE	117	468	*339.6*	132.5	3.8		19623						240
TOTAL	117	468	*339.6*	132.5	55.8	4136	20427	226	*138*	8	*77*	1	240

MDT MONTANA DEPARTMENT OF TRANSPORTATION

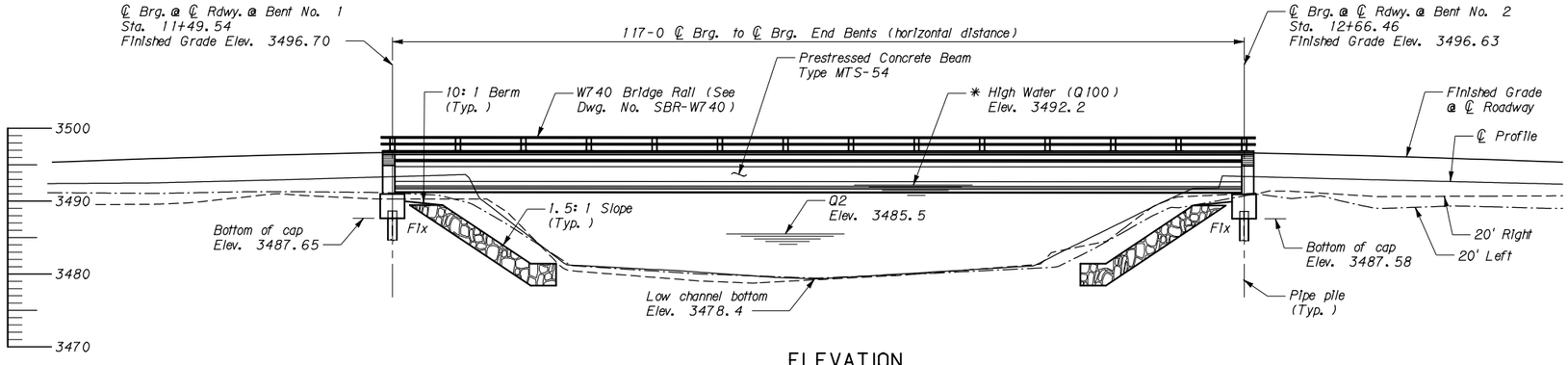
PREPARED	6-23-11	G. J. N.	...\AB\5166000BRQSH001AB.DGN		UPN NUMBER 5166000
CHECKED	6-30-11	J. S. O.	u2435	5/11/2017 12:40:15 PM	DRAWING NO. 21231Q

AS-BUILTS

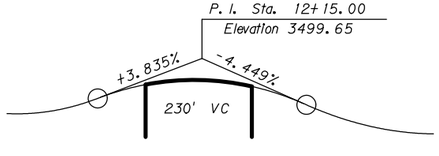
STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B2



PLAN



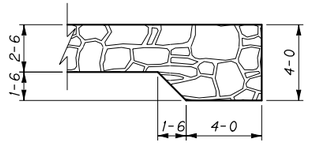
ELEVATION



PROFILE GRADE
No Scale

NOTE: Water Surface on date of survey Elev. 3480.5 (5-31-07)

NOTE: Top of Riprap elevation is 3489.39 except as shown in Section A-A.



SECTION B-B
Scale: 1/4" = 1'-0"

STREAM DATA

Drift:	Light
Contraction Scour (Q100):	0.0'
Ice:	None
Drainage Area:	2673 sq. mi.
2-year Stage (Q2):	3485.5
Base Flood Flow (Q100):	11,200 cfs
Base Flood Stage:	3492.2
* Base Flood Velocity:	8.44 fps
Low Beam Elevation:	3491.0

Also see Hydraulic Data Summary sheet.
Base Flood Stage elevation includes backwater
*

NOTES

FINISHED GRADE: Finished grade of bridge at centerline roadway is the same as the Profile Grade shown on Road Plans.

LIVE LOAD: Standard HL-93 loading.

SPECIFICATIONS: Montana Department of Transportation and the Montana Transportation Commission Standard Specifications for Road and Bridge Construction, 2006 edition, and any amendments thereto, and the Special Provisions govern unless otherwise noted. The design was prepared in accordance with AASHTO LRFD Bridge Design Specifications, Fourth edition - 2007 with 2008 Interim revisions.

REINFORCING STEEL: Use new deformed type reinforcing steel meeting the requirements of AASHTO M 31 Grade 60. Include all costs associated with furnishing and placing new reinforcing steel in the unit price bid for either Reinforcing Steel or Reinforcing Steel - Epoxy Coated.

CAST IN PLACE CONCRETE: Unless otherwise approved or specified, use Class DD-Bridge for all substructure concrete and Class SD for all superstructure concrete.

CONCRETE STRENGTH: Use f'c = 4000 p.s.i. for Class DD-Bridge concrete. Use f'c = 4000 p.s.i. for Class SD concrete.

STRUCTURE EXCAVATION: Include structure excavation in the unit price bid for Class DD-Bridge concrete.

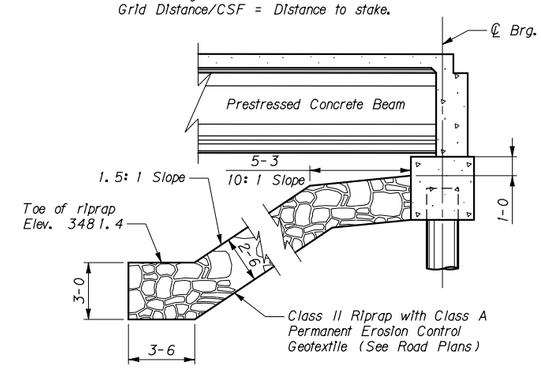
TRAFFIC CONTROL PLAN AND SEQUENCE OF OPERATIONS: See Special Provisions.

UTILITIES: Call 1-800-424-5555 for utility locates at least two working days prior to starting any construction activity that could disturb the utility.

EXISTING STRUCTURE: Remove the existing structure (see Road Plans sheets and Special Provisions).

STATE PLANE COORDINATES: Stations shown on the bridge plans are state plane grid stations based on state plane coordinates (NAD83-1992). Dimensions shown on the bridge plans are horizontal ground distances and not state plane grid distances. The combination scale factor (CSF) at this locations is 0.99930361.

Horizontal ground distance x CSF = Grid Distance
Grid Distance/CSF = Distance to stake.



SECTION A-A
Scale: 1/4" = 1'-0"

Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL RIVER - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019(12)

GOLDEN VALLEY COUNTY

GENERAL LAYOUT

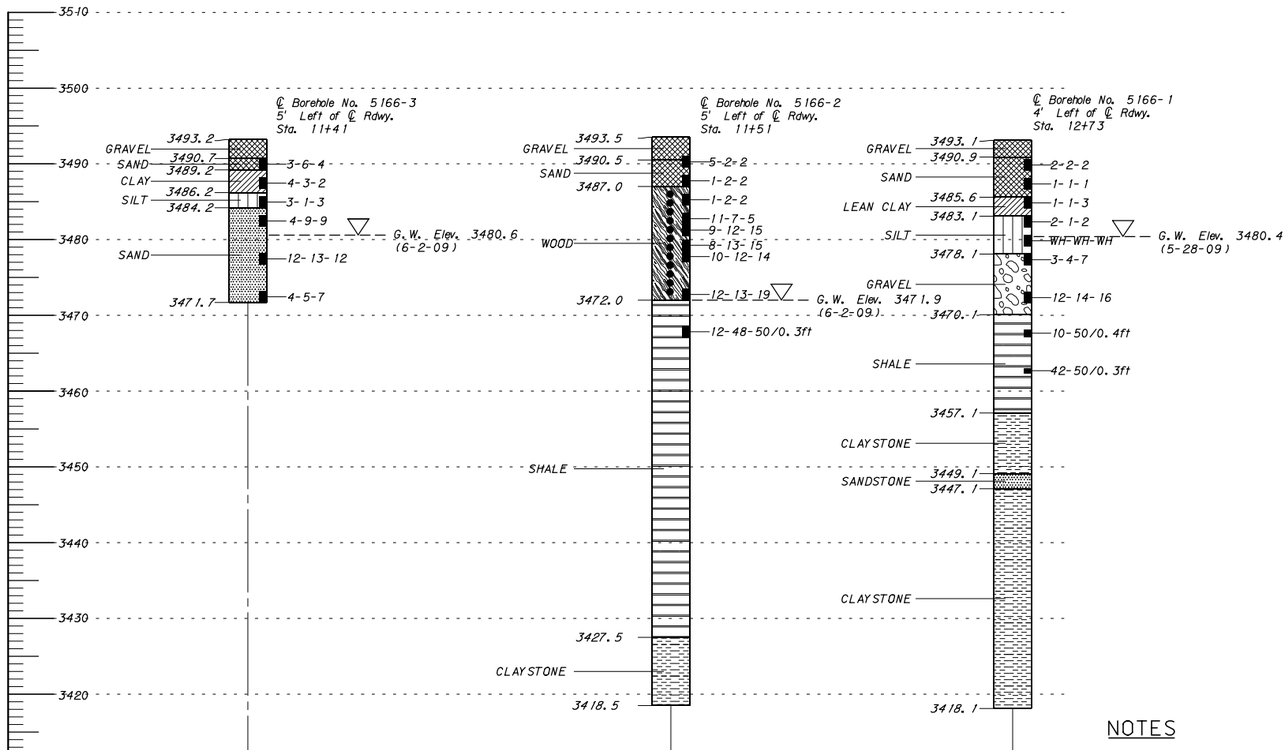
Scale: 1" = 10'-0" (Except as noted)

DESIGNED	5/21/09	J. A. N.
DRAWN	7/20/09	L. D. C.
CHECKED	6/30/11	J. S. O.
APPROVED	7/1/11	K. M. B.
REVISED		
REVISED		
REVISED		
REVISED		

...\AB\5166000BRGEN001AB.DGN UPN NUMBER 5166000
u2435 5/11/2017 12:39:41 PM DRAWING NO. 21231

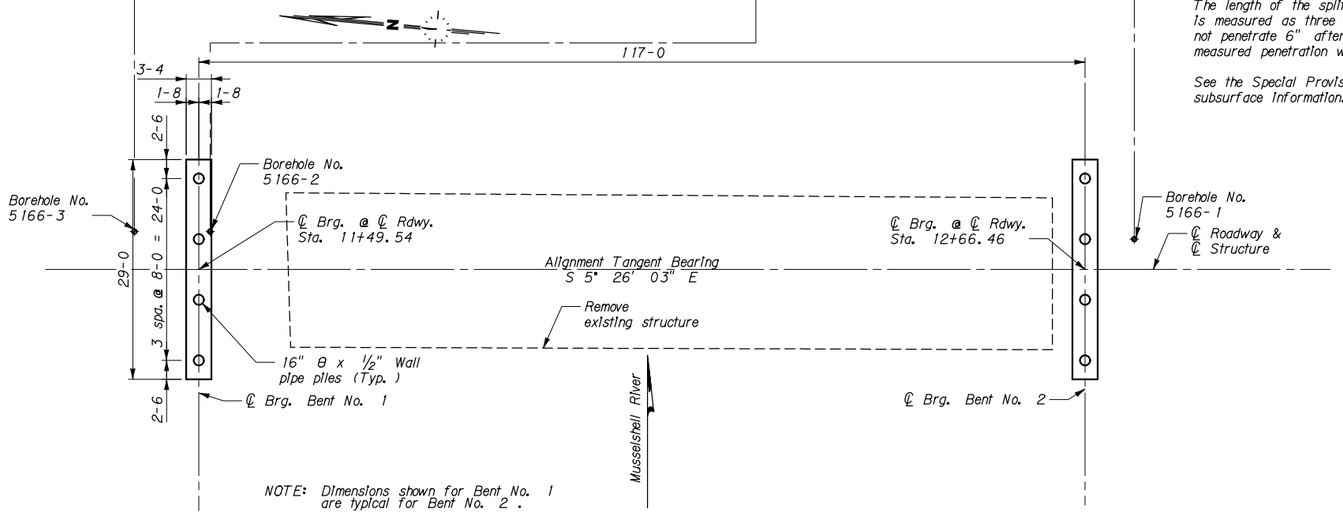
AS BUILTS

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019 (12)	B3



SUMMARY OF LOG OF BORINGS

Scale ~ 1" = 10'-0"



NOTE: Dimensions shown for Bent No. 1 are typical for Bent No. 2.

PLAN

Scale ~ 1" = 10'-0"

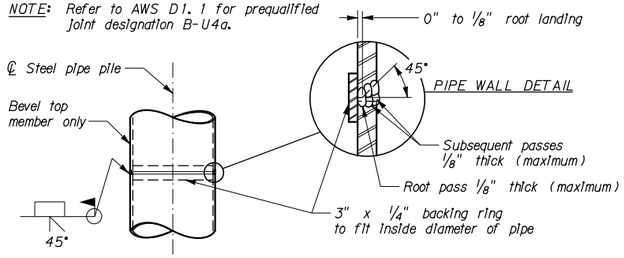
NOTES

SOILS AND FOUNDATION MATERIAL: The Footing Plan shows points where the State of Montana, Department of Transportation, drilled boreholes.

The series of numbers on the Log of Borings shows the number of blows from a 140 pound hammer with a 30" drop required to drive a 2" split spoon sampler 6" (Standard Penetration Test). The length of the split spoon sampler is 18". The sampler length is measured as three 6" intervals. If the split spoon sampler did not penetrate 6" after 50 blows, the Log of Borings shows the measured penetration within that particular interval.

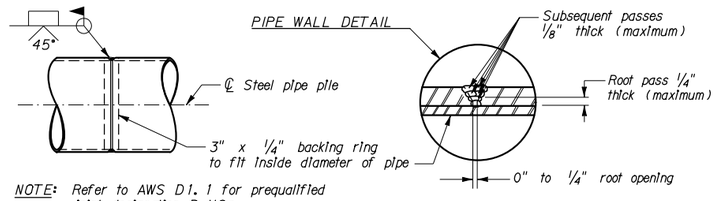
See the Special Provisions for original boring logs and additional subsurface information.

NOTE: Refer to AWS D1.1 for prequalified joint designation B-U4a.



PILE EXTENSION AFTER DRIVING

(Pile Vertical)



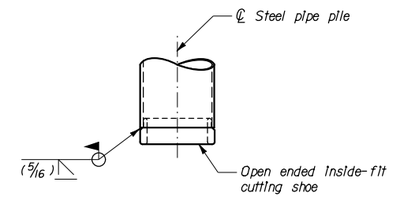
NOTE: Refer to AWS D1.1 for prequalified joint designation B-U2a.

PILE EXTENSION BEFORE DRIVING

PERMISSIBLE WELDED SPLICE DETAILS FOR STEEL PIPE PILES

No Scale

NOTE: Use only E7018 series electrodes. Prepare the weld surfaces to a smooth, uniform finish. Remove all fins, tears, loose scale, slag, rust, grease, moisture and other material that would prevent proper welding.



CUTTING SHOE WELD DETAIL

Slip shoe inside pipe. Use 7018 SMAW rod.
No Scale

Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL R. - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019 (12)

GOLDEN VALLEY COUNTY

FOOTING PLAN

SCALE ~ AS NOTED

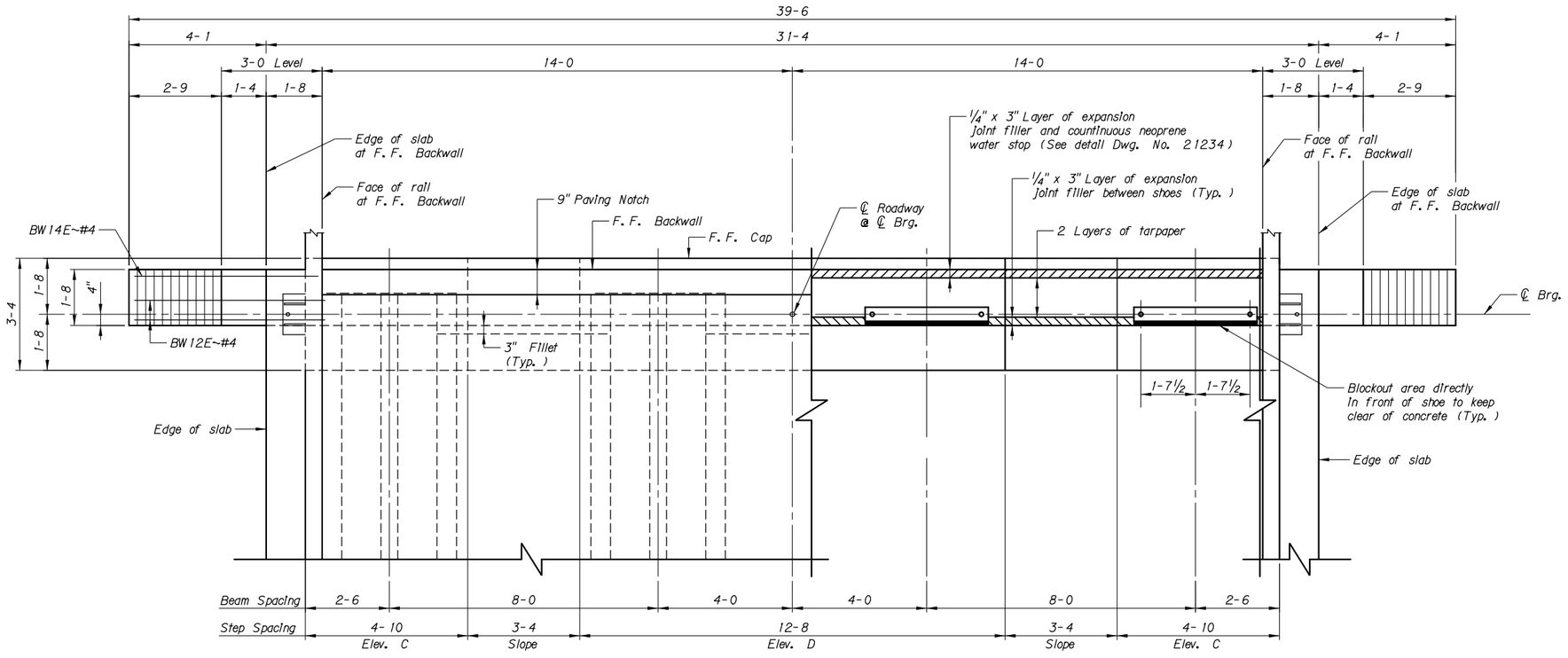
DESIGNED	6-27-11	J.E.P.
DRAWN	6-27-11	G.J.N.
CHECKED	6-30-11	J.S.O.
REVISED		
REVISED		
REVISED		

...\AB\5166000BRFPL001AB.DGN UPN NUMBER 5166000

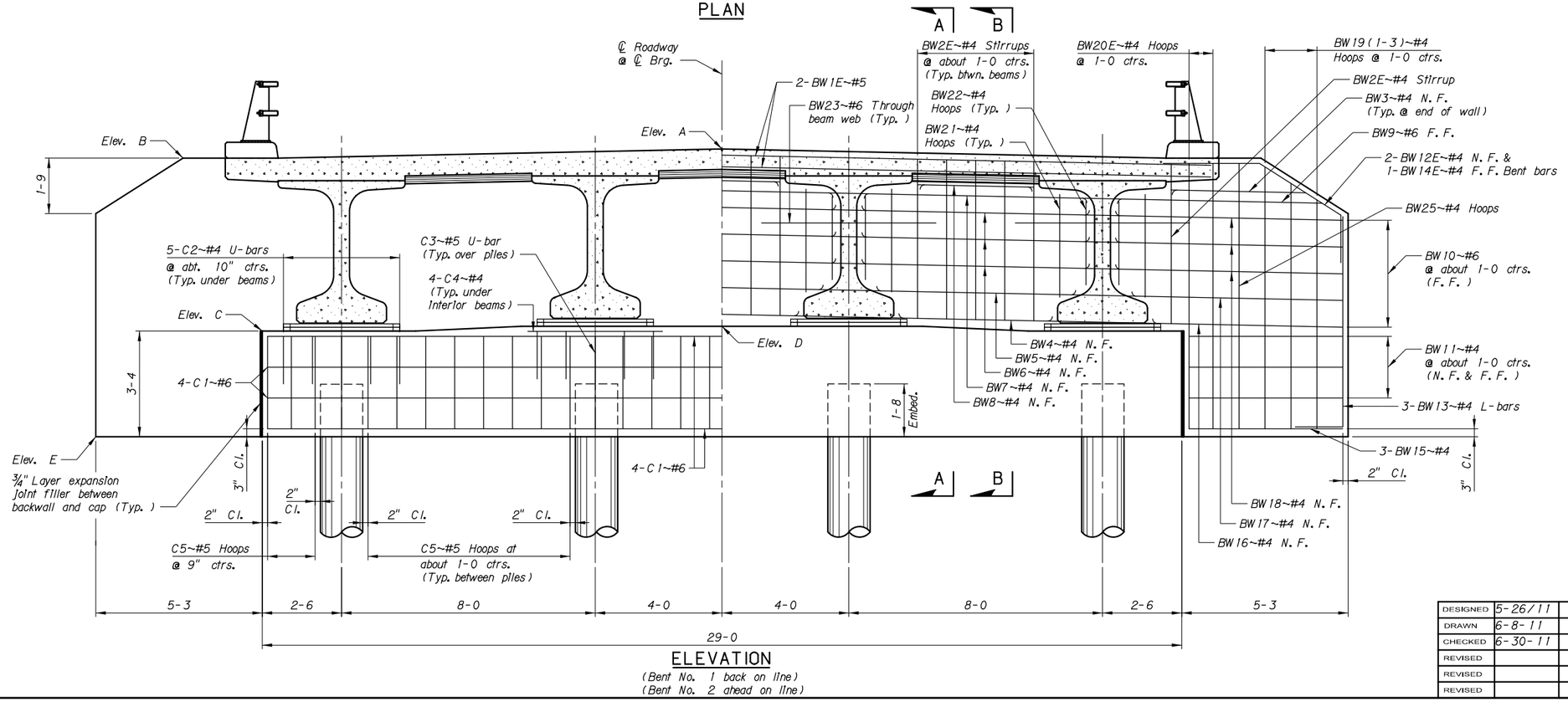
u2435 5/11/2017 12:39:03 PM DRAWING NO. 21232

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B4

AS-BUILTS



PLAN



ELEVATION
(Bent No. 1 back on line)
(Bent No. 2 ahead on line)

TABLE OF ELEVATIONS		
Elev.	Bent No. 1	Bent No. 2
A	3496.70	3496.63
B	3496.42	3496.35
C	3490.98	3490.92
D	3491.14	3491.08
E	3487.65	3487.58

NOTE: For Bill of reinforcing Steel see Dwg. No. 21234

NOTE: For Section A-A and Section B-B see Dwg. No. 21234

NOTE: N.F. denotes near face. F.F. denotes fill face.

MDT Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL RIVER - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019(12)

GOLDEN VALLEY COUNTY

BENT NO. 1 & 2

Scale ~ ½" = 1'-0"

DESIGNED	5-26/11	J.E.P.
DRAWN	6-8-11	G.J.N.
CHECKED	6-30-11	J.S.O.
REVISED		
REVISED		
REVISED		

...\AB\5166000BRBNT001AB.DGN UPN NUMBER 5166000
u2435 5/11/2017 12:25:02 PM DRAWING NO. 21233

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B5

AS BUILTS

*NOTE: Use D1~1½" Ø smooth bars meeting the requirements of AASHTO M 270 Grade 36.

NOTE: The suffix E denotes epoxy coated reinforcing steel.

NOTE: Design pile tip elevation:

Bent No. 1 = 3465.7 Estimated pile length = 22 ft.
Bent No. 2 = 3456.6 Estimated pile length = 31 ft.

Ultimate pile capacity during driving: 638 kips

Contact the MDT Geotechnical Section at (406)444-6281 if pile tip elevations deviate more than 1 foot from the elevation indicated

NOTE: Include all costs associated with furnishing and placing the expansion joint filler, tarpaper, neoprene waterstop and metal expansion caps in the unit price bid for Concrete - Class DD-Bridge.

