FUTURE FISHERIES IMPROVEMENT PROGRAM GRANT APPLICATION

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

I. APPLICANT INFORMATION

A. Applicant Name: Big Blackfoot Chapter of Trout Unlimited

Mailing Address: PO Box 1

City: Ovando State: MT Zip: 59854

Telephone: 406-240-4824 E-mail: ryen@montanatu.org

B. Contact Person (if different than applicant): Ryen Neudecker

Address: Same as above

City: State: Zip:

Telephone: E-mail:

C. Landowner and/or Lessee Name (if different than applicant): Ken deLaski

Mailing Address: PO Box 137

City: Ovando State: MT Zip: 59854

Telephone: 406-793-2006 E-mail:

II. PROJECT INFORMATION

A. Project Name: Chamberlain Creek Fish Passage Project

River, stream, or lake: Chamberlain River

Location: Township: 15N Range: 13W Section: 4E

Latitude: 47.235065 Longitude: -113.533282 *Within project (decimal degrees)*

County: Powell

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

The purpose of this project is to restore fish passage for native populations of westslope cutthroat trout throughout the Chamberlain Creek drainage to enhance populations throughout the middle Blackfoot River watershed by upgrading an existing irrigation diversion.

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

Chamberlain Creek is a high priority tributary in the middle Blackfoot River and one of the most productive westslope cutthroat trout streams in the watershed. Several past projects have been implemented in the Chamberlain Creek drainage over the last two decades (culvert removals, stream restoration, road decommissioning, water lease, etc) and this project will address one of the last remaining issues impacting westslope cutthroat trout in the drainage. The project is located near stream-mile 1.0 and the focus of the work involves upgrading an existing irrigation diversion consisting of a concrete pin and plank dam that has been identified as a partial fish passage barrier that frequently plugs during the migration season for cutthroat trout.

The existing pin and plank diversion check structure is a channel-spanning dam built to send water down the adjacent irrigation ditch. There is an old denil fish ladder on the structure, but the ladder does require a lot of maintenance and if plugged, does not provide fish passage. Last fall, the entire structure heaved up by over a foot and flows are now sluicing underneath the pin and plank structure and into the ditch outside of the irrigation season.

The proposed project involves removing the historic pin and plank diversion and rebuilding the existing diversion structure with a rock weir step-pool structure. In addition, a stretch of streambank will be restored with vegetated wood matrix structures to provide bank stability along with transplants. This is a high priority project that would replace the problematic diversion to enable unrestricted fish passage and will complement the success of past projects and reinforce previous restoration investment in the drainage by ensuring connectivity to high quality spawning and rearing habitat.

Project objectives include:

1. Restore fish passage for all salmonids and aquatic species accessing this reach of Chamberlain Creek and beyond.
2. Design/build in channel rock weir that will restore stream function and sediment transport capacity.
3. Ensure project will accommodate future irrigation needs.

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

As previously described, the existing irrigation diversion is a partial fish passage barrier.

E. Length of stream or size of lake that will be treated (project extent): 250

Length/size of impact, if larger than project extent (e.g., stream miles opened): Nine+ miles

F. Project Budget Summary:

Grant Request (Dollars):	**$**	**16,600**
Matching Dollars:	**$**	**38,957.50**
Matching In-Kind Services:*	**$**	**20,423.97**

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

Other Contributions (not used as match)	**$**	
Total Project Cost:	**$**	**75,981.47**

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

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

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

I. Attach project plans:

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

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

Project partners include: MTFWP, BBCTU, BLM and Private Landowner

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

A. A 20-year maintenance commitment is required*. Please confirm that you will ensure this protection and describe your approach. Attach any relevant maintenance plans. Yes [X] No [ ]

**If it is a water leasing project, describe the length of the agreement.*

The Landowner has committed to signing a 20-year landowner agreement.

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

Grazing is not a part of nor adjacent to the project.

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

As-built surveys will be completed on the project when the project is complete. Long term fisheries monitoring data will be collected by FWP on both the Blackfoot River near Chamberlain Creek and within Chamberlain Creek.

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

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

This project will benefit migratory populations of native westslope cutthroat trout, a species of special concern in Montana.

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

By improving fish passage within Chamberlain Creek, migration corridors will be improved for westslope cutthroat trout. FWP has identified Chamberlain Creek as one of the most important and productive westslope cutthroat streams in the watershed.

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

This project will improve fish passage for native trout species in the short and long term as well as improving recruitment to the larger Blackfoot River watershed. Chamberlain Creek enters a section of the Blackfoot River with the highest angler days recorded in the Blackfoot.

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

The project site is just downstream of BLM and DNRC lands with access points. In addition, as previously mentioned Chamberlain Creek is a tributary to a section of the Blackfoot River with the highest number of angler days.

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

This project involves the continuation of the Blackfoot River Restoration program and improvements to a native trout tributary. Public benefits include: 1) expanding suitable habitat conditions for pure westslope cutthroat trout, 2) improved migration corridors, and 3) contribute to the recovery of westslope cutthroat trout. This project, in conjunction with the cumulative effects of other projects in the drainage, will aid in the recovery of westslope cutthroat trout, which is in the public's interest.

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

The existing irrigator is the landowner and this project has been developed in collaboration with them.

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

No.

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

No.

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

V. AUTHORIZING STATEMENT

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

Applicant Signature: Ryer Neudecker Date: 05/14/2025

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

Mail to:	FWP Future Fisheries Fish Habitat Bureau PO Box 200701 Helena, MT 59620-0701	Email:	Future Fisheries Coordinator FWPFFIP@mt.gov (electronic submissions must be signed) For files over 10MB, use https://transfer.mt.gov and send to mmcgree@mt.gov

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

Both tables MUST be completed appropriately or the application will be invalid. Please see the example budget sheet for clarification.

