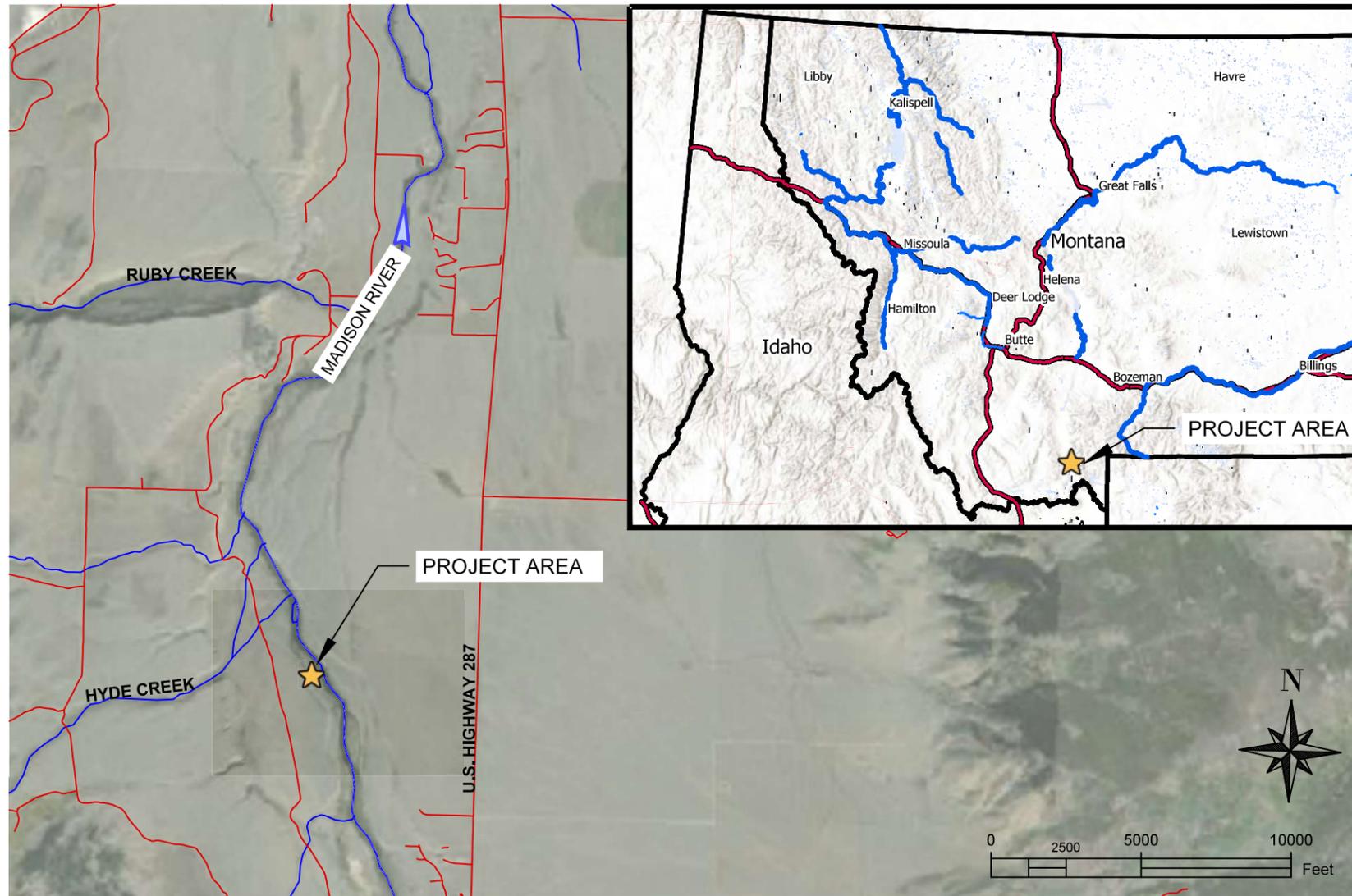


MADISON SIDE CHANNEL RESTORATION

NEAR HYDE CREEK



PROJECT AREA

PROJECT DESCRIPTION

THE PROJECT AREA IS LOCATED ON THE LEFT BANK OF THE MADISON RIVER AT RIVER MILE 77.7 ON LAND MANAGED BY THE BUREAU OF LAND MANAGEMENT (BLM). WITHIN THIS REACH A FLOODPLAIN SWALE COMPLEX IS PRESENT THAT INCLUDES SOME WETLAND AND RIPARIAN VEGETATION. THE FLOODPLAIN SWALES LIKELY HISTORICALLY FUNCTIONED AS SIDE CHANNELS THAT WOULD RECEIVE SURFACE FLOW FOR SOME OR ALL OF THE YEAR, PROVIDING OFF CHANNEL AQUATIC HABITAT FOR SPAWNING AND REARING. DUE TO THE ALTERED FLOW REGIME AS A RESULT OF HEBGEN DAM, AND SEDIMENT ACCUMULATION IN THE SWALE, THESE FEATURES ARE NO LONGER HYDROLOGICALLY CONNECTED TO THE MADISON RIVER SURFACE FLOWS.

GOALS OF RESTORATION AND DESIGN CRITERIA WITHIN THE PROJECT AREA INCLUDE:

- CREATE SPAWNING AND REARING HABITAT CONNECTED TO THE MADISON RIVER;
- INCREASE AQUATIC HABITAT COMPLEXITY;
- PROVIDE COOL-WATER REFUGIA AND THERMAL COVER;
- INCREASE RIPARIAN CORRIDOR WIDTH AND WOODY VEGETATION COVER;
- PROMOTE PRIMARY PRODUCTION AND FOOD WEB SUPPORT;
- AND INCREASE BIODIVERSITY AND HABITAT COMPLEXITY TO SUPPORT LONG-TERM ECOSYSTEM RESILIENCE.

