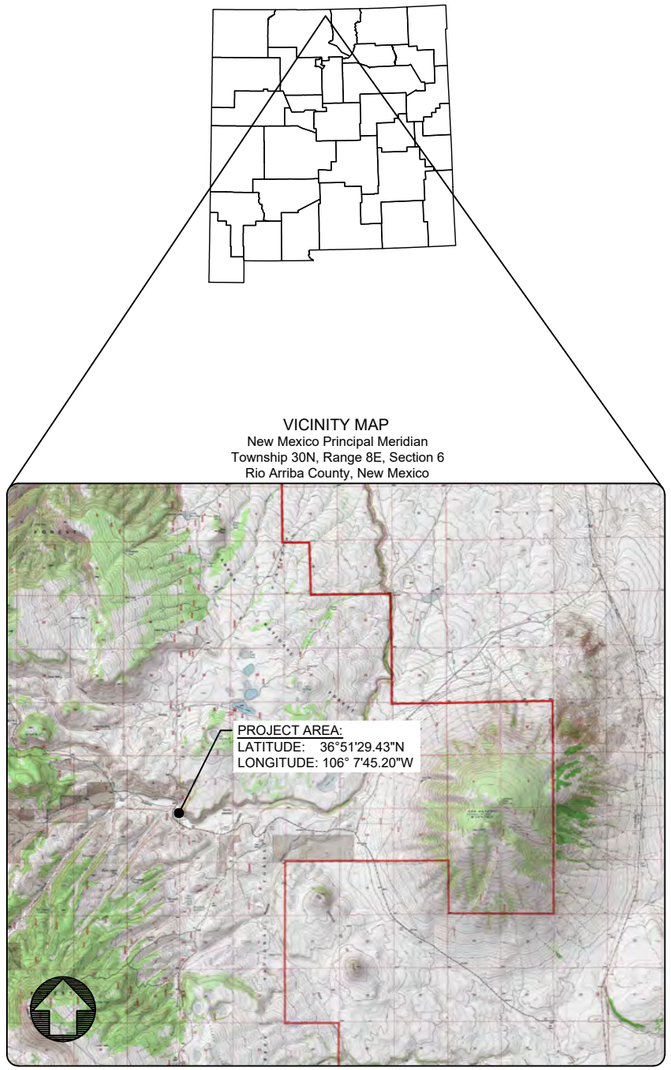
Stewart Meadows
Habitat Assessment & Conceptual Design
Rio Arriba County, New Mexico



VICINITY MAP
New Mexico Principal Meridian
Township 30N, Range 8E, Section 6
Rio Arriba County, New Mexico

Rio San Antonio

SUBMITTED TO

CLIENT:
New Mexico Department of Game & Fish
1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

SUBMITTED BY

RESTORATION DESIGN SPECIALIST & PROJECT PRIME:
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CIVIL/ECOLOGICAL ENGINEERING:
Oxbow Ecological Engineering, LLC
3491 S. Gillenwater Drive
Flagstaff, AZ 86005
(928) 266-6192

SHEET INDEX

DRAWING REVISIONS

NUMBER	DATE	BY	REVISION DESCRIPTION
0	6.29.22	GFC/CS	Conceptual Design

PROJECT NAME:
Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
NA

PROJECT PHASE:
70% Design Plans

CLIENT:
New Mexico Department of Game & Fish
1 Wildlife Way
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DRAWN BY: GFC
DESIGNED BY: CS & GFC
REVIEWED BY: CS & GFC

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DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING: Cover Sheet

DRAWING #:	SHEET #:	REVISION #:
CVR01	1 OF 21	0

0 500 1000

SCALE IN FEET

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DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Upstream Project Area Assessment Overview

DRAWING #:	SHEET #:	REVISION #:
AUS01	2 OF 21	1

Assessment Summary: Upstream Project Reach

River Setting	The Stewart Meadows Upstream Project Area is located along one of the few laterally unconfined Reaches of the San Antonio River, where the river exits the Tusas Mountains and creates the western boundary of the Taos Plateau Volcanic Field. The geology of the area consists of overlapping volcanic zones including the basaltic formations from the San Antonio Mountain volcano immediately to the east and the thick tuff and compressed ash layers of the Tusas mountains to the west. The drainage area of the Rio San Antonio is largely composed of meta-sedimentary volcanic material resulting from ash eruptions of the Brazos Cones Volcanic Field. The complex volcanic geology has left much of the Rio San Antonio Watershed with highly erodible, fine textured soils and loosely consolidated rock that are highly erosive. The lower slopes of the watershed are dominated by grasslands while many ridgetops are densely forested especially on protected aspects. Small caliber and fine sediments are contributed in abundance to the mainstem channel by most tributary drainages, especially those on dry south and west facing aspects, as well as by sparsely vegetated and highly erosive uplands. The arrival of the narrow-gauge railroad to the area in 1880 initiated broadscale land degradation on multiple fronts. The Rio San Antonio watershed has been very heavily grazed, first by sheep, then by cattle starting at the arrival of the railroad. Many areas were logged to support the growing demand of the railroad itself and the expanding communities it supported.
River Behavior	The Upper Project Reach is slightly to moderately entrenched, although historically the reach has been severely entrenched. The current conditions have resulted from refilling of the entrenched channel and adjacent valley bottom with excess sediments generated upstream. Extensive beaver activity throughout the reach has also contributed to its aggradation. The entire reach is largely depositional with minimal, shallow pool habitat and the frequent formation of deposited inner berm features that readily colonize with wetland and riparian plant species. Much of the reach has a high width to depth ratio due to the abundant sediment load. Formerly, the reach was dominated by Birch Leaf Alder that experienced a regional die off across the Southern Rockies in the past 15 years due to an unknown pathogen. Deadwood is abundant in the reach; however, Alder wood is extremely soft and has limited utility for restoration structures. Currently, there are very few Narrowleaf Cottonwoods present and while the Alders have been significantly set back, there is amble evidence of new growth from the bases of many of the trees, however, it is unclear whether Alders will remain a significant component of the riparian plant community in the future. Bluestem, Peachleaf and Coyote Willows are present throughout the reach and are pioneer colonizers of many of the depositional features
Trajectory of Change	The channel is likely to continue in its development of an inset floodplain and inner berm features, however its floodplain expansion will be limited by confinement of the channel where it lies along the valley edge. The lateral erosion of streambanks will likely lead to increased sinuosity and a reduced channel gradient in the long term. An active population of beavers, which currently exists, is essential to reducing potential channel downcutting and maximizing the floodprone area and sediment storage. This reach is a critical sediment buffer for downstream portions of the Rio San Antonio, which become increasingly confined. The 2 miles of private lands immediately upstream of this reach are the primary sediment source due to poor land management practices including unrestricted, season-long grazing of the riparian corridor, thus it is very likely that this reach will continue to receive excess fine sediment for the foreseeable future. From what is visible along the road, the two miles of private land is moderately to severely entrenched, poorly vegetated and has extensive active bank erosion that is releasing large amounts of fine volcanic sediments into the river. The dramatic increase in water turbidity across the privately owned reach is evident when the water quality flowing from USFS lands immediately upstream is compared to the turbidity of the water as it exits the private lands. It is likely that woody and herbaceous riparian vegetation cover will increase with time due to the recent construction of a livestock exclosure and the abundance of depositional features.
Recovery Potential	The recovery potential for this reach is very high due to the potential of reconnecting floodplains and off channel wetlands over a broad area. Restoration activities have been designed to complement and expand the benefits of the resident beaver population. The combination of a robust beaver dam complex and active restoration work to reconnect the entire valley bottom with off channel and channel connected wetlands is the best opportunity to reduce the adverse water quality impact being generated on upstream reaches of private land. Water quality improvement, especially reducing turbidity and temperature is essential to enhance the quality of downstream fisheries along Stewart Meadows. We believe that the restoration of the Upper Stewart Meadows Reach is critical to achieving those goals and substantially improving the water quality and aquatic habitat of the Downstream Project Reach.