NOTE: Securely nail expansion joint filler to pile cap concrete and hold in proper position while placing backwall concrete.

NOTE: N. F. denotes near face.
F. F. denotes fill face.

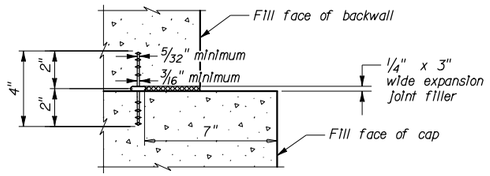
NOTE: Lap #4 bars 1-6 minimum.
Lap #5 bars 1-10 minimum.
Lap #6 bars 2-4 minimum.

NOTE: Slab and beam reinforcing steel is omitted for clarity. See Dwg. No. 21237, Dwg. No. 21236, and Dwg. No. 21235 for details.

NOTE: Finish beam seats level to the elevations shown on this drawing. Slope areas between beam seats as shown.

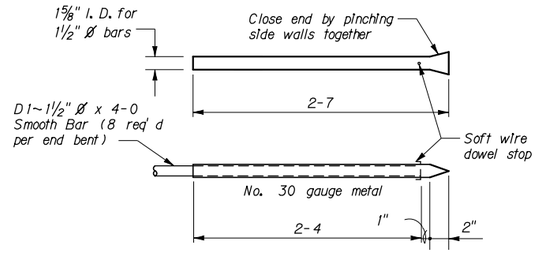
NOTE: Fill the steel pipe piles with Class DD-Bridge concrete. Wait a minimum of one day before placing the pile cap concrete.

NOTE: Do not start driving service piles until the test pile analysis is complete, as directed by the Engineer.

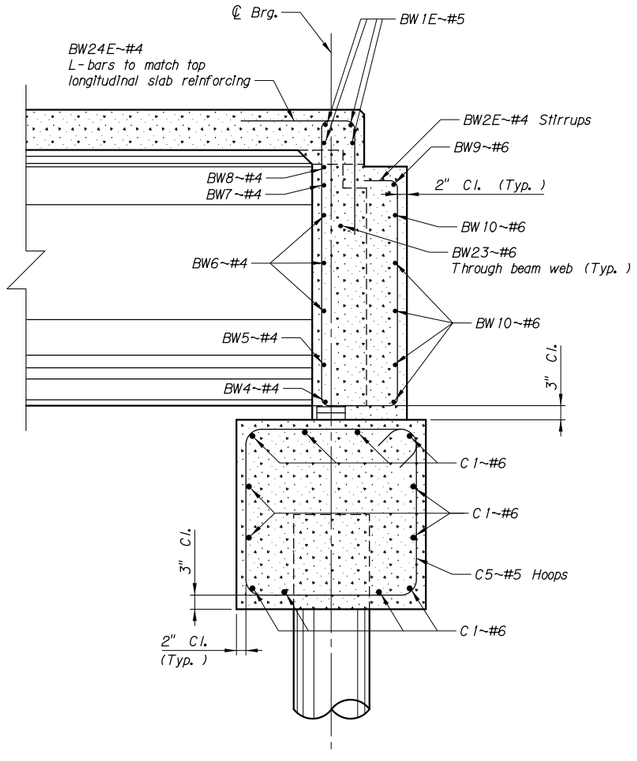


WATERSTOP DETAIL
No Scale

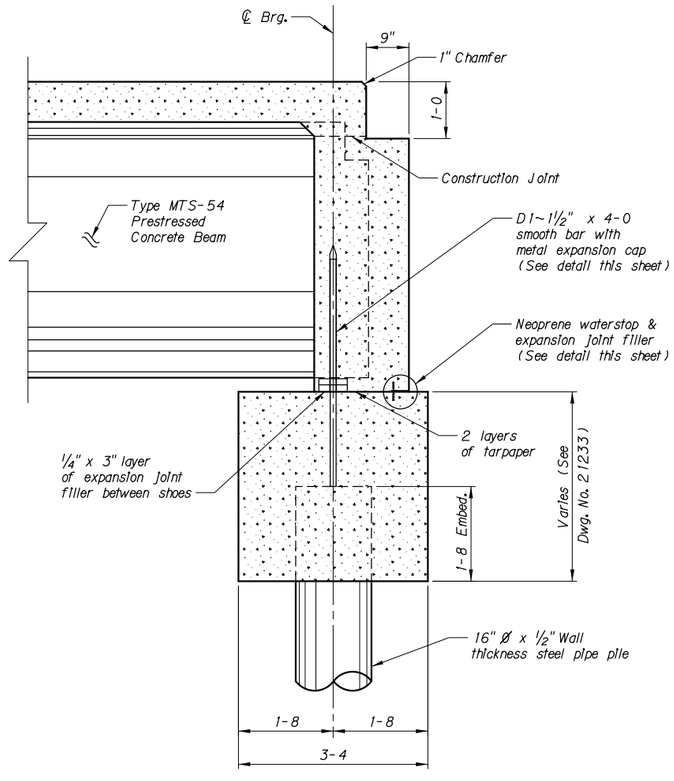
NOTE: Hold waterstop in accurate position while placing concrete.



METAL EXPANSION CAP DETAIL
No Scale



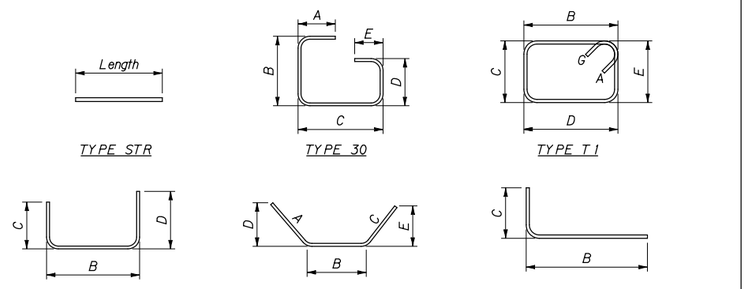
SECTION A-A
Scale ~ ¾" = 1'-0"



SECTION B-B
Scale ~ ¾" = 1'-0"

BILL OF REINFORCING STEEL

(FOR ONE BENT ONLY)
(ALL DIMENSIONS ARE OUT TO OUT)



Mark	Size	No.	Type	Length	A	B	C	D	E	G	N
BW1E	#5	4	STR	30-10							
BW2E	#4	17	30	11-6	7"	5-0	1-4	4-0	7"		
BW3	#4	2	STR	4-3							
BW4	#4	3	STR	4-10							
BW5	#4	3	STR	6-3							
BW6	#4	9	STR	7-2							
BW7	#4	3	STR	7-0							
BW8	#4	3	STR	3-8							
BW9	#6	2	STR	20-1							
BW10	#6	10	STR	20-9							
BW11	#4	12	STR	4-10							
BW12E	#4	4	29	7-7	3-0	3-1	1-6	1-8	1-3		
BW13	#4	6	37	8-2		6-8	1-6				
BW14E	#4	2	29	7-5½	2-10½	3-1	1-6	1-6½	1-3		
BW15	#4	6	STR	4-10							
BW16	#4	2	STR	6-0							
BW17	#4	2	STR	6-8							
BW18	#4	6	STR	7-2							
BW19-1	#4	2	T1	17-11	0-4½	1-4	7-3	1-4	7-3	0-4½	
BW19-2	#4	2	T1	18-11	0-4½	1-4	7-9	1-4	7-9	0-4½	
BW19-3	#4	2	T1	19-11	0-4½	1-4	8-3	1-4	8-3	0-4½	
BW20E	#4	4	T1	20-2	0-4½	1-4	8-4½	1-4	8-4½	0-4½	
BW21	#4	8	T1	9-11	0-4½	1-4	3-3	1-4	3-3	0-4½	
BW22	#4	8	T1	8-9	0-4½	1-4	2-8	1-4	2-8	0-4½	
BW23	#6	4	STR	5-6							
BW24E	#4	22	37	4-0		2-0	2-0				
BW25	#4	2	T1	20-2	0-4½	1-4	8-4½	1-4	8-4½	0-4½	
C1	#6	12	STR	28-8							
C2	#4	20	17	6-0		3-0	1-6	1-6			
C3	#5	4	17	8-10		3-0	2-11	2-11			
C4	#4	8	STR	4-3							
C5	#5	30	T1	12-9	0-5½	3-0	2-11	3-0	2-11	0-5½	
D1	1½"	8	STR	4-0							

MDT Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL RIVER - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019(12)

GOLDEN VALLEY COUNTY

BENT DETAILS

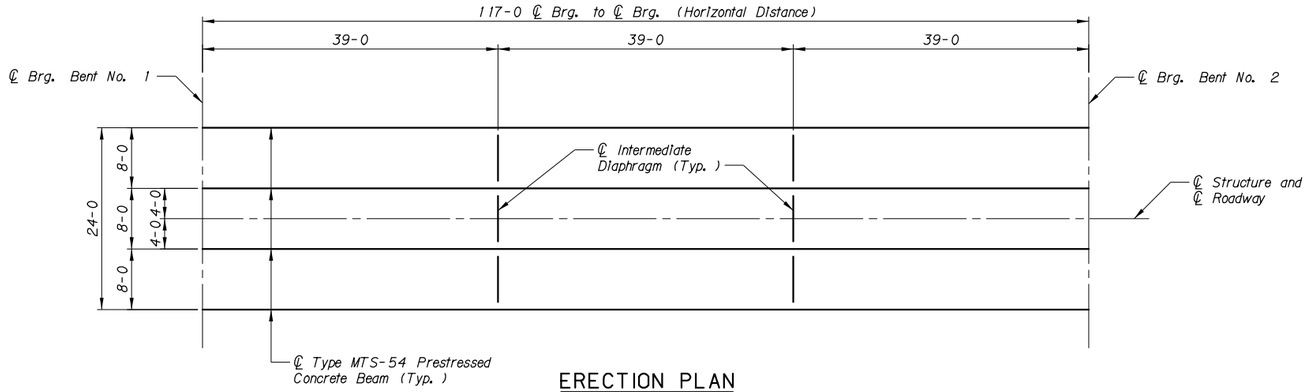
Scale ~ As Noted

DESIGNED	5-26/11	J. E. P.
DRAWN	6-8-11	G. J. N.
CHECKED	6-30-11	J. S. O.
REVISED		
REVISED		
REVISED		

...\AB\5166000BRBNT002AB.DGN UPN NUMBER 5166000
u2435 5/11/2017 12:36:45 PM DRAWING NO. 21234

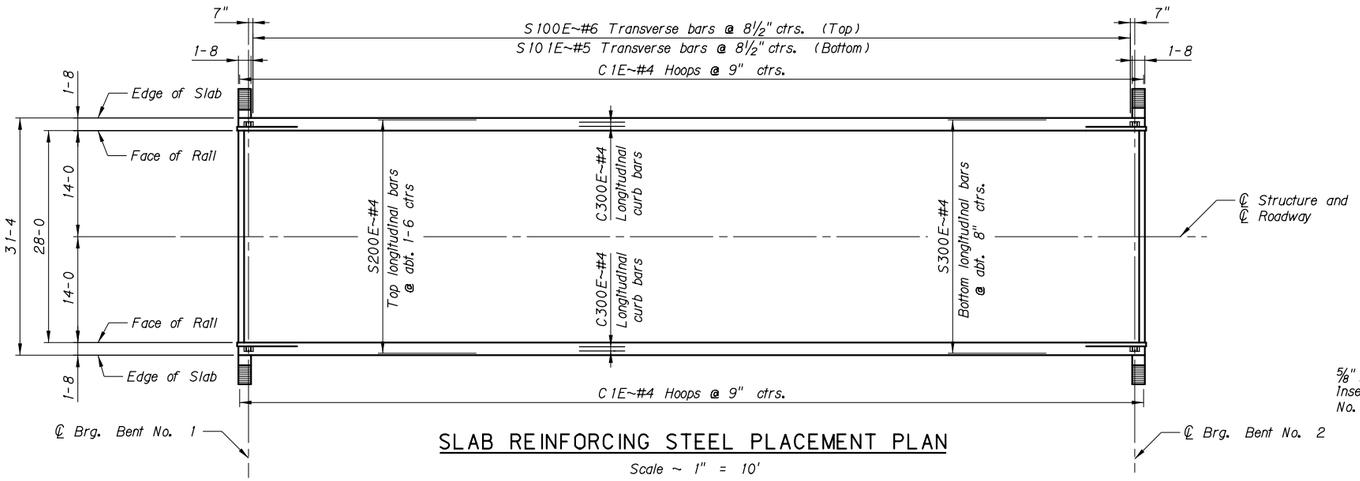
AS BUILTS

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B6



ERECTION PLAN

Scale ~ 1" = 10'

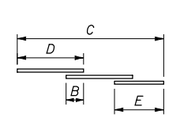


SLAB REINFORCING STEEL PLACEMENT PLAN

Scale ~ 1" = 10'

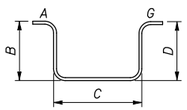
BILL OF REINFORCING STEEL

(ALL DIMENSIONS ARE OUT TO OUT)

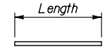


N = Number of Laps

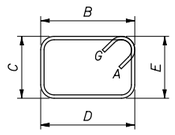
TYPE 27



TYPE S4



TYPE STR

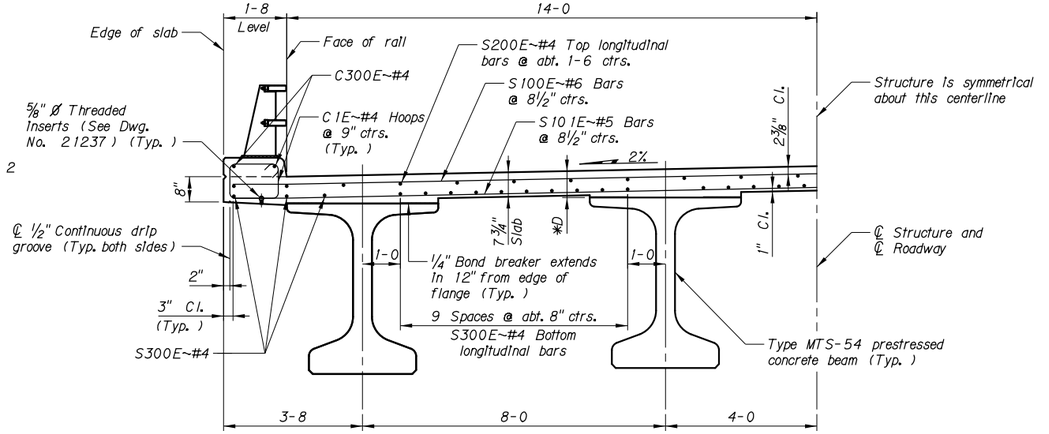


TYPE T1

Mark	Size	No.	Type	Length	A	B	C	D	E	G	N
C300E	#4	4	27	125-10		2-2	119-4	40-0	5-10		3
S100E	#6	164	STR	30-10							
S101E	#5	164	STR	30-10							
S200E	#4	22	27	124-5		2-2	117-11	40-0	4-5		3
S300E	#4	36	27	124-5		2-2	117-11	40-0	4-5		3
C1E	#4	320	T1	4-11	0-4½	1-3	0-10	1-3	0-10	0-4½	
D1E	#4	30	S4	7-7	0-4½	3-1½	0-7	3-1½		0-4½	
D2E	#4	12	T1	5-6	0-4½	0-7	1-9½	0-7	1-9½	0-4½	
D3E	#4	12	T1	6-6	0-4½	0-7	2-3½	0-7	2-3½	0-4½	
D4E	#6	12	STR	7-2							
D5E	#4	24	STR	7-2							
D6E	#6	4	STR	5-6							

NOTE: The suffix E denotes epoxy coated reinforcing.

NOTE: Lap #4 bars 1-10 minimum.



PARTIAL TRANSVERSE SECTION

Scale ~ ½" = 1'-0"

*NOTE: Dimension D = 8½" at ℄ Brg. (Varies at tenth points). See Dead Load Deflection Table (this sheet) and Camber Diagram (See Dwg. No. 21237)

PRESTRESSED BEAM DESIGN PARAMETERS

AASHTO Specifications	LRFD 4th edition with 2008 Interims
Structure Type	Simple Span
Deck Concrete Strength	4000 psi
Deck Concrete Density	150 lb/ft³
Prestressing Strand	270 ksi Low Relaxation - (0.500" or 0.600" diameter)
Shear Reinforcing	AASHTO M 31 Grade 60
Alternate Shear Reinforcing	Welded Wire Fabric - AASHTO M211 & M225
Section Property Calculations	Transformed Section
Prestress Loss Method	Refined Losses per LRFD 5.9.5 and 5.9.5.4
Shear Computation Method	Sectional Model per LRFD 5.8.3
Beam / Slab Interface	Intentionally Roughened to ¼" amplitude
Load Rating Requirements	AASHTO LRFR Design Load

PRESTRESSED BEAM LOAD TABLE

LOAD TYPE	LOADS	APPLICATION METHOD
Barrier Load	0.162 klp/ft per rail	Equally ot all beams
Future Wearing Surface	10 lb/ft² applied between curbs	Equally to all beams
Interior Diaphragm	2.753 klp/diaphragm	At point load
Exterior Diaphragm	1.377 klp/diaphragm	At point load
Additional Dead Load	---	---
Live Load	LRFD - HL 93	per AASHTO LRFD

NOTE: See Dwg. No. 21237 for additional slab, rail and threaded insert details.

NOTE: Forming straight across the underside of the bay containing the crown break will be permitted. Pay quantities are based on the section shown. Any additional concrete is not paid for.

DEAD LOAD DEFLECTION TABLE

TYPE MTS-54 PRESTRESSED CONCRETE BEAM

Span Length (ft)		Tenth Point (In)				
		0.1	0.2	0.3	0.4	0.5
117'-00" Span	Int.	1.07"	2.02"	2.77"	3.24"	3.40"
	Ext.	1.06"	2.00"	2.74"	3.21"	3.37"

NOTE: Deflections symmetrical about 0.5 point and do not include beam dead load.

NOTE TO FABRICATOR: For design purposes, increase beam haunch depth to account for vertical crest curve and final beam deflection.

DESIGNED	2-15-11	J.E.P.
DRAWN	6-21-11	G.J.N.
CHECKED	6-30-11	J.S.O.
REVISED		
REVISED		
REVISED		

MDT Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL RIVER - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019(12)

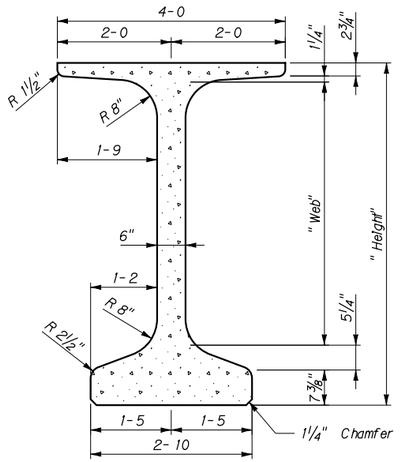
GOLDEN VALLEY COUNTY
SLAB DETAILS &
ERECTION PLAN

Scale: 1" = 10'-0" (Except as noted)

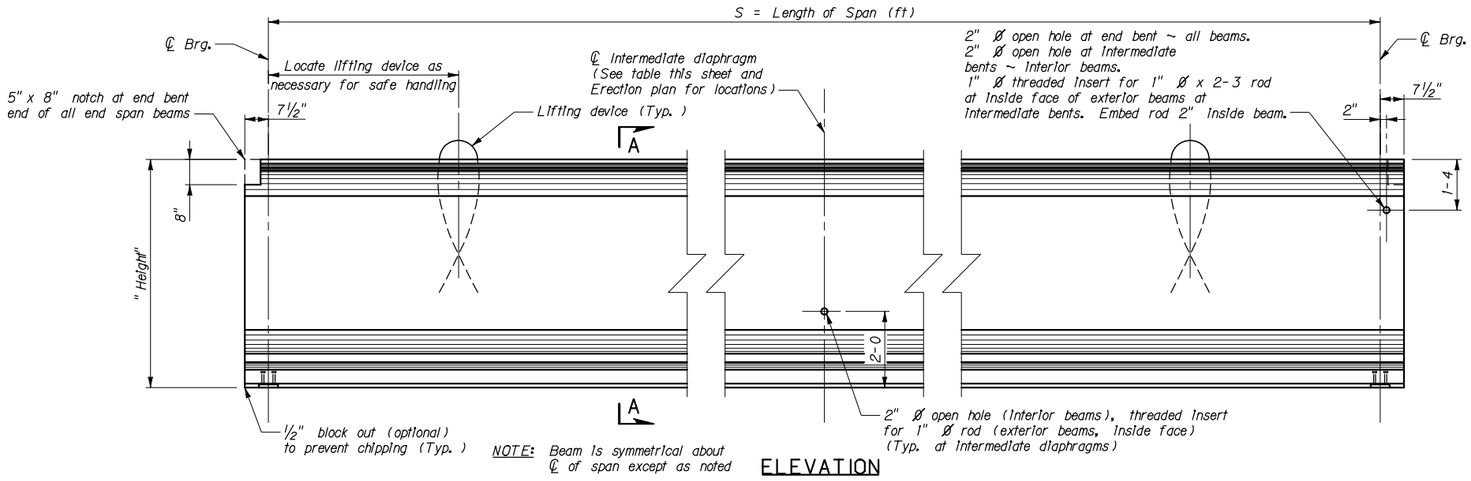
...\AB\5166000BRSLD001AB.DGN UPN NUMBER 5166000

u2435 5/11/2017 12:55:46 PM DRAWING NO. 21235

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B7



SECTION A-A



NOTE: Beam is symmetrical about ℄ of span except as noted

ELEVATION

NOTES

SPECIFICATIONS: For design specifications, see General Layout. Design and fabricate the beam to support the dead load and live load stresses and provide a minimum ultimate moment capacity shown on the Erection Plan. Show stresses in the beam under each loading condition that is anticipated in the manufacture, handling and service life of the beam.

PRESTRESSING STEEL: Use 0.500" diameter of 0.600" diameter, 7 wire strand prestressing steel.

HARDWARE: Threaded inserts, hold down devices, lifting devices and any other hardware which is to be incorporated in the beam will be approved by the Engineer before fabrication is begun.

DIAPHRAGMS: See Erection Plan for location of diaphragms when structure is skewed.

BEAM LENGTH: Increase the overall length of the beam 0.0075 inches per foot of length to allow for elastic shortening, shrinkage and creep.

SHOES: Paint shoes in accordance to Standard Specifications. See details on Bridge Plans if expansion shoes are required. See General layout for type of shoes required.

REINFORCING STEEL: See General Layout.

SHEAR REINFORCING: Fabricator will provide shear and end reinforcement to meet the requirements of the AASHTO code specified on the General Layout.

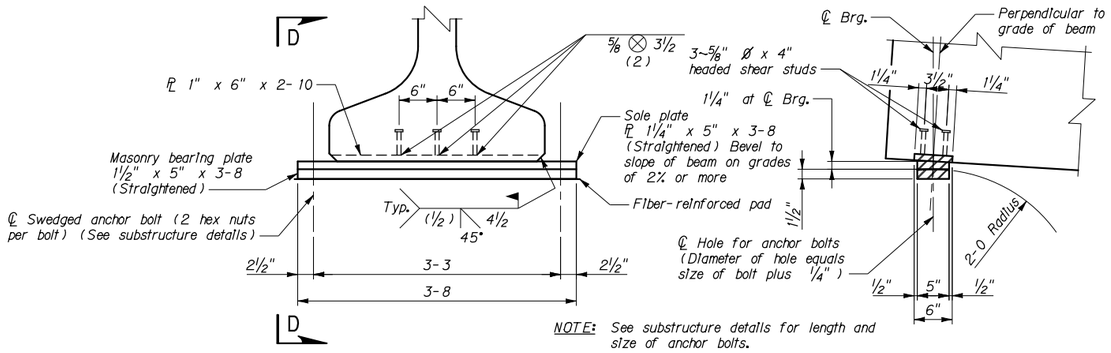
PAYMENT: Include all costs to furnish and install anchor bolts, nuts, shoes, fiber-reinforced pads and embedded plates in the unit price bid for Prestressed Beams Type MTS.