PROJECT COSTS					GRANT REQUEST AND FUNDING			
Work Items (Itemize by Category)	**Number of Units**	**Unit Description***	**Cost/Unit**	**Total Cost**	**FUTURE FISHERIES REQUEST**	**Matching Contributions (Cash or In-Kind)*** **	**Other Contributions (Funds not used as match)**	**Total Funding**
**Units = feet, hours, cubic yards, etc. Do not use lump sum unless necessary.*								
Personnel								
Survey	21	hrs	$155.00	$ 3,255.00		3,255.00		$ 3,255.00
Design	76	hrs	$155.00	$ 11,780.00		11,780.00		$ 11,780.00
Engineering	32	hrs	$155.00	$ 4,960.00		4,960.00		$ 4,960.00
Permitting	38	hrs	$48.00	$ 1,824.00		1,824.00		$ 1,824.00
Oversight	55	hrs	$165.00	$ 9,075.00		9,075.00		$ 9,075.00
Project Mgmt	61	hrs	$48.00	$ 2,928.00		2,928.00		$ 2,928.00
			Sub-Total	$ 33,822.00	$ -	$ 33,822.00	$ -	$ 33,822.00
Travel								
Mileage	891	miles	$0.67	$ 596.97		596.97		$ 596.97
Per diem				$ -				$ -
			Sub-Total	$ 596.97		$ 596.97	$ -	$ 596.97
Construction Materials								
Boulders	80	ea	$75.00	$ 6,000.00		6,000.00		$ 6,000.00
Pipe & Headgate	1	LS	$1,500.00	$ 1,500.00	500.00	1,000.00		$ 1,500.00
Sluice Gate Valve	1	EA	$900.00	$ 900.00		900.00		$ 900.00
Willows	625	E	$1.50	$ 937.50	-	937.50		$ 937.50
			Sub-Total	$ 9,337.50	$ 500.00	$ 8,837.50	$ -	$ 9,337.50
Equipment, Labor, and Mobilization								
Remove & dispose of existing diversion	1	LS	$5,000.00	$ 5,000.00	2,000.00	3,000.00		$ 5,000.00
Salvage Existing Vegetation	1	LS	$1,000.00	$ 1,000.00	500.00	500.00		$ 1,000.00
Water mgmt-coffer dams/pump	1	LS	$1,000.00	$ 1,000.00	-	1,000.00		$ 1,000.00
Construct Boulder Weir	1	LF	$15,000.00	$ 15,000.00	10,000.00	5,000.00		$ 15,000.00
Install pipe, headgate, valves	1	LS	$1,200.00	$ 1,200.00	600.00	600.00		$ 1,200.00

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

Install VWM Type 1 bank treatments	125	LF	$35.00	$ 4,375.00	2,000.00	2,375.00		$ 4,375.00
Transplant salvaged vegetation	15	EA	$50.00	$ 750.00		750.00		$ 750.00
Furnish wood	1	Loads	$900.00	$ 900.00		900.00		$ 900.00
Mobilization	1	LS	$3,000.00	$ 3,000.00	1,000.00	2,000.00		$ 3,000.00
			Sub-Total	$ 32,225.00	$ 16,100.00	$ 16,125.00	$ -	$ 32,225.00
			OVERALL TOTALS	$ 75,981.47	$ 16,600.00	$ 59,381.47	$ -	$ 75,981.47

OTHER REQUIREMENTS:

**For projects that include a maintenance request, it cannot exceed 10% of the total project cost.

***Match can include in-kind materials or labor. Justification for in-kind labor (e.g. hourly rates used) can be noted below. Do not use government salaries as match.

Additional budget detail:

APPLICATION MATCHING CONTRIBUTIONS

Total should equal match listed above; do not include requested funds

CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
USFS Helena National Forest	$ 6,000.00		$ 6,000.00	Yes
BLM	$ -	$ 15,000.00	$ 15,000.00	Yes
BBCTU	$ 14,423.97	$ 3,962.50	$ 18,386.47	Yes
MTFWP Design Funds		$ 19,995.00	$ 19,995.00	Yes
TOTALS	$ 20,423.97	$ 38,957.50	$ 59,381.47	

OTHER CONTRIBUTIONS

Total should equal other contributions listed above; these are funds not specically matched to the Future Fisheries application

CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
TOTALS	$ -	$ -	$ -	

MONTANA FISH, WILDLIFE & PARKS

Future Fisheries Improvement Program

Appendix: FWP Statement

Project Title: **Chamberlain Creek Diversion Replacement**

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

Chamberlain Creek is one of the most important and productive streams for migratory westslope cutthroat trout in Blackfoot River drainage. Following identification as a high priority native trout tributary, Chamberlain Creek has been the focus of comprehensive restoration since the 1990s. A large portion of the drainage was private industrial timberland that has been converted to public ownership (BLM and DNRC). FWP holds a conservation easement on the DNRC parcels to ensure protection of fish and wildlife values. Except for this pin and plank diversion, all known major fisheries impairments have been addressed through road drainage repairs, road decommissioning, grazing management, instream habitat restoration, and water leasing. The current pin and plank diversion includes a Denil fish ladder that frequently plugs with debris during the westslope cutthroat trout migration timeframe. This is a high priority project that would replace the problematic diversion with a rock weir structure to enable unrestricted fish passage. This project will complement the success of past projects and reinforce previous restoration investment in the drainage by ensuring connectivity to high quality spawning and rearing habitat. This project follows management direction in the Statewide Fisheries Management Plan that calls for restoring habitat to favor native salmonids in priority native trout tributaries and improving trout recruitment to the mainstem river through connectivity improvements in tributaries.