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LOCATION:
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70% Design Plans

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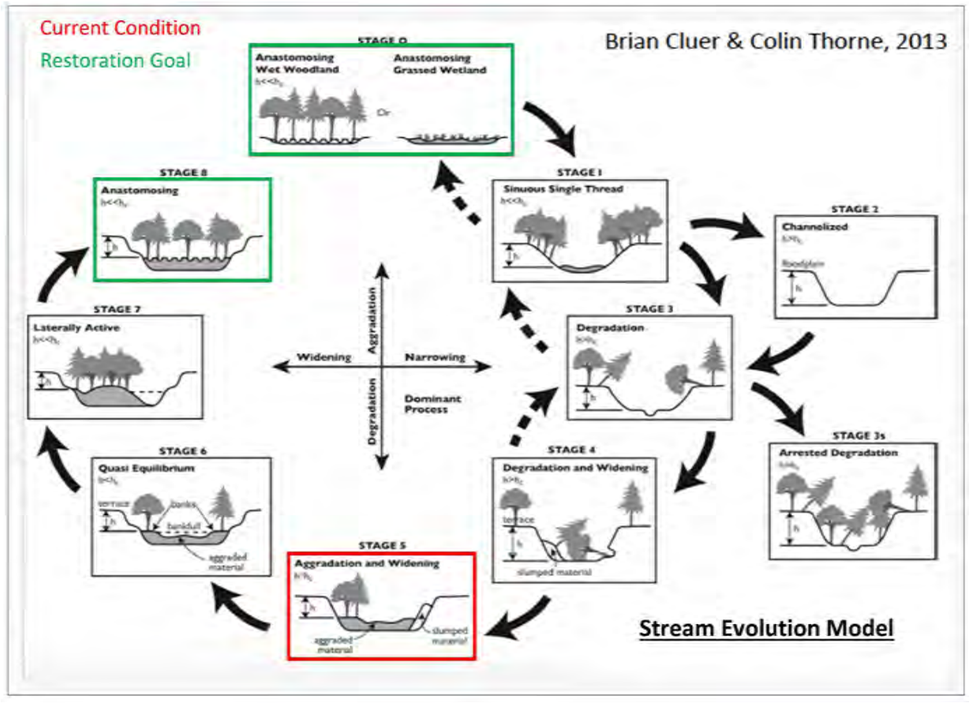
DATE: 06.29.2022
OEE PROJECT #: NM-014-1

DRAWING:
Upstream Project Area Assessment Summary

DRAWING #: AUS02
SHEET #: 3 OF 21
REVISION #: 1

Restoration Opportunities: Upstream Project Reach

Design Hypothesis	The restoration of this project area has a critical relationship to the water quality and habitat quality of reaches that are immediately downstream. The concept is to use earthworks and channel shaping to hydrologically reconnect as much of the valley bottom as possible and create an extensive, sediment trapping wetland complex. This restoration approach is based on the Stream Evolution Model and is Known as Stage 0 restoration. Such a wetland complex would no doubt provide improved habitat and shelter water for the younger life stages of trout, as well as significantly improved habitat for a wide variety of wetland dependent plant and animal species. Alone, this project is unlikely to improve the quality of the angler's experience within the reach, but this is a necessary element of improving fish habitat and the angler's experience in downstream reaches.
Restoration Objectives	○ Reconnect and create flood channels, channel connected wetlands and backwater habitats wherever possible ○ Redistribute flood energy and sediment deposition across as much of the valley bottom as possible ○ Increase overbank flow at lower flood stages ○ Accelerate floodplain development ○ Reduce future downstream sediment loads by expanding wetlands within this project area
Restoration Approach	The restoration approach for this reach will include the construction of earthen channel plugs and excavated leadout channels to direct base flow and floods into and existing flood channel network and adjacent floodplain surfaces. Additionally, channel shaping will be used in flood channels to ensure that runoff is spread across as much of the valley bottom as possible to reduce the potential for localized channel entrenchment due to excessive flow velocities. Shallow borrow areas will be created to generate fill for the channel plugs and enhance off channel wetland habitats.
Project Reach Length & Area	**1.7 miles** **36 acres**



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DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

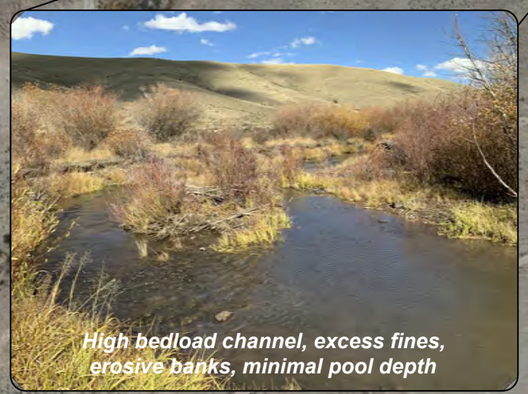
DRAWING:
Upstream Project Area Restoration Potential

DRAWING #:	SHEET #:	REVISION #:
AUS03	4 OF 21	1

Slightly entrenched, laterally adjusting, riffle dominated.

Moderately entrenched, riffle dominated, minimal shade, biofilm, sparse shallow pools

High w/d, depositional reach, possibly caused by breached beaver dams



High bedload channel, excess fines, erosive banks, minimal pool depth

Well vegetated, low w/d, pools, overhanging banks, good aquatic habitat

Natural inner berm formation caused by excess fine sediment load

0 250 500

SCALE IN FEET

Assessment Legend

- River Character
- Sediment Character
- Reference Condition

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DRAWING:
Upstream Project Area 1 Assessment Map & Photo Points

DRAWING #:	SHEET #:	REVISION #:
AUS04	5 OF 21	1

Upstream Project Area 1

	River Character	
1	River character	Slightly entrenched, laterally adjusting, riffle dominated with beaver dam return flow
2	River character	Visually over wide, but within regional curve parameters, wetland plants trying to colonize fine sediment deposits
3	River character	Lower w/d, slightly deeper pools, some shading, numerous willow seedlings will encroach on the channel in the absence of livestock
4	River character	Low w/d, good bank veg, some shading, Alder and some will, no cottonwood
5	River character	Moderately entrenched, riffle dominated, minimal shade, biofilm, sparse shallow pools
6	River character	Moderately/ highly entrenched, pools, bank veg, good aquatic habitat
7	River character	High w/d, depositional reach, possibly caused by breached dams
8	River character	Breached beaver dam reach, deposition upstream, deep pools, localized scour, old breeches
	Sediment Character	
1	Sediment character	Excess hoof sheer on sandy erosive banks, trampling of deposited fines limiting colonization by wetland species, biofilm, high w/d
2	Sediment character	High bedload channel, excess fines, erosive banks, minimal pool depth
3	Sediment character	Excess fine sediment load, eroding terrace high bank h=5' l=200'
4	Sediment character	Fining of sediment caliber in a downstream direction
	Reference Condition	
1	Reference condition	Woody recruitment on eroding bank, alders and willows
2	Reference condition	Well vegetated, low w/d, pools, overhanging banks, good aquatic habitat
3	Reference condition	Inner berm reach

Active beaver dam complex at the top of the reach, immediately downstream from the boundary fence.