STRUCTURAL STEEL: Use structural steel meeting the requirements of AASHTO M 270 Grade 36 for embedded plates and shoes. Use structural steel meeting the requirements of AASHTO M 314 Grade 55 for anchor bolts. Galvanize the anchor bolts meeting the requirements of AASHTO M 232. Use headed shear studs meeting the requirements of AASHTO M 169 Grades 1010 through 1020.

AS BUILTS

MONTANA SUPER GIRDER PROPERTIES							
Girder Depth "Height"	"Web"	A (In^2)	Ycg (In)	Ixo (In^4)	Sx (Top) (In^3)	Sx (Bot) (In^3)	Weight (lb/ft)
36"	1'-7⅜"	669.28	16.48	111 953	5 735.30	6 793.26	697.16
45"	2'-4⅜"	723.28	20.33	197 542	8 007.38	9 716.77	753.41
54"	3'-1⅜"	777.28	24.27	311 960	10 493.10	12 853.73	809.66
63"	3'-10⅜"	831.28	28.28	457 557	13 178.49	16 179.53	865.91
72"	4'-7⅜"	885.28	32.35	636 645	16 056.62	19 679.91	922.16
81"	5'-4⅜"	939.28	36.47	851 394	19 119.56	23 345.05	978.41
96"	6'-7⅜"	1 029.28	43.43	1 294 510	24 624.50	29 806.82	1 072.16

DIAPHRAGM LOCATIONS	
SPAN LENGTH	DIAPHRAGM LOCATION
0 - 40 ft	NONE
40 - 80 ft	½ S
80 - 120 ft	⅓ S
120 - 160 ft	¼ S
greater than 160 ft	⅕ S



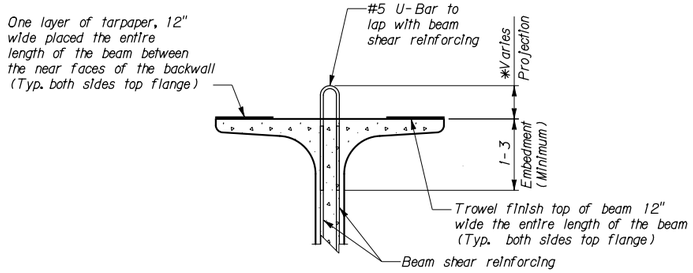
END VIEW

NOTE: See substructure details for length and size of anchor bolts.

NOTE: Adjust shear stud spacing as necessary to avoid prestressing steel.

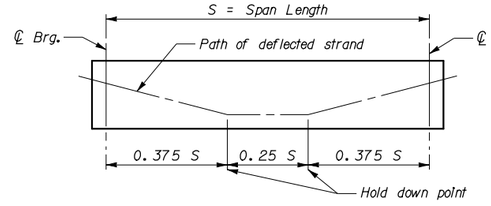
VIEW D-D

FIXED SHOE DETAILS



HORIZONTAL INTERFACE SHEAR REINFORCEMENT

*NOTE: Extend horizontal interface shear reinfocment such that is located between top and bottom deck mat reinforcing layers.



TYPICAL DEFLECTED STRAND FOR PRE-TENSIONING SYSTEM

No Scale

MDT Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL RIVER - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019(12)

GOLDEN VALLEY COUNTY

TYPE MTS PRESTRESSED CONCRETE BEAM

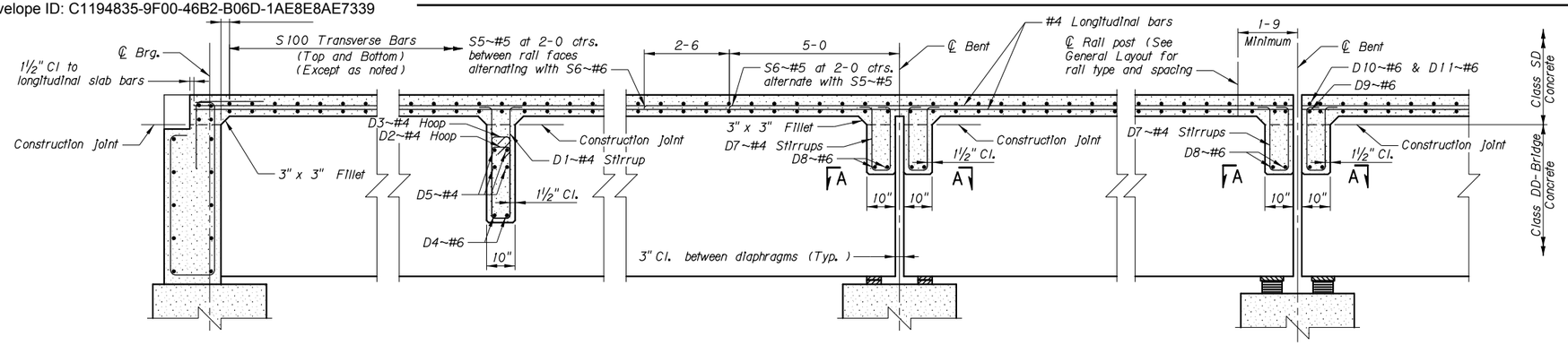
No Scale

DESIGNED	2-15-11	J.E.P.	
DRAWN	2-2-11	T.J.B.	
CHECKED	6-30-11	J.S.O.	
REVISED			
REVISED			
REVISED			

...\AB\5166000BRSTDMTSAB.DGN UPN NUMBER 5166000

u2435 5/11/2017 12:57:05 PM DRAWING NO. 21236

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B8



DETAIL AT FIXED END BENT | INTERMEDIATE DIAPHRAGM | CONTINUOUS SLAB AT INTERMEDIATE BENT | EXPANSION JOINT AT INTERMEDIATE BENT

LONGITUDINAL SECTION

**NOTE: Use a detail for end bents with expansion joints similar to the detail for an expansion joint at an intermediate bent.

NOTES

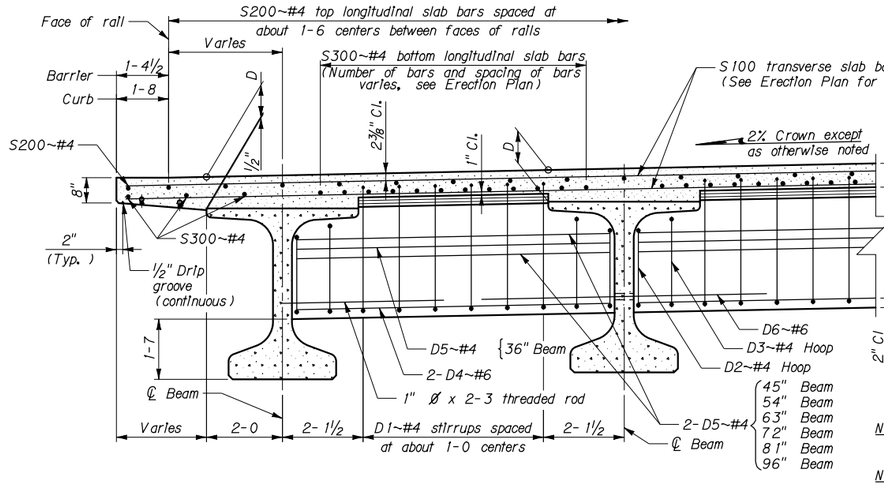
Use details shown on this sheet only as they apply to the project. See the General Layout or Erection Plan for beam spacing, slab thickness, size and spacing of S100 bars, number and spacing of S200 and S300~#4 bars, deck joint arrangement, rail and curb length, rail post spacing, bill of reinforcing steel and roadway width.

When adjoining spans have a different number of longitudinal slab bars, make the longitudinal bars of the shorter span continuous over the bent and extend them 3-0 into the longer span.

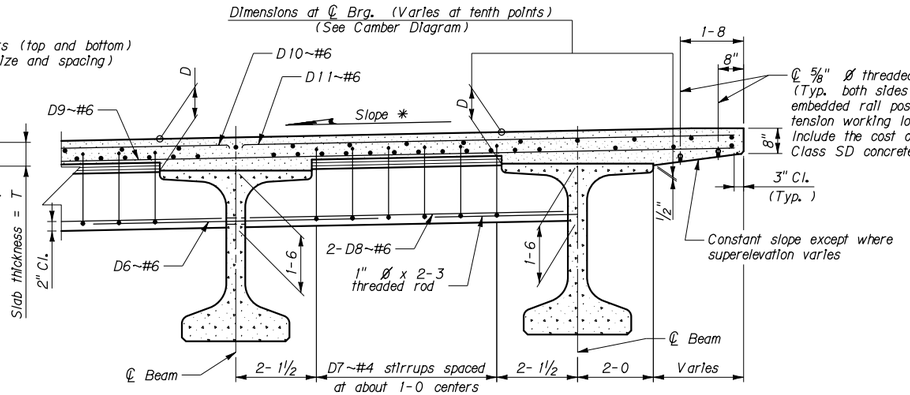
If the bridge is skewed, place the transverse slab reinforcing steel as shown on the Erection Plan.

See Standard Bridge Rail drawings for rail details.

AS BUILTS



TRANSVERSE SECTION NEAR INTERMEDIATE DIAPHRAGM AT LOW SIDE

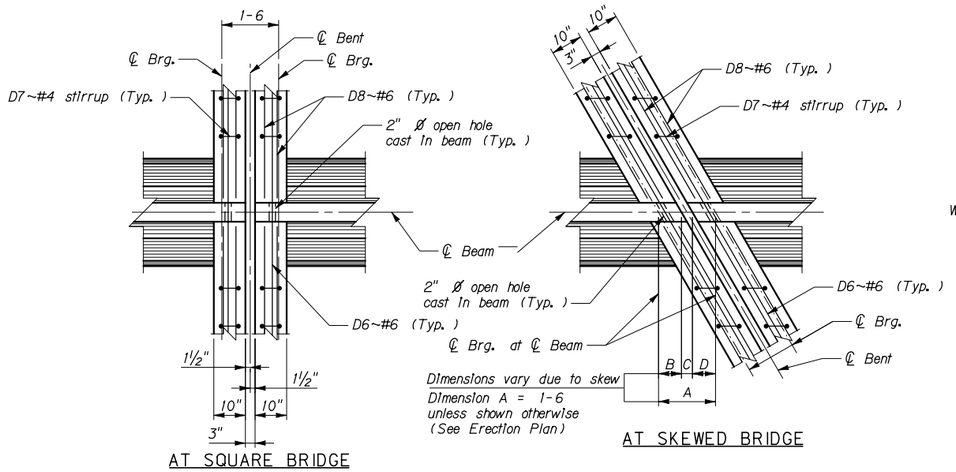


NOTE: Include threaded rod in the unit price bid for Prestressed Concrete Beams.

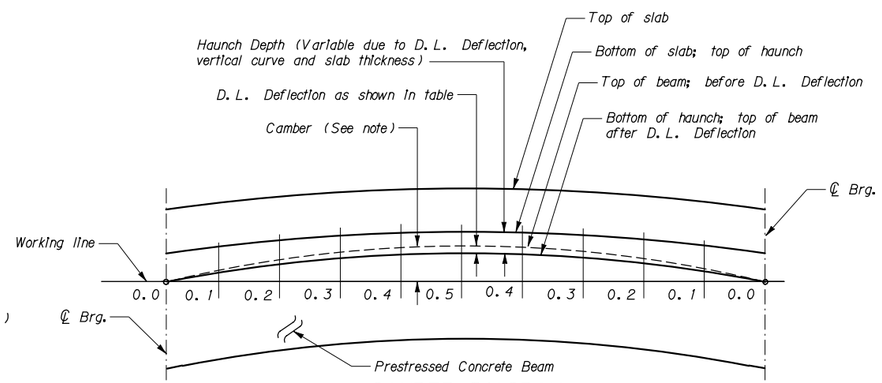
NOTE: For Dimension D at ℄ Brg. see slab Transverse Section. (Varies at tenth points) See Dead Load Deflection Table and Camber Diagram.

TRANSVERSE SECTION NEAR INTERMEDIATE BENT AT HIGH SIDE

*NOTE: Detail shown is for superelevations other than normal crown.



SECTION A-A



CAMBER DIAGRAM

NOTE: See Erection plan for theoretical D.L. Deflection Table for Prestressed Concrete Beams.

NOTE: Camber is noted as the distance from the working line to the top of beam and may vary from theoretically calculated D.L. deflection.

Montana Department of Transportation

BRIDGE OVER
MUSSELSHELL RIVER - CUSHMAN

AT STA. 12+08.00

FEDERAL AID PROJECT NO.
BR 9019(12)

GOLDEN VALLEY COUNTY

SLAB AND DIAPHRAGM DETAILS FOR TYPE MTS BEAM

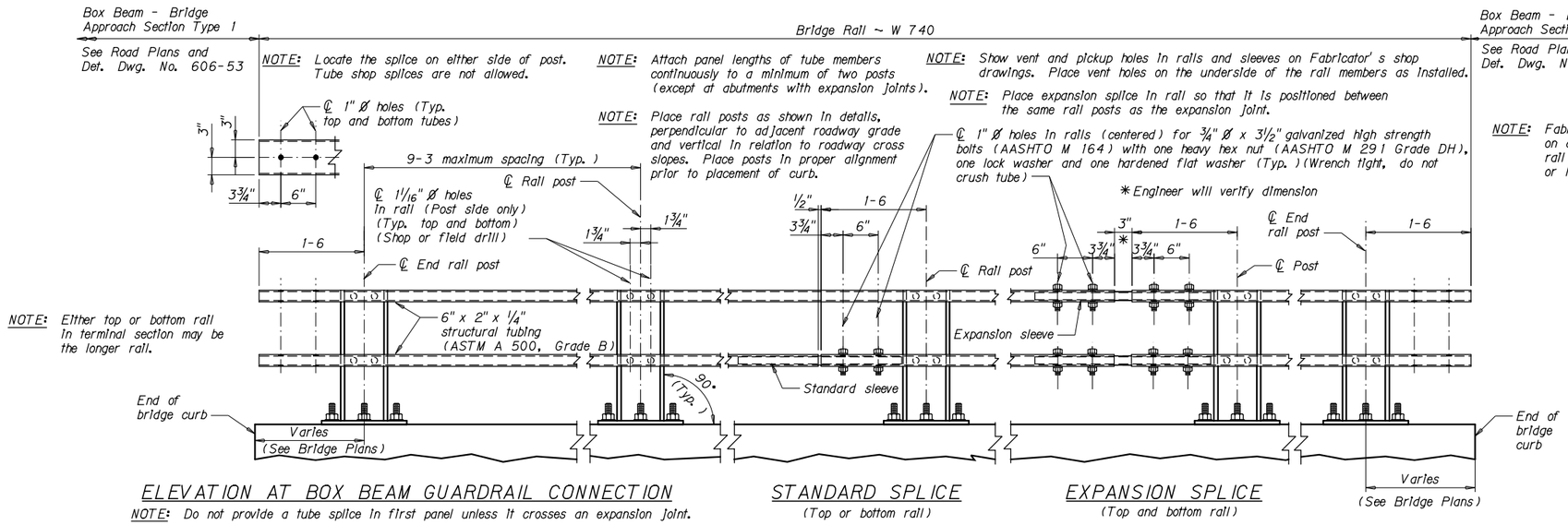
No Scale

DESIGNED	2-15-11	J.E.P.
DRAWN	3-7-11	T.J.B.
CHECKED	6-30-11	J.S.O.
REVISED		
REVISED		
REVISED		

...\AB\5166000BRSTDSL8AB.DGN UPN NUMBER 5166000
u2435 5/11/2017 12:57:29 PM DRAWING NO. 21237

AS BUILTS

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	BR 9019(12)	B9



ELEVATION AT BOX BEAM GUARDRAIL CONNECTION

NOTE: Do not provide a tube splice in first panel unless it crosses an expansion joint.

STANDARD SPLICE
(Top or bottom rail)

EXPANSION SPLICE
(Top and bottom rail)

NOTES

GALVANIZING: Galvanize all bolts, nuts, washers and pipe sleeves in accordance with AASHTO M 232.

REFLECTORS: Place a white reflector on top of the top tube rail at equal spacing (not to exceed 30 foot spacing) between ends of rail. See Dtl. Dwg. No. 606-60 for reflector detail. Mount the reflector on the tube rail with an approved adhesive. Include the cost of reflector in the unit price bid for Bridge Rail ~ W740.

PAYMENT: Payment for Bridge Rail ~ W740 per linear foot includes compensation for the cost of Class SD concrete in the curb and for all resources necessary to complete the work. See the General Layout for the number of linear feet for payment of Bridge Rail ~ W740. Use rail post plates and base plates conforming to AASHTO M 270 Grade 36T3. Use AASHTO M 270 Grade 36 for all other plates.

ERECTION: Place rail posts as shown in details, perpendicular to adjacent roadway grade and vertical in relation to roadway cross slopes. Place posts in proper alignment prior to placement of curb.

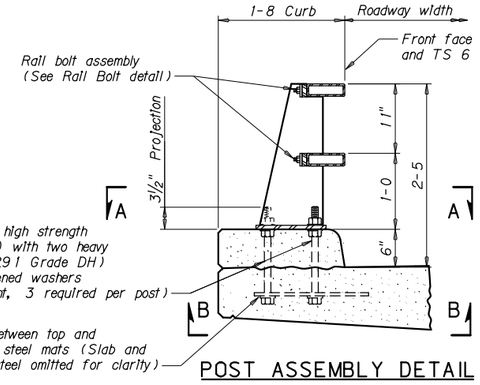
PAINTING: Paint all posts, structural tubing and plates (except as noted) in accordance with the Standard Specifications. Galvanizing the posts, structural tubing and plates in accordance with AASHTO M 111 will be allowed.

EXCEPTIONS: Use details shown on this drawing only as they apply to the project. Anchorage details may vary. Refer to other drawings for variations in these details.

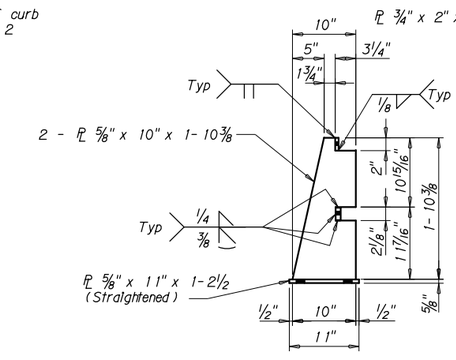
FABRICATION: For the purposes of fabrication, this rail system is considered an ancillary item. The requirments of subsection 1.3.6 of AASHTO/AWS D1.5 apply.

RAIL WEIGHT: For informational purposes only, the rail weight is approximately 123.0 lb/ft for the curb and 39 lb/ft for the rail.

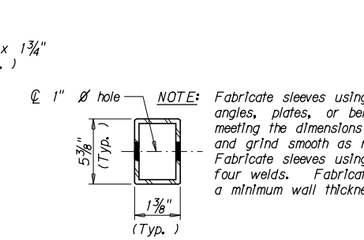
INSIDE ELEVATION OF RAIL



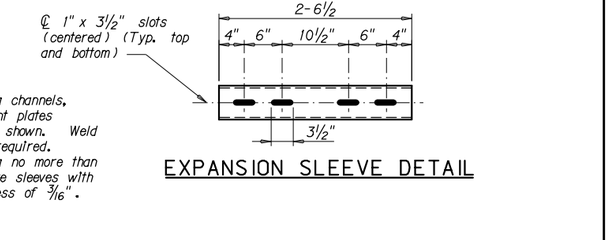
POST ASSEMBLY DETAIL



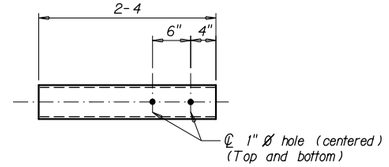
POST DETAILS



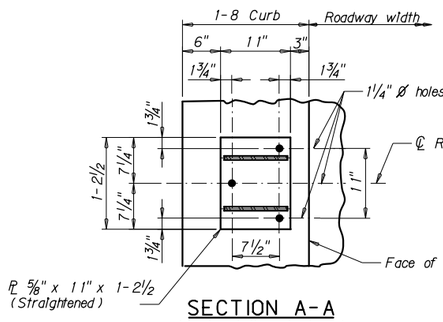
SLEEVE FABRICATION OPTIONS



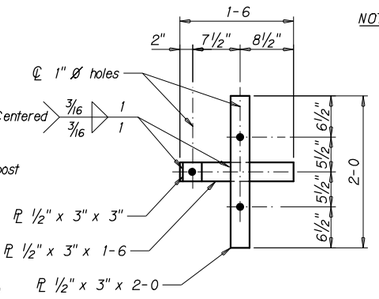
EXPANSION SLEEVE DETAIL



STANDARD SLEEVE DETAIL

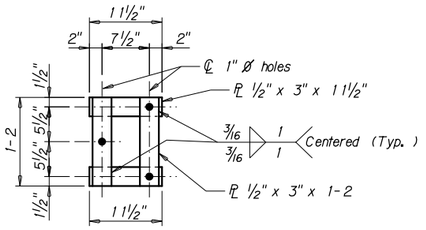


SECTION A-A
(Anchor bolts not shown)

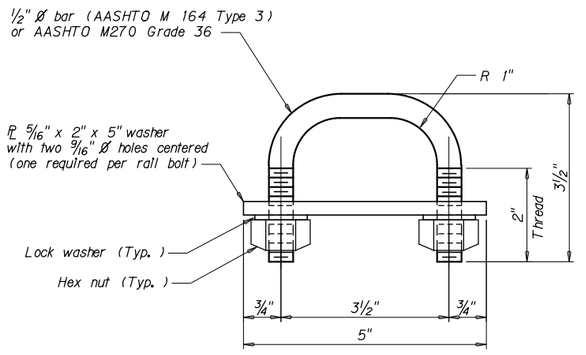


NOTE: Anchor bolts may be tack welded to anchorage (shop or field).