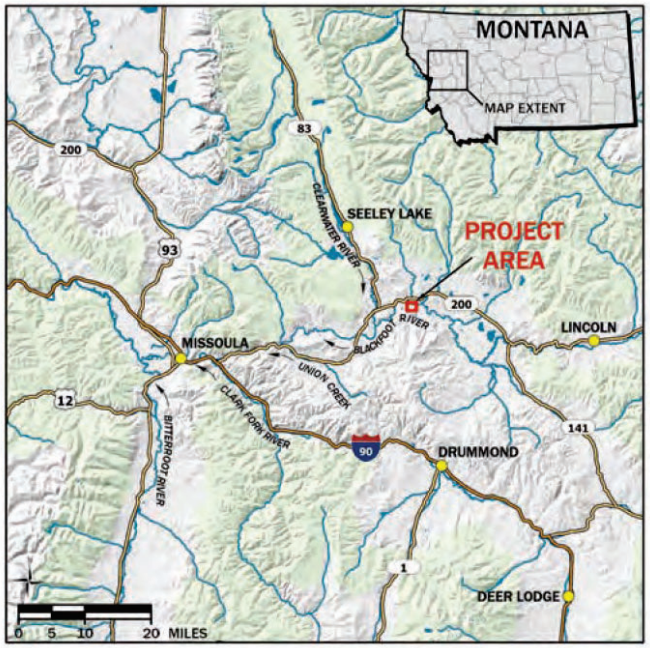
Name of FWP Biologist Patrick Uthe Date: 5/9/2025

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

Photos 1 & 2: Existing diversion near stream-mile 1.0 on Chamberlain Creek

CHAMBERLAIN CREEK DIVERSION PROJECT
CONCEPTUAL DESIGN PLAN SET

CHAMBERLAIN CREEK VICINITY MAP



LEGAL DESCRIPTION: S32, T15 N, R13 W, SE4, N2SW4

DRAWING INDEX

PROJECT PARTNERS

BIG BLACKFOOT CHAPTER OF MONTANA TROUT UNLIMITED
PO BOX 1
OVANDO, MONTANA 59854

MONTANA FISH, WILDLIFE & PARKS
1420 EAST SIXTH AVENUE
PO BOX 200701
HELENA, MONTANA

PROJECT DESCRIPTION

CHAMBERLAIN CREEK IS AN IMPORTANT COLD-WATER TRIBUTARY TO THE BLACKFOOT RIVER AND SUPPORTS POPULATIONS OF PURE STRAIN WESTSLOPE CUTTHROAT TROUT. BBCTU IN PARTNERSHIP WITH MONTANA FISH, WILDLIFE AND PARKS (FWP) ARE INTERESTED IN UPGRADING AN EXISTING DIVERSION STRUCTURE LOCATED AT N 47.01003° E -113.26552° IN THE CHANDLER CREEK WATERSHED. THE DIVERSION IS LOCATED ON PRIVATE LAND AND DELIVERS WATER TO A RECREATIONAL POND MANAGED AND OWNED BY BLACKFOOT SOUTH PRESERVE, LLC. THE EXISTING DIVERSION CONSISTS OF A FOUR-FOOT SLIDE GATE AND 36-INCH CORRUGATED METAL PIPE AND FLASHBOARD ASSEMBLY THAT WHEN IN FULL OPERATION PRECLUDE THE UPSTREAM PASSAGE OF WESTSLOPE CUTTHROAT TROUT AND OTHER SPECIES DURING LOW FLOW PERIODS.

BIG BLACKFOOT CHAPTER OF MONTANA TROUT UNLIMITED (BBCTU) AND MONTANA FISH, WILDLIFE & PARKS (MFWP) IDENTIFIED THE FOLLOWING PROJECT GOALS:

- DECOMMISSION EXISTING INFRASTRUCTURE INCLUDING HEADWORKS, DENIL FISH LADDER, FLASHBOARD ASSEMBLY, CONCRETE HEADWALL, STEM WALL AND SCOUR APRON.
- REPLACE THE EXISTING DIVERSION INFRASTRUCTURE WITH A MAINTENANCE-FREE DOUBLE OR TRIPLE STEP ROCK CROSS-VANE STRUCTURE THAT WILL MAINTAIN THE DELIVERY OF WATER TO THE EXISTING DITCH WHILE PROVIDING FISH AND SEDIMENT PASSAGE DURING ALL FLOW STAGES.

STANDARD OF PRACTICE

RIVER DESIGN GROUP, INC. WORKS EXCLUSIVELY IN THE RIVER ENVIRONMENT AND UTILIZES THE MOST CURRENT AND ACCEPTED PRACTICES AVAILABLE FOR PLANNING AND DESIGN OF RIVER, FLOODPLAIN, AND AQUATIC HABITAT RESTORATION PROJECTS. CURRENT STANDARDS FOR THE DESIGN OF RESTORATION PROJECTS VARY DEPENDING ON PROJECT GOALS. STABILITY CRITERIA INCLUDE DESIGNING STREAMBED AND STREAMBANK STRUCTURES FOR THE 25-YR RECURRENCE INTERVAL DISCHARGE FLOOD. REGIONAL CURVES WERE USED TO EVALUATE BANKFULL DISCHARGE, AND HIGHER RETURN INTERVAL DISCHARGES INCLUDING THE 100-YEAR FLOW.