1 ***Signs of Degradation. Excess hoof sheer on sandy erosive banks, trampling of deposited fines limiting colonization by wetland species, biofilm, high w/d ratio***

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DRAWING:
Upstream Project Area 1
Additional Assessment Information

DRAWING #: AUS05
SHEET #: 6 OF 21
REVISION #: 1

Excess fine sediment source, eroding terrace high bank h=5' l=200'

Abandoned channel/active flood channel, well vegetated, with historic beaver activity

Shallow backwater wetland created by beaver dam complex

Moderately entrenched, partially confined at valley margin

Upstream edge of beaver dam complex backwater

3 4 9 10 11 4 12 5 13 6

0 250 500

SCALE IN FEET

Assessment Legend

- River Character
- Sediment Character
- Reference Condition

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DRAWING:
Upstream Project Area 2 Assessment Map & Photo Points

DRAWING #:	SHEET #:	REVISION #:
AUS06	7 OF 21	1

Upstream Project Area 2

	River Character	
9	River character	Moderately entrenched, partially confined
10	River character	Moderately/ highly entrenched, high w/d, riffle dominated
11	River character	Abandoned channel/active flood channel, well vegetated, historic beaver activity
12	River character	Upstream edge of backwater from beaver complex
	Sediment Character	
3	Sediment character	Excess fine sediment load, eroding terrace high bank h=5' l=200'
4	Sediment character	Fining of sediment caliber in a downstream direction
	Reference Condition	
4	Reference condition	Large beaver dam breach and channel relocation
5	Reference condition	Shallow backwater wetland

4 ***Breached beaver dam with mid channel depositional bar located near a proposed channel plug and excavated leadout channel location. The low energy geomorphology of this location lends itself well for sending flows onto the adjacent flood channels and floodplain with the use of an earthen channel plug.***

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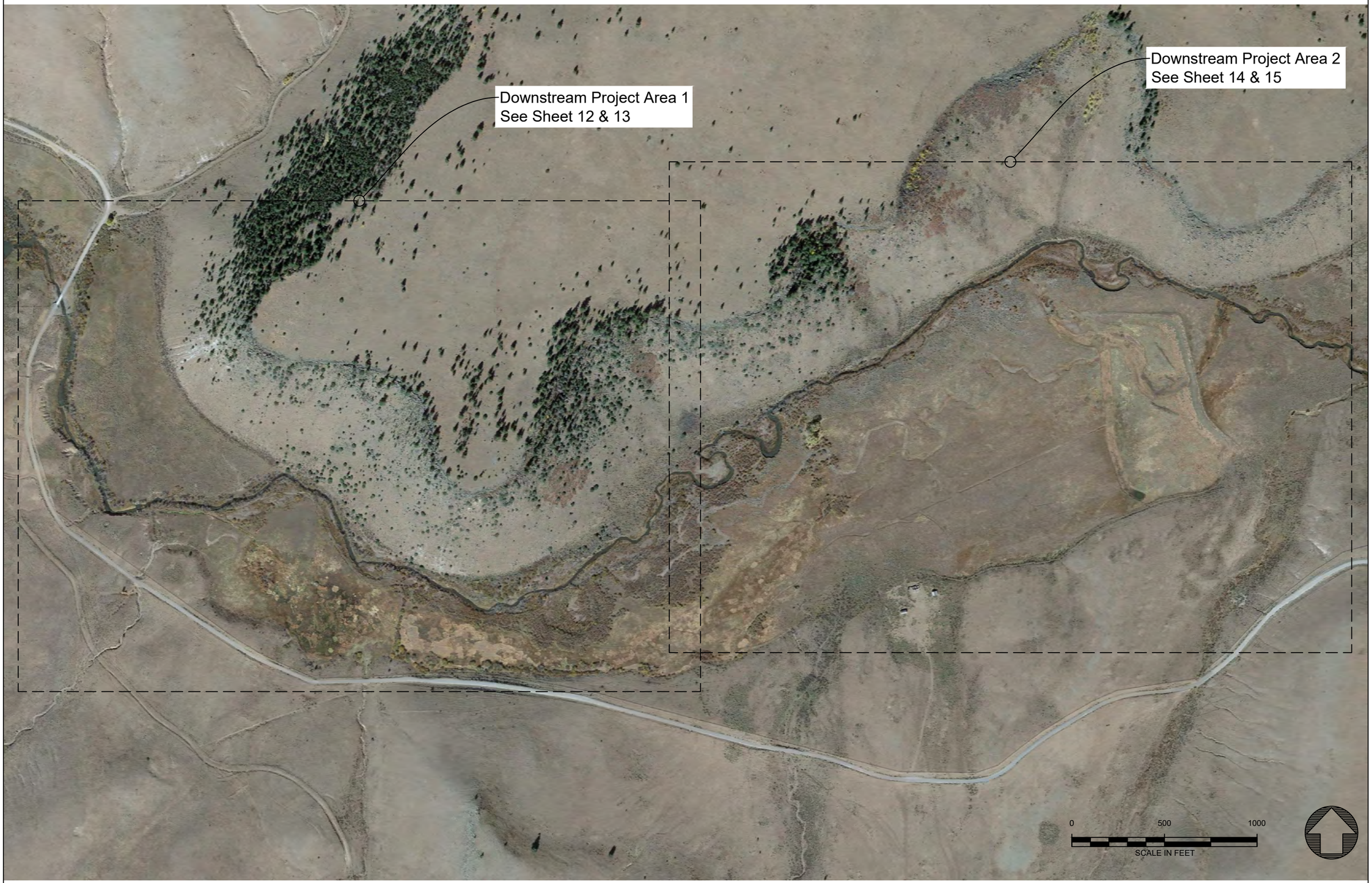
DRAWING:
Upstream Project Area 2 Additional Assessment Information

DRAWING #:	SHEET #:	REVISION #:
AUS07	8 OF 21	0



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DATE:	OEE PROJECT #:
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DRAWING:
Downstream Project Area Assessment Overview

