VOLUME NO. VOL. 3

SHEET NO. 6.14

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.20

SEE SHEET NO. 6.13

SEE SHEET NO. 6.15

SEE SHEET NO. 6.8

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

80 40 0 80 160

SCALE (FT)

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REVISIONS

NO.	DESCRIPTION	ENGR.	APPROV.	DATE

PREPARED FOR:

UPPER TRINITY REGIONAL WATER DISTRICT

900 N KEALY ST
LEWISVILLE, TX 75057

LAKE RALPH HALL MITIGATION
MITIGATION ZONE C
FANNIN COUNTY, TEXAS

ALAN PLUMMER ASSOCIATES, INC.
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TEXAS REGISTERED ENGINEERING
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PROJECT ENGINEER

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TIMOTHY J. NOACK
TEXAS P.E. NO. 54732
DATE: 7/8/2019

VOLUME NO.	SHEET NO.
VOL. 3	6.15

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.14

SEE SHEET NO. 6.9

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

80 40 0 80 160

SCALE (FT)

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ZONE C
PLANTING PLAN

SEE SHEET NO. 6.21

SEE SHEET NO. 6.17

SEE SHEET NO. 6.10

LEGEND
- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

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SCALE (FT)

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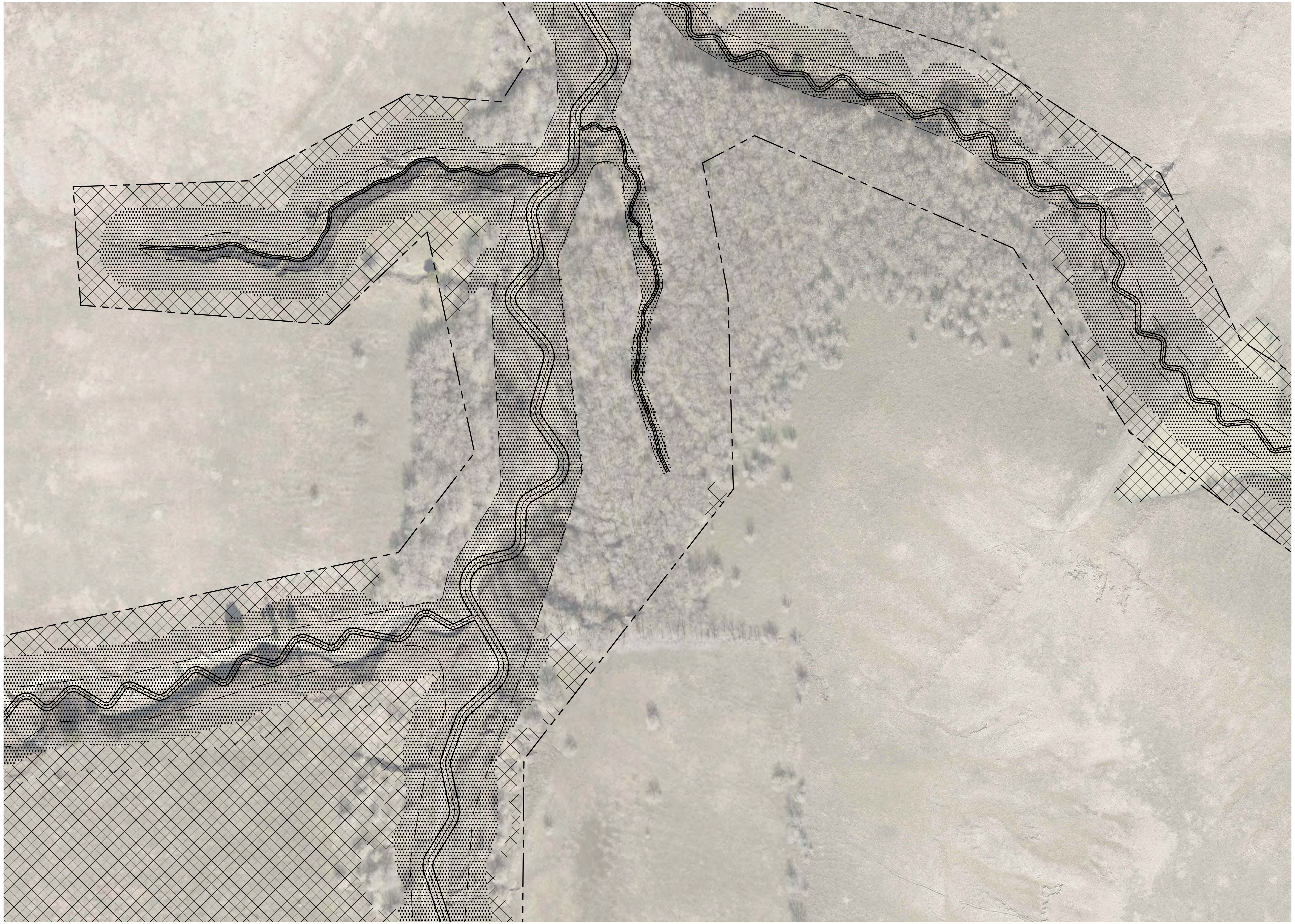
VOLUME NO.	SHEET NO.
VOL. 3	6.17

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.22

SEE SHEET NO. 6.16



SEE SHEET NO. 6.18

SEE SHEET NO. 6.11

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

80 40 0 80 160

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VOLUME NO. VOL. 3

SHEET NO. 6.18

ZONE C
PLANTING PLAN

SEE SHEET NO. 6.23

SEE SHEET NO. 6.17

SEE SHEET NO. 6.19

SEE SHEET NO. 6.12

LEGEND

ENHANCEMENT STREAM

RESTORATION STREAM CHANNEL (WIDTH VARIES)

CONSERVATION EASEMENT BOUNDARY

FLOODPLAIN BENCH

PLANTING ZONE 1

PLANTING ZONE 2

PLANTING ZONE 3

80 40 0 80 160

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UPPER TRINITY REGIONAL WATER DISTRICT

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TEXAS P.E. NO. 54732
DATE: 7/8/2019

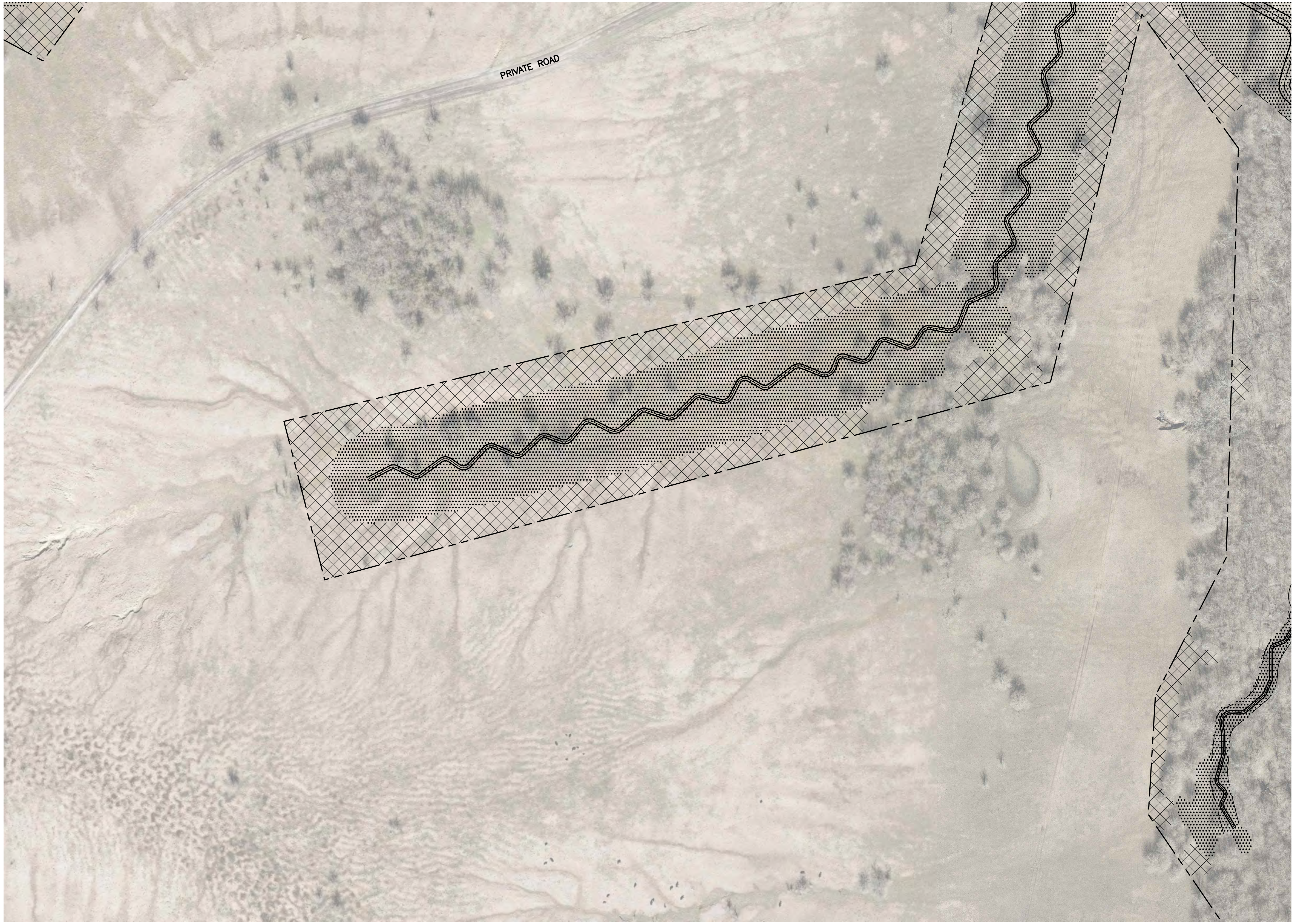
VOLUME NO. VOL. 3

SHEET NO. 6.19

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.24



SEE SHEET NO. 6.18

SEE SHEET NO. 6.20

SEE SHEET NO. 6.13

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

80 40 0 80 160

SCALE (FT)

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UPPER TRINITY REGIONAL WATER DISTRICT

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VOLUME NO. VOL. 3

SHEET NO. 6.20

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.25

SEE SHEET NO. 6.19

SEE SHEET NO. 6.14

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

80 40 0 80 160

SCALE (FT)

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REVISIONS				
NO.	DESCRIPTION	ENGR.	APPROV.	DATE

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UPPER TRINITY REGIONAL WATER DISTRICT

900 N KEALY ST
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TIMOTHY J. NOACK
TEXAS P.E. NO. 54732
DATE: 7/8/2019

VOLUME NO. VOL. 3

SHEET NO. 6.21

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.26

SEE SHEET NO. 6.22

SEE SHEET NO. 6.16

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

80 40 0 80 160

SCALE (FT)

REVISIONS

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PREPARED FOR:

UPPER TRINITY REGIONAL WATER DISTRICT

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LEWISVILLE, TX 75057

LAKE RALPH HALL MITIGATION
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VOLUME NO.
VOL. 3

SHEET NO.
6.22

ZONE C
PLANTING PLAN

SEE SHEET NO. 6.27

SEE SHEET NO. 6.21

SEE SHEET NO. 6.23

SEE SHEET NO. 6.17

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

80 40 0 80 160
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UPPER TRINITY REGIONAL WATER DISTRICT

900 N KEALY ST
LEWISVILLE, TX 75057

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ZONE C
PLANTING PLAN

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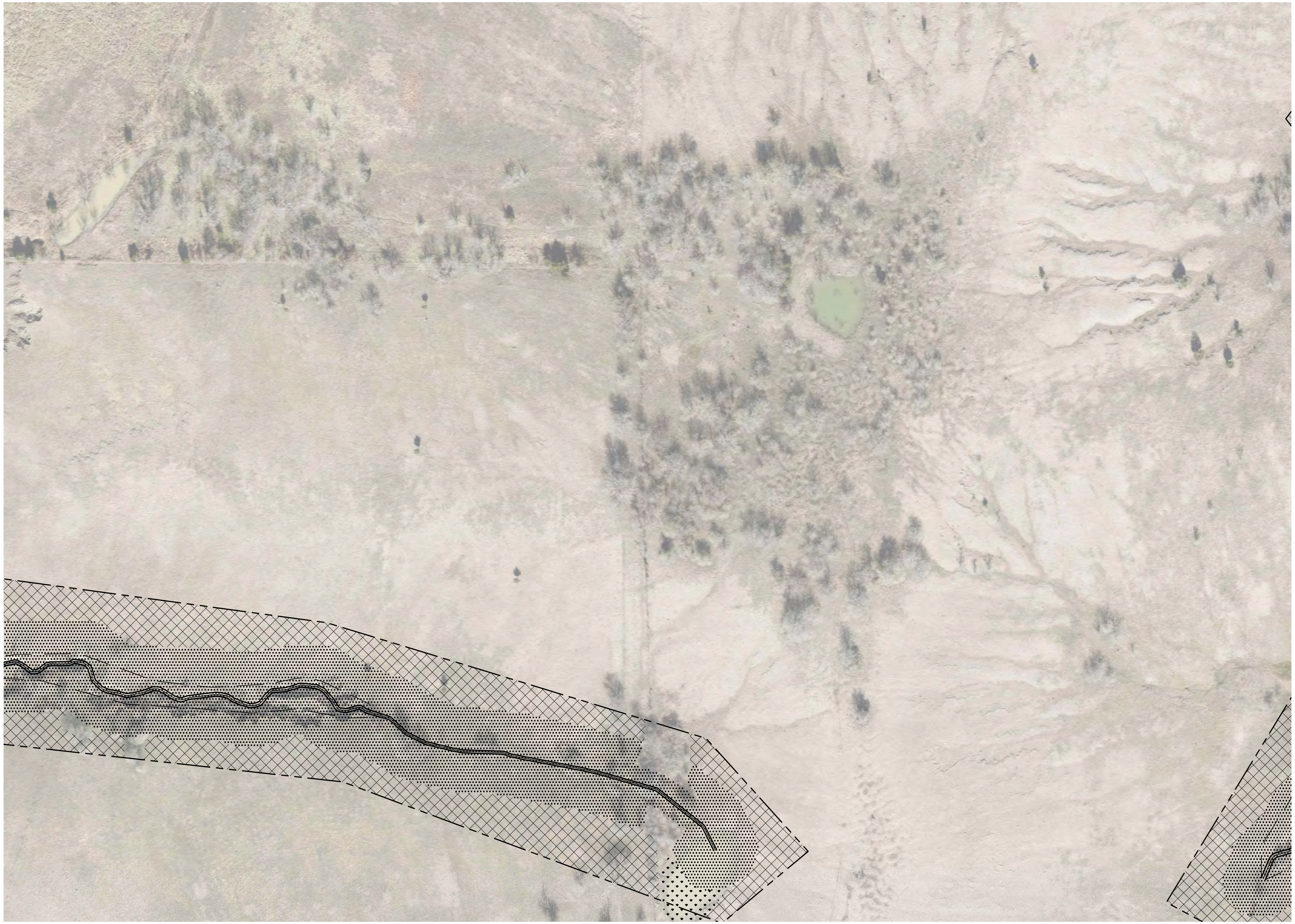

SEE SHEET NO. 6.24

SEE SHEET NO. 6.18

LEGEND

ENHANCEMENT STREAM

RESTORATION STREAM CHANNEL (WIDTH VARIES)

CONSERVATION EASEMENT BOUNDARY

FLOODPLAIN BENCH

PLANTING ZONE 1

PLANTING ZONE 2

PLANTING ZONE 3

80 40 0 80 160

SCALE (FT)

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REVISIONS

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UPPER TRINITY REGIONAL WATER DISTRICT

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VOLUME NO. VOL. 3

SHEET NO. 6.24

ZONE C

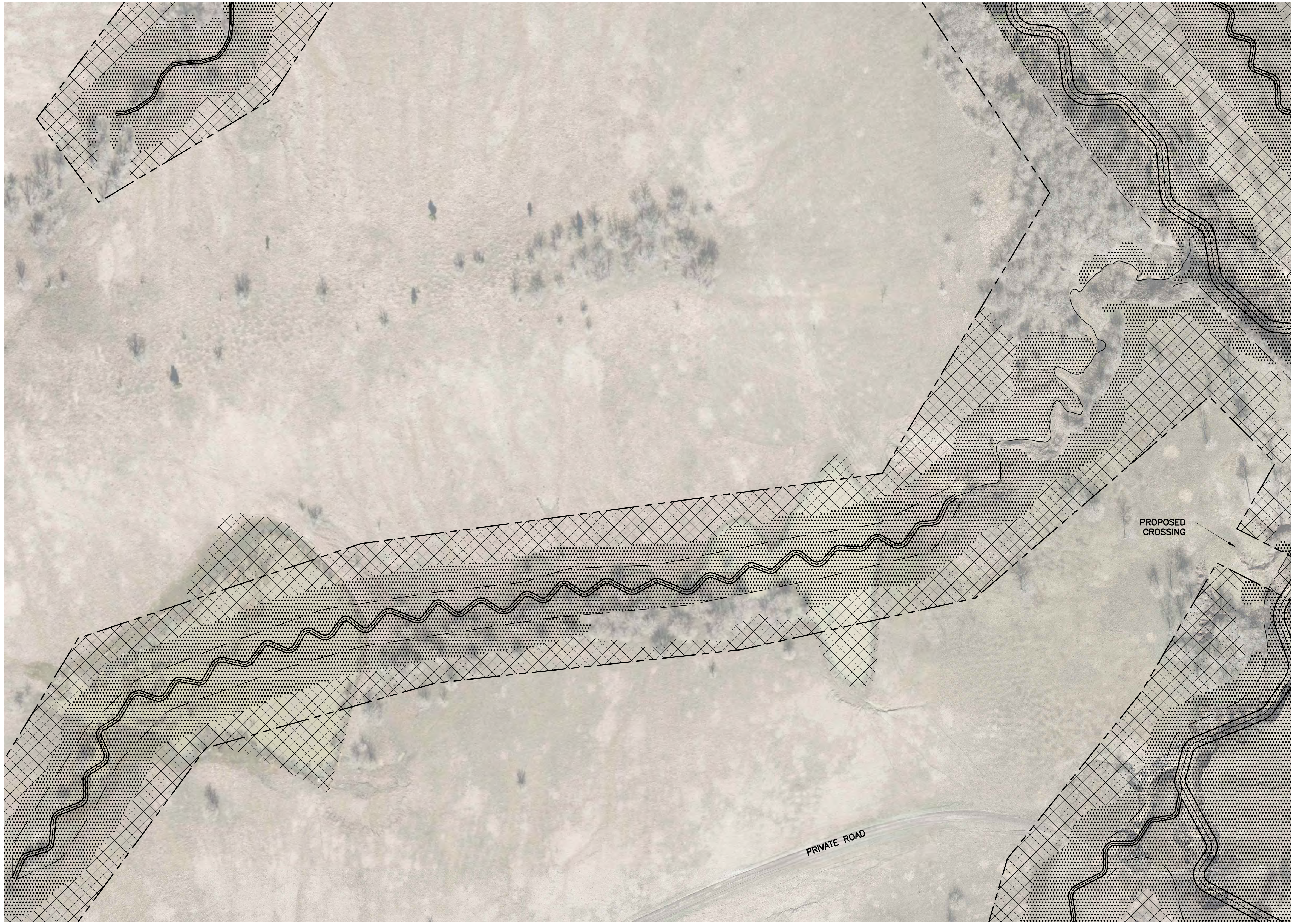
PLANTING PLAN

SEE SHEET NO. 6.28

SEE SHEET NO. 6.29

SEE SHEET NO. 6.23

SEE SHEET NO. 6.25



SEE SHEET NO. 6.19

LEGEND

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- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
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- PLANTING ZONE 1
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80 40 0 80 160
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VOLUME NO. VOL. 3

SHEET NO. 6.25

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.29

SEE SHEET NO. 6.24

SEE SHEET NO. 6.26

SEE SHEET NO. 6.20

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
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- PLANTING ZONE 1
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VOLUME NO. VOL. 3 | SHEET NO. 6.26

ZONE C
PLANTING PLAN

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

SEE SHEET NO. 6.25

SEE SHEET NO. 6.27

SEE SHEET NO. 6.21

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UPPER TRINITY REGIONAL WATER DISTRICT

900 N KEALY ST
LEWISVILLE, TX 75057

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TEXAS P.E. NO. 54732
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VOLUME NO. VOL. 3 | SHEET NO. 6.27

ZONE C
PLANTING PLAN

SEE SHEET NO. 6.30

SEE SHEET NO. 6.26

SEE SHEET NO. 6.28

SEE SHEET NO. 6.22

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

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SHEET NO. 6.28

ZONE C

PLANTING PLAN

SEE SHEET NO. 6.31

SEE SHEET NO. 6.27

SEE SHEET NO. 6.29

SEE SHEET NO. 6.24

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

80 40 0 80 160

SCALE (FT)

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SHEET NO. 6.29

ZONE C

PLANTING PLAN

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SEE SHEET NO. 6.19

LEGEND

- ENHANCEMENT STREAM
- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

N

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VOLUME NO.	SHEET NO.
VOL. 3	6.30

ZONE C
PLANTING PLAN

LEGEND

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- RESTORATION STREAM CHANNEL (WIDTH VARIES)
- CONSERVATION EASEMENT BOUNDARY
- FLOODPLAIN BENCH
- PLANTING ZONE 1
- PLANTING ZONE 2
- PLANTING ZONE 3

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ZONE C

PLANTING PLAN

SEE SHEET NO. 6.29

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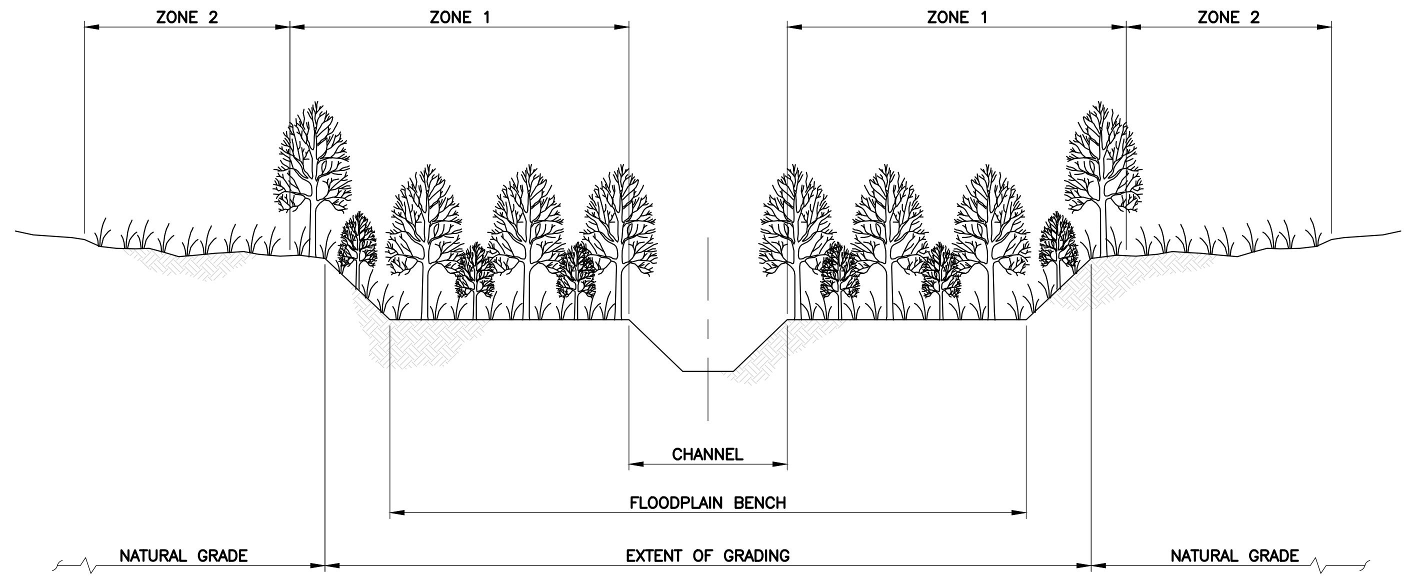
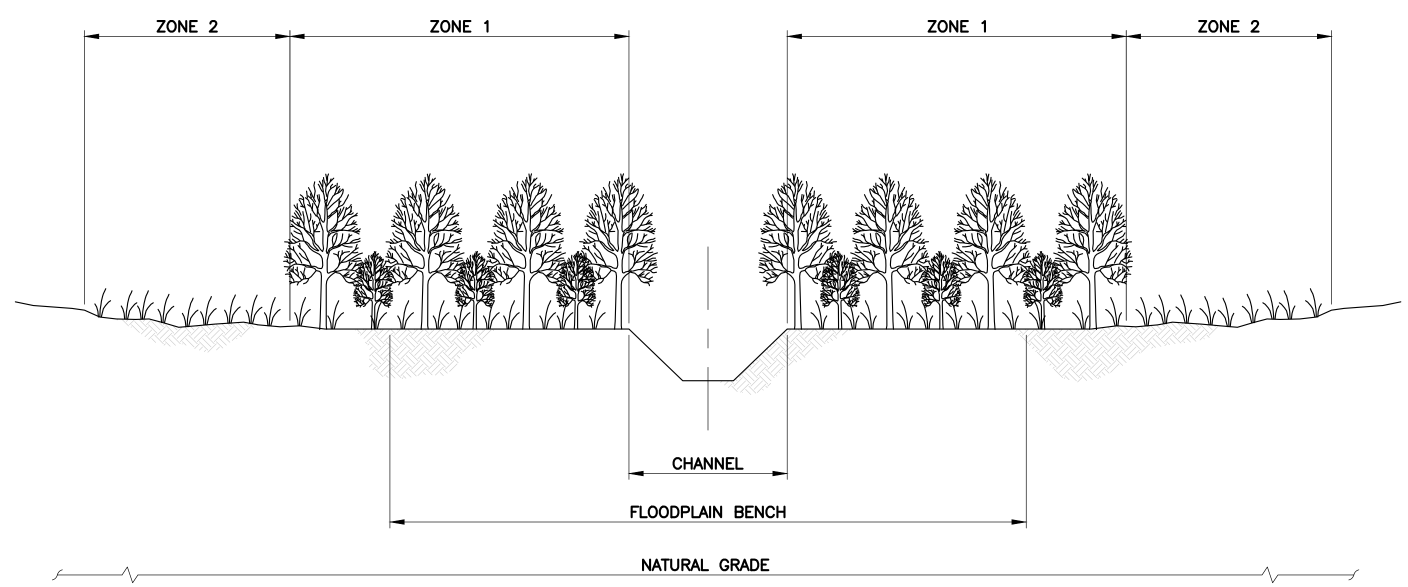
ZONE C
PLANTING DETAILS AND NOTES



TYPICAL PLANTING ZONES WITH FLOODPLAIN BENCH

NOT TO SCALE



TYPICAL PLANTING ZONES WITH NATURAL GROUND

NOT TO SCALE

NOTES:

1. CHANNEL WILL MEANDER WITHIN THE FLOODPLAIN BENCH.
2. REFER TO TABLE 6.1. 6.2, AND 6.3 FOR STREAM MITIGATION PLANTINGS.
3. PLANTING ZONE 1 WILL BE A MINIMUM 60' WIDE AS MEASURED FROM THE OUTSIDE TOP OF BANK. IF EXTENT OF GRADING IS BEYOND 60', EXTEND WIDTH OF PLANTING ZONE 1 TO COVER BARE GROUND. PLANTINGS WITHIN ZONE 1 WILL INCLUDE HERBACEOUS SEED MIX FROM TABLE 6.3 AND TREE/SHRUB PLANTINGS FROM TABLE 6.1 AND 6.2.
4. PLANTING ZONE 2 WILL BE A MINIMUM OF 30' WIDE AS MEASURED FROM THE OUTSIDE OF ZONE 1. PLANTINGS WITHIN ZONE 2 SHALL INCLUDE HERBACEOUS SEED MIX FROM TABLE 6.3. EXISTING DESIRABLE PLANT SPECIES (NATIVE GRASS, SHRUBS, TREES) WITHIN ZONE 2 MAY REMAIN.
5. UNDESIRABLE SPECIES SHALL BE REMOVED PER MITIGATION PLAN.
6. ALL DISTURBED AREAS DUE TO CONSTRUCTION ACTIVITIES SHALL BE PLANTED WITH HERBACEOUS SEED MIX PER TABLE 6.3 AND IF WITHIN 60' OF STREAM CHANNEL SHALL ALSO BE PLANTED WITH TREE/SHRUB PLANTINGS PER TABLE 6.1 AND 6.2.
7. EXISTING DESIRABLE TREE, SHRUB AND HERBACEOUS SPECIES WITHIN PLANTING ZONE 1 SHALL REMAIN, FOR AREAS WITH EXISTING TREE CANOPY, CONTRACTOR SHALL PLANT SHRUB/SMALL TREES (MID STORY) AS NEEDED TO ENHANCE RIPARIAN CORRIDOR.
8. CONTRACTOR SHALL PLANT CANOPY TREE SPECIES FROM TABLE 6.1 SUCH THAT ZONE 1 ACHIEVES A MINIMUM OF 60 PERCENT CANOPY COVER WITHIN 7 YEARS OF PLANTING EFFORT. ONE SINGLE CANOPY TREE SPECIES SHALL NOT OCCUPY GREATER THAN 30% COVERAGE IN ZONE 1. CANOPY TREE SPECIES SHALL BE SPACED TO ACHIEVE MAXIMUM CANOPY TREE COVER WITHIN ZONE 1.

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VOLUME NO. VOL. 3

SHEET NO. 6.33

ZONE C

PLANTING TABLES

TABLE 6.1: STREAM BANK AND PLANTING ZONE 1 CANOPY TREE SPECIES*

Strata	Common Name	Scientific Name
Canopy Tree	American Elm	*Ulmus americana*
	Black Walnut	*Juglans nigra*
	Bois d'Arc	*Maclura pomifera*
	Bur Oak	*Quercus macrocarpa*
	Cedar Elm	*Ulmus crassifolia*
	Chinkapin Oak	*Quercus muehlenbergii*
	Pecan	*Carya illinoensis*
	Shumard Oak	*Quercus shumardii*
	Texas Ash	*Fraxinus texensis*
	Water Oak	*Quercus nigra*
	Willow Oak	*Quercus phellos*

*See Note 1

TABLE 6.2: STREAM BANK AND PLANTING ZONE 1 UNDERSTORY TREES AND SHRUB SPECIES

Strata	Common Name	Scientific Name
Small Tree and Shrub	American Beautyberry	*Callicarpa americana*
	Buttonbush	*Cephalanthus occidentalis*
	Common or Texas Persimmon	*Diospyros virginianum or D. texana*
	Coralberry	*Symphoricarpos orbiculatus*
	Deciduous Holly	*Ilex decidua*
	Eastern Redbud	*Cercis canadensis*
	Eve's Necklace	*Sophora Affinis*
	Mexican Plum	*Prunus mexicana*
	Rough-leaf Dogwood	*Cornus drummondii*
	Rusty Blackhaw	*Viburnum rufidulum*
	Swamp Privet	*Forestiera acuminata*

TABLE 6.3: STREAM BANK.PLANTING ZONE 1 AND PLANTING ZONE 2 HERBACEOUS SPECIES

Type	Common Name	Scientific Name
Grasses	Big Bluestem	*Andropogon gerardii*
	Bushy Bluestem	*Andropogon glomeratus*
	Cane Bluestem	*Bothriochloa barbinodis*
	Eastern Gamagrass	*Tripsacum dactyloides*
	Florida Paspalum	*Paspalum floridanum*
	Green Sprangletop	*Leptochloa dubia*
	Indiangrass	*Sorghastrum nutans*
	Inland Seaoats	*Chasmanthium latifolium*
	Plains Bristlegrass	*Setaria vulpiseta*
	Prairie Wildrye	*Elymus canadensis*
	Sand Dropseed	*Sporobolus cryptandrus*
	Sideoats Grama	*Bouteloua curtipendula*
	Switchgrass	*Panicum virgatum*
	Texas Cupgrass	*Eriochloa sericea*
	Texas Wintergrass	*Nassella leucotricha*
	Virginia Wildrye	*Elymus virginicus*
	White Tridens	*Tridens albescens*
Legumes	Illinois Bundleflower	*Desmanthus illinoensis*
	Partridge Pea	*Chamaecrista fasciculata*
Forbs	Black-eyed Susan	*Rudbeckia hirta*
	Buttonbush	*Cephalanthus occidentalis*
	Cardinal Flower	*Lobelia cardinalis*
	Clasping Coneflower	*Dracopis amplexicaulis*
	Cutleaf Daisy	*Engelmannia pinnatifida*
	Frostweed	*Verbesina virginica*
	Giant Goldenrod	*Solidago gigantea*
	Lemon Mint	*Monarda citridora*
	Maximilian Sunflower	*Helianthus maximiliani*
	Plains Coreopsis	*Coreopsis tinctoria*
	Pink Evening Primrose	*Oenothera speciosa*
	Redwhisker Clammyweed	*Polanisia dodecandra*
	Rose Milkweed	*Asclepias incarnata*
	Scarlet Sage	*Salvia coccinea*
	Swamp Sunflower	*Helianthus angustifolius*
	Tall Aster	*Symphyotrichum praealtum*
	Tall Goldenrod	*Solidago altissima*
	Turk's Cap/Wax Mallow	*Malvaviscus arboreus*

TABLE 6.4: PLANTING ZONE 3 - WETLAND PLANTINGS FOR TEMPORARILY FLOODED AREAS

Common Name	Scientific Name
Switchgrass	*Panicum virgatum*
Eastern Gamagrass	*Tripsacum dactyloides*
Inland Seaoats	*Chasmanthium latifolium*
Green Sprangletop	*Leptochloa dubia*
Prairie Wildrye	*Elymus canadensis*
Illinois Bundleflower	*Desmanthus illinoensis*
Partridge Pea	*Chamaecrista fasciculata*
Swamp Sunflower	*Helianthus angustifolius*
Plains Coreopsis	*Coreopsis tinctoria*

TABLE 6.5: PLANTING ZONE 3 - WETLAND PLANTINGS FOR SEASONALLY FLOODED AREAS

Common Name	Scientific Name
Swamp Smartweed	*Polygonum hydropiperoides*
Spikerush	*Eleocharis spp.*
Sedges	*Carex spp.*
Squarestem Spikerush	*Eleocharis quadrangulata*
Crowfoot Sedge	*Carex crus-corvi*
Duck Potato Arrowhead	*Sagittaria latifolia*
Soft Rush	*Juncus effusus*
Three-square bulrush	*Schoenoplectus pungens*

NOTES:

1. CONTRACTOR SHALL PLANT CANOPY TREE SPECIES FROM TABLE 6.1 SUCH THAT ZONE 1 ACHIEVES A MINIMUM OF 60 PERCENT CANOPY COVER WITHIN 7 YEARS OF INITIAL PLANTING EFFORT. ONE SINGLE CANOPY TREE SPECIES SHALL NOT OCCUPY GREATER THAN 30% COVERAGE IN ZONE 1. CANOPY TREE SPECIES SHALL BE SPACED TO ACHIEVE MAXIMUM CANOPY TREE COVER WITHIN ZONE 1.

2. PLANTING ZONE 3 WILL CONSIST OF WETLAND PLANTINGS FROM TABLES 6.4 AND 6.5. FOR AREAS TEMPORARILY FLOODED, USE SEED MIX FROM TABLE 6.4. FOR AREAS SEASONALLY FLOODED, USE A MIX OF PLANTINGS FROM TABLE 6.5. PLANTING MAY OCCUR YEAR-ROUND.

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PREPARED FOR:

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UPPER TRINITY REGIONAL WATER DISTRICT

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TEXAS P.E. NO. 54732
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UPPER TRINITY
REGIONAL WATER DISTRICT

UPPER TRINITY REGIONAL WATER DISTRICT

CONSTRUCTION PLANS FOR

LAKE RALPH HALL MITIGATION PROJECT VOLUME 4 NORTH SULPHUR RIVER MAIN CHANNEL- ZONE A

OWNER

UPPER TRINITY REGIONAL WATER DISTRICT

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Ramiro Lopez ____________ Vice President
Mike Fairfield ____________ Treasurer
Brian Roberson ____________ Secretary

Larry N. Patterson, PE ____________ Executive Director
Thomas W. Snyder ____________ Director, Construction and Engineering
Edward M. Motley, PE ____________ Lake Ralph Hall Program Manager

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Freese and Nichols, Inc.

JULY 2019

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F-2	INDEX SHEET
F-3	OVERALL LAYOUT
F-4	STA 10+00 - STA 20+00
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F-6	STA 30+00 - STA 40+00
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F-13	FLOODPLAIN STEP PLAN & SECTION VIEW
F-14	STEP POOL DETAILS
F-15	FLOODPLAIN STEP TYPICAL SECTION
F-16	TYPICAL SECTIONS
F-17	DETAILS
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F-19	DETAILS
F-20	DETAILS
F-21	VEGETATION PLAN

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LEON HURSE DAM

STREAM RESTORATION

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SEQ. .
SHEET F-2

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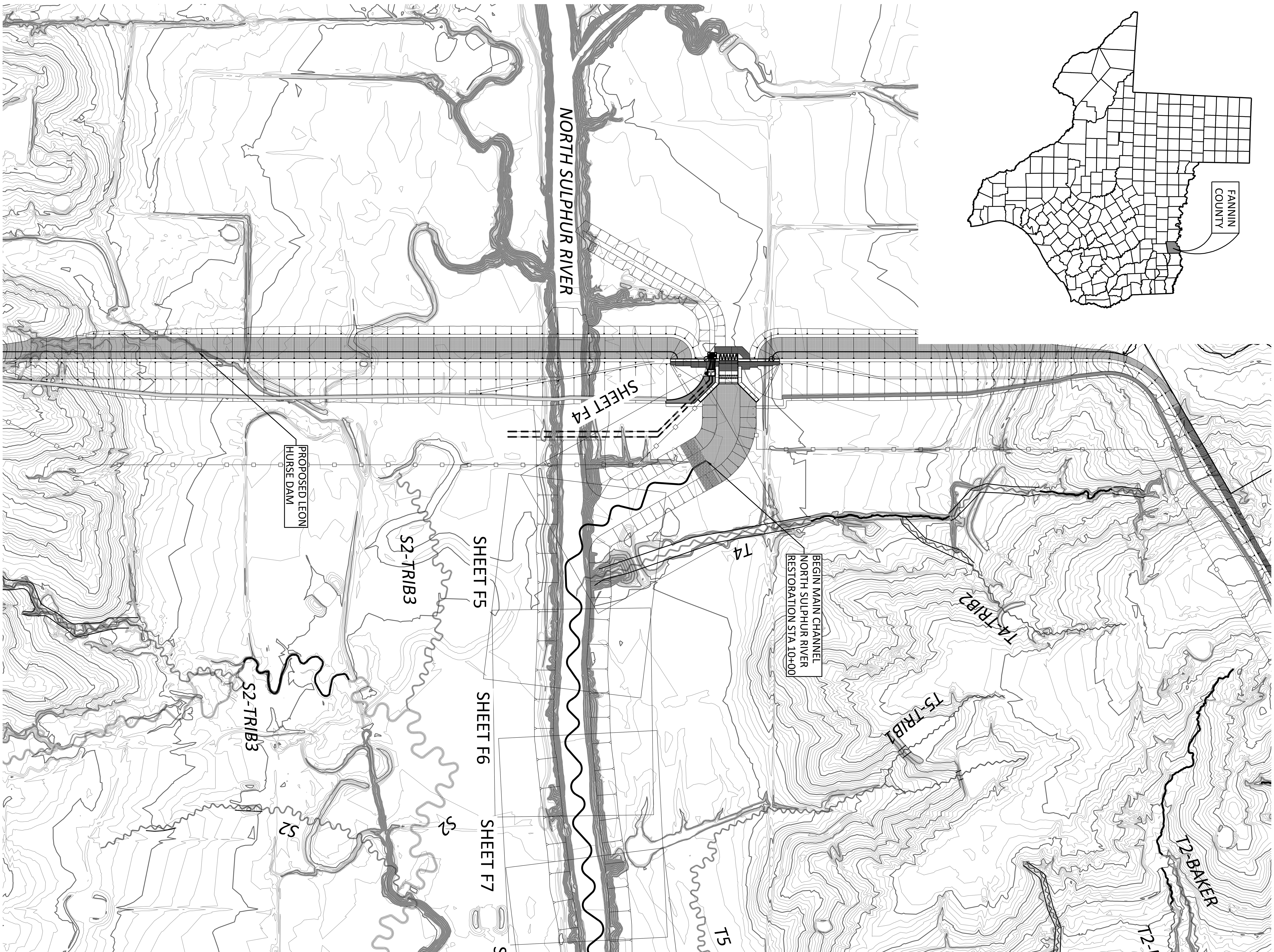

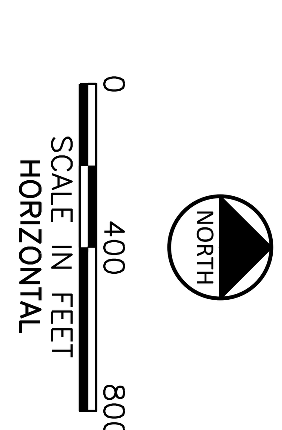

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DATE	7/18/2019
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DRAWN	EMD
REVISED	
CHECKED	ICJ
FILE NAME	STRM-CV-KEYMAP.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

OVERALL LAYOUT

FREESE NICHOLS

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SHEET F-3
SEQ. .