TO CREATE PERENNIAL SIDE CHANNELS SUITABLE FOR SPAWNING AND REARING HABITAT, CHANNELS WILL BE EXCAVATED ALONG THE EXISTING FLOODPLAIN SWALE. MATERIAL WILL BE EXCAVATED TO CREATE MULTIPLE SIDE CHANNELS SUMMING TO APPROXIMATELY 6-10 FOOT WIDE AND 5300 FEET LONG AT AN ELEVATION THAT WILL SUPPORT PERENNIAL FLOW WITH WATER DEPTHS BETWEEN 0.5 FT AND 2 FT THROUGHOUT THE YEAR. THE CHANNEL BED WILL CONSIST OF NATIVE GRAVEL (10-35MM) AND SCATTERED BOULDERS THAT ARE CONFIRMED, BY TEST PITTING, TO BE ALREADY PRESENT AT AN APPROPRIATE ELEVATION. BRUSH BANK MATRIX STRUCTURES WITH WILLOW CUTTINGS HARVESTED FROM A NATIVE STAND WITHIN THE WATERSHED WILL LINE PORTIONS OF BOTH BANKS OF THE SIDE CHANNEL TO PROVIDE AQUATIC HABITAT COMPLEXITY, SUPPORT REVEGETATION AND PROVIDE OVERHANGING COVER AND SHADE. ROCK RIB STRUCTURES INCORPORATING EXISTING BOULDERS WILL BE UTILIZED TO MAINTAIN A GRADIENT (MAXIMUM 0.3%) SUITABLE FOR SUSTAINING SPAWNING SUBSTRATE WITHIN THE REACH AND WILL FUNCTION AS RIFFLE CRESTS TO ENCOURAGE POOL FORMATION. FLOW VELOCITIES WILL BE BETWEEN 1 AND 2 FT PER SECOND TO KEEP GRAVELS CLEAN AND DISCOURAGE VEGETATION GROWTH IN THE CHANNEL BED. THE NEWLY CONSTRUCTED SIDE CHANNELS WILL CONNECT TO THE MADISON RIVER AT THE UPSTREAM AND DOWNSTREAM END. EXCESS MATERIAL REMOVED TO CREATE THE SIDE CHANNELS WILL BE PLACED IN AN UPLAND REPOSITORY AGAINST AN ADJACENT TERRACE. THIS TREATMENT IS DESIGNED TO WORK WITH THE ALTERED FLOW REGIME OF THE MADISON RIVER TO CREATE A PERENNIAL SIDE CHANNEL COMPLEX, A NATURAL FEATURE THAT WOULD HAVE BEEN PRESENT AND HYDROLOGICALLY CONNECTED PRIOR TO HEBGEN DAM.