DRAWING #:	SHEET #:	REVISION #:
ADS01	9 OF 21	1

Assessment Summary: Downstream Project Reach

River Setting	The Stewart Meadows Upstream Project Area is located along one of the few laterally unconfined Reaches of the San Antonio River, where the river exits the Tusas Mountains and creates the western boundary of the Taos Plateau Volcanic Field. The geology of the area consists of overlapping volcanic zones including basaltic formations from the San Antonio Mountain volcano immediately to the east and the thick tuff and compressed ash layers of the Tusas mountains to the west. The drainage area of the Rio San Antonio is largely composed of meta-sedimentary volcanic material resulting from ash eruptions of the Brazos Cones Volcanic Field. The complex volcanic geology has left much of the Rio San Antonio Watershed with highly erodible, fine textured soils and loosely consolidated rock that are highly erosive. The lower slopes of the watershed are dominated by grasslands while many ridgetops are densely forested especially on protected aspects. Small caliber and fine sediments are contributed in abundance to the mainstem channel by most tributary drainages, especially those on dry south and west facing aspects, as well as by sparsely vegetated and highly erosive uplands. The arrival of the narrow-gauge railroad to the area in 1880 initiated broadscale land degradation on multiple fronts. The Rio San Antonio watershed has been very heavily grazed, first by sheep, then by cattle starting at the arrival of the railroad. Many areas were logged to support the growing demand of the railroad itself and the expanding communities it supported. Stewart Meadows was historically drained and leveled to develop irrigated agriculture and grow hay for a ranching operation. In 2009 Stewart Meadows was rehydrated to improve waterfowl habitat by an extensive restoration project that featured a public/ private partnership with the USFS, NMED and many other organizations. The goal of the project was to spread water across the historic wetland surface with an elaborate system of flow diversions, routing channels, berms, flow splitters and excavated pothole wetlands. That project is still functioning much as it was designed to and will remain unimpacted by our future restoration activities. Despite land use changes, active restoration work and recent livestock exclusion fencing, the water quality that enters this reach from upstream is highly turbid and overly warm. Features necessary to dramatically improve water quality, such as broad floodplains and extensive wetlands are absent within this project reach. The water was uniformly turbid throughout the reach at the time of the assessment in October 2021 and during multiple days of walking the river no trout were seen in the reach at all.
River Behavior	The Downstream Project Reach is notably different than the Upstream Reach since it is moderately to severely entrenched along most of its length. The channel in this reach was dramatically altered and relocated to facilitate the former hay growing operation. The river channel flows along the toe of the north side of the valley in an artificially confined setting resulting from past channel modifications. There are frequent but discontinuous floodplain pockets throughout the reach and the channel is prohibited from most lateral movement by the boulder strewn valley edge on the north side and earthen berms on the south side that were built to protect the wetland project. The channel has a high width to depth ratio for about half of this reach and is also interspersed with frequent sub-reaches that are relatively narrow and deep due to the erratic presence of colluvial boulders along the margins of the channel. The boulders that are in the channel along the north valley edge are responsible for most of the localized habitat diversity, including flow constrictions and forced pools. The boulders tend to capture floating woody debris and there are numerous small log jams where boulders are found. Shading is intermittent along the reach and was significantly reduced by the Alder die off that occurred in the past 15 years. There are some Narrowleaf Cottonwoods, although they are in low abundance and Bluestem, Peachleaf and Coyote Willows are frequent but only offer marginal shade. The lower half of this reach is more laterally active with frequent eroding banks and short radius scrolling meander bends. Much of the lateral erosion can be attributed to a reduction in the contribution of colluvial boulders and the presence of breeched beaver dams. A lot of the bank erosion is reworking sediments that were deposited behind now absent beaver dams. There was evidence of beaver feeding in the reach during the assessment, but no dam construction. The result of the bank erosion is increased geomorphic complexity and the development of and inset floodplain.
Trajectory of Change	Below the road crossing of Forest Road 87 to approximately midway through the Downstream Project Reach, the river is largely in a state of Arrested Degradation. Under the current flow regime, there is not enough stream power to overcome the boulder armored condition that the channel bed and banks have in places. The artificial valley confinement present throughout most of the reach is inhibiting lateral migration, as well as meander, and floodplain development. The inset floodplain that is present is stable and well vegetated in most places. Riparian vegetation is likely to increase following the recent construction of livestock exclosure fencing. Many of the Alders that died back have some new shoots emerging from their bases, but it is uncertain whether Alders will remain a significant component of this riparian plant community. The willow species present are likely to continue to colonize depositional surfaces in the absence of grazing, however, dense stands of willows along the banks could significantly diminish angler access and their fishing experience. The downstream portion of this reach is more geomorphically active and we expect that condition to persist. Some banks in the lower reach are sparsely vegetated and the sediments deposited behind the former beaver dams are readily available for erosion and transport. Aside from the excess sediment load contribution, the continued lateral migration of this portion of the reach will aid in the formation of a lower gradient channel and increased floodprone area.
Recovery Potential	The recovery potential for this reach is moderate to high for improving aquatic habitat. Which species occupy that habitat will likely be a question of water quality, which is the result of land degradation upstream from the proposed project reach. There is very little that can be done within the reach to effectively reduce turbidity. One option includes the aggressive recruitment of herbaceous riparian plant species along the lower banks and inner berm features to filter out some of the suspended sediment. This would have a minor impact on turbidity but could have a greater impact on water temperature by increasing shading along the banks. Shade creation is likely the most effective measure that can be taken to improve water quality throughout the reach. The species, proximity, and density of shade plantings near the channel will be a large determining factor in the angler's experience. There are numerous opportunities to improve and expand in-stream habitat by increasing the frequency and depth of pools, reducing the width to depth ratio and enhancing the amount and quality of underwater sheltering locations near pools and prime feeding reaches. Because water quality improvement, especially reducing turbidity and temperature is essential to enhance the quality of the fishery along Stewart Meadows, we firmly believe that the upstream project reach is an integral component of any aquatic habitat improvements that may occur in the downstream reach.

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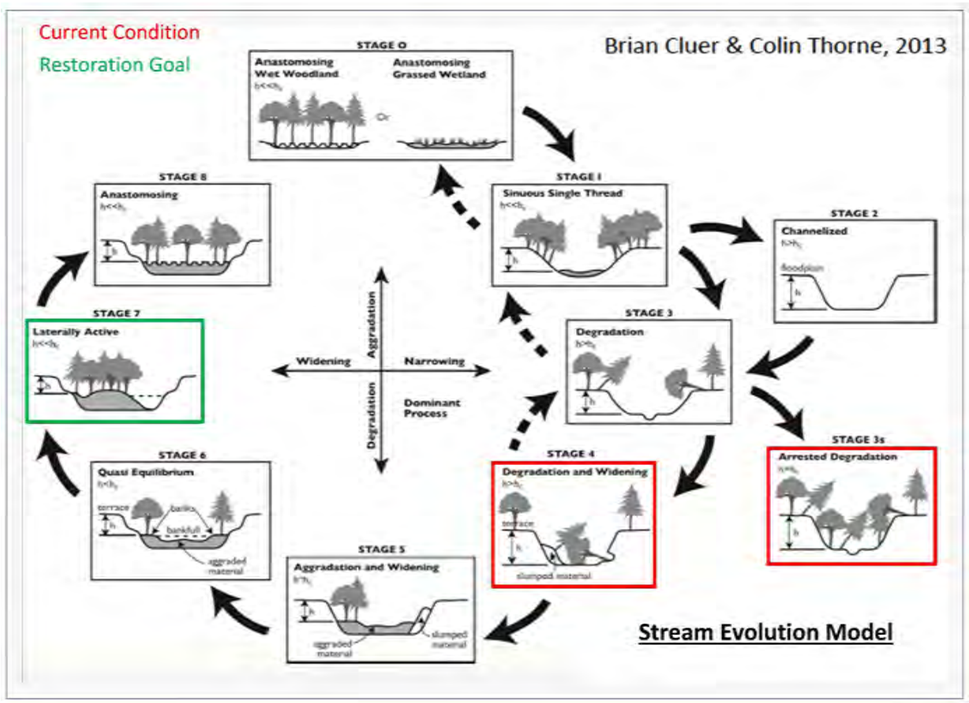
DATE: 06.29.2022
OEE PROJECT #: NM-014-1

DRAWING: Downstream Project Area Assessment Summary

DRAWING #: ADS02
SHEET #: 10 OF 21
REVISION #: 0

Restoration Opportunities: Downstream Project Reach

Design Hypothesis	The restoration of the downstream project area is the best opportunity in the immediate vicinity of Stewart Meadows to improve fish habitat for recreational fishing. The poor water quality will no doubt prove to be a challenge to overcome. Instream cover, increased pool frequency and depth, improved width to depth ratio, enhanced food production and increased channel shading are well within the realm of achievable outcomes following structural enhancement of the physical habitat in the project reach. Water quality is not a metric that can be readily improved within the confines of the same reach. Our hypothesis is that we can make physical and ecological improvements to aquatic habitat in the Rio San Antonio within the Downstream Reach, however, to do so will require the creation of an extensive channel-connected and backwater wetland complex (Stage 0) in the Upstream Project Area to reduce flow velocity and sediment transport while increasing the contact between stream runoff and herbaceous wetland vegetation that can filter suspended sediments out of the water column.
Restoration Objectives	○ Increase hydraulic diversity and shelter habitat for trout ○ Increase pool frequency and depth throughout the project reach ○ Increase frequency of large woody debris jams throughout reach ○ Reduce width to depth ratio wherever possible ○ Increase herbaceous plant cover on stream banks, inner berms and depositional features ○ Increase channel shading with vegetation conducive to a positive angler experience ○ Reduce future downstream sediment loads by restoring wetlands within this project area
Restoration Approach	The restoration approach for this reach will include the construction of log jams and boulder clusters to increase hydraulic diversity, improve cover habitat and add large woody debris. These structures will be designed to maintain pool scour and increase pool depth. Pools will be excavated to generate fill materials to construct inner berms that will reduce the channel width to depth ratio and provide depositional surfaces for herbaceous wetland plant species to colonize and ultimately narrow the channel at base flow levels. Woody riparian shade plantings will be used to cast shade over as much of the project reach as possible. The plantings can consist of Narrowleaf Cottonwoods willow species and Colorado Blue Spruce or similar coniferous trees to maximize the density of shade and provide for easy angler access and ample shade.
Project Reach Length & Area	**1.46 miles** **39 acres**