ACAD Rel: 23.0s (LMS Tech)
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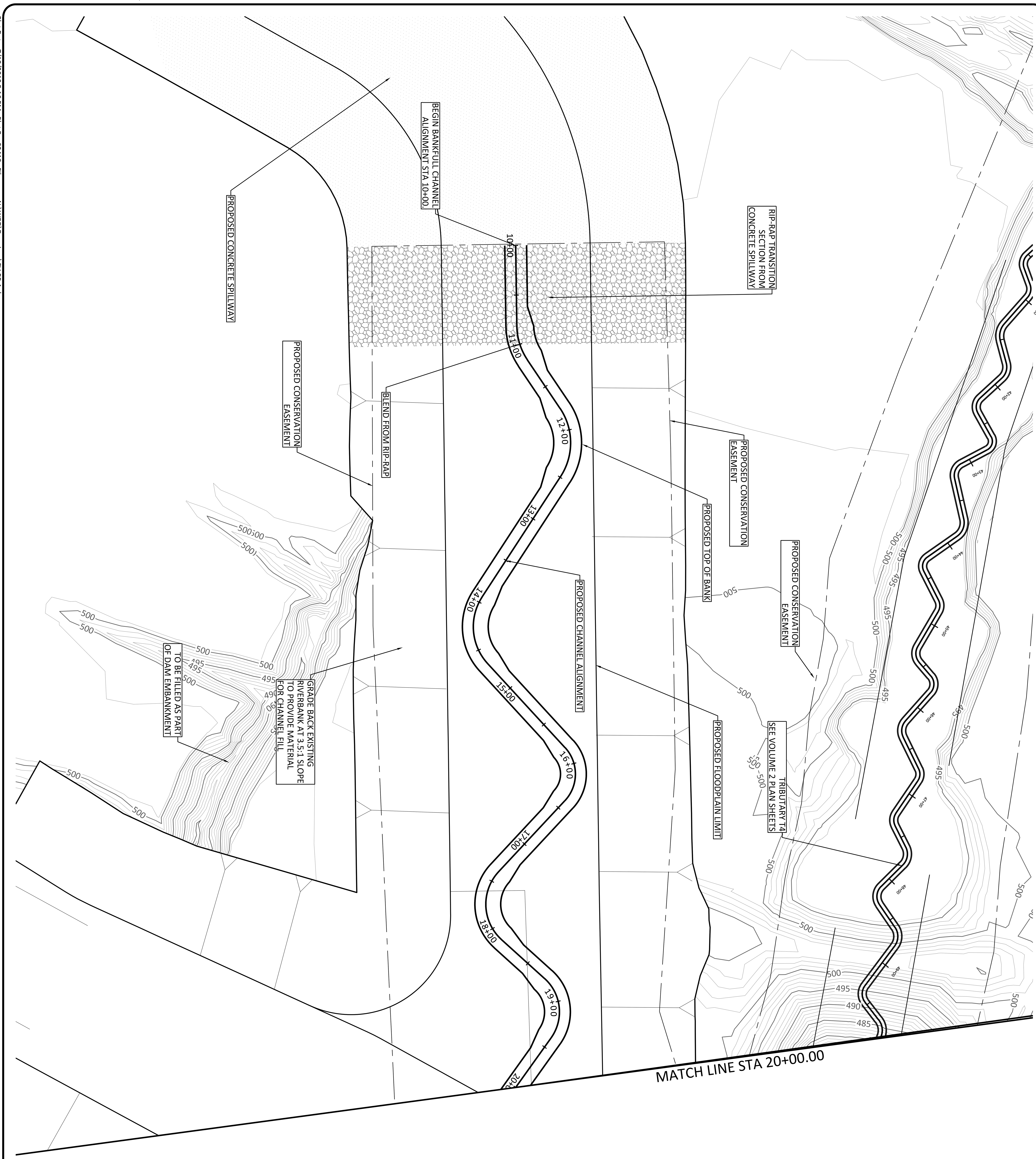
Plot Date: 7/18/2019 5:16 PM Plot By: 02418 Filename: N:\WRD\Drawings\CV-PP-1.dwg



LEGEND

- PROPOSED CHANNEL
- CONSERVATION EASEMENT
- FLOODPLAIN LIMIT
- FLOODPLAIN BLOCK
- ROCK OR LOG CROSS-VANE OR VANE
- STEP POOL
- CHANNEL PLUG

NORTH

0 50' 100'
SCALE IN FEET
HORIZONTAL

DRAFT DESIGN PLANS

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FILE NAME
CV-PP-1.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE

STA 10+00 - STA 20+00

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SHEET F-4

SEQ. .

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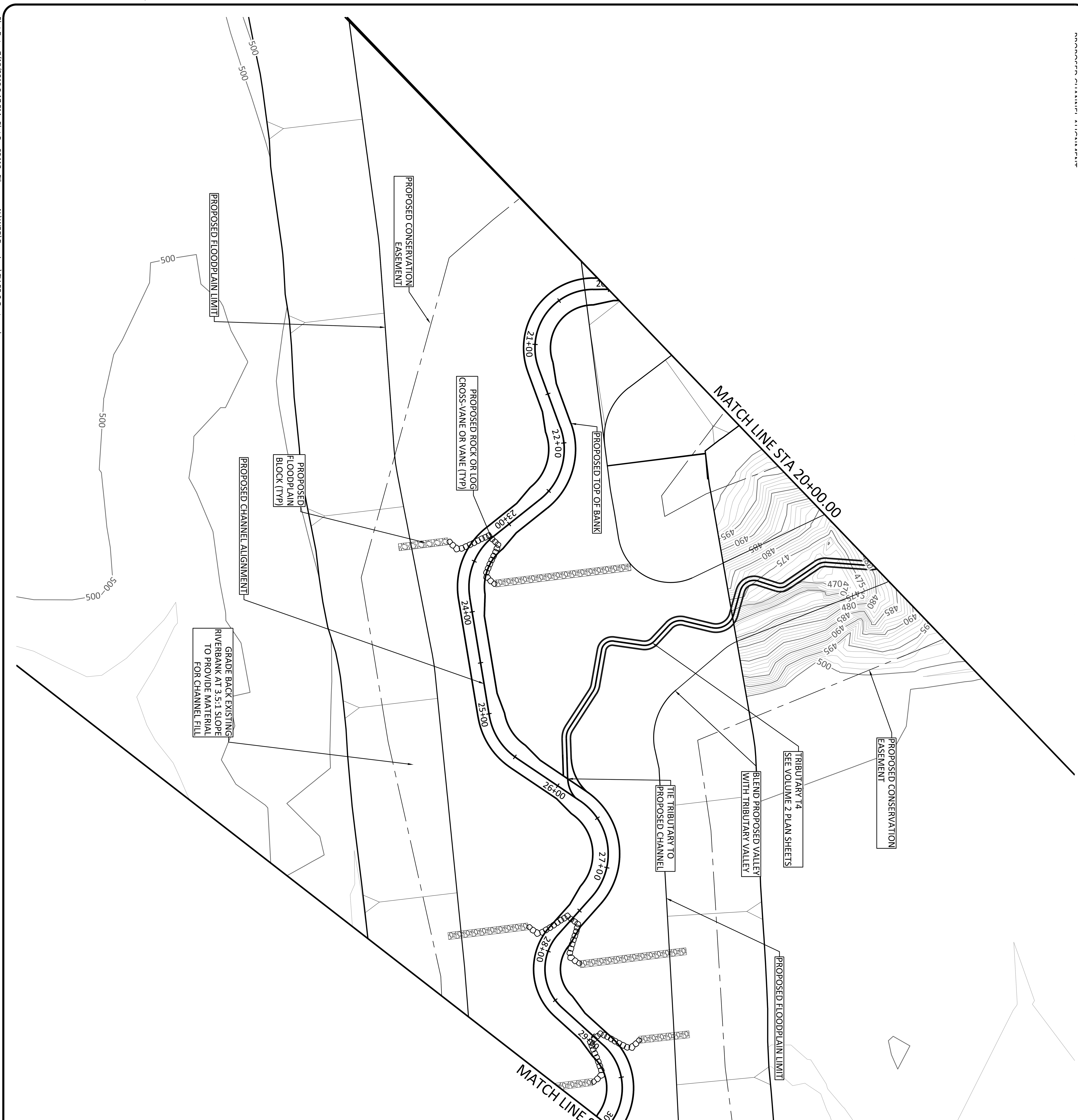

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SEQ. .

SHEET F-5

F&N JOB NO. UTR18259
DATE 7/18/2019
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REVISED
CHECKED ICJ
FILE NAME CV-PP-2-Restore.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE

STA 20+00 - STA 30+00

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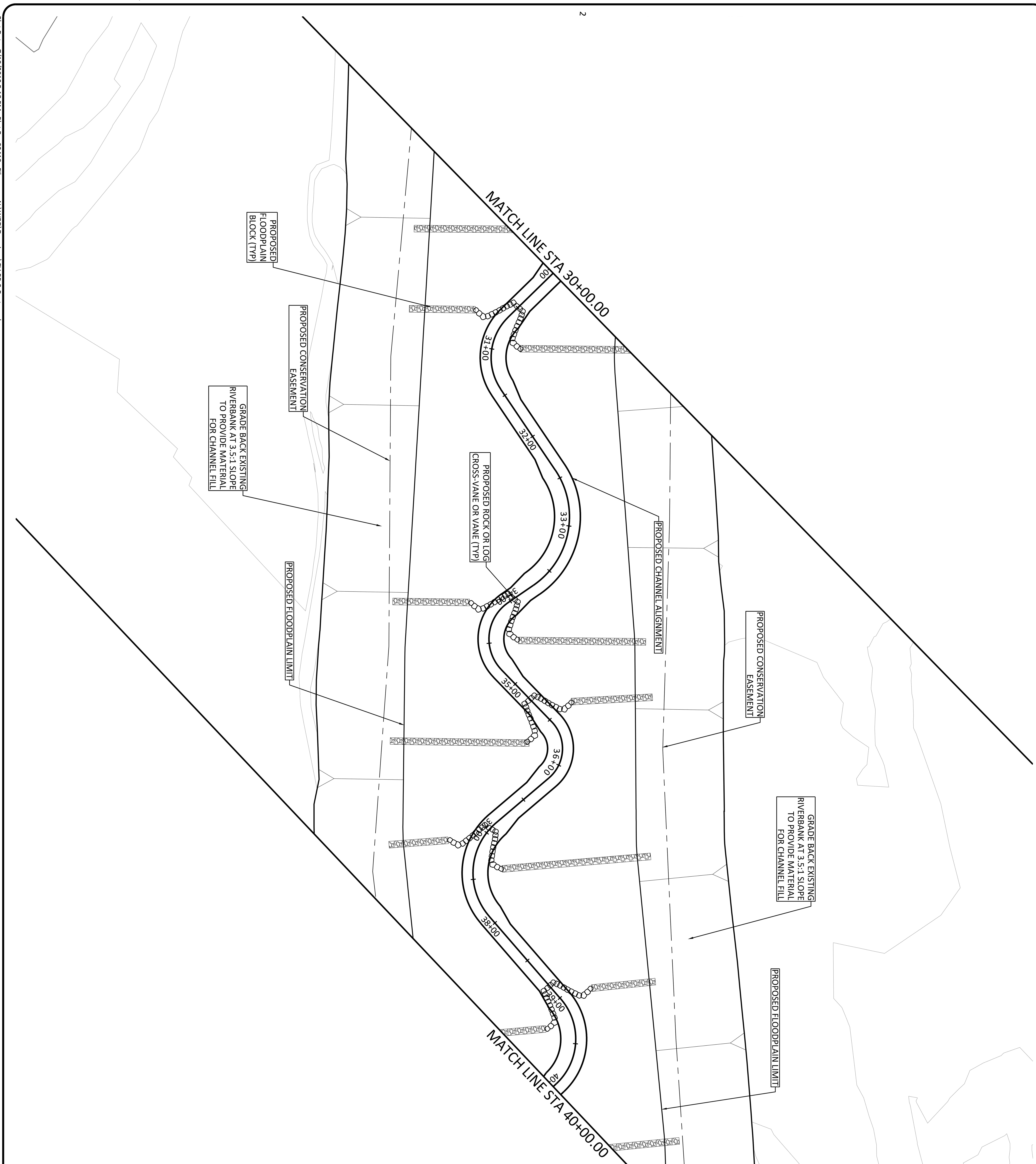

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FILE NAME CV-PP-3-Restore.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE

STA 30+00 - STA 40+00

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SHEET F-6
SEQ. .

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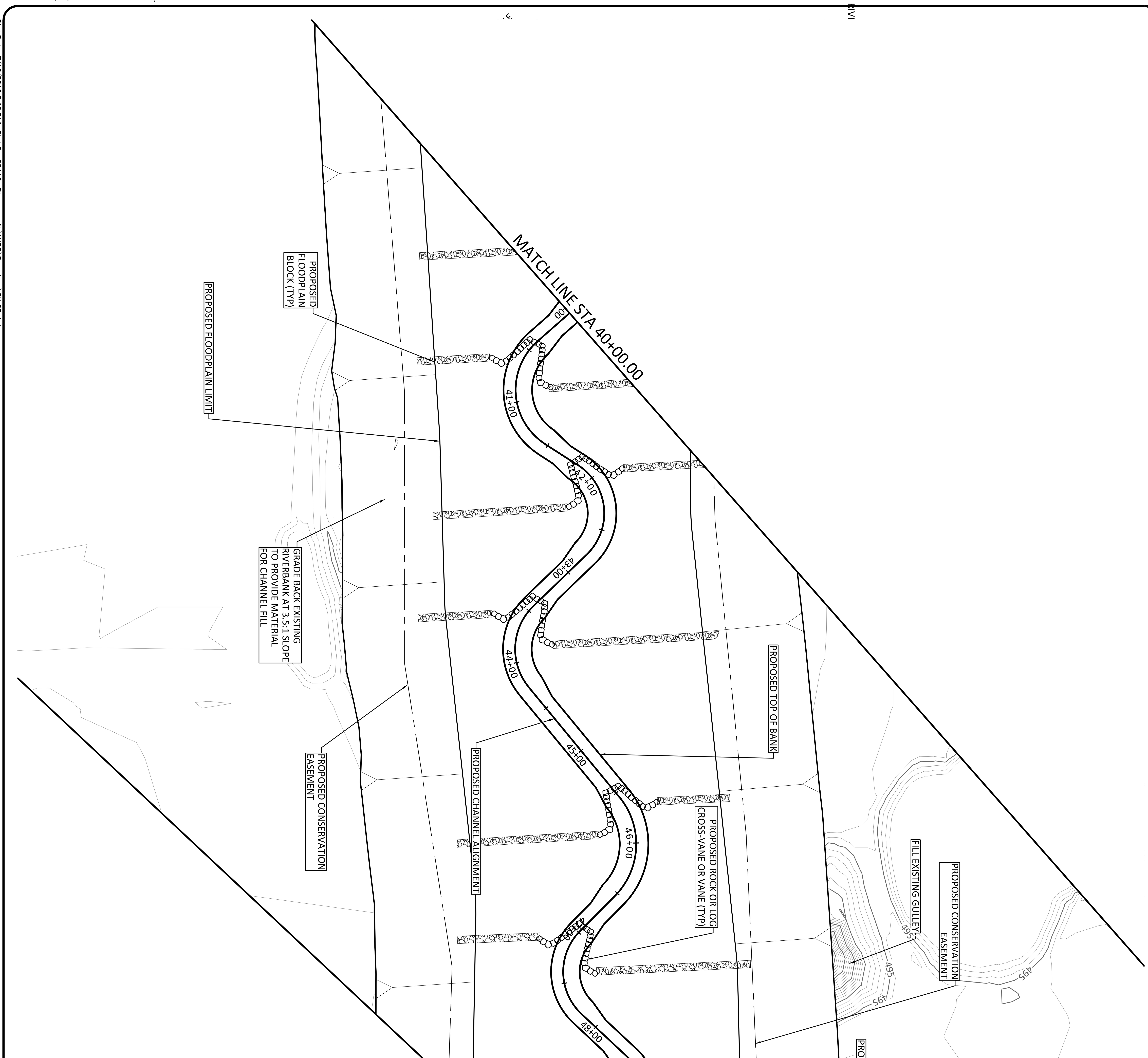

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FILE NAME CV-PP-4.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE

STA 40+00 - STA 50+00

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SHEET F-7

SEQ. .

ACAD Rel: 23.0s (LMS Tech)
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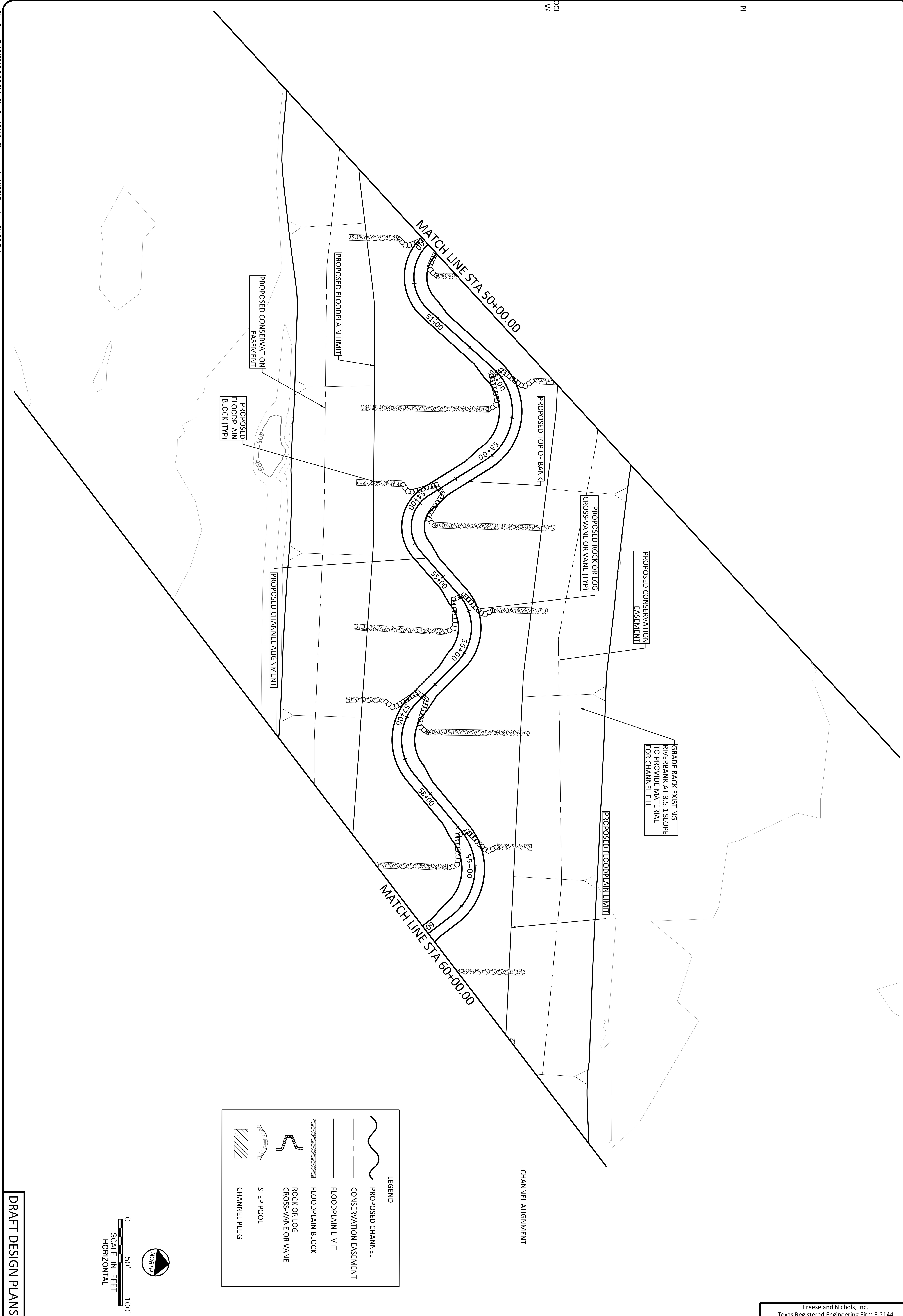

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DRAWN EMD
REVISED
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FILE NAME CV-PP-5.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION
PLAN & PROFILE
STA 50+00 - STA 60+00

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SHEET F-8
SEQ. .

ACAD Rel: 23.0s (LMS Tech)
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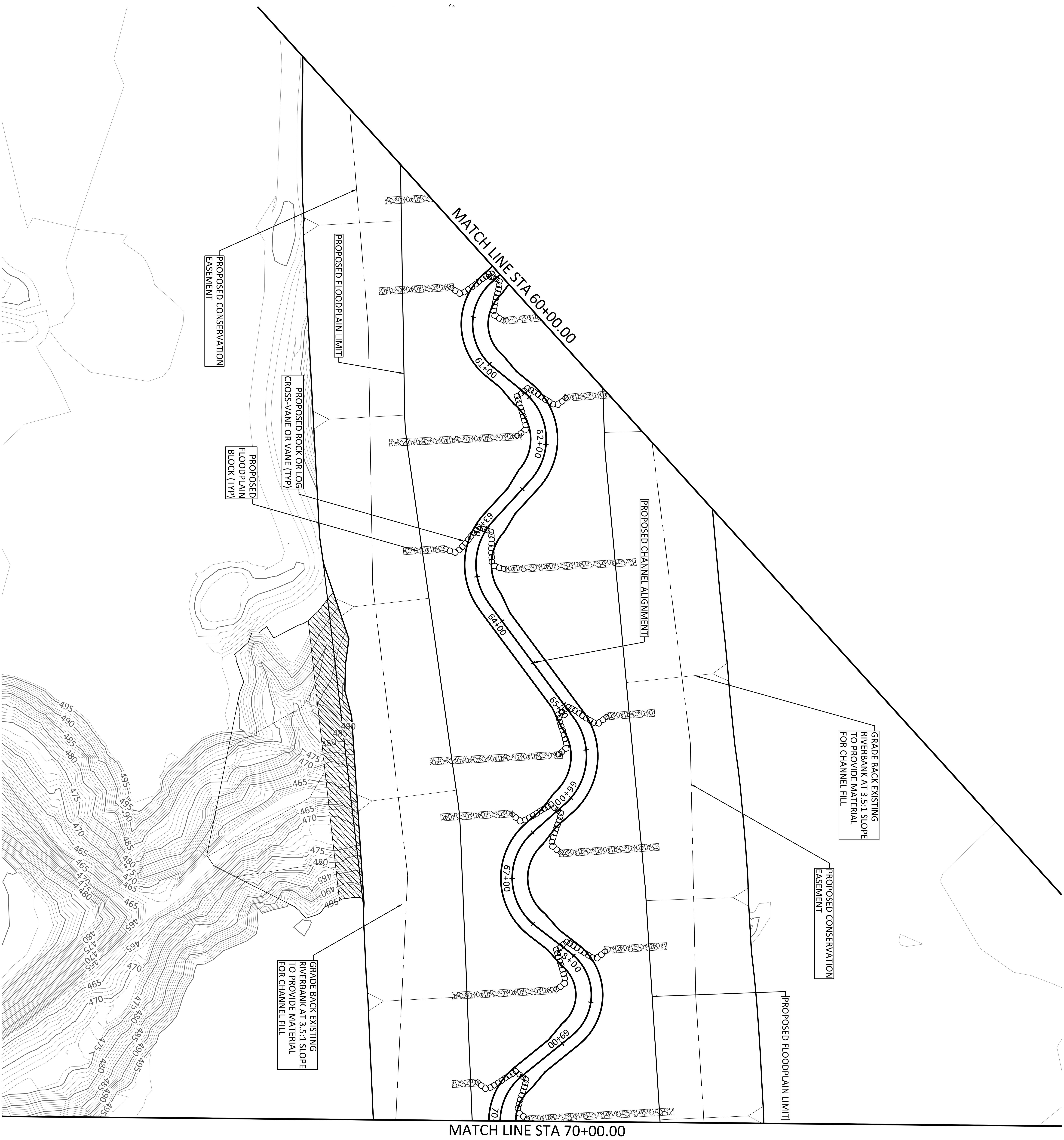
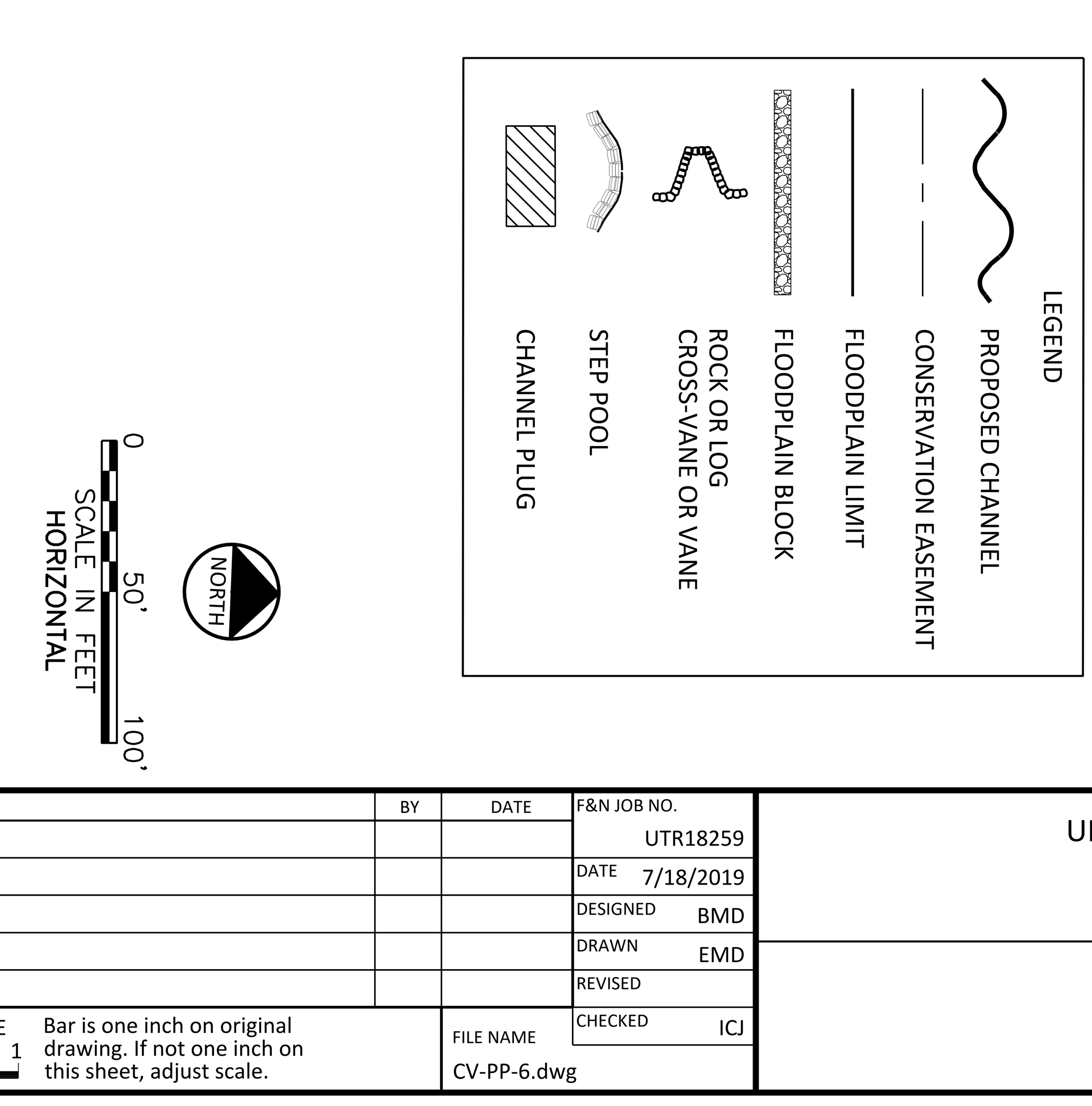


CK EXISTING
< AT 3.5:1 SLOPE
)E MATERIAL
NEL FILL



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FILE NAME CV-PP-6.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE
STA 60+00 - STA 70+00

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SHEET F-9
SEQ. .

ACAD Rel: 23.0s (LMS Tech)
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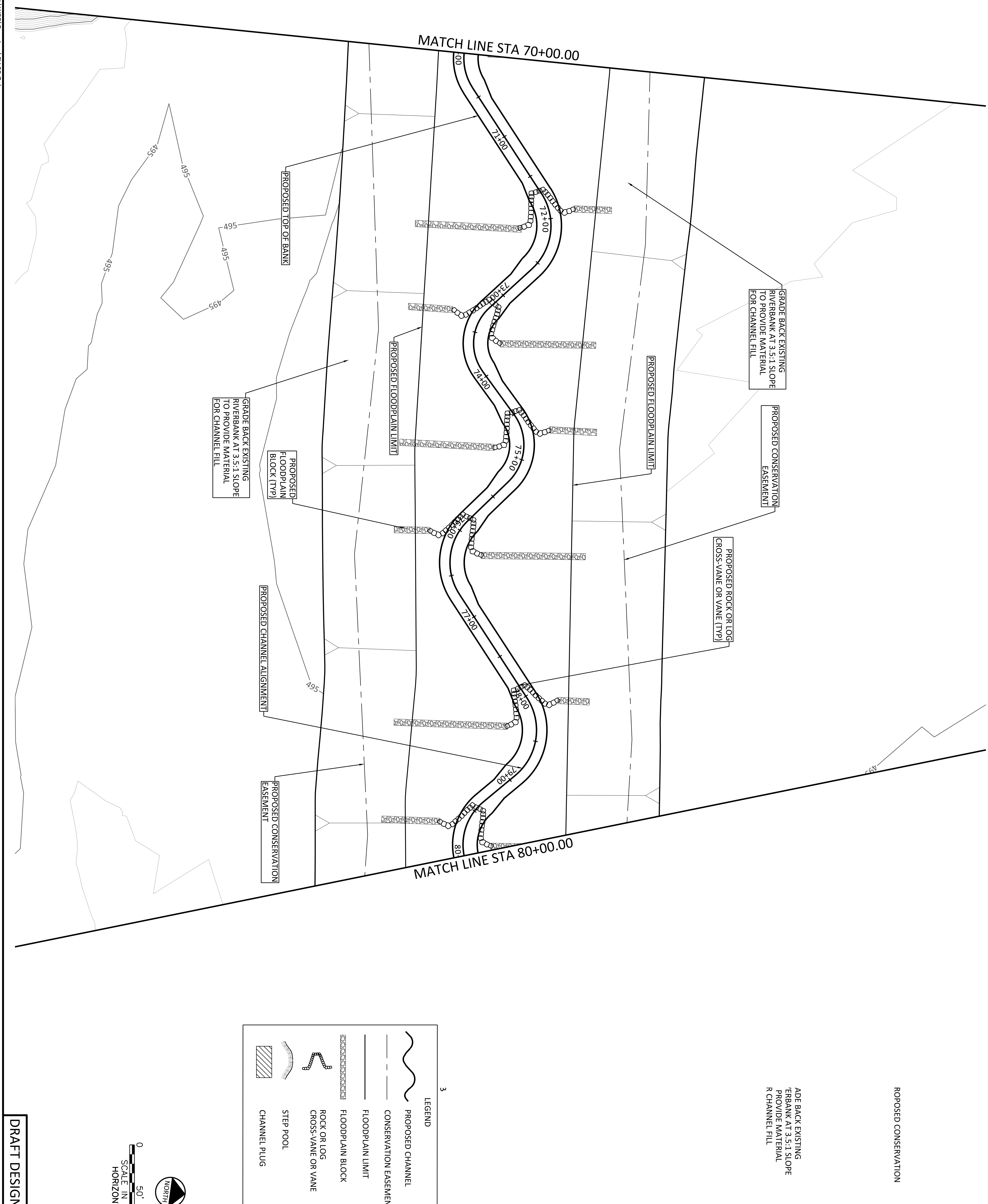

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F&N JOB NO.	UTR18259
DATE	7/18/2019
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CHECKED	ICJ
FILE NAME	CV-PP-7.dwg

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UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE

STA 70+00 - STA 80+00

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SHEET F-10

SEQ. .

ACAD Rel: 23.0s (LMS Tech)
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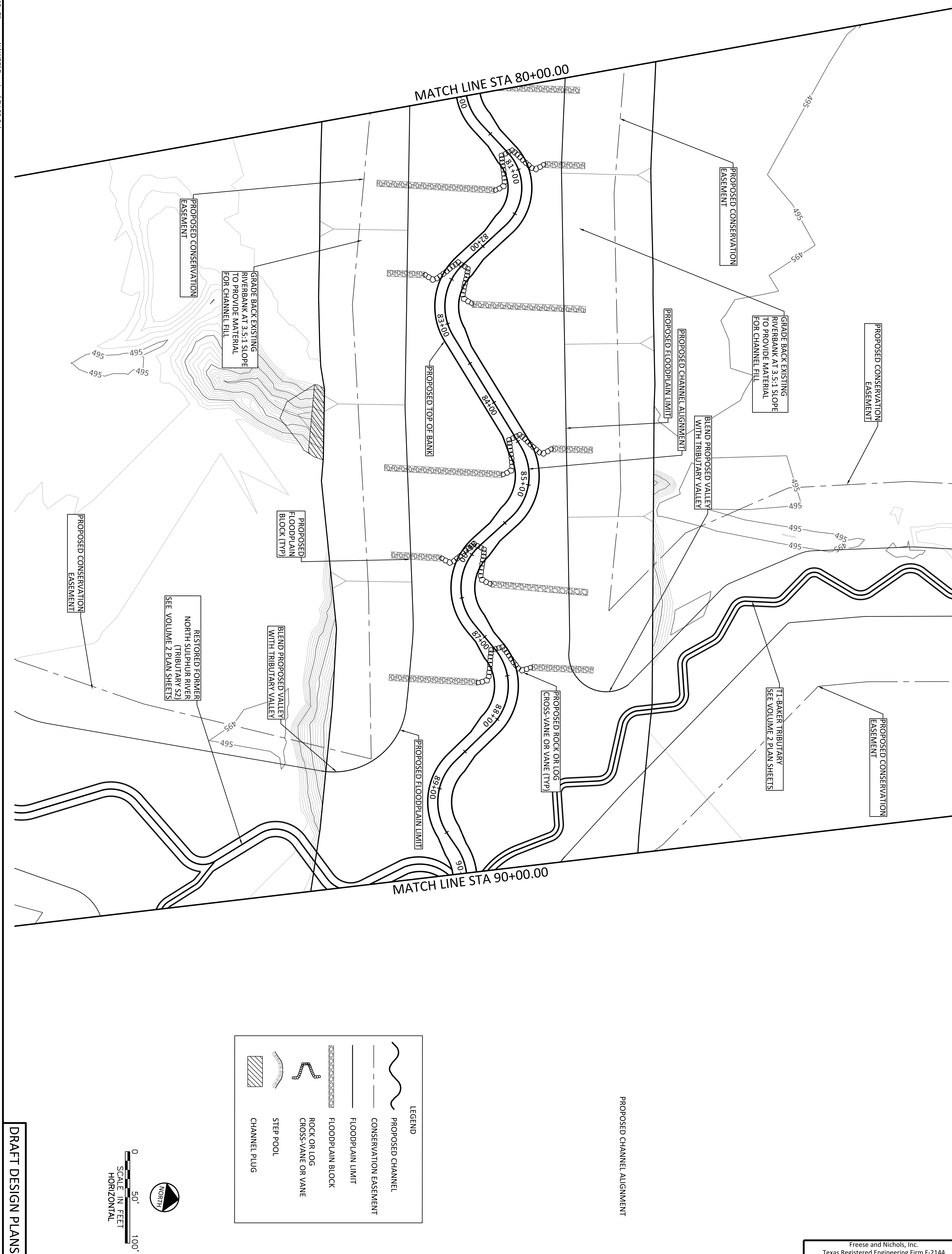

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FILE NAME CV-PP-8.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

PLAN & PROFILE

STA 80+00 - STA 90+00

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SHEET F-11
SEQ. .

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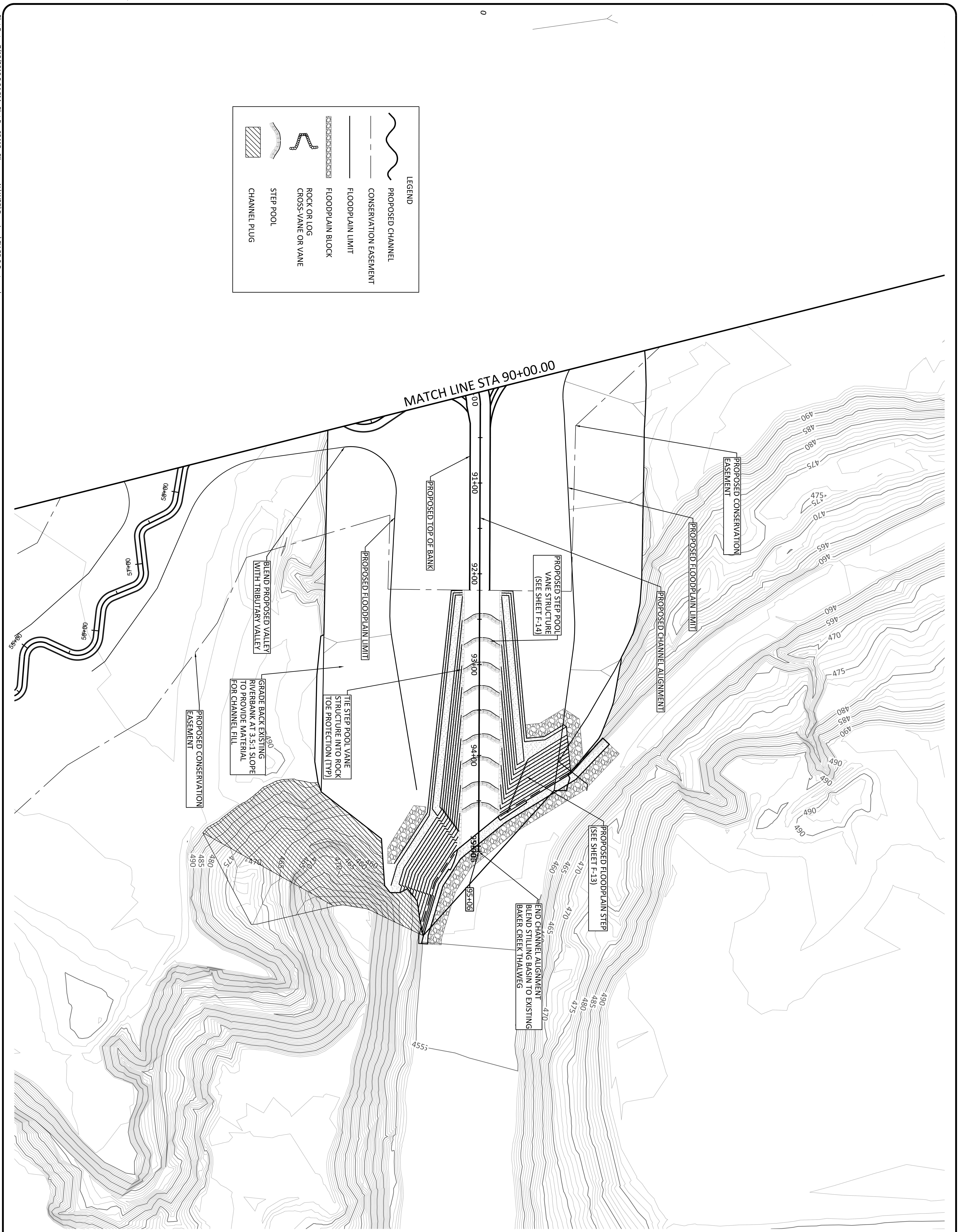

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FILE NAME CV-PP-9-Restore.dwg

VERIFY SCALE 0 1
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SHEET F-12
SEQ. .

