Date: December 1, 2025

Emilee Novak,
Division of Water Quality, Watershed Management Program
ND Department of Environmental Quality
4201 Normandy Street
Bismarck, ND 58503-1324

Re: Upper Sheyenne River Watershed Pilot Project EPA 319 Watershed Project Proposal (2026-2027)

Dear Ms. Novak,

The Upper Sheyenne River Joint Water Resource Board (Joint Board) is pleased to submit EPA 319 Water Project Proposal for years 2026-2027 (Proposal) to implement critical and high-priority projects along mainstem Sheyenne River at three (3) locations within the Upper Sheyenne River Watershed. These projects were identified through a comprehensive Upper Sheyenne River Erosion & Sedimentation Risk Assessment Study (Study) completed by the Joint Board, with funding support from ND DEQ, in February 2019.

The Study identified 18 (eighteen) reaches requiring further work. The Joint Board identified 7 (seven) pilot project sites based on their priority within the basis. Out of seven, the Joint Board is recommending three (3) sites under the Proposal. Upon implementation of these projects, annual downstream sediment and total phosphorus loading to Lake Ashtabula is expected to reduce, thereby improving overall water quality of the Sheyenne River – a critical riverine system in the Red River Basin.

Estimated planning-level cost for design, engineering, permitting, and construction of 3 projects identified is $3,438,488. The Joint Board secured $1,100,000 from the ND Department of Water Resources (ND DWR) in 2021 under a 4-year cost share agreement. During the contract period, the Joint Board utilized $699,743.16 towards engineering design, permitting, and construction engineering. The Joint Board extended the cost share agreement with the ND DWR through December 2027. The remaining amount of $400,256.84 will be utilized for the engineering, permitting, and construction engineering of the proposed sites. The Joint Board also secured $150,000 through the Garrison Diversion Conservancy District (GDCD) in August 2022. Out of the $150,000, the Joint Board utilized $83,000 towards construction of two sites. The remaining balance of $67,000 will go towards construction of the proposed sites. In August 2022, the Joint Board secured approval of $2,234,248 through the USDA NRCS RCPP grant application (RCPP). The RCPP grant amount will be primarily used for engineering, permitting, and construction of proposed sites. The Joint Board also plans to submit a cost share request to the ND Outdoor Heritage Fund during the October 2026 application cycle. Below is a breakdown of total estimated cost and requested funding through EPA 319 Proposal:

Total Cost ($)	Existing & Anticipated Funding[1] ($)	Local Share ($)	Requested EPA Funding ($)
$3,438,488	$3,048,488	$30,000	$360,000

[1] Anticipated funding from ND OHF in the amount of $376,983.16 to applied in October 2026.

Additional details have been included in the Proposal and attached appendices. We appreciate the opportunity to present this Proposal and look forward to a positive outcome for an important Project to improve water quality in the Upper Sheyenne River Basin. If you have any questions, please contact me via email at usjwrd@hotmail.com, scwater@gmail.com or by phone at (701) 653-5094.

Sincerely,

Tasha Krueger

Tasha Krueger
Manager,
Upper Sheyenne River Joint Water Resource Board

1.0 Project Proposal Summary Sheet

PROJECT TITLE Upper Sheyenne River Watershed Pilot Project

NAME, ADDRESS, PHONE AND E-MAIL OF LEAD PROJECT SPONSOR/SUBGRANTEE
Tasha Krueger, Manager
P.O. Box 231, Finley, ND 58230
Phone: (701) 524-1105 E-mail: USJWRD@hotmail.com and/or scwater@gmail.com

STATE CONTACT Emilee Novak

PHONE 702-328-5232 FAX_____ E-MAIL: ejnovak@nd.gov
STATE North Dakota WATERSHED Upper Sheyenne River

HYDROLOGIC UNIT CODE 09020204
HIGH PRIORITY WATERSHED (yes/no) yes

TMDL Development 9 and/or Implementation 9 (Check any that apply)

PROJECT TYPES	WATERBODY TYPES	NPS CATEGORY
[] STAFFING & SUPPORT	[] GROUNDWATER	[X] AGRICULTURE
[X] WATERSHED	[] LAKES/RESERVOIRS	[] URBAN RUNOFF
[] GROUNDWATER	[X] RIVERS	[] SILVICULTURE
[] I&E	[X] STREAMS	[X] CONSTRUCTION
	[X] WETLANDS	[] RESOURCE EXTRACTION
	[]OTHER	[] STOWAGE/LAND DISPOSAL
		[] HYDRO MODIFICATION
		[] OTHER

PROJECT LOCATION: LATITUDE_____MIN._____LONGITUDE___MIN._____

The Sheyenne River has its headwaters in Sheridan County, North Dakota, southwest of the City of Harvey, and flows approximately 303 river miles (or 183 valley miles) to Baldhill Dam and the outlet from Lake Ashtabula in Barnes County, upstream of Valley City. The portion of the river upstream of Baldhill Dam is known as the Upper Sheyenne River. Nine counties within the Sheyenne River basin—Sheridan, Pierce, Benson, Griggs, Nelson, Steele, Eddy, Barnes, and Stutsman—form the Upper Sheyenne River Joint Water Resource Board (Joint Board).

SUMMARIZATION OF MAJOR GOALS:
The Upper Sheyenne River Joint Water Resource Board (Joint Board) was approved for an EPA 319 Nonpoint Source Implementation Grant (Subaward Number G21.081), effective July 1, 2022, for the Upper Sheyenne River Watershed Pilot Project (Project). The subaward was approved in the amount of $384,248. The Joint Board implemented Pilot Projects at two (2) sites within the basin during the subaward period. The subaward expired at the end of the contract period in December 2025. The Joint Board is currently working on additional sites in the basin with anticipated construction during the 2027 construction season. The initial project cost estimates were

developed with less than 5% design information in 2018-2019. Over the last seven years, factoring in escalation and inflation, costs have increased, and our revised estimated construction costs reflect these changes.

The primary goal of the Upper Sheyenne River Watershed Pilot Project (Project) is to identify and implement channel stability measures in select areas of high priority across the Upper Sheyenne River, from the headwaters in Sheridan County to Lake Ashtabula. Potential applicable measures to improve channel stability include changes to riparian vegetation, changes to grazing practices, replacement of road crossing culverts, and targeted bank stabilization measures. These measures will directly benefit in improving Sheyenne River water quality by reducing sediment loading as well as total phosphorus loading.

PROJECT DESCRIPTION:

Key river reaches were selected where broad land use changes are indicated. At both the reach-scale and at specific locations, input from the Joint Board, landowners, and local stakeholders was used to identify priorities for stabilization and restoration and to guide restoration activities. Once proposed measures are implemented at the following sites, designs can be replicated at similar locations along the Upper Sheyenne River. Potential applicable measures to improve channel stability include changes to riparian vegetation, changes to grazing practices, replacement of road crossing culverts, and targeted bank stabilization measures. Multiple stabilization techniques may be appropriate at individual locations based on the site conditions, adjacent land use, and proximity to public or private infrastructure. Depending on site conditions, both hard armoring and bioengineering stabilization techniques may be appropriate.

2.0 Statement of Need

2.1 Portions of the Upper Sheyenne River, including from Harvey Dam in Wells County through Benson County, and at Lake Ashtabula, are listed as threatened on the North Dakota Section 303(d) List for the designated use of fish and other aquatic biota with respect to sedimentation/siltation. Lake Ashtabula itself is listed as impaired for the designated use of recreation with respect to nutrient/eutrophication biological indicators. TMDL studies have not yet been performed to address these threatened and impaired water quality standards.

A comprehensive Erosion and Sedimentation Risk Assessment of the Upper Sheyenne River was completed by Barr Engineering Co. (Barr) in February 2019 under the direction of the Upper Sheyenne River Joint Water Resource Board (Joint Board) and ND Department of Environmental Quality (ND DEQ). The Upper Sheyenne River Corridor Erosion and Sedimentation Risk Assessment determined that 18 out of the 30 study reaches are at high risk for instability and are likely contributing excess sediment to the river (see Figure 1). The primary source of excess sediment appears to be accelerated bank erosion, which is widespread along the river. This excess sediment is a likely cause of the threatened aquatic uses for sedimentation, and a major contributing factor to the eutrophication impairment in Lake Ashtabula. The Project will address bank erosion at selected sites, which will reduce sediment inputs to the river and help to address the water quality impairment in Lake Ashtabula.

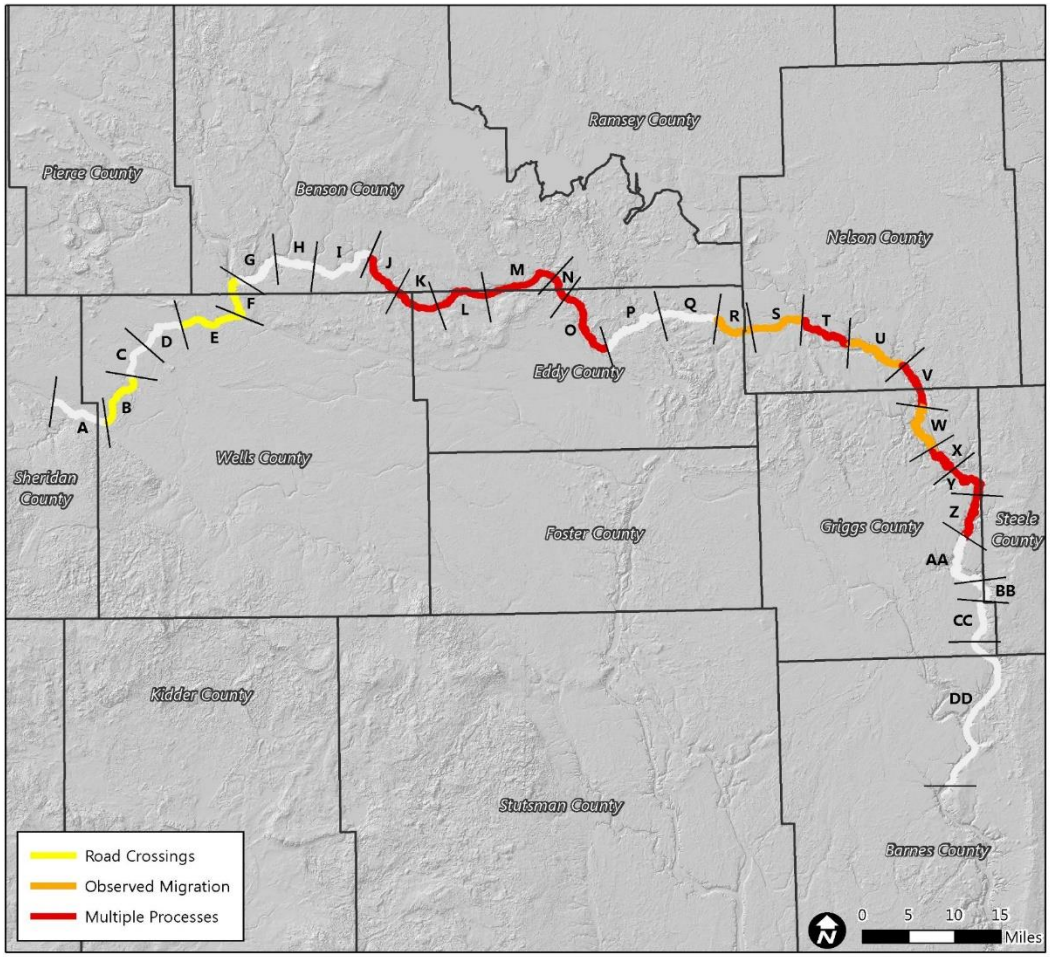


Figure 1 Sheyenne River Areas of Potential Erosion, Sedimentation, and Floodplain Connectivity Risk

2.2 The Sheyenne River is a riverine system in North Dakota that supports significant biodiversity, agriculture, and recreation within the region. The Sheyenne River has its headwaters in Sheridan County, southwest of the City of Harvey, and flows approximately 303 river miles (or 183 valley miles) to Baldhill Dam and the outlet from Lake Ashtabula in Barnes County, upstream of Valley City (Figure 2). Downstream of Baldhill Dam, the river flows south to Lisbon in Ransom County before turning east and north to join the Red River of the North in Cass County near Fargo. The portion of the river upstream of Baldhill Dam is known as the Upper Sheyenne River (Hydrologic Unit 09020204).