VIEW B-B (STANDARD SLAB)
(Do not galvanize)
(Anchor bolts not shown)



VIEW B-B (U-TYPE BENT)
(Do not galvanize)
(Anchor bolts not shown)



RAIL BOLT DETAIL

DRAWN	6-27-06	L.M.S.
CHECKED	12-4-06	M.L.R.
APPROVED	3-26-08	D.F.J.
REVISED	2-1-11	D.F.J.
REVISED		
REVISED		
REVISED		
REVISED		

MDT Montana Department of Transportation

STANDARD BRIDGE RAIL
TYPE W740

No Scale

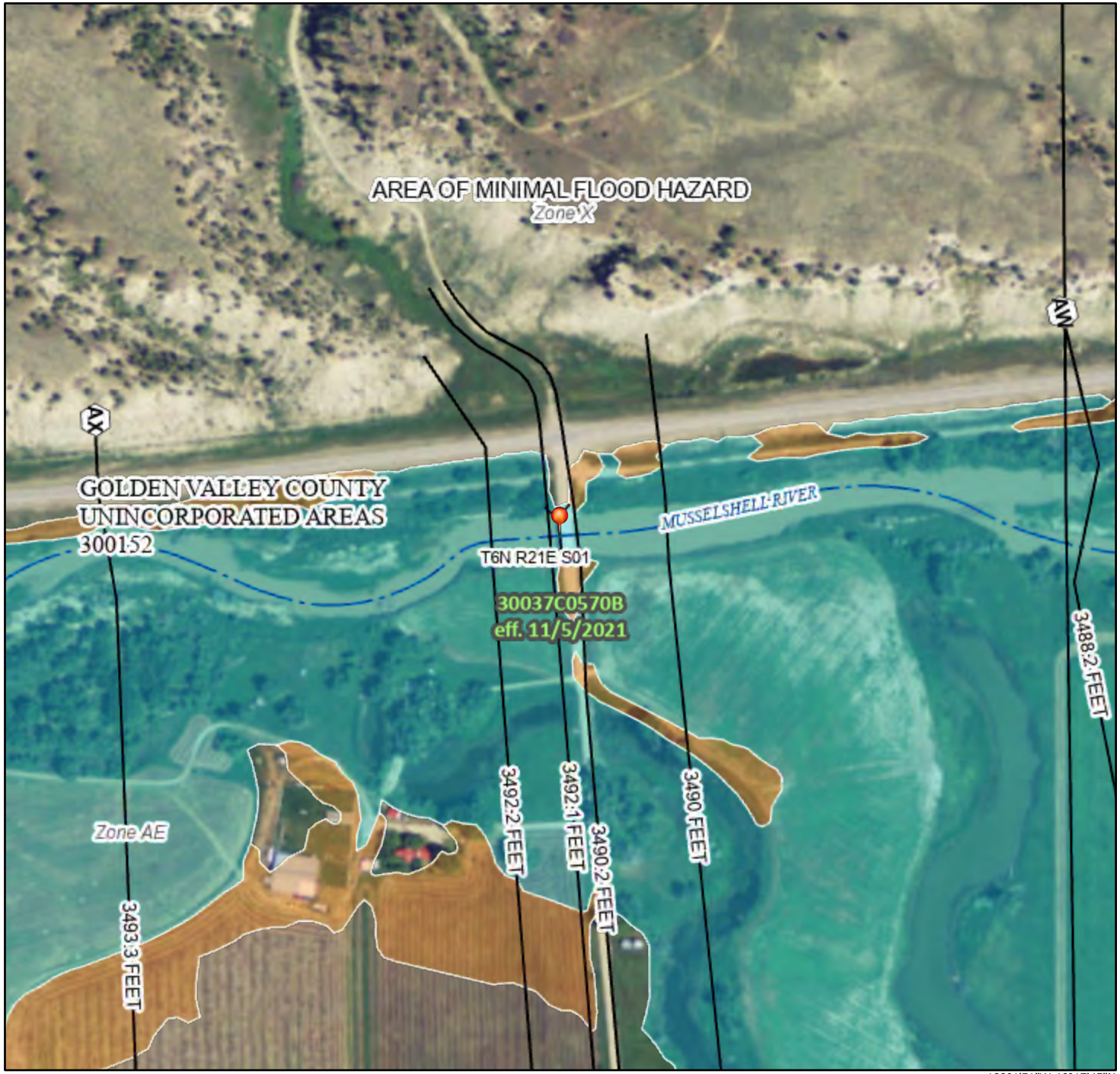
STD REF W740211.STD

DRAWING NO. SBR-W740

National Flood Hazard Layer FIRMette

FEMA

109°2'28"W 46°18'9"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

109°1'51"W 46°17'45"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

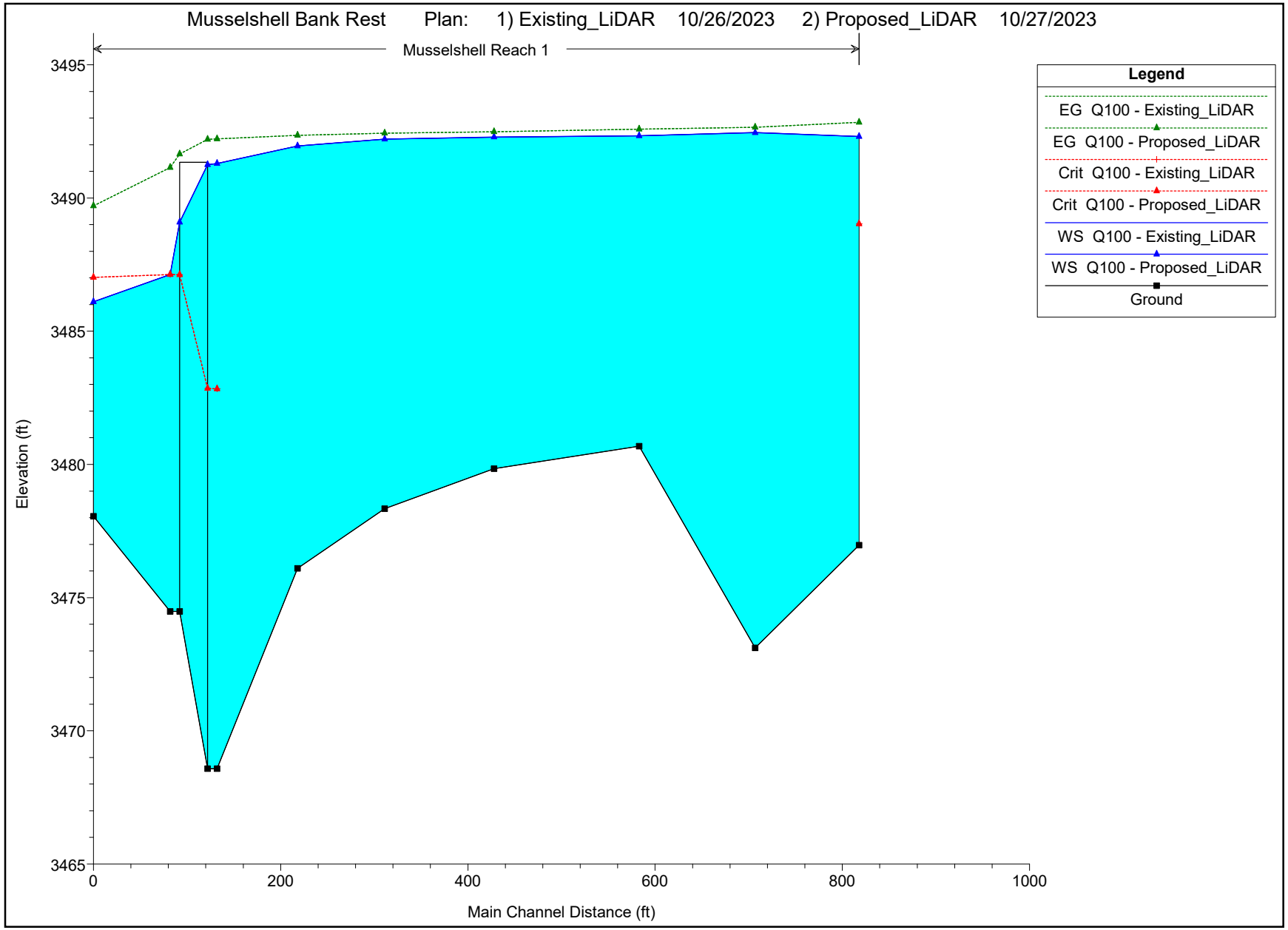
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

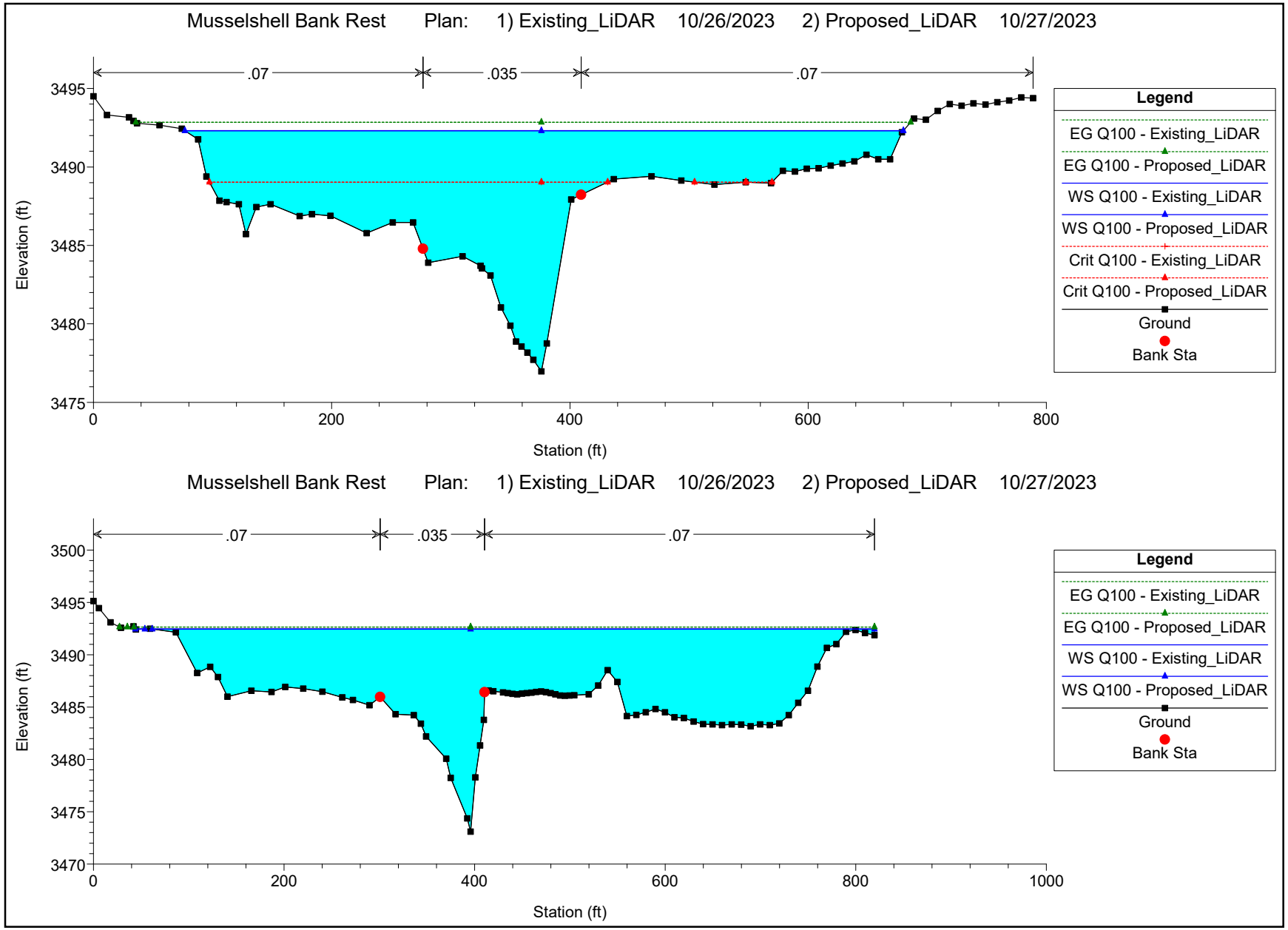
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/27/2023 at 11:54 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

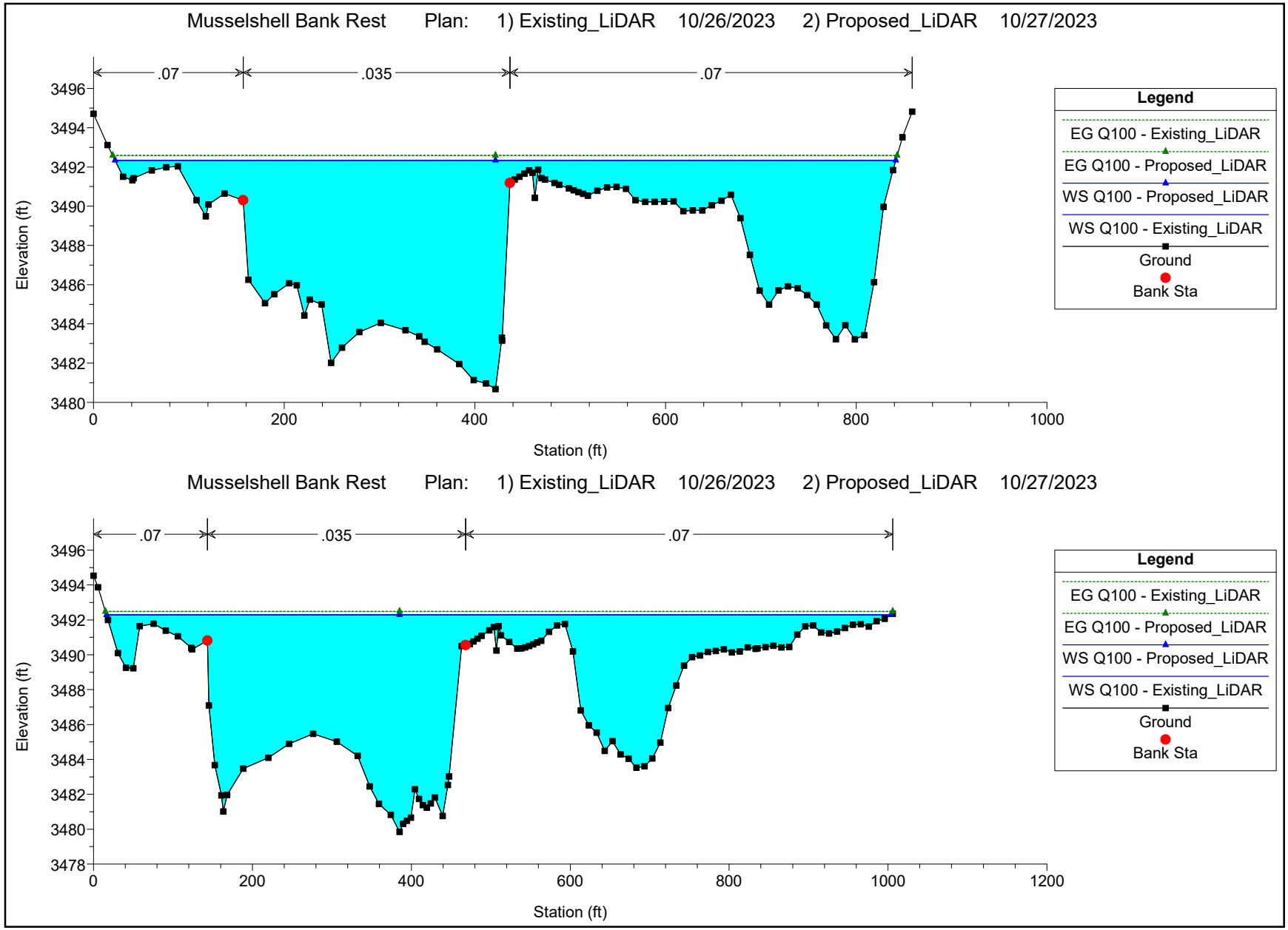
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

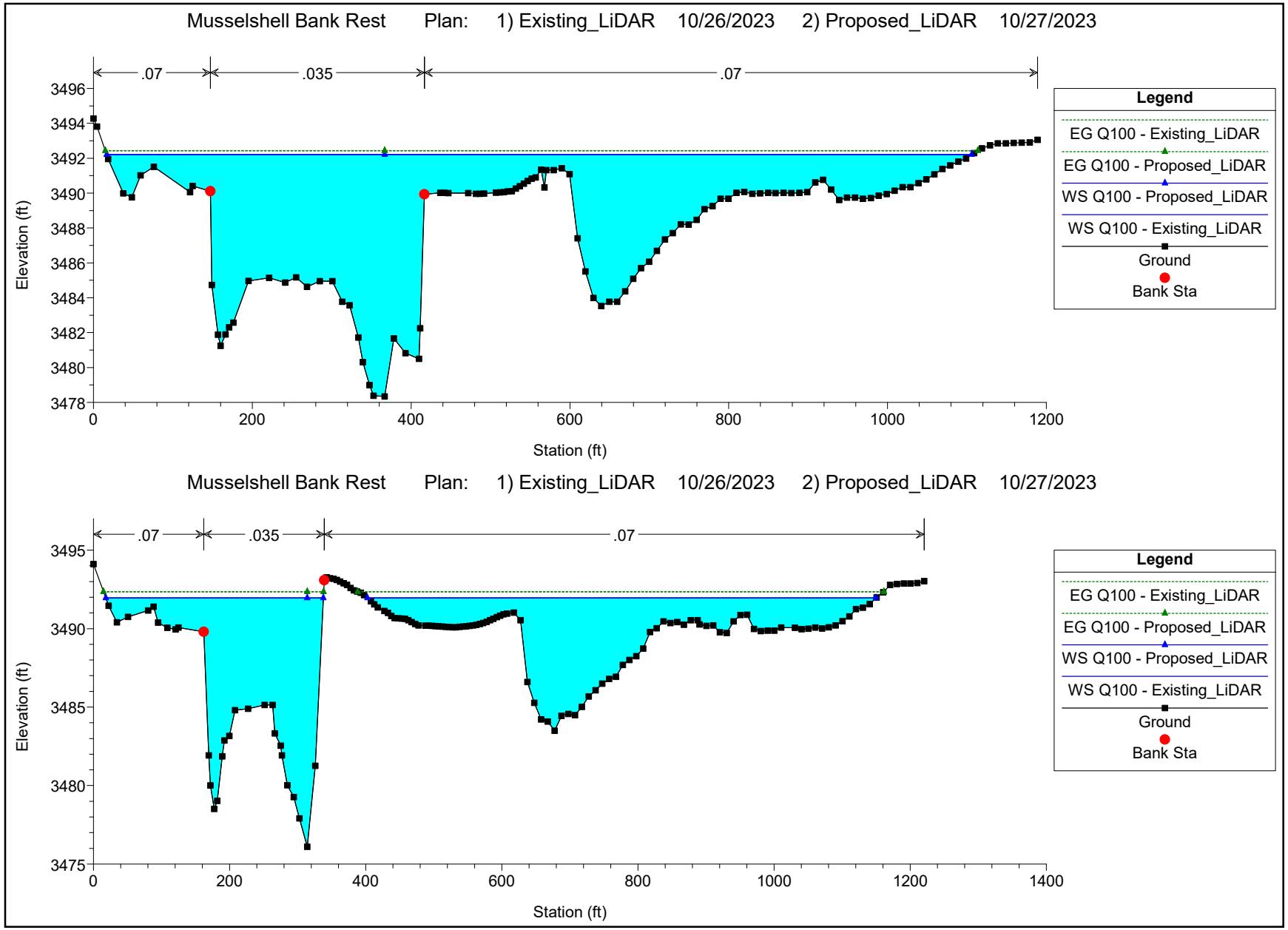
HEC-RAS River: Musselshell Reach: Reach 1 Profile: Q100

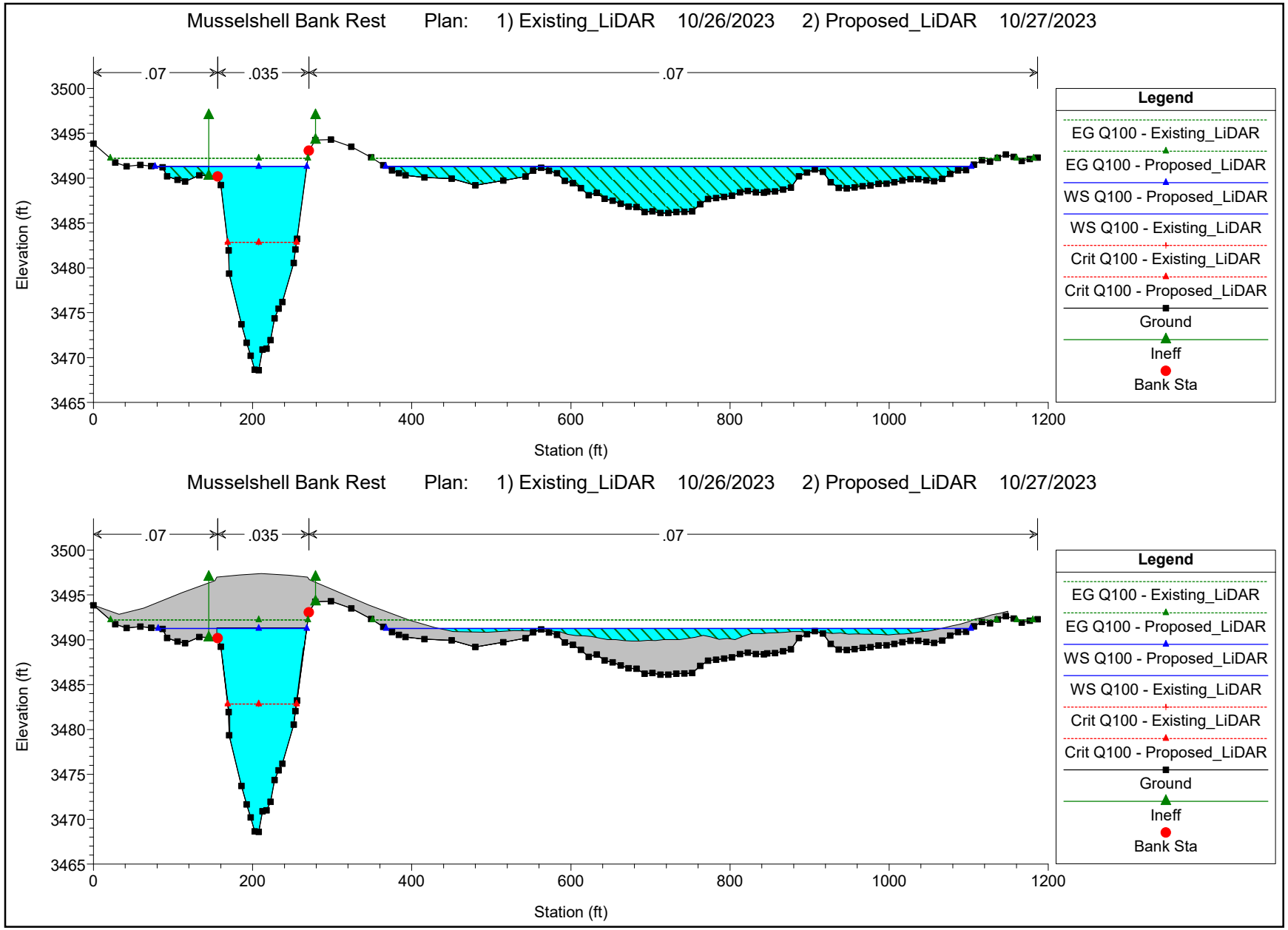
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	600	Q100	Existing_LiDAR	12151.00	3476.97	3492.31	3489.03	3492.84	0.001240	6.77	3064.03	603.37	0.38
Reach 1	600	Q100	Proposed_LiDAR	12151.00	3476.97	3492.31	3489.03	3492.84	0.001241	6.77	3061.97	603.27	0.38
Reach 1	500	Q100	Existing_LiDAR	12151.00	3473.11	3492.46		3492.66	0.000556	4.81	5036.73	768.95	0.25
Reach 1	500	Q100	Proposed_LiDAR	12151.00	3473.11	3492.45		3492.65	0.000557	4.82	5034.11	767.91	0.25
Reach 1	400	Q100	Existing_LiDAR	12151.00	3480.68	3492.34		3492.58	0.000604	4.31	4026.85	818.90	0.26
Reach 1	400	Q100	Proposed_LiDAR	12151.00	3480.68	3492.34		3492.58	0.000591	4.26	4050.50	818.94	0.26
Reach 1	300	Q100	Existing_LiDAR	12151.00	3479.84	3492.28		3492.49	0.000468	3.88	4456.17	986.91	0.23
Reach 1	300	Q100	Proposed_LiDAR	12151.00	3479.84	3492.29		3492.49	0.000448	3.77	4522.38	987.33	0.22
Reach 1	200	Q100	Existing_LiDAR	12151.00	3478.34	3492.21		3492.43	0.000516	4.10	4663.57	1089.49	0.24
Reach 1	200	Q100	Proposed_LiDAR	12151.00	3478.34	3492.21		3492.43	0.000509	4.08	4675.82	1089.56	0.24
Reach 1	100	Q100	Existing_LiDAR	12151.00	3476.10	3491.95		3492.35	0.000993	5.73	3819.43	1066.93	0.33
Reach 1	100	Q100	Proposed_LiDAR	12151.00	3476.10	3491.95		3492.35	0.000993	5.73	3819.43	1066.93	0.33
Reach 1	30	Q100	Existing_LiDAR	12151.00	3468.58	3491.29	3482.83	3492.22	0.001109	7.72	1585.52	926.99	0.36
Reach 1	30	Q100	Proposed_LiDAR	12151.00	3468.58	3491.29	3482.83	3492.22	0.001109	7.72	1585.52	926.99	0.36
Reach 1	0			Bridge									
Reach 1	-30	Q100	Existing_LiDAR	12151.00	3474.48	3487.13	3487.13	3491.15	0.009450	16.09	755.39	216.44	0.99
Reach 1	-30	Q100	Proposed_LiDAR	12151.00	3474.48	3487.13	3487.13	3491.15	0.009450	16.09	755.39	216.44	0.99
Reach 1	-100	Q100	Existing_LiDAR	12151.00	3478.05	3486.10	3487.02	3489.71	0.016397	15.95	957.39	265.49	1.23
Reach 1	-100	Q100	Proposed_LiDAR	12151.00	3478.05	3486.10	3487.02	3489.71	0.016397	15.95	957.39	265.49	1.23