REUSE OF DRAWINGS

NOT FOR CONSTRUCTION

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Corvallis, OR 97333
541.738.2920

RDG
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927

COVER PAGE AND NOTES
CHAMBERLAIN CREEK CONCEPTUAL RESTORATION PLAN
POWEL COUNTY, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/9/25	LS	Conceptual Design	JM

PROJECT NUMBER
00098657-000-CRB

DRAWING NUMBER
1.0

Drawing 1 of 7

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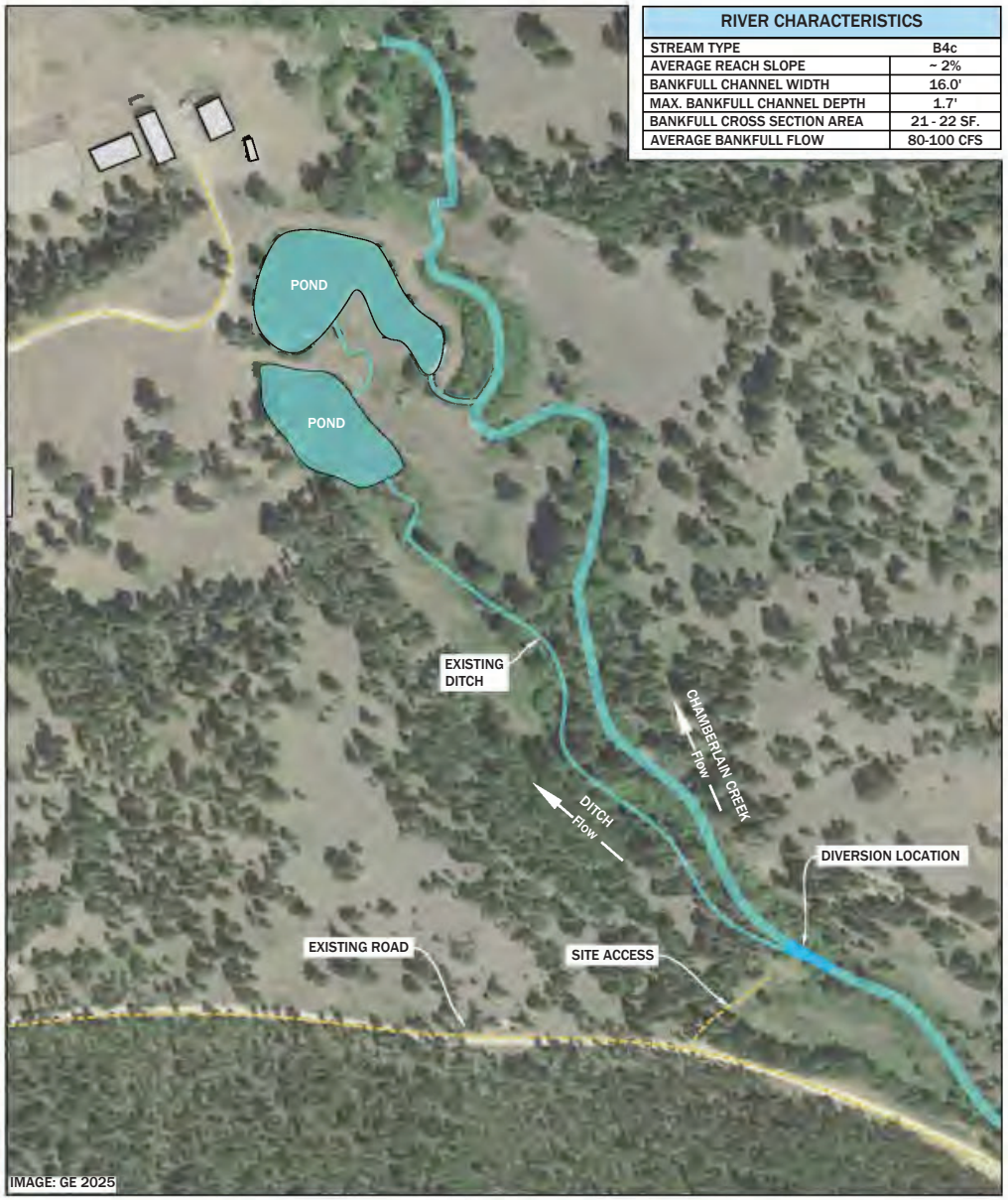
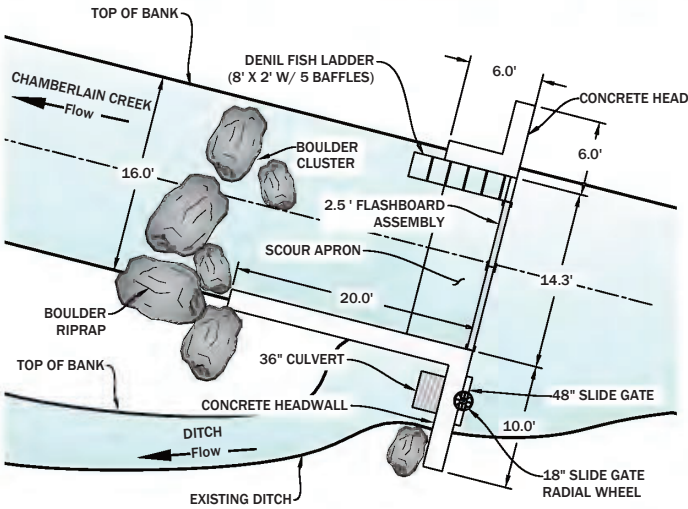
RIVER CHARACTERISTICS	
STREAM TYPE	B4c
AVERAGE REACH SLOPE	~ 2%
BANKFULL CHANNEL WIDTH	16.0'
MAX. BANKFULL CHANNEL DEPTH	1.7'
BANKFULL CROSS SECTION AREA	21 - 22 SF.
AVERAGE BANKFULL FLOW	80-100 CFS