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION
PLAN & PROFILE
STA 90+00 - STA 95+15

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Last Saved: 7/18/2019 5:13 PM Saved By: 02418

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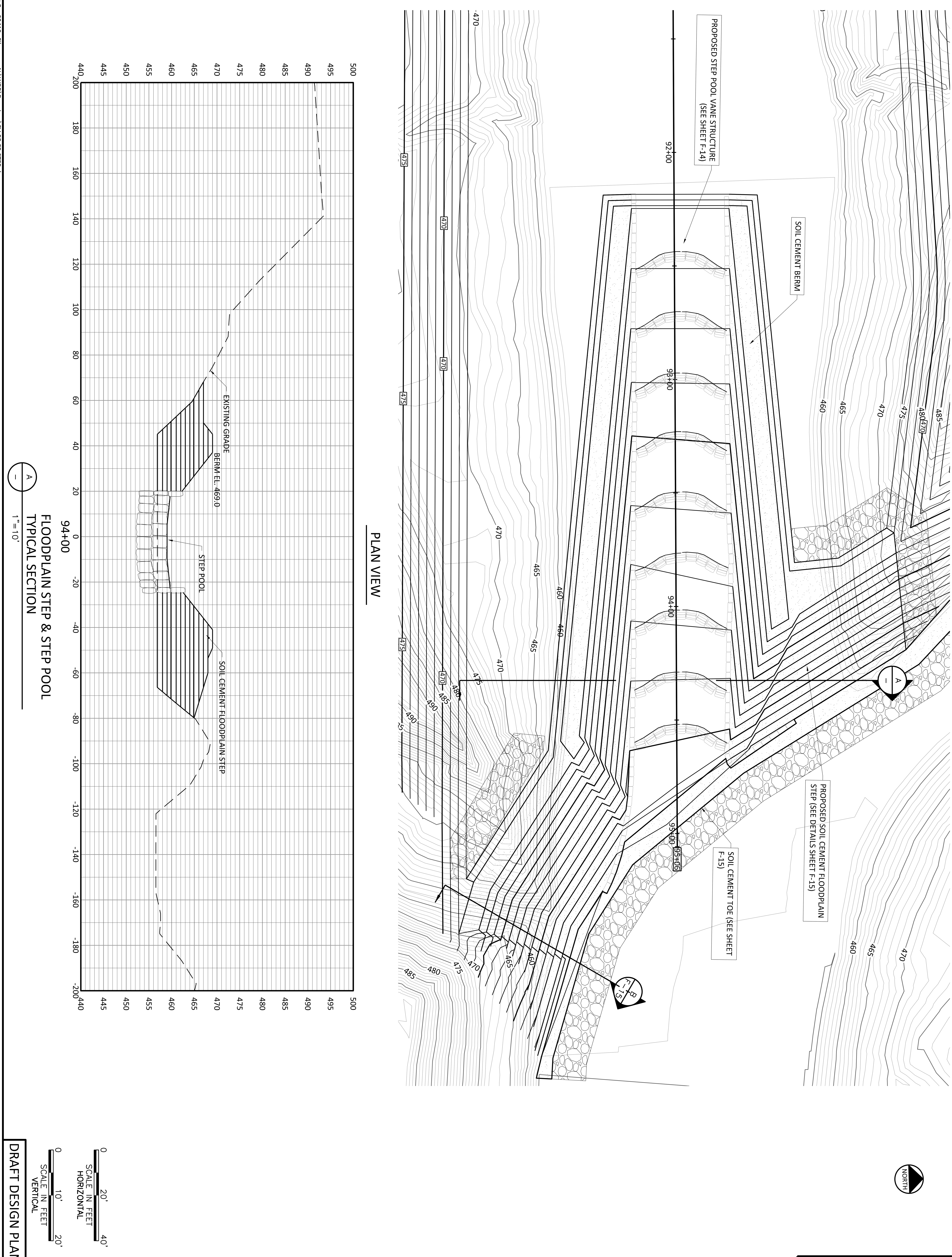

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F&N JOB NO. UTR18259
DATE 7/18/2019
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REVISED
CHECKED WEH
FILE NAME CV-PP-FP-STEP.dwg

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SHEET F-13
SEQ. .

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

FLOODPLAIN STEP
PLAN & SECTION VIEW

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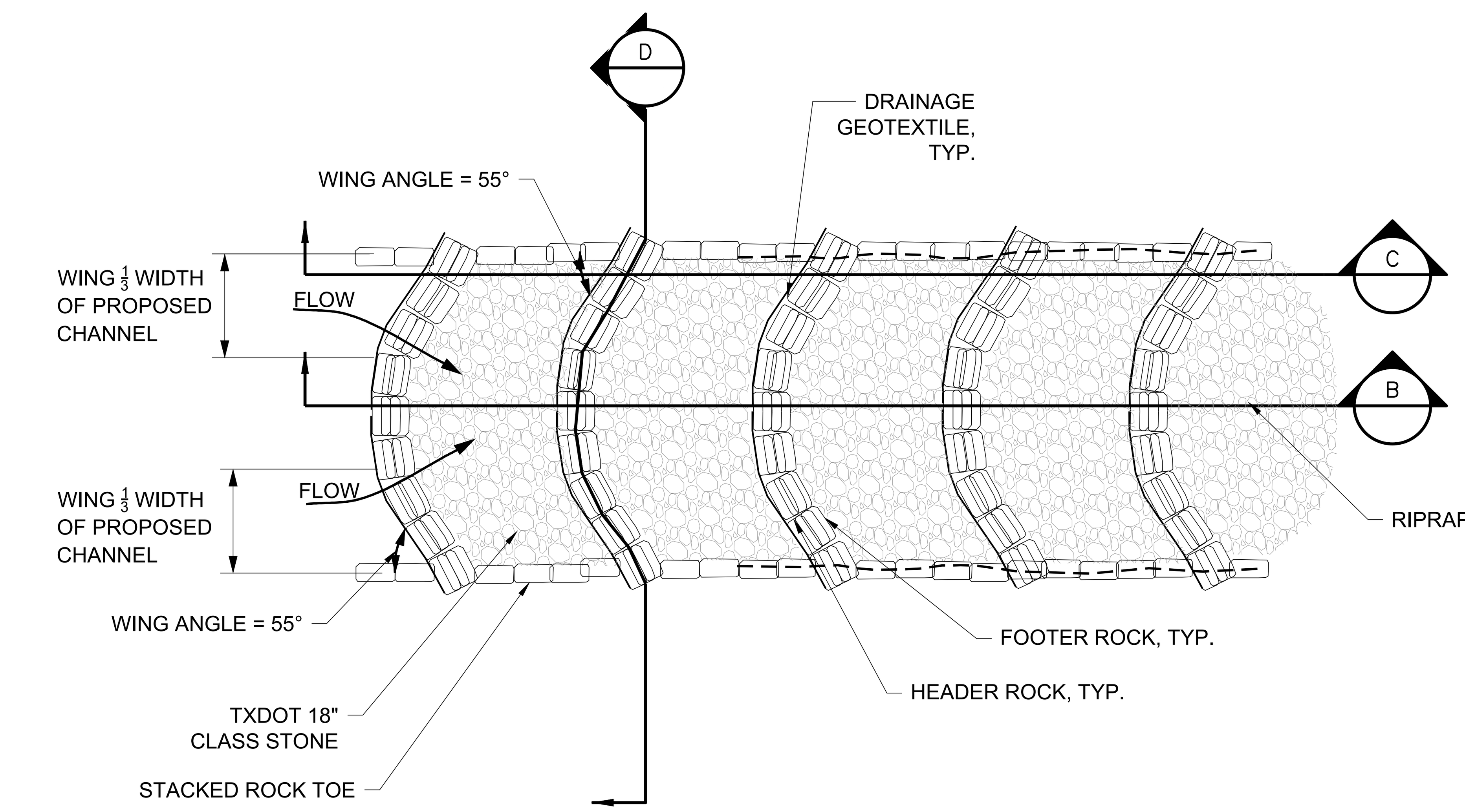
Filename: N:\WRD\Drawings\STRM-DT - JUNE SUBMITTAL.dwg
Last Saved: 7/18/2019 4:08 PM Saved By: 02418



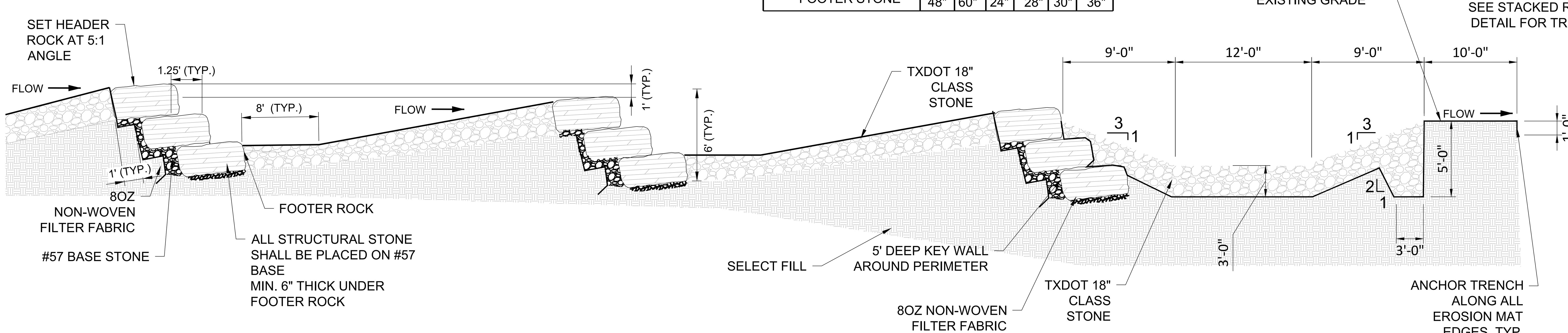
A FLOODPLAIN STEP - PLAN VIEW

NOT TO SCALE

NOTES:

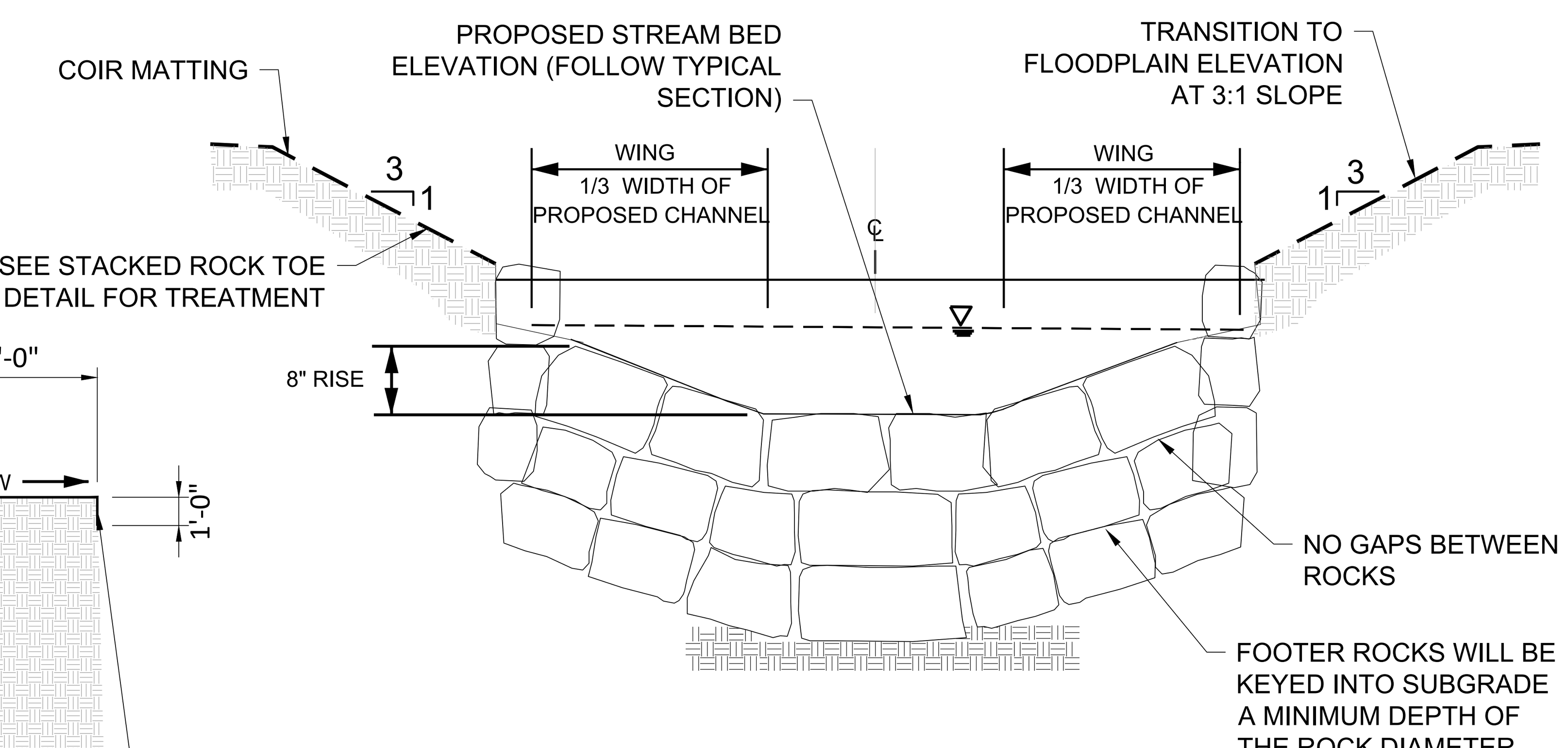
1. HEADER, FOOTER, SILL ROCKS, AND ROCK TOE SHALL BE STACKABLE.
2. SILLS SHALL BE EMBEDDED IN BANK MIN. 6'
3. STACKABLES SHALL BE INSTALLED TIGHTLY AGAINST EACH OTHER; GAPS ARE NOT ACCEPTABLE.

STACKABLES/ BOULDER SIZE CHART						
MEASUREMENT PLANE	L		H		W	
	MIN	MAX	MIN	MAX	MIN	MAX
HEADER STONE	48"	60"	24"	28"	30"	36"
FOOTER STONE	48"	60"	24"	28"	30"	36"



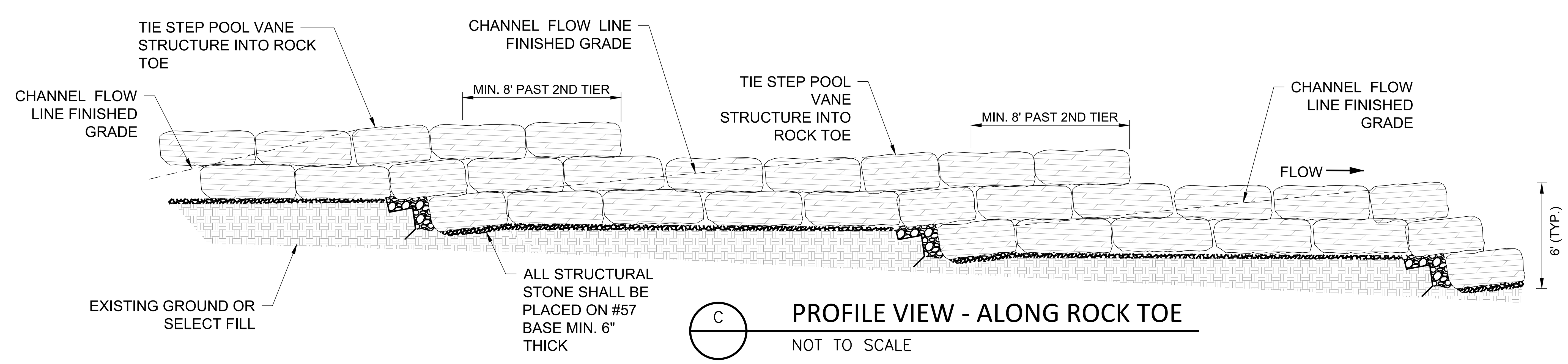
B PROFILE VIEW - ALONG CENTERLINE

NOT TO SCALE



D CROSS SECTION - LOOKING UPSTREAM

NOT TO SCALE



C PROFILE VIEW - ALONG ROCK TOE

NOT TO SCALE

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UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

STEP POOL DETAILS

NO.	ISSUE	BY	DATE	
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				DATE 7/18/2019
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SHEET F-14

SEQ. .

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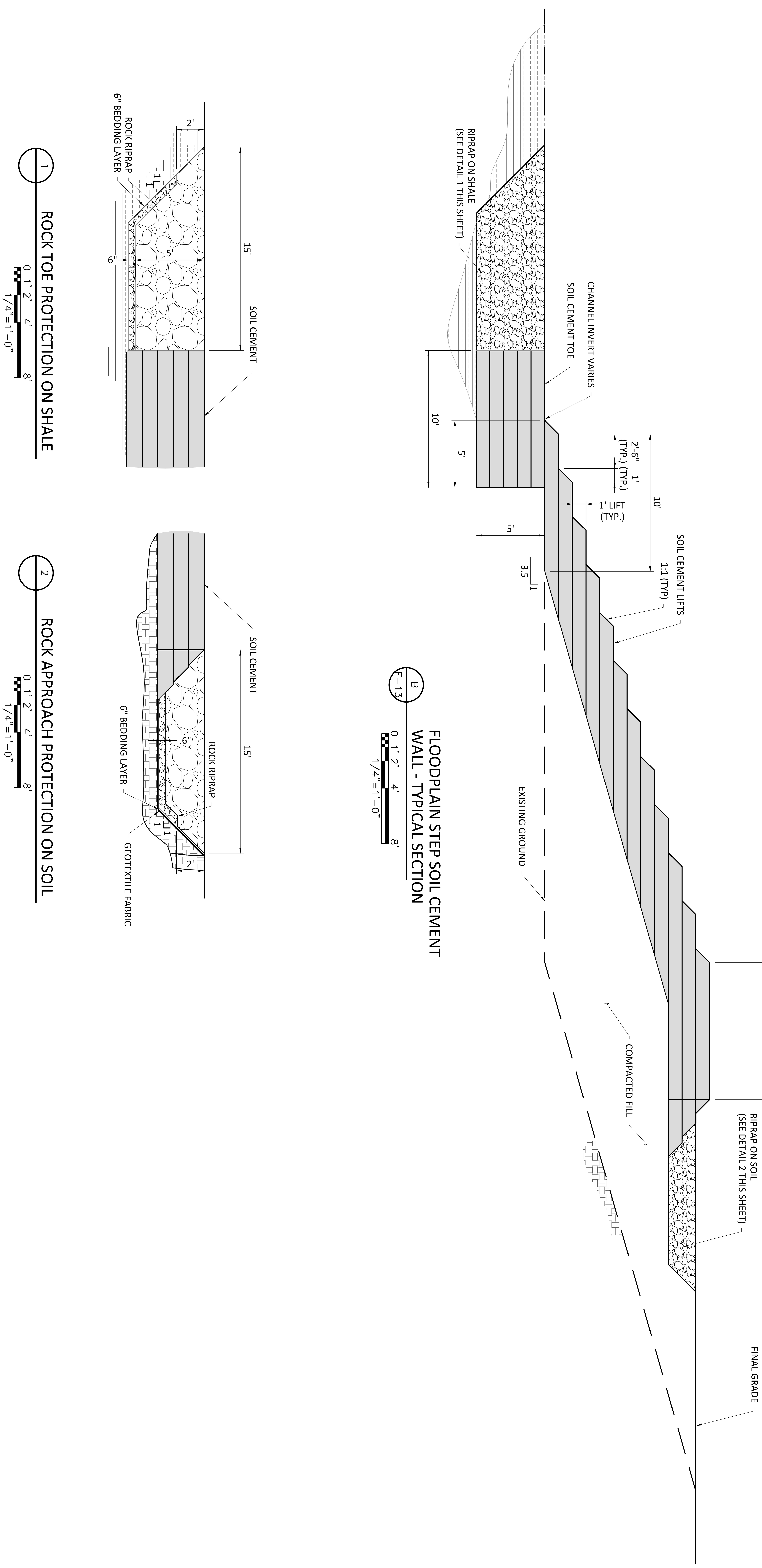
Plot Date: 7/18/2019 5:25 PM Plot By: 02418 Filename: N:\WRD\Drawings\STRM-DT - JUNE SUBMITTAL.dwg



DRAFT DESIGN PLANS

NO.	ISSUE	BY	DATE

F&N JOB NO. UTR18259
DATE 7/18/2019
DESIGNED EMD
DRAWN MPT
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FILE NAME STRM-DT - JUNE SUBMITTAL.dwg

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

FLOODPLAIN STEP TYPICAL SECTION

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SHEET F-15
SEQ. .

ACAD Rel: 23.0s (LMS Tech)
Filename: N:\WRD\Drawings\STRM-DT.dwg
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Plot Date: 7/18/2019 5:25 PM Plot By: 02418 Filename: N:\WRD\Drawings\STRM-DT.dwg

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SEQ.	SHEET F-16	NO.	ISSUE	BY	DATE	F&N JOB NO. UTR18259
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UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

TYPICAL SECTIONS

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Fort Worth, Texas 76109-4895
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Texas Registered Engineering Firm F-2144

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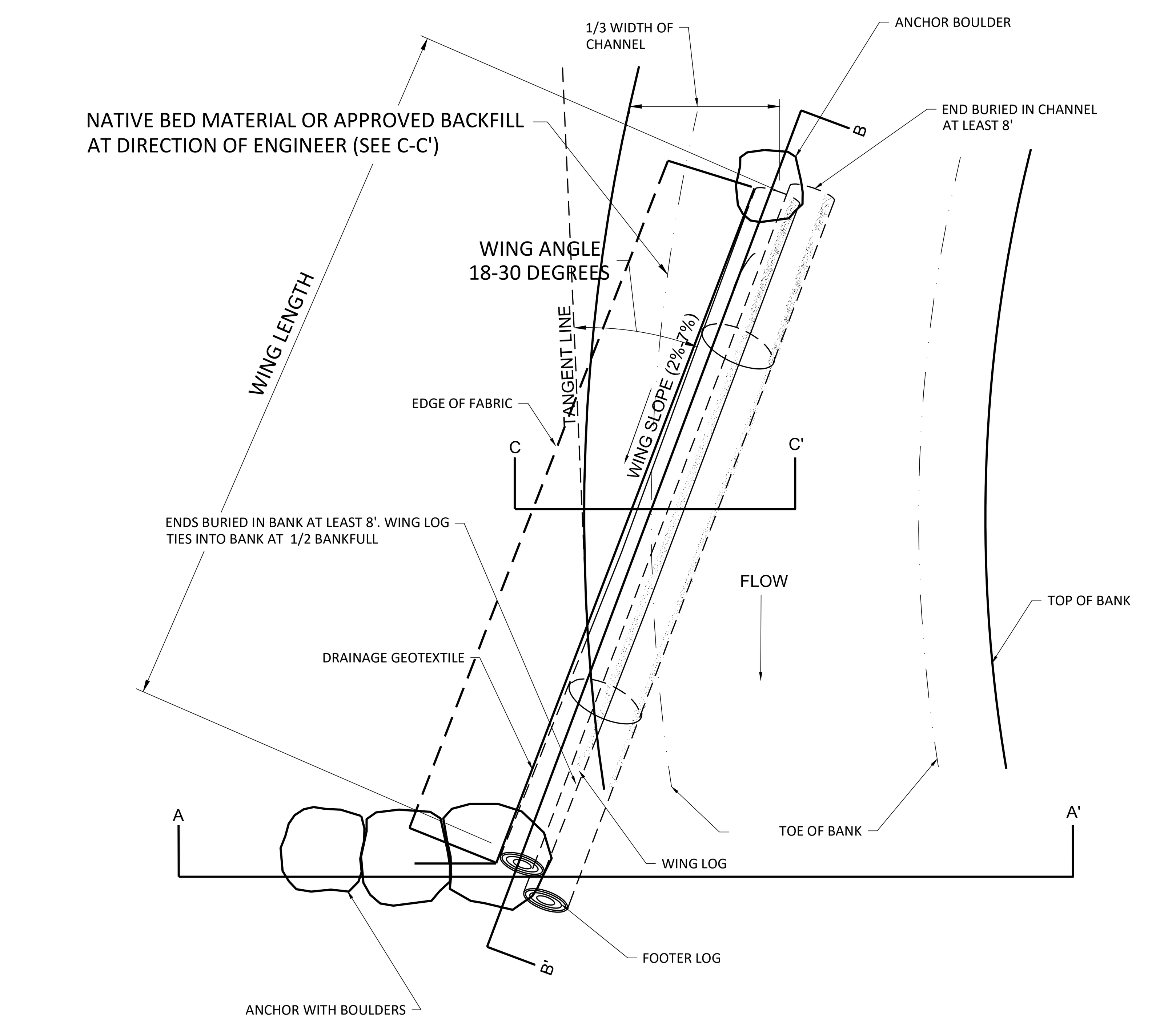
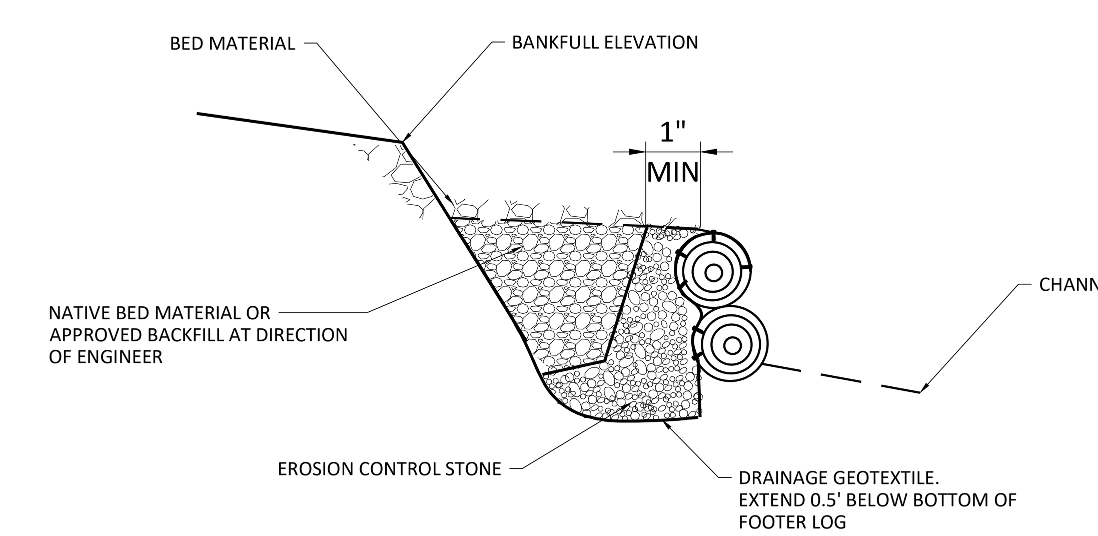
LOG VANE
SCALE: NTS



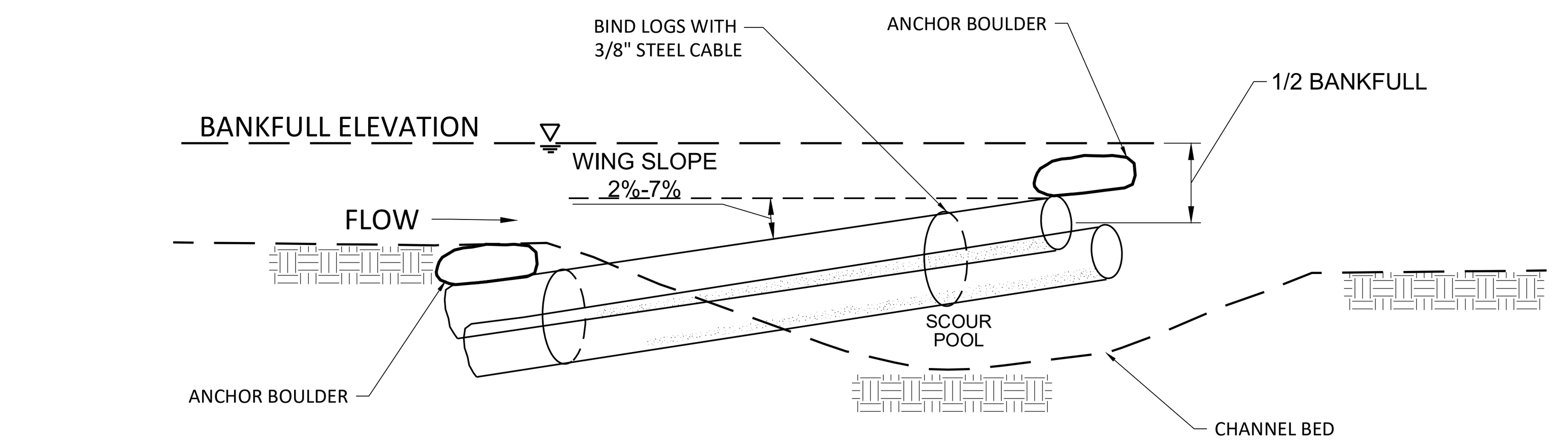
PLAN VIEW

NOTES:

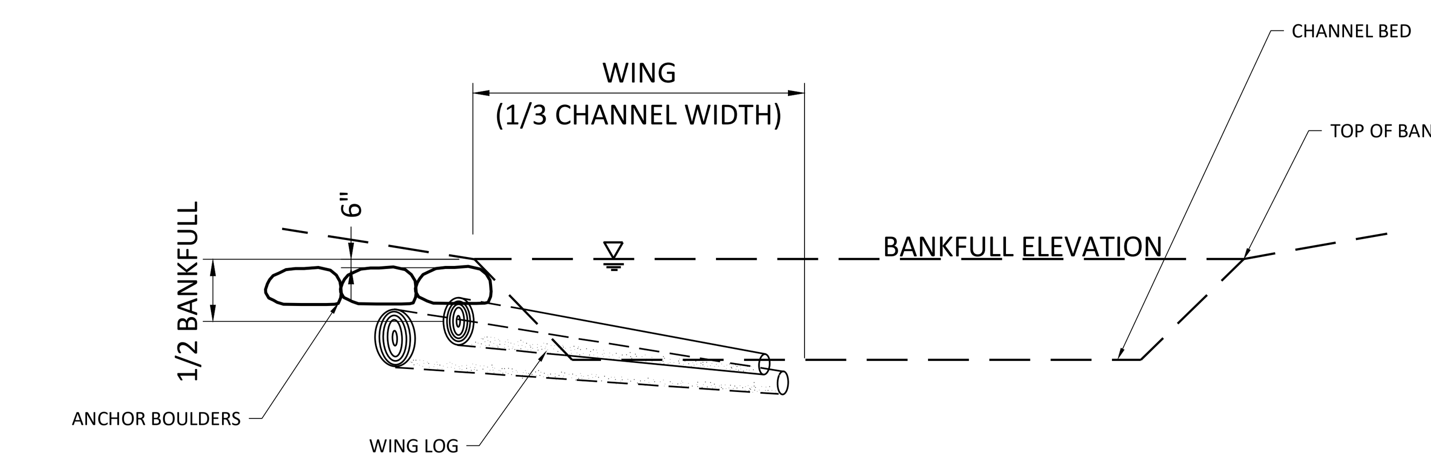
1. VANE ARMS BACKFILLED WITH NATIVE BED MATERIAL OR APPROVED BACKFILL AT DIRECTION OF ENGINEER.
2. BANKFULL CHANNEL WIDTH INDICATES THE WIDTH OF THE PROPOSED CHANNEL AT THE SPECIFIC STRUCTURE LOCATION. THIS WIDTH MAY NOT NECESSARILY BE THE SAME AS THE TYPICAL CROSS-SECTION WIDTH SHOWN IN THE DETAILS.
3. FINAL FREQUENCY OF STRUCTURES TO BE EQUAL TO OR LESS THAN THAT SHOWN ON PRELIMINARY DESIGN.



SECTION C-C'

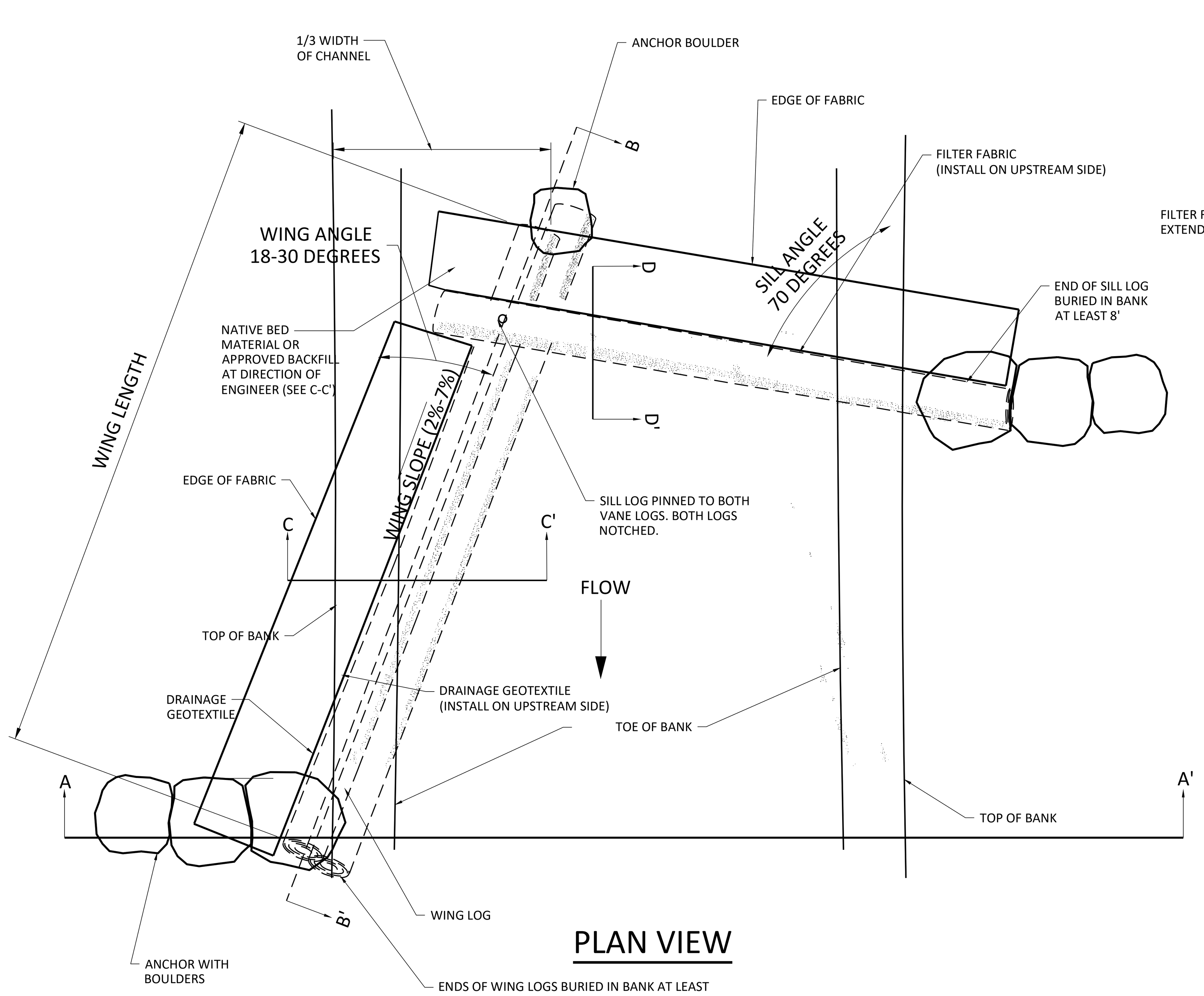


SECTION B-B' (PROFILE VIEW)

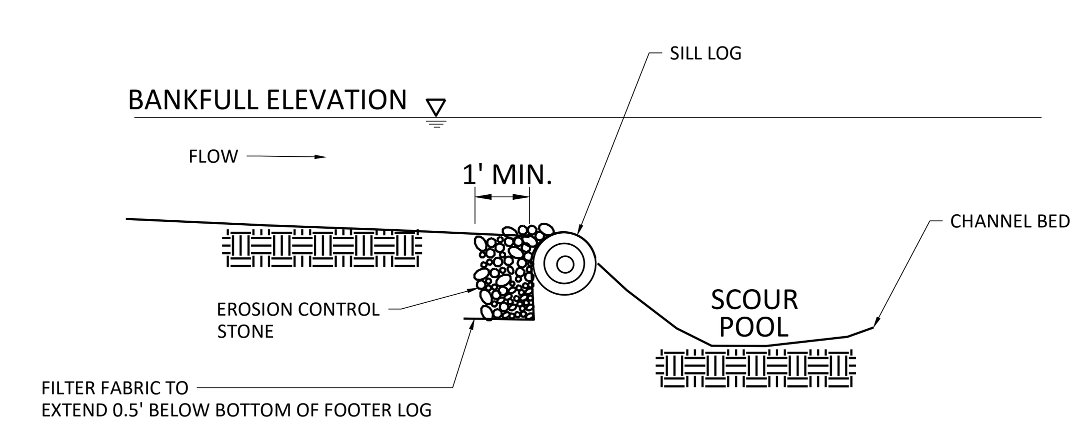


SECTION A'-A (UPSTREAM VIEW)