The watershed area of the Upper Sheyenne River at Baldhill Dam is 3,900 square miles; however, a significant portion of the watershed consists of landlocked prairie potholes and does not contribute flow to the river under most conditions. The U.S. Geological Survey (USGS) estimates that the total contributing drainage area of the Upper Sheyenne River above Baldhill Dam (gage location 05058000) is 1,910 square miles (U.S. Geological Survey, 2018).

The Upper Sheyenne River is a perennial stream, with estimated bankfull discharge that ranges from 50 cfs at the headwaters to more than 1,200 cfs at the entrance to Lake Ashtabula. Many reaches of the river are at high risk for instability, as shown in Figure 1; cross-section surveys and field-stability assessments performed in 2018 at 15 locations (both

stable and unstable) revealed that some locations had bank shifts of 10 feet or more since a previous study in 2001. In addition, many of the survey locations in the downstream two-thirds of the study area had poor stability rankings, indicating ongoing channel instability and high potential for bank erosion.

2.3 An overview of the Upper Sheyenne River watershed is shown in Figure 2.

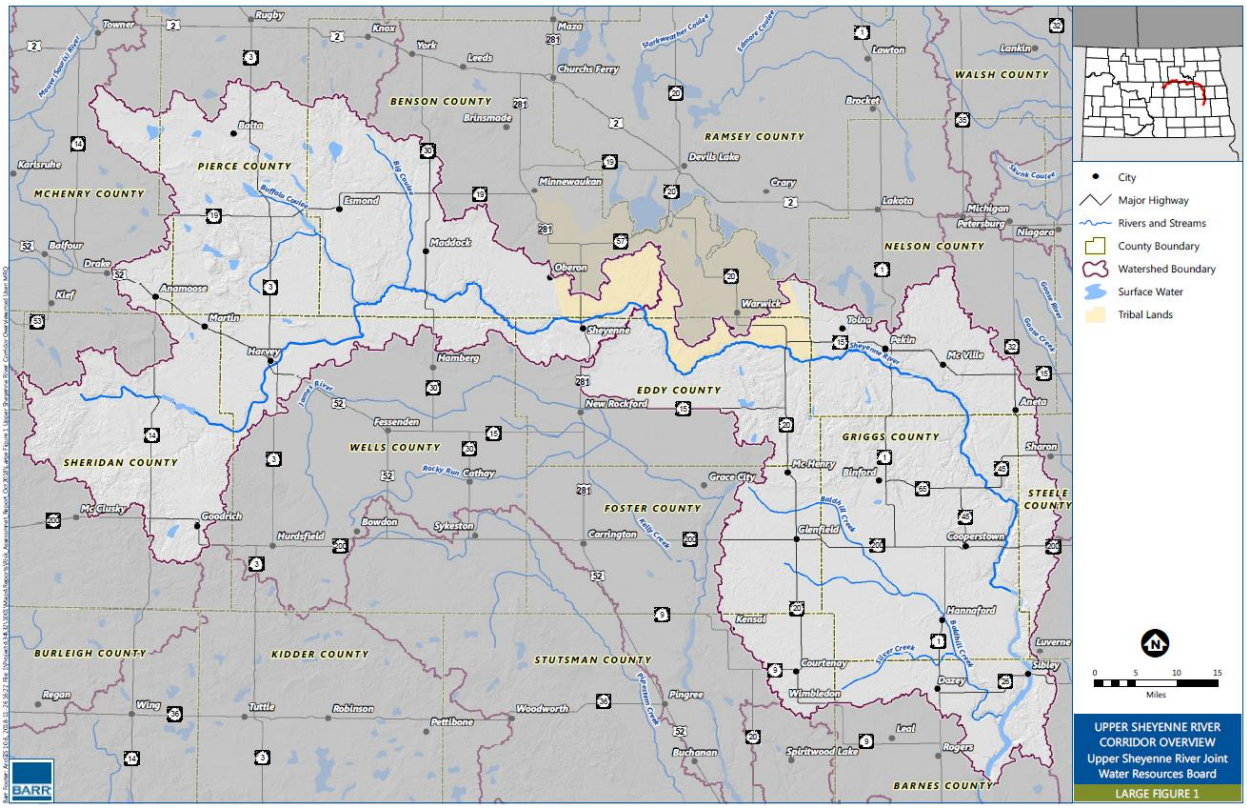


Figure 2 Upper Sheyenne River Watershed Overview

Current land use/land cover in the Upper Sheyenne River watershed is shown in Figure 3. According to the available land use/land cover data from the 2011 National Land Cover Database (Homer, et al., 2015), the majority of the riparian corridor is agricultural land. Hay and pasture fields dominate in the middle third of the river valley, and cultivated crops dominate in the upstream and downstream sections (Figure 3). There are some forested areas along the river banks throughout the valley, with the presence of forest and wetlands increasing in the downstream portions of the valley. Land cover along the river banks has a significant effect on the ability of the banks to resist erosion, and specific land uses at the river's edge, such as grazing, can cause dramatic increases in erosion.

Cross-sectional surveys and bank stability assessments were performed at 15 locations along the river in 2018 (Figure 4).

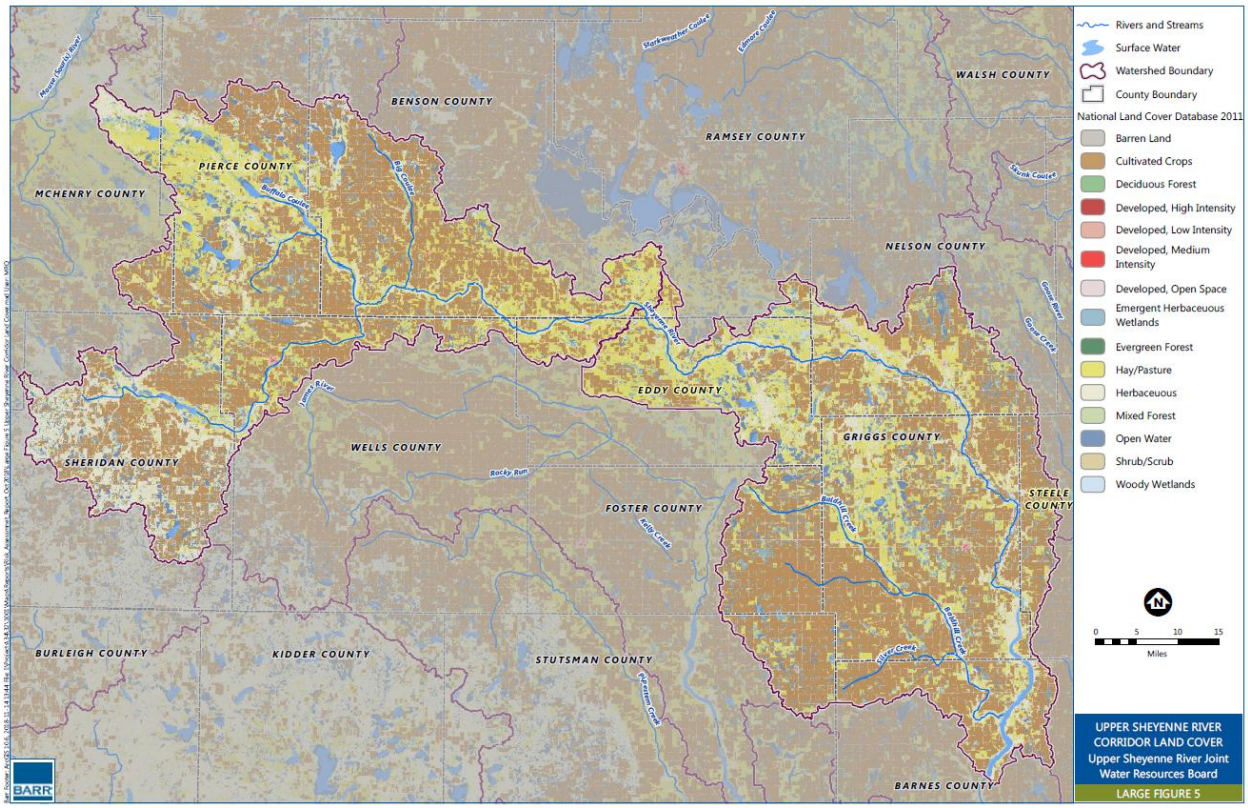


Figure 3 Upper Sheyenne River Watershed Land Use/Land Cover

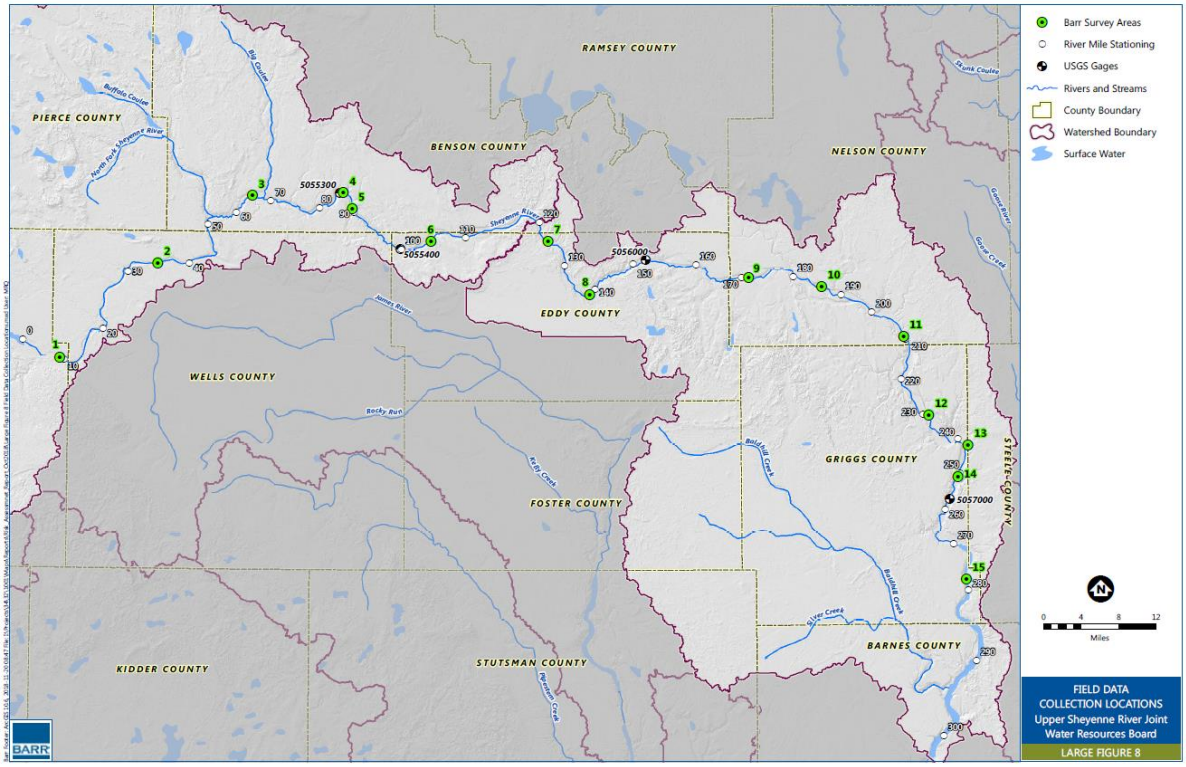


Figure 4 2018 Field Data Collection Locations

2.4 The Upper Sheyenne River drains much of the physiographic region known as the “glaciated plains” in central North Dakota (Bluemle, et al., 2007). The glaciated plains region consists of rolling topography with a variety of glacial landforms resulting from the depositional and erosional effects of multiple periods of glaciation. The valley of the Upper Sheyenne River is of relatively consistent width, with the valley narrowing significantly only upstream of the confluence with the North Fork of the Sheyenne River in western Benson County. The valley bottom is wide enough in virtually all locations that the river is able to meander freely without being confined by the valley walls. The slope of the Upper Sheyenne River valley bottom ranges from 0.5 to 6.3 feet per mile, with most of the steeper segments concentrated upstream of the confluence with the North Fork. Downstream of the confluence, the valley slope is relatively consistent with an average slope of 1.7 feet per mile. The valley walls are gently sloped at approximately 10% towards the river, and in places, the river runs along the toe of the valley walls.