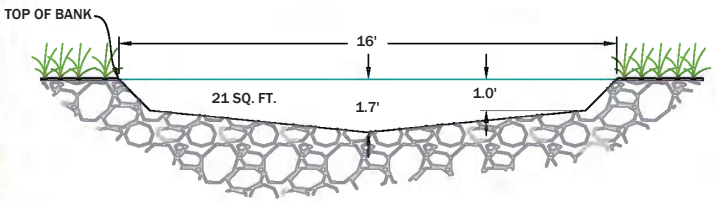


1 EXISTING CONDITIONS SITE PLAN
PLAN VIEW
1" = 200'

PHOTO OF EXISTING DIVERSION STRUCTURE



PLAN VIEW EXISTING DIVERSION STRUCTURE



EXISTING CHANNEL SECTION

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EXISTING SITE PLAN

CHAMBERLAIN CREEK CONCEPTUAL RESTORATION PLAN
POWEL COUNTY, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/9/25	LS	Conceptual Design	JM

PROJECT NUMBER
00098657-000-CRB

DRAWING NUMBER
2.0
Drawing 2 of 7

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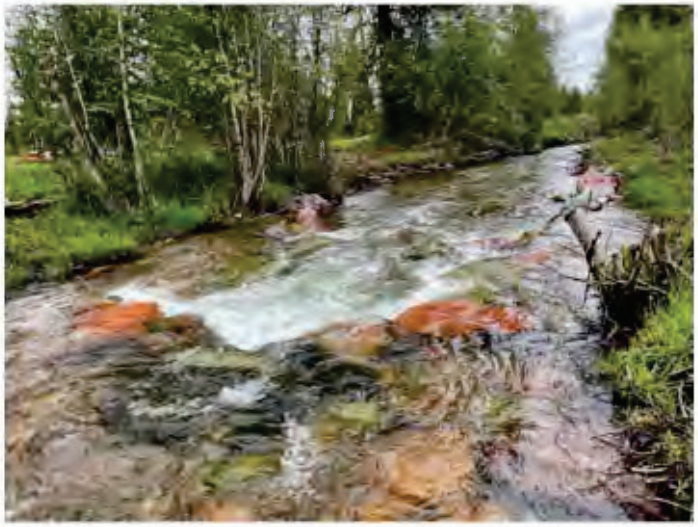
1 **SITE PLAN**
PLAN VIEW
1" = 40'

EXAMPLE OF A SIMILAR BOULDER CASCADE STRUCTURE WITH DIVERSION



EXAMPLE OF A SIMILAR BOULDER CASCADE STRUCTURE

DETAIL LEGEND		
SYMBOL		DETAIL SHEET #
	BOULDER CASCADE STRUCTURE	5.0
	VEGETATED WOOD MATRIX - TYPE 1	5.1

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CONCEPTUAL RESORATION PLAN

CHAMBERLAIN CREEK CONCEPTUAL RESTORATION PLAN
POWEL COUNTY, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/9/25	LS	Conceptual Design	JM

PROJECT NUMBER
00098657-000-CRB

DRAWING NUMBER
3.0

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TOTAL WOOD QUANTITIES

ITEM	QUANTITY	DIAMETER	LENGTH	ROOTWAD
CATEGORY 2 WOOD	31	3"-6"	10-12 FT	OPTIONAL
CATEGORY 3 WOOD	250	< 3 IN	10-12 FT	OPTIONAL
WILLOW CUTTINGS	625	0.25-1.0 IN	8 FT	NO

NOTE:
WOOD LENGTHS SHOWN WILL PRODUCE THE PROPER AMOUNT MATERIAL FOR STRUCTURES WHEN SPLIT INTO APPROPRIATE SIZES DURING CONSTRUCTION. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.

TOTAL ROCK QUANTITIES

ITEM	QUANTITY (EA)	DIAMETER (IN)		
CATEGORY 1 ROCK	80	24-36		
ITEM	QUANTITY (CY)			
STREAMBED/STREAMBANK FILL	23	SEE GRADATION BELOW		

STREAMBED ALLUVIUM GRADATION

SIZE (IN)	PERCENT PASSING
10	95
8	80-90
4	50-70
2	30-50
1	20-30
0.08	20

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION

STREAMBANK ALLUVIUM GRADATION

SIZE (IN)	PERCENT PASSING
6	95
5	80-90
4	50-70
2	30-50
1	20-30
0.08	20

*NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION. *PROVIDE MINIMUM 20% RETAINED IN 0.05" SIZE CLASS**

DIVERSION STRUCTURE QUANTITIES (PER STRUCTURE)

ITEM	SIZE	QUANTITY (EA)
BOULDERS	24"-36"	80
STREAMBED ALLUVIUM	SEE GRADATION	10 CY
SMOOTH WALL HDPE PIPE	40 LF OF 8" DIA.	1
SLUICE GATE VALVE	8"	1
CMP	24" X 10'	1
DIVERSION GATE VALVE	24"	1
DIVERSION SLIDE GATE	24"	1
NON-WOVEN GEOTEXT FABRIC	12.5' ROLL	130 (LF)

VEGETATED WOOD MATRIX QUANTITIES

ITEM	QUANTITY
VEGETATED WOOD MATRIX TYPE 1	125 (LF)
CATEGORY 2 WOOD	31 (EA)
CATEGORY 3 WOOD	250 (EA)
WILLOW CUTTINGS	625 (EA)
STREAMBANK FILL	13 (CY)