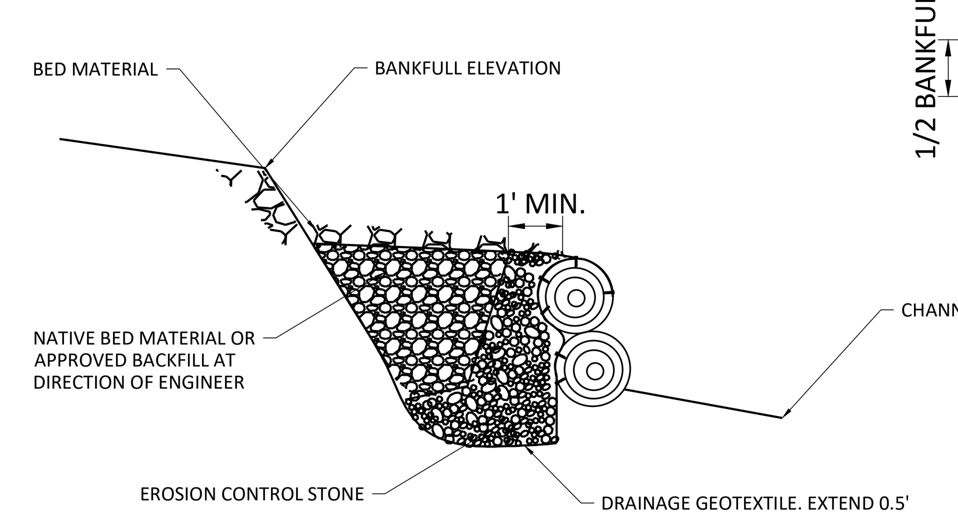
LOG GRADE CONTROL VANE
SCALE: NTS



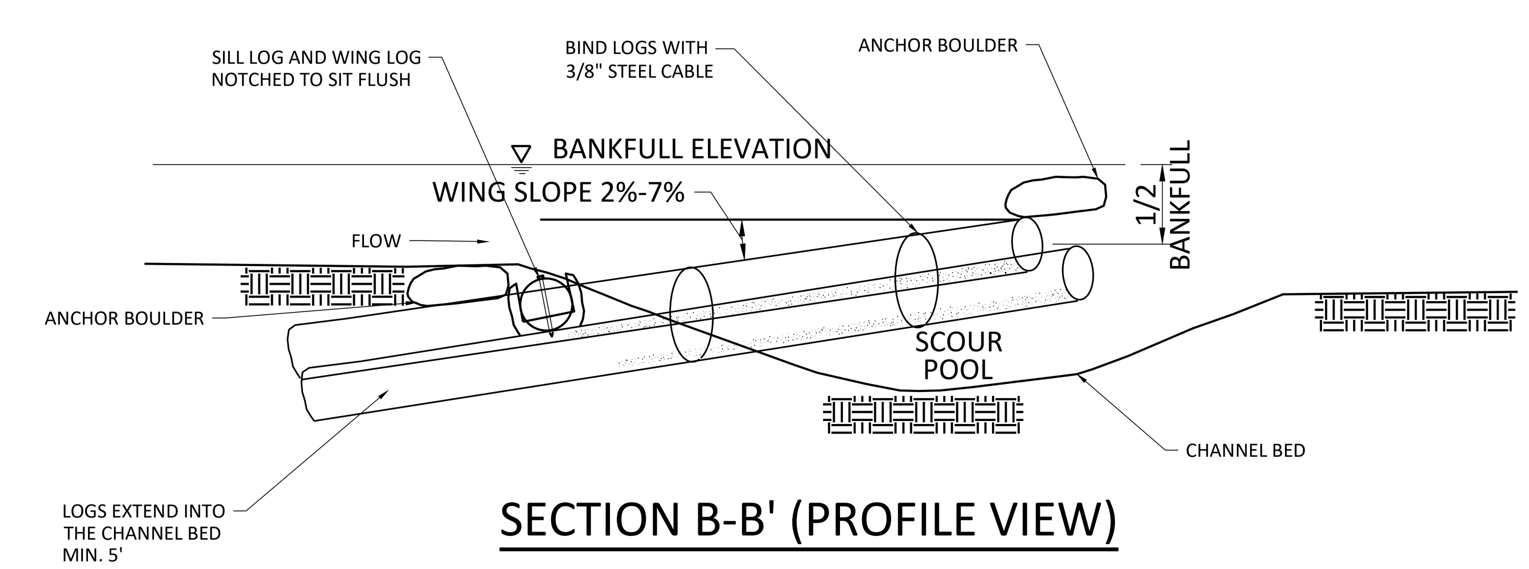
PLAN VIEW



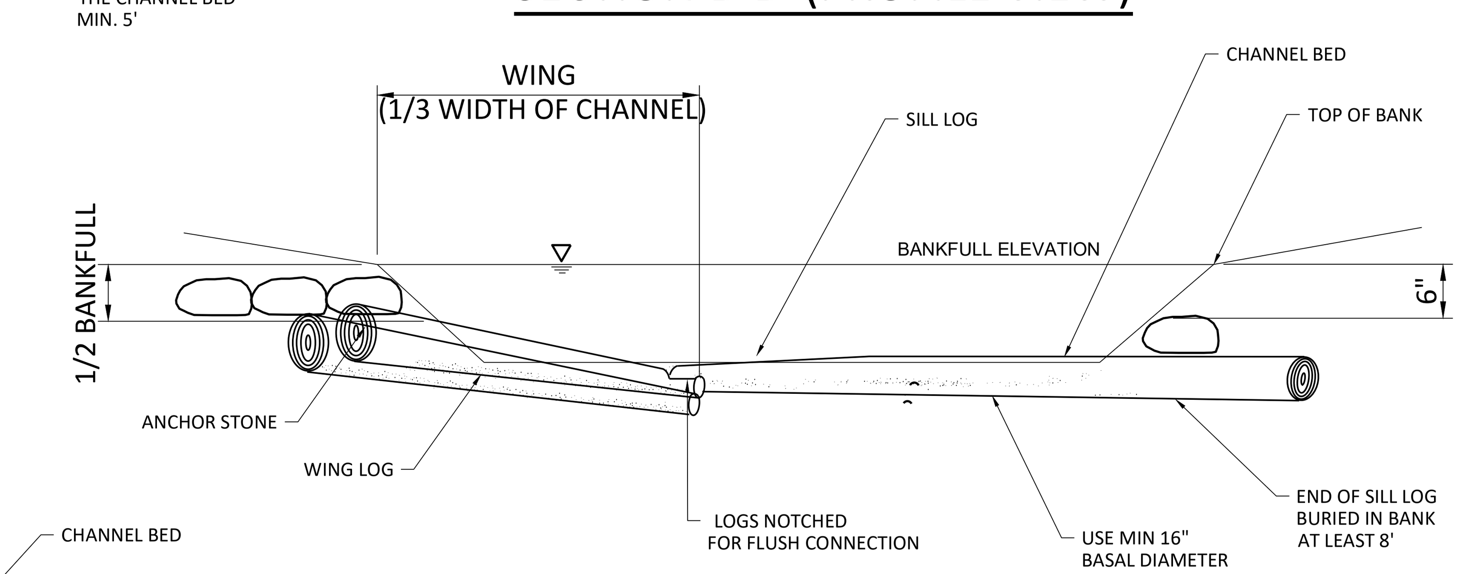
SECTION D-D'



SECTION C-C'



SECTION B-B' (PROFILE VIEW)



SECTION A'-A (UPSTREAM VIEW)

NOTES:

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2. BANKFULL CHANNEL WIDTH INDICATES THE WIDTH OF THE PROPOSED CHANNEL AT THE SPECIFIC STRUCTURE LOCATION. THIS WIDTH MAY NOT NECESSARILY BE THE SAME AS THE TYPICAL CROSS-SECTION WIDTH SHOWN IN THE DETAILS.

DRAFT DESIGN PLANS

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

DETAILS

Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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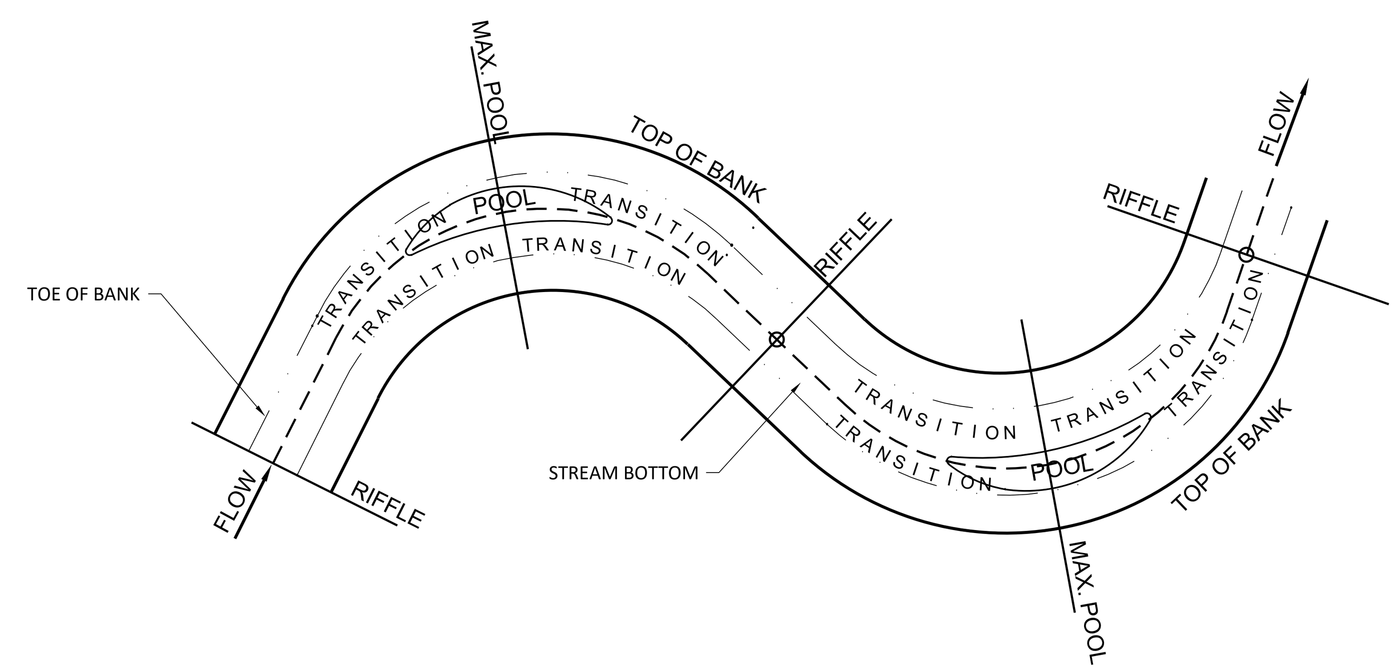
NOTES:

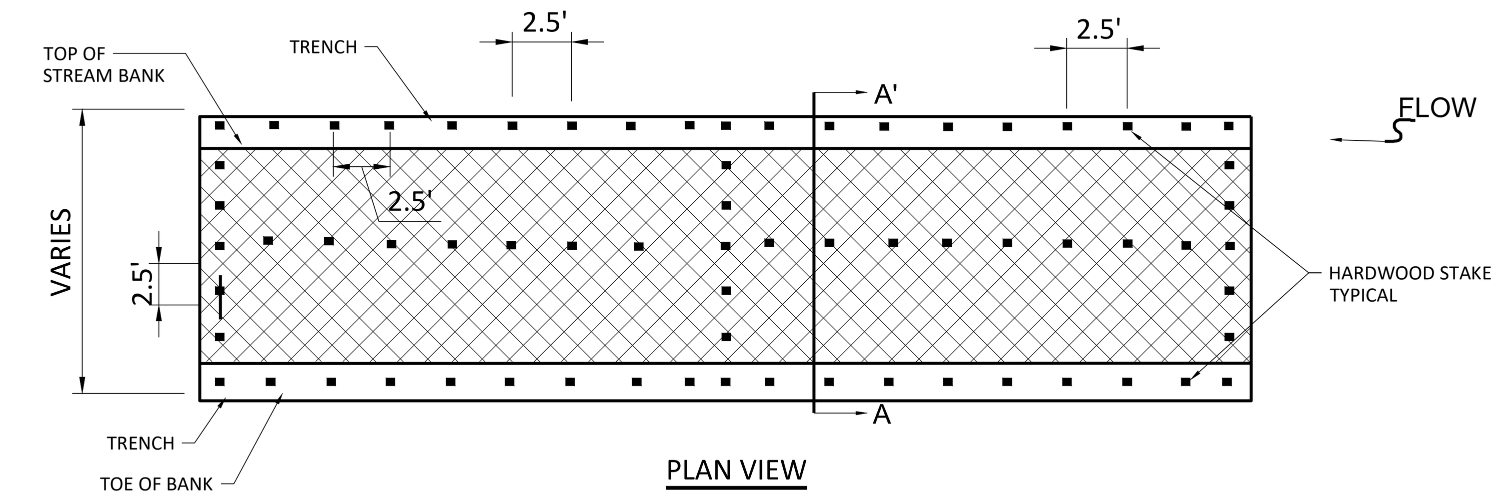
1. AREAS IN BETWEEN LABELED FEATURES ARE TRANSITION AREAS.
2. SEE PROPOSED GRADING



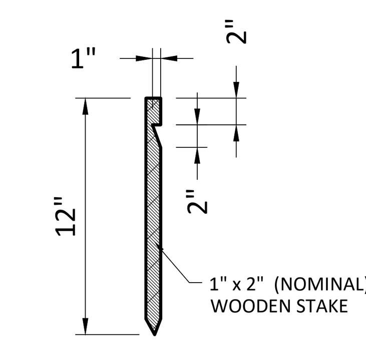
CROSS SECTION TRANSITION LOCATIONS
SCALE: NTS

NOTES:

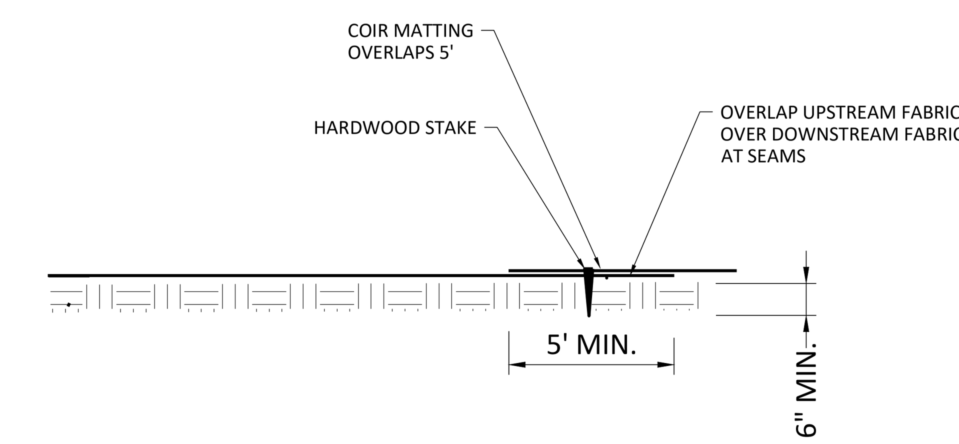
1. MAXIMUM SINGLE LENGTH OF MATTING/MESH IS 100'.
2. TOP AND BOTTOM EDGES OF MATTING/MESH SHALL BE KEYED IN.
3. COIR MATTING DETAIL SHOWN IS FOR PERMANENT INSTALLATION. TEMPORARY INSTALLATION FOR EROSION CONTROL PROTECTION AS STIPULATED SHALL BE TO THE EXTENT THAT THE PROJECT SITE NEEDS TO BE PROTECTED FOR EROSION AND SEDIMENT CONTROL DURING NON-WORKING HOURS.

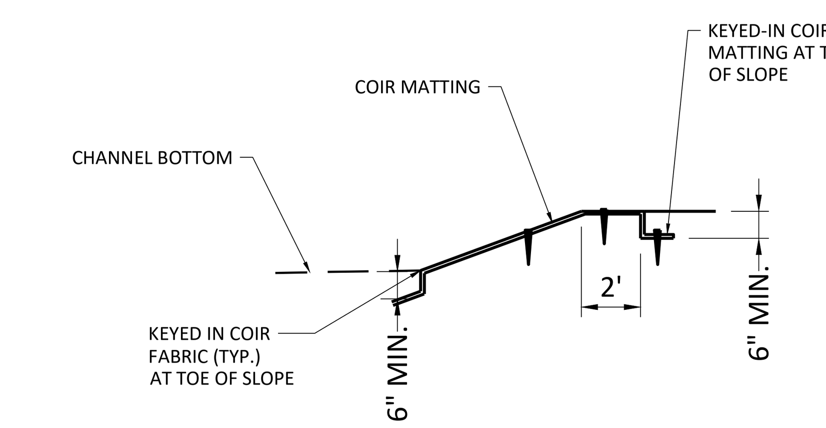


PLAN VIEW



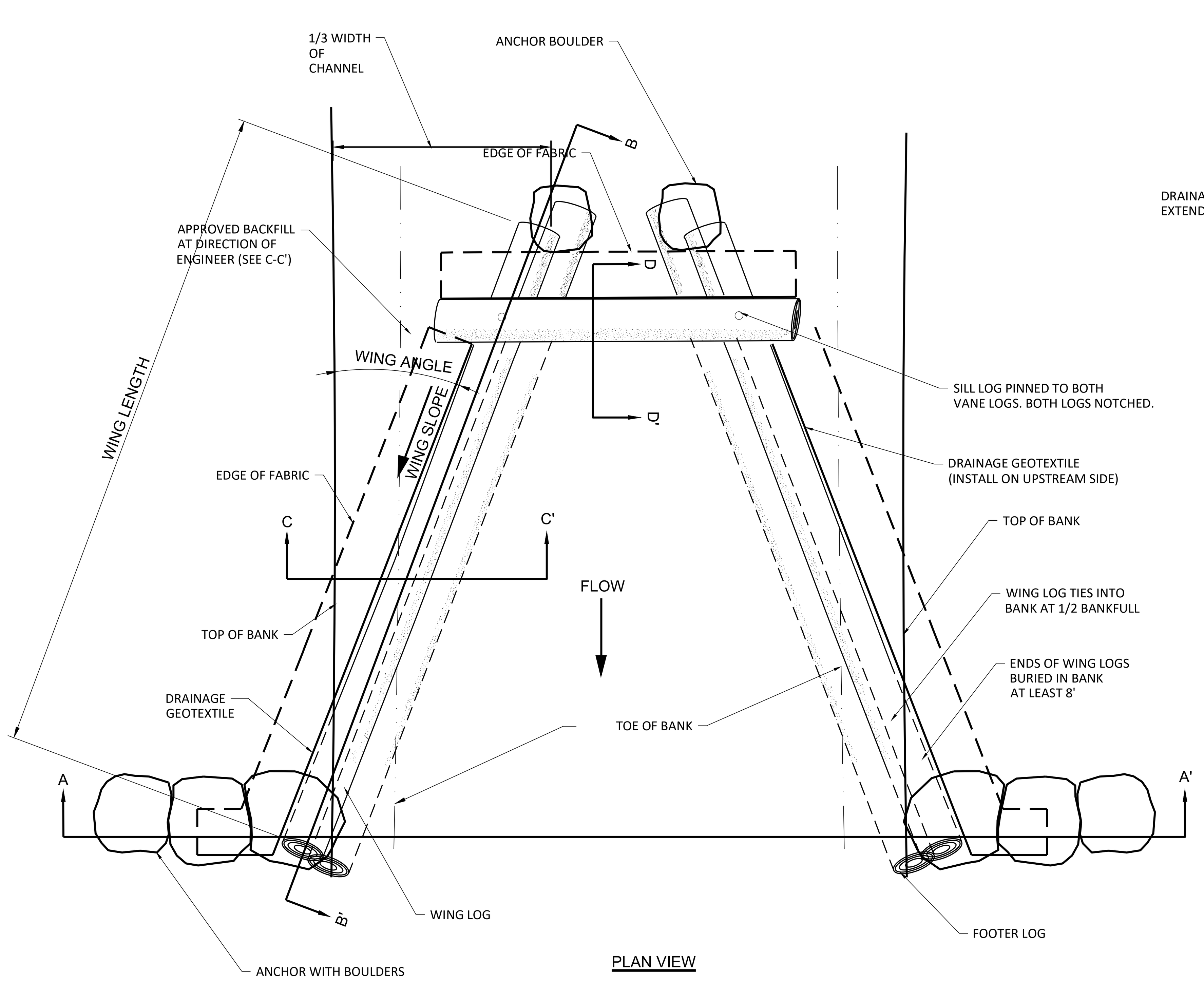
STAKE DETAIL



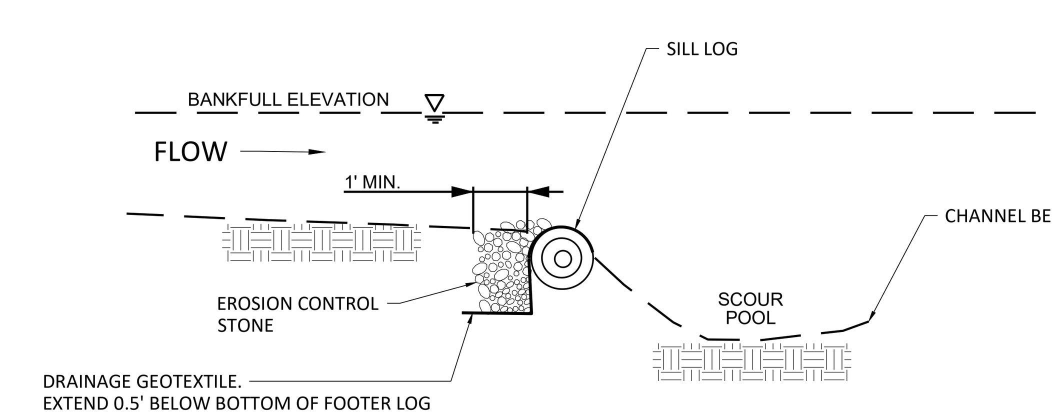


SECTION A-A'

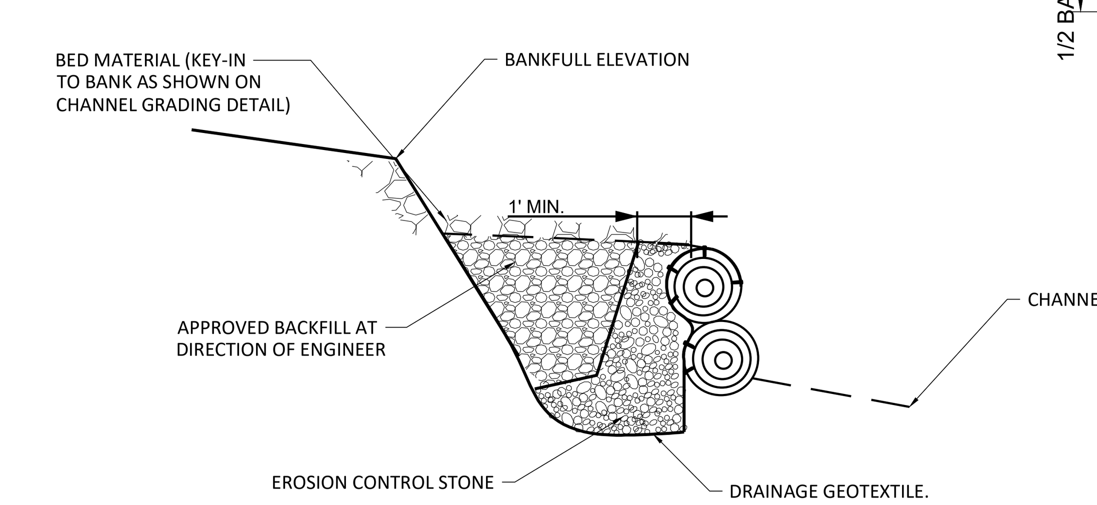
COIR MATTING
SCALE: NTS



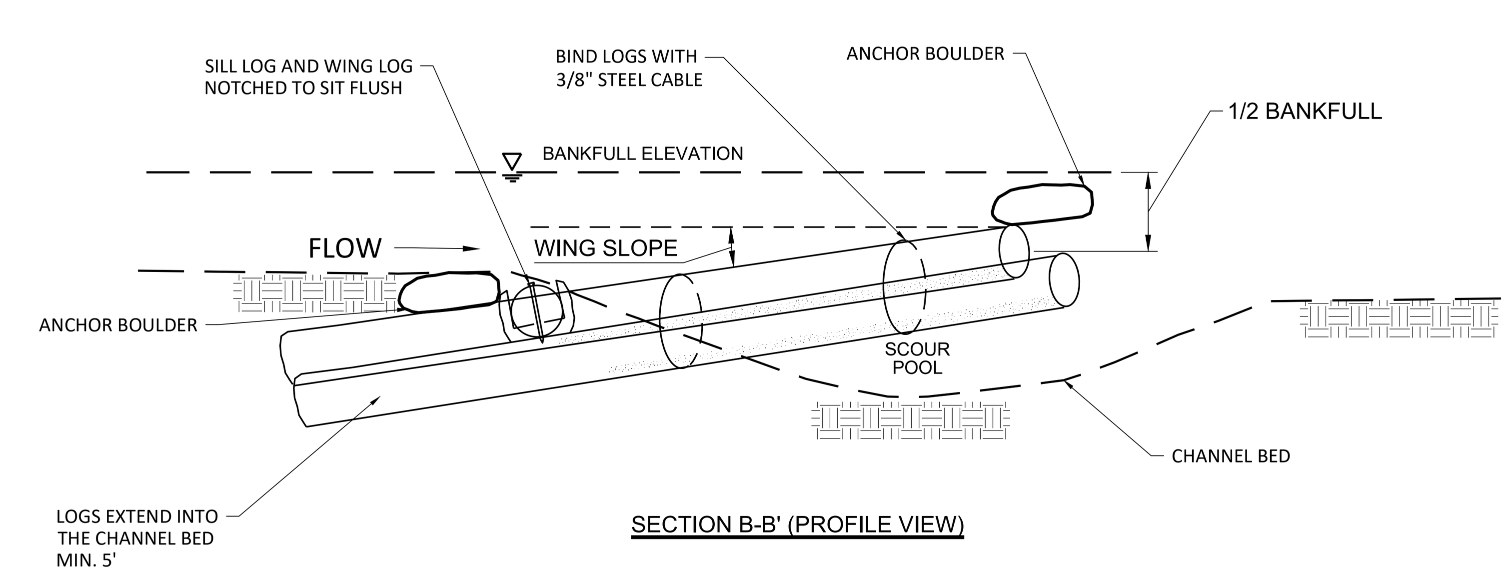
PLAN VIEW



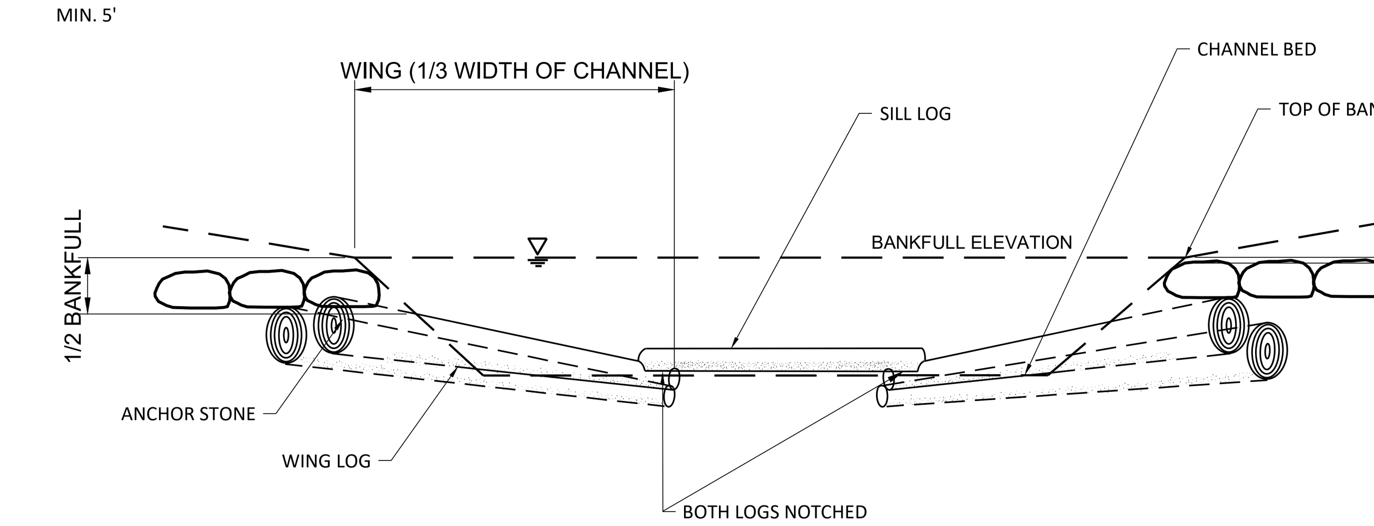
SECTION D-D'



SECTION C-C'



SECTION B-B' (PROFILE VIEW)



SECTION A'-A (UPSTREAM VIEW)

NOTES:

1. VANE ARMS BACKFILLED WITH APPROVED BACKFILL AT DIRECTION OF ENGINEER.
2. FINAL FREQUENCY OF STRUCTURES TO BE EQUAL TO OR LESS THAN THAT SHOWN ON PRELIMINARY DESIGN.

LOG CROSS VANE
SCALE: NTS

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Web - www.freese.com

UPPER TRINITY REGIONAL WATER DISTRICT

LEON HURSE DAM

STREAM RESTORATION

DETAILS

NO.	ISSUE	BY	DATE		
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				CHECKED	ICJ

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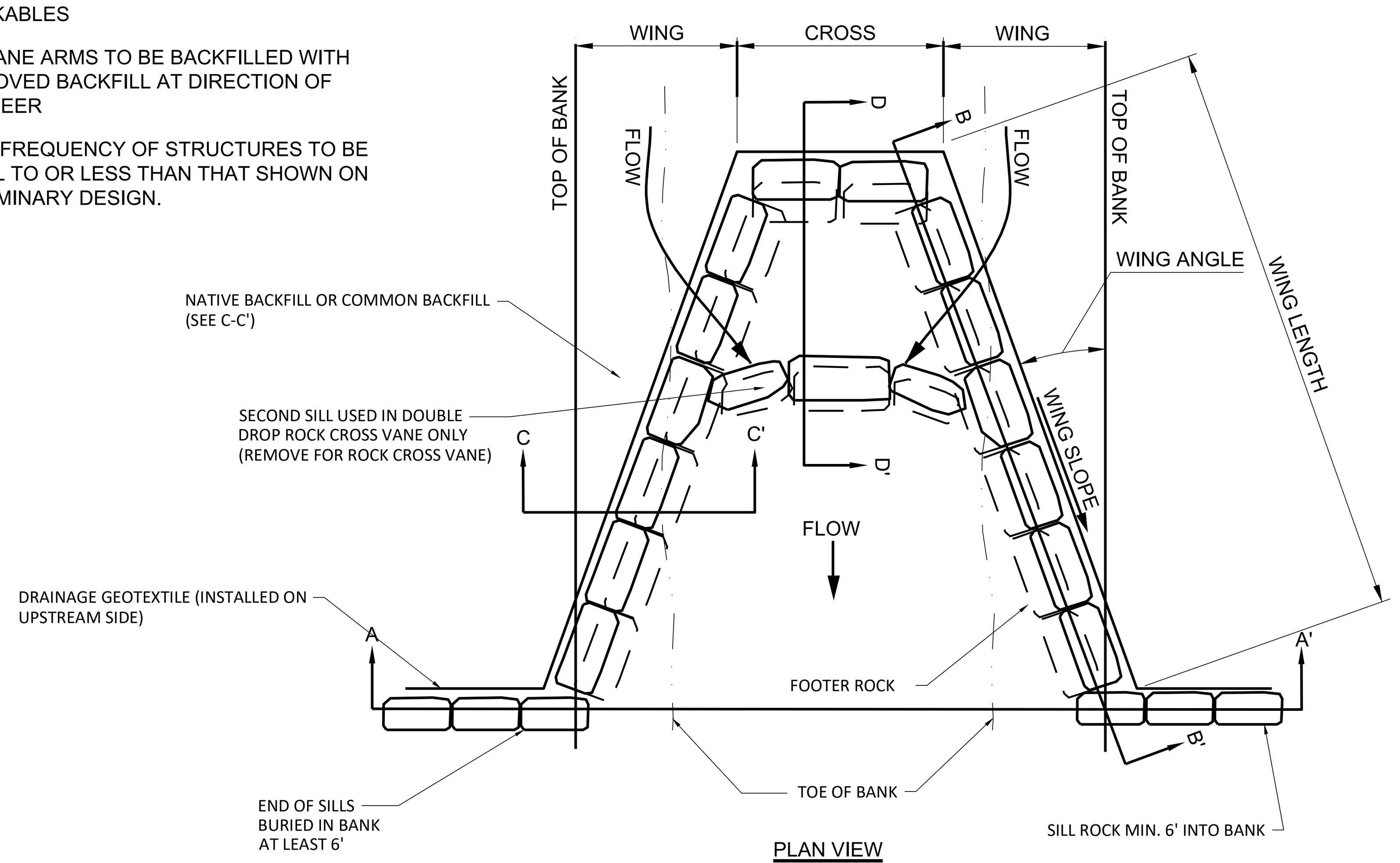
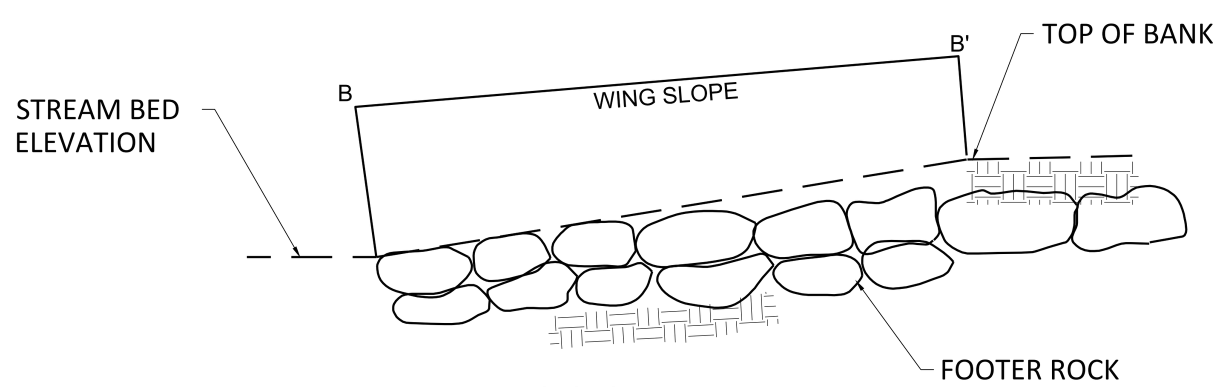
NOTE:

1. HEADER, FOOTER, AND SILL ROCKS TO BE STACKABLES
2. ALL VANE ARMS TO BE BACKFILLED WITH APPROVED BACKFILL AT DIRECTION OF ENGINEER
3. FINAL FREQUENCY OF STRUCTURES TO BE EQUAL TO OR LESS THAN THAT SHOWN ON PRELIMINARY DESIGN.