The soils present within a river valley and its walls greatly influence the shape and behavior of a river channel. Soils with higher sand content, in particular fine sands, are generally more erodible than other soil types and provide a greater supply of sediment to the river. As expected, based on the geologic setting, the Upper Sheyenne River valley flows through glacial till, with variable soil conditions along its length (Natural Resources Conservation Service, 2018). In general, soils adjacent to the upstream half of the river valley have a higher sand content that peaks in Eddy County near the center of the study area. Sand contents in the river valley walls and uplands decrease as the river approaches Lake Ashtabula.

Based on these characteristics, the entire length of the Upper Sheyenne River valley can be characterized as an unconfined valley, with valley-bottom materials of alluvial origin, containing indicators of fluvial deposition, terraces, and a floodplain (valley type U-AL-FD (Rosgen, 2014)). Such valleys are common in non-mountainous regions and often result in the formation of a stable meandering river with a well-defined floodplain.

2.5 As discussed in Section 2.1, portions of the Upper Sheyenne River are listed as threatened on the North Dakota Section 303(d) List for the designated use of fish and other aquatic biota with respect to sedimentation/siltation, and Lake Ashtabula itself is listed as impaired for the designated use of recreation with respect to nutrient/eutrophication biological indicators.

Although a detailed identification of the sources of sediment and nutrients to Lake Ashtabula (such as a TMDL study) has not been performed, bank erosion and the accompanying accelerated channel migration are likely significant contributors of sediment to the lake. Channel migration is widespread throughout the Upper Sheyenne River, and especially in Eddy, Nelson, and Griggs Counties (Figure 5).

One factor contributing to the accelerated bank erosion is a shift in the flow-duration distribution in recent years, with longer periods of moderate flows (200 cfs and above) and shorter periods of low flows (Figure 6). Flows that now persist for half of each year (approximately 200 cfs and above) are likely competent to mobilize the fine-grained sediment that forms the bed and banks of the Upper Sheyenne River, which may lead to more total sediment being transported throughout the year and therefore increases the potential for erosion and channel enlargement.

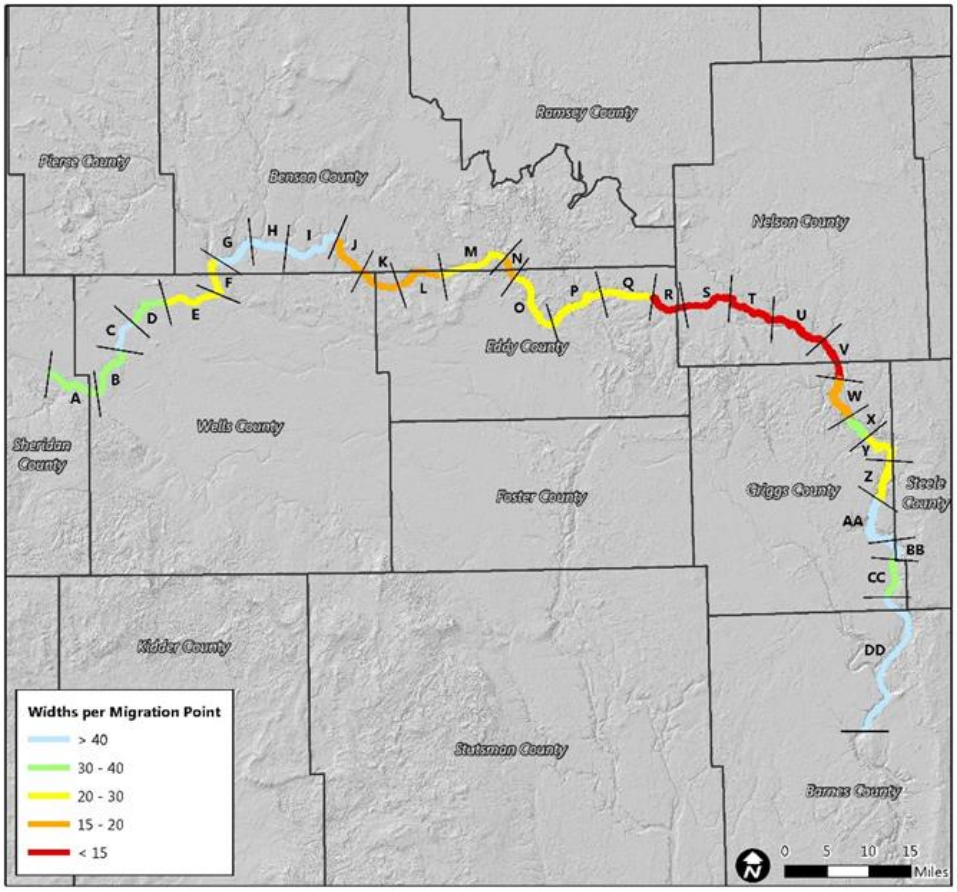


Figure 5 **Observed Frequency of Highly-Migrating Meander Bends**

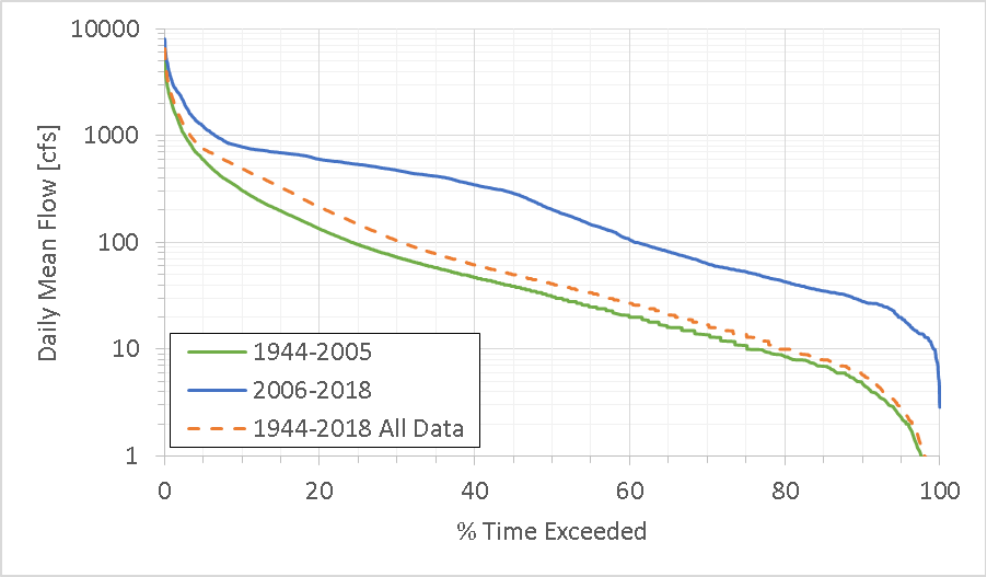


Figure 6 **Flow-Duration Distributions for USGS Gage 05057000 (Sheyenne River near Cooperstown, ND), Showing Distinct Shift in Recent Years**

3.0 Project Description

3.1 The primary goal of the Sheyenne River Riparian Corridor Improvement and Management project is to implement channel stability measures in areas of high priority across the Upper Sheyenne River, from the headwaters in Sheridan County to Lake Ashtabula. Potential applicable measures to improve channel stability include changes to riparian vegetation, changes to grazing practices, replacement of road crossing culverts, and targeted bank stabilization measures.

3.2 Out of 18 sites identified as requiring stabilization measures, the Joint Board identified six potential project sites located within Eddy, Nelson, and Griggs Counties. The sites were selected based on the apparent existence of significant bank erosion and accompanying impacts to public infrastructure, private structures, and downstream water quality. The risk assessment methods used for this study were developed by Dave Rosgen as part of his Watershed Assessment of River Stability and Sediment Supply and are referred to as RRISSC: the Rapid Resource Inventory for Sediment and Stability Consequences (Rosgen, 2009). Out of 15 reaches studied and analyzed, proposed pilot project sites are located on reaches 7, 8, 9, 10,11, 13, and 14. Out of 6 (six) selected sites (2022-2023), the Joint Board selected 2 (two) priority sites for further work over the next 2-year period. These sites (Sites 1 and 2) are part of the funding request for this EPA 319 application. An additional site (Site L) was identified by the Joint Board during the public notice period for the RCPP program. The prioritized projects are summarized in Table 1. Site photographs for all sites, channel stability ratings, and BEHI score for all reaches, and other relevant details are provided in the Upper Sheyenne River Erosion & Sedimentation Risk Assessment Report, located on the Joint Board's website under the following pathway: https://uppersheyennejointboard.weebly.com/important-documents.html. Priority rankings for potential stabilization projects were assigned to each of the sites based on the following criteria: protection of public infrastructure, protection of actively used private structures, and significant reductions in sediment loading that could improve downstream water quality. For each of the potential projects, a planning-level design and cost estimate was developed. A Project Prioritization Memo for all sites, including early planning-level design and cost estimates, is included in Appendix A.

Table 1 Project Prioritization Site Summary

Site Number	County	Description	Primary Concern
1	Eddy	Long eroding bend with vertical bank 7' tall, migrating towards County Road 1	Public infrastructure, water quality
2	Eddy	Two long eroding bends with vertical banks 7' tall, approaching private farmstead	Private structures, water quality
L	Eddy	Long eroding bends with 7' vertical banks, approaching private farmstead	Private infrastructure, water quality

Objective: Reduce channel migration at three (3) selected project sites to reduce sediment loading to the river and protect public and private infrastructure, and to improve downstream water quality.

Site 1: Implement bank stabilization BMPs along 1,700 feet of stream bank. Measures to be implemented will be bioengineering bank stabilization such as toe wood and log vanes, grading to establish a bankfull bench, and native vegetation establishment.

Product:	Stability of 1,700 feet of stream banks that will protect a nearby County highway and reduce sediment loading to the river, as well as improve water quality.
Cost:	$ 1,180,383

The Joint Board is currently developing a preliminary engineering design for this site – up to three alternatives will be developed at 10% design level. Since Site 1 is being developed by utilizing RCPP funds, the design must follow engineering and technical guidelines specified by the NRCS. The preliminary design is expected to be completed in December 2025. Once preliminary design is completed and reviewed by the NRCS staff, the landowners will have an opportunity to review and provide comments on the preferred alternative. The preferred alternative will be advanced to 30% design and then to 60% design. Permit applications will be submitted at 60% design completion. Landowner (access and construction) easements will be secured prior to construction. Project will be tentatively issued to bid by December 2026 with an anticipated winter 2027 construction timeframe, depending upon factors such as snow cover, freeze depth, and contractor availability.

Site 2: Implement bank stabilization BMPs along 1,150 feet of stream bank. Measures to be implemented will be bioengineering bank stabilization such as toe wood and log vanes, grading to establish a bankfull bench, and native vegetation establishment.

Product:	Stability of 1,150 feet of stream banks that will protect a nearby farmstead and reduce sediment loading to the river, as well as improve water quality.
Cost:	$ 1,072,674

The Joint Board is currently developing a preliminary engineering design for this site – up to three alternatives will be developed at 10% design level. Since Site 2 is being developed by utilizing RCPP funds, the design must follow engineering and technical guidelines specified by the NRCS. The preliminary design is expected to be completed in December 2025. Once preliminary design is completed and reviewed by the NRCS staff, the landowners will have an opportunity to review and provide comments on the preferred alternative. The preferred alternative will be advanced to 30% design and then to 60% design. Permit applications will be submitted at 60% design completion. Landowner (access and construction) easements will be secured prior to construction. Project will be tentatively issued to bid by December 2026 with an anticipated winter 2027 construction timeframe, depending upon factors such as snow cover, freeze depth, and contractor availability.