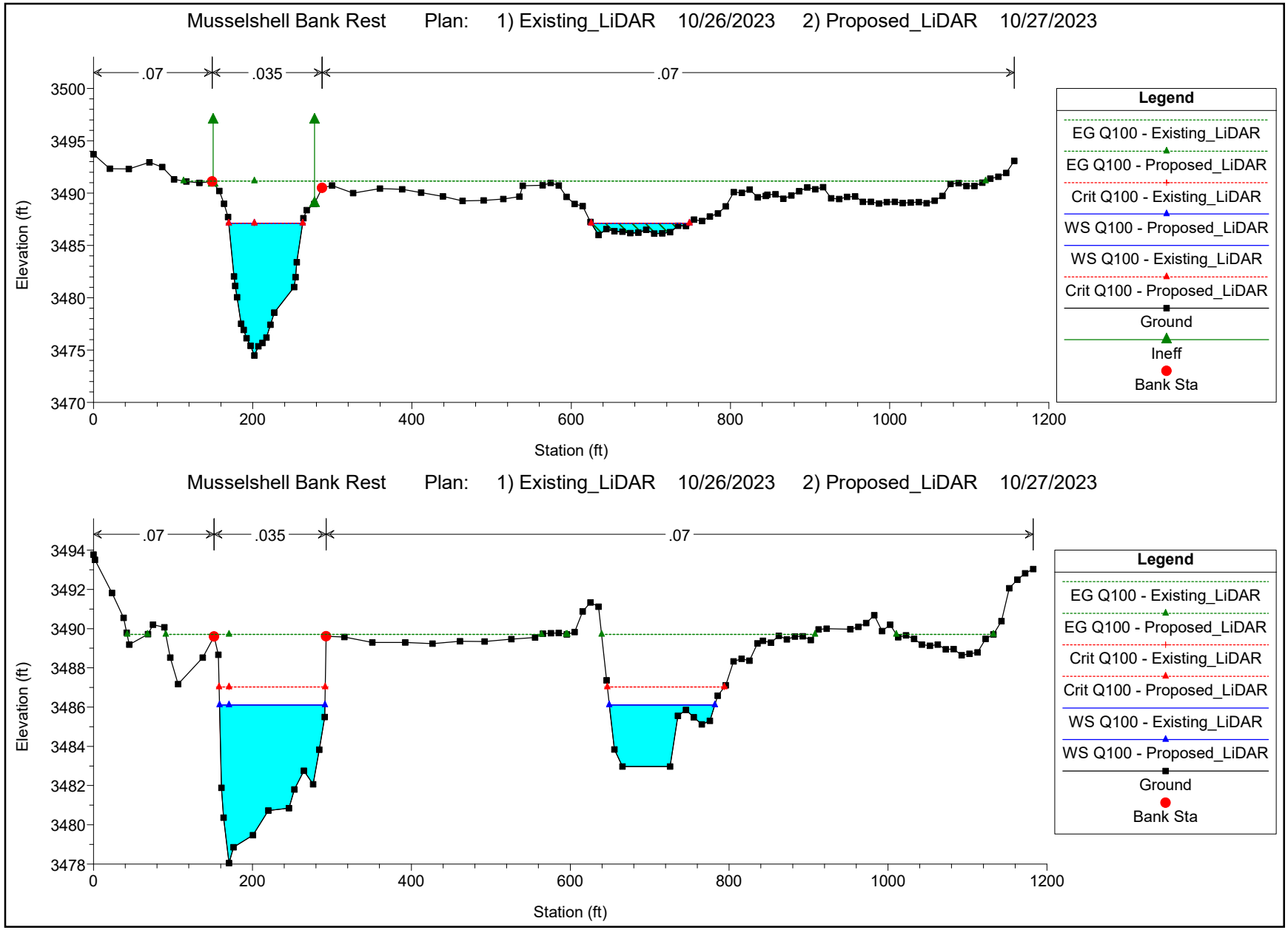












Plan: Proposed_LiDAR Musselshell Reach 1 RS: 600 Profile: Q100

E.G. Elev (ft)	3492.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	3492.31	Reach Len. (ft)	94.00	111.00	119.00
Crit W.S. (ft)	3489.03	Flow Area (sq ft)	1004.69	1307.27	750.01
E.G. Slope (ft/ft)	0.001241	Area (sq ft)	1004.69	1307.27	750.01
Q Total (cfs)	12151.00	Flow (cfs)	2195.85	8848.52	1106.64
Top Width (ft)	603.27	Top Width (ft)	199.94	132.88	270.45
Vel Total (ft/s)	3.97	Avg. Vel. (ft/s)	2.19	6.77	1.48
Max Chl Dpth (ft)	15.34	Hydr. Depth (ft)	5.03	9.84	2.77
Conv. Total (cfs)	344870.4	Conv. (cfs)	62322.7	251139.1	31408.7
Length Wtd. (ft)	110.10	Wetted Per. (ft)	201.12	135.81	270.67
Min Ch El (ft)	3476.97	Shear (lb/sq ft)	0.39	0.75	0.21
Alpha	2.19	Stream Power (lb/ft s)	0.85	5.05	0.32
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	5.50	35.23	22.56
C & E Loss (ft)	0.10	Cum SA (acres)	1.92	3.83	6.51

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 500 Profile: Q100

E.G. Elev (ft)	3492.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	3492.45	Reach Len. (ft)	122.00	124.00	99.00
Crit W.S. (ft)		Flow Area (sq ft)	1187.25	1230.49	2616.36
E.G. Slope (ft/ft)	0.000557	Area (sq ft)	1187.25	1230.49	2616.36
Q Total (cfs)	12151.00	Flow (cfs)	1726.01	5926.45	4498.54
Top Width (ft)	767.91	Top Width (ft)	249.06	109.61	409.24
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	1.45	4.82	1.72
Max Chl Dpth (ft)	19.34	Hydr. Depth (ft)	4.77	11.23	6.39
Conv. Total (cfs)	515053.1	Conv. (cfs)	73161.4	251208.7	190683.0
Length Wtd. (ft)	117.35	Wetted Per. (ft)	249.71	116.69	411.27
Min Ch El (ft)	3473.11	Shear (lb/sq ft)	0.17	0.37	0.22
Alpha	2.18	Stream Power (lb/ft s)	0.24	1.76	0.38
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	3.13	31.99	17.96
C & E Loss (ft)	0.00	Cum SA (acres)	1.44	3.52	5.59

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 400 Profile: Q100

E.G. Elev (ft)	3492.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	3492.34	Reach Len. (ft)	109.00	155.00	176.00
Crit W.S. (ft)		Flow Area (sq ft)	161.71	2400.54	1488.26
E.G. Slope (ft/ft)	0.000591	Area (sq ft)	161.71	2400.54	1488.26
Q Total (cfs)	12151.00	Flow (cfs)	94.23	10235.25	1821.52
Top Width (ft)	818.94	Top Width (ft)	134.46	279.79	404.69
Vel Total (ft/s)	3.00	Avg. Vel. (ft/s)	0.58	4.26	1.22
Max Chl Dpth (ft)	11.66	Hydr. Depth (ft)	1.20	8.58	3.68
Conv. Total (cfs)	499976.7	Conv. (cfs)	3877.3	421149.6	74949.8
Length Wtd. (ft)	157.34	Wetted Per. (ft)	134.71	285.76	407.27
Min Ch El (ft)	3480.68	Shear (lb/sq ft)	0.04	0.31	0.13
Alpha	1.73	Stream Power (lb/ft s)	0.03	1.32	0.16
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	1.24	26.82	13.30
C & E Loss (ft)	0.01	Cum SA (acres)	0.90	2.97	4.66

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 300 Profile: Q100

E.G. Elev (ft)	3492.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	3492.29	Reach Len. (ft)	77.00	117.00	112.00
Crit W.S. (ft)		Flow Area (sq ft)	183.99	2843.00	1495.39
E.G. Slope (ft/ft)	0.000448	Area (sq ft)	183.99	2843.00	1495.39
Q Total (cfs)	12151.00	Flow (cfs)	105.50	10715.89	1329.61
Top Width (ft)	987.33	Top Width (ft)	127.09	324.88	535.36
Vel Total (ft/s)	2.69	Avg. Vel. (ft/s)	0.57	3.77	0.89
Max Chl Dpth (ft)	12.45	Hydr. Depth (ft)	1.45	8.75	2.79
Conv. Total (cfs)	573911.9	Conv. (cfs)	4982.9	506129.2	62799.8
Length Wtd. (ft)	115.94	Wetted Per. (ft)	127.67	331.09	537.40
Min Ch El (ft)	3479.84	Shear (lb/sq ft)	0.04	0.24	0.08
Alpha	1.75	Stream Power (lb/ft s)	0.02	0.91	0.07
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.81	17.49	7.27
C & E Loss (ft)	0.00	Cum SA (acres)	0.57	1.89	2.76

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 200 Profile: Q100

E.G. Elev (ft)	3492.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	3492.21	Reach Len. (ft)	39.00	93.00	34.00
Crit W.S. (ft)		Flow Area (sq ft)	200.19	2464.70	2010.93
E.G. Slope (ft/ft)	0.000509	Area (sq ft)	200.19	2464.70	2010.93
Q Total (cfs)	12151.00	Flow (cfs)	127.16	10061.12	1962.72
Top Width (ft)	1089.56	Top Width (ft)	130.76	269.48	689.32
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)	0.64	4.08	0.98
Max Chl Dpth (ft)	13.87	Hydr. Depth (ft)	1.53	9.15	2.92
Conv. Total (cfs)	538730.3	Conv. (cfs)	5637.8	446072.6	87019.9
Length Wtd. (ft)	81.55	Wetted Per. (ft)	131.00	280.02	690.89
Min Ch El (ft)	3478.34	Shear (lb/sq ft)	0.05	0.28	0.09
Alpha	2.07	Stream Power (lb/ft s)	0.03	1.14	0.09
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.47	10.37	2.76
C & E Loss (ft)	0.02	Cum SA (acres)	0.35	1.09	1.19

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 100 Profile: Q100

E.G. Elev (ft)	3492.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.	0.070	0.035	0.070
W.S. Elev (ft)	3491.95	Reach Len. (ft)	83.00	86.00	16.00
Crit W.S. (ft)		Flow Area (sq ft)	208.63	1658.10	1952.70
E.G. Slope (ft/ft)	0.000993	Area (sq ft)	208.63	1658.10	1952.70
Q Total (cfs)	12151.00	Flow (cfs)	178.36	9497.73	2474.92
Top Width (ft)	1066.93	Top Width (ft)	144.19	175.56	747.18
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)	0.85	5.73	1.27
Max Chl Dpth (ft)	15.85	Hydr. Depth (ft)	1.45	9.44	2.61
Conv. Total (cfs)	385667.8	Conv. (cfs)	5661.0	301453.9	78552.8
Length Wtd. (ft)	78.85	Wetted Per. (ft)	144.36	187.11	748.50
Min Ch El (ft)	3476.10	Shear (lb/sq ft)	0.09	0.55	0.16
Alpha	2.57	Stream Power (lb/ft s)	0.08	3.15	0.20
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.29	5.97	1.22
C & E Loss (ft)	0.05	Cum SA (acres)	0.22	0.62	0.63

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 30 Profile: Q100

E.G. Elev (ft)	3492.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.	0.070	0.035	
W.S. Elev (ft)	3491.29	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)	3482.83	Flow Area (sq ft)	12.24	1573.28	
E.G. Slope (ft/ft)	0.001109	Area (sq ft)	83.53	1573.28	1641.36
Q Total (cfs)	12151.00	Flow (cfs)	9.14	12141.86	
Top Width (ft)	926.99	Top Width (ft)	78.93	111.81	736.24
Vel Total (ft/s)	7.66	Avg. Vel. (ft/s)	0.75	7.72	
Max Chl Dpth (ft)	22.71	Hydr. Depth (ft)	1.09	14.07	
Conv. Total (cfs)	364880.6	Conv. (cfs)	274.5	364606.1	
Length Wtd. (ft)	10.00	Wetted Per. (ft)	11.26	123.36	
Min Ch El (ft)	3468.58	Shear (lb/sq ft)	0.08	0.88	
Alpha	1.01	Stream Power (lb/ft s)	0.06	6.81	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.01	2.78	0.56
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.33	0.35

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 0 BR U Profile: Q100

E.G. Elev (ft)	3492.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.070	0.035	
W.S. Elev (ft)	3491.25	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)	3482.85	Flow Area (sq ft)	1.36	1556.61	
E.G. Slope (ft/ft)	0.001157	Area (sq ft)	1.36	1556.61	
Q Total (cfs)	12151.00	Flow (cfs)	1.03	12149.96	
Top Width (ft)	113.01	Top Width (ft)	1.26	111.75	
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)	0.76	7.81	
Max Chl Dpth (ft)	22.67	Hydr. Depth (ft)	1.08	13.93	
Conv. Total (cfs)	357259.9	Conv. (cfs)	30.4	357229.5	
Length Wtd. (ft)	30.00	Wetted Per. (ft)	1.26	123.86	
Min Ch El (ft)	3468.58	Shear (lb/sq ft)	0.08	0.91	
Alpha	1.00	Stream Power (lb/ft s)	0.06	7.08	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.00	2.42	0.37
C & E Loss (ft)	0.49	Cum SA (acres)	0.00	0.31	0.27

Plan: Proposed_LiDAR Musselshell Reach 1 RS: 0 BR D Profile: Q100

E.G. Elev (ft)	3491.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.56	Wt. n-Val.		0.035	
W.S. Elev (ft)	3489.09	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)	3487.12	Flow Area (sq ft)		945.99	
E.G. Slope (ft/ft)	0.005112	Area (sq ft)		945.99	
Q Total (cfs)	12151.00	Flow (cfs)		12151.00	
Top Width (ft)	102.43	Top Width (ft)		102.43	
Vel Total (ft/s)	12.84	Avg. Vel. (ft/s)		12.84	
Max Chl Dpth (ft)	14.61	Hydr. Depth (ft)		9.24	
Conv. Total (cfs)	169944.7	Conv. (cfs)		169944.7	
Length Wtd. (ft)	10.00	Wetted Per. (ft)		108.68	
Min Ch El (ft)	3474.48	Shear (lb/sq ft)		2.78	
Alpha	1.00	Stream Power (lb/ft s)		35.68	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)		1.55	0.37
C & E Loss (ft)	0.44	Cum SA (acres)		0.23	0.27

Plan: Proposed_LiDAR Musselshell Reach 1 RS: -30 Profile: Q100

E.G. Elev (ft)	3491.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.02	Wt. n-Val.		0.035	
W.S. Elev (ft)	3487.13	Reach Len. (ft)	74.00	82.00	87.00
Crit W.S. (ft)	3487.13	Flow Area (sq ft)		755.39	
E.G. Slope (ft/ft)	0.009450	Area (sq ft)		755.39	90.14
Q Total (cfs)	12151.00	Flow (cfs)		12151.00	
Top Width (ft)	216.44	Top Width (ft)		92.86	123.58
Vel Total (ft/s)	16.09	Avg. Vel. (ft/s)		16.09	
Max Chl Dpth (ft)	12.65	Hydr. Depth (ft)		8.14	
Conv. Total (cfs)	124997.3	Conv. (cfs)		124997.3	
Length Wtd. (ft)	82.24	Wetted Per. (ft)		98.17	
Min Ch El (ft)	3474.48	Shear (lb/sq ft)		4.54	
Alpha	1.00	Stream Power (lb/ft s)		73.02	
Frctn Loss (ft)	1.16	Cum Volume (acre-ft)		1.36	0.36
C & E Loss (ft)	0.36	Cum SA (acres)		0.21	0.26

Plan: Proposed_LiDAR Musselshell Reach 1 RS: -100 Profile: Q100

E.G. Elev (ft)	3489.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.60	Wt. n-Val.		0.035	0.070
W.S. Elev (ft)	3486.10	Reach Len. (ft)			
Crit W.S. (ft)	3487.02	Flow Area (sq ft)		688.77	268.62
E.G. Slope (ft/ft)	0.016397	Area (sq ft)		688.77	268.62
Q Total (cfs)	12151.00	Flow (cfs)		10987.45	1163.55
Top Width (ft)	265.49	Top Width (ft)		132.78	132.71
Vel Total (ft/s)	12.69	Avg. Vel. (ft/s)		15.95	4.33
Max Chl Dpth (ft)	8.05	Hydr. Depth (ft)		5.19	2.02
Conv. Total (cfs)	94893.4	Conv. (cfs)		85806.7	9086.7
Length Wtd. (ft)		Wetted Per. (ft)		137.03	133.53
Min Ch El (ft)	3478.05	Shear (lb/sq ft)		5.15	2.06
Alpha	1.44	Stream Power (lb/ft s)		82.08	8.92
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Bridge Riprap Sizing per Hydraulic Engineering Circular No. 23
Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance - Third Edition
September 2009
Publication No. FHWA-NHI-09-112

Inputs

8.16	= V, characteristic average velocity in the contracted section, ft/s	
2.65	= Ss, specific gravity of rock riprap (typically use 2.65)	
32.2	= g, gravitational acceleration, 32.2 ft/s2	
9.15	= y, depth of flow, ft	
spill-through	= Abutment type:	spill-through
		vertical wall

Calculations

0.475	= Froude Number for wide opening (V/(gy)^1/2)	
1.650	= (Ss - 1)	
0.226	= V^2/gy	

For Froude Numbers <= 0.80 (Equation 14.1)

0.89	= K	
0.539	= K/(Ss - 1)	
1.115	= D50 (ft)	

For Froude Numbers > 0.80 (Equation 14.2)

0.61	= K	
0.370	= K/(Ss - 1)	
2.747	= D50 (ft)	

Summary

1.115	**= D50, caluculated median stone diameter, ft**	
	Note:	Class I D50 = 0.66 ft
		Class II D50 = 1.32 ft
		Class III D50 = 2.00 ft
Class II	= Class of Riprap selected	

PIONEER TECHNICAL SERVICES, INC.

Technical Memorandum

To: Musselshell Watershed Coalition

From: Jon Jupka, P.E., CFM

CC: Karin Boyd and George Austiguy, P.E.

Date: 6/3/2022

Re: Rowton and Cushman Bridge Preliminary Engineering Report

This Memorandum provides preliminary design and cost opinions for (2) projects selected by The Musselshell River Watershed Coalition. Two alternatives are provided for each project. The (2) projects that were evaluated are:

- Rowton Property, and
- Cushman Bridge

Figure 1 shows the projects' locations. Each proposed project's objective, design criteria, method and cost estimate are discussed in this memo.

Rowton Property Bank Restoration

Rowton Property looking North

Background and Objective

In response to the 2011 Musselshell River flood event a meander bend stream bank on the Rowton property experienced significant erosion and migration. Additional high flow events since the 2011 event have continued to erode to the channel banks and the river has migrated to the west and the north. The erosion has resulted in loss of agricultural land and if it continues, may endanger multiple structures on the Rowton property. The project objective is to use vegetation to increase streambank and floodplain roughness. Flattening and vegetating the steep cut bank will help reduce channel migration and provide a more resilient floodplain and streambank. The Rowton property is not located in a regulatory mapped floodplain area of the Musselshell River.

Method

The proposed bank restoration method will involve building a brush matrix bank and grading the steep cut bank back to a milder slope (3 horizontal to 1 vertical [3:1]).

A brush matrix bank treatment consists of constructing a new channel bank with coarse alluvium, dormant willow cuttings and woody debris (branches, roots, or small trees not expected to grow). Once the willow cuttings have been established, they will increase roughness by providing riparian vegetation within the floodplain and streambank. This vegetation will improve bank stability and provide shade/cover, improving aquatic habitat. The woody debris adds roughness to the bank, reducing erosive forces until the willows are established. As part of the brush matrix bank treatment a bench 10-15 feet wide will be constructed at the floodplain elevation to provide additional floodplain conveyance capacity. This bench will be planted with willow cuttings to add floodplain roughness during out of bank flood events. Finally, grading the cut bank to a milder slope and vegetating will provide a more geotechnically stable slope that is easier for vegetation to become established and will help to reduce erosion during flood events.

The brush matrix bank treatment is designed to be constructed to bankfull flow elevation. The brush matrix and bench will be planted with locally harvested willows and the slope will be planted with native grasses. The proposed bank design was based on April 2022 GPS survey data, 2011 LiDAR, and site observations.

Results

Two alternatives were proposed for the Rowton Property Bank restoration project, as shown in Figure 2 and Figure 3. The first alternative would provide bank treatment for the more actively eroding reach of bank. This alternative would start at the meander bend's downstream end and continue ~1,000ft upstream. The second alternative would provide bank treatment for entire ~1,800 ft of eroding meander bend. Two brush matrix bank treatment variations are proposed. For areas that are expected to see higher erosive forces an erodible rock toe will be placed in the channel beneath the brush matrix. This rock toe is intended to withstand more frequent flood events but can be mobilized at less frequent flood events. This will provide a better chance for the new vegetation to establish, while still allowing the river the ability to adjust during large flood events. Figure 7 shows the typical brush matrix bank treatments. Additional detailed survey and engineering analysis will be required for final construction level design.

The brush matrix bank treatment is proposed as a bank restoration technique. Per the State of Montana Model Floodplain Ordinances Section 9.14 stream bank restoration is categorized as "*projects intended to reestablish the terrestrial and aquatic attributes of a natural stream and not for protection of a structure or development*". The Rowton bank restoration is not intended or designed to protect a structure but to reduce future erosion and improve aquatic and riparian habitat by promoting vegetation. The bank treatments are not designed to

withstand a specific flow but will be designed to "*not increase velocity or erosion upstream, downstream, across from or adjacent to the site;*" (ARM 36.15.606(1)(b)). A floodplain permit and approval will be required as part of the project permits.

A feasibility level cost opinion (+25%) was developed based on the preliminary design. The cost opinion assumes cut material will be disposed of locally, fill material will be available locally and willow cuttings can be harvested on or near the site. Due to the cut banks height a large volume of bank material will need to be excavated. Installing a narrower bench may save cost on the overall project. The total cost could be reduced by using volunteer labor to harvest and plant the willows.

Where available, local rates were used to calculate the expected costs. Where local data was not readily available costs from RS Means and other similar projects were used for the estimate. The cost opinion includes cost of construction and a 25% contingency.

Table 1 and Table 2 summarizes the itemized breakdown of the total feasibility cost opinion for Alternative 1 at $165,100 and Alternative 2 at $245,500, respectfully.

Cushman Bridge

Cushman Bridge Site Looking West

Background and Objective

When the Cushman Bridge was installed, the Musselshell River upstream of the crossing was relatively straight and streamflow traveled perpendicular to Cushman Road. Since the 2011 flood event, the south bank has started eroding as the river attempts to lengthen. The river has abandoned the old channel and now flows in a new channel to the south and has created a meander bend just west of Cushman Road (Figure 4). The erosion has resulted in loss of land and if continues, may endanger Cushman Road. The project objective is to reduce the erosion potential, improve aquatic and riparian habitat, and improve the hydraulic bridge approach. The Cushman Bridge site objective will be to have a less deformable toe than Rowton, the degree of protection will be determined by stake holders during final design. The Cushman Bridge is in a mapped Zone AE (no Floodway) reach of the Musselshell River.

Method

Two alternatives were analyzed for the Cushman Bridge site.