PLAN VIEW



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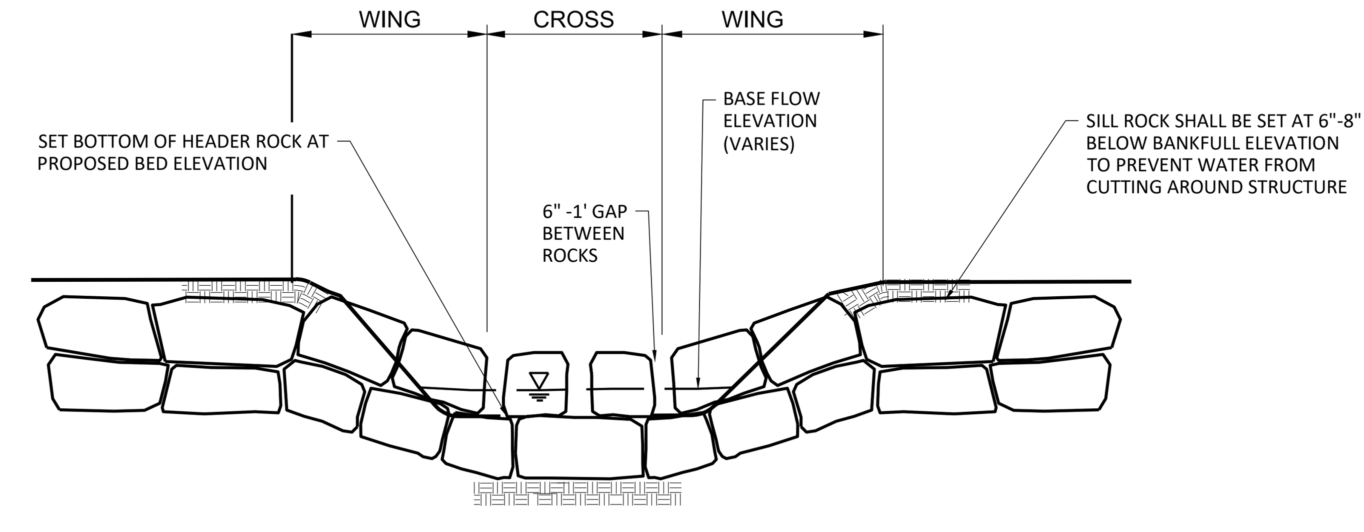
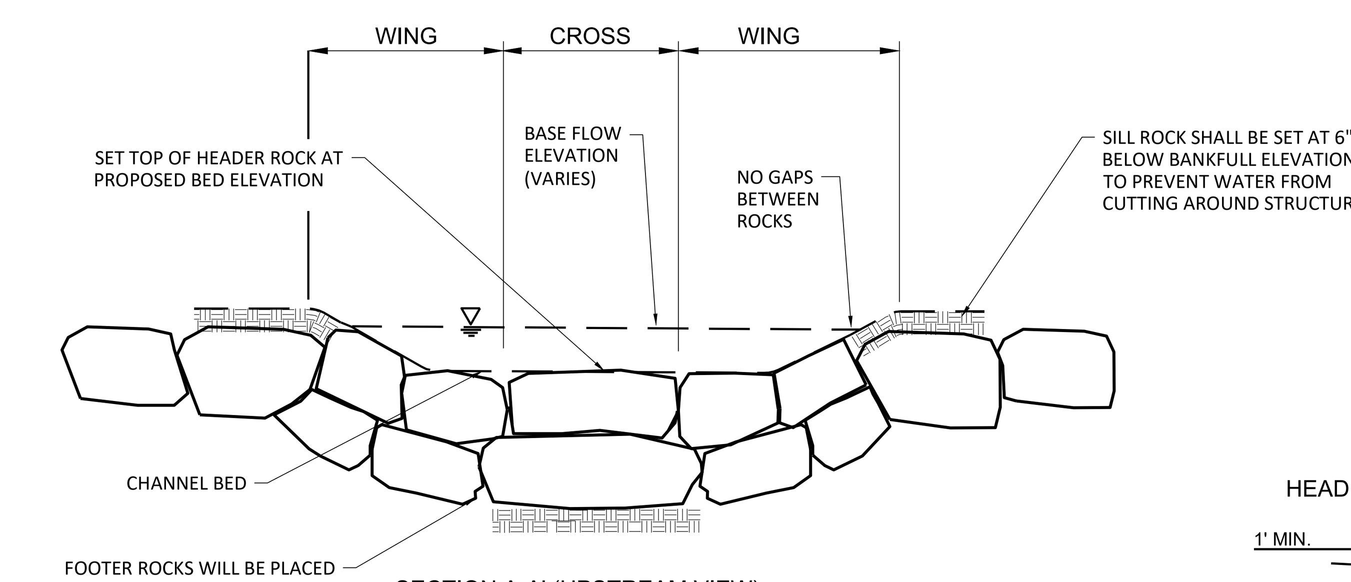
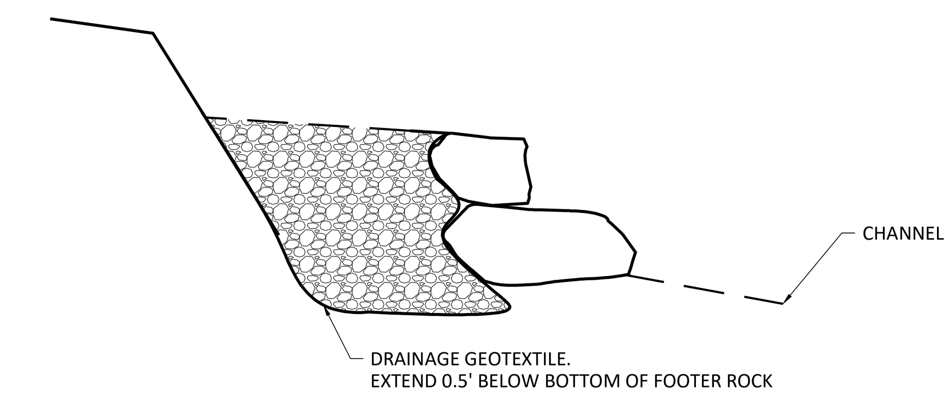


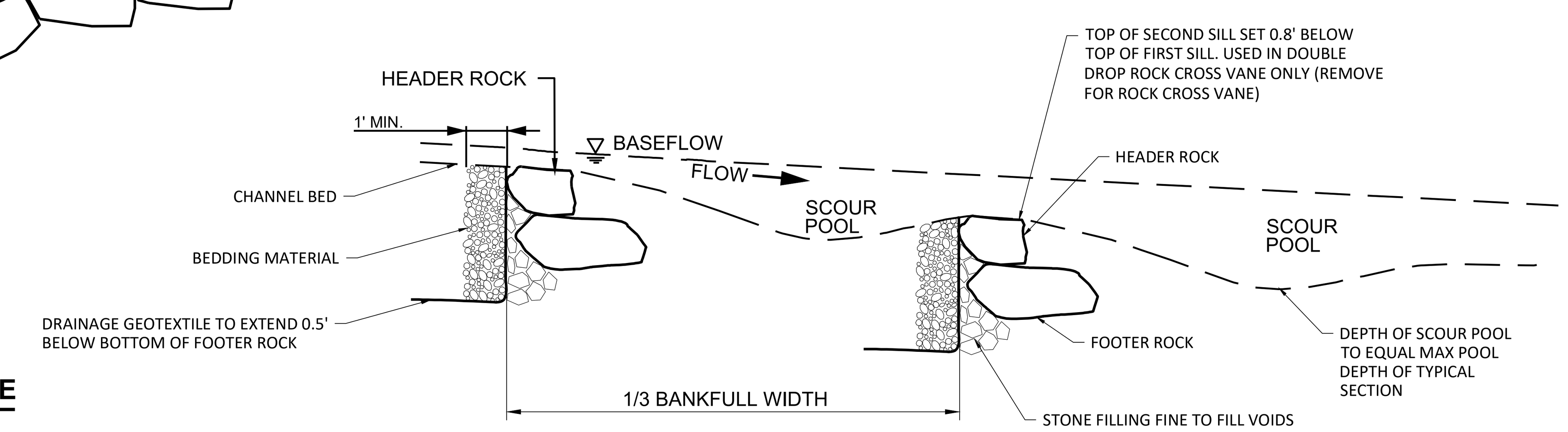
SECTION A-A' WITH GAPS IN HEADER ROCKS



SECTION A-A' (UPSTREAM VIEW)

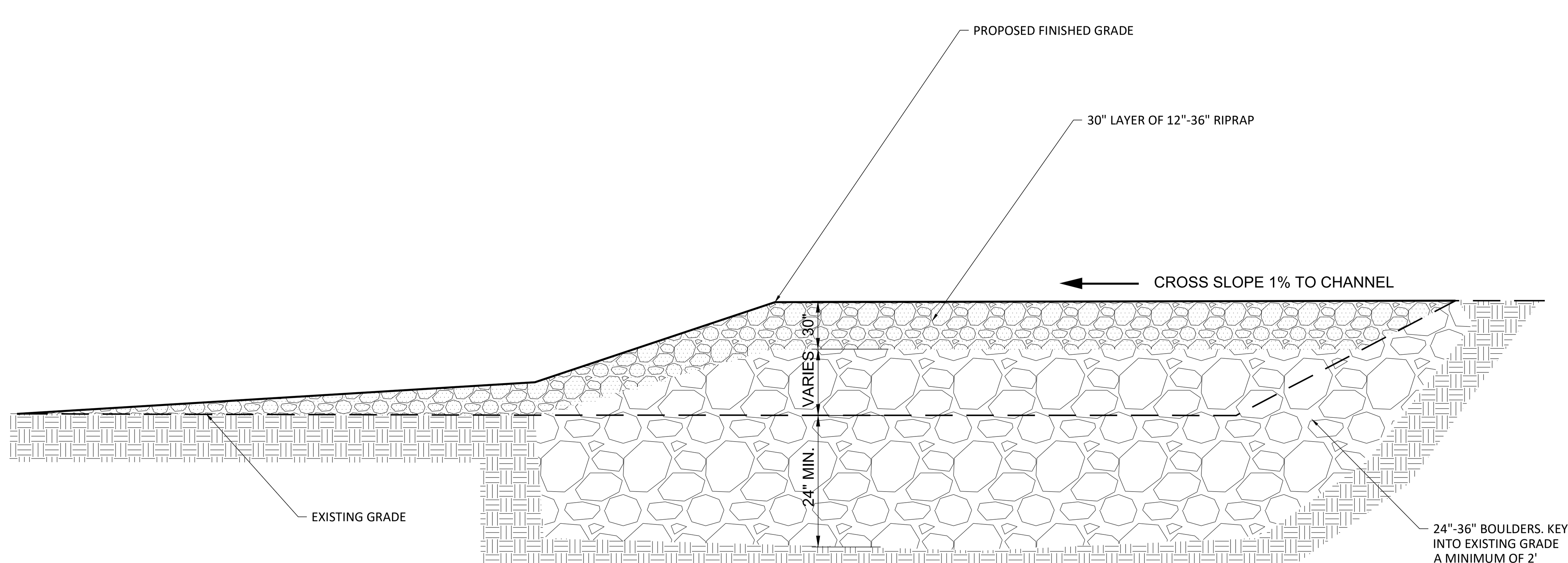


SECTION C-C'



SECTION D-D' PROFILE VIEW

DOUBLE DROP ROCK CROSS OR ROCK CROSS VANE
SCALE: NTS



NOTE:

1. SEE PLAN AND PROFILE SHEETS FOR LENGTH AND LOCATION OF STRUCTURE.
2. TOP WIDTH OF STRUCTURE (ON PLANVIEW) IN THE DOWNSTREAM DIRECTION SHALL BE 15'
3. DIMENSIONS TO BE DETERMINED.
4. FINAL FREQUENCY OF STRUCTURES TO BE EQUAL TO OR LESS THAN THAT SHOWN ON PRELIMINARY DESIGN.

FLOODPLAIN BLOCK
SCALE: NTS

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UPPER TRINITY REGIONAL WATER DISTRICT
LEON HURSE DAM
STREAM RESTORATION
DETAILS

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				CHECKED ICJ

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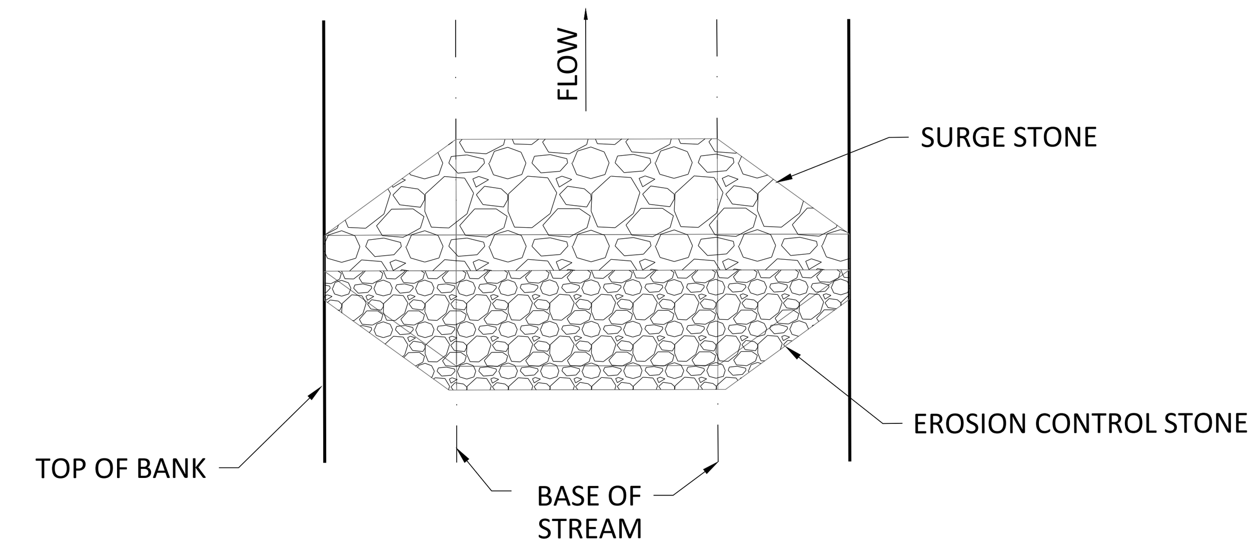
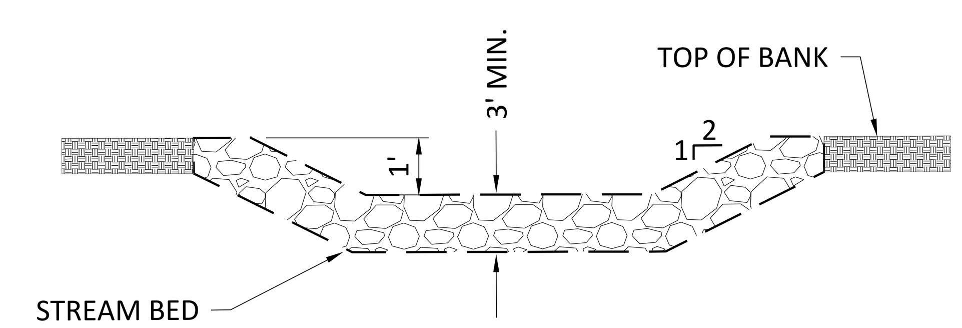
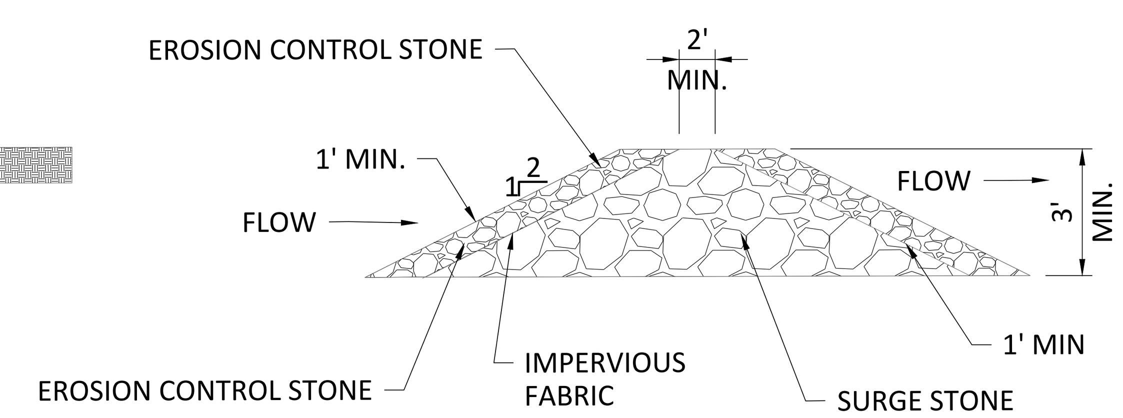


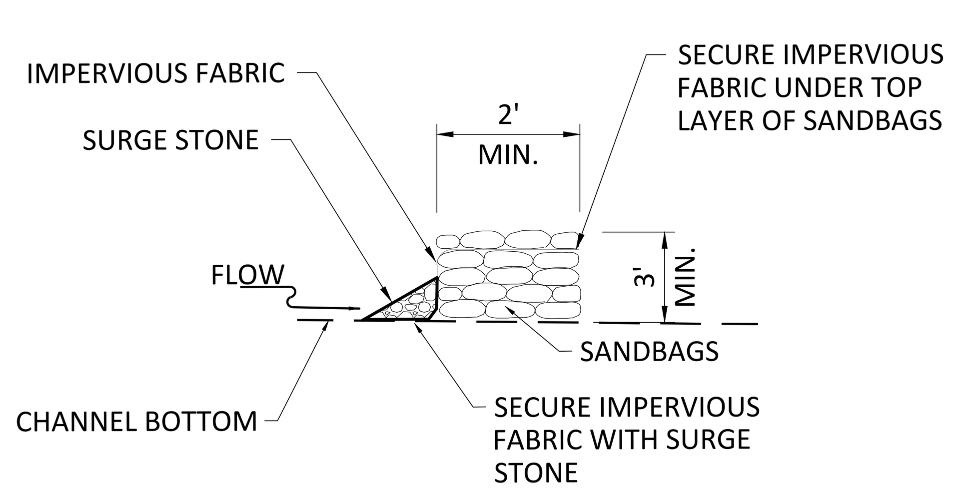
STONE IMPERVIOUS DIKE
PLAN VIEW



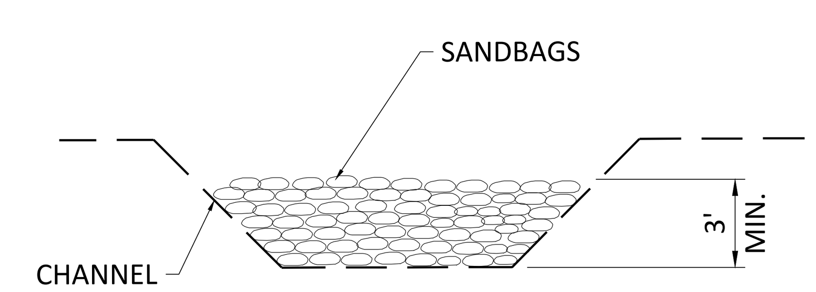
STONE IMPERVIOUS DIKE
CROSS SECTION



STONE IMPERVIOUS DIKE
PROFILE



SANDBAG IMPERVIOUS
DIKE PROFILE

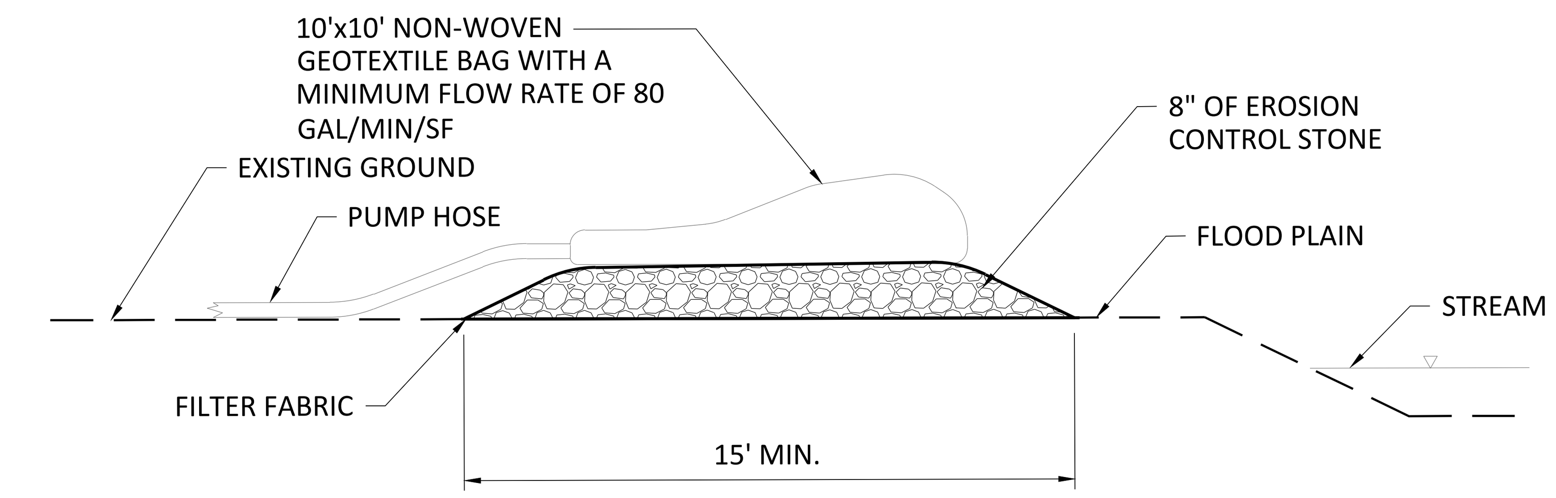


SANDBAG IMPERVIOUS DIKE
CROSS SECTION

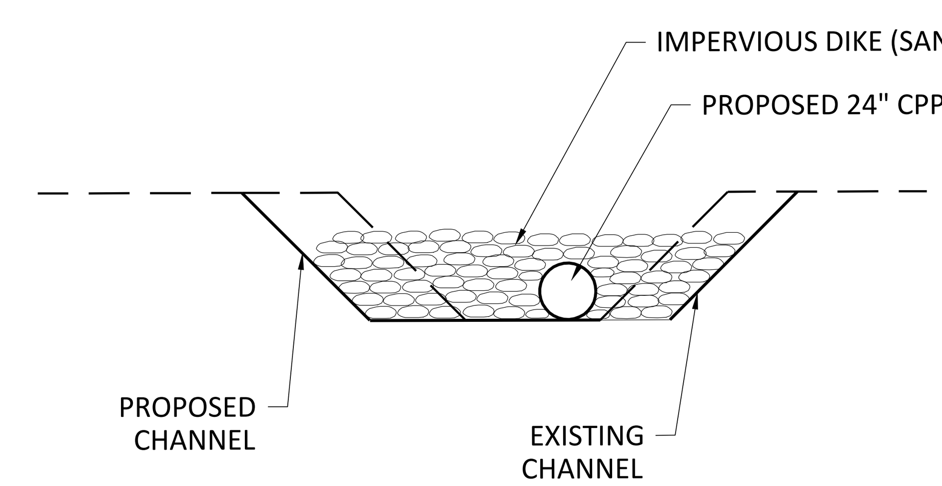
NOTES:

1. THE STRUCTURE SHALL BE USED FOR DIVERTING AND PUMPING ONLY. THE STRUCTURE SHALL BE RELOCATED OR REMOVED ONCE PUMPING/DIVERTING IS COMPLETE.
2. EITHER TYPE OF IMPERVIOUS DIKE (SANDBAG OR STONE) MAY BE USED.

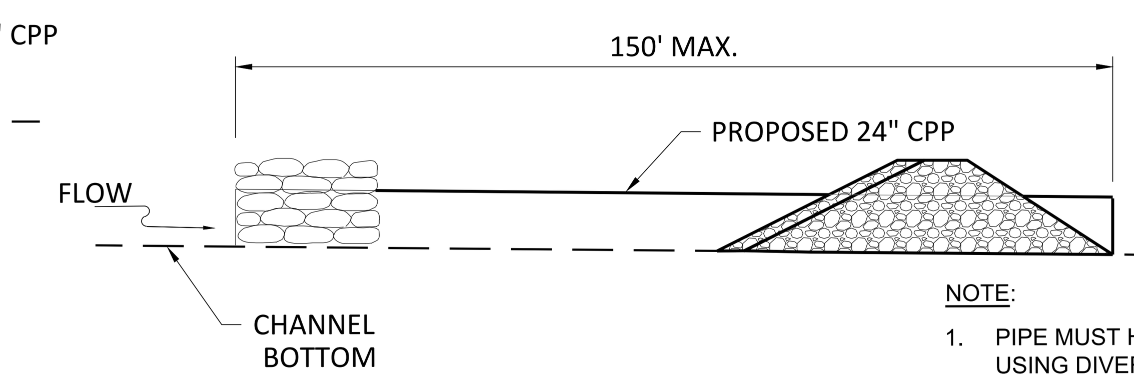
IMPERVIOUS DIKE
SCALE: NTS



SPECIAL STILLING BASIN
SCALE: NTS



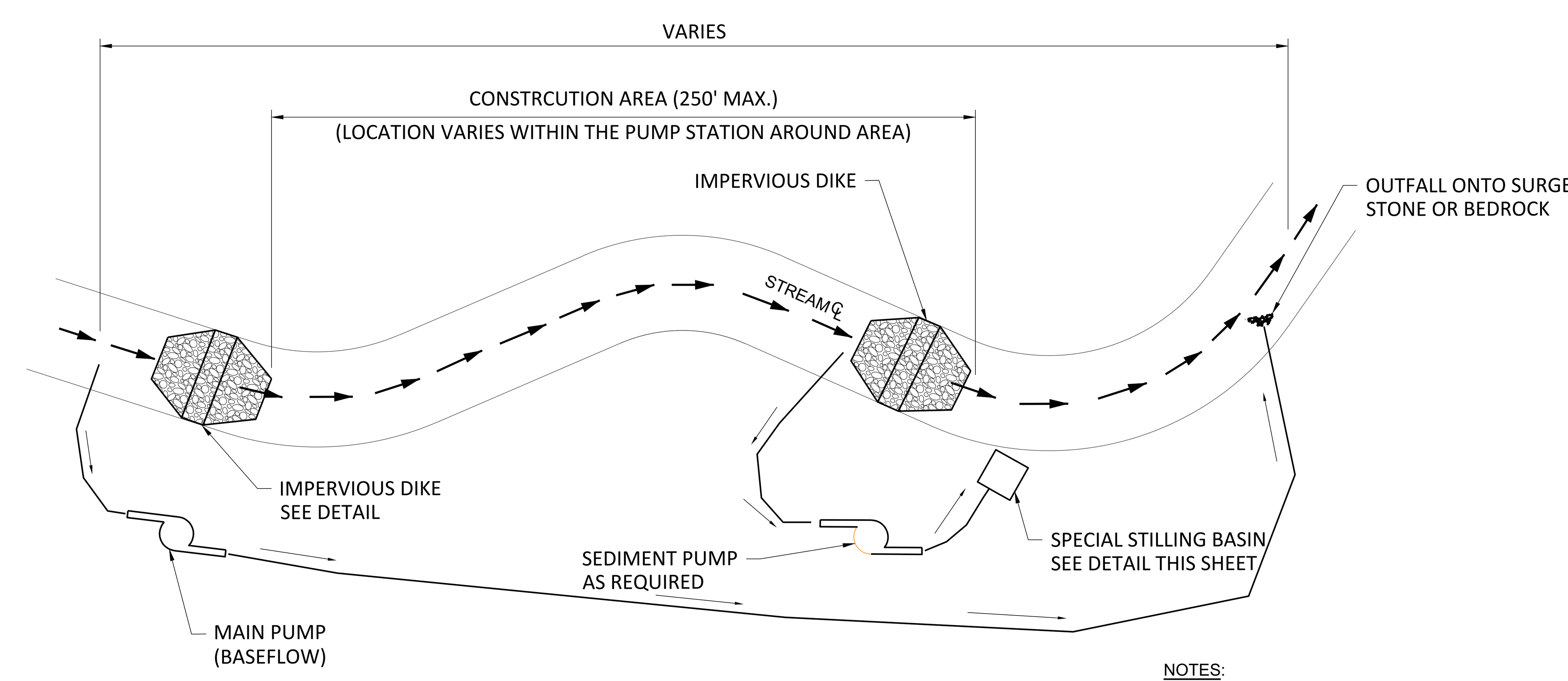
PIPE DIVERSION CROSS SECTION



NOTE:

1. PIPE MUST HAVE POSITIVE DRAINAGE WHEN USING DIVERSION (0.3% TO 2.0% PIPE SLOPE IS RECOMMENDED)

PIPE DIVERSION PROFILE



NOTES:

1. CHANNEL SHALL BE MATTED WITH COIR FIBER MATTING PRIOR TO THE CLOSE OF EACH WORK DAY.
2. IF FINAL CHANNEL GRADING HAS NOT BEEN PERFORMED, TEMPORARILY SECURE COIR MATTING WITH STAKES OR ROCK.
3. THE MAIN PUMP SHALL BE ADEQUATE TO REDIRECT STREAM BASE FLOW AROUND CONSTRUCTION ACTIVITIES.
4. SEDIMENT PUMPS SHALL BE ADEQUATE TO PUMP WATER THAT HAS INFILTRATED INTO THE CONSTRUCTION AREA WHILE CONSTRUCTION ACTIVITIES ARE ON GOING.
5. DURING ANTICIPATED LARGER STORM EVENTS, CHANNEL CONSTRUCTION SHALL BE STABILIZED TO REDUCE EROSION.

PUMP-AROUND DIVERSION PLANVIEW

PUMP-AROUND/PIPE DIVERSION
SCALE: NTS

DRAFT DESIGN PLANS

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Texas Registered Engineering Firm F-2144

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UPPER TRINITY REGIONAL WATER DISTRICT
LEON HURSE DAM
STREAM RESTORATION
DETAILS

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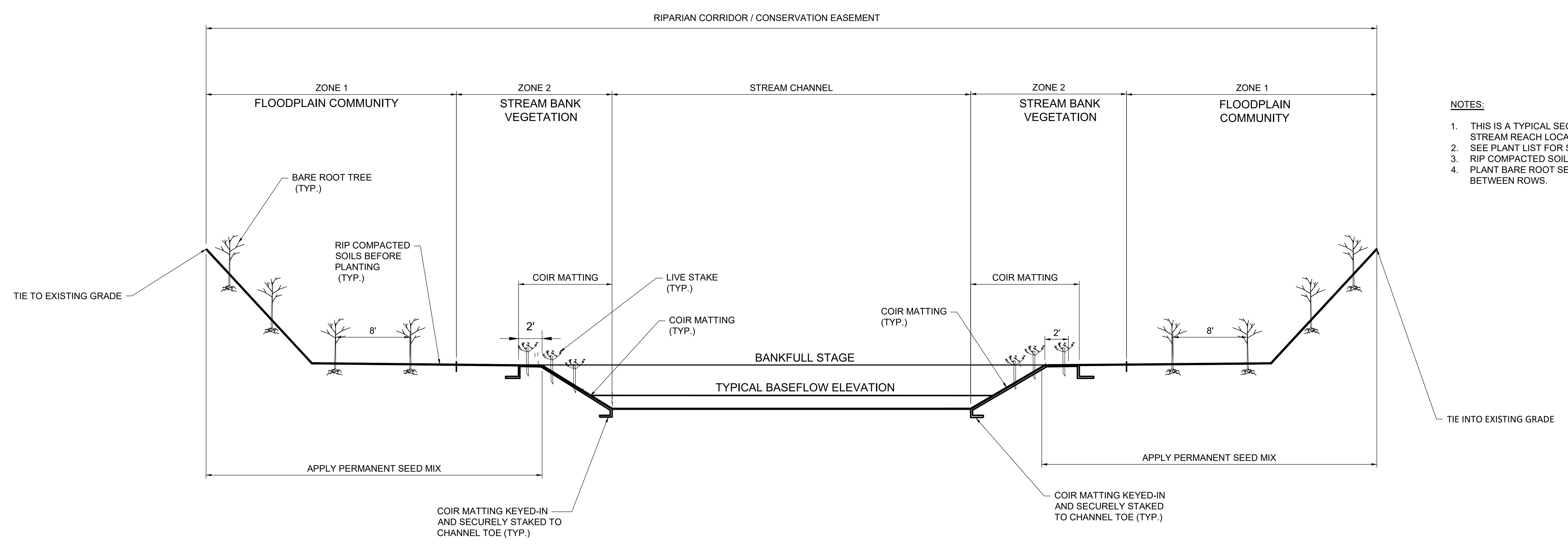

NOTES:

1. THIS IS A TYPICAL SECTION; DIMENSIONS WILL VARY BASED ON STREAM REACH LOCATION AND EXISTING TIE-IN CONDITIONS.
2. SEE PLANT LIST FOR SPECIES AND SIZE.
3. RIP COMPACTED SOILS BEFORE PLANTING.
4. PLANT BARE ROOT SEEDLINGS ON 8X8 SPACING, STAGER BETWEEN ROWS.

REVEGETATION SECTION
SCALE: NTS

	SEEDING DATES	SCIENTIFIC NAME	COMMON NAME	LS	BR	B&B	%	REMARKS
ZONE 1 FLOODPLAIN VEGETATION	TREES	Populus deltoides	Eastern Cottonwood*					
		Quercus nigra	Water Oak					
		Quercus shumardii	Shumard Oak		FINAL SPECIES LIST AND PLANT QUANTITIES TO BE DETERMINED			
		Carya illinoinesis	Pecan					
		Ulmus crassifolia	Cedar Elm					
		Fraxinus pennsylvanica	Green Ash					
		Celtis laevigata	Sugarberry					
		Plantus occidentalis	Sycamore*					
	SHRUBS	Symphoricarpos orbiculatus	Corral Berry					
		Ilex decidua	Deciduous Holly					
		Calicarpa americana	American Beautyberry					
		Cornus drummondii	Roughleaf Dogwood					
		Cephalanthus occidentalis	Common Buttonbush					
		Amorpha fruticosa	Indigo Bush					
ZONE 2 STREAM BANK VEGETATION	TREES	Salix nigra	Black Willow					
		Acer negundo	Box Elder					
		Plantus occidentalis	Sycamore					
	SHRUBS	Cornus drummondii	Roughleaf Dogwood					
		Cephalanthus occidentalis	Common Buttonbush					
ZONE 1-2	PERMANENT SEED MIX	Chasmanthium latfolium	Inland Sea Oats					
		Elymus virginicus	Virginia Wildrye					
		Carex cherokeensis	Cherokee Sedge					

PLANTING PLAN
SCALE: NTS

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UPPER TRINITY REGIONAL WATER DISTRICT
LEON HURSE DAM
STREAM RESTORATION
VEGETATION PLAN

NO.	ISSUE	BY	DATE

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DATE 7/18/2019
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UPPER TRINITY REGIONAL WATER DISTRICT

UPPER TRINITY
REGIONAL WATER DISTRICT

CONSTRUCTION PLANS FOR

LAKE RALPH HALL MITIGATION PROJECT VOLUME 5 EMERGENT WETLAND MITIGATION

OWNER

UPPER TRINITY REGIONAL WATER DISTRICT

Rich Lubke — President
Ramiro Lopez — Vice President
Mike Fairfield — Treasurer
Brian Roberson — Secretary

Larry N. Patterson, P.E. — Executive Director
Thomas W. Snyder — Director, Construction and Engineering
Edward M. Motley, P.E. — Lake Ralph Hall Program Manager

ECOSYSTEM PLANNING & RESTORATION
EPR
TEXAS REGISTERED ENGINEERING FIRM F-14997

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
TEXAS REGISTERED ENGINEERING FIRM F-13

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TEXAS P.E. NO.113620
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TIMOTHY J. NOACK, P.E.
TEXAS P.E. NO. 54732
DATE: 7/12/2019

KEVIN L. TWEEDY, P.E., VICE PRESIDENT
ECOSYSTEM PLANNING AND RESTORATION

JULY 2019

TIMOTHY J. NOACK, P.E., PROJECT MANAGER
Alan Plummer Associates, Inc.

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INSET

LEGEND

LAKE RALPH HALL PROJECT BOUNDARY

LAKE RALPH HALL – CONSERVATION POOL ELEVATION 551

MITIGATION ZONE BOUNDARIES

SHEET INDEX

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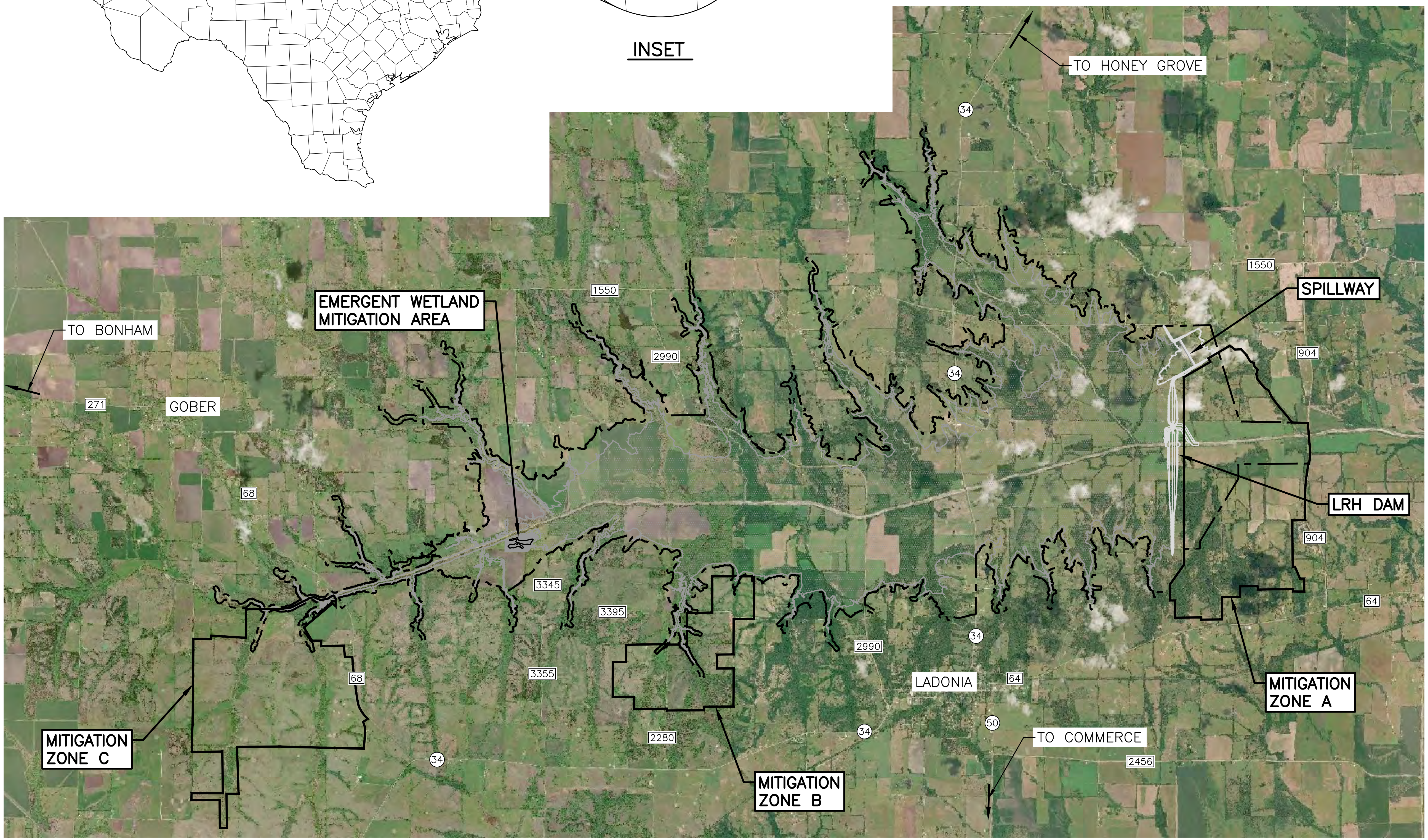
3000 1500 0 3000 6000

GRAPHIC SCALE : 1" = 3000'



ABBREVIATIONS

℄ OR CL	CENTERLINE
CPT	CONTROL POINT SURVEY
E	EAST
EL	ELEVATION
MAX	MAXIMUM
MIN	MINIMUM
N	NORTH
NWL	NORMAL WATER LEVEL
RE:	REFERENCE
S	SOUTH
W	WEST

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EMERGENT WETLAND MITIGATION

EMERGENT WETLANDS

LOCATION MAP AND TABLE OF CONTENTS

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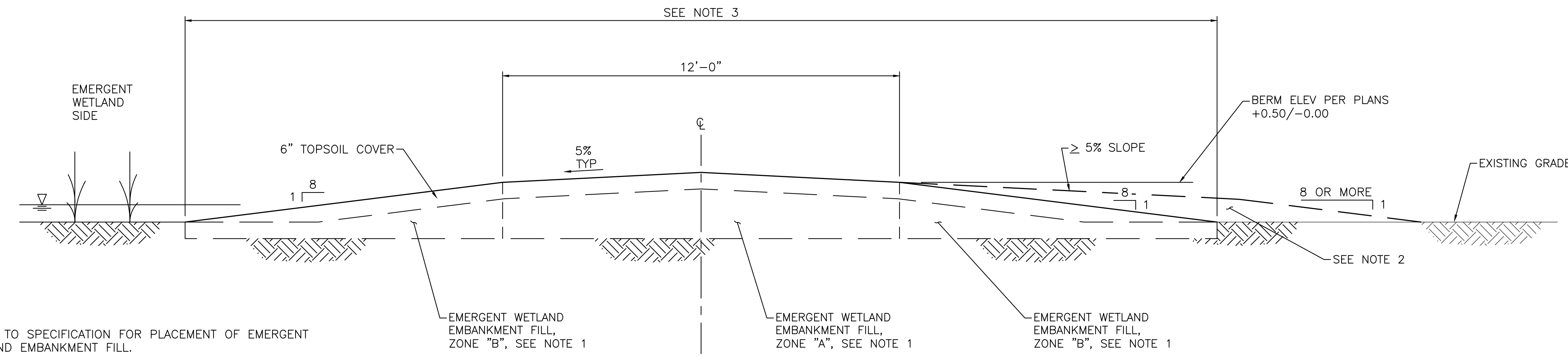

NOTES:

1. REFER TO SPECIFICATION FOR PLACEMENT OF EMERGENT WETLAND EMBANKMENT FILL.
2. EXCESS SOIL PRODUCED FROM MACRO-DEPRESSION AREA MAY BE WASTED BY WIDENING THE BERM ON THE OPPOSITE SIDE OF THE EMERGENT WETLAND. WIDENED SECTIONS SHALL BE PARALLEL TO CENTERLINE OF BERM AND FINISHED BERM SHALL BE COVERED WITH 6" TOPSOIL AND BE SLOPED AS SHOWN.
3. ESTABLISH VEGETATIVE COVER FROM TOE TO TOE ON BERM PER SPECIFICATIONS.

BERM SECTION (1)

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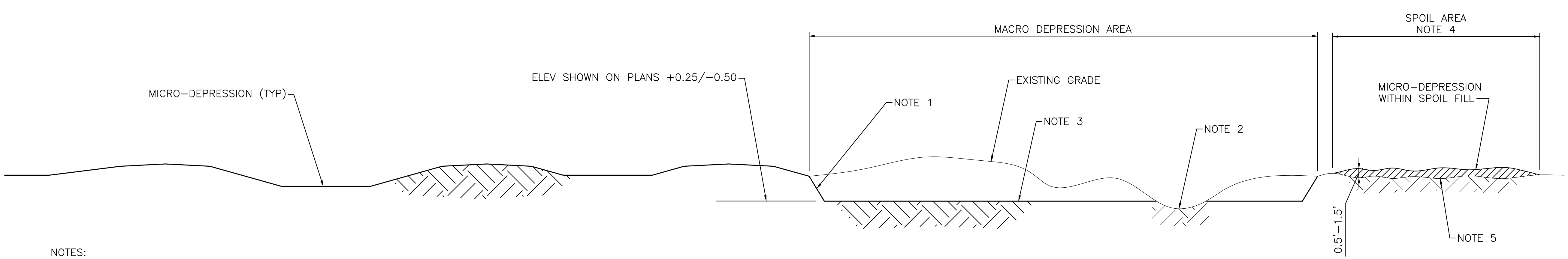

NOTES:

1. NO SLOPE REQUIREMENT FOR EDGE OF EXCAVATED AREAS.
2. EXISTING GRADES LOWER THAN THE DESIGN BOTTOM ELEVATION SHOULD NOT BE FILLED.
3. TOPSOIL REPLACEMENT NOT REQUIRED IN EXCAVATED MACRO-DEPRESSIONS.
4. WILDLIFE LOAFING AREAS MAY BE CREATED USING EXCESS SPOIL FROM EXCAVATED MACRO-DEPRESSION AREAS THAT IS NOT USED FOR CONSTRUCTION OF THE BERM. REFER TO APPROVED SPOIL AREAS SHOWN ON THE PLAN SHEETS.
5. TOPSOIL STRIPPING IS NOT REQUIRED IN SPOIL AREAS.