Site L: Implement bank stabilization BMPs along 1,800 feet of stream bank. Measures to be implemented will be bioengineering bank stabilization such as toe wood and log vanes, grading to establish a bankfull bench, and native vegetation establishment.

Product: Stability of 1,800 feet of stream banks that will protect a nearby farmstead and reduce sediment loading to the river, as well as improve water quality.

Cost: $ 1,185,431

The Joint Board is currently developing a preliminary engineering design for this site – up to three alternatives will be developed at 10% design level. Since Site L is being developed by utilizing RCPP funds, the design must follow engineering and technical guidelines specified by the NRCS. The preliminary design is expected to be completed in December 2025. Once preliminary design is completed and reviewed by the NRCS staff, the landowners will have an opportunity to review and provide comments on the preferred alternative. The preferred alternative will be advanced to 30% design and then to 60% design. Permit applications will be submitted at 60% design completion. Landowner (access and construction) easements will be secured prior to construction. Project will be tentatively issued to bid by December 2026 with an anticipated winter 2027 construction timeframe, depending upon factors such as snow cover, freeze depth, and contractor availability.

Table 2 provides a summary of the reductions in suspended sediment and phosphorus from the constructed sites and two of the future sites. The reduction in annual phosphorus and suspended solids loading will provide direct benefits that contribute to water quality improvements in the Upper Sheyenne River. Values have been calculated using estimates of erosion rate as a function of bank stability metrics based on Colorado data by Rosgen included in the RRISSC procedures (Rosgen, 2009). Limited repeated survey data of erosion rates at Site 1 suggest that these estimates are likely an underestimation and the actual erosion rates may be up to nine times higher in places.

Table 2 Reductions in Suspended Sediment and Phosphorus at Completed and Future Sites

Location	Estimated TSS reduction (lb/year) (1)	Estimated TP reduction (lb/year) (2)
Site 1	71,000	35(3)
Site 2	191,000	96
Site L	73,000 (4)	36 (4)
Site 5 (constructed 2024)	7,700	3.8
Site Alt D (constructed 2025)	61,000	36

1) Existing erosion rates derived from Colorado data for sedimentary/metamorphic geology (Rosgen 2009). Stabilized erosion rate assumes 0.04 ft/year bank movement. TSS reduction assumes 1 lb TSS/1 lb sediment.
2) TP reduction assumes 1 lb TP/1 ton sediment.
3) Site 1 measured bank migration is approximately 9 times higher than estimated by these methods, TP reduction may be higher than estimated.
4) Site L estimates are preliminary based on assumed existing bank stability conditions.

3.3 The Project began engineering design in October 2020. Site 5 was constructed in 2024 and Site 10 was constructed in 2025. The Joint Board also completed bid-ready engineering design and permitting at Sites 3 and Alt D; however, construction at these sites could not be completed due to concerns expressed by landowners. Engineering design of the remaining sites was paused while the NRCS RCPP funding, project definition, and signup process developed but is now ready to move into engineering design. Table 3 shows the estimated milestone completion of critical path items.

Table 3 Estimated Critical Path Items and Milestone Completion Date

Task	Estimated Start Date	Estimated Completion Date	Comments
Topographic Survey	December 2025	March 2026	Driven by weather and surveyor schedule
10% Design	December 2025	February 2026	10% alternatives evaluation
30% Design	February 2026	March 2026	30% design plans and engineer's opinion of probable cost (OPC)
60% Design	April 2026	May 2026	60% design plans and engineer's opinion of probable cost (OPC)
Permit Applications	June 2026	December 2026	Local, State, and Federal permit applications submitted at 60% design completion
90% Design	July 2026	October 2026	90% design plans and engineer's opinion of probable cost (OPC)
Bid Preparation	November 2026	December 2026	Prepare construction bids for project
Project Bidding	January 2027	January 2027	Issue bids for project construction/implementation
Construction / Implementation	March 2027	December 2027	Construction will take place between March 2027-May 2027 and September 2027-December 2027 to account for spring and summer runoff season and Devils Lake Outlet operations

3.4 We estimate the following permits will be required for the Project (Table 4).

Table 4 List of Required Permits

Permit	Agency	Type of Permit/Approval
1	USACE	Section 10 Work in Navigable Waters
2	USACE	Section 404 Authorization
3	USACE	T&E Review
4	USACE/SHPO	Cultural Resource Review
5	ND DEQ	General Construction SWPPP Permit
6	Office of State Engineer	Sovereign Lands Permit
7	Office of State Engineer	Construction Permit

3.5 The Joint Board is the appropriate entity to coordinate and implement the Project because of the integral role the Joint Board plays in the watershed. The Joint Board was established in 1985 with the following mandate: "Providing a coordinated and cooperative approach to planning and implementing a comprehensive water management program in the Upper Sheyenne Watershed." The Joint Board works collaboratively with multiple local, state, and federal stakeholders. The Joint Board has expertise and leadership to execute the Project. Upon implementation, the pilot project will benefit the overall water quality of the Sheyenne

River by addressing ongoing erosion and sedimentation issues along the mainstem Sheyenne River.

3.6 The Project is estimated to have minimal annual Operation and Maintenance (O&M) costs associated due to the incorporation of bioengineering and rock riffles, where necessary. However, the Joint Board will implement a robust annual O&M program, which will include annual inspection of pilot project sites and periodic review of BMPs. Additionally, the Joint Board will outline landowner responsibilities associated with land management BMPs as part of a contract if land management practices are part of the Project.

4.0 Coordination Plan

4.1 The Joint Board will serve as the lead project sponsor.. Barr Engineering Co. will serve as the Joint Board's engineer of record on the Project. The Joint Board continues to be in frequent communication with the leadership of partnering counties, funding partners, regulatory agencies as well as local landowners.

4.2 The Joint Board held six (6) public meetings within the Upper Sheyenne River watershed across multiple counties in 2018 to identify issues associated with Upper Sheyenne River erosion, sedimentation, bank loss, and associated impacts on water quality. These public meetings were well attended by area landowners, and by ND DEQ and ND SWC staff. Input was also sought from Griggs County and Wells County Soil Conservation Districts early on to identify ongoing projects within their jurisdiction. These public meetings and early planning input from stakeholders helped guide field work locations as well as selection of project sites. In February 2022, the Joint Board, along with NRCS staff, met with Eddy County landowners at the New Rockford NRCS office to discuss the project objectives and benefits. There is broad support for the implementation of watershed pilot projects within the Upper Sheyenne River watershed among the community due to the benefits of addressing ongoing issues associated with the river and improving water quality.

4.3 The Joint Board will communicate and coordinate with ND DEQ and EPA diligently and effectively if and when additional funding becomes available from other partners. At this time, that is not the case.

4.4 The Upper Sheyenne River Watershed Pilot Project is a unique and first-of-its-kind project being implemented across the State of North Dakota, where a watershed-based approach is executed through legislative support. The Joint Board is committed to making this a successful project so that, in the future, more watershed-based projects across the state will avail themselves of the same benefits and similar opportunities.

5.0 Evaluation and Monitoring Plan

5.1 Evaluation and monitoring plan will be developed, as needed, upon completion of engineering design of the project and before construction is complete.

6.0 Budget

6.1 Total estimated cost for engineering design, permitting, and construction of the three sites listed above in Table 1 of Section 3.2 is $3,438,488. The Joint Board secured $1,100,000 from the ND Department of Water Resources (ND DWR) in 2021 under a 4-year cost share agreement. During the contract period, the Joint Board utilized $699,743.16 towards engineering design, permitting, and construction engineering. The Joint Board extended the cost share agreement with the ND DWR through December 2027. The remaining amount of $400,256.84 will be utilized for the engineering, permitting, and construction engineering of the proposed sites. The Joint Board also secured $150,000 through the Garrison Diversion Conservancy District (GDCD) in August 2022. Out of the $150,000, the Joint Board utilized $83,000 towards construction of Site 5 and Site 10. The remaining balance of $67,000 will go towards construction of the proposed sites. In August 2022, the Joint Board secured approval of $2,234,248 through the USDA NRCS RCPP grant application (RCPP). The RCPP grant amount will be primarily used for engineering, permitting, and construction of proposed sites. The Joint Board also plans to submit a cost share request to the ND Outdoor Heritage Fund during the October 2026 application cycle. See Part 1: Funding Sources, Table 5.

Table 5 Funding Sources

Funding Sources	2026	2027
ND DWR	$200,128.42	$200,128.42
EPA 319	$180,000	$180,000
NRCS RCPP	$1,117,124	$1,117,124
GDCD	$33,500	$33,500
NDIC OHF	$173,492	$173,492
Local Share	$15,000	$$15,000

Please note that these budget estimates are preliminary and subject to change. As the project engineering design is complete, the planning level costs estimated are expected to be refined further.

Part 2: Funding Breakdown is presented in Table 6 and Table 7.

Table 6 Administrative Cost Breakdown

EPA 319 Funds	2026	2027	Costs	Total Match
Administrative Cost/Personnel/Support	$15,000	$15,000	$30,000	$12,000

Table 7 Task-based Funding Breakdown

Tasks	2026	2027	Costs	Total Match
Objective 1: Engineering Design	$209,000	$209,000	$418,000	$167,200
Objective 2: Permitting	$36,000	$36,000	$72,000	$28,800

Objective 1: Engineering Design – Includes topographic survey and engineering design at 2 (two)

sites identified under initial Watershed Pilot Project, along with newly incorporated Site L. Objective 1 will advance project through 10%, 30%, 60%, 90%, and final design stage with an improved project definition and cost estimate at end of each stage.

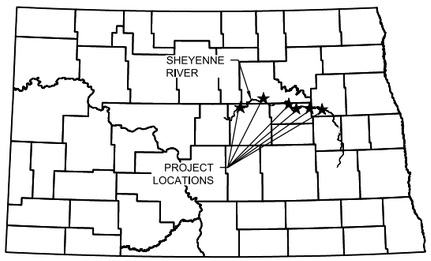
Objective 2: Permitting – Includes securing required permits and easements at 2 (two) sites identified under initial Watershed Pilot Project, along with newly incorporated Site L.

Completing Objectives 1 and 2 for all identified sites at once will yield overall cost savings.

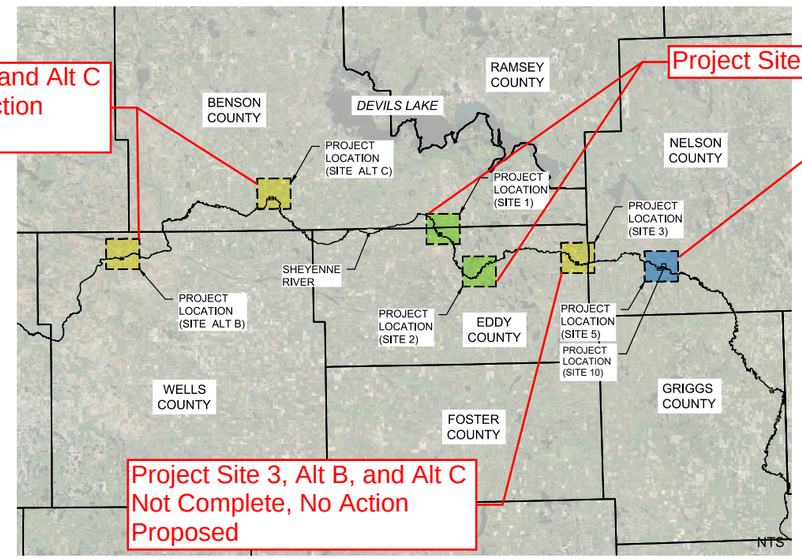
7.0 Public Involvement

The Joint Board will work collaboratively with the public. Up to one (1) public information meeting will be held within Eddy County where projects will be executed, to share 30% preferred design alternatives with the public. At these meetings, an overall milestone schedule will also be shared with the attendees. Any additional public input required towards successful execution of the Project will be sought through by means of local county water resource board channel, with the Joint Board leading this effort.