TOTAL EARTHWORK QUANTITIES

ITEM	QUANTITY (CY)
CUT	30
BACKFILL	30
NET FILL	0

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

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Corvallis, OR 97333
541.738.2920

MATERIALS AND QUANTITIES

CHAMBERLAIN CREEK CONCEPTUAL RESTORATION PLAN
POWEL COUNTY, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/9/25	LS	Conceptual Design	JM

PROJECT NUMBER
00098657-000-CRB

DRAWING NUMBER
4.0

Drawing 5 of 7

CONSTRUCTION NOTES

1. ROCK SHALL BE FROM AN APPROVED SOURCE AND SHALL BE SOUND, DENSE (SG=2.65 MIN) AND FREE FROM CRACKS, SEAMS OR OTHER DEFECTS CONDUCIVE TO ACCELERATED WEATHERING.

2. ROCK SHALL BE EQUIPMENT PLACED SO THAT LARGER ROCKS ARE UNIFORMLY DISTRIBUTED AND IN CONTACT WITH ONE ANOTHER AND SMALLER ROCKS FILLING IN VOIDS. NO END DUMPING OF ROCK WILL BE ALLOWED.

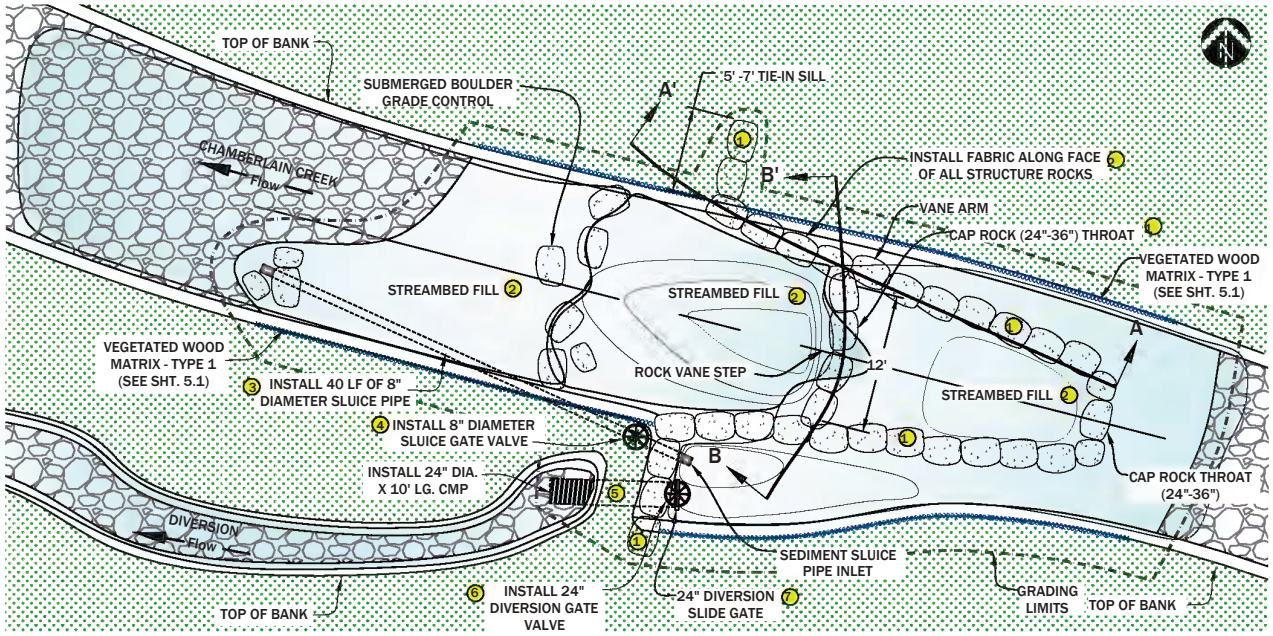
3. EXCAVATE POOL TO SET WEIR FOOTER AND POOL FOUNDATION ROCKS. FOOTER ROCKS ARE TO BE PLACED TO MINIMIZE VOIDS AND MAXIMIZE ROCK TO ROCK CONTACT.

4. PLACE WEIR ROCKS ON TOP OF FOOTERS, ALIGN AS SHOWN IN DETAIL AS SO TO CREATE A CONSOLIDATED ACTIVE FLOW PATH. WEIR AND WING ROCK SHALL BE PLACED TO MINIMIZE GAPS.

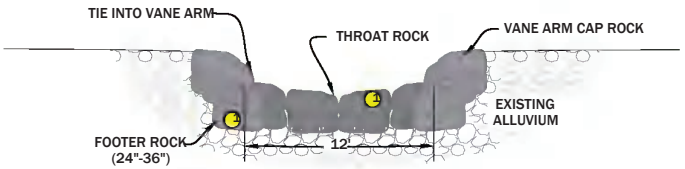
5. EXCAVATE POOL ACCORDING TO SPECIFIED DIMENSIONS. USE EXCAVATED MATERIAL FOR STRUCTURE BACKFILL OR HAUL TO A LOCATION SPECIFIED BY CONSTRUCTION MANAGER.

6. BACKFILL EACH POOL AND FILL ALL GAPS AND VOIDS OF EACH STRUCTURE WITH NATIVE GRAVELS, COBBLE AND BOULDERS TO MINIMIZE PIPING OF WATER THROUGH EACH STRUCTURE.