TYPICAL SECTION EXCAVATED MACRO/MICRO DEPRESSION COMPLEX (2)

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DETAILS I

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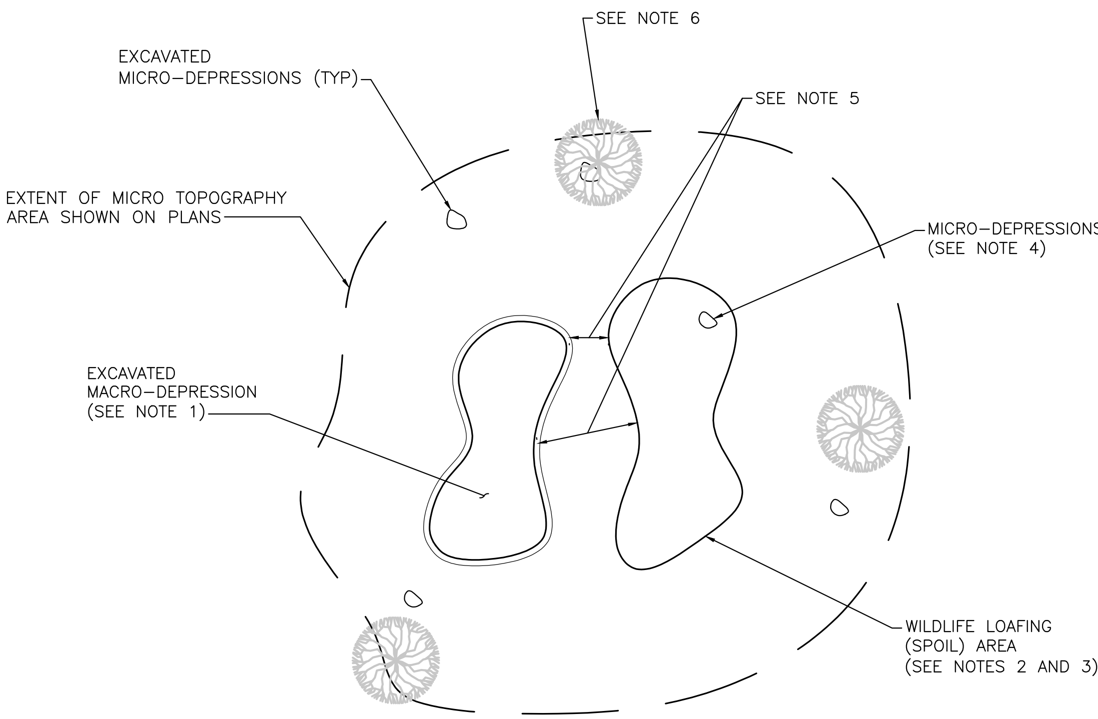

NOTES:

1. EXCAVATED MACRO-DEPRESSION SHALL BE CONSTRUCTED PER GRADING SHEET 4.1.
2. WILDLIFE LOAFING (SPOIL) AREAS ARE TO BE LOCATED IMMEDIATELY ADJACENT TO EXCAVATED MACRO-DEPRESSIONS. REFER TO GRADING SHEET 4.1 FOR APPROXIMATE LOCATIONS AND SHAPES.
3. FOOTPRINT OF WILDLIFE LOAFING (SPOIL) AREA SHALL BE APPROXIMATE SHAPES SHOWN IN THE PLANS. HOWEVER EXTENT OF FOOTPRINT MAY BE FIELD ADJUSTED TO ACCOMMODATE ACTUAL VOLUME OF SPOIL WHILE MAINTAINING TOTAL SPREAD THICKNESS OF 0.5' TO 1.5', UNLESS A MINIMUM ELEV IS SHOWN ON THE PLANS. SPOIL AREAS DO NOT NEED TO COMPLETELY DRAIN WATER AS SHALLOW PONDING IS ACCEPTABLE.
4. MICRO-DEPRESSIONS SHALL BE SHALLOW (0.5'-1.5') EXCAVATED DEPRESSIONS MEASURING APPROX 1 TO 2 EQUIPMENT WIDTHS BY 5' TO 20' LONG. SPOIL FROM MICRO DEPRESSIONS MAY BE DEPOSITED ADJACENT TO THE MICRO-DEPRESSION, SPREAD SPOIL TO NO MORE THAN 1' HIGH. MICRO-DEPRESSIONS SHALL BE PLACED IN RANDOM PATTERNS IN THE WILDLIFE LOAFING (SPOIL) AREA AND AROUND THE MACRO-DEPRESSION TO THE EXTENT LINE SHOWN ON THE PLANS. DENSITY OF MICRO-DEPRESSIONS SHALL BE 2 TO 4 PER ACRE. DO NOT PLACE MICRO-DEPRESSIONS WITHIN THE EXCAVATED MACRO-DEPRESSIONS.
5. DISTANCE BETWEEN WILDLIFE LOAFING (SPOIL) AREA AND MACRO-DEPRESSION EXCAVATION SHALL BE 10 TO 50 FEET, UNLESS PLANS SHOW OTHERWISE.
6. ALL EXISTING TREES SHALL REMAIN. AVOID PLACING MICRO-DEPRESSIONS WITHIN 10 FEET OF THE DRIP LINE OF EXISTING TREES GREATER THAN 6" DBH.

TYPICAL PLAN VIEW
EXCAVATED MACRO/MICRO-DEPRESSION COMPLEX (3)

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TABLE 5.1: Wetland Planting List

Hydrologic Zone	Common Name	Scientific Name
A - Temporarily Flooded	Switchgrass	*Panicum virgatum*
	Eastern Gamagrass	*Tripsacum dactyloides*
	Inland Seaoats	*Chasmanthium latifolium*
	Green Sprangletop	*Leptochloa dubia*
	Prairie Wildrye	*Elymus canadensis*
	Illinois Bundleflower	*Desmanthus illinoensis*
	Partridge Pea	*Chamaecrista fasciculata*
	Swamp Sunflower	*Helianthus angustifolius*
	Plains Coreopsis	*Coreopsis tinctoria*
B - Seasonally Flooded	Swamp Smartweed	*Polygonum hydropiperoides*
	Spikerush	*Eleocharis spp*
	Sedges	*Carex spp*
	Squarestem Spikerush	*Eleocharis quadrangulata*
	Crowfoot Sedge	*Carex crus-corvi*
	Duck Potato Arrowhead	*Sagittaria latifolia*
	Soft Rush	*Juncus effusus*
	Three-square bulrush	*Schoenoplectus pungens*
C - Semi-Permanently Flooded	Grassy Arrowhead	*Sagittaria graminea*
	Pickerelweed	*Pontederia cordata*
	Olney's Bulrush	*Schoenoplectus americanus*
	Softstem Bulrush	*Schoenoplectus tabernaemontani*
D - Permanently Flooded	Giant Bulrush	*Schoenoplectus californicus*
	Coontail	*Ceratophyllum demersum*
	American Wild Celery	*Vallisneria americana*
	American Pondweed	*Potamogeton nodosus*

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DETAILS II

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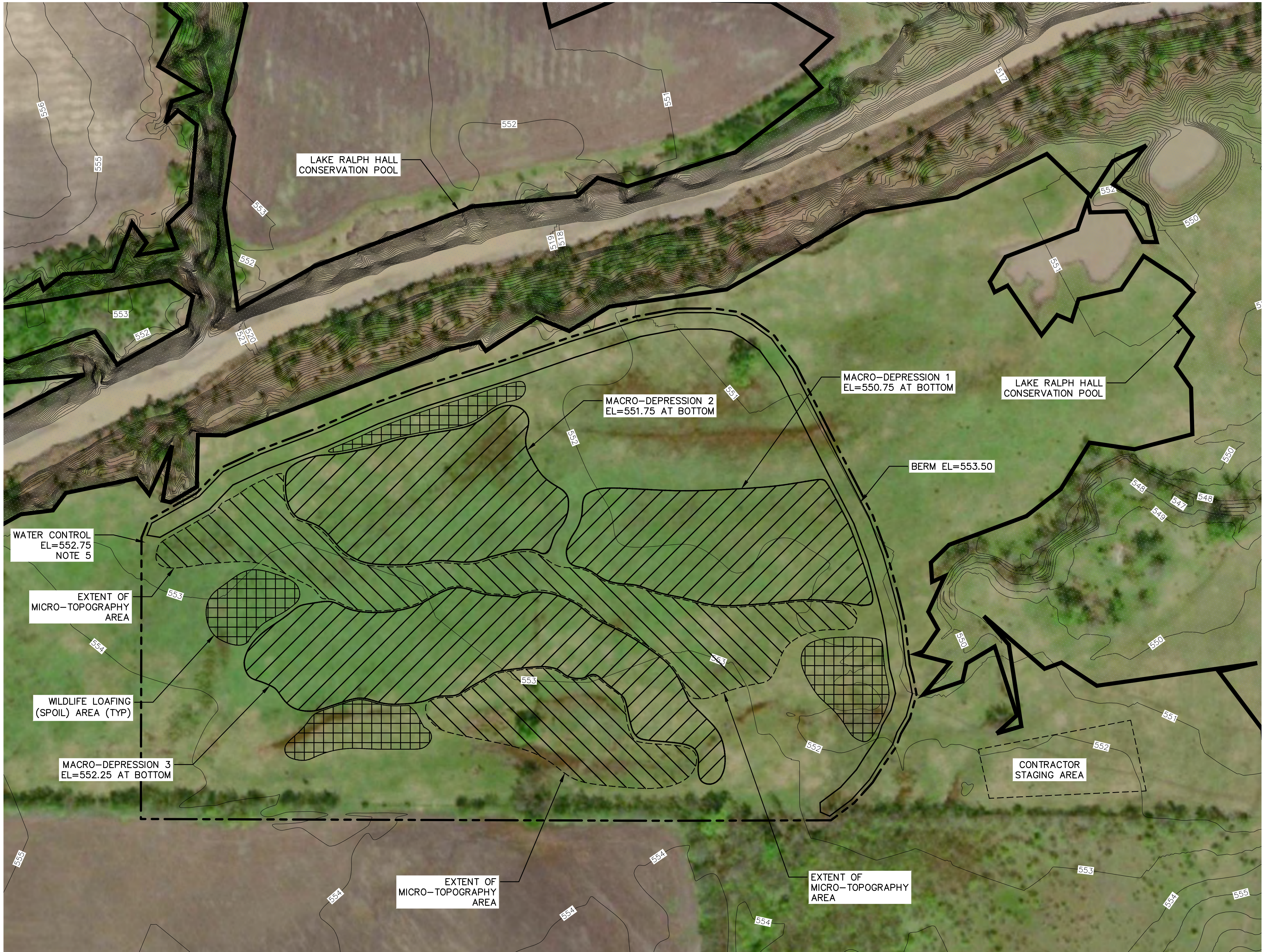

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100 50 0 100 200

GRAPHIC SCALE : 1" = 100'

NOTES:

1. SEE DETAIL 1 ON SHEET 3.1 FOR BERM CROSS-SECTION.
2. SEE DETAILS 2 AND 3 ON SHEETS 3.1 AND 3.2 FOR MACRO/MICRO-TOPOGRAPHY COMPLEX.
3. MACRO-DEPRESSION AREAS SHALL TOTAL A MINIMUM OF 8.0 ACRES.
4. SEE DETAILS 4 AND 5 ON SHEET 5.1 FOR EMERGENT WETLAND VEGETATION PLANTING.
5. TERMINATE BERM AT LOCATION SHOWN. ADJUST GRADE AT TOE OF BERM TO ELEV SHOWN TO SET MAX WATER LEVEL IN WETLAND. RE-ESTABLISH VEGETATION COVER ON ANY AREAS DISTURBED DURING GRADING OPERATIONS.

LEGEND

- MACRO-DEPRESSION
- WILDLIFE LOAFING (SPOIL) AREAS
- MICRO-TOPOGRAPHY AREA
- CONSERVATION EASEMENT
- EXTENT OF CONSERVATION POOL
- 500 — EXISTING CONTOUR

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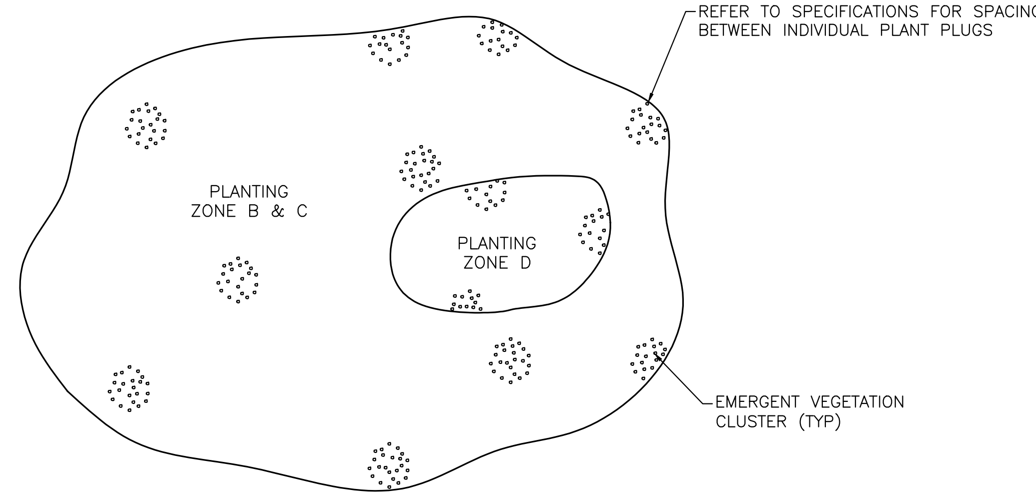
NOTES:

1. EACH CLUSTER TO CONTAIN ONE PLANT SPECIES WITH 8–20 PLANT PLUGS PER CLUSTER FOR PLANTING ZONES B AND C, AND 8–12 PLANT PLUGS FOR ZONE D.
2. RANDOMLY PLACE EACH CLUSTER WITHIN THE SPECIFIED PLANTING ZONE



EXAMPLE PLACEMENT OF EMERGENT WETLAND PLANT CLUSTERS (4)

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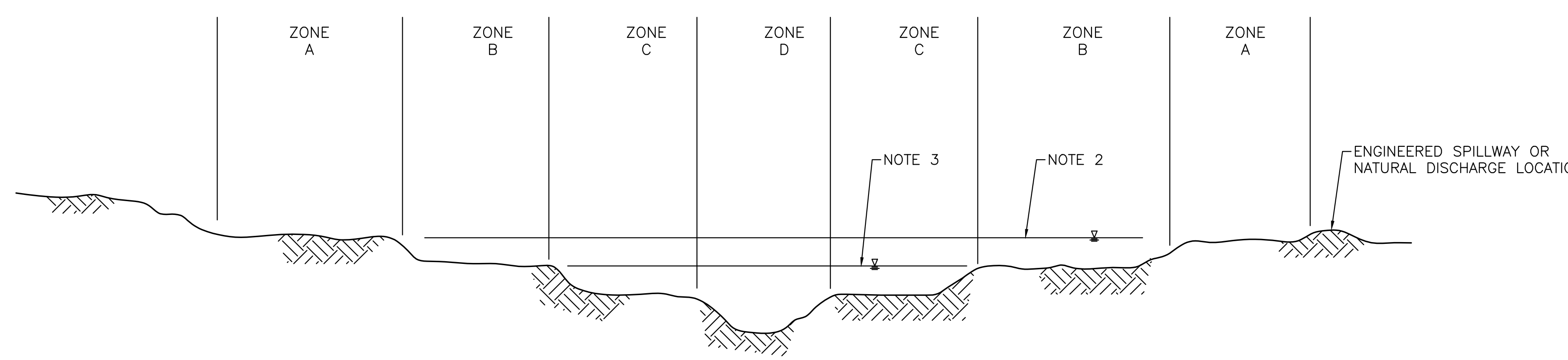

NOTES:

1. ZONE A = TEMPORARY FLOODED
   ZONE B = SEASONALLY FLOODED
   ZONE C = SEMI–PERMANENTLY FLOODED
   ZONE D = PERMANENTLY FLOODED
   SEE ALSO SPECIFICATIONS FOR ADDITIONAL DETAILS.
2. COOL SEASON NORMAL WATER LEVEL.
3. WARM SEASON NORMAL WATER LEVEL.
4. REFER TO TABLE 5.1 FOR WETLAND SPECIES LIST.

AQUATIC VEGETATION PLANTING ZONES (5)

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EMERGENT WETLANDS

VEGETATION DETAILS

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APPENDIX G

FUNCTIONAL CAPACITY OF PROPOSED MITIGATION STREAMS WITHIN MITIGATION ZONES A, B AND C

APPENDIX G

RATIONALE FOR DETERMINATION OF CREDITS

A. Overview

Full documentation of the SWAMPIM assessment protocol is provided in **Appendix C**. The methodology related to calculation of SWAMPIM FCUs for a given SAR is also described in **Part III, Section 4**. SWAMPIM FCUs are calculated using the following equation:

FCU = Stream Length x FCI x Multiplication Factor

Where:

FCU = Functional Capacity Unit
Stream Length = Length of SAR, feet
FCI = Total Functional Condition Index score
Multiplication Factor determined by stream characterization as follows:
- Ephemeral Streams = 0.00125
- Intermittent Streams = 0.00250
- Intermittent Streams with Perennial Pools = 0.00315
- Perennial Streams = 0.00380

A discussion of how each of the three variables (stream length, FCI, and multiplication factor) is determined and the rationale for each is provided in the following sections.

B. Stream Length

Stream length of the SAR is measured directly from the design plans and is provided in linear feet. The stream length used in the FCU calculation omits the length of stream within any easements that may cross a stream and excludes stream lengths occupied by culverts, roads, or other requisite crossings that are outside the conservation easement boundary.

C. FCI Scores

The determination of mitigation credits requires projected FCI scores. For consistency and repeatability of FCI scores, it is important that all assessors have experience in performing ecological functional assessments, and more specifically in using the SWAPIMP protocol. It is also important that assessors have detailed knowledge of the scores that were developed during the baseline condition assessments, so that the methodologies can be applied consistently between pre-mitigation and post-mitigation conditions. The assessor should understand how each FCI metric within each functional category is scored, including understanding relationships between metrics. As an example, **Table G-1** is provided to show which FCI metrics are affected by the presence or absence of water.

TABLE G-1 SWAMPIM FCI Metrics that are Dependent Upon the Presence of Water

	Scored Metric	Score Basis
Hydrologic Functions	1. Flow Regime and Groundwater Interaction	Non-Water Dependent[1]
	2. Channel Condition/Alteration	Non-Water Dependent
	3. Channel Capacity to Flow Frequency	Non-Water Dependent
	4. Channel Bank Stability	Non-Water Dependent
	5. Channel Sinuosity	Non-Water Dependent
	6. Channel Bottom Substrate	Non-Water Dependent
	7. Instream Bottom Topography **OR** Manning's Number[2]	Non-Water Dependent
	8. Channel Incision	Non-Water Dependent
	9. Pools	Water Dependent
	10. Channel Flow Status	Water Dependent
Water Quality / Biogeochemical Functions	1. Bank Stability	Non-Water Dependent
	2. Channel Bottom Bank Stability **OR** Channel Sediment/Substrate Composition[3]	Non-Water Dependent
	3. Water Clarity	Water Dependent
	4. Nutrient Enrichment **OR** Aquatic Vegetation[4]	Water Dependent
	5. Composition of Organic Matter	Non-Water Dependent
	6. Land Use Pattern (beyond immediate riparian zone)	Non-Water Dependent
	7. Riparian Zone Width (from stream edge to field)	Non-Water Dependent
	8. Riparian Zone Vegetation Protection/Completeness	Non-Water Dependent
Habitat Functions	1. Flow Regime	Non-Water Dependent[1]
	2. Epifaunal Substrate/Available Cover	Non-Water Dependent
	3. Stream Bottom Substrate	Non-Water Dependent
	4. Pool Variability	Non-Water Dependent
	5. Sediment Deposition/Scouring	Non-Water Dependent
	6. Channel Flow Status	Non-Water Dependent
	7. Channel Alteration	Non-Water Dependent
	8. Channel Sinuosity	Non-Water Dependent
	9. Bank Stability	Non-Water Dependent
	10. Vegetative Protection	Non-Water Dependent
	11. Riparian Zone	Non-Water Dependent
	12. Riparian Habitat Condition	Non-Water Dependent

Notes for Table G-1 are provided on the following page.

Notes for Table G-1:

[1] Flow Regime is partially dependent on the presence of water. For ephemeral streams, if the SAR has good channel form AND water in the channel it would receive a score of 2. If the SAR has EITHER good channel form OR water is present then it would score a 1, and if the SAR has poor channel form AND no water it would score a 0. For intermittent streams, if the SAR has good channel form AND water in the channel, it would receive a score of 4. If the intermittent SAR has poor channel form OR lacked water, it would score a 3.
[2] Instream bottom topography is globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
[3] Channel bottom bank stability is used globally instead of channel sediment/substrate composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
[4] Nutrient enrichment is used globally for scoring because aquatic vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.

The following paragraphs provide detailed descriptions of projected FCI scores that were used in the determination of credits. The FCI scores provided are expected to be achieved at the end of construction (EOC), at the end of the 7-year monitoring period (EOM), and at maturity, given typical climatic conditions. Each FCI metric is described below and includes the projected FCI scores (or range of projected FCI scores) expected for the metric within the mitigation zones for each stream classification type. Streams categorized as "restoration" and "re-establishment" in the Mitigation Plan are scored with similar ranges and therefore only restoration is displayed below. A brief bulleted discussion is included describing the proposed activities to achieve the projected score. A table is also included that shows the conversion of qualitative descriptors to numeric scores ranging from 0 to 10 used for each SWAMPIM metric. Note that each table is taken from the SWAMPIM field sheets.

Hydrologic Functions

1. ***Flow regime***

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 2	1 to 2	1 to 2	1 to 2
North Sulphur River Main Channel Restoration	3	7	7	7
Former North Sulphur River Restoration	--	7	7	7

Flow Regime											
Type	Perennial			Intermittent w/ Perennial Pools			Intermittent		Ephemeral		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Scoring comparable to baseline scores – but channel form is expected to improve.
- Channel displays good channel form and contains water: score = 2
- Channel displays good channel form and no water: score = 1

North Sulphur River Main Channel Restoration

- Baseline condition of existing NSR is intermittent. Evidence of groundwater inflows observed throughout the restoration reach.
- Creation of relatively deep pools.
- Ensuring adequate compaction of fill in floodplain – the material being used as fill from the side slopes is comprised of a low-permeability clay.

- Flow would consist of contributions from the immediate watershed, lateral infiltration as groundwater inputs, and occasional spills from the dam.
- Retention of water aided by the planned transition to the existing channel at the downstream extent of the restored channel.
- Placing an impermeable layer or barrier behind the proposed “Floodplain Step” structure or using the floodplain blocks as a means of retaining groundwater in the restored main channel corridor.
- Based on preliminary designs and hydrologic modeling, pools would retain water most of the year. Refer to the Preliminary Design Memorandum[1] for the restored main channel NSR.

Former North Sulphur River Restoration

- Preliminary hydrologic analyses[2] indicate that during normal climatic conditions, this channel would retain water year-round in deep pools throughout most of its length. Additional detailed hydrologic analyses[3] supports classification as intermittent with perennial pools.

2. *Channel Condition/Alteration*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	8 (no range)	8 (no range)	8 (no range)
North Sulphur River Main Channel Restoration	0	8	8	8
Former North Sulphur River Restoration	--	8	8	8

	Optimal			Suboptimal			Marginal		Poor		
Channel Condition /Alteration	Natural channel; no structures or channelization minimal. No evidence of downcutting or excessive lateral cutting. Normal frequency of hydrological connection between channel and floodplain			Some channelization (usually in bridge areas) or past channel alteration, but with significant recovery of channel bed and banks. Acceptable frequency of overbank flows onto floodplain.			Altered channel; 40-80% of the reach channelized or disrupted; braided channel with excessive frequency of overbank flows onto the floodplain. Historical incision, dikes, or levees restrict floodplain.		Channel is actively downcutting or widening. >80% of the reach riprap or channelized. Degradation, dikes or levees prevent access to the floodplain.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- For sections of existing stream channels that are stable to partially stable, a combination of instream structure placement, localized grading and bank sloping, bend realignment, and supplemental plantings may be implemented.

Ephemeral Streams – Restoration

- Natural channel design used to produce appropriate channel form and sinuosity.

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[1] Freese & Nichols, Inc. Main Channel North Sulphur River Restoration – Preliminary Design Memorandum, April 9, 2019

[2] Robert J. Brandes Consulting. Technical Memorandum – Analysis of Flood Flows for Revised North Sulphur River Restored Channel. Dated 11 August 2017.

[3] Ecosystem Restoration and Planning LLC. Technical Memorandum Number 3, July 2019.

- Normal frequency of hydrological connection between restored channel and its floodplain.
- Anticipated flooding frequency to fall within range of return periods of 1.5 to 2.5 years.

North Sulphur River Main Channel Restoration

- Natural channel design used to produce appropriate channel form and sinuosity.
- Normal frequency of hydrological connection between restored channel and its floodplain.
- Anticipated flooding frequency to fall within range of return periods of 1.5 to 2.5 years.

Former North Sulphur River Restoration

- Natural channel design used to produce appropriate channel form and sinuosity.
- Normal frequency of hydrological connection between restored channel and its floodplain.
- Anticipated flooding frequency to fall within range of return periods of 1.5 to 2.5 years.

3. *Channel Capacity to Flow Frequency*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	8 (no range)	8 (no range)	8 (no range)
North Sulphur River Main Channel Restoration	0	8	8	8
Former North Sulphur River Restoration	--	8	8	8

	Optimal			Suboptimal			Marginal		Poor		
Channel Capacity to Flow Frequency Ratio (for 2-year Peak Flow)	Channel capacity to flow frequency ratio is such that bank overflow from storm events occur at a 1.25 to 2.5-year frequency. Ratio to 2-year peak flow 0.75-1.25			Channel capacity to flow frequency ratio is such that bank overflow from storm events are more frequent than every 1.25 years or less frequent than every 2.5 years. Ratio to 2-year peak flow <0.75 or >1.25			Channel capacity to flow frequency ratio is such that bank overflow from storm events are more frequent than every year or less frequent than every 5 years. Ratio to 2-year peak flow <0.5 or >1.5		Channel capacity to flow frequency ratio is such that bank overflow from storm events are more frequent than every half year or less frequent than every 10 years. Ratio to 2-year peak flow <0.25 or >2		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Scoring comparable to baseline scores.

Ephemeral Streams – Restoration

- Natural channel design will emphasize designing channels to carry the bankfull discharge and allowing larger flows to overbank onto an active floodplain.
- Reconnection with stream's historic floodplain will be preference when practical.
- Where reconnection with historic floodplain not practical, bankfull benches will be excavated to provide floodplain access such that the excavated floodplain is accessed by flood flows at the bankfull discharge and greater.

North Sulphur River Main Channel Restoration

- Similar metrics to the Ephemeral Streams – Restoration
- Natural channel design will emphasize designing channel to carry the design discharge and allowing larger flows to overbank onto an active floodplain.

Former North Sulphur River Restoration

- Similar metrics to the Ephemeral Streams – Restoration
- Natural channel design will emphasize designing channel to carry the bankfull discharge and allowing larger flows to overbank onto an active floodplain.

4. ***Channel Bank Stability*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	6 to 8	7 to 8	8 (no range)
North Sulphur River Main Channel Restoration	2	9	9	9
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Channel Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; (<5% of bank affected), perennial vegetation to waterline; no raw or undercut banks (some erosion on outside meander bends o.k.); no recently exposed roots; no recent tree falls.			Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of minor erosion and/or bank undercutting; perennial vegetation to waterline in most places; recently exposed trees roots rare but present.			Moderately unstable; perennial vegetation to waterline sparse (mainly scoured or stripped by lateral erosion), bank held by hard points (trees, rock outcrops) and eroded bank elsewhere; 30-60% of bank in reach has areas of erosion and bank undercutting; recently exposed tree roots and fine root hairs common.		Unstable; no perennial vegetation at waterline; severe erosion of both banks; recently exposed tree roots common; tree falls and/or severely undercut trees common; many eroded areas; "raw" areas frequent along straight sections; 60-100% of bank has erosional scars.		
Grade (Left)	10	9	8	7	6	5	4	3	2	1	0
Grade (Right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Minimal work such as localized grading and bank sloping and bend realignment to address erosion and channel migration issues.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

Ephemeral Streams – Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.

- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

North Sulphur River Main Channel Restoration

- Channel will be reconstructed and stream channel dimension sized to convey design storm flows while maintaining stability with larger flows spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as rock vanes to protect stream banks and maintain bank stabilities.

Former North Sulphur River Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

5. *Channel Sinuosity*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	1 to 8	1 to 8	1 to 8
Restoration	--	1 to 8	1 to 8	1 to 8
North Sulphur River Main Channel Restoration	1	4	4	4
Former North Sulphur River Restoration	--	8	8	8

	Optimal			Suboptimal			Marginal		Poor		
Channel Sinuosity (bends in low gradient stream)	Bends in the stream increase the stream length 2.5 to 4 times longer than if it were straight. Channel length/valley length at least >1.5.			Bends in the stream increase the stream length 1.5 to 2.5 times longer than if it were a straight line. Channel length/valley length 1.2 to 1.5.			Bends in the stream increase the stream length 1 to 1.5 times longer than if it were a straight line. Channel length/valley length 1.0 to 1.2.		Channel straight; waterway has been channelized for a long distance. Channel length/valley length equal to 1.0.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Enhanced streams should maintain existing stream sinuosity. Some meander bends may be realigned to promote bank stability and decrease shear stresses on the bank.

Ephemeral Streams – Restoration

- Restored streams were designed with sinuosities that mimic stable reference reaches, as described in EPR Technical Memorandum 2 (**Appendix F**).

North Sulphur River Main Channel Restoration

- Formal design analyses of hydraulics, hydrology, and sediment transport indicated a target design sinuosity of 1.2 was appropriate for the reach.

Former North Sulphur River Restoration

- Formal design analyses of hydrology, topography, and sediment transport indicated design sinuosities greater than 2.0 for the reach.

6. *Channel Bottom Substrate*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 5	--	--	--
Enhancement	--	1 to 5	1 to 5	1 to 5
Restoration	--	1 to 4	1 to 4	1 to 4
North Sulphur River Main Channel Restoration	0	6	6	6
Former North Sulphur River Restoration	--	4	4	4

Bottom Substrate Composition	Optimal			Suboptimal			Marginal		Poor		
	Little or no channel enlargement resulting from sediment accumulation; channel is stable.			Some gravel bars of coarse stones and well-washed debris present, little silt; moderately stable.			Sediment bars of rocks, sands, and silt common; moderately unstable.		Channel divided into braids or stream is channelized; substrate is uniform sand, silt, clay, or bedrock; unstable.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Channel bottom substrate will remain as uniform clay or mud with root mat development in areas with mature riparian corridors.
- Organic substrate deposition will occur seasonally in ephemeral enhancement streams with mature riparian cover.

Ephemeral Streams – Restoration

- Natural channel design will be employed to establish a stable channel bottom for the expected soil substrates.
- Channel bottom substrate will remain as uniform clay or mud with root mats developing as the wooded riparian corridors mature.
- Dominated by “sand-size” or smaller bed material for most SARs.
- Stable riffle slopes were determined through sediment transport analyses, and when valley/stream gradient exceeded predicted stable slopes, grade control structures, such as logs and rock riffles, were incorporated.
- Organic substrate deposition will occur seasonally in ephemeral restored streams as riparian cover matures.

North Sulphur River Main Channel Restoration

- Natural channel design approaches were used to establish a stable channel bottom for the expected soil substrates.
- Stable riffle slopes were determined through sediment transport analyses, and when valley/stream gradient exceeded predicted stable slopes, grade control structures, such as rock cross-vanes, were incorporated.

- In situ soils consist of a mixture of cobble, gravels, sands, and fine grains. Accordingly, sediment bars consisting of a mixture of this material should be common.
- Organic substrate deposition will occur seasonally as riparian cover matures.

Former North Sulphur River Restoration

- Natural channel design approaches were used to establish a stable channel bottom for the expected soil substrates.
- Stable riffle slopes were determined through sediment transport analyses, and when valley/stream gradient exceeded predicted stable slopes, grade control structures, such as logs and rock riffles, were incorporated.
- Stream bottom design consists of a mixture of sand, mud or clay, with root mats developing as well as submerged vegetation.
- Organic substrate deposition will occur seasonally as riparian cover matures.

7. *Instream Bottom Topography*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	1 to 4	2 to 4	2 to 4	3 to 5
North Sulphur River Main Channel Restoration	1	4	5	6
Former North Sulphur River Restoration	--	5	6	7

Instream Bottom Topography	Optimal			Suboptimal			Marginal		Poor		
	Diverse bottom topography including >7 of the following: deep pools, boulders/gravel, logs/large woody debris, backwaters/oxbows, overhanging vegetation, riffles, vegetated shallows, rootwads, undercut banks, or side channel pools			Channel bottom includes 5-7 of the items listed in Optimal Category			Channel bottom includes < 5 of the items listed in Optimal Category		Channel bottom includes <3 of the items listed in Optimal Category		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement and Restoration

- Enhanced and restored ephemeral channel SARs are expected to include a combination of pools, overhanging vegetation, logs/large woody debris, rootwad/toe wood, and/or riffles.

North Sulphur River Main Channel Restoration

- North Sulphur River Main Channel Restoration SARs will include pools, overhanging vegetation, rock vanes, riffles, woody debris, and/or vegetated shallows.

Former North Sulphur River Restoration

- The Former North Sulphur River Restoration SARs will include pools, overhanging vegetation, logs/large woody debris, riffles, rock, rootwad/toe wood, vegetated shallows, and/or gravel.

8. *Channel Incision*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 9	--	--	--
Enhancement	--	2 to 9	3 to 9	3 to 9
Restoration	--	8 (no range)	8 (no range)	8 (no range)
North Sulphur River Main Channel Restoration	1	9	9	9
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Channel Incision	Incision ratio >1.0 <1.2 and Where channel slope >2%; Entrenchment ratio >1.4; Where channel slope <2%; Entrenchment ratio >2.0			Incision ratio >1.2 <1.4 and Where channel slope >2%, Entrenchment ratio >1.4; Where channel slope <2%, Entrenchment ratio >2.0			Incision ratio > 1.4 < 2.0 and Where channel slope > 2%, Entrenchment ratio >1.4; Where channel slope <2%, Entrenchment ratio >2.0		Incision ratio >2.0 and Where channel slope >2%, Entrenchment ratio <1.4; Where channel slope <2%, Entrenchment ratio <2.0		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Future scores would be comparable to baseline scores for the enhancement streams except where banks are sloped and benches are established in select locations.

Ephemeral Streams – Restoration

- Natural channel design approaches utilized on ephemeral channel restoration SARs will result in streams with incision and entrenchment ratios appropriate for the valley slopes and stream types. Restored and re-established streams will have access to functional floodplains.

North Sulphur River Main Channel Restoration

- Natural channel design approaches utilized for the North Sulphur River Main Channel Restoration SARs will result in incision and entrenchment ratios appropriate for the valley slope and stream type. The restored stream will have access to a functional floodplain.

Former North Sulphur River Restoration

- Natural channel design approaches utilized for the Former North Sulphur River Restoration SARs will result incision and entrenchment ratios appropriate for the valley slope and stream type. The restored stream will have access to a functional floodplain.

9. *Pools*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 3	0 to 5	0 to 5	0 to 5
North Sulphur River Main Channel Restoration	3	7	7	7
Former North Sulphur River Restoration	--	5	5	5

	Optimal			Suboptimal			Marginal		Poor		
Pools (abundant, present, or absent)	Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or pools are at least 5 feet deep.			Pools present, but not abundant; from 10-30% of the pool bottom is obscure due to depth, or the pools are at least 3 feet deep.			Pools present, but shallow; from 5-10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep.		Pools absent, or the entire bottom is discernible.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Additional pools associated with instream structures and stabilized meander bends, resulting in low suboptimal scores for most reaches

North Sulphur River Main Channel Restoration

- Hydrology and scale of North Sulphur River Main Channel Restoration will enable more pool diversity to be included in design and greater pool depths to be developed.
- Pools at least four feet in depth will be established.

Former North Sulphur River Restoration

- Hydrology and scale of Former North Sulphur River Restoration will enable more pool diversity to be included in design and greater pool depths to be developed.
- Pools at least three feet in depth will be established.

10. *Channel Flow Status*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 6[4]	0 to 6	0 to 6	0 to 6
North Sulphur River Main Channel Restoration	2	6	6	6
Former North Sulphur River Restoration	--	6	6	6

	Optimal			Suboptimal			Marginal		Poor		
Channel Flow Status (degree to which channel is filled)	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.			Water fills >75% of the available channel; or <25% of channel substrate is exposed.			Water fills 25-75% of the available channel, and /or riffle substrates are mostly exposed.		Very little water in channel and mostly present as standing pools. No water = zero.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Future scores would be comparable to baseline scores.

[4] During the baseline assessment, an ephemeral tributary (S2-TRIB3-(10)) slated for enhancement was observed with water occupying more than 75 percent of the channel.

- If water occupies the channel, it would be measured and recorded.
- If the channel is dry, this metric has a “no water equals zero” provision – score would be zero.

North Sulphur River Main Channel Restoration

- Groundwater inflow along the alluvium-bedrock interface to the North Sulphur River Main Channel Restoration reach is anticipated to provide mid-range suboptimal conditions.

Former North Sulphur River Restoration

- Hydrology for the Former North Sulphur River Restoration reach including groundwater inflow supplemented by surface runoff is expected to result in mid-range suboptimal conditions.

Water Quality / Biogeochemical Functions

1. ***Bank Stability*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	6 to 8	7 to 8	8 (no range)
North Sulphur River Main Channel Restoration	2	9	9	9
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Bank Stability (score each bank, left or right facing downstream)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.			Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.			Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.		Unstable; many eroded areas; "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Minimal work such as localized grading and bank sloping and bend realignment to address erosion and channel migration issues.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

Ephemeral Streams – Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.

- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

North Sulphur River Main Channel Restoration
- Channel will be reconstructed and stream channel dimension sized to convey design storm flows while maintaining stability with larger flows spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as rock vanes to protect stream banks and maintain bank stabilities.

Former North Sulphur River Restoration
- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

2. ***Channel Bottom Bank Stability*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	5 to 8	5 to 8	5 to 8
North Sulphur River Main Channel Restoration	0	9	9	9
Former North Sulphur River Restoration	--	9	9	9

Channel Bottom Bank Stability	Optimal			Suboptimal			Marginal		Poor		
	Bottom 1/3 of bank is generally highly resistant plant/soil matrix or material.			Bottom 1/3 of bank is generally resistant plant/soil matrix or material.			Bottom 1/3 of bank is generally highly erodible material; plant/soil matrix compromised.		Bottom 1/3 of bank is generally highly erodible material; plant/soil matrix severely compromised.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Minimal work such as localized grading and bank sloping and bend realignment to address erosion and channel migration issues.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

Ephemeral Streams – Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

North Sulphur River Main Channel Restoration

- Channel will be reconstructed and stream channel dimension sized to convey design storm flows while maintaining stability with larger flows spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as rock vanes to protect stream banks and maintain bank stabilities.