UPPER SHEYENNE RIVER WATERSHED
RIVER IMPROVEMENTS PILOT PROJECT
NORTH DAKOTA
SITE 1, 2, 3, 5, ALT B, & ALT C



VICINITY MAP
NOT TO SCALE



SITE LOCATION MAP
SHEYENNE RIVER, NORTH DAKOTA

PROJECT INFROMATION

CIVIL:
BARR ENGINEERING CO.
MANDAR NANGARE
234 W CENTURY AVE,
BISMARCK, ND 58503
PHONE: 701-255-5460

NORTH DAKOTA ONE CALL
NORTH DAKOTA ONE CALL:
CALL BEFORE YOU DIG.
1-800-795-0555 or 811

CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.

PRELIMINARY DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	—	-

CLIENT	8/17/22						
BID							
CONSTRUCTION							
RECORD							
RELEASED TO/FOR	A	B	C	0	1	2	3
	DATE RELEASED						

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	AMP3
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

USRW PILOT PROJECT
SITE 1, 2, 3, 5, ALT B, ALT C

TITLE SHEET, INDEX, AND SITE LOCATION MAP

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. G-00
REV. No. A

Proposed - Site 1

Rock at Toe of Slope

ID: 7-2
BEHI Rating: Moderate
NBS Rating: Low

7_B

Bankfull Flat

EDDY COUNTY

SEC. 2

Bush Township

High terrace

T150N, R 65W

Low terrace

ID: 7-1
BEHI Rating: High
NBS Rating: Very Low

124

7_A

29TH ST NE

NE

SEC. 12

SEC. 12

Bank height: 4.5 ft
Bank length: 240 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr
Bank erosion estimate from survey data (2001-2018): 0.05 ft/yr

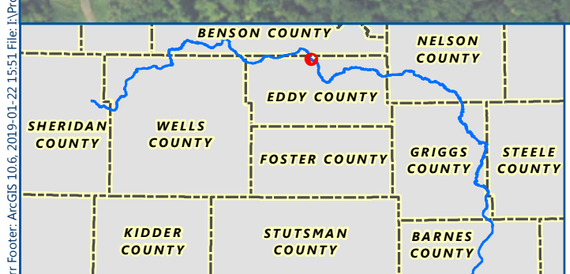
Sediment loss estimate from BANCS: 8 tons/yr
Sediment loss estimate from survey: 3 tons/yr

Bank height: 7 ft
Bank length: 2200 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.2 ft/yr
Bank erosion estimate from survey data (2001-2018): 1.2 ft/yr

Sediment loss estimate from BANCS: 150 tons/yr
Sediment loss estimate from survey: 890 tons/yr

Total sediment loss estimate from BANCS: 160 tons/yr
Total sediment loss estimate from survey: 890 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr



River Mile Stationing
Barr Cross Section Location
County Boundary
Public Land Survey Township
Public Land Survey Section

BANCS - BEHI Rating
Extreme
Very High
High
Moderate
Low
Very Low

BANCS - NBS Rating
Extreme
Very High
High
Moderate
Low
Very Low

N

0 150 300 450
Feet

Imagery: USDA-FSA-APFO NAIP, 2017

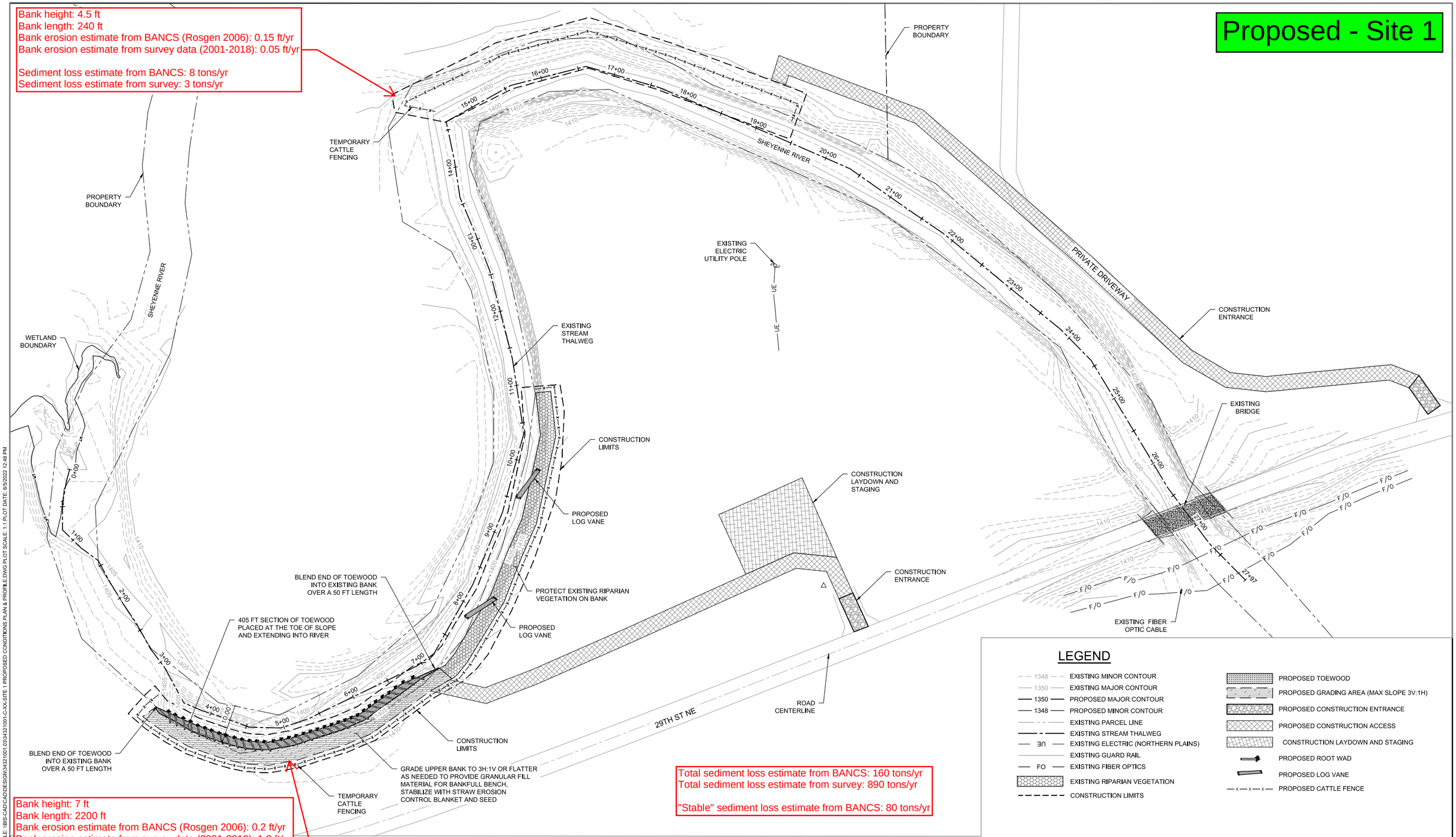
APPENDIX A

FIELD SURVEY SUMMARY
Upper Sheyenne River Joint Water Resources Board

Bank height: 4.5 ft
Bank length: 240 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr
Bank erosion estimate from survey data (2001-2018): 0.05 ft/yr

Sediment loss estimate from BANCS: 8 tons/yr
Sediment loss estimate from survey: 3 tons/yr

Proposed - Site 1



Bank height: 7 ft
Bank length: 2200 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.2 ft/yr
Bank erosion estimate from survey data (2001-2018): 1.2 ft/yr

Sediment loss estimate from BANCS: 150 tons/yr
Sediment loss estimate from survey: 890 tons/yr

Total sediment loss estimate from BANCS: 160 tons/yr
Total sediment loss estimate from survey: 890 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

LEGEND

- 1348 — EXISTING MINOR CONTOUR
- 1350 — EXISTING MAJOR CONTOUR
- 1350 — PROPOSED MAJOR CONTOUR
- 1348 — PROPOSED MINOR CONTOUR
- EXISTING PARCEL LINE
- EXISTING STREAM THALWEG
- UE — EXISTING ELECTRIC (NORTHERN PLAINS)
- EXISTING GUARD RAIL
- FO — EXISTING FIBER OPTICS
- EXISTING RIPARIAN VEGETATION
- CONSTRUCTION LIMITS
- PROPOSED TOEWOOD
- PROPOSED GRADING AREA (MAX SLOPE 3V:1H)
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED CONSTRUCTION ACCESS
- CONSTRUCTION LAYDOWN AND STAGING
- PROPOSED ROOT WAD
- PROPOSED LOG VANE
- x — PROPOSED CATTLE FENCE

1 - PLAN: RIVER IMPROVEMENTS

0 60 120
SCALE IN FEET

PRELIMINARY DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	-	-

PRINTED NAME
SIGNATURE
DATE LICENSE #

CLIENT	08/17/22						
BID							
CONSTRUCTION							
RECORD							
RELEASED TO/FOR	A	B	C	0	1	2	3
	DATE RELEASED						

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	AMP3
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

USRW PILOT PROJECT
SITE 1

PROPOSED CONDITIONS
PLAN & PROFILE

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-03
REV. No. A

CADD USER: ANDREW M. PAPKE-LARSON FILE: \\BIS-CAD\CAD\DESIGN\34321001.03\34321001-C-XX-SITE 1 PROPOSED CONDITIONS PLAN & PROFILE.DWG PLOT SCALE: 1:1 PLOT DATE: 8/5/2022 12:48 PM

Proposed - Site 2

Bank height: 5.0 ft
Bank length: 120 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.85 ft/yr

Sediment loss estimate from BANCS: 25 tons/yr

Bank height: 6.0 ft
Bank length: 120 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr

Sediment loss estimate from BANCS: 5 tons/yr

Bank height: 5.0 ft
Bank length: 430 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.4 ft/yr

Sediment loss estimate from BANCS: 41 tons/yr

Bank height: 5.0 ft
Bank length: 190 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.6 ft/yr

Sediment loss estimate from BANCS: 27 tons/yr

Bank height: 6.0 ft
Bank length: 570 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.2 ft/yr

Sediment loss estimate from BANCS: 33 tons/yr

Bank height: 5.5 ft
Bank length: 600 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.25 ft/yr

Sediment loss estimate from BANCS: 40 tons/yr

Bank height: 5.5 ft
Bank length: 1030 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.25 ft/yr

Sediment loss estimate from BANCS: 68 tons/yr

Total sediment loss estimate from BANCS: 240 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

ID: 8-1
BEHI Rating: High
NBS Rating: Very High

ID: 8-2
BEHI Rating: Moderate
NBS Rating: Low

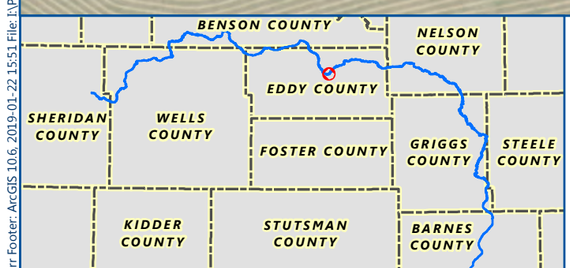
ID: 8-3
BEHI Rating: Very High
NBS Rating: Moderate

ID: 8-4
BEHI Rating: Very High
NBS Rating: High

ID: 8-5
BEHI Rating: High
NBS Rating: Low

ID: 8-6
BEHI Rating: High
NBS Rating: Low

ID: 8-7
BEHI Rating: High
NBS Rating: Very Low



River Mile Stationing
Barr Cross Section Location
County Boundary
Public Land Survey Township
Public Land Survey Section