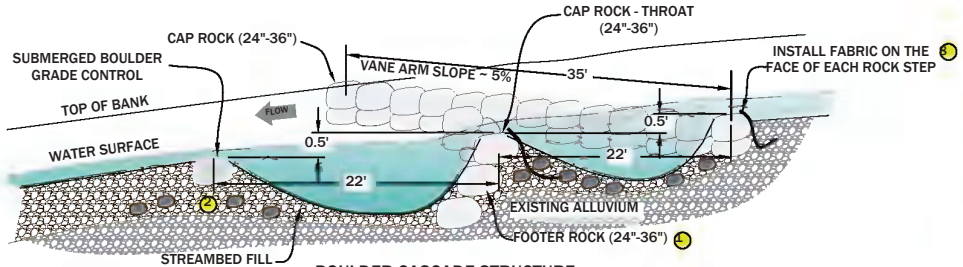
7. THE CONSTRUCTION MANAGER HAS THE RIGHT TO ALTER OR CHANGE THE DESIGN DURING CONSTRUCTION DUE TO UNFORESEEN CIRCUMSTANCES.



BOULDER CASCADE STRUCTURE
PLAN VIEW
0' 5 10



ROCK VANE STEP
SECTION B - B' NTS



BOULDER CASCADE STRUCTURE
SECTION A - A' NTS

EXAMPLE OF A SIMILAR BOULDER CASCADE STRUCTURE

STREAMBED ALLUVIUM GRADATION	
SIZE (IN)	PERCENT PASSING
10	95
8	80-90
4	50-70
2	30-50
1	20-30
0.08	20

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION

**PROVIDE MINIMUM 20% RETAINED IN 0.05" SIZE CLASS*

MATERIAL SCHEDULE (PER STRUCTURE)			
	ITEM	SIZE	QUANTITY (EA)
1	BOULDERS	24"-36"	80
2	STREAMBED ALLUVIUM	SEE GRADATION	10 CY
3	SMOOTH WALL HDPE PIPE	40 LF OF 8" DIA.	1
4	SLUICE GATE VALVE	8"	1
5	CMP	24" X 10'	1
6	DIVERSION GATE VALVE	24"	1
7	DIVERSION SLIDE GATE	24"	1
8	NON-WOVEN GEOTEXT FABRIC	ROLL	200 (LF)

NOTE:
PRIOR TO INSTALLATION ALL LARGE COBBLE AND BOULDERS SHALL BE SALVAGED FROM THE CHANNEL AND UTILIZED WITHIN THE STRUCTURE.

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BOULDER CASCADE DETAIL

CHAMBERLAIN CREEK CONCEPTUAL RESTORATION PLAN
POWEL COUNTY, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/9/25	LS	Conceptual Design	JM

PROJECT NUMBER
00098657-000-CRB

DRAWING NUMBER
5.0

Drawing 6 of 7

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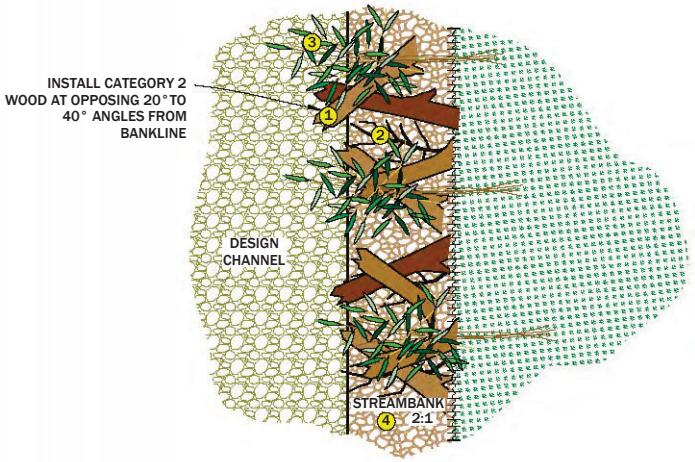
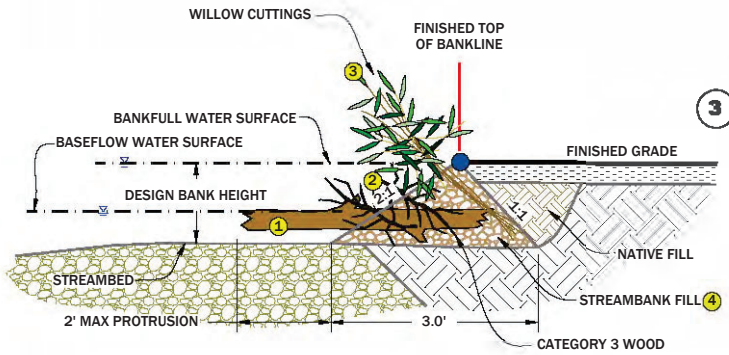
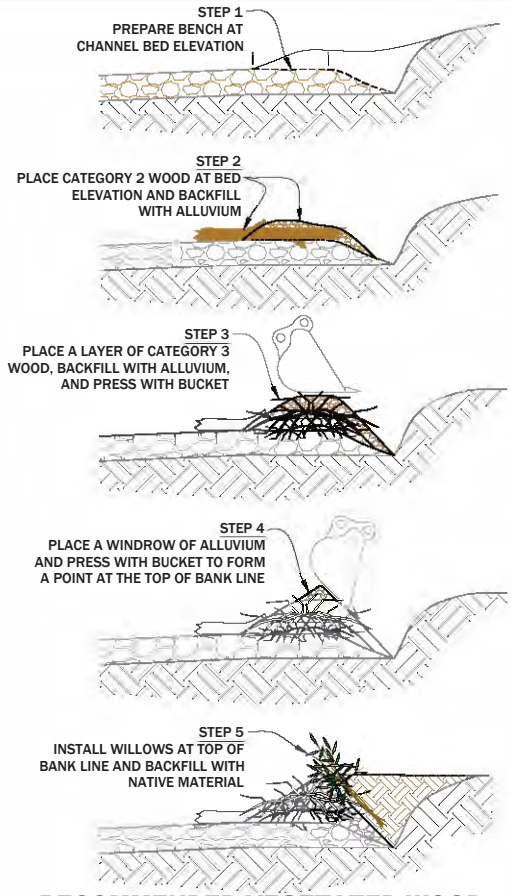