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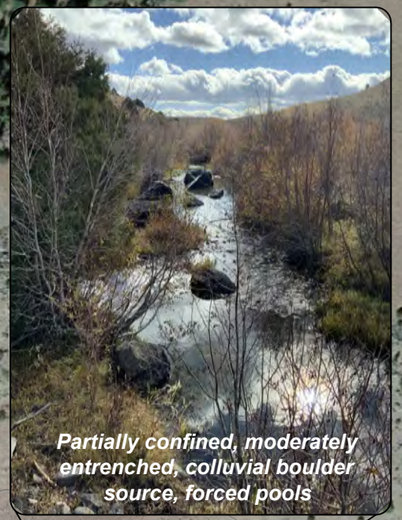
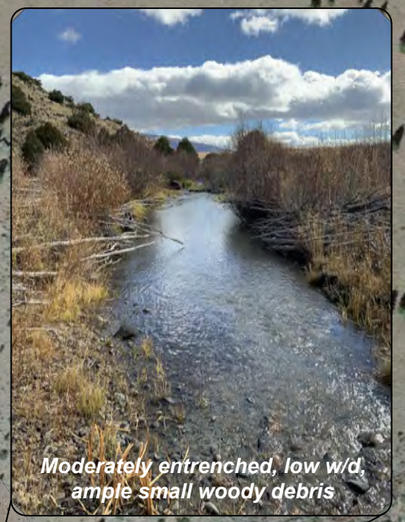
811 Know what's below. Call before you dig.

DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Downstream Project Area Restoration Potential

DRAWING #:	SHEET #:	REVISION #:
ADS03	11 OF 21	1





13 6 15 7 16 14 17 18 19 20 8 21 22 23 5 9

Photo Point Legend

- River Character
- Sediment Character
- Reference Condition

0 250 500

SCALE IN FEET

PROJECT NAME:
Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
NA

PROJECT PHASE:
70% Design Plans

CLIENT:
New Mexico Department of Game & Fish
1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

DRAWN BY: GFC
DESIGNED BY: CS & GFC
REVIEWED BY: CS & GFC

PRELIMINARY NOT FOR CONSTRUCTION

DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Downstream Project Area 1 Assessment Map & Photo Points

DRAWING #:	SHEET #:	REVISION #:
ADS04	12 OF 21	0

Downstream Project Area 1

	River Character	
13	River character	Floodplain access, riffle dominated, larger caliber bed material, high w/d, grazing impacted
14	River character	Highly entrenched, low gradient, well vegetated, large caliber bed material
15	River character	Partially confined, moderately entrenched, colluvial Boulder source, forced pools
16	River character	Moderately entrenched, riffle dominated, colluvial boulders, large caliber bed material
17	River character	Moderately entrenched, low w/d, lots of small woody debris
18	River character	Slightly to moderately entrenched, riffle pool, frequent constrictions, boulders and log jams
19	River character	Slightly entrenched, high w/d, low gradient, some boulders, less shading
20	River character	Slightly entrenched, high w/d, numerous bars, poor shading, small woody debris, former beaver dam backwater
21	River character	Moderately entrenched, high w/d, riffle dominated, poorly shaded
22	River character	Moderately entrenched, high w/d, plane bed, biofilm, smaller caliber bed material, poorly shaded
23	River character	Slightly entrenched, moderate w/d, evolving meanders, unconsolidated alluvial bank material
	Sediment Character	
5	Sediment character	High yield eroding bank, fine sediments, terrace high
	Reference Condition	
6	Reference condition	Good w/d, short reach
7	Reference condition	Boulder assisted log jam, small diameter alder
8	Reference condition	Natural small diameter log jam
9	Reference condition	Very deep pool, 4'+

20 ***Slightly entrenched reach with high w/d ratio, numerous bars, poor shading, small woody debris jams in a former beaver dam backwater***

23 ***Slightly entrenched reach with moderate w/d ratio, evolving meanders and unconsolidated alluvial bank material***

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Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
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Rio Arriba County, NM

PROJECT NUMBER:
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CLIENT:
New Mexico Department of Game & Fish
1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

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DESIGNED BY: CS & GFC
REVIEWED BY: CS & GFC

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 06.29.2022
OEE PROJECT #: NM-014-1

DRAWING:
Downstream Project Area 1 Additional Assessment Information

DRAWING #: ADS05
SHEET #: 13 OF 21
REVISION #: 0

PROJECT NAME:
Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
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811 Know what's below. Call before you dig.

DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Downstream Project Area 2 Assessment Map & Photo Points

DRAWING #:	SHEET #:	REVISION #:
ADS06	14 OF 21	1

Downstream Project Area 2

		River Character
24	River character	Moderately entrenched, partially confined by unconsolidated, high yield eroding bank, evolving meanders, sediment caliber fining downward
25	River character	Slightly entrenched, high w/d, deep pools, some erratic boulders, larger caliber bed material, more shade, small woody debris, ***large fish, possibly suckers.
26	River character	Partially confined with colluvial boulders, forced pools, woody debris
27	River character	Slightly entrenched, low w/d, large caliber bed material, well shaded
28	River character	Moderately entrenched, low w/d, elongated pool, heavily shaded
29	River character	Floodplain access, inset floodplain, monoplane bed, beaver dam backwater
30	River character	Beaver dam backwater, large flood prone area, high yield eroding bank 10'+ fine sediment
31	River character	Moderately entrenched, partially confined, course bed material, intermittent shade
32	River character	Beaver dam complex
33	River character	Evolving meanders, beaver dam complex
34	River character	Evolving meanders, beaver dam complex
		Sediment Character
6	Sediment character	8' tall eroding bank, fine sediment
7	Sediment character	10'+ eroding bank, fine sediment source
		Reference Condition
10	Reference condition	Cross channel log jam
11	Reference condition	Intact floodplain, riffle pool, deep forced pools, decent vegetation, erratic boulders
12	Reference condition	Beaver dam with extensive backwater
13	Reference condition	Spawning gravel deposited below breached beaver dam
14	Reference condition	Boulder assisted log jam
15	Reference condition	Beaver dam complex, in partially confined channel with inset floodplain
16	Reference condition	Beaver dam complex

6 ***Eight-foot-tall bank eroding into the terrace over its entire height, resulting in a significant sediment source.***

13 ***Spawning gravel deposited below a breached beaver dam***

PROJECT NAME:
Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
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1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