BANCS - BEHI Rating
Extreme
Very High
High
Moderate
Low
Very Low

BANCS - NBS Rating
Extreme
Very High
High
Moderate
Low
Very Low

0 150 300 450
Feet

Imagery: USDA-FSA-APFO NAIP, 2017

APPENDIX A

FIELD SURVEY SUMMARY
Upper Sheyenne River Joint Water Resources Board

Proposed - Site 2

Bank height: 6.0 ft
Bank length: 120 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr

Sediment loss estimate from BANCS: 5 tons/yr

Bank height: 5.0 ft
Bank length: 120 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.85 ft/yr

Sediment loss estimate from BANCS: 25 tons/yr

Bank height: 5.0 ft
Bank length: 190 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.6 ft/yr

Sediment loss estimate from BANCS: 27 tons/yr

Bank height: 5.5 ft
Bank length: 600 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.25 ft/yr

Sediment loss estimate from BANCS: 40 tons/yr

Bank height: 6.0 ft
Bank length: 570 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.2 ft/yr

Sediment loss estimate from BANCS: 33 tons/yr

Bank height: 5.5 ft
Bank length: 1030 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.25 ft/yr

Sediment loss estimate from BANCS: 68 tons/yr

Total sediment loss estimate from BANCS: 240 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

20.00' MESIC PRAIRIE SEED MIX
WETLAND SEED MIX W/ LIVE STAKES SEE
MIXED HAY LAND SEED MIX SEE
EXISTING STRUCTURE
EXISTING STREAM THALWEG
EXISTING PARCEL LINE
SHEYENNE RIVER
ROAD CENTERLINE
EXISTING BRIDGE
AVE NE
MESIC PRAIRIE SEED MIX SEE

LEGEND

- EXISTING PARCEL LINE
- EXISTING WETLAND DELINEATION
- CONSTRUCTION LIMITS
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING ELECTRICAL LINE
- EXISTING GUARD RAIL
- EXISTING FIBER OPTICS
- PROPOSED MESIC PRAIRIE SEED MIX
- PROPOSED WETLAND SEED MIX W/ LIVE STAKES
- PROPOSED HAY LAND SEED MIX

NOTES:

- STABILIZE WITH SPECIFIED SEED MIX AND ECB ON RIVER BANKS AND ALL AREAS 3H:1V OR STEEPER, STABILIZE WITH SPECIFIED SEED MIX AND STRAW MULCH ALL OTHER AREAS

1 PLAN: RIVER IMPROVEMENTS

0 60 120
SCALE IN FEET

PRELIMINARY DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	-	-

PRINTED NAME
SIGNATURE
DATE . . LICENSE # . .

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT 08/17/22							
BID							
CONSTRUCTION							
RECORD							

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	AMP3
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

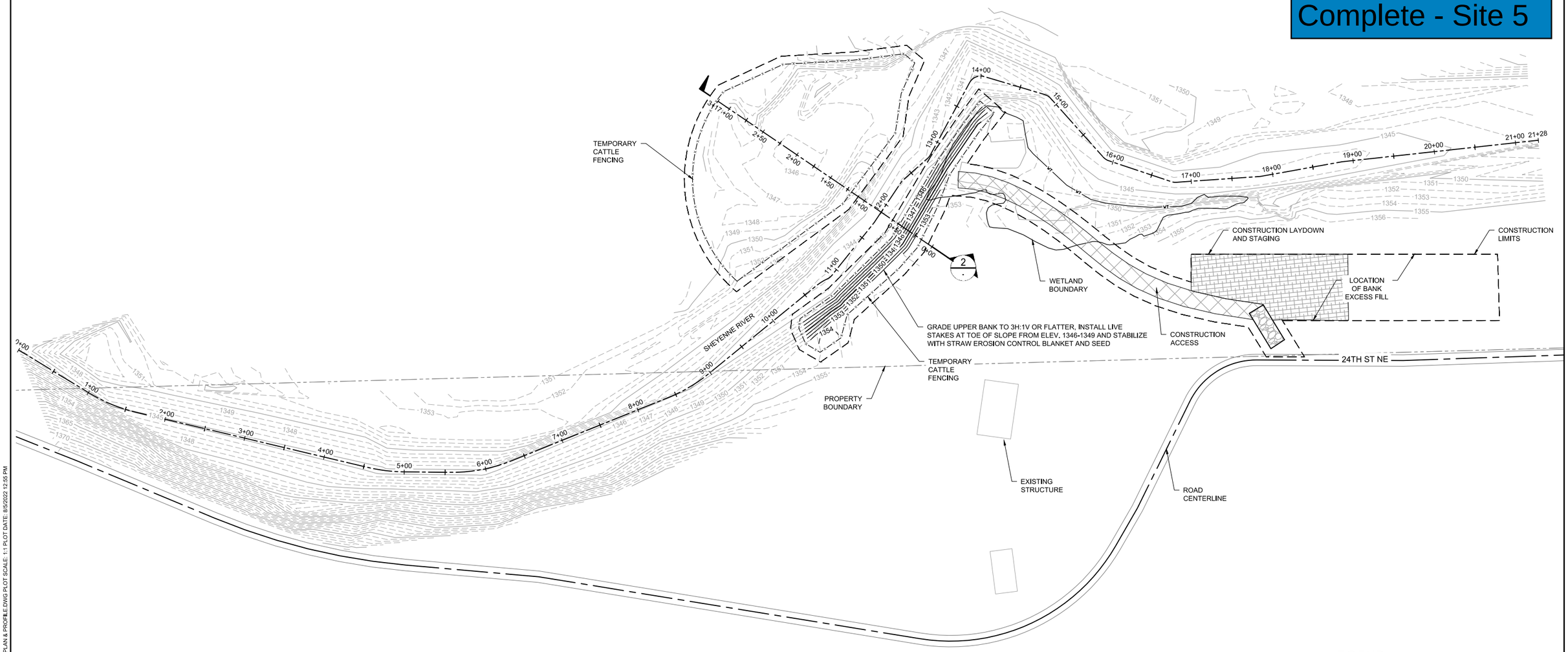
USRW PILOT PROJECT
SITE 2

RESTORATION PLAN

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-04
REV. No. A

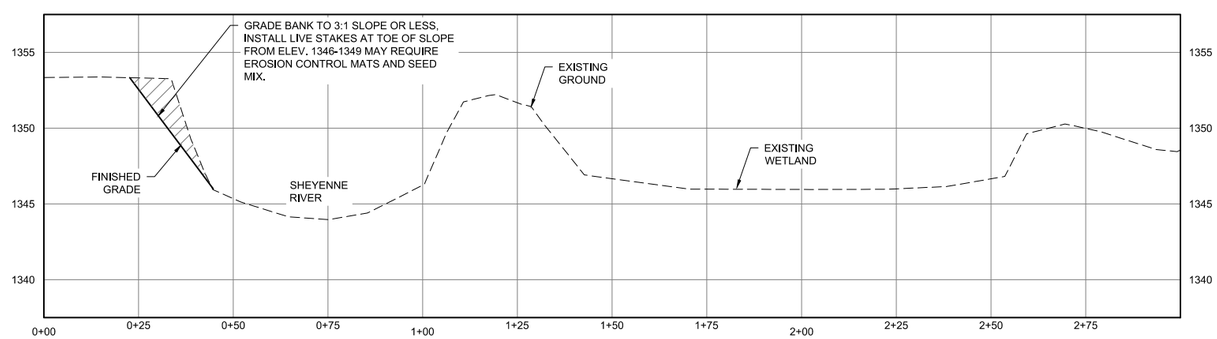
CADD USER: ANDREW M. PAPKE-LARSON FILE: \\BIS-CAD\CAD\DESIGN\34321001.03\34321001-C-XX-SITE 2 RESTORATION PLAN.DWG PLOT SCALE: 1

Complete - Site 5



1 PLAN: RIVER IMPROVEMENTS

0 60 120
SCALE IN FEET



2 PROFILE: BANK STABILIZATION

0 20 40
HORIZONTAL SCALE IN FEET

0 5 10
VERTICAL SCALE IN FEET

LEGEND

- 1348 EXISTING MINOR CONTOUR
- 1350 EXISTING MAJOR CONTOUR
- 1350 PROPOSED MAJOR CONTOUR
- 1348 PROPOSED MINOR CONTOUR
- EXISTING PARCEL LINE
- EXISTING STREAM THALWEG
- CONSTRUCTION LIMITS
- PROPOSED CATTLE FENCE
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED CONSTRUCTION ACCESS
- CONSTRUCTION LAYDOWN AND STAGING

PERLIMINARY DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	-	-

PRINTED NAME
SIGNATURE
DATE LICENSE #

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT	08/17/22						
BID							
CONSTRUCTION							
RECORD							

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	AMP3
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

USRW PILOT PROJECT
SITE 5

PROPOSED CONDITIONS
PLAN & PROFILE

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-03
REV. No. A

CADD USER: ANDREW M. PAPKE-LARSON FILE: \\BIS-CAD\CAD\DESIGN\34321001\34321001.03\34321001-C-XX-SITE 5 PROPOSED CONDITIONS PLAN & PROFILE.DWG PLOT SCALE: 1:1 PLOT DATE: 8/5/2022 12:55 PM

Complete - Site 10

Bank height and length are updated!

Need help updating:

Bank erosion estimate from BANCS (Rosgen 2006)
Bank erosion estimate from survey data (2001-2018)

Sediment loss estimate from BANCS
Sediment loss estimate from survey

Bank height: ~4 ft (up to 7ft)
Bank length: 215 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr
Bank erosion estimate from survey data (2001-2018): 0.05 ft/yr

Sediment loss estimate from BANCS: 8 tons/yr
Sediment loss estimate from survey: 3 tons/yr

Excavated to make low flow channel in stream center

ID: 10-1
BEHI Rating: High
NBS Rating: Moderate

Mid-Channel Bar

Cattle crossing

Installed 316ft of cattle fence

Installed 676ft of cattle fence

10_A

1

T150N, R 60W

ID: 10-4
BEHI Rating: Moderate
NBS Rating: Low

Terrace

ID: 10-5
BEHI Rating: High
NBS Rating: Low

SEC. 34

ID: 10-2
BEHI Rating: High
NBS Rating: Low

Bankfull Flat

10_B

Osago Township

SEC. 35

185

ID: 10-6
BEHI Rating: Very High
NBS Rating: Low

NELSON COUNTY

ID: 10-3
BEHI Rating: Very High
NBS Rating: Low

Bank height and length are updated!