1 VEGETATED WOOD MATRIX - TYPE 1
PLAN VIEW NTS



2 VEGETATED WOOD MATRIX - TYPE 1
SECTION VIEW NTS



3 RECOMMENDED VEGETATED WOOD MATRIX INSTALLATION SEQUENCE
SECTION VIEW 1" = 5'

GENERAL NOTES

1. CONSTRUCTION OF THE VEGETATED WOOD MATRIX WILL OCCUR AFTER THE CHANNEL AND FLOODPLAIN BACKFILL IS PLACED AND THE CHANNEL STREAMBED IS CONSTRUCTED. INSTALLATION OF FLOODPLAIN TREATMENT SHALL BE COMPLETED AFTER VEGETATED WOOD MATRIXES ARE INSTALLED.
2. IF VEGETATED WOOD MATRIX STRUCTURES ARE INSTALLED PRIOR TO OCTOBER 1, LEAVE BACK TRENCH UNFILLED AND COMPLETE STRUCTURE WHEN DORMANT WILLOWS ARE AVAILABLE.
3. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.
4. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY CONSTRUCTION MANAGER.
5. CONTRACTOR SHALL MARK AND CONSTRUCTION ENGINEER SHALL APPROVE THE GENERAL LOCATION FOR EACH VEGETATED WOOD MATRIX STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON VEGETATED WOOD MATRIX INSTALLATION

1. EXCAVATE TO THE EXCAVATION LIMITS AS SHOWN. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
2. PREPARE THE BENCH OF THE STRUCTURE BY PLACING CHANNEL STREAMBED ALLUVIUM FROM THE BASE OF THE EXCAVATION DEPTH/BOTTOM OF EXCAVATION TO WITHIN 1.0-FT. OF FINISHED GRADE.
3. CATEGORY 2 AND CATEGORY 3 WOOD, AND CHANNEL STREAMBED ALLUVIUM SHALL BE PLACED IN ALTERNATING LAYERS AND BUCKET COMPACTED UP TO THE TOP OF BANK ELEVATION AS SHOWN BELOW IN THE INSTALLATION SEQUENCE. PLACE SIX (6) FT TO EIGHT (8) FT. DORMANT WILLOW CUTTINGS AT A DENSITY OF 5 PER LINEAR FT ALONG THE TOP OF BANK LINE ELEVATION. WILLOW CUTTINGS SHALL SLOPE AT AN APPROXIMATE 1:1 SLOPE AS SHOWN IN SECTION VIEW. STEMS MAY OVERLAP. THE CUT ENDS SHALL BE PLACED AT THE BASE OF THE SLOPES WITH THE UN-CUT ENDS EXTENDING BEYOND THE EDGE OF THE TRENCH SO NO GREATER THAN ONE-THIRD OF THE TOTAL CUTTING LENGTH IS EXPOSED BEYOND THE TOP OF BANK EDGE. WILLOW CUTTINGS SHOULD INTERCEPT THE DESIGN TOP OF BANK LINE AS SHOWN IN STEP 5 OF THE INSTALLATION SEQUENCE.
4. THE UPSTREAM AND DOWNSTREAM ENDS OF THE STRUCTURE SHALL TRANSITION SMOOTHLY INTO ADJACENT STREAMBANK STRUCTURES TO MINIMIZE EROSION, FLANKING, AND BANK FAILURE. STRUCTURE ENDS MAY BE STABILIZED WITH ADDITIONAL CATEGORY 1 ROCK AS APPROVED BY ENGINEER.
5. AFTER INSTALLATION OF THE VEGETATED WOOD MATRIX, BACKFILL THE STRUCTURE WITH STOCKPILED MATERIAL TO FINISHED GRADE, AND BUCKET COMPACT. INSTALL WILLOW TRENCHES AT A RATE OF 2 PER LINEAR FOOT (OR 20 PER TRENCH) AS SHOWN. NO AREAS BEHIND THE FINISHED BANKLINE ARE TO BE LEFT BELOW FINISHED GRADE.

STREAMBANK ALLUVIUM GRADATION

SIZE (IN)	PERCENT PASSING
6	95
5	80-90
4	50-70
2	30-50
1	20-30
0.08	20

*NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION. *PROVIDE MINIMUM 20% RETAINED IN 0.05" SIZE CLASS**

TYPE 1 - VEGETATED WOOD MATRIX MATERIAL SCHEDULE (PER LINEAR FOOT)

	ITEM	DIA. (IN)	QTY.
1	CATEGORY 2 WOOD	3"-6"	0.25
2	CATEGORY 3 WOOD	< 3"	2
3	WILLOW CUTTINGS	0.25"-1.0"	5
4	STREAMBANK ALLUVIUM	SEE GRADATION	0.1 CY

NOW PART OF SWCA
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VEGETATED WOOD MATRIX DETAIL

CHAMBERLAIN CREEK CONCEPTUAL RESTORATION PLAN
POWEL COUNTY, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	05/9/25	LS	Conceptual Design	JM

PROJECT NUMBER 00098657-000-CRB

DRAWING NUMBER 5.1

Drawing 7 of 7