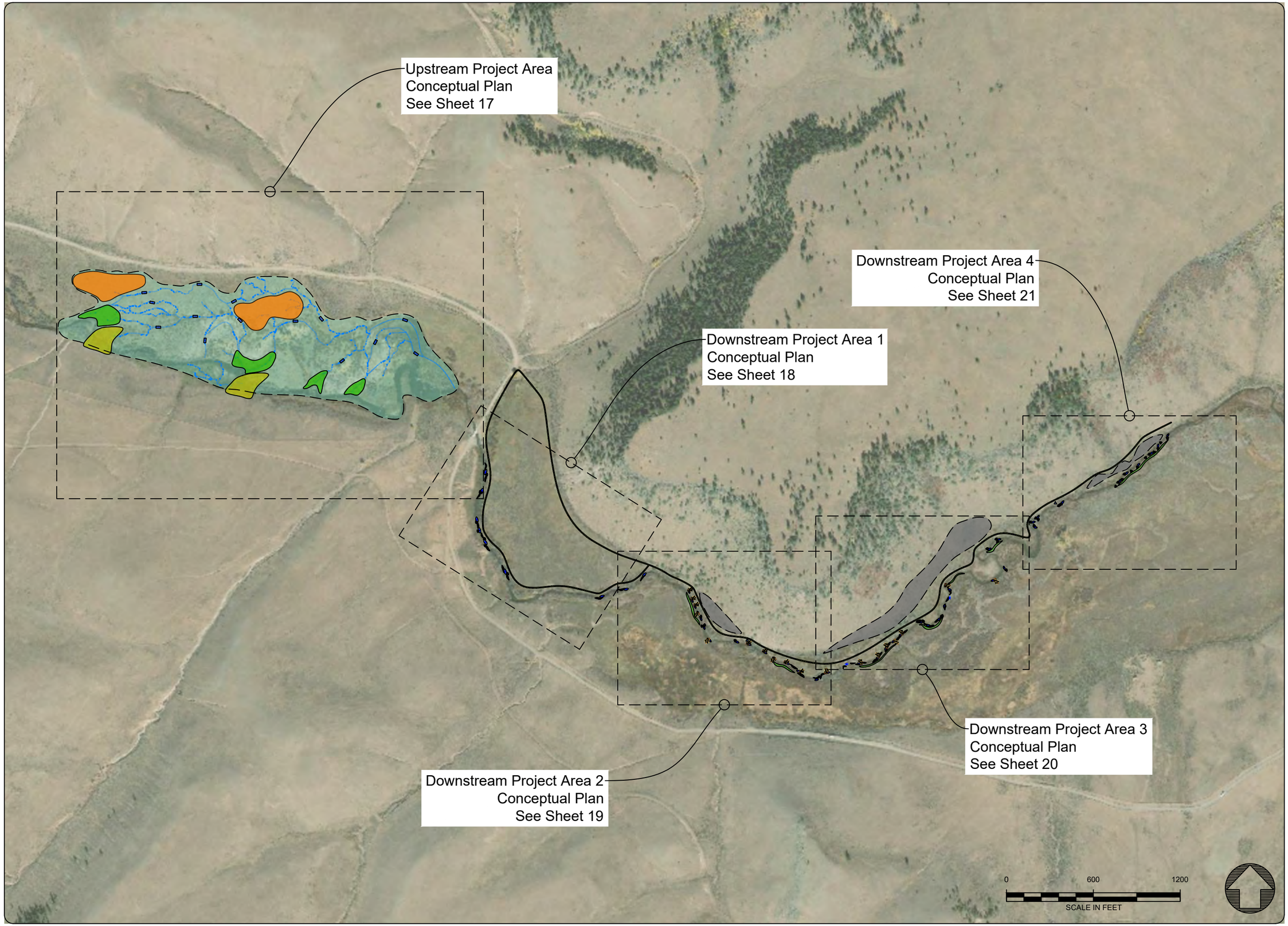
DRAWN BY: GFC
DESIGNED BY: CS & GFC
REVIEWED BY: CS & GFC

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 06.29.2022
OEE PROJECT #: NM-014-1

DRAWING: Downstream Project Area 2 Additional Assessment Information

DRAWING #: ADS07
SHEET #: 15 OF 21
REVISION #: 1



PROJECT NAME:
Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
NA

PROJECT PHASE:
70% Design Plans

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New Mexico Department of Game & Fish
1 Wildlife Way
Santa Fe, NM 87507
(505) 476-8000

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DESIGNED BY: CS & GFC

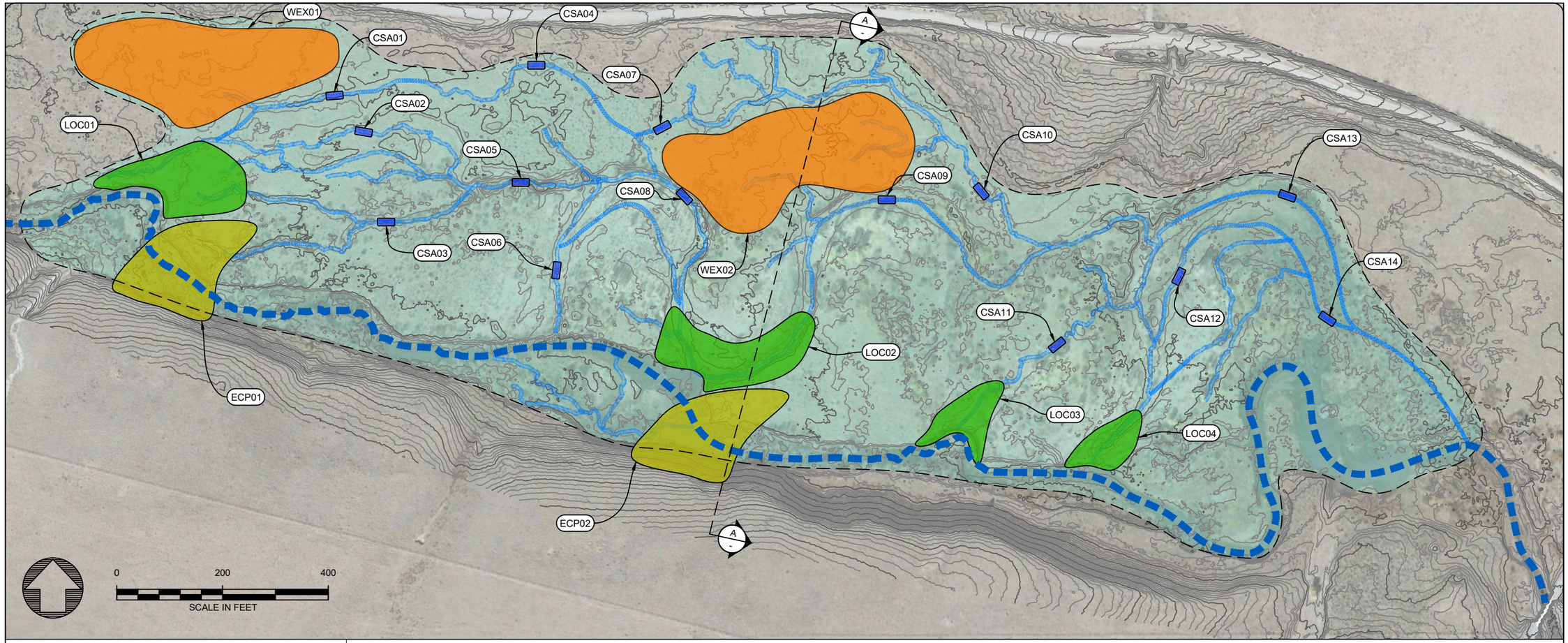
REVIEWED BY: CS & GFC

PRELIMINARY NOT FOR CONSTRUCTION

DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Conceptual Plan Overview

DRAWING #:	SHEET #:	REVISION #:
CPT01	16 OF 21	1



Legend

Existing Features

- Major Contours @ 5-foot Intervals (2016 LIDAR)
- Minor Contours @ 1-foot Intervals (2016 LIDAR)
- Rio San Antonio Thalweg
- Relic Stream/Floodplain Channel Network

Proposed Features

- Earthen Outcropping/Channel Plug (ECP)
- Excavated Wetland Expansion/Borrow Area (WEX)
- Excavated Lead-out Channel (LOC)
- Channel Shaping/Velocity Interruption Area (CSA)
- Potential Flow Paths
- Potential Zone of Influence (~36 Acres)

Notes for the Conceptual Design

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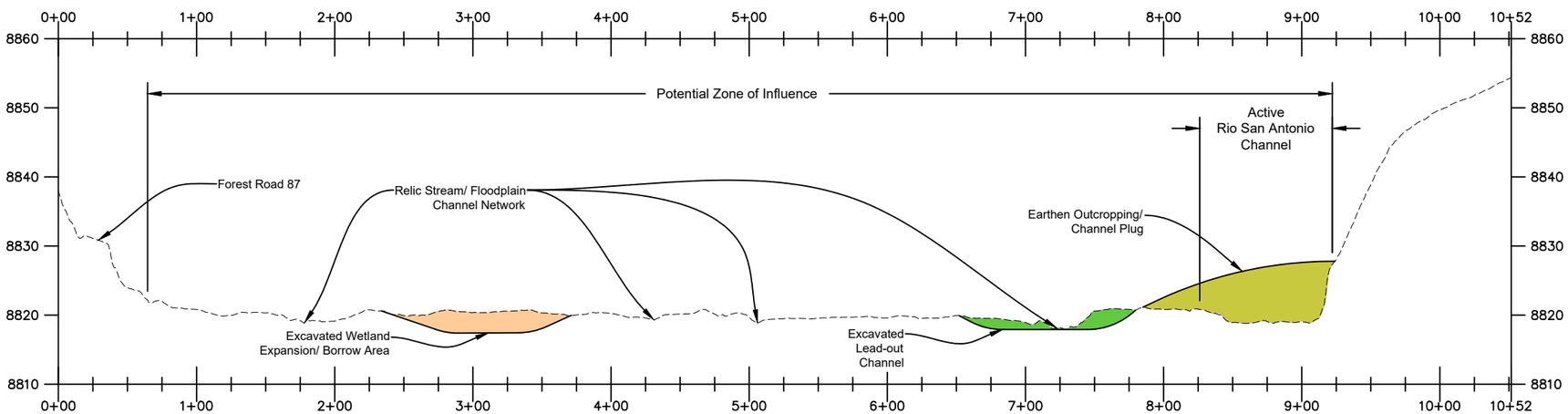