Former North Sulphur River Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

3. *Water Clarity*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 4	0 to 5	0 to 5	0 to 5
North Sulphur River Main Channel Restoration	2	6	6	6
Former North Sulphur River Restoration	--	6	6	6

	Optimal			Suboptimal			Marginal		Poor		
Water Clarity	Very clear, or clear but tea-colored; objects visible at depth 3-6 feet (less if slightly colored); no oil sheen on surface; no noticeable film on submerged objects or rocks.			Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5-3 ft; may have slightly green color; no oil sheen on water surface.			Considerable cloudiness most of the time; objects visible to depth 0.5-1.5 ft; slow sections may appear pea-green; bottom rocks or submerged objected covered with film.		Very turbid or muddy appearance most the time; objects visible to depth <0.5 ft; slow moving water may be bright-green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface. No water = zero.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Water quality of the ephemeral channels is not expected to change significantly.
- Protected vegetated riparian buffers should attenuate nutrient inflow thereby limiting impacts to water clarity resulting from algal blooms.

North Sulphur River Main Channel Restoration

- Channel restoration is expected to contain water due to groundwater influence as well as runoff from the contributing watershed and occasional spills from the dam.
- Protected vegetated riparian buffers should attenuate nutrient inflow thereby limiting impacts to water clarity resulting from algal blooms.
- A score in the mid-suboptimal range is expected due to occasional cloudiness following rain events, especially with the colloidal nature of the local clay soils.

Former North Sulphur River Restoration

- Channel expected to contain water due to groundwater influence as well as runoff from the contributing watershed.
- Protected vegetated riparian buffers should attenuate nutrient inflow thereby limiting impacts to water clarity resulting from algal blooms.
- Occasional cloudiness is expected following rain events, especially with the colloidal nature of the local clay soils.

4. *Nutrient Enrichment*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 4	0 to 5	0 to 5	0 to 5
North Sulphur River Main Channel Restoration	1	7	7	7
Former North Sulphur River Restoration	--	7	7	7

	Optimal			Suboptimal			Marginal		Poor		
Nutrient Enrichment	Clear water along entire reach; diverse aquatic plant community includes low quantities of many species of macrophytes; little algal growth present.			Fairly clear or slightly greenish water along entire reach; moderate algal growth on stream substrates.			Greenish water along entire reach; overabundance of lush green macrophytes; abundant algal growth, especially during warmer months.		Pea green, gray, or brown water along entire reach; dense stands of macrophytes clog stream; severe algal blooms create thick algal mats in stream or NO algae present due to unstable substrate. No water = zero.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Hydrology of the ephemeral channels is not expected to change significantly.
- Future scores are expected to be comparable to baseline scores.

North Sulphur River Main Channel Restoration

- The North Sulphur River Main Channel Restoration is expected to contain water due to groundwater influence and runoff from the contributing watershed.
- Protected riparian buffer zones will provide filtration of storm runoff and minimize nutrient inputs.

Former North Sulphur River Restoration

- The Former North Sulphur River Restoration is expected to contain water due to groundwater influence and runoff from the contributing watershed.

- Protected riparian buffer zones will provide filtration of storm runoff and minimize nutrient inputs.

5. *Composition of Organic Matter*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 5	1 to 5	2 to 7	4 to 8
North Sulphur River Main Channel Restoration	2	4	6	9
Former North Sulphur River Restoration	--	4	6	9

	Optimal			Suboptimal			Marginal		Poor		
Composition of Organic Matter	Mainly consisting of leaves and wood without sediment.			Leaves and wood scarce; fine organic debris without sediment.			No leaves or woody debris; coarse and fine organic matter with sediment.		Fine organic sediment - black in color and foul odor (anaerobic) or no sediment present due to excessive scouring		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Establishment of protected riparian corridors of multiple strata is expected to provide substantial input of leaves and woody debris to the channels on a seasonal basis.
- Enhancement designs are expected to develop stable channels with in-channel structures that would facilitate retention of leaves and woody debris.
- Restoration designs are expected to develop stable channels with in-channel structures and incorporate structures that will facilitate retention of leaves and woody debris.

North Sulphur River Main Channel Restoration

- Establishment of protected riparian corridor of multiple strata along the restored channel is expected to provide substantial input of leaves and woody debris to the channel on a seasonal basis.
- Restoration design is expected to develop a stable channel with in-channel structures that will facilitate retention of leaves and woody debris.
- The larger watershed and riparian corridor developed is expected to provide a larger volume of leaves and woody debris input and the larger channel will have more capacity for retention.

Former North Sulphur River Restoration

- Establishment of protected riparian corridor of multiple strata along the restored channel is expected to provide substantial input of leaves and woody debris to the channel on a seasonal basis.
- Restoration design is expected to develop a stable channel with in-channel structures that will facilitate retention of leaves and woody debris.
- The larger watershed and riparian corridor developed is expected to provide a larger volume of leaves and woody debris input and the larger channel will have more capacity for retention.

6. ***Land Use Pattern*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	3 to 6	5 to 9	7 to 9	9 (no range)
North Sulphur River Main Channel Restoration	2.5	9	9	9
Former North Sulphur River Restoration	--	9	9	9

<table>
<tr><td rowspan="2">Land Use Pattern</td><td colspan="3">Optimal</td><td colspan="3">Suboptimal</td><td colspan="2">Marginal</td><td colspan="3">Poor</td></tr>
<tr><td colspan="3">Undisturbed, consisting of forest, pristine native prairie, and/or natural wetlands.</td><td colspan="3">Permanent pasture mixed with woodlots and swamps, few row crops</td><td colspan="2">Mixed row crops and pasture; some wooded areas may be present but as isolated patches</td><td colspan="3">Mainly row crops</td></tr>
<tr><td>Grade (left)</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Grade (right)</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
</table>

Ephemeral Streams – Enhancement & Restoration

- Riparian corridors with multiple strata will be developed through plantings.
- Native prairie plantings will be established between the riparian corridor and the conservation easement boundary.
- Areas will be excluded from agricultural practices such as farming or livestock rearing.
- These areas are anticipated to develop into undisturbed forests with patches of native prairie interspersed – similar to what is typically seen in undisturbed riparian systems associated with the Blackland Prairie Ecosystem.

North Sulphur River Main Channel Restoration

- Riparian corridors with multiple strata will be developed through plantings.
- These areas will be fenced and undisturbed by agricultural practices such as farming or livestock rearing.
- These areas are anticipated to develop into undisturbed forests with patches of native prairie interspersed – similar to what is typically seen in undisturbed riparian systems associated with the Blackland Prairie Ecosystem.

Former North Sulphur River Restoration

- Extensive riparian corridors with multiple strata will be developed through plantings.
- These areas will be fenced and undisturbed by agricultural practices such as farming or livestock rearing.
- These areas are anticipated to develop into undisturbed forests with patches of native prairie interspersed – similar to what is typically seen in undisturbed riparian systems associated with the Blackland Prairie Ecosystem.

7. ***Riparian Buffer Zone Width*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	2 to 8	3 to 8	6 to 8	9 (no range)
North Sulphur River Main Channel Restoration	2.5	5	7	9
Former North Sulphur River Restoration	--	5	7	9

	Optimal			Suboptimal			Marginal		Poor		
Riparian Zone Width (from steam edge to field)	Width of riparian zone >18 meters (1-2 channel widths with trees, shrubs, or tall grasses), human activities have not impacted zone.			Width of riparian zone 12-18 meters (1/2-1 active channel width w/trees, shrubs, or grasses), human activities have minimally impacted zone.			Width of riparian zone 6-12 meters (1/3-1/2 active channel width vegetated), impacted by human activities.		Width of riparian zone < 6 meters (natural vegetation less than 1/3 active channel width), little riparian vegetation due to human activities.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Protected riparian buffer zone will be established along all mitigation channels which will include a minimum 18 meters (60 feet) of riparian buffer zone on either side of the stream meander belt width appropriate for each channel. Both the riparian buffer and meander belt width will be planted to establish multiple strata of vegetation.

North Sulphur River Main Channel Restoration

- Protected riparian buffer zone would be established along all mitigation channels which will include a minimum 18 meters (60 feet) of riparian buffer zone on either side of the stream meander belt width appropriate for the channel. Both the riparian buffer and meander belt width will be planted to establish multiple strata of vegetation. Refer to Figure 9-1 in Section 9 for illustration of Stream Mitigation Area.

Former North Sulphur River Restoration

- Protected riparian buffer zone would be established along all mitigation channels which will include a minimum 18 meters (60 feet) of riparian buffer zone on either side of the stream meander belt width appropriate for the channel. Both the riparian buffer and meander belt width will be planted to establish multiple strata of vegetation. Refer to Figure 9-1 in Section 9 for illustration of Stream Mitigation Area.

8. ***Riparian Buffer Zone Vegetation Protection/Completeness*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	1 to 6	2 to 6	5 to 7	9 (no range)
North Sulphur River Main Channel Restoration	3	2	6	9
Former North Sulphur River Restoration	--	2	6	9

	Optimal			Suboptimal			Marginal		Poor		
Riparian Zone Vegetation Protection / Completeness	>90% plant density of mature trees or shrubs, prairie grasses, or marsh plants, riparian zone intact or disruption from grazing/mowing minimal.			75-90% streambank vegetation, mixed young species along channel and mature trees behind; disruption evident with breaks occurring at intervals of >50 meters.			50-75% streambank vegetation of mixed grasses and sparse young tree or shrub species; breaks frequent with some gullies and scars every 50 meters.		Less than 50% streambank vegetation coverage consisting mostly of pasture grasses, few trees & shrubs; low plant density; bank deeply scarred with gullies all along its length.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Protected riparian corridors will be established along ephemeral mitigation channels through plantings of native species of trees, shrubs, grasses, and forbs. The plantings will cover the full riparian buffer zone width as described above. Composition of the riparian corridor will include multiple strata. Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.

North Sulphur River Main Channel Restoration

- Protected riparian corridors will be established along the North Sulphur River Main Channel Restoration reach through plantings of native species of trees, shrubs, grasses, and forbs. The plantings will cover the full riparian buffer zone width as described above. Composition of the riparian corridor will include multiple strata. Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.

Former North Sulphur River Restoration

- Protected riparian corridors will be established along the Former North Sulphur River Restoration channel through plantings of native species of trees, shrubs, grasses, and forbs. The plantings will cover the full riparian buffer zone width as described above. Composition of the riparian corridor will include multiple strata. Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.

Habitat Functions

1. *Flow Regime*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 2	1 to 2	1 to 2	1 to 2
North Sulphur River Main Channel Restoration	3	7	7	7
Former North Sulphur River Restoration	--	7	7	7

Flow Regime										
Type	Perennial			Intermittent w/ Perennial Pools			Intermittent		Ephemeral	
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Scoring comparable to baseline scores – but channel form is expected to improve.
- Channel displays good channel form and contains water: score = 2
- Channel displays good channel form and no water: score = 1

North Sulphur River Main Channel Restoration[5]

- Flow will consist of contributions from the immediate watershed, lateral infiltration as groundwater inputs, and occasional spills from the dam.
- Retention of water aided by restored stream being located on low-permeability fill and through improved pool geometry, including the creation of deep pools.
- Based on designs and hydrologic modeling, pools will retain water most of the year.

Former North Sulphur River Restoration

- Preliminary hydrologic analyses[6] indicate that during normal climatic conditions, this channel will retain water year-round throughout most of its length especially within deep pools. Additional detailed hydrologic analyses[7] support the findings from the preliminary hydrologic analyses study.

[5] Freese and Nichols, Inc., Lake Ralph Hall – Main Channel North Sulphur River Stream Restoration Basis of Design Report, June 2019.
[6] Robert J. Brandes Consulting. Technical Memorandum – Preliminary Analysis of North Sulphur River Restored Channel as Perennial Stream. February 24, 2017.
[7] Ecosystem Restoration and Planning LLC. Technical Memorandum Number 3, July 2019.

2. *Epifaunal Substrate/Available Cover*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 6	--	--	--
Enhancement	--	1 to 4	2 to 4	2 to 5
Restoration	--	3 to 5	3 to 5	3 to 5
North Sulphur River Main Channel Restoration	1	9	9	9
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Epifaunal Substrate / Available Cover	Within stream bed, greater than 50% coverage by stable habitat features, favorable for stream faunal colonization and/or fish/amphibian cover. Most habitat features non transient. Features may include snags, submerged logs, undercut banks, roots, cobble, rocks, persistent leaf packs, pools and glides, or other stable habitat at a stage to allow colonization			Within stream bed, 30-50% coverage by stable habitat features favorable for stream faunal colonization and/or fish/amphibian cover. Many habitat features not transient. (See Excellent Category for habitat feature components.)			Within stream bed, 10-30% coverage by stable habitat features favorable for stream faunal colonization and/or fish/amphibian cover; habitat availability may be less than desirable, substrate may be frequently disturbed. (See Excellent Category for habitat feature components.)		Less than 10% habitat features present; lack of habitat is obvious; substrate unstable or lacking; concrete lined channels. Habitat features and pools buried or lacking, channel bottom may be flat.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Anticipate some increase in quantity and variety of natural structures within the enhanced streams due to proposed incorporation of large woody debris and instream structures in localized areas.

Ephemeral Streams – Restoration

- Anticipate increase in quantity and variety of natural structures within the restored streams due to proposed incorporation of large woody debris and instream structures as design elements in natural channel design.

North Sulphur River Main Channel Restoration

- Anticipate substantial increase in quantity and variety of natural structures within the restored channel due to proposed incorporation of instream structures as design elements in the natural channel design.
- The North Sulphur River Main Channel Restoration reach is expected to retain water within the channel and provide increased quantity and variety of natural structure.

Former North Sulphur River Restoration

- Anticipate substantial increase in quantity and variety of natural structures within the restored channel due to proposed incorporation of large woody debris, pools, and other features as design elements in the natural channel design.
- The Former North Sulphur River Restoration channel is expected to retain water within the channel and therefore the increased quantity and variety of natural structure.

3. *Stream Bottom Substrate*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	1 to 4	1 to 6	1 to 6	1 to 6
North Sulphur River Main Channel Restoration	1	6	6	6
Former North Sulphur River Restoration	--	6	6	6

Stream Bottom Substrate	Optimal			Suboptimal			Marginal		Poor		
	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.			Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.			All mud or clay or sand bottom; little or no root mat; no submerged vegetation.		Hard pan clay or bedrock; no root mat or submerged vegetation.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Stream bottom substrate for most streams observed within the mitigation area currently consists of uniform clay or mud.
- Some organic bottom substrate observed seasonally in areas with riparian vegetation along and overhanging streams.
- Stream bottom substrate will remain as uniform clay or mud with root mat development including enhanced wooded riparian corridors.
- Organic deposition will continue to occur seasonally.

Ephemeral Streams – Restoration

- Stream bottom substrate for restored channels will remain as uniform clay or mud with root mat development as planted riparian corridors mature.
- Organic deposition will occur seasonally as riparian plantings mature.

North Sulphur River Main Channel Restoration

- In situ soils consist of a mixture of cobble, gravels, sands, and fine grains. Accordingly, stream bottom substrate should consist of a mixture of soft sand, mud, or clay.
- Organic deposition will occur seasonally as riparian plantings mature.

Former North Sulphur River Restoration

- The Former North Sulphur River Restoration will be designed with a stream bottom consisting of a mixture of sand, mud or clay, with root mats developing as well as submerged vegetation.
- Organic deposition would occur seasonally as riparian plantings mature.

4. *Pool Variability*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	0 to 3	--	--	--
Enhancement	--	1 to 4	2 to 4	2 to 4
Restoration	--	2 to 4	2 to 4	2 to 6
North Sulphur River Main Channel Restoration	1	9	9	9
Former North Sulphur River Restoration	--	8	8	8

Pool Variability	Optimal			Suboptimal			Marginal		Poor		
	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present			Majority of pools large-deep; very few shallow.			Shallow pools much more prevalent than deep pools		Majority of pools small-shallow or pools absent		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Natural channel design plans include instream structure placement, localized grading and bank sloping, bend realignment, and/or supplemental plantings to achieve channel stability and bed form diversity.
- Placement of instream structures will induce downstream scour pools.
- For streams with sinuosity less than 1.2, pool spacing and placement will primarily be driven by the placement of instream structures.
- For streams with design sinuosity greater than 1.2, pool spacing and placement will be driven by a combination of meander geometry and structure placement.

Ephemeral Streams – Restoration

- Natural channel design plans include instream structure placement, grading to achieve appropriate channel sinuosity and bank sloping to achieve channel stability and bed form diversity, and riparian plantings to establish riparian buffer zones.
- Placement of instream structures will induce downstream scour pools.
- For streams with sinuosity less than 1.2, pool spacing and placement will primarily be driven by the placement of instream structures.
- For streams with design sinuosity greater than 1.2, pool spacing and placement will be driven by a combination of meander geometry and structure placement.

North Sulphur River Main Channel Restoration

- Natural channel design for the North Sulphur River Main Channel Restoration will include a mixture of different sizes and depths of pools which are expected to retain water for extended periods.

Former North Sulphur River Restoration

- Natural channel design for the Former North Sulphur River Restoration will include a mixture of different sizes and depths of pools which are expected to retain water for extended periods.

5. *Sediment Deposition/Scouring*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 8	2 to 8	4 to 8	4 to 8
North Sulphur River Main Channel Restoration	1	8	8	8
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Sediment Deposition / Scouring	<5% of channel bottom affected by scour or deposition.			5-30% affected by scour or deposition; Scour at constrictions and where grades steepen. Some deposition in pools			30-50% affected by scour or deposition. Deposits and scour at obstructions, constrictions and bends. Some filling of pools.		More than 50% of the bottom in a state of flux or change nearly yearlong. Pools minimal or absent due to heavy deposition or excessive scouring.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Conditions for the enhanced ephemeral streams are expected to express suboptimal conditions due to the steeper grades encountered in these headwater streams.
- Natural channel design principles will be utilized to incorporate instream structure placement, localized grading and bank sloping, bend realignment, and/or supplemental plantings to achieve appropriate grade control and bed form diversity.

Ephemeral Streams – Restoration

- Principles of natural channel design will be utilized to design channels with appropriate channel dimension, channel pattern, and channel profile so that deposition and scouring are provided as stable bed form diversity.
- Additional grade control is provided for the restored ephemeral streams compared to the enhanced ephemeral streams.

North Sulphur River Main Channel Restoration

- Natural channel design utilized for the North Sulphur River Restoration reach enables optimal conditions of negligible scour or deposition to be achieved.

Former North Sulphur River Restoration

- Natural channel design utilized for the Former North Sulphur River Restoration reach enables optimal conditions of negligible scour or deposition to be achieved.

6. *Channel Flow Status*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	0 to 6	0 to 6	0 to 6	0 to 6
North Sulphur River Main Channel Restoration	2	6	6	6
Former North Sulphur River Restoration	--	6	6	6

Channel Flow Status	Optimal			Suboptimal			Marginal		Poor		
	Water reaches the base of both lower banks; <5% of channel substrate is exposed			Water fills >75% of the channel; or <25% of channel substrate is exposed			Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed		Very little water in the channel and mostly present in standing pools; or stream is dry		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Ephemeral streams are expected to retain some water within scour pools downstream of instream structures for a few days (or weeks), but channels would be primarily dry except immediately after rain events.
- Projected future scores would remain comparable to baseline scores.
- If water occupies the channel, it would be measured and recorded.

Ephemeral Streams – Restoration

- Restored ephemeral streams are also expected to retain some water within scour pools downstream of instream structures for a few days (or weeks), but channels will be primarily dry except immediately after rain events.
- Projected future scores will remain comparable to baseline scores with minimal improvement expected.
- If water occupies the channel, it will be measured and recorded.

North Sulphur River Main Channel Restoration

- Water will be retained for extended periods in the North Sulphur River Main Channel Restoration reach due to groundwater inflow along the alluvium-bedrock interface.

Former North Sulphur River Restoration

- Water will be retained for extended periods in the Former North Sulphur River Restoration reach due to groundwater inflow supplemented by surface runoff.

7. *Channel Alteration*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	8 (no range)	8 (no range)	8 (no range)
North Sulphur River Main Channel Restoration	1	9	9	9
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Channel Alteration	Channelization, alteration, or dredging absent or minimal; normal and stable stream meander pattern. Alteration by stormwater inputs absent or minimal			Some alteration or channelization present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (I.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration is not present. Minor alteration from stormwater or other inputs.			Alteration or channelization may be extensive; embankments (including spoil piles) or shoring structures present on both banks; normal stable stream meander pattern has not recovered. Alteration from stormwater inputs may be extensive. 40-80% of stream reach altered.		Banks shored with gabion, riprap, or concrete. Concrete or riprap lined channels. Instream habitat significantly altered by stormwater or other inputs. Over 80% of the stream reach altered.		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Enhancement of these channels includes instream structure placement, localized grading and bank sloping, bend realignment and supplemental plantings as needed to enhance stability and function.

Ephemeral Streams – Restoration

- Natural channel design and geomorphology principles were be used to develop appropriate channel form and sinuosity.
- Normal frequency of hydrological connection between restored channels and their floodplains will be achieved.
- Stable riffle slopes were determined through sediment transport analyses, and when valley/stream gradient exceeded these predicted stable slopes, grade control structures, such as logs and rock riffles, were be incorporated.
- Protected wooded riparian corridors aide with grade control over time with tree roots and debris jams as examples.

North Sulphur River Main Channel Restoration

- Natural channel design and geomorphology principles were used to develop appropriate channel form and sinuosity for the North Sulphur River Main Channel restoration.
- Pattern and profile designs were based on the reference reach information from the project watershed, reference reach information from similar streams in other regions, and professional judgement gained from past restoration projects.
- Stable riffle slopes were determined through sediment transport analyses, and grade control structures, such as rock vanes, were incorporated to account for flood flows.

- Normal frequency of hydrological connection between restored channel and its floodplain will be achieved.

Former North Sulphur River Restoration

- Natural channel design and geomorphology principles were used to develop appropriate channel form and sinuosity for the Former North Sulphur River Restoration.
- Pattern and profile designs were based on the reference reach information from the project watershed, reference reach information from similar streams in other regions, and professional judgement gained from past restoration projects.
- Stable riffle slopes were determined through sediment transport analyses, and when valley/stream gradient exceeded these predicted stable slopes, grade control structures, such as logs and rock riffles, were incorporated.
- Normal frequency of hydrological connection between restored channel and its floodplain will be achieved.

8. *Channel Sinuosity*

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 5	--	--	--
Enhancement	--	1 to 5	1 to 5	1 to 5
Restoration	--	1 to 5	1 to 5	1 to 5
North Sulphur River Main Channel Restoration	1	3	3	3
Former North Sulphur River Restoration	--	5	5	5

	Optimal			Suboptimal			Marginal		Poor		
Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas).			The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.			The bends in the stream increase the stream 1 to 2 times longer than if it was in a straight line		Channel straight; waterway has been channelized for a long distance		
Grade	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Major modifications are not proposed for enhancement streams.
- Projected future scores are comparable to the baseline scores.

Ephemeral Streams – Restoration

- Restored streams were designed with sinuosities that mimic stable reference reaches, as described in EPR Technical Memorandum 2 (**Appendix F**).

North Sulphur River Main Channel Restoration

- Formal design analyses of hydraulics, hydrology, and sediment transport indicated a target design sinuosity of 1.2 was appropriate for the reach.

Former North Sulphur River Restoration

- Formal design analyses of hydrology, topography, and sediment transport indicated design sinuosities greater than 2.0 for the reach.

9. ***Bank Stability*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams	1 to 8	--	--	--
Enhancement	--	2 to 8	4 to 8	6 to 8
Restoration	--	6 to 8	7 to 8	8 (no range)
North Sulphur River Main Channel Restoration	2	9	9	9
Former North Sulphur River Restoration	--	9	9	9

	Optimal			Suboptimal			Marginal		Poor		
Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; (<5% of bank affected), perennial vegetation to waterline; no raw or undercut banks (some erosion on outside of meander bends O.K.); no recently exposed roots; no recent tree falls;			Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of minor erosion and/or bank undercutting; perennial vegetation to waterline in most places; recently exposed tree roots rare but present.			Moderately unstable; perennial vegetation to waterline sparse (mainly scoured or stripped by lateral erosion), bank held by hard points (trees, rock outcrops) and eroded back elsewhere; 30-60% of bank in reach has areas of erosion and bank undercutting; recently exposed tree roots and fine root hairs common; high erosion potential during floods		Unstable; no perennial vegetation at waterline; severe erosion of both banks; recently exposed tree roots common; tree falls and/or severely undercut trees common; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement

- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Minimal work such as localized grading and bank sloping and bend realignment to address erosion and channel migration issues.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

Ephemeral Streams – Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

North Sulphur River Main Channel Restoration

- Channel will be reconstructed and stream channel dimension sized to convey design storm flows while maintaining stability with larger flows spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as rock vanes to protect stream banks and maintain bank stabilities.

Former North Sulphur River Restoration

- Channel will be reconstructed. Restored stream channel dimension will be sized to convey bankfull flows while maintaining stability with flows greater than bankfull spilling onto the floodplain.
- Vegetation will be planted to promote root mass along stream banks to provide stability.
- Inclusion of native material in-stream structures such as log vanes and/or toe wood to protect stream banks and maintain bank stabilities.

10. ***Vegetative Protection*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	1 to 7	2 to 6	5 to 7	9 (no range)
North Sulphur River Main Channel Restoration	3.5	2	6	9
Former North Sulphur River Restoration	--	2	6	9

	Optimal			Suboptimal			Marginal		Poor		
Vegetation Protection	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.			70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.			50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.		Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Protected riparian buffer zones and enhancement plantings consisting of native vegetation and including canopy trees, understory shrubs, and herbaceous ground cover to establish stable stream banks.
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

North Sulphur River Main Channel Restoration

- Protected riparian buffer zones and enhancement plantings consisting of native vegetation and including canopy trees, understory shrubs, and herbaceous ground cover to establish stable stream banks.
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

Former North Sulphur River Restoration

- Protected riparian buffer zones and enhancement plantings consisting of native vegetation and including canopy trees, understory shrubs, and herbaceous ground cover to establish stable stream banks.
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

11. ***Riparian Buffer Zone*** (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	2 to 8	3 to 8	6 to 8	9 (no range)
North Sulphur River Main Channel Restoration	2.5	5	7	9
Former North Sulphur River Restoration	--	5	7	9

	Optimal			Suboptimal			Marginal		Poor		
Riparian Zone	Width of riparian zone >18 meters; human activities (I.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.			Width of riparian zone 12-18 meters; human activities have impacted zone only minimally).			Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.		Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Protected riparian buffer zones greater than 18 meters wide will be provided for all mitigation streams. Therefore, this metric which is comparable to the water quality riparian buffer zone width metric (see water quality functions #7) will score optimal for all streams.
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

North Sulphur River Main Channel Restoration

- Protected riparian buffer zones greater than 18 meters wide will be provided for all mitigation streams. Therefore, this metric which is comparable to the water quality riparian buffer zone width metric (see water quality functions #7) will score optimal for all streams.
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

Former North Sulphur River Restoration

- Protected riparian buffer zones greater than 18 meters wide will be provided for all mitigation streams. Therefore, this metric which is comparable to the water quality riparian buffer zone width metric (see water quality functions #7) will score optimal for all streams.

- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

12. *Riparian Habitat Condition* (Note the score for this metric is the average of the scores of the left and right sides.)

	Baseline Range	EOC Expected Range	EOM Expected Range	At Maturity Expected Range
Ephemeral Streams (Enhancement & Restoration)	1 to 6	2 to 6	4 to 6	7 to 8
North Sulphur River Main Channel Restoration	3	2	5	7
Former North Sulphur River Restoration	--	2	5	7

	Optimal			Suboptimal			Marginal		Poor		
Riparian Habitat Condition	Tree stratum (dbh>3 inches) present, with >60% tree canopy cover. (Additional forest layers may include: sapling, shrub, herbaceous, and leaf litter including mosses/lichens and woody debris.) Score at the high end of Excellent range if >2 additional layers are present. Score at low end if <1 additional layers are present.			Tree stratum (dbh>3 inches) present, with 30% to 60% tree canopy cover. (See Excellent Category for examples of additional forest layers.) Score at the high end of Good range if >2 additional forest layers are present. Score at low end if <1 additional forest layers are present. OR cutover areas with stumps remaining.			Tree stratum (dbh>3 inches) present, with <30% tree canopy cover. (See Excellent Category for examples of additional forest layers.) Score at the high end of Fair range if >2 additional layers are present. Score at low end if <1 additional layers are present. OR area consists of non-maintained and naturalized dense herbaceous and/or woody vegetation.		Tree stratum absent; impervious surfaces, croplands, mine spoil lands, culverted streams, mowed and maintained herbaceous areas, denuded surfaces, actively grazed pasture, and etc.		
Grade (left)	10	9	8	7	6	5	4	3	2	1	0
Grade (right)	10	9	8	7	6	5	4	3	2	1	0

Ephemeral Streams – Enhancement & Restoration

- Riparian plantings proposed within the mitigation plan will establish riparian habitat conditions to include at a minimum a tree stratum with trees greater than three inches at diameter breast height (dbh) at the end of the 7-year monitoring period. The tree canopy cover will be on track to be between 50-60% coverage at maturity. The riparian areas will also include strata consisting of the following:
    - Saplings
    - Shrubs
    - Herbaceous Vegetation
    - Leaf Litter
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.

- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

North Sulphur River Main Channel Restoration

- Riparian plantings proposed within the mitigation plan will establish riparian habitat conditions to include at a minimum a tree stratum with trees greater than three inches at diameter breast height (dbh) at the end of the 7-year monitoring period. The tree canopy cover will be on track to be between 50-60% coverage at maturity. The riparian areas will also include strata consisting of the following:
    - Saplings
    - Shrubs
    - Herbaceous Vegetation
    - Leaf Litter
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

Former North Sulphur River Restoration

- Riparian plantings proposed within the mitigation plan will establish riparian habitat conditions to include at a minimum a tree stratum with trees greater than three inches at diameter breast height (dbh) at the end of the 7-year monitoring period. The tree canopy cover will be on track to be between 50-60% coverage at maturity. The riparian areas will also include strata consisting of the following:
    - Saplings
    - Shrubs
    - Herbaceous Vegetation
    - Leaf Litter
- Non-native/invasive species shall not comprise more than 2% of the woody vegetation and/or more than 5% of the herbaceous cover.
- Acceptable woody species will consist of at least four native species with one species not comprising more than 35% of the canopy cover.

D. Stream Classification

The final component in calculating FCU scores and in the determination of functional credits is the stream classification multiplier. There are three general classifications of streams in SWAMPIM as follows: (1) ephemeral, (2) intermittent, and (3) perennial. SWAMPIM further separates intermittent streams into two categories: intermittent without perennial pools and intermittent with perennial pools. In the calculation of FCU's, SWAMPIM applies a multiplication factor in accordance with the stream's respective flow regime. This multiplication factor is related to the extent of the riparian corridor generally supported by each classification of stream and corresponding habitat area influenced.

Intermittent streams can be highly variable ranging from some that have groundwater input that sustains flow for a few days to a few weeks to some with sustained flow for most of the year and substantial pools that provide refuge for aquatic organisms during periods of no flow. Within the protocol, SWAMPIM is silent on the differentiator between intermittent streams with and without perennial pools. The biotic community will vary among temporary waters such as intermittent streams with duration of hydroperiod and timing of the hydrologic cycle[8]. Intermittent streams with perennial pools offer a higher functional quality when compared to intermittent streams without perennial pools. Intermittent streams with perennial pools within the North Sulphur River watershed provide a host of ecosystem benefits such as:

- In-stream water storage and source to provide habitat for flora and fauna;
- Recharge for alluvial groundwater aquifers;
- Support for riparian vegetative communities; and
- Relatively stable features that supports biological community recovery following an ecosystem stressor.

Accordingly, intermittent streams with perennial pools are differentiated from intermittent streams without perennial pools. The following SWAMPIM multiplication factors for stream classification are adopted, which includes recognition of intermittent streams with perennial pools:

Ephemeral streams	0.00125
Intermittent streams without perennial pools	0.00250
Intermittent streams with perennial pools	0.00315
Perennial streams	0.00380

In the determination of credits, all streams are classified as ephemeral except for the restored main channel North Sulphur River and the restored former channel North Sulphur River, each of which are classified as intermittent with perennial pools. Justification for classification of the restored main channel North Sulphur River is provided in the Basis of Design Report[9] for that stream. A copy of this memorandum in provided **Appendix H**. Justification for classification of the restored former channel North Sulphur River is provided in EPR Technical Memorandum Number 3[10]. A copy of this memorandum is also provided in **Appendix H**.

[8] Fritz, K.M., Johnson, B.R., and Walters, D.M. 2006. Field Operations Manual for Assessing the Hydrologic Permanence and Ecological Condition of Headwater Streams. EPA/600/R-06/126. U.S. Environmental Protection Agency, Office of Research and Development, Washington DC.

[9] Freese and Nichols, Inc., Lake Ralph Hall – Main Channel North Sulphur River Stream Restoration Basis of Design Report, June 2019

[10] Ecosystem Restoration and Planning LLC. Technical Memorandum Number 3, July 2019.

TABLE G-1
LAKE RALPH HALL
SUMMARY OF PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B, AND C[1]

Mitigation Zone	Mitigation Type	Stream Type	Proposed Total SAR Length (Linear Feet)[2]	Proposed Functional Capacity Unit (FCU) Total At end of Construction[3]	Proposed Stream Functional Capacity Unit (FCU) Total At end of Monitoring[3]	Proposed Stream Functional Capacity Unit (FCU) Total At Maturity[3]
A	Enhancement	Ephemeral	15,255	20.14	23.72	28.62
A	Restoration	Intermittent / Perennial Pools	17,894	110.35	120.78	130.36
A	Restoration	Ephemeral	86,615	135.92	157.35	177.23
A	Re-Establishment	Ephemeral	19,787	29.94	34.81	39.33
B	Enhancement	Ephemeral	11,887	16.97	19.23	22.74
B	Restoration	Ephemeral	30,111	47.64	55.02	61.88
B	Re-Establishment	Ephemeral	5,109	7.79	9.05	10.22
C	Enhancement	Ephemeral	11,512	14.49	17.92	22.41
C	Restoration	Ephemeral	55,561	89.67	102.55	114.54
C	Re-Establishment	Ephemeral	17,041	25.73	29.77	33.62
Subtotal	**-**	***Intermittent / Perennial Pools***	***17,894***	***110.35***	***120.78***	***130.36***
Subtoal	**-**	***Ephemeral***	***252,878***	***388.29***	***449.42***	***510.59***
TOTAL	**-**	**-**	**270,772**	**498.64**	**570.20**	**640.95**

Notes for Table G-1:

1. The stream lengths and functional capacities listed in this table are from designs for each stream segment. Within this Mitigation Plan UTRWD will use streams from these areas that will provide a minimum of 439.59 FCUs, plus the baseline FCUs for the proposed mitigation streams with an appropriate safety factor.