The first alternative consists of a similar brush matrix bank treatment as proposed for on the Rowton Property (Figure 6), new bank will be constructed with coarse alluvium, willow cuttings and woody debris. The treatment will also include a small bench (10'-15') with willow cuttings and grading the steep cut bank back to a milder slope (3 horizontal to 1 vertical [3:1]). The brush matrix bank treatment will be placed near bankfull flow elevation and planted with locally harvested willow cuttings (Figure 5).

The second alternative would realign the river back into the abandoned channel with the use of a large woody debris plug and new channel banks would be constructed using the brush matrix bank treatment (Figure 6).

A large woody debris plug is an embankment placed in the active river channel to divert the flow into a newly constructed or re-activated channel. Large logs and/or root wads will be partially embedded within the embankment with the root ball side exposed to the river (Figure 8). The roughness from the woody debris provides habitat and reduces the erosive forces on the plug to help establish the new channel.

Excess material from the re-activated channel excavation will be placed in the current active channel to create a floodplain and wetland areas. Locally harvested willow clumps (large, salvaged willow plants) will be placed in the new floodplain. The existing cut bank to the south will be graded back to a 3:1 slope and seeded to reduce the chance of additional erosion during large flood events. Both proposed alternatives were based on April 2022 GPS survey data, 2011 LiDAR, and site observations.

Results

The first alternative would provide bank treatment for approximately 475 feet. Figure 7 shows the typical brush matrix bank treatment. This alternative would not move the river from its current alignment. Additional detailed survey and engineering analysis will be required for final construction level design.

For the second alternative approximately 500 feet of channel will be re-constructed to realign the channel to the pre-2011 channel alignment. A brush matrix bank treatment will be installed on both relocated channel banks where erosive forces are expected to occur. The existing cut bank would be graded and seeded. Additional detailed survey and analysis will be required for final construction level design.

Both alternatives could be considered streambank restoration projects as discussed above for the Rowton Project or designed as bank stabilization protecting the bank for flows up to the 100-year storm event. Since the

Cushman Bridge site falls within a mapped Zone AE flood zone and encroachment analysis will be required along with the project permits. The first alternative may allow for a less expensive qualitative encroachment analysis (if treated as a bank restoration project).

The second alternative would require placing fill in the existing channel and construction within an effective Special Flood Hazard Area. The placement of fill and channel re-alignment will require a quantitative encroachment analysis to demonstrate the re-aligned channel will not raise the BFE water surface more than 0.5 feet during a 100-year storm event. In addition to the encroachment analysis, placing fill within the active channel will require approval from the Army Corps of Engineers. Both additional requirements will be addressed under the Joint Application permits but will require extra design effort and federal agency approval to proceed.

A feasibility level cost opinion (+25%) was developed based on the preliminary design. The cost opinion assumes cut material will be reused to fill in the channel and willow cuttings/clumps can be harvested on or near the site. The total cost may be reduced by using volunteer labor to harvest and plant the willows. Reinforcing the toe to withstand the 100-year storm event would add additional cost for the larger stone.

When available, local rates were used to calculate the expected costs. Where local data was not readily available costs from RS Means and other similar projects were used for the estimate. The cost opinion includes cost of construction and a 25% contingency.

Table 3 and Table 4 summarizes the itemized breakdown of the total feasibility cost opinion for Alternative 1 at $92,800 and Alternative 2 at $176,100 respectfully.

Tables

Table 1 - Rowton Property Alternative #1

Project: **Rowton Property**
Date: **6/1/2022**

Work Item	Desc.	Unit	Quantity	Unit Cost	Total Cost	Notes
	Alternative #1 - Construction Costs					
1	Mobilization	LS	1	$ 12,500	$ 12,500	Includes all prep work for transport and movement of personal, equipment, supplies and incidentals to/from the project site.
1a	Bonding	LS	1	$ 4,800	$ 4,800	Construction Bonding 5% of project total
2	Water Management	LS	1	$ 1,000	$ 1,000	Includes work area stormwater management and sediment control
3	Bank Treatment					Includes brush matrix bank construction, bank excavation, slope grading, fill materials, plantings, seeding and labor
3a	Type 1 Bank Treatment	LS	1	$ 17,000	$ 17,000	Brush matrix construction with native toe (490 lf, ~$34.75/ft)
3b	Type 2 Bank Treatment	LS	1	$ 20,000	$ 20,000	Brush matrix construction with cobble toe (510 lf, ~39.25/ft)
3c	Excavation, Grading, Miscellaneous	LS	1	$ 46,500	$ 46,500	Bank excavation, slope grading, fill materials, plantings, seeding
	Construction Subtotal				**$ 101,800**	
	Construction Contingency				**$ 25,450**	25% construction cost contingency
	Construction Total				**$ 127,250**	Total construction cost estimate with 20% contingency.
	Alternative #1 - Engineering Costs					
4	Final Design and Permitting	T&M			**$ 20,200**	Includes finalizing (100%) construction drawings and specifications, Bid package support, attendance at Pre-bid Meeting and issue clarifications\addenda to the bid documents as needed.
5	Construction Services	T&M			**$ 17,600**	Includes Design Engineer or Engineer Representative on-site inspections during river diversion, for milestone inspection and support ,(6 days total) substantial completion, submittal reviews, design clarifications\adjustments and pay request reviews.
	Rowton Alternative #1 Total[1]				**$ 165,100**	

1 Rounded up to the nearest $100

Table 2 - Rowton Property Alternative #2

Project: **Rowton Property**
Date: **6/1/2022**

Work Item	Desc.	Unit	Quantity	Unit Cost	Total Cost	Notes
	Alternative #2 - Construction Costs					
1	Mobilization	LS	1	$ 17,900	$ 17,900	Includes all prep work for transport and movement of personal, equipment, supplies and incidentals to/from the project site.
1a	Bonding	LS	1	$ 7,700	$ 7,700	Construction Bonding 5% of project total
2	Water Management	LS	1	$ 2,000	$ 2,000	Includes work area stormwater management and sediment control
3	Bank Treatment					Includes brush matrix bank construction, bank excavation, slope grading, fill materials, plantings, seeding and labor
3a	Type 1 Bank Treatment	LS	1	$ 35,400	$ 35,400	Brush matrix construction with native toe (1,020 lf, ~$34.75/ft)
3b	Type 2 Bank Treatment	LS	1	$ 30,600	$ 30,600	Brush matrix construction with cobble toe (780 lf, ~39.25/ft)
3c	Excavation, Grading, Miscellaneous	LS	1	$ 69,300	$ 69,300	Bank excavation, slope grading, fill materials, plantings, seeding
	Construction Subtotal				**$ 162,900**	
	Construction Contingency				**$ 40,725**	25% construction cost contingency
	Construction Total				**$ 203,625**	Total construction cost estimate with 20% contingency.
	Alternative #2 - Engineering Costs					
4	Final Design and Permitting	T&M			**$ 20,200**	Includes finalizing (100%) construction drawings and specifications, Bid package support, attendance at Pre-bid Meeting and issue clarifications\addenda to the bid documents as needed.
5	Construction Services	T&M			**$ 21,600**	Includes Design Engineer or Engineer Representative on-site inspections during river diversion, for milestone inspection and support ,(10 days total) substantial completion, submittal reviews, design clarifications\adjustments and pay request reviews.
	Rowton Alternative #2 Total[1]				**$ 245,500**	

1 Rounded up to the nearest $100

Table 3 - Cushman Bridge Alternative #1

Project: **Cushman Bridge**
Date: **6/1/2022**

	Alternative #1 - Construction Costs					
Work Item	**Desc.**	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**	**Notes**
1	Mobilization	LS	1	$ 7,800	$ 7,800	Includes all prep work for transport and movement of personal, equipment, supplies and incidentals to/from the project site.
1a	Bonding	LS	1	$ 2,200	$ 2,200	Construction Bonding 5% of project total
2	Water Management	LS	1	$ 600	$ 600	Includes work area stormwater management and sediment control
3	Bank Treatment					Includes brush matrix bank construction, bank excavation, slope grading, fill materials, plantings, seedings and labor
3a	Type 1 Bank Treatment	LS	1	$ 9,600	$ 9,600	Brush matrix construction with native toe (275 lf, ~$34.75/ft)
3b	Type 2 Bank Treatment	LS	1	$ 7,900	$ 7,900	Brush matrix construction with cobble toe (200 lf, ~39.25/ft) [Type 2 bank treatment costed with cobbles, larger, less mobile stone will add cost to bank treatment]
3c	Excavation, Grading, Miscellaneous	LS	1	$ 19,400	$ 19,400	Bank excavation, slope grading, fill materials, plantings, seeding
	Construction Subtotal				**$ 47,500**	
	Construction Contingency				**$ 11,875**	25% construction cost contingency
	Construction Total				**$ 59,375**	Total construction cost estimate with 20% contingency.

	Alternative #1 - Engineering Costs					
4	Final Design and Permitting	T&M			**$ 17,800**	Includes finalizing (100%) construction drawings and specifications, Bid package support, attendance at Pre-bid Meeting and issue clarifications\addenda to the bid documents as needed.
5	Construction Services	T&M			**$ 15,600**	Includes Design Engineer or Engineer Representative on-site inspections during river diversion, for milestone inspection and support ,(4 days total) substantial completion, submittal reviews, design clarifications\adjustments and pay request reviews.

1 Rounded up to the nearest $100

Cushman Alternative #1 Total[1] **$ 92,800**

Table 4 - Cushman Bridge Alternative #2

Project: **Cushman Bridge**
Date: **6/1/2022**

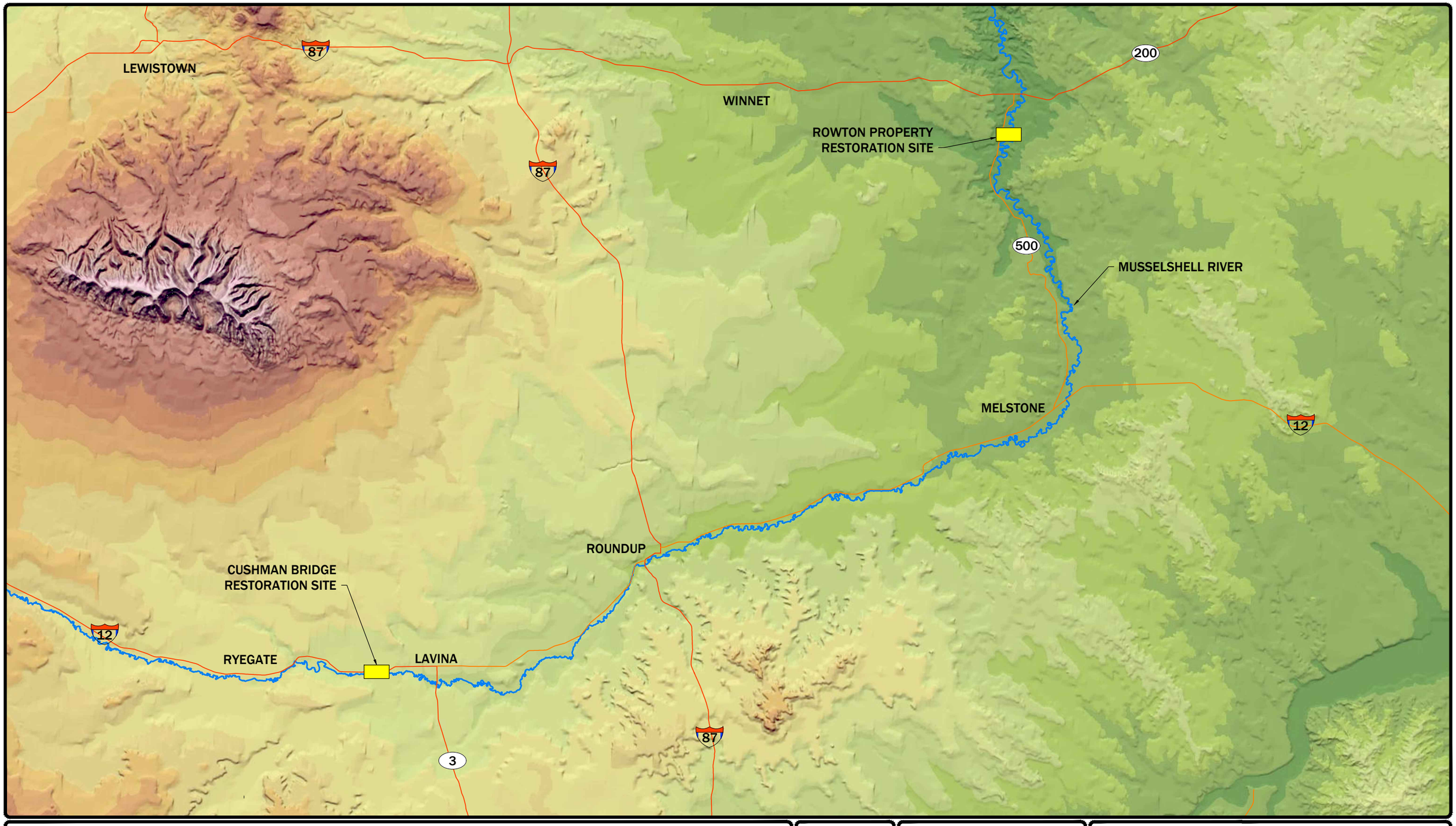
	Alternative #2 - Construction Costs					
Work Item	**Desc.**	**Unit**	**Quantity**	**Unit Cost**	**Total Cost**	**Notes**
1	Mobilization	LS	1	$ 9,400	$ 9,400	Includes all prep work for transport and movement of personal, equipment, supplies and incidentals to/from the project site.
1a	Bonding	LS	1	$ 4,800	$ 4,800	Construction Bonding 5% of project total
2	Water Management	LS	1	$ 3,600	$ 3,600	Includes work area dewatering, stormwater management and sediment control
3	Channel Construction					Includes channel excavation, brush matrix bank construction, and slope grading
3a	Type 1 Bank Treatment	LS	1	$ 5,200	$ 5,200	Brush matrix construction with native toe (185 lf, ~$28.00/ft)
3b	Type 2 Bank Treatment	LS	1	$ 10,300	$ 10,300	Brush matrix construction with cobble toe (320 lf, ~32.25/ft) [Type 2 bank treatment costed with cobbles, larger, less mobile stone will add cost to bank treatment]
3c	Excavation, Grading, Miscellaneous	LS	1	$ 27,900	$ 27,900	Channel excavation and slope grading
4	Active Channel Plug and Backfill	LS	1	$ 40,800	$ 40,800	Includes fill materials, constructing channel plug, backfill, habitat grading, plantings, seedings and labor
	Construction Subtotal				**$ 102,000**	
	Construction Contingency				**$ 25,500**	25% construction cost contingency
	Construction Total				**$ 127,500**	Total construction cost estimate with 20% contingency.

	Alternative #2 - Engineering Costs					
4	Final Design and Permitting	T&M			**$ 27,000**	Includes finalizing (100%) construction drawings and specifications, Bid package support, attendance at Pre-bid Meeting and issue clarifications\addenda to the bid documents as needed.
5	Construction Services	T&M			**$ 21,600**	Includes Design Engineer or Engineer Representative on-site inspections during river diversion, for milestone inspection and support ,(10 days total) substantial completion, submittal reviews, design clarifications\adjustments and pay request reviews.

1 Rounded up to the nearest $100

Cushman Alternative #2 Total[1] **$ 176,100**

Figures



DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANES
DATUM: NAD83/NAVD88
UNITS: INTL. FEET
SOURCE: PIONEER

SCALE IN FEET
0 20,000 40,000

FIGURE 1

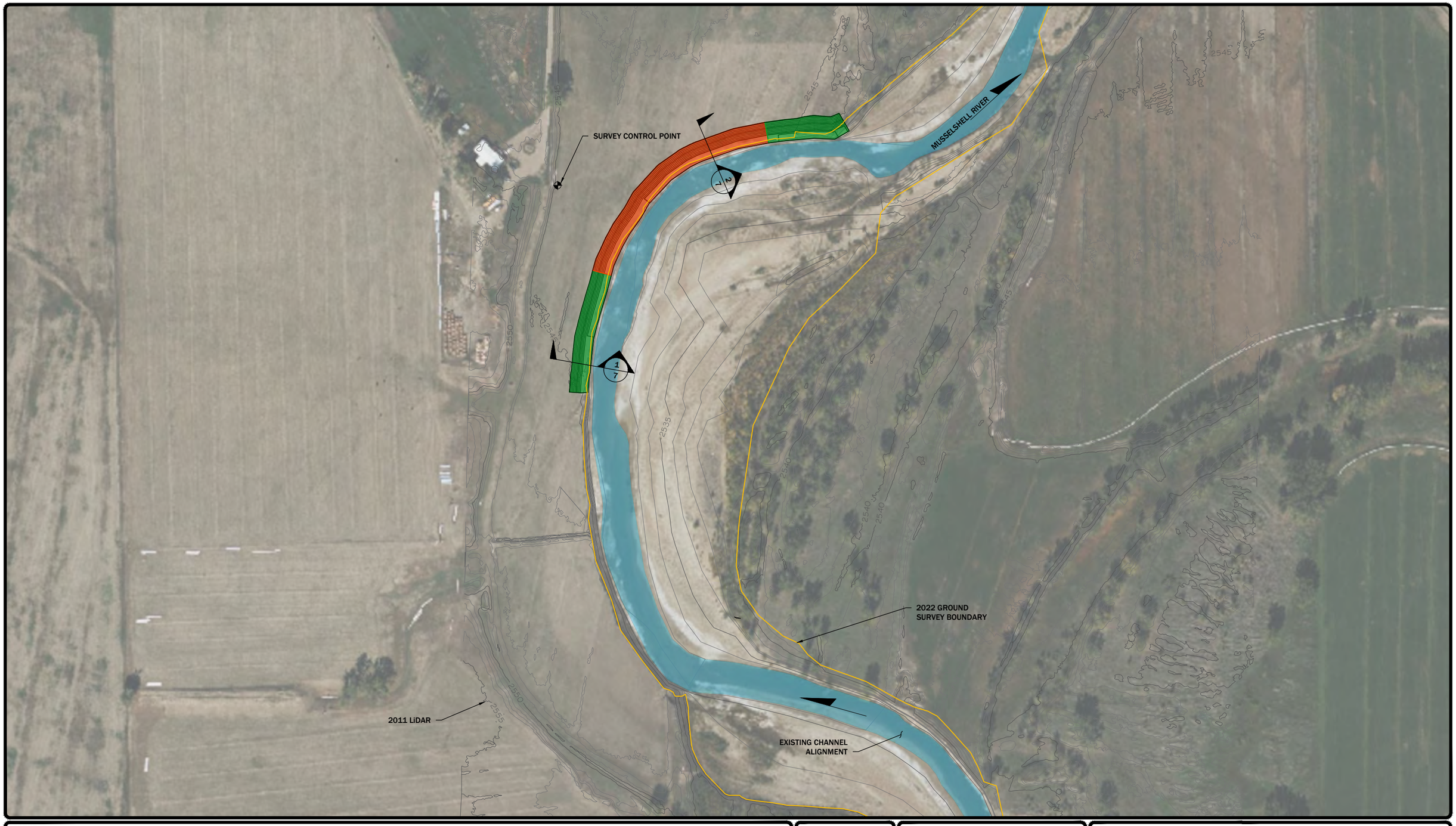
ROWTON AND CUSHMAN BRIDGE SITE LOCATION

PIONEER TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 6/01/2022

6/2/2022 4:12:42 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\ROWTON_SITE_PLAN.DWG

Docusign Envelope ID: C1194835-9F00-46B2-B06D-1AE8E8AE7339



LEGEND:

- TYPE 1 BANK TREATMENT
- TYPE 2 BANK TREATMENT

N

DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANES
DATUM: NAD83/NAVD88
UNITS: INTL. FEET
SOURCE: PIONEER, BING

SCALE IN FEET
0 100 200

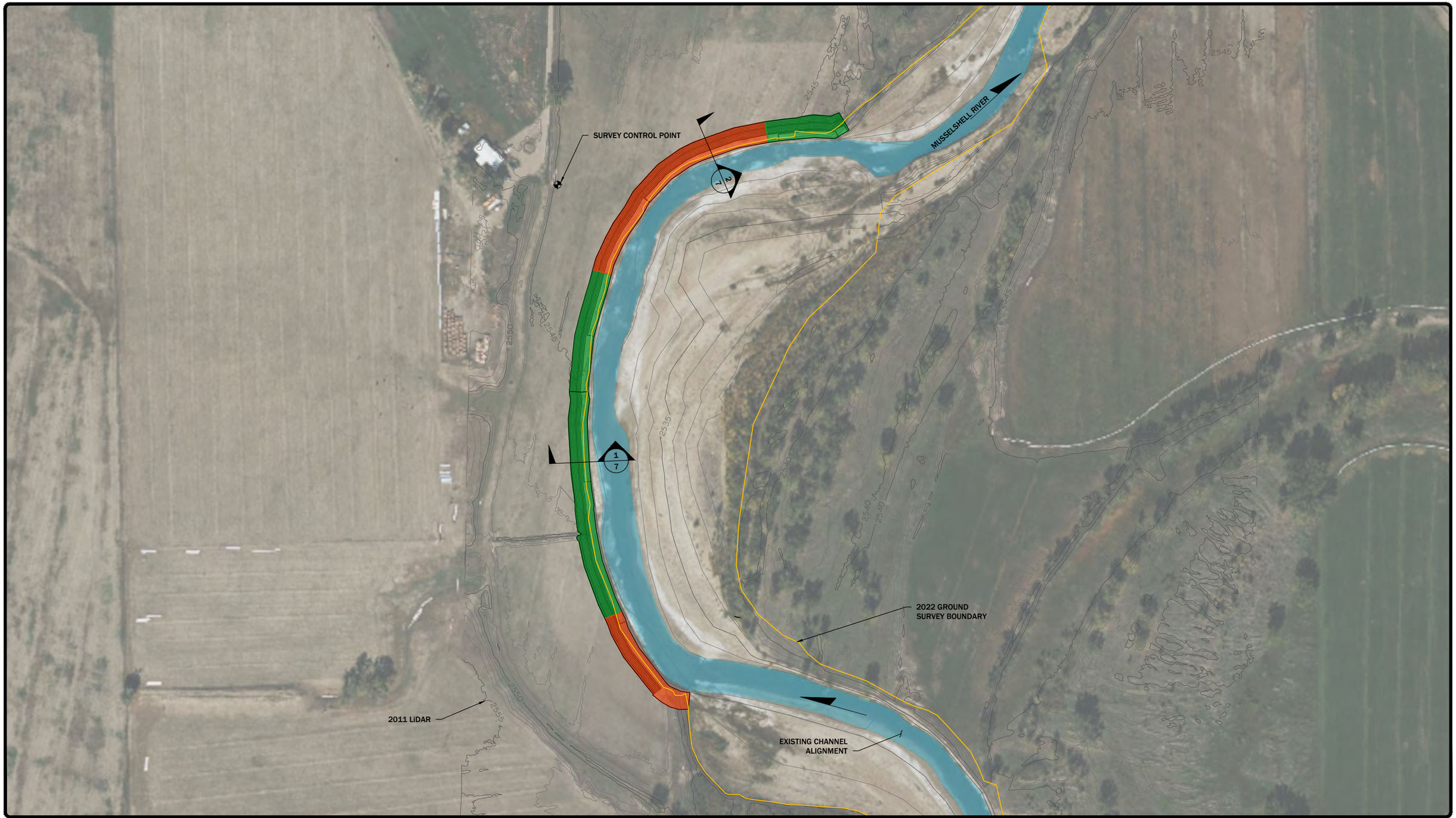
FIGURE 2

ROWTON PROPERTY
BANK RESTORATION
ALTERNATIVE 1
PLAN VIEW

PIONEER TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 6/01/2022

6/2/2022 2:12:02 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\ROWTON.DWG



LEGEND:

- TYPE 1 BANK TREATMENT
- TYPE 2 BANK TREATMENT

N

DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANES
DATUM: NAD83/NAVD88
UNITS: INTL. FEET
SOURCE: PIONEER, BING

SCALE IN FEET
0 100 200

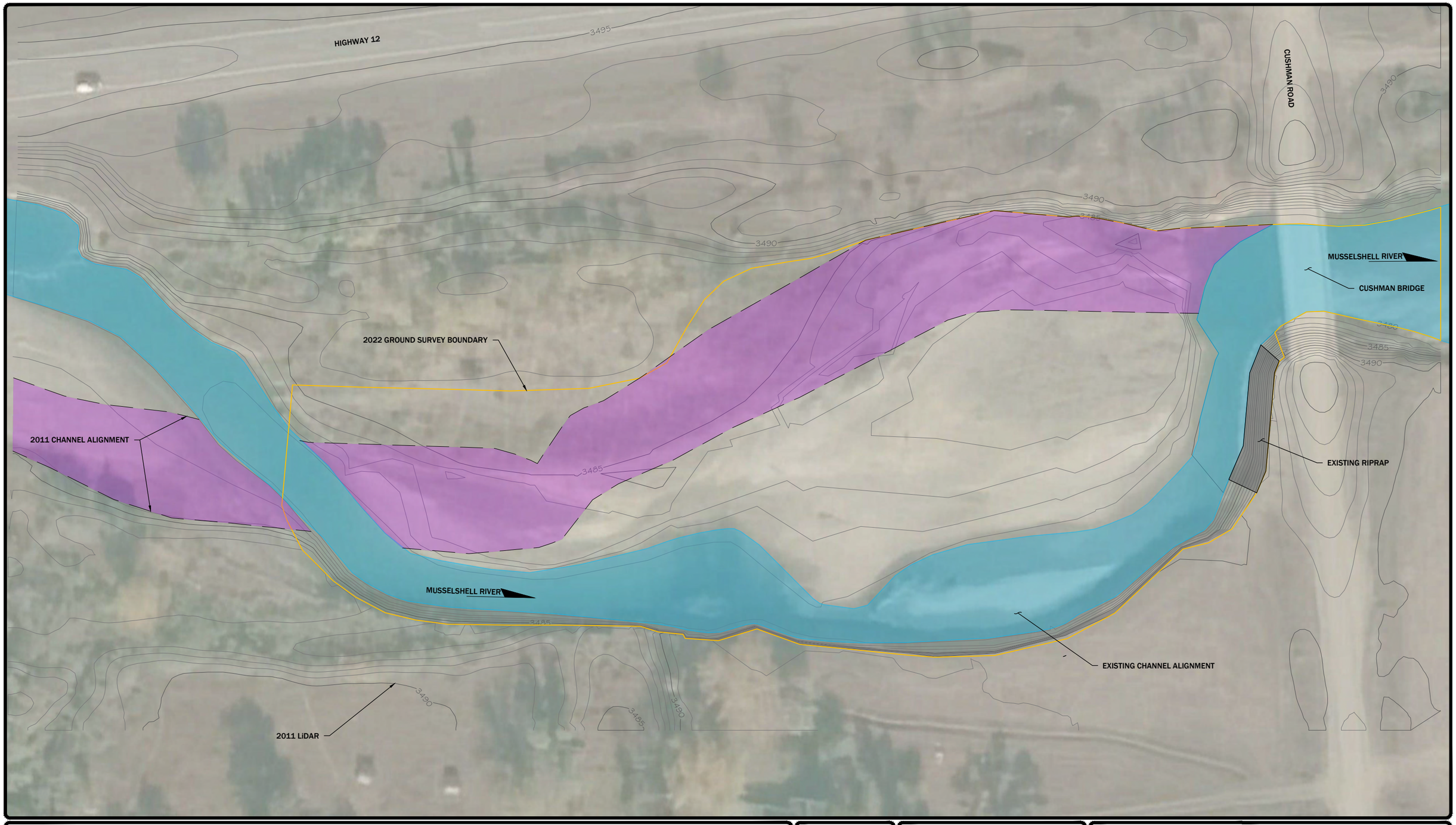
FIGURE 3

ROWTON PROPERTY
BANK RESTORATION
ALTERNATIVE 2
PLAN VIEW

PIONEER TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 6/01/2022

6/2/2022 2:12:26 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\ROWTON.DWG



DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANES
DATUM: NAD83/NAVD88
UNITS: INT. FEET
SOURCE: PIONEER

SCALE IN FEET
0 30 60

FIGURE 4

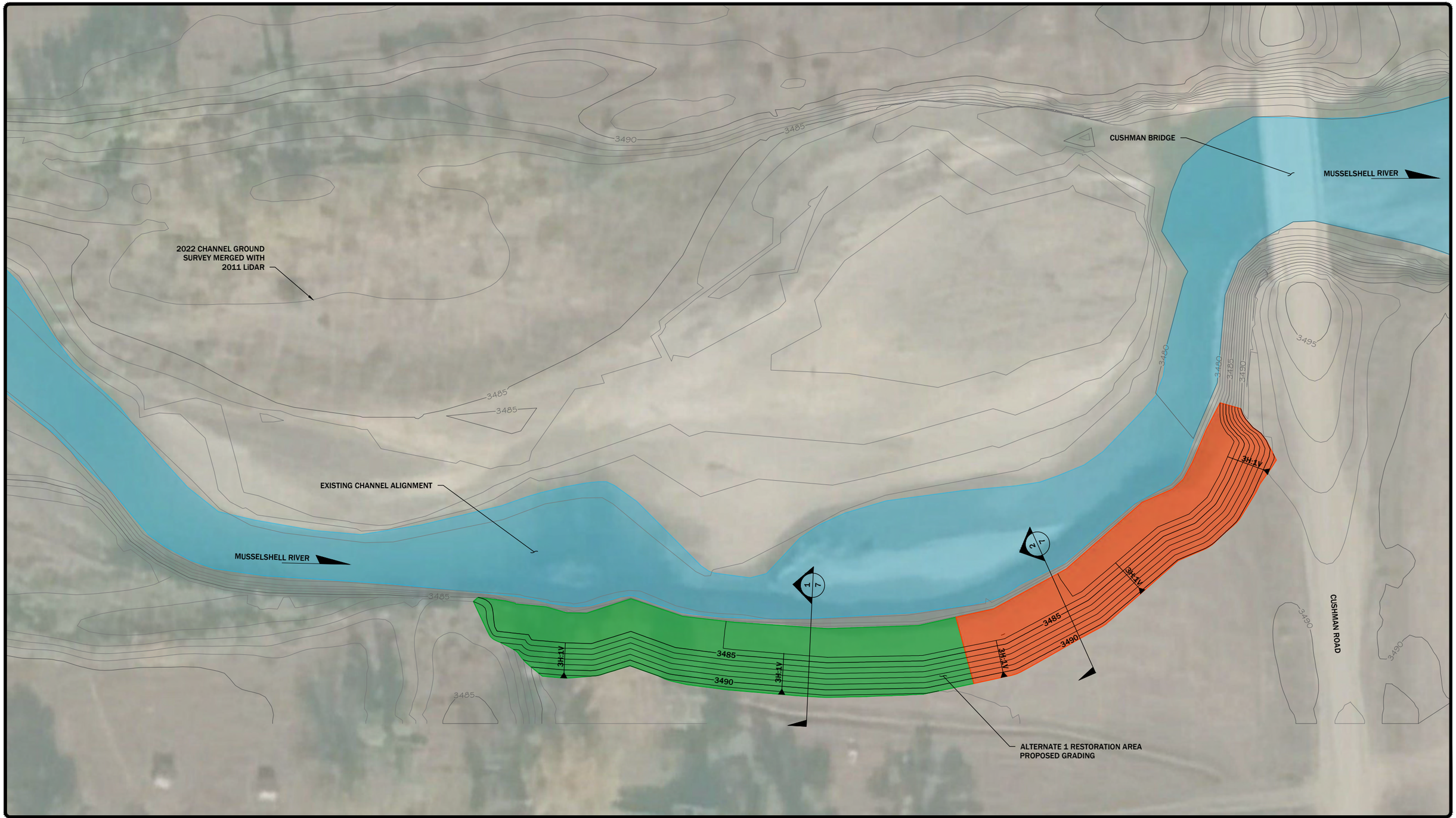
CUSHMAN BRIDGE
SITE MAP
EXISTING
CONDITIONS

PIONEER
TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 6/01/2022

6/2/2022 2:09:52 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\CUSHMAN.DWG

Docusign Envelope ID: C1194835-9F00-46B2-B06D-1AE8E8AE7339



LEGEND:

- TYPE 1 BANK TREATMENT
- TYPE 2 BANK TREATMENT

N

DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANES
DATUM: NAD83/NAVD88
UNITS: INT. FEET
SOURCE: PIONEER

SCALE IN FEET
0 25 50

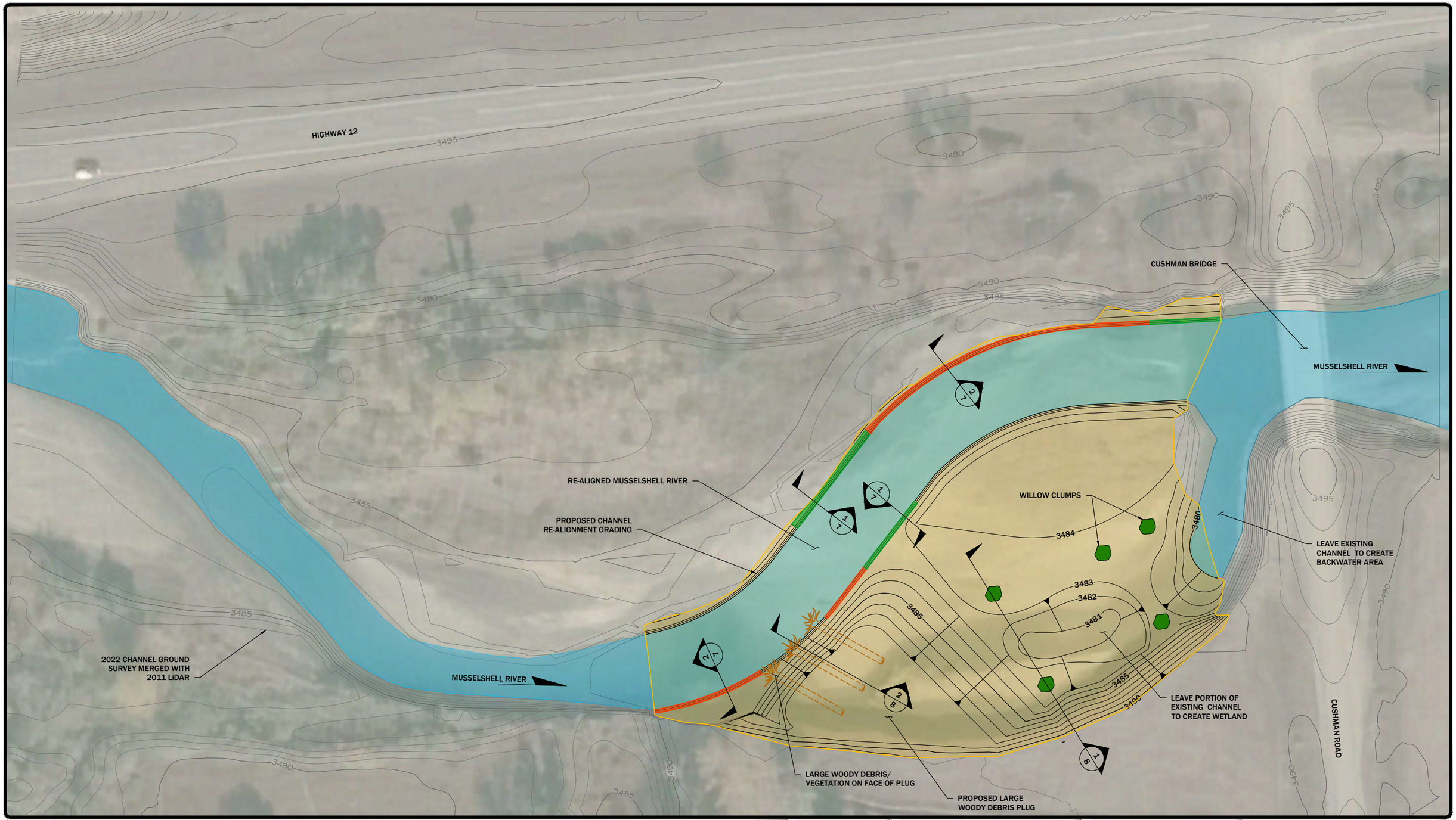
FIGURE 5

PIONEER TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

CUSHMAN BRIDGE BANK RESTORATION ALTERNATIVE 1 PLAN VIEW

DATE: 6/01/2022

6/2/2022 2:10:15 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\CUSHMAN.DWG



LEGEND:

- TYPE 1 BANK TREATMENT
- TYPE 2 BANK TREATMENT
- ALTERNATIVE 2 RESTORATION AREA PROPOSED GRADING

N

	DISPLAYED AS:
COORD SYS/ZONE:	MONTANA STATE PLANES
DATUM:	NAD83/NAVD88
UNITS:	INT. FEET
SOURCE:	PIONEER

SCALE IN FEET
0 30 60

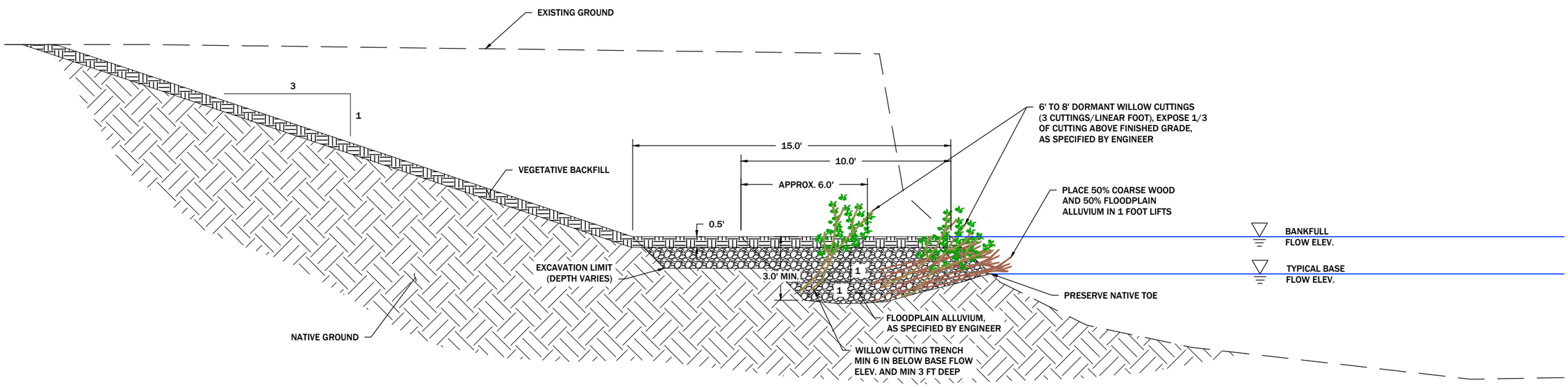
FIGURE 6

PIONEER TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

CUSHMAN BRIDGE BANK RESTORATION ALTERNATIVE 2 PLAN VIEW

DATE: 6/01/2022

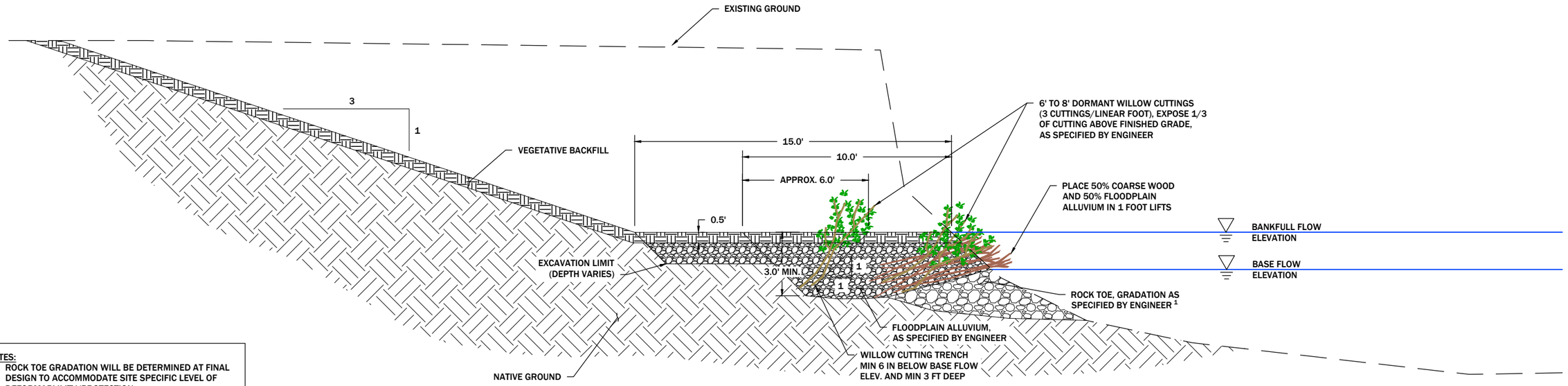
6/2/2022 2:10:42 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\CUSHMAN.DWG



TYPE 1 BANK TREATMENT

1

TYPICAL SECTION
SHEETS: 2, 3, 5, 6
N.T.S.



TYPE 2 BANK TREATMENT

2

TYPICAL SECTION
SHEETS: 2, 3, 5, 6
N.T.S.

NOTES:
1. ROCK TOE GRADATION WILL BE DETERMINED AT FINAL DESIGN TO ACCOMMODATE SITE SPECIFIC LEVEL OF DEFORMABLILITY/PROTECTION.

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: PIONEER

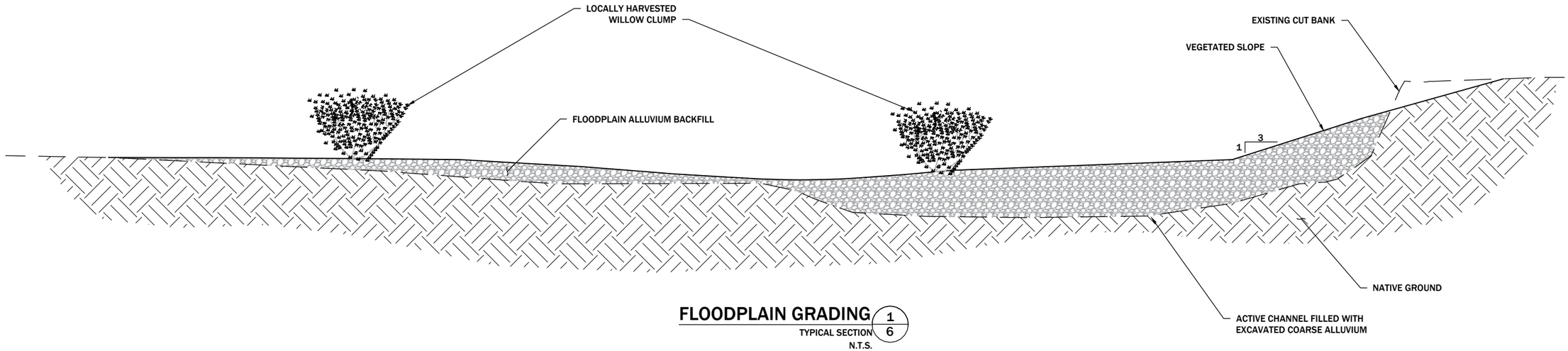
SCALE IN FEET
0 NA

FIGURE 7

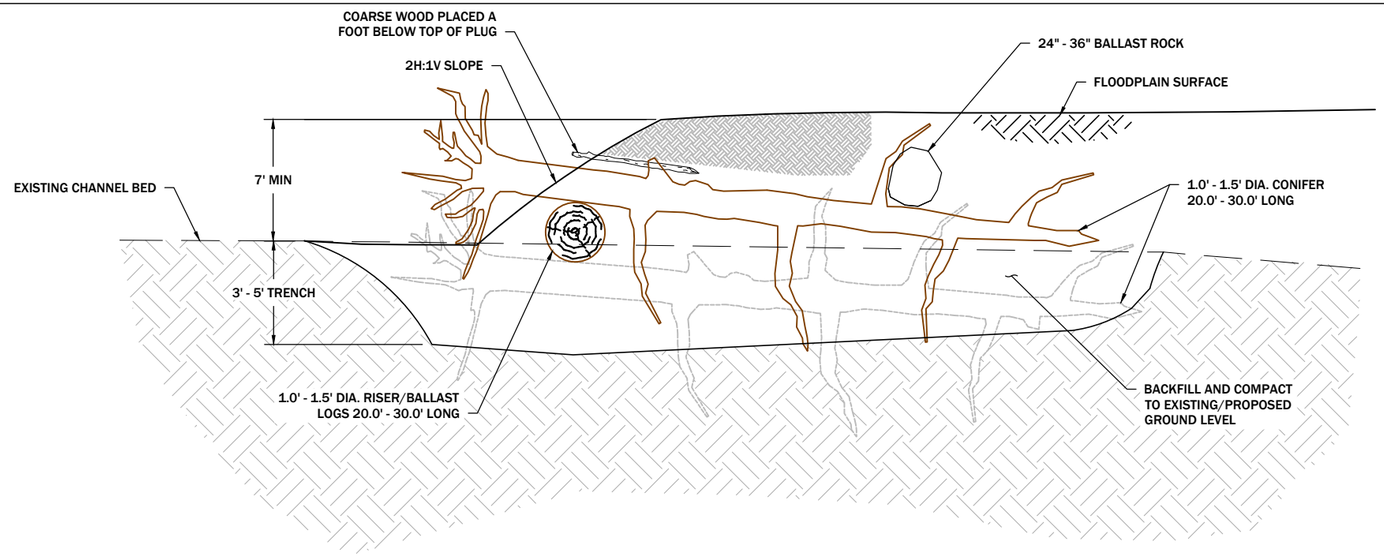
BRUSH MATRIX
BANK TREATMENT
TYPICAL SECTIONS

PIONEER
TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 6/01/2022



FLOODPLAIN GRADING 1/6
TYPICAL SECTION
N.T.S.



LARGE WOODY DEBRIS PLUG 2/6
TYPICAL SECTION
N.T.S.

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: PIONEER

SCALE IN FEET
0 NA

FIGURE 8

PIONEER TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

CUSHMAN BRIDGE
FLOODPLAIN
GRADING AND
LWD PLUG
TYPICAL SECTIONS
DATE: 6/01/2022

6/2/2022 2:11:10 PM G:\AGI\ROWTON_CUSHMAN_PER\DRAWINGS\ACAD\CUSHMAN.DWG

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

GREG GIANFORTE, GOVERNOR
1539 ELEVENTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE: (406) 444-2074
FAX: (406) 444-2684
PO BOX 201601
HELENA, MONTANA 59620-1601

Conservation and Resource Development Division
Environmental Checklist Instructions

Purpose of This Document:

All applicants must consider the potential environmental impacts of their projects. Consideration of these impacts on the location, design, or construction actions may help avoid expensive costs. A project will not be eligible for funding if it results in significant environmental degradation.

DNRC requires compliance with the Montana Environmental Policy Act (MEPA) per state law and associated DNRC Administrative Rules (ARM 36.2.523). MEPA requires state agencies to prepare a detailed statement on any project, program, or activity directly undertaken by the agency; a project or activity supported through a contract, grant, subsidy, loan, or other form of funding assistance from the agency; and a project or activity involving the issuance of a lease, permit, license, certificate, or other entitlement for use or permission by the agency (MCA Title 75, Chapter 1). Thus, all project applications will be subject to MEPA review.

What Does This Mean for Applicants?

- ☐ All applicants must complete the Environmental Checklist in its entirety and provide sufficient documentation on public participation.
- ☐ Public participation, or scoping, of the project must include stakeholder, landowner, and community engagement. These efforts can be in the form of documented public meetings (e.g., meeting minutes, pdf presentations) or letters of support.
  - The public meeting must be properly noticed (advertised) and the public must be provided with an opportunity at the meeting to comment on the project.
  - Minutes of the meeting should reflect what was discussed about the project, including all comments received from the public.
  - Letters of support must be included from any identified or interested stakeholders.
- ☐ Agency Comment Letters (see instructions below)
- ☐ Please submit these items with your application.
- ☐ Provide Affidavit of Publication or Meeting Minutes for the public comment period notice on the draft EA

How Will DNRC Use the Information Provided?