A - Valley Section (Vertical Exaggeration = 5)

0 100 200
HORIZ SCALE IN FEET

PROJECT NAME:
Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
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DESIGNED BY: CS & GFC
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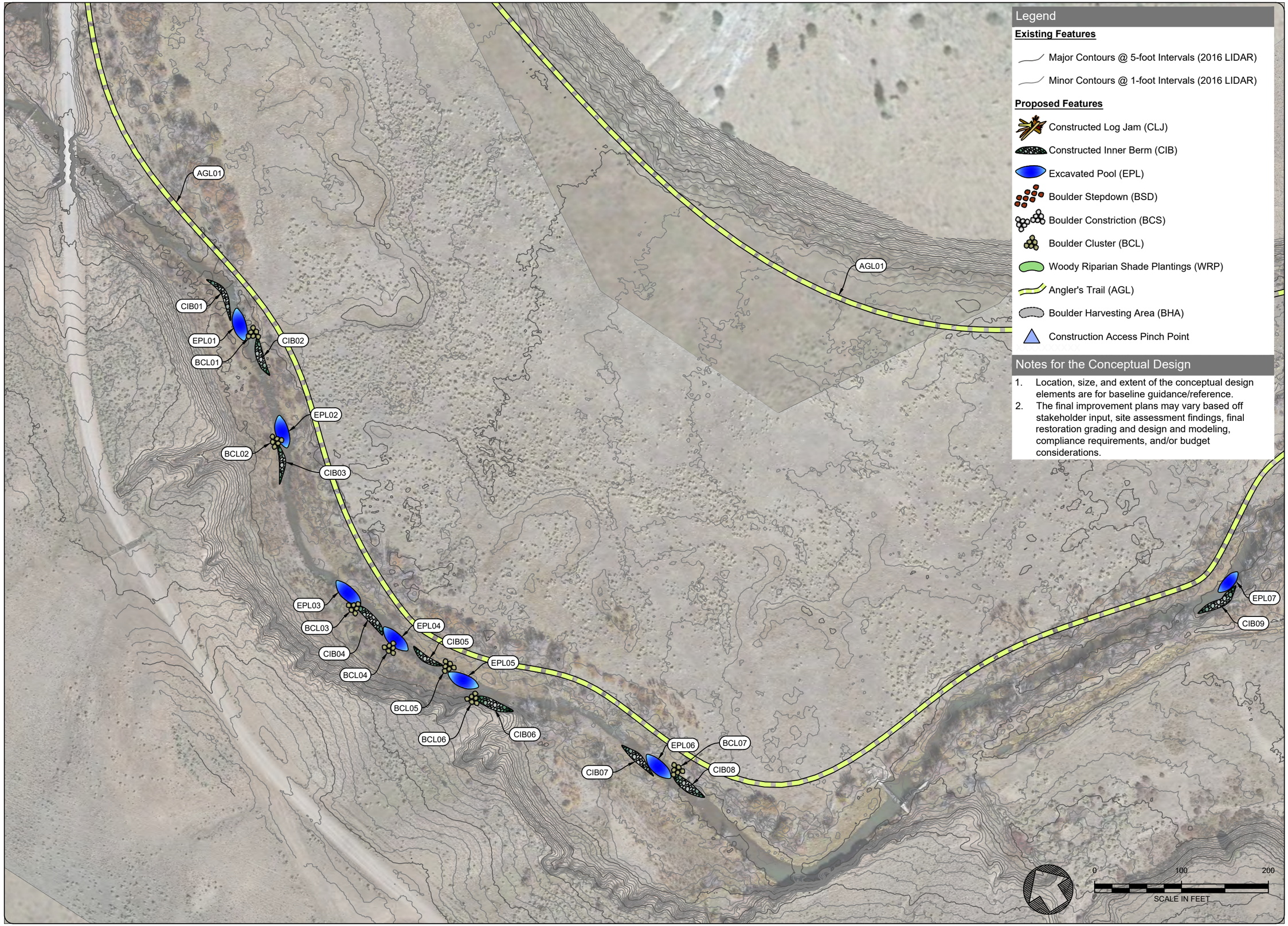
PRELIMINARY NOT FOR CONSTRUCTION

DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Conceptual Plan
Upstream Project Area

DRAWING #:	SHEET #:	REVISION #:
CPT02	17 OF 21	0



Legend

Existing Features

- Major Contours @ 5-foot Intervals (2016 LIDAR)
- Minor Contours @ 1-foot Intervals (2016 LIDAR)

Proposed Features

- Constructed Log Jam (CLJ)
- Constructed Inner Berm (CIB)
- Excavated Pool (EPL)
- Boulder Stepdown (BSD)
- Boulder Constriction (BCS)
- Boulder Cluster (BCL)
- Woody Riparian Shade Plantings (WRP)
- Angler's Trail (AGL)
- Boulder Harvesting Area (BHA)
- Construction Access Pinch Point

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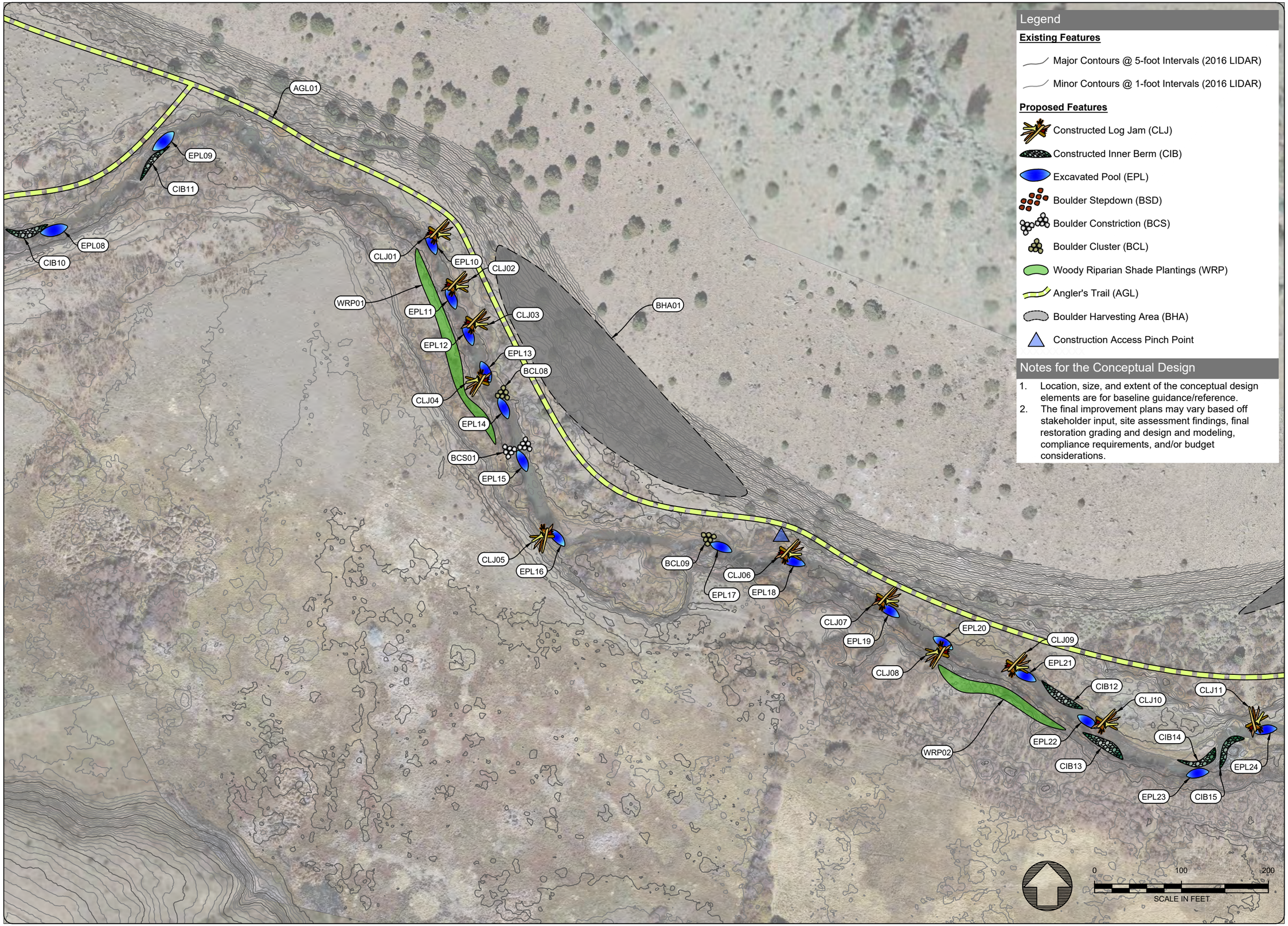
DATE: 06.29.2022
OEE PROJECT #: NM-014-1