Need help updating:

Bank height: Up to 7 ft
Bank length: 416 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.2 ft/yr
Bank erosion estimate from survey data (2001-2018): 1.2 ft/yr

Sediment loss estimate from BANCS: 150 tons/yr
Sediment loss estimate from survey: 890 tons/yr

Need help updating:

Total sediment loss estimate from BANCS: 160 tons/yr
Total sediment loss estimate from survey: 890 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

Need help updating:

Bank erosion estimate from BANCS (Rosgen 2006)
Bank erosion estimate from survey data (2001-2018)

Sediment loss estimate from BANCS
Sediment loss estimate from survey

24TH ST NE

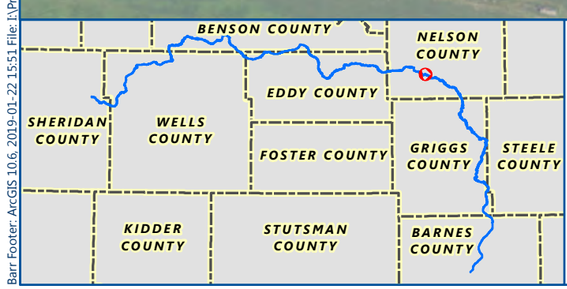
Bergen Township

SEC. 3

T149N, R 60W

186

SEC. 2



River Mile Stationing
Barr Cross Section Location
County Boundary
Public Land Survey Township
Public Land Survey Section

BANCS - BEHI Rating
Extreme
Very High
High
Moderate
Low
Very Low

BANCS - NBS Rating
Extreme
Very High
High
Moderate
Low
Very Low

N

0 150 300 450
Feet

Imagery: USDA-FSA-APFO NAIP, 2017

APPENDIX A

FIELD SURVEY SUMMARY
Upper Sheyenne River Joint Water Resources Board

Complete - Site 10

LEGEND

- 1348 — EXISTING MINOR CONTOUR
- 1350 — EXISTING MAJOR CONTOUR
- 1350 — PROPOSED MAJOR CONTOUR
- 1348 — PROPOSED MINOR CONTOUR
- EXISTING PARCEL LINE
- EXISTING STREAM THALWEG
- EXISTING TREE CANOPY
- PROPOSED CATTLE FENCE
- CONSTRUCTION LIMITS
- PROPOSED CATTLE FENCE
- ROCK CONSTRUCTION ENTRANCE
- CONSTRUCTION ACCESS ROUTE
- CONSTRUCTION LAYDOWN AND STAGING

PROPERTY BOUNDARY
EXISTING STRUCTURE
WETLAND BOUNDARY
PRIVATE DRIVEWAY
NORTH DAKOTA HIGHWAY 1
EXCAVATE SEDIMENT BAR TO CREATE LOW-FLOW CHANNEL IN CENTER OF RIVER, THALWEG EL. ~1343
REMOVE EXISTING ROCK DIKE, RE-USE ROCKS FOR TOE WOOD LOG BALLAST
EXISTING CATTLE CROSSING TO REMAIN
EXISTING BRIDGE
EXISTING BRIDGE SUPPORT
MTNCP70
MTNCP71
EXTEND FENCE LINE 100 FT WEST OF TOE WOOD ALONG RIVER BANK
EXTEND FENCE LINE TO PROPERTY LINE AT RIVER BANK
FILL BEHIND TOE WOOD TO BANKFULL ELEVATION WITH SOIL EXCAVATED FROM RIVER BED AND BANKS
3 D-02 INSTALL 306 LF CATTLE FENCING MAX 2 FT BEHIND TOP OF EXISTING RIVER BANK
1 D-02 INSTALL 216 LF TOE WOOD WITH VRSS TO BANKFULL ELEVATION
EXISTING CATTLE FENCE
PROTECT EXISTING TREES
PROTECT EXISTING FENCE AND GATE
SPREAD EXCESS SOIL FROM RIVER BANK WITHIN CONSTRUCTION LIMITS (MAX 6 IN HIGH), STABILIZE WITH MULCH AND SEED. NO FILL ALLOWED WITHIN WETLAND AREAS.
SITE ACCESS THROUGH 16' CATTLE GATE
CONSTRUCTION LAYDOWN AND STAGING
CONSTRUCTION LIMITS
CONSTRUCTION ACCESS
ROAD CENTERLINE
SHEYENNE RIVER
GRADE UPPER BANK TO 3H:1V OR FLATTER, INSTALL LIVE STAKES AT TOE OF SLOPE FROM ELEV. 1347-1350 AND STABILIZE WITH EROSION CONTROL BLANKET AND SEED
3 R-01 2 D-02
PROTECT EXISTING TREES
INSTALL CATTLE FENCING 20' OFF EXISTING TOP OF BANK
3 D-02 INSTALL 676 LF CATTLE FENCING

t and length are updated!

Bank height: Up to 7 ft
Bank length: 416 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.2 ft/yr
Bank erosion estimate from survey data (2001-2018): 1.2 ft/yr

Sediment loss estimate from BANCS: 150 tons/yr
Sediment loss estimate from survey: 890 tons/yr

Need help updating:

Bank erosion estimate from BANCS (Rosgen 2006)
Bank erosion estimate from survey data (2001-2018)

Sediment loss estimate from BANCS
Sediment loss estimate from survey

Need help updating:

Total sediment loss estimate from BANCS: 160 tons/yr
Total sediment loss estimate from survey: 890 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

1 PLAN: RIVER IMPROVEMENTS
0 60 120
SCALE IN FEET

ISSUED FOR BID AND CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	—	-

PERMIT
CLIENT
BID
CONSTRUCT

RELEASED TO/FOR | A B C 0 1 2 3 | DATE RELEASED

Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277
Ph: 1-800-632-2277 Fax: (701) 222-6371 www.barr.com

AS SHOWN
11/14/2024
AMP3
PJH
Designed BARR
Approved PJH

UPPER SHEYENNE RIVER JOINT WATER RESOURCE BOARD
SHEYENNE RIVER, NORTH DAKOTA

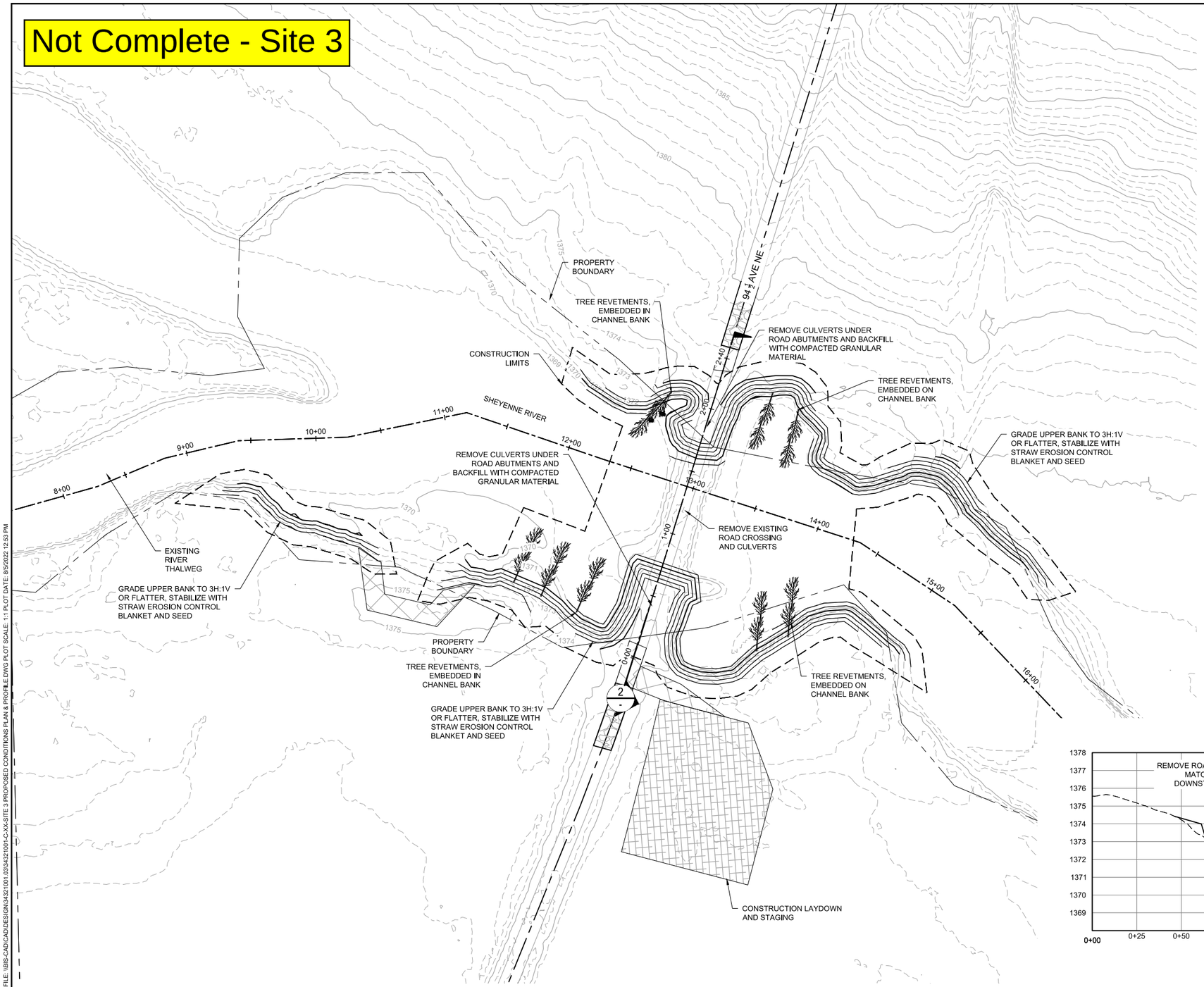
USRW PILOT PROJECT
SITE 10

PROPOSED CONDITIONS PLAN

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-03
REV. No. 0

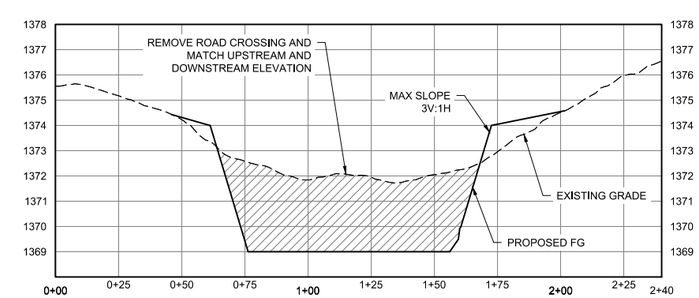
CADD USER: ANDREW M. PAPKE-LARSON FILE: \\BIS-CAD\CAD\DESIGN\34321001.03\SITE 10\34321001.03 SITE 10 PROPOSED CONDITIONS PLAN & PROFILE.DWG PLOT SCALE: 1:1 PLOT DATE: 11/7/2024 4:00 PM

Not Complete - Site 3



LEGEND

- 1348 — EXISTING MINOR CONTOUR
- 1350 — EXISTING MAJOR CONTOUR
- 1350 — PROPOSED MAJOR CONTOUR
- 1348 — PROPOSED MINOR CONTOUR
- EXISTING PARCEL LINE
- EXISTING STREAM THALWEG
- CONSTRUCTION LIMITS
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED CONSTRUCTION ACCESS
- CONSTRUCTION LAYDOWN AND STAGING



1 PLAN: RIVER IMPROVEMENTS
0 40 80
SCALE IN FEET

2 PROFILE: BANK STABILIZATION
0 30 60 — VERTICAL SCALE IN FEET
0 3 6 — HORIZONTAL SCALE IN FEET

PRELIMINARY DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	-	-

PRINTED NAME
SIGNATURE
DATE LICENSE #

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT 08/17/22							
BID							
CONSTRUCTION							
RECORD							

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	AMP3
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

USRW PILOT PROJECT
SITE 3

PROPOSED CONDITIONS
PLAN & PROFILE

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-03
REV. No. A

CADD USER: ANDREW M. PAPKE-LARSON FILE: \\BIS-CAD\CAD\DESIGN\34321001.03\34321001-C-XX-SITE 3 PROPOSED CONDITIONS PLAN & PROFILE.DWG PLOT SCALE: 1:1 PLOT DATE: 8/5/2022 12:53 PM

Not Complete - Site Alt B

Culvert Replacement for Fish Passsage

Valley Toe

Terrace

Bankful Flat

2_A

ID: 2-2
BEHI Rating: Low
NBS Rating: Moderate

Wells Township

2_B

T150N, R 72W

Valley Toe

SEC. 23

SEC. 24

WELLS COUNTY

Sediment Bar

35

Perched Culvert

ID: 2-1
BEHI Rating: High
NBS Rating: High

Bank height and length are updated!