DURING PROJECT CONSTRUCTION, EQUIPMENT WILL BE WASHED PRIOR TO ENTERING THE SITE TO PREVENT IMPORT OF WEED SEEDS. SOME WEEDS ARE PRESENT ON THE SITE, SO OVERLAND ACCESS ROUTES AND EXCESS MATERIAL REPOSITORY WILL BE IDENTIFIED IN COOPERATION WITH BLM TO LIMIT WEED SPREAD. DISTURBED AREAS WILL BE SEEDED WITH A NATIVE SEED MIX APPROVED BY BLM. LIVESTOCK FENCE IS INCLUDED AS PART OF THIS DESIGN BECAUSE THE AREA IS CURRENTLY GRAZED. THE NEED FOR AND EXTENT OF LIVESTOCK FENCE WILL BE COORDINATED WITH BLM.

GENERAL NOTES

- IMAGERY IS FROM 2021 USDA NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP).
- TOPOGRAPHIC SURFACE IS USGS 2017 LIDAR.
- 'TYP.' REFERS TO A NOTE OR DETAIL THAT IS STANDARD ACROSS ALL REPEAT FEATURE TYPES.

SYMBOLS

- DESIGN NOTE
- DETAIL CALLOUT
- DETAIL #
- PAGE #

SHEET INDEX

- 2.0 COVER SHEET
- 2.1 MATERIALS SCHEDULE
- 2.2 EXISTING CONDITIONS
- 2.3 PROPOSED CONDITIONS
- 2.4 PROFILE & CROSS SECTIONS
- D.1 DETAILS

PROJECT PARTNERS:



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222 E. MAIN ST. SUITE H
ENNIS, MT 59729
(406) 682-3148

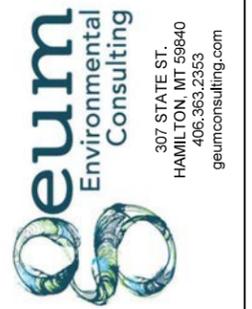
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730 N. MONTANA
DILLION, MT 59725
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(406) 542-5961



307 STATE ST.
HAMILTON, MT 59840
406.363.2353
geumconsulting.com

REVISION:	DATE:	BY:	DESC:

PRELIMINARY

COVER SHEET

MADISON SIDE CHANNEL RESTORATION
MADISON COUNTY, MT

DATUM: NAD83
PROJECTION: MT831F
DRAWN BY: JNE
DESIGNED BY: GEUM
DATE: 10.31.2025

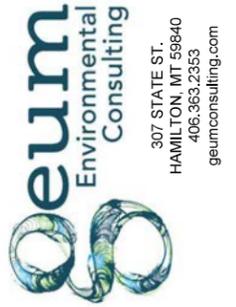
SHEET 2.0

ESTIMATED TREATMENT QUANTITIES		
ITEM	UNIT	QUANTITY
BRUSH BANK MATRIX	LINEAR FEET	2,000
ROCK RIB / RIFFLE CREST STRUCTURES	EACH	25
CHANNEL BED EXCAVATION	LINEAR FEET	5,265
FENCE	LINEAR FEET	3,640

ESTIMATED MATERIAL QUANTITIES				
ITEM	DIMENSION	UNIT	QUANTITY	SOURCE ON SITE / OFF SITE
BRUSH AND SMALL WOOD	3-8 IN D, 6-8 FT L	EACH	4,000	OFF SITE
WILLOW CUTTINGS	1/2-1 IN D, 6-8 FT L	EACH	6,000	OFF SITE
TREATED WOODEN POSTS	6 FT TALL, 4 IN D	EACH	180	OFF SITE
SMOOTH WIRE	12.5 GAGE	LINEAR FEET	7,280	OFF SITE
BARBED WIRE	12.5 GAGE, 2-POINT BARBS	LINEAR FEET	7,280	OFF SITE
FENCE STAPLES	U-SHAPED	EACH	1,440	OFF SITE
SEED	N/A	ACRES	1	OFF SITE
ROCK	> 12 IN D	EACH	125-250	ON SITE