DRAWING:
Conceptual Plan
Downstream Project Area 1

DRAWING #:	SHEET #:	REVISION #:
CPT03	18 OF 21	1



Legend

Existing Features

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Proposed Features

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DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Conceptual Plan
Downstream Project Area 2

DRAWING #:	SHEET #:	REVISION #:
CPT04	19 OF 21	1

Legend

Existing Features

- Major Contours @ 5-foot Intervals (2016 LIDAR)
- Minor Contours @ 1-foot Intervals (2016 LIDAR)

Proposed Features

- Constructed Log Jam (CLJ)
- Constructed Inner Berm (CIB)
- Excavated Pool (EPL)
- Boulder Stepdown (BSD)
- Boulder Constriction (BCS)
- Boulder Cluster (BCL)
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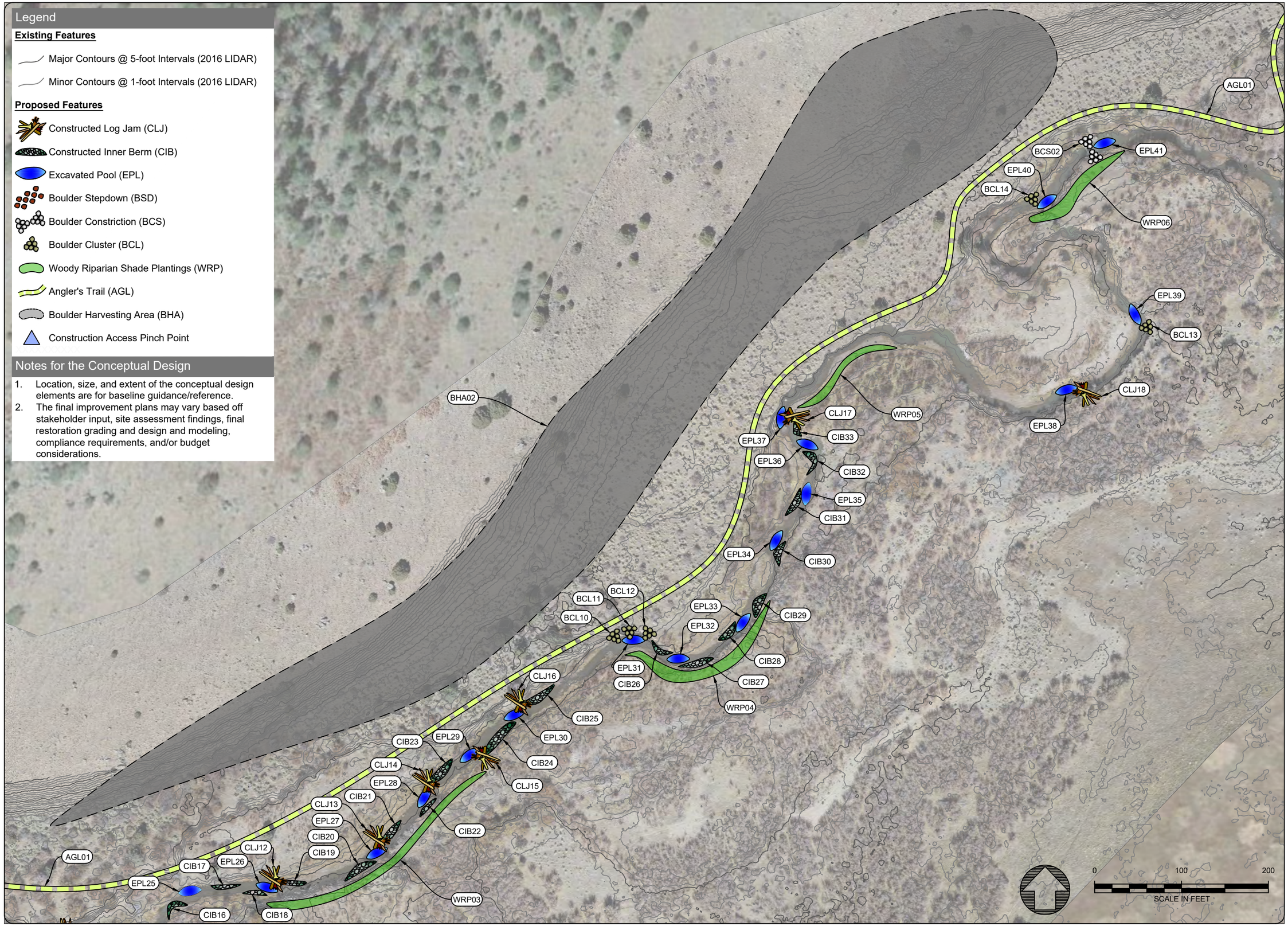

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Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
Stewart Meadows
Rio Arriba County, NM

PROJECT NUMBER:
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PROJECT PHASE:
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CLIENT:
New Mexico Department of Game & Fish
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Santa Fe, NM 87507
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DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Conceptual Plan
Downstream Project Area 3

DRAWING #:	SHEET #:	REVISION #:
CPT05	20 OF 21	1

Legend

Existing Features

- Major Contours @ 5-foot Intervals (2016 LIDAR)
- Minor Contours @ 1-foot Intervals (2016 LIDAR)

Proposed Features

- Constructed Log Jam (CLJ)
- Constructed Inner Berm (CIB)
- Excavated Pool (EPL)
- Boulder Stepdown (BSD)
- Boulder Constriction (BCS)
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Stewart Meadows Habitat Assessment & Conceptual Design

LOCATION:
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Rio Arriba County, NM

PROJECT NUMBER:
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PROJECT PHASE:
70% Design Plans

CLIENT:
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Santa Fe, NM 87507
(505) 476-8000

DRAWN BY: GFC
DESIGNED BY: CS & GFC
REVIEWED BY: CS & GFC

PRELIMINARY NOT FOR CONSTRUCTION

DATE:	OEE PROJECT #:
06.29.2022	NM-014-1

DRAWING:
Conceptual Plan
Downstream Project Area 4

DRAWING #:	SHEET #:	REVISION #:
CPT06	21 OF 21	1