Need help updating:

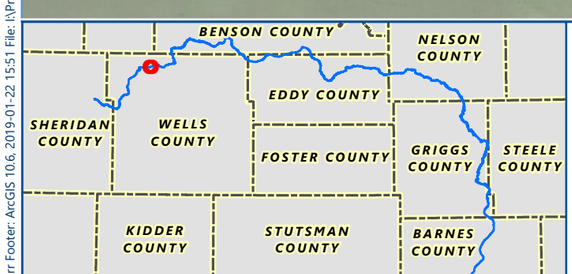
Bank height: 5 ft (up to 10ft)
Bank length: 220 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr
Bank erosion estimate from survey data (2001-2018): 0.05 ft/yr

Sediment loss estimate from BANCS: 8 tons/yr
Sediment loss estimate from survey: 3 tons/yr

Total sediment loss estimate from BANCS: 160 tons/yr
Total sediment loss estimate from survey: 890 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

Microsoft, Vantor



River Mile Stationing
Barr Cross Section Location
County Boundary
Public Land Survey Township
Public Land Survey Section

BANCS - BEHI Rating
Extreme
Very High
High
Moderate
Low
Very Low

BANCS - NBS Rating
Extreme
Very High
High
Moderate
Low
Very Low

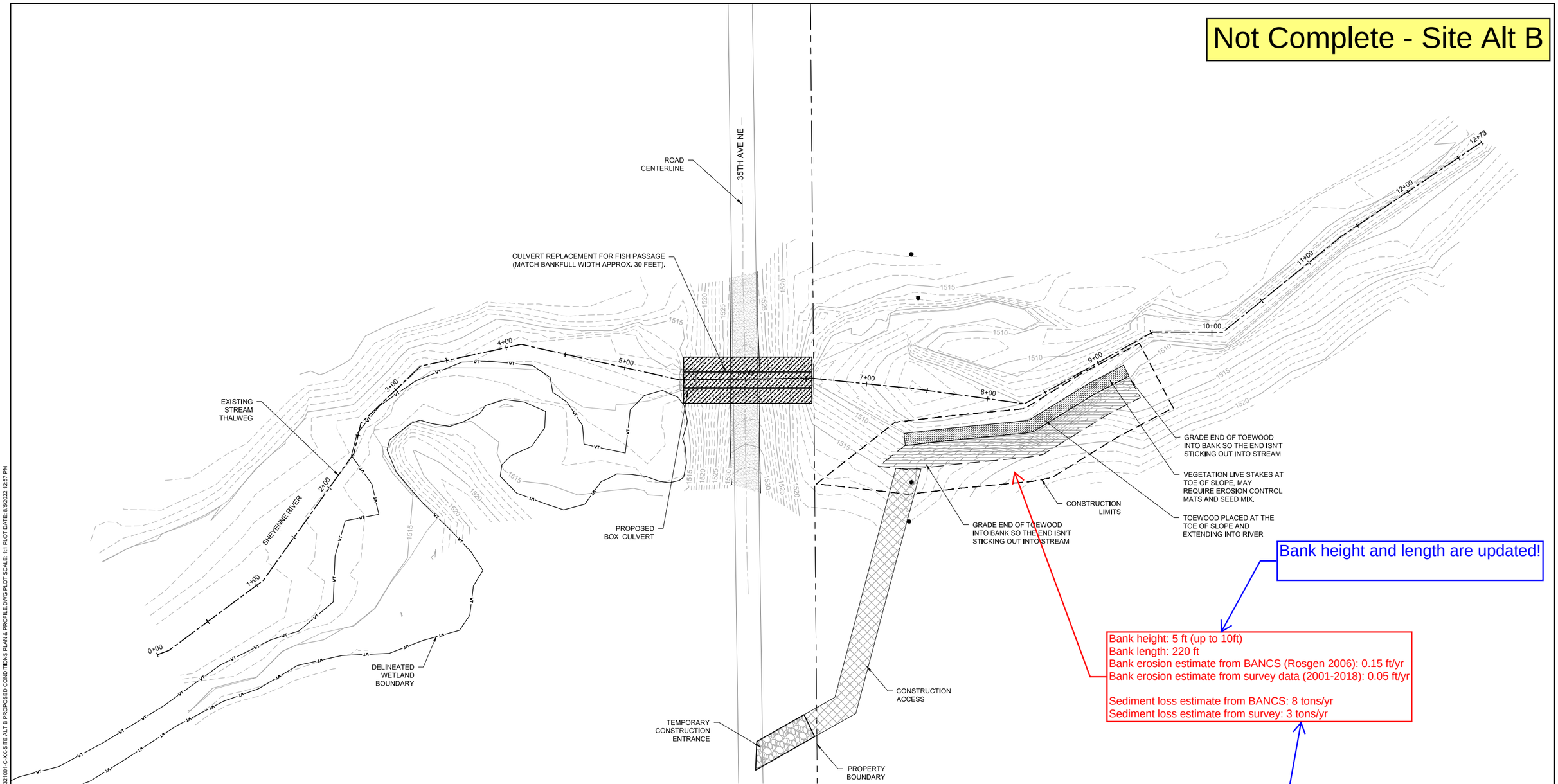
0 150 300 450
Feet

Imagery: USDA-FSA-APFO NAIP, 2017

APPENDIX A

FIELD SURVEY SUMMARY
Upper Sheyenne River Joint Water Resources Board

Not Complete - Site Alt B



Bank height and length are updated!

Bank height: 5 ft (up to 10ft)
Bank length: 220 ft
Bank erosion estimate from BANCS (Rosgen 2006): 0.15 ft/yr
Bank erosion estimate from survey data (2001-2018): 0.05 ft/yr

Sediment loss estimate from BANCS: 8 tons/yr
Sediment loss estimate from survey: 3 tons/yr

Need help updating:

Total sediment loss estimate from BANCS: 160 tons/yr
Total sediment loss estimate from survey: 890 tons/yr

"Stable" sediment loss estimate from BANCS: 80 tons/yr

LEGEND

- EXISTING PARCEL LINE
- EXISTING WETLAND DELINEATION
- CONSTRUCTION LIMITS
- 1348 EXISTING MINOR CONTOUR
- 1350 EXISTING MAJOR CONTOUR
- 1350 PROPOSED MAJOR CONTOUR
- 1348 PROPOSED MINOR CONTOUR
- PROPOSED FENCE
- PROPOSED TOEWOOD
- PROPOSED LOG VANES
- PROPOSED GRADING AREA (MAX SLOPE 3V:1H)
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED CONSTRUCTION ACCESS

1 - PLAN: RIVER IMPROVEMENTS
1" = 60'

PRELIMINARY DRAFT

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	-	-

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT	08/17/22						
BID							
CONSTRUCTION							
RECORD							
DATE RELEASED							

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	CWF
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

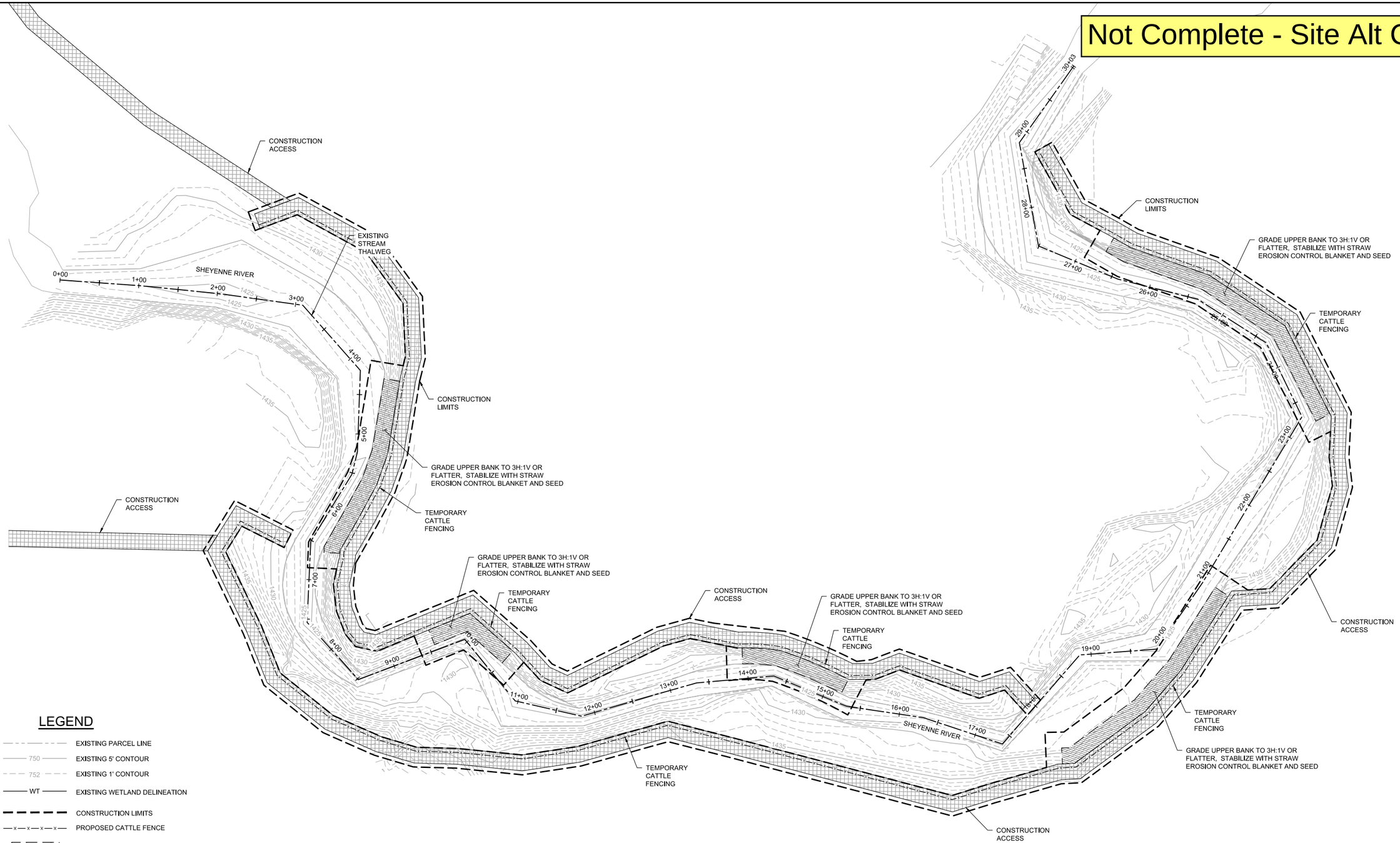
USRW PILOT PROJECT
SITE Alt. B

PROPOSED CONDITIONS
PLAN & PROFILE

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-03
REV. No. A

CADD USER: ANDREW M. PAPKE-LARSON FILE: \\BIS-CAD\CAD\DESIGN\34321001.03\34321001-C-XX-SITE ALT B PROPOSED CONDITIONS PLAN & PROFILE.DWG PLOT SCALE: 1:1 PLOT DATE: 8/5/2022 12:57 PM

Not Complete - Site Alt C



LEGEND

- EXISTING PARCEL LINE
- 750 EXISTING 5' CONTOUR
- 752 EXISTING 1' CONTOUR
- WT EXISTING WETLAND DELINEATION
- CONSTRUCTION LIMITS
- PROPOSED CATTLE FENCE
- PROPOSED GRADING AREA (MAX SLOPE 3V:1H)
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED CONSTRUCTION ACCESS

1 PLAN: RIVER IMPROVEMENTS

0 60 120
SCALE IN FEET

PRELIMINARY DRAFT

CADD USER: ANDREW M. PAPKE-LARSON FILE: I:\BIS-CAD\CAD\DESIGN\34321001.03\34321001-C-XX-SITE ALT C PROPOSED CONDITIONS PLAN & PROFILE.DWG PLOT SCALE: 1:1 PLOT DATE: 8/5/2022 12:59 PM

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
-	-	-	-	-	-

PRINTED NAME
SIGNATURE
DATE - - LICENSE # -

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT	08/17/22						
BID							
CONSTRUCTION							
RECORD							

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
234 WEST CENTURY AVENUE
BISMARCK, ND 58503
Ph: 1-800-632-2277
Fax: (701) 222-6371
www.barr.com

Scale	AS SHOWN
Date	08/17/2022
Drawn	CWF
Checked	PJH
Designed	BARR
Approved	PJH

UPPER SHEYENNE RIVER WATERSHED
SHEYENNE RIVER, NORTH DAKOTA

USRW PILOT PROJECT
SITE ALT C

PROPOSED CONDITIONS
PLAN & PROFILE

BARR PROJECT No. 34/32-1001.03
CLIENT PROJECT No.
DWG. No. C-03
REV. No. A