BRUSH BANK MATRIX MATERIAL SCHEDULE (PER LINEAR FOOT)		
ITEM	DIMENSIONS	QUANTITY
BRUSH	3"-8" D, 6'-8' L	2 PIECES
WILLOW CUTTINGS	0.5"-1" D, 6'-8' L	3 PIECES

ROCK RIB STRUCTURE MATERIAL SCHEDULE (EACH)		
ITEM	DIMENSION	QUANTITY
ROCK	>12" D	5-10



REVISION:		
DATE:	BY:	DESC:

PRELIMINARY

MATERIALS SCHEDULE

MADISON SIDE CHANNEL RESTORATION
MADISON COUNTY, MT

DATUM: NAD83
PROJECTION: MT83IF
DRAWN BY: JNE
DESIGNED BY: GEUM
DATE: 10.31.2025

SHEET
2.1

EXISTING

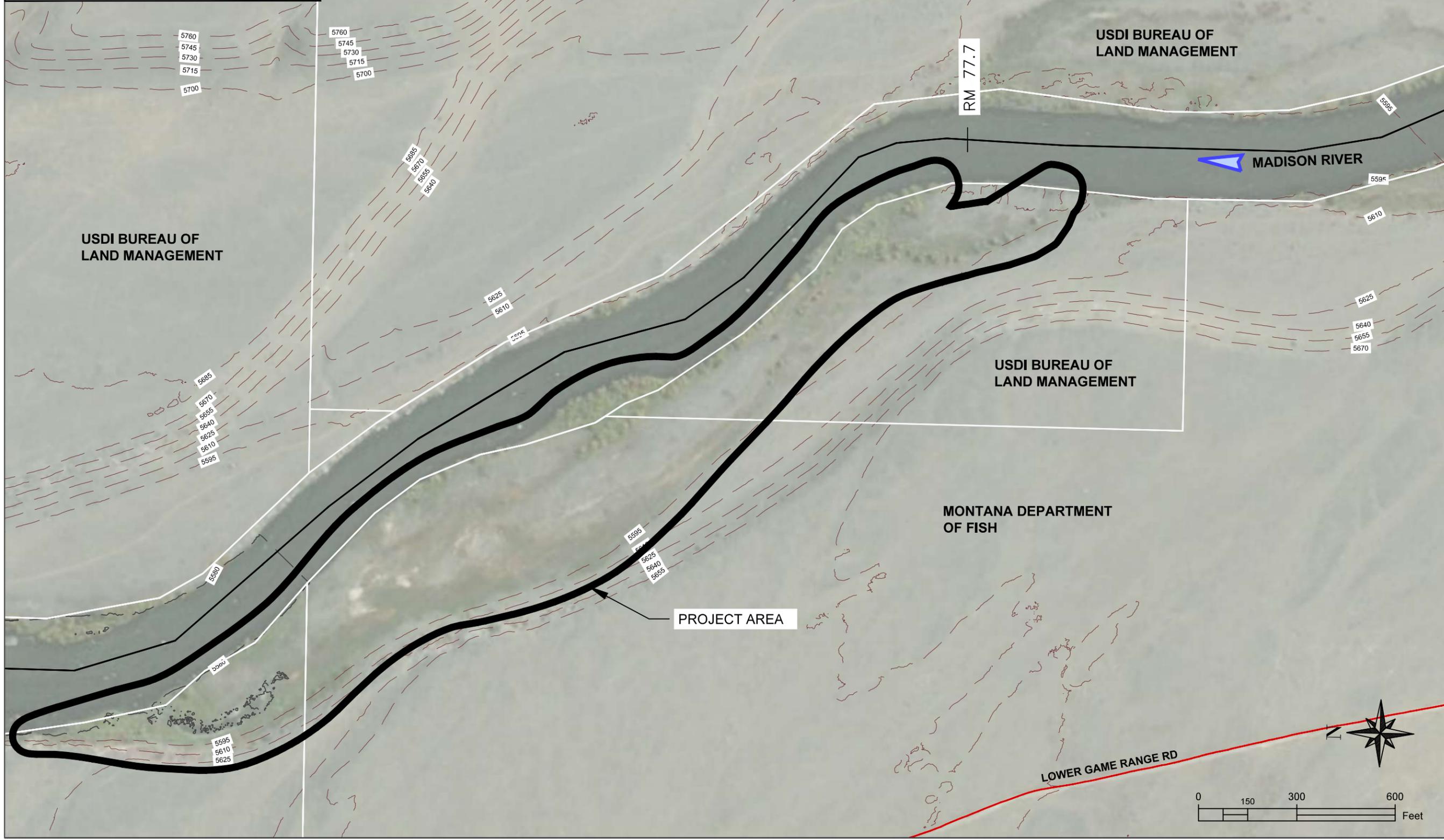
-  PROJECT AREA
-  STREAMS
-  CADASTRAL PROPERTY BOUNDARIES
-  MONTANA ROADS
-  EXISTING GRADE CONTOURS
-  FLOW DIRECTION