The information provided within the Environmental Checklist will be subject to a MEPA review by DNRC. If this review should result in an Environmental Assessment, please be aware that DNRC will draft the Environmental Assessment. The drafted Environmental Assessment decision will be posted for a public comment period of up to 30 days dependent on the level of environmental impact.

When the draft EA is posted, we require the project proponent to post the notice in either one local newspaper outlet in the legal advertising section or provide the notice during a publicly held meeting. The applicant must then provide the affidavit of publication if posted in the newspaper or meeting minutes if discussed in a public meeting. Please note this public comment period does not suffice for the public participation component mentioned above. The MEPA document will then require a final decision by DNRC before funds are awarded.

It is also important to note for projects with no environmental impacts, or those that do not lead directly to construction or any other sort of environmental degradation, will not be subject to an environmental assessment and the checklist/public participation does not need to be completed. Examples of these sorts of activities include, but are not limited to, development of a PER (professional engineering report), planning, and education/informational outreach. Please let us know if there are additional questions on what other projects may fall under this category.

Instructions:

Complete the Environmental Checklist on the following pages after the instructions below. DNRC retains the ultimate decision-making authority on all MEPA decisions. If DNRC determines this section to be incomplete, additional information will be required before consideration for funding.

Example			
Impact Code	**Impact Type**	**Permits/ Mitigation Required?**	**Explanation of Impact to Resource**
1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)			
☐ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☐ NA	*Current Conditions:* *Preferred Alternative Environmental Narrative:*

1. **Impact Code:** In the first column, identify the impact that the preferred alternative will have on each resource (e.g. 1. Soil Suitability, Topographic and/or Geologic Constraints) in the project area. Select from the following impact codes:
   - *No Impact*: No impact to the resource is anticipated or this is not applicable to this project.
   - *Beneficial*: Potentially beneficial impact to the resource.
   - *Adverse*: Potentially adverse impact to the resource.

   Please note that a resource may have more than one impact. Identify all possible impacts to the resource in the space provided. For example, the preferred alternative may have a short-term direct negative impact and a long-term direct and indirect positive impact on the resource. Check all boxes that apply and use the space provided in the final column "Explanation of Impact to Resource" to explain.

Example			
Impact Code	**Impact Type**	**Permits/ Mitigation Required?**	**Explanation of Impact to Resource**

1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)			
☐ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☐ NA	*Current Conditions:* *Preferred Alternative Environmental Narrative:*

2. **Impact Type:** In the second column, identify the type(s) of impact to the resource from the preferred alternative. (Impacts may be direct, indirect or cumulative).
    - *Direct impacts*: Occur at the same time and place as the proposed project.
    - *Indirect or secondary impacts*: Occur at a different location or later time than the proposed project.
    - *Cumulative impacts*: Collective impacts on the environment when considered in conjunction with other past, present, and future actions related to the proposed project. Cumulative impact analysis includes a review of all state and nonstate activities that have occurred, are occurring, or may occur that have impacted or may impact the same resource as the proposed project.

    Just as above, please note that a resource may have more than one impact. Identify all possible impacts to the resource in the space provided. For example, the preferred alternative may have a short-term direct negative impact and a long-term direct and indirect positive impact on the resource. Check all boxes that apply and use the space provided in the final column "Explanation of Impact to Resource" to explain.

Example			
Impact Code	**Impact Type**	**Permits/ Mitigation Required?**	**Explanation of Impact to Resource**
1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)			
☐ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☐ NA	*Current Conditions:* *Preferred Alternative Environmental Narrative:*

3. **Permits/Mitigation Required:** In the third column, please select if a permit and/or mitigation is required for the project (e.g., 310, USACE Section 404 Nationwide).
    - Please make sure to include which permits (if any) are required for the particular resource and what mitigation techniques will be used if impacts are to occur.

Example			
Impact Code	**Impact Type**	**Permits/ Mitigation Required?**	**Explanation of Impact to Resource**

1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)			
☐ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☐ NA	Current Conditions: Click or tap here to enter text. Preferred Alternative Environmental Narrative: Click or tap here to enter text.

4. **Explanation of Impact to Resource:** In the final column, use the space provided on the Environmental Checklist to summarize the following information:
    - ***Current Conditions***
        - Describe the current environmental resources of the affected area including the impact of no action. Your description of the current natural resources will provide a baseline to compare all alternatives and their associated environmental impacts.
    - ***Preferred Alternative Environmental Narrative:***
        - Describe the impact of the preferred alternative or ***indicate why there is no impact*** from the project.
        - Identify any reasonable cumulative impacts that may result from implementing the preferred alternative. Cumulative impacts are the collective impacts on the environment when considered in conjunction with other past, present, and future actions related to the proposed project.
        - If a potentially adverse impact is identified for the preferred alternative, the applicant must provide the following:
            - An analysis of the severity, duration, extent, and frequency of the impact. Please specify and describe the following:
                - Severity: negligible, minor, or major.
                - Duration: short-term or long-term.
                - Extent: local, regional, or statewide.
                - Frequency: non-recurring or recurring.
            - An explanation of short- and/or long-term measures to mitigate the impact with a discussion on the effects of those mitigative measures on the proposed project.
        - Identify any required permits.

5. **Additional Information:** Underneath the table the following information must be provided:
    - Cultural Survey Acknowledgement
    - Sources of Information: Identify all sources consulted for the completion of the Environmental Checklist. Sources may include studies, plans, documents, or the persons, organizations, or agencies contacted for assistance.

Certain sections of this Environmental Checklist require specialized knowledge. Please contact the following agencies and attach comments provided by those agencies to your application. Below are contacts for certain sections that require additional review by other agencies:

- *Physical Environment,* ***Section #5*** **– Surface Water Quality** – Montana Department of Environmental Quality, (406) 444 - 3080.
- *Physical Environment,* ***Section #6*** **– Floodplains and Floodplain Management** – Contact the Local Floodplain Administrator for your County and/or Community

(http://dnrc.mt.gov/divisions/water/operations/floodplain-management/contacts/20210924FPAs2021.1.pdf) or visit the Department of Natural Resources Water Resources Division, (406) 444 – 0860, http://dnrc.mt.gov/divisions/water/operations/floodplain-management.

- *Physical Environment,* ***Section #7*** **– Wetlands** – U.S. Department of the Army Corps of Engineers, (406) 441 - 1375 or montana.reg@usace.army.mil.
- *Physical Environment,* ***Section #9*** **– Vegetation and Wildlife Species and Habitats** – Montana Fish, Wildlife and Parks, Wildlife Office (406) 444 - 2612 or find your Regional Office at https://fwp.mt.gov/aboutfwp/contact-us.
- *Physical Environment,* ***Section #10*** **– Unique, Endangered, Fragile or Limited Environmental Resources** – U.S. Fish and Wildlife Service for consultation on potential impacts to endangered or limited plants, fish, or other wildlife, (406) 449 - 5225.
- *Human Environment,* ***Section #4*** **– Historic Properties, Cultural or Archaeological Resources –** Montana State Historic Preservation Office (SHPO), (406) 444 - 7767 or dmurdo@mt.gov.

For assistance in preparing the Environmental Checklist, contact DNRC grant manager listed on grant application.

Environmental Checklist

Environmental Checklist Prepared by: On: 4/13/2023

Nate Peressini	Stahly Engineering & Associates
Name of Person 1	Organization
(406) 522-8594	NPeressini@seaeng.com
Phone Number	Email
Click or tap here to enter text.	Click or tap here to enter text.
Name of Person 2	Organization
Click or tap here to enter text.	Click or tap here to enter text.
Phone Number	Email

Click or tap here to enter text.

List additional people above. Include organization, phone number and email for all.

Physical Environment			
Impact Code	**Impact Type**	**Permits/ Mitigation Required?**	**Explanation of Impact to Resource**

1. Soil Suitability, Topographic and/or Geologic Constraints (example: soil slump, steep slopes, subsidence, seismic activity)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project area is currently a nearly vertical cut bank of the Musselshell River. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring material to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
2. Hazardous Facilities (example: power lines, hazardous waste sites, acceptable distance from explosive and flammable hazards including chemical/petrochemical storage tanks, underground fuel storage tanks, and related facilities such as natural gas storage facilities and propane storage tanks)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There are no hazardous facilities associated with the project. See attached aerial. Preferred Alternative Environmental Narrative: There are no hazardous facilities associated with the project
3. Surrounding Air Quality (example: dust, odors, emissions)			
☐ No Impact ☐ Beneficial ☒ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There are no impacts to air quality. Preferred Alternative Environmental Narrative: Construction of the project will introduce minor, short-term, local, non-reocurring air quality impacts from dust and emissions.
4. Groundwater Resources and Aquifers (example: quantity, quality, distribution, depth to groundwater, sole source aquifers)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
5. Surface Water/Water Quality, Quantity and Distribution (example: streams, lakes, storm runoff, irrigation systems, canals)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.

6. Floodplains and Floodplain Management (Identify any floodplains within one mile of the boundary of the project.)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank , see included screenshot of Musselshell floodplain and FIRMette panel. Preferred Alternative Environmental Narrative: The project will mitigate further erosions, within Zone AE of a floodplain, by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
7. Wetlands (Identify any wetlands within one mile of the boundary of the project and state potential impacts.)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: The project area is currently a nearly vertical cut bank of the Musselshell River and outside of any wetlands. Wetlands do exist adjacent to the site, up and downstream of the project. Preferred Alternative Environmental Narrative: It is anticipated this project will avoid impacting wetlands. A wetland delineation will be completed to avoid impacts.
8. Agricultural Lands, Production, and Farmland Protection (example: grazing, forestry, cropland, prime or unique agricultural lands) Identify any prime or important farm ground or forest lands within one mile of the boundary of the project.			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project area is directly adjacent to the Musselshell River and does include agricultural land that continues to be eroded by the river. Preferred Alternative Environmental Narrative: The project will mitigate current vertical bank erosion by laying the slope of the bank back creating stability not only for the river, but also the surrounding environments. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
9. Vegetation and Wildlife Species and Habitats, Including Fish (example: terrestrial, avian and aquatic life and habitats)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River and does include agricultural land and habitats that continues to be eroded by the river. Per the included IPaC provided by the USFW Services there are no critical habitats in the area. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.

10. Unique, Endangered, Fragile, or Limited Environmental Resources, Including Endangered Species (example: plants, fish or wildlife)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank and does include agricultural land and habitat that continues to be eroded by the river. Per the included IPaC provided by the USFW Services there are listed species. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization. , per the included IPaC provided by the USFW Services there are listed species, but no affects to these species anticipated.
11. Unique Natural Features (example: geologic features)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There are no known unique natural features in the project area. Preferred Alternative Environmental Narrative: There are no known unique natural features in the project area.
12. Access to, and Quality of, Recreational and Wilderness Activities, Public Lands and Waterways (including Federally Designated Wild & Scenic Rivers), and Public Open Space			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project location prohibits access and use of the Musselshell River due to the vertical cut bank and constant erosion and sedimentation. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
Human Environment			
Impact Code	**Impact Type**	**Resource**	
1. Visual Quality – Coherence, Diversity, Compatibility of Use and Scale, Aesthetics			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project location prohibits access and use of the Musselshell River due to the vertical cut bank and constant erosion and sedimentation. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.

2. Nuisances (example: glare, fumes)			
☐ No Impact ☐ Beneficial ☒ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: No nuisances currently exist in the project area. Preferred Alternative Environmental Narrative: Construction of the project will introduce minor, short-term, local, non-recurring nuisances from dust, noise, and emissions.
3. Noise – Suitable Separation Between Housing and Other Noise Sensitive Activities and Major Noise Sources (example: aircraft, highways and railroads.)			
☐ No Impact ☐ Beneficial ☒ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: No noise currently exist in the project area. Preferred Alternative Environmental Narrative: Construction of the project will introduce minor, short-term, local, non-recurring noise from construction activities.
4. Historic Properties, Cultural, and Archaeological Resources***(Please see end of Environmental Checklist for details if Cultural Survey has not been performed per SHPO Section 106)*			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: No known historic, cultural, or archaeological resources exist within the project site. Preferred Alternative Environmental Narrative: With the construction of this project no known historic, cultural, or archaeological resourced will be affected.
5. Changes in Demographic (Population) Characteristics (example: quantity, distribution, density)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: No affect on demographic characteristics. Preferred Alternative Environmental Narrative: No affect on demographic characteristics.
6. General Housing Conditions – Quality, Quantity, Affordability			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. One home is adjacent to the project area. Preferred Alternative Environmental Narrative: No change in housing conditions are anticipated with the project, and there is no anticipated impact to the adjacent home site.
7. Businesses or Residents (example: loss of, displacement, or relocation)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. One home is adjacent to the project area with no businesses. Preferred Alternative Environmental Narrative: No impacts to businesses or residents is anticipated with the project.

8. Public Health and Safety			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
9. Local Employment – Quantity or Distribution of Employment, Economic Impact			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: No local employment is related to the vertical bank along the Musselshell River. Preferred Alternative Environmental Narrative: Minor, short-term, local, non-reoccuring employment will be provided by the project in order to construct.
10. Income Patterns – Economic Impact			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There are no impacts to income patterns associated with the existing. Preferred Alternative Environmental Narrative: No changes in income patterns are anticipated with the project.
11. Local and State Tax Base and Revenues			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: Residential tax base exists adjacent to the project. Preferred Alternative Environmental Narrative: No changes in the tax base are anticipated with the project.
12. Community and Government Services and Facilities (example: educational facilities; health and medical services and facilities; police; emergency medical services; and parks, playgrounds and open space)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: Vertical cut bank along the Musselshell River with no surrounding community and government services and facilities. Preferred Alternative Environmental Narrative: The project will not impact any community and government services and facilities.
13. Commercial and Industrial Facilities – Production and Activity, Growth or Decline			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: No commercial or industrial activities exist in the project area. Preferred Alternative Environmental Narrative: As there are no commercial or industrial activities in the project area, there will be no impacts by the project.

14. Social Structures and Mores (example: standards of social conduct/social conventions)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: Any social structures that exist in the project area will not be affected by the project. Preferred Alternative Environmental Narrative: Any social structures that exist in the project area will not be affected by the project.
15. Land Use Compatibility (example: growth, land use change, development activity, adjacent land uses and potential conflicts)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: Land use around the site is primarily agricultural. Preferred Alternative Environmental Narrative: Land use will not change with the project.
16. Energy Resources – Consumption and Conservation			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There is currently no energy used. Preferred Alternative Environmental Narrative: There will be no energy used upon completion of the project.
17. Solid Waste Management			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: This project has no affect on solid waste management. Preferred Alternative Environmental Narrative: This project has no affect on solid waste management.
18. Wastewater Treatment – Sewage System			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: This project has no affect on wastewater treatment. Preferred Alternative Environmental Narrative: This project has no affect on wastewater treatment.
19. Storm Water – Surface Drainage			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☒Permit ☐Mitigation ☐ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. It is anticipated this work will require a Floodplain, SPA 124, and ACOE 404 Permits along with a DEQ 318 Authorization.
20. Community Water Supply			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: This project has no affect on the water supply. Preferred Alternative Environmental Narrative: This project has no affect on the water supply.
21. Fire Protection – Hazards			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: This project has no affect on the fire protection. Preferred Alternative Environmental Narrative: This project has no affect on the fire protection.

22. Cultural Facilities, Cultural Uniqueness and Diversity			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There are no cultural facilities associated with the project. Preferred Alternative Environmental Narrative: There are no cultural facilities associated with the project.
23. Transportation Networks and Traffic Flow Conflicts (example: rail; auto including local traffic; airport runway clear zones – avoidance of incompatible land use in airport runway clear zones)			
☐ No Impact ☐ Beneficial ☒ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: Currently the large cutbank doesn't impact transportation networks, but with further erosion could wash out adjacent roadway. Preferred Alternative Environmental Narrative: The project will have short-term, temporary nonreoccuring impacts to traffic during construction.
24. Consistency with Local Ordinances, Resolutions, or Plans (example: conformance with local comprehensive plans, zoning, or capital improvement plans.)			
☐ No Impact ☒ Beneficial ☐ Adverse	☒ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: There is a known regulatory issue with constant erosion of the site along the Musselshell River. The project is included in the Capital Improvements Plan for Golden Valley County that is in the process of completion. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank. This project was included in a technical memorandum provided by Pioneer Technical Services as requested by the Musselshell Watershed Coalition and supported by Golden Valley County.
25. Private Property Rights (example: a regulatory action or project activity that reduces, minimizes, or eliminates the use of private property.)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: The project will take place on the banks of the Musselshell River where there is constant erosion from a vertical bank. Preferred Alternative Environmental Narrative: The project will mitigate further erosions by laying back the vertical bank and installing armoring to further stabilize the bank.
26. Environmental Justice (example: does the project avoid placing lower income households in areas where environmental degradation has occurred, such as adjacent to brownfield sites?)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: This project will have no impacts on environmental justice. Preferred Alternative Environmental Narrative: This project will have no impacts on environmental justice.

27. Lead Based Paint and/or Asbestos (example: does the project replace asbestos-lined pipes? Do any structures qualify as containing lead-based paint?)			
☒ No Impact ☐ Beneficial ☐ Adverse	☐ Direct ☐ Indirect ☐ Cumulative	☐Permit ☐Mitigation ☒ NA	Current Conditions: This project will have no impacts/use lead based paint and or asbestos products. Preferred Alternative Environmental Narrative: This project will have no impacts/use lead based paint and or asbestos products.

Additional Information

****If no cultural survey has been performed, or is not expected to be needed, applicant must agree to the following statement:**

☒ I hereby agree that, to my knowledge, there are no cultural or paleontological materials in the proposed project site. If previously unknown cultural or paleontological materials are identified during project related activities, the DNRC grant manager will be notified, and all work will cease until a professional assessment of such resources can be made.

List all sources of information used to complete the Environmental Checklist. Sources may include studies, plans, documents, or the individuals, organizations, or agencies contacted for assistance. For individuals, groups, or agencies, please include a contact person and phone number. List any scoping documents or meetings and/or public meetings during project development.

Previous site visits, National Wetlands Inventory provided by the US Fish and Wildlife, FEMA floodplain mapper, previously compiled technical memorandum, and discussions with County staff.

National Wetlands Inventory (usgs.gov)- Wetland Mapper

FEMA Flood Map Service Center | Search By Address- Floodplain Maper

IPaC: Explore Location resources (fws.gov) – Endangered Species

Below is a list of electronic resources available for data gathering to aid in the development of the Environmental Checklist:

Abandoned Mines (DEQ): https://deq.mt.gov/cleanupandrec/Programs/aml

Agricultural Statistics (USDA): USDA - National Agricultural Statistics Service - Data and Statistics

Air Quality

- Nonattainment Areas: Plan and Rule Development | Montana DEQ (mt.gov)
- Opening Burning Guidelines: Open Burning | Montana DEQ (mt.gov)

Army Corps of Engineers: http://www.usace.army.mil/Home.aspx

Bureau of Business and Economic Research, UM: http://www.bber.umt.edu/

Cadastral (for property ownership info): http://svc.mt.gov/msl/mtcadastral

Census Information, MT Dept. of Commerce: http://ceic.mt.gov

Conservation Districts, MT: http://macdnet.org/

Cultural Records

- Montana Historical Society: https://mhs.mt.gov/Shpo/CulturalRecords

DEQ data search tools: Montana DEQ's GIS Portal (mt.gov)

- Including Clean Water Act Info Center, Hazardous Waste Handlers, Petroleum Release Fund Claims, Unpermitted Releases, Underground Storage Tanks, Source Water Protection

EPA Enforcement and Compliance History Online http://echo.epa.gov/

Farmland Classification: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Fish (Also See Wildlife)

- Montana Fisheries Information System: Montana Fish, Wildlife & Parks GIS Data (arcgis.com)
- Aquatic Invasive Species: Montana FWP AIS Surveys Dashboard 2021 (arcgis.com)

Floodplain Maps, FEMA: https://msc.fema.gov/portal

Geographic Information, Natural Resources Information System: http://nris.mt.gov/gis

Geologic Information - MBMG - Publications - Download Geologic Maps (mtech.edu)

Maps of Montana for species observations, land cover, wetland and riparian areas, land management: Montana Natural Heritage Program (mtnhp.org); http://mtnhp.org/mapviewer/?t=6

Montana Department of Transportation: https://www.mdt.mt.gov/

- Environmental Manual: http://www.mdt.mt.gov/publications/docs/manuals/env/preface.pdf
- Environmental Manual - Chapter 29, Permits Required: https://www.mdt.mt.gov/publications/docs/manuals/env/Chapter%2029%20PERMITS%20REQUIRED.pdf

Montana Board of Oil and Gas Conservation Information System:

- http://bogc.dnrc.mt.gov/webApps/DataMiner/

Plants

- Plant database, USDA Natural Resources Conservation Service: http://plants.usda.gov/java
- Plant Species, MT Field Guide: http://fieldguide.mt.gov/default.aspx
- Plant Species of Concern: http://mtnhp.org/SpeciesOfConcern/Default.aspx?AorP=p
- Threatened, Endangered and Rare Plants, USDA: https://plants.usda.gov/home/raritySearch

Soils

- USDA Natural Resource Conservation Service database: https://websoilsurvey.nrcs.usda.gov/app/

- Montana soil and water conservation districts: http://swcdmi.org/

State Historic Preservation Office: http://mhs.mt.gov/Shpo

Tourism, UM – Institute of Tourism & Recreation Research: http://www.itrr.umt.edu

Tribal Resources:

- Blackfeet Tribal Environmental Permits: http://www.blackfeetenvironmental.com
- CSKT Natural Resources Department: http://nrd.csktribes.org/
- Montana Office of Indian Affairs: http://tribalnations.mt.gov/
- Tribal Historic Preservation Officer List: Search - NATHPO
- Tribal Directory Assessment Tool (TDAT): https://egis.hud.gov/tdat/

Vehicle Traffic Count (MDT): http://www.mdt.mt.gov/publications/datastats/traffic.shtml

Water

- Stream Record Extension Facilitator, USGS: USGS | National Water Dashboard
- Streamstats basin characteristics, USGS: http://water.usgs.gov/osw/streamstats/
- Water Resources Division, DNRC: http://dnrc.mt.gov/divisions/water ; ArcGIS Web Application (mt.gov)
- Water Rights Bureau, DNRC: http://dnrc.mt.gov/divisions/water/water-rights
- Water Right Query System, DNRC: DNRC Water Right Query System (mt.gov)
- Wetlands database, USFWS: http://www.fws.gov/wetlands/Data/mapper.html

Wild and Scenic Rivers: http://www.rivers.gov/montana.php

Wildlife

- Animal Species, MT Field Guide: http://fieldguide.mt.gov/default.aspx
- Animal Species of Concern: http://mtnhp.org/SpeciesOfConcern/Default.aspx?AorP=a
- Aquatic Invasive Species: Montana FWP AIS Surveys Dashboard 2021 (arcgis.com)
- Critical Habitat Mapper, USFWS: http://ecos.fws.gov/crithab/
- Crucial Areas Planning System/Habitat Assessment Tool: Habitat MT (HB 526) Funded Lands (arcgis.com)
- FWP Contact Map: http://fwp.mt.gov/gis/maps/contactUs/ (includes biologist responsibility areas)
- Maps and GIS Data, FWP: Montana Fish, Wildlife & Parks GIS Data (arcgis.com)
- Sage grouse management, FWP: Montana Fish, Wildlife & Parks GIS Data : Sage-grouse Habitat/Current Distribution (Montana) : Sage-grouse Habitat/Current Distribution (Montana) (arcgis.com)

- Sage grouse habitat conservation program, DNRC: http://sagegrouse.mt.gov/
- Sage grouse habitat map: https://sagegrouse.mt.gov/ProgramMap