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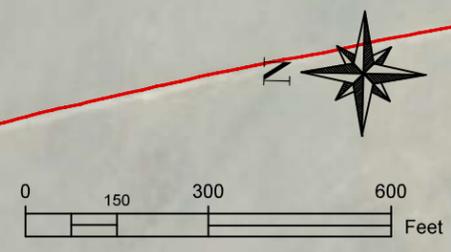
PRELIMINARY

EXISTING CONDITIONS

MADISON SIDE CHANNEL RESTORATION
MADISON COUNTY, MT

DATUM: NAD83
PROJECTION: MT83IF
DRAWN BY: JNE
DESIGNED BY: GEUM
DATE: 10.24.2025

SHEET
2.2



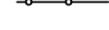
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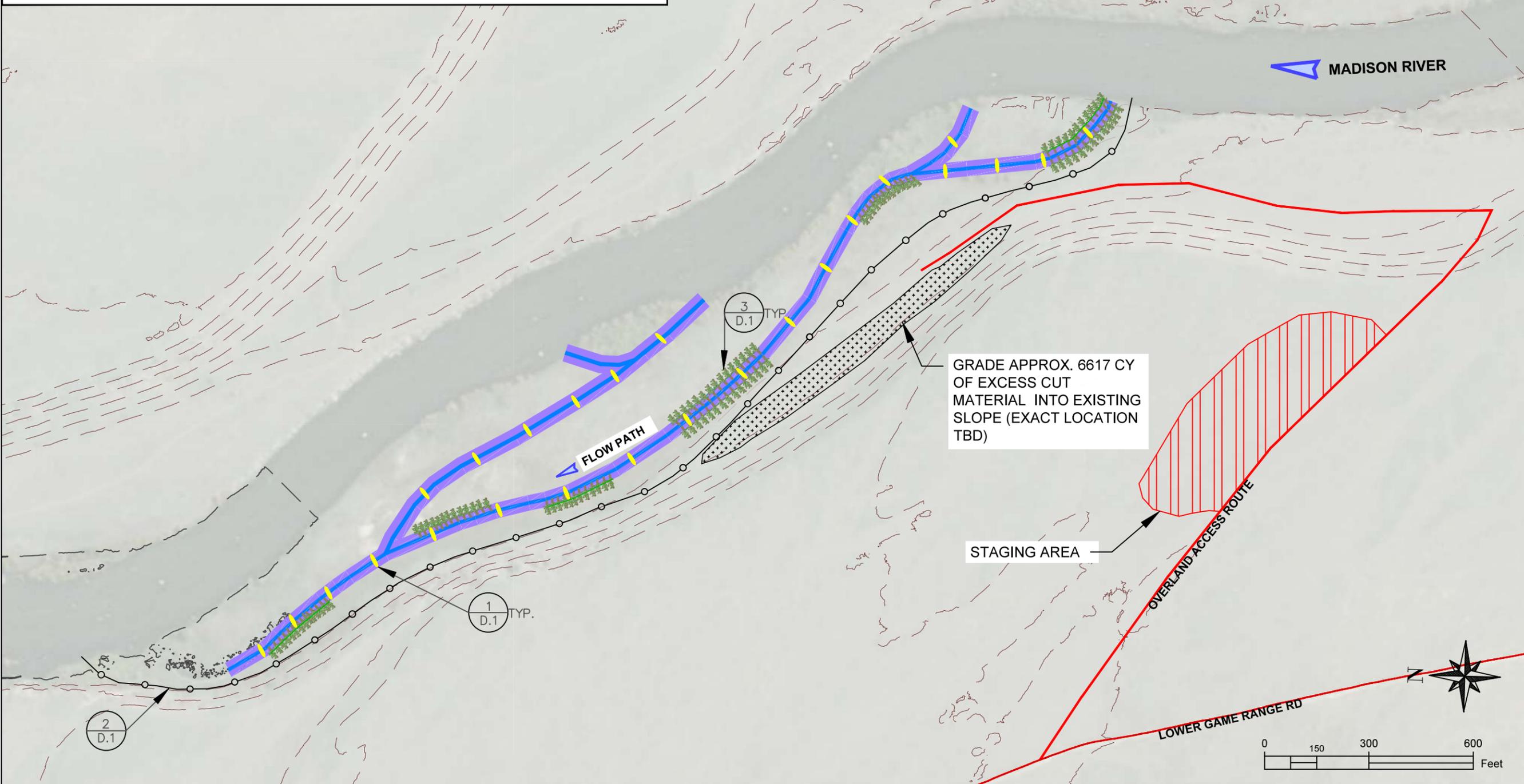
-  PROJECT AREA
-  STREAMS
-  CADASTRAL PROPERTY BOUNDARIES
-  MONTANA ROADS
-  EXISTING GRADE CONTOURS
-  FLOW DIRECTION

DESIGN NOTES

- ① SIDE CHANNELS WILL VARY FROM 6 TO 10 FOOT BOTTOM WIDTH

PROPOSED

-  STAGING AREA
-  REPOSITORY
-  FLOODPLAIN SLOPE & TIE IN
-  SIDE CHANNEL CENTERLINE
-  OVERLAND ACCESS ROUTE
-  WATER LEVEL
-  LIVESTOCK FENCE
-  SIDE CHANNEL FLOW PATH
-  ROCK RIB/RIFFLE CREST STRUCTURE
-  BRUSH BANK MATRIX



REVISION:	DATE:	BY:	DESC:

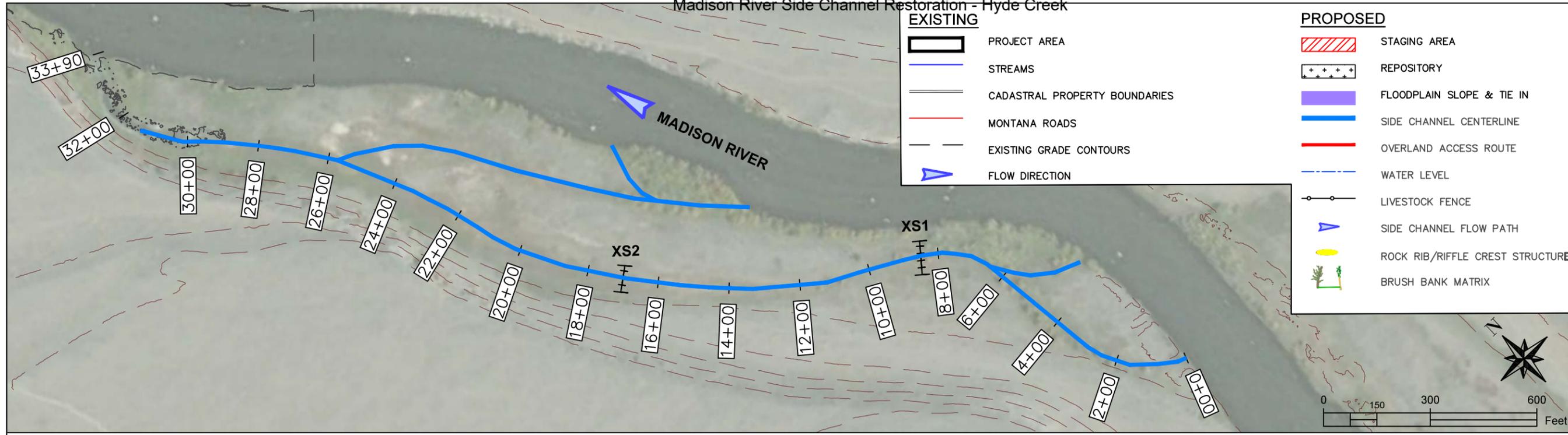
PRELIMINARY

PROPOSED CONDITIONS

MADISON SIDE CHANNEL RESTORATION
MADISON COUNTY, MT

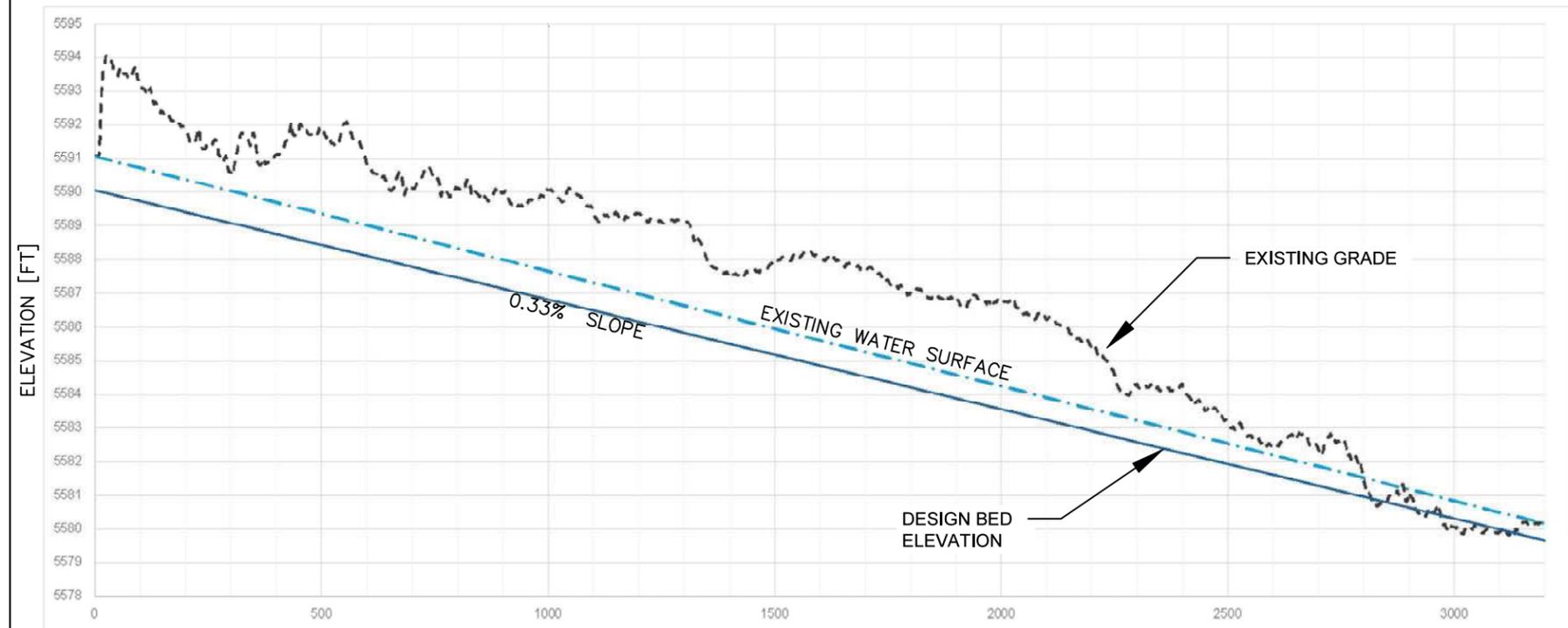
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PROJECTION: MT83IF
DRAWN BY: JNE
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DATE: 10.31.2025

SHEET
2.3



REVISION:	DATE:	BY:	DESC:

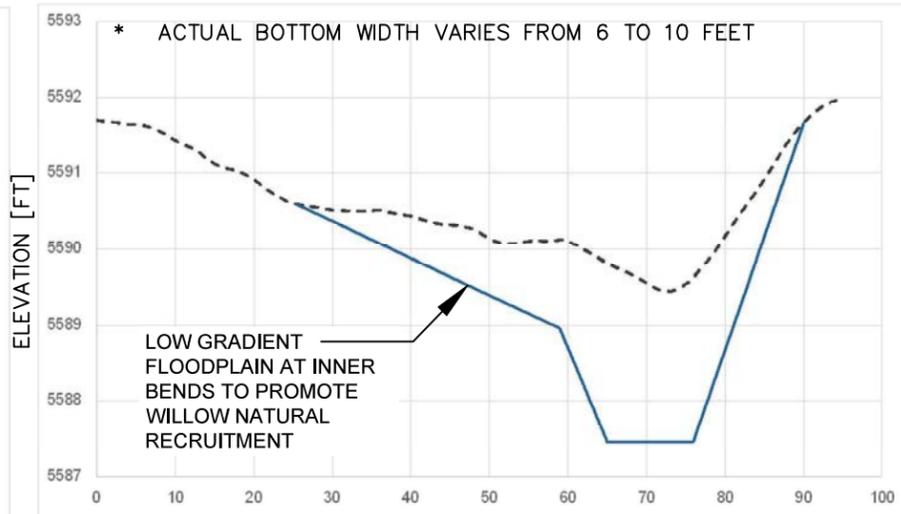
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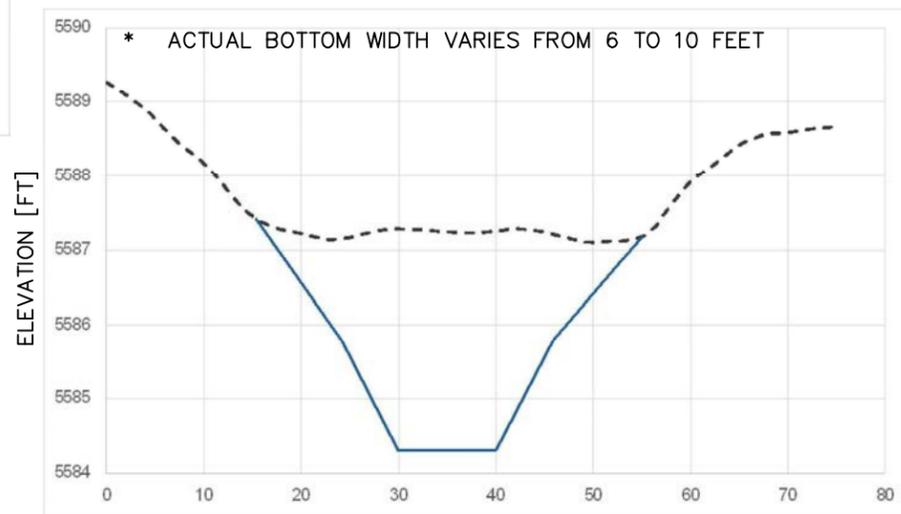
SIDE CHANNEL PROFILE

STATIONED CHANNEL LENGTH: 3150 FEET
 CHANNEL BED SLOPE: 0.33%
 BOTTOM WIDTH: 6 TO 10 FEET
 CHANNEL DEPTH: 1.5 FEET
 TIE IN SLOPES: VARIES BASED ON EXISTING TOPOGRAPHY

- * ROCK RIBS / RIFFLE CRESTS WILL RESULT IN AN EFFECTIVE SLOPE OF < 0.3% FOR GRAVEL RETENTION AND RIFFLE-POOL HABITAT FORMATION.
- * STATIONING IS MARKED ALONG THE LONGEST SIDE CHANNEL WITHIN THE SIDE CHANNEL COMPLEX AS A REPRESENTATIVE EXAMPLE OF DESIGN ELEVATION, SLOPE, BOTTOM WIDTH, AND CROSS-SECTIONAL AREA.



CROSS SECTION (XS 1)



CROSS SECTION (XS 2)

PROFILE & CROSS SECTIONS

MADISON SIDE CHANNEL RESTORATION
MADISON COUNTY, MT

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