*2. Proposed SAR Length is from design plans provided in **Appendix F** .*

*3. FCU = Reach Length * FCI * Multiplication Factor; Shown rounded to the nearest hundredth. Refer to Table G-2 for data on individual SARs within each mitigation area.*

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
NSR-MC-RST	A	A-6, A-7, A-8	Restoration	Intermittent / Perennial Pools	6,629	2.30	0.00315	48.03
NSR-MC-RST (SPILLWAY)	A	A-6	Restoration	Ephemeral	1,600	1.77	0.00125	3.54
S1-TRIB1-(1a)	A	A-8	Restoration	Ephemeral	3,622	1.76	0.00125	7.97
S1-TRIB1-(1b)	A	A-8	Restoration	Ephemeral	1,180	1.70	0.00125	2.51
S2-(2a)	A	A-10	Restoration	Ephemeral	1,425	1.68	0.00125	2.99
S2-(2b)	A	A-7	Restoration	Ephemeral	1,785	1.71	0.00125	3.82
S2-(3a)	A	A-7	Restoration	Intermittent / Perennial Pools	7,836	2.33	0.00315	57.51
S2-(3b)	A	A-8	Restoration	Intermittent / Perennial Pools	1,296	2.33	0.00315	9.51
S2-(3c)	A	A-8	Restoration	Intermittent / Perennial Pools	1,821	2.28	0.00315	13.08
S2-(3d)	A	A-8	Restoration	Intermittent / Perennial Pools	312	2.27	0.00315	2.23
S2-TRIB1-(1a)	A	A-14	Re-Establishment	Ephemeral	878	1.56	0.00125	1.71
S2-TRIB1-(1b)	A	A-11, A-14	Restoration	Ephemeral	2,547	1.55	0.00125	4.93
S2-TRIB1-(2)	A	A-8, A-11	Restoration	Ephemeral	5,589	1.61	0.00125	11.25
S2-TRIB1-A1-(1)	A	A-13	Restoration	Ephemeral	471	1.47	0.00125	0.87
S2-TRIB1-A1-(2)	A	A-13	Restoration	Ephemeral	300	1.50	0.00125	0.56
S2-TRIB1-A1-(3)	A	A-13	Restoration	Ephemeral	422	1.55	0.00125	0.82
S2-TRIB1-A1-(4)	A	A-11	Restoration	Ephemeral	1,251	1.56	0.00125	2.44
S2-TRIB2-(1)	A	A-16	Restoration	Ephemeral	234	1.62	0.00125	0.47
S2-TRIB2-(2)	A	A-16	Restoration	Ephemeral	385	1.63	0.00125	0.78
S2-TRIB2-(3)	A	A-16	Restoration	Ephemeral	187	1.68	0.00125	0.39
S2-TRIB2-(4)	A	A-13	Restoration	Ephemeral	947	1.71	0.00125	2.02
S2-TRIB2-(5)	A	A-13	Restoration	Ephemeral	994	1.74	0.00125	2.16
S2-TRIB2-(6)	A	A-13	Restoration	Ephemeral	1,630	1.72	0.00125	3.50
S2-TRIB2-(7)	A	A-10	Restoration	Ephemeral	889	1.72	0.00125	1.91
S2-TRIB2-(8a)	A	A-7, A-10	Restoration	Ephemeral	2,582	1.72	0.00125	5.55
S2-TRIB2-(8b)	A	A-7	Restoration	Ephemeral	3,468	1.76	0.00125	7.63
S2-TRIB2-A1-(1)	A	A-13	Restoration	Ephemeral	649	1.49	0.00125	1.21
S2-TRIB2-A1-(2)	A	A-13	Restoration	Ephemeral	91	1.50	0.00125	0.17
S2-TRIB2-A1-(3)	A	A-13	Restoration	Ephemeral	369	1.56	0.00125	0.72
S2-TRIB2-A1-B1-(1)	A	A-13	Enhancement	Ephemeral	244	1.40	0.00125	0.43
S2-TRIB2-A2-(1)	A	A-13	Enhancement	Ephemeral	129	1.45	0.00125	0.23
S2-TRIB2-A2-(2)	A	A-13	Restoration	Ephemeral	450	1.56	0.00125	0.88
S2-TRIB2-A2-(3)	A	A-13	Restoration	Ephemeral	362	1.68	0.00125	0.76
S2-TRIB2-A2-B5-(1)	A	A-13	Enhancement	Ephemeral	49	1.44	0.00125	0.09
S2-TRIB2-A2-B6-(1)	A	A-13	Enhancement	Ephemeral	61	1.43	0.00125	0.11
S2-TRIB2-A2-B7-(1)	A	A-13	Enhancement	Ephemeral	230	1.43	0.00125	0.41
S2-TRIB2-A2-B8-(1)	A	A-13	Enhancement	Ephemeral	183	1.42	0.00125	0.32
S2-TRIB2-A3-(1)	A	A-13	Restoration	Ephemeral	549	1.47	0.00125	1.01
S2-TRIB2-A3-(2)	A	A-13	Enhancement	Ephemeral	202	1.46	0.00125	0.37
S2-TRIB2-A3-(3)	A	A-13	Enhancement	Ephemeral	410	1.71	0.00125	0.88
S2-TRIB2-A3-(4)	A	A-13	Restoration	Ephemeral	640	1.70	0.00125	1.36
S2-TRIB2-A3-B4-(1)	A	A-13	Enhancement	Ephemeral	49	1.44	0.00125	0.09
S2-TRIB2-A4-(1)	A	A-16	Enhancement	Ephemeral	438	1.38	0.00125	0.76

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S2-TRIB2-A4-(2)	A	A-16	Restoration	Ephemeral	334	1.54	0.00125	0.64
S2-TRIB2-B2-(1)	A	A-16	Restoration	Ephemeral	359	1.51	0.00125	0.68
S2-TRIB2-B3-(1)	A	A-16	Enhancement	Ephemeral	139	1.36	0.00125	0.24
S2-TRIB2-B4-(1)	A	A-13	Enhancement	Ephemeral	234	1.39	0.00125	0.41
S2-TRIB2-B4-(2)	A	A-13	Restoration	Ephemeral	204	1.56	0.00125	0.40
S2-TRIB3-(1)	A	A-15	Restoration	Ephemeral	255	1.55	0.00125	0.49
S2-TRIB3-(2)	A	A-15	Restoration	Ephemeral	558	1.63	0.00125	1.14
S2-TRIB3-(3)	A	A-15	Restoration	Ephemeral	295	1.63	0.00125	0.60
S2-TRIB3-(4)	A	A-12	Restoration	Ephemeral	1,613	1.68	0.00125	3.39
S2-TRIB3-(5)	A	A-12	Restoration	Ephemeral	707	1.66	0.00125	1.47
S2-TRIB3-(6)	A	A-12	Restoration	Ephemeral	1,191	1.73	0.00125	2.58
S2-TRIB3-(7)	A	A-12	Restoration	Ephemeral	1,089	1.73	0.00125	2.35
S2-TRIB3-(8)	A	A-10	Restoration	Ephemeral	2,018	1.69	0.00125	4.26
S2-TRIB3-(9)	A	A-10	Restoration	Ephemeral	1,935	1.60	0.00125	3.87
S2-TRIB3-(10)	A	A-6	Enhancement	Ephemeral	1,473	1.92	0.00125	3.54
S2-TRIB3-A4-(1)	A	A-6	Restoration	Ephemeral	2,824	1.83	0.00125	6.46
S2-TRIB3-A5-(1)	A	A-12	Restoration	Ephemeral	528	1.49	0.00125	0.98
S2-TRIB3-A5-(2)	A	A-9	Restoration	Ephemeral	2,407	1.57	0.00125	4.72
S2-TRIB3-A5-(3)	A	A-9	Restoration	Ephemeral	1,333	1.74	0.00125	2.90
S2-TRIB3-A5-B1-(1)	A	A-12	Enhancement	Ephemeral	98	1.47	0.00125	0.18
S2-TRIB3-A5-B1-(2)	A	A-12	Restoration	Ephemeral	172	1.50	0.00125	0.32
S2-TRIB3-A5-B2-(1)	A	A-9	Restoration	Ephemeral	69	1.48	0.00125	0.13
S2-TRIB3-A5-B3-(1)	A	A-9	Restoration	Ephemeral	67	1.48	0.00125	0.12
S2-TRIB3-A5-B4-(1)	A	A-9	Restoration	Ephemeral	198	1.50	0.00125	0.37
S2-TRIB3-A5-TRIBA-(1)	A	A-9	Restoration	Ephemeral	657	1.52	0.00125	1.25
S2-TRIB3-A6-(1)	A	A-13	Enhancement	Ephemeral	844	1.44	0.00125	1.52
S2-TRIB3-A6-(2)	A	A-13	Restoration	Ephemeral	445	1.57	0.00125	0.87
S2-TRIB3-A7-(0)	A	A-15	Re-Establishment	Ephemeral	773	1.53	0.00125	1.48
S2-TRIB3-A7-(1)	A	A-12	Restoration	Ephemeral	1,318	1.58	0.00125	2.60
S2-TRIB3-A7-(2)	A	A-12	Restoration	Ephemeral	508	1.58	0.00125	1.00
S2-TRIB3-A7-(3)	A	A-12	Restoration	Ephemeral	700	1.77	0.00125	1.55
S2-TRIB3-A7-B2-(1)	A	A-12	Enhancement	Ephemeral	534	1.41	0.00125	0.94
S2-TRIB3-A7-B3-(1)	A	A-12	Restoration	Ephemeral	112	1.46	0.00125	0.20
S2-TRIB3-A7-B4-(1)	A	A-12	Enhancement	Ephemeral	548	1.40	0.00125	0.96
S2-TRIB3-A7-B5-(1)	A	A-12	Restoration	Ephemeral	353	1.48	0.00125	0.65
S2-TRIB3-A8-(1)	A	A-15	Restoration	Ephemeral	514	1.53	0.00125	0.98
S2-TRIB3-A8-(2)	A	A-15	Restoration	Ephemeral	359	1.51	0.00125	0.68
S2-TRIB3-A8-B1-(1)	A	A-15	Enhancement	Ephemeral	169	1.37	0.00125	0.29
S2-TRIB3-A8-B2-(1)	A	A-15	Enhancement	Ephemeral	129	1.37	0.00125	0.22
S2-TRIB3-A9-(1)	A	A-15	Enhancement	Ephemeral	130	1.41	0.00125	0.23
S2-TRIB3-A9-(2)	A	A-15	Restoration	Ephemeral	447	1.50	0.00125	0.84
S2-TRIB3-A10-(2)	A	A-15	Restoration	Ephemeral	105	1.50	0.00125	0.20
S2-TRIB3-A10-(3)	A	A-15	Restoration	Ephemeral	302	1.53	0.00125	0.58

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S2-TRIB3-A10-B1-(1)	A	A-15	Restoration	Ephemeral	123	1.50	0.00125	0.23
S2-TRIB3-B1-(1)	A	A-15	Restoration	Ephemeral	283	1.51	0.00125	0.53
T1-BAKER-(0)	A	A-4, A-5	Re-Establishment	Ephemeral	2,710	1.72	0.00125	5.83
T1-BAKER-(1)	A	A-5, A-8	Restoration	Ephemeral	1,540	1.66	0.00125	3.20
T2-BAKER-(1)	A	A-2	Enhancement	Ephemeral	1,493	1.57	0.00125	2.93
T2-BAKER-(2)	A	A-2	Restoration	Ephemeral	1,229	1.56	0.00125	2.40
T2-BAKER-(3)	A	A-2	Restoration	Ephemeral	698	1.56	0.00125	1.36
T2-BAKER-TRIB1-(1)	A	A-2	Enhancement	Ephemeral	274	1.35	0.00125	0.46
T2-BAKER-TRIB1-(2)	A	A-2	Restoration	Ephemeral	1,080	1.55	0.00125	2.09
T3-BAKER-(7)	A	A-2	Restoration	Ephemeral	430	1.66	0.00125	0.89
T3-BAKER-TRIB1-(1)	A	A-1	Restoration	Ephemeral	155	1.50	0.00125	0.29
T3-BAKER-TRIB1-(2)	A	A-2	Enhancement	Ephemeral	190	1.39	0.00125	0.33
T3-BAKER-TRIB1-(3a)	A	A-2	Restoration	Ephemeral	923	1.50	0.00125	1.73
T3-BAKER-TRIB1-(3b)	A	A-2	Restoration	Ephemeral	201	1.54	0.00125	0.39
T3-BAKER-TRIB1-B1-(1)	A	A-2	Enhancement	Ephemeral	289	1.36	0.00125	0.49
T3-BAKER-TRIB1-B2-(1)	A	A-2	Enhancement	Ephemeral	165	1.56	0.00125	0.32
T3-BAKER-TRIB1-B2-(2)	A	A-2	Enhancement	Ephemeral	136	1.42	0.00125	0.24
T4-(2)	A	A-3	Re-Establishment	Ephemeral	302	1.54	0.00125	0.58
T4-(3)	A	A-3	Re-Establishment	Ephemeral	549	1.46	0.00125	1.00
T4-(4)	A	A-3	Re-Establishment	Ephemeral	738	1.55	0.00125	1.43
T4-(5)	A	A-3	Re-Establishment	Ephemeral	938	1.47	0.00125	1.72
T4-(6)	A	A-3	Re-Establishment	Ephemeral	799	1.57	0.00125	1.57
T4-(7)	A	A-6	Re-Establishment	Ephemeral	1,047	1.57	0.00125	2.05
T4-TRIB2-(1a)	A	A-3	Re-Establishment	Ephemeral	731	1.51	0.00125	1.38
T4-TRIB2-(1b)	A	A-3	Re-Establishment	Ephemeral	233	1.52	0.00125	0.44
T4-TRIB2-(1c)	A	A-3	Re-Establishment	Ephemeral	539	1.52	0.00125	1.02
T4-TRIB2-(2)	A	A-3	Re-Establishment	Ephemeral	517	1.54	0.00125	1.00
T5-(1a)	A	A-4	Re-Establishment	Ephemeral	666	1.50	0.00125	1.25
T5-(1b)	A	A-4	Re-Establishment	Ephemeral	431	1.49	0.00125	0.80
T5-(2)	A	A-4	Re-Establishment	Ephemeral	508	1.54	0.00125	0.98
T5-(3)	A	A-4	Re-Establishment	Ephemeral	394	1.55	0.00125	0.76
T5-(4)	A	A-4	Re-Establishment	Ephemeral	467	1.56	0.00125	0.91
T5-(5)	A	A-4	Re-Establishment	Ephemeral	3,856	1.71	0.00125	8.24
T5-TRIB1-(1a)	A	A-3, A-4	Re-Establishment	Ephemeral	569	1.49	0.00125	1.06
T5-TRIB1-(1b)	A	A-4	Re-Establishment	Ephemeral	390	1.49	0.00125	0.73
T5-TRIB1-(1c)	A	A-4	Re-Establishment	Ephemeral	218	1.49	0.00125	0.41
T6-BAKER-(1a)	A	A-4	Restoration	Ephemeral	1,015	1.56	0.00125	1.98
T6-BAKER-(1b)	A	A-4	Restoration	Ephemeral	1,132	1.57	0.00125	2.22
T6-BAKER-(1c)	A	A-4, A-5	Restoration	Ephemeral	2,732	1.61	0.00125	5.50
AX-S2-TRIB1-(1)	A	A-17	Restoration	Ephemeral	921	1.55	0.00125	1.78
AX-S2-TRIB1-(2)	A	A-17	Restoration	Ephemeral	591	1.55	0.00125	1.15
AX-S2-TRIB1-(3)	A	A-14	Restoration	Ephemeral	701	1.80	0.00125	1.58
AX-S2-TRIB1-(4)	A	A-14	Restoration	Ephemeral	1,292	1.80	0.00125	2.91

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
AX-S2-TRIB1-A2-(1)	A	A-14	Enhancement	Ephemeral	791	1.44	0.00125	1.42
AX-S2-TRIB1-A2-(2)	A	A-14	Restoration	Ephemeral	876	1.54	0.00125	1.69
AX-S2-TRIB1-A2-TRIBA-(1)	A	A-14	Enhancement	Ephemeral	342	1.38	0.00125	0.59
AX-S2-TRIB1-A3-(1)	A	A-14	Restoration	Ephemeral	227	1.54	0.00125	0.44
AX-S2-TRIB1-A4-(1a)	A	A-14, A-17	Restoration	Ephemeral	1,071	1.80	0.00125	2.41
AX-S2-TRIB1-A4-(1b)	A	A-14	Restoration	Ephemeral	652	1.78	0.00125	1.45
AX-S2-TRIB1-A4-TRIBA-(1)	A	A-14	Restoration	Ephemeral	295	1.52	0.00125	0.56
AX-S2-TRIB1-A4-TRIBB-(1)	A	A-17	Enhancement	Ephemeral	129	1.42	0.00125	0.23
AX-S2-TRIB1-A4-TRIBB-(2a)	A	A-17	Restoration	Ephemeral	141	1.53	0.00125	0.27
AX-S2-TRIB1-A4-TRIBB-(2b)	A	A-14, A-17	Restoration	Ephemeral	466	1.54	0.00125	0.90
AX-S2-TRIB1-A4-TRIBB-(2c)	A	A-14	Restoration	Ephemeral	592	1.55	0.00125	1.15
AX-S2-TRIB1-A4-TRIBB-AA-(1)	A	A-14	Enhancement	Ephemeral	206	1.46	0.00125	0.38
AX-S2-TRIB1-A4-TRIBB-AB-(1)	A	A-14, A-17	Enhancement	Ephemeral	226	1.44	0.00125	0.41
AX-S2-TRIB1-A4-TRIBB-AC-(1)	A	A-17	Enhancement	Ephemeral	141	1.46	0.00125	0.26
AX-S2-TRIB1-A4-TRIBC-(1)	A	A-17	Enhancement	Ephemeral	172	1.42	0.00125	0.31
AX-S2-TRIB1-A4-TRIBC-(2)	A	A-17	Re-Establishment	Ephemeral	112	1.50	0.00125	0.21
AX-S2-TRIB1-A4-TRIBD-(1)	A	A-17	Restoration	Ephemeral	257	1.51	0.00125	0.49
AX-S2-TRIB1-A4-TRIBE-(1)	A	A-17	Restoration	Ephemeral	221	1.48	0.00125	0.41
AX-S2-TRIB1-A5-(1)	A	A-14	Restoration	Ephemeral	254	1.53	0.00125	0.49
AX-S2-TRIB1-A6-(1)	A	A-17	Enhancement	Ephemeral	439	1.48	0.00125	0.81
AX-S2-TRIB1-A7-(1)	A	A-17	Restoration	Ephemeral	359	1.49	0.00125	0.67
AX-S2-TRIB1-A7-(2)	A	A-17	Restoration	Ephemeral	154	1.55	0.00125	0.30
AX-S2-TRIB2-B2-(1)	A	A-16	Enhancement	Ephemeral	355	1.45	0.00125	0.64
AX-S2-TRIB2-B2-TRIBA-(1)	A	A-16	Enhancement	Ephemeral	384	1.40	0.00125	0.67
AX-S2-TRIB3-(1)	A	A-15	Enhancement	Ephemeral	211	1.44	0.00125	0.38
AX-S2-TRIB3-(2a)	A	A-15	Restoration	Ephemeral	804	1.57	0.00125	1.58
AX-S2-TRIB3-(2b)	A	A-15	Restoration	Ephemeral	1,036	1.60	0.00125	2.07
AX-S2-TRIB3-A7-(1)	A	A-16	Enhancement	Ephemeral	139	1.48	0.00125	0.26
AX-S2-TRIB3-A7-(2a)	A	A-16	Restoration	Ephemeral	242	1.55	0.00125	0.47
AX-S2-TRIB3-A7-(2b)	A	A-16	Restoration	Ephemeral	321	1.57	0.00125	0.63
AX-S2-TRIB3-A7-(2c)	A	A-16	Restoration	Ephemeral	176	1.56	0.00125	0.34
AX-S2-TRIB3-A7-(3)	A	A-16	Enhancement	Ephemeral	564	1.57	0.00125	1.11
AX-S2-TRIB3-A7-(4)	A	A-15, A-16	Re-Establishment	Ephemeral	555	1.56	0.00125	1.08
AX-S2-TRIB3-A7-TRIBA-(1)	A	A-15	Restoration	Ephemeral	401	1.48	0.00125	0.74
AX-S2-TRIB3-A7-TRIBA-(2)	A	A-15	Enhancement	Ephemeral	233	1.50	0.00125	0.44
AX-S2-TRIB3-A7-TRIBA-(3)	A	A-15	Restoration	Ephemeral	97	1.48	0.00125	0.18
AX-S2-TRIB3-A7-TRIBA-(4)	A	A-15	Re-Establishment	Ephemeral	457	1.57	0.00125	0.90
AX-S2-TRIB3-A7-TRIBA-AA-(1)	A	A-15	Restoration	Ephemeral	122	1.48	0.00125	0.23
AX-S2-TRIB3-A7-TRIBA-AB-(1)	A	A-15	Enhancement	Ephemeral	168	1.44	0.00125	0.30
AX-S2-TRIB3-A7-TRIBA-AC-(1)	A	A-15	Restoration	Ephemeral	79	1.50	0.00125	0.15
AX-S2-TRIB3-A7-TRIBA-AD-(1)	A	A-15	Restoration	Ephemeral	86	1.48	0.00125	0.16
AX-S2-TRIB3-A7-TRIBB-(1)	A	A-16	Restoration	Ephemeral	290	1.53	0.00125	0.55
AX-S2-TRIB3-A7-TRIBB-(2)	A	A-16	Re-Establishment	Ephemeral	134	1.54	0.00125	0.26

TABLE G-2
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PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
AX-S2-TRIB3-A7-TRIBB-AA-(1)	A	A-16	Restoration	Ephemeral	275	1.49	0.00125	0.51
AX-S2-TRIB3-A7-TRIBC-(1)	A	A-15, A-16	Restoration	Ephemeral	179	1.53	0.00125	0.34
AX-S2-TRIB3-A7-TRIBD-(1)	A	A-16	Enhancement	Ephemeral	284	1.33	0.00125	0.47
AX-S2-TRIB3-A7-TRIBD-AA-(1)	A	A-16	Enhancement	Ephemeral	69	1.30	0.00125	0.11
AX-S2-TRIB3-A7-TRIBE-(1)	A	A-15	Restoration	Ephemeral	895	1.53	0.00125	1.71
AX-S2-TRIB3-A7-TRIBF-(1)	A	A-16	Restoration	Ephemeral	94	1.48	0.00125	0.17
AX-S2-TRIB3-A7-TRIBG-(1)	A	A-16	Restoration	Ephemeral	142	1.50	0.00125	0.27
AX-S2-TRIB3-A10-(1)	A	A-15	Enhancement	Ephemeral	218	1.49	0.00125	0.41
AX-S2-TRIB3-A10-(2)	A	A-15	Restoration	Ephemeral	235	1.55	0.00125	0.46
AX-S2-TRIB3-A10-B1-(1)	A	A-15	Restoration	Ephemeral	70	1.53	0.00125	0.13
AX-S2-TRIB3-A10-TRIBA-(1)	A	A-15	Restoration	Ephemeral	289	1.53	0.00125	0.55
AX-S2-TRIB3-A11-(1)	A	A-15	Enhancement	Ephemeral	429	1.46	0.00125	0.78
AX-S2-TRIB3-A12-(1)	A	A-15	Enhancement	Ephemeral	163	1.46	0.00125	0.30
AX-S2-TRIB3-A13-(1)	A	A-15	Enhancement	Ephemeral	255	1.44	0.00125	0.46
AX-S2-TRIB3-A13-(2)	A	A-15	Restoration	Ephemeral	244	1.54	0.00125	0.47
AX-S2-TRIB3-A14-(1)	A	A-15	Enhancement	Ephemeral	144	1.45	0.00125	0.26
AX-S2-TRIB3-A14-(2)	A	A-15	Restoration	Ephemeral	345	1.55	0.00125	0.67
AX-S2-TRIB3-A15-(1)	A	A-15	Enhancement	Ephemeral	93	1.47	0.00125	0.17
AX-S2-TRIB3-A16-(1)	A	A-15	Enhancement	Ephemeral	157	1.42	0.00125	0.28
AX-S2-TRIB3-A16-(2)	A	A-15	Restoration	Ephemeral	327	1.54	0.00125	0.63
AX-S2-TRIB3-A17-(1)	A	A-15	Restoration	Ephemeral	224	1.53	0.00125	0.43
AX-S2-TRIB3-A18-(0)	A	A-15	Re-Establishment	Ephemeral	276	1.54	0.00125	0.53
AX-S2-TRIB3-A18-(1)	A	A-15	Enhancement	Ephemeral	103	1.43	0.00125	0.18
AX-S2-TRIB3-A19-(1)	A	A-15	Restoration	Ephemeral	232	1.54	0.00125	0.45
AX-S2-TRIB3-A20-(1)	A	A-15	Restoration	Ephemeral	205	1.53	0.00125	0.39
A Subtotal	-	-	-	-	***139,551***	-	-	***375.54***
S15-TRIB3-(1)	B	B-3	Enhancement	Ephemeral	76	1.49	0.00125	0.14
S15-TRIB3-(2a)	B	B-3	Enhancement	Ephemeral	736	1.48	0.00125	1.36
S15-TRIB3-(2b)	B	B-1	Enhancement	Ephemeral	226	1.48	0.00125	0.42
S15-TRIB3-(3)	B	B-1	Restoration	Ephemeral	476	1.80	0.00125	1.07
S15-TRIB3-(4)	B	B-1	Enhancement	Ephemeral	1,115	1.77	0.00125	2.47
S15-TRIB3-A1-(1)	B	B-1	Restoration	Ephemeral	211	1.51	0.00125	0.40
S15-TRIB3-A1-(2)	B	B-1	Enhancement	Ephemeral	809	1.53	0.00125	1.55
S15-TRIB3-A1-(3)	B	B-1	Restoration	Ephemeral	149	1.79	0.00125	0.33
S15-TRIB3-A1-TRIBA-(1)	B	B-1	Enhancement	Ephemeral	159	1.46	0.00125	0.29
S15-TRIB3-A2-(1)	B	B-1	Enhancement	Ephemeral	567	1.70	0.00125	1.20
S15-TRIB3-A3-(1)	B	B-1	Enhancement	Ephemeral	182	1.42	0.00125	0.32
S15-TRIB3-A3-(2)	B	B-1	Re-Establishment	Ephemeral	429	1.55	0.00125	0.83
S15-TRIB3-A3-(3)	B	B-1	Enhancement	Ephemeral	354	1.41	0.00125	0.62
S15-TRIB3-A3-(4)	B	B-1	Enhancement	Ephemeral	317	1.70	0.00125	0.67
S15-TRIB3-A3-(5)	B	B-1	Restoration	Ephemeral	385	1.80	0.00125	0.87
S15-TRIB3-A3-TRIBA-(1)	B	B-1	Enhancement	Ephemeral	266	1.41	0.00125	0.47
S15-TRIB3-A3-TRIBB-(1)	B	B-1	Enhancement	Ephemeral	59	1.40	0.00125	0.10

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S15-TRIB3-A3-TRIBB-(2)	B	B-1	Re-Establishment	Ephemeral	311	1.49	0.00125	0.58
S15-TRIB3-A4-(1)	B	B-1	Restoration	Ephemeral	186	1.49	0.00125	0.35
S15-TRIB3-A5-(1a)	B	B-1	Restoration	Ephemeral	530	1.50	0.00125	0.99
S15-TRIB3-A5-(1b)	B	B-1	Restoration	Ephemeral	538	1.54	0.00125	1.04
S15-TRIB3-A5-TRIBA-(1)	B	B-1	Restoration	Ephemeral	300	1.49	0.00125	0.56
S15-TRIB3-A6-(1)	B	B-1	Restoration	Ephemeral	830	1.52	0.00125	1.58
S15-TRIB3-A7-(1)	B	B-1	Enhancement	Ephemeral	457	1.40	0.00125	0.80
S15-TRIB3-A8-(1)	B	B-1, B-3	Restoration	Ephemeral	455	1.51	0.00125	0.86
S15-TRIB3-A9-(1)	B	B-1	Restoration	Ephemeral	126	1.53	0.00125	0.24
S16-(1)	B	B-8	Restoration	Ephemeral	912	1.83	0.00125	2.09
S16-(2a)	B	B-8	Restoration	Ephemeral	1,305	1.79	0.00125	2.92
S16-(2b)	B	B-5	Restoration	Ephemeral	945	1.75	0.00125	2.07
S16-TRIB7-(1)	B	B-7	Restoration	Ephemeral	613	1.83	0.00125	1.40
S16-TRIB7-(2)	B	B-7	Restoration	Ephemeral	935	1.82	0.00125	2.13
S16-TRIB7-(3)	B	B-7	Re-Establishment	Ephemeral	1,429	1.81	0.00125	3.23
S16-TRIB7-(4)	B	B-4	Restoration	Ephemeral	420	1.81	0.00125	0.95
S16-TRIB7-(5)	B	B-4	Restoration	Ephemeral	1,597	1.79	0.00125	3.57
S16-TRIB7-A2-(1)	B	B-4	Re-Establishment	Ephemeral	588	1.47	0.00125	1.08
S16-TRIB7-A2-(2)	B	B-4	Restoration	Ephemeral	411	1.50	0.00125	0.77
S16-TRIB7-A3-(1)	B	B-4	Enhancement	Ephemeral	176	1.44	0.00125	0.32
S16-TRIB7-A3-(2a)	B	B-4	Restoration	Ephemeral	322	1.52	0.00125	0.61
S16-TRIB7-A3-(2b)	B	B-4	Restoration	Ephemeral	408	1.53	0.00125	0.78
S16-TRIB7-A3-(2c)	B	B-4	Restoration	Ephemeral	492	1.53	0.00125	0.94
S16-TRIB7-A3-(2d)	B	B-4	Restoration	Ephemeral	570	1.56	0.00125	1.11
S16-TRIB7-A3-(3)	B	B-4	Re-Establishment	Ephemeral	821	1.55	0.00125	1.59
S16-TRIB7-A3-(4)	B	B-4	Restoration	Ephemeral	407	1.56	0.00125	0.79
S16-TRIB7-A3-TRIBA-(1a)	B	B-4	Restoration	Ephemeral	607	1.48	0.00125	1.12
S16-TRIB7-A3-TRIBA-(1b)	B	B-4	Restoration	Ephemeral	537	1.52	0.00125	1.02
S16-TRIB7-A3-TRIBA-AA-(1)	B	B-4	Restoration	Ephemeral	165	1.49	0.00125	0.31
S16-TRIB7-A3-TRIBA-AB-(1)	B	B-4	Restoration	Ephemeral	215	1.51	0.00125	0.41
S16-TRIB7-A3-TRIBB-(1)	B	B-4	Restoration	Ephemeral	167	1.54	0.00125	0.32
S16-TRIB7-A3-TRIBC-(1)	B	B-4	Restoration	Ephemeral	249	1.46	0.00125	0.45
S16-TRIB7-A3-TRIBD-(1)	B	B-4	Restoration	Ephemeral	121	1.49	0.00125	0.23
S16-TRIB7-A3-TRIBE-(1a)	B	B-4	Restoration	Ephemeral	151	1.54	0.00125	0.29
S16-TRIB7-A3-TRIBE-(1b)	B	B-4	Restoration	Ephemeral	291	1.55	0.00125	0.56
S16-TRIB7-A3-TRIBE-(1c)	B	B-4	Restoration	Ephemeral	220	1.54	0.00125	0.42
S16-TRIB7-A3-TRIBF-(1)	B	B-7	Enhancement	Ephemeral	453	1.44	0.00125	0.82
S16-TRIB7-A3-TRIBF-(2)	B	B-4	Restoration	Ephemeral	573	1.51	0.00125	1.08
S16-TRIB7-A3-TRIBF-AA-(1)	B	B-7	Enhancement	Ephemeral	369	1.40	0.00125	0.65
S16-TRIB7-A3-TRIBG-(1)	B	B-4	Restoration	Ephemeral	403	1.49	0.00125	0.75
S16-TRIB7-A3-TRIBH-(1)	B	B-4	Restoration	Ephemeral	259	1.49	0.00125	0.48
S16-TRIB7-A3-TRIBI-(1)	B	B-4	Restoration	Ephemeral	366	1.53	0.00125	0.70
S16-TRIB7-A4-(1)	B	B-8	Enhancement	Ephemeral	436	1.75	0.00125	0.95

TABLE G-2
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Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S16-TRIB7-A4-(2)	B	B-5, B-8	Re-Establishment	Ephemeral	359	1.56	0.00125	0.70
S16-TRIB7-A4-(3)	B	B-5	Restoration	Ephemeral	237	1.56	0.00125	0.46
S16-TRIB7-A5-(1)	B	B-7	Enhancement	Ephemeral	451	1.40	0.00125	0.79
S16-TRIB7-A6-(1)	B	B-7	Restoration	Ephemeral	559	1.46	0.00125	1.02
S16-TRIB7-A6-TRIBA-(1)	B	B-7	Restoration	Ephemeral	461	1.46	0.00125	0.84
S16-TRIB7-A6-TRIBB-(1)	B	B-7	Restoration	Ephemeral	373	1.49	0.00125	0.69
S16-TRIB7-A7-(1)	B	B-7	Enhancement	Ephemeral	664	1.86	0.00125	1.54
S16-TRIB8-(1)	B	B-3	Enhancement	Ephemeral	708	1.45	0.00125	1.28
S16-TRIB8-(2a)	B	B-3	Restoration	Ephemeral	276	1.76	0.00125	0.61
S16-TRIB8-(2b)	B	B-3	Restoration	Ephemeral	388	1.75	0.00125	0.85
S16-TRIB8-(2c)	B	B-2	Restoration	Ephemeral	1,171	1.76	0.00125	2.58
S16-TRIB8-A1-(1)	B	B-2	Re-Establishment	Ephemeral	511	1.49	0.00125	0.95
S16-TRIB8-A1-(2)	B	B-2	Enhancement	Ephemeral	139	1.42	0.00125	0.25
S16-TRIB8-A1-(3)	B	B-2	Restoration	Ephemeral	221	1.51	0.00125	0.42
S16-TRIB8-A2-(1)	B	B-2	Enhancement	Ephemeral	721	1.44	0.00125	1.30
S16-TRIB8-A2-(2)	B	B-2	Restoration	Ephemeral	411	1.52	0.00125	0.78
S16-TRIB8-A3-(1)	B	B-2	Enhancement	Ephemeral	356	1.42	0.00125	0.63
S16-TRIB8-A3-(2)	B	B-2	Re-Establishment	Ephemeral	171	1.49	0.00125	0.32
S16-TRIB8-A3-(3)	B	B-2	Enhancement	Ephemeral	129	1.44	0.00125	0.23
S16-TRIB8-A4-(1)	B	B-3	Enhancement	Ephemeral	596	1.44	0.00125	1.07
S16-TRIB8-A4-(2)	B	B-3	Restoration	Ephemeral	185	1.49	0.00125	0.34
S16-TRIB8-A5-(1)	B	B-3	Restoration	Ephemeral	849	1.54	0.00125	1.63
S16-TRIB8-A6-(1)	B	B-3	Enhancement	Ephemeral	113	1.42	0.00125	0.20
S16-TRIB10-(1a)	B	B-9	Restoration	Ephemeral	1,187	1.79	0.00125	2.66
S16-TRIB10-(1b)	B	B-9	Restoration	Ephemeral	429	1.75	0.00125	0.94
S16-TRIB10-(2)	B	B-8, B-9	Restoration	Ephemeral	517	1.80	0.00125	1.16
S16-TRIB10-A1-(1)	B	B-9	Re-Establishment	Ephemeral	490	1.53	0.00125	0.94
S16-TRIB10-A1-(2a)	B	B-9	Restoration	Ephemeral	378	1.56	0.00125	0.74
S16-TRIB10-A1-(2b)	B	B-9	Restoration	Ephemeral	599	1.52	0.00125	1.14
S16-TRIB11-(1)	B	B-8	Restoration	Ephemeral	1,108	1.82	0.00125	2.52
S16-TRIB11-(2)	B	B-8	Restoration	Ephemeral	1,040	1.81	0.00125	2.35
S16-TRIB11-A1-(1)	B	B-8	Enhancement	Ephemeral	126	1.55	0.00125	0.24
S16-TRIB11-A1-(2)	B	B-8	Restoration	Ephemeral	95	1.51	0.00125	0.18
S16-TRIB11-A2-(1)	B	B-8	Enhancement	Ephemeral	72	1.54	0.00125	0.14
S16-TRIB11-A2-(2)	B	B-8	Restoration	Ephemeral	79	1.49	0.00125	0.15
S16-TRIB11-A3-(1)	B	B-8	Enhancement	Ephemeral	65	1.52	0.00125	0.12
S16-TRIB11-A3-(2)	B	B-8	Enhancement	Ephemeral	291	1.48	0.00125	0.54
S16-TRIB11-A3-(3)	B	B-8	Restoration	Ephemeral	106	1.49	0.00125	0.20
S16-TRIB12-(1a)	B	B-9	Restoration	Ephemeral	581	1.54	0.00125	1.12
S16-TRIB12-(1b)	B	B-9	Restoration	Ephemeral	822	1.54	0.00125	1.58
S16-TRIB13-(1)	B	B-8	Enhancement	Ephemeral	699	1.44	0.00125	1.26
S16-TRIB13-(2)	B	B-8	Restoration	Ephemeral	192	1.50	0.00125	0.36
B Subtotal	**-**	**-**	**-**	**-**	***47,107***	**-**	**-**	***94.84***

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S25-(7)	C	C-12	Re-Establishment	Ephemeral	641	1.76	0.00125	1.41
S25-(8)	C	C-9, C-12	Enhancement	Ephemeral	3,619	1.70	0.00125	7.69
S25-(9a)	C	C-6	Restoration	Ephemeral	4,212	1.77	0.00125	9.32
S25-(9b)	C	C-3	Restoration	Ephemeral	1,480	1.78	0.00125	3.29
S25-TRIB1-(1)	C	C-2	Enhancement	Ephemeral	603	1.48	0.00125	1.12
S25-TRIB1-(2a)	C	C-3	Restoration	Ephemeral	683	1.79	0.00125	1.53
S25-TRIB1-(2b)	C	C-3	Restoration	Ephemeral	270	1.78	0.00125	0.60
S25-TRIB1-A1-(1)	C	C-3	Restoration	Ephemeral	268	1.50	0.00125	0.50
S25-TRIB2-(1)	C	C-5	Re-Establishment	Ephemeral	535	1.53	0.00125	1.02
S25-TRIB2-(2)	C	C-6	Enhancement	Ephemeral	714	1.43	0.00125	1.28
S25-TRIB2-(3)	C	C-6	Restoration	Ephemeral	406	1.77	0.00125	0.90
S25-TRIB3-(1)	C	C-6	Restoration	Ephemeral	681	1.54	0.00125	1.31
S25-TRIB4-(1)	C	C-5	Restoration	Ephemeral	317	1.49	0.00125	0.59
S25-TRIB4-(2)	C	C-6	Restoration	Ephemeral	1,406	1.54	0.00125	2.71
S25-TRIB5-(0)	C	C-6	Restoration	Ephemeral	1,654	1.55	0.00125	3.20
S25-TRIB5-(1)	C	C-6	Restoration	Ephemeral	443	1.54	0.00125	0.85
S25-TRIB6-(1)	C	C-5, C-6	Re-Establishment	Ephemeral	1,908	1.54	0.00125	3.67
S25-TRIB6-(2)	C	C-6	Enhancement	Ephemeral	909	1.73	0.00125	1.97
S25-TRIB9-(1)	C	C-9	Restoration	Ephemeral	391	1.49	0.00125	0.73
S25-TRIB10-(1)	C	C-9	Restoration	Ephemeral	837	1.51	0.00125	1.58
S25-TRIB10-(2)	C	C-9	Re-Establishment	Ephemeral	322	1.49	0.00125	0.60
S25-TRIB10-(3)	C	C-9	Restoration	Ephemeral	395	1.74	0.00125	0.86
S25-TRIB10-A1-(1)	C	C-9	Re-Establishment	Ephemeral	692	1.48	0.00125	1.28
S25-TRIB11-(1)	C	C-9	Re-Establishment	Ephemeral	1,147	1.48	0.00125	2.12
S25-TRIB11-(2)	C	C-9	Restoration	Ephemeral	370	1.48	0.00125	0.68
S25-TRIB12-(1)	C	C-13	Restoration	Ephemeral	334	1.48	0.00125	0.62
S25-TRIB12-(2)	C	C-13	Restoration	Ephemeral	382	1.55	0.00125	0.74
S25-TRIB12-(3)	C	C-10	Restoration	Ephemeral	444	1.51	0.00125	0.84
S25-TRIB12-(4)	C	C-9	Enhancement	Ephemeral	478	1.47	0.00125	0.88
S25-TRIB12-(5a)	C	C-12	Re-Establishment	Ephemeral	308	1.77	0.00125	0.68
S25-TRIB12-(5b)	C	C-12	Re-Establishment	Ephemeral	627	1.77	0.00125	1.39
S25-TRIB12-(6)	C	C-9	Enhancement	Ephemeral	590	1.69	0.00125	1.25
S25-TRIB12-(7)	C	C-9	Restoration	Ephemeral	310	1.73	0.00125	0.67
S25-TRIB12-A1-(1)	C	C-12	Re-Establishment	Ephemeral	953	1.53	0.00125	1.82
S25-TRIB12-A1-(2)	C	C-12	Re-Establishment	Ephemeral	352	1.55	0.00125	0.68
S25-TRIB12-A1-TRIBA-(1)	C	C-12	Re-Establishment	Ephemeral	550	1.53	0.00125	1.05
S25-TRIB12-A2-(1)	C	C-10	Restoration	Ephemeral	1,166	1.50	0.00125	2.19
S25-TRIB12-A3-(1)	C	C-10, C-13	Restoration	Ephemeral	780	1.54	0.00125	1.50
S25-TRIB13-(1)	C	C-8	Re-Establishment	Ephemeral	616	1.53	0.00125	1.18
S25-TRIB13-(2)	C	C-8	Restoration	Ephemeral	712	1.51	0.00125	1.34
S25-TRIB13-(3)	C	C-9	Re-Establishment	Ephemeral	1,324	1.76	0.00125	2.91
S25-TRIB13-A1-(1)	C	C-8, C-9	Enhancement	Ephemeral	953	1.38	0.00125	1.64
S25-TRIB13-A1-(2)	C	C-9	Re-Establishment	Ephemeral	724	1.54	0.00125	1.39

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S25-TRIB14-(2)	C	C-12	Enhancement	Ephemeral	129	1.43	0.00125	0.23
S25-TRIB15-(1)	C	C-6, C-9	Re-Establishment	Ephemeral	1,976	1.54	0.00125	3.80
S26-(5a)	C	C-14	Restoration	Ephemeral	945	1.75	0.00125	2.07
S26-(5b)	C	C-11, C-14	Restoration	Ephemeral	451	1.75	0.00125	0.99
S26-(5c)	C	C-11	Restoration	Ephemeral	2,790	1.77	0.00125	6.17
S26-(6a)	C	C-7, C-11	Restoration	Ephemeral	2,540	1.76	0.00125	5.59
S26-(6b)	C	C-7	Restoration	Ephemeral	1,580	1.77	0.00125	3.50
S26-(6c)	C	C-4	Restoration	Ephemeral	2,243	1.75	0.00125	4.91
S26-(6d)	C	C-5	Restoration	Ephemeral	248	1.75	0.00125	0.54
S26-(6e)	C	C-2, C-5	Restoration	Ephemeral	3,175	1.76	0.00125	6.99
S26-TRIB1-(1)	C	C-2	Restoration	Ephemeral	200	1.47	0.00125	0.37
S26-TRIB2-(1)	C	C-1	Enhancement	Ephemeral	1,019	1.47	0.00125	1.87
S26-TRIB2-(2)	C	C-1, C-4	Re-Establishment	Ephemeral	787	1.54	0.00125	1.51
S26-TRIB2-(3)	C	C-4	Restoration	Ephemeral	301	1.56	0.00125	0.59
S26-TRIB2-(4)	C	C-5	Restoration	Ephemeral	614	1.75	0.00125	1.34
S26-TRIB3-(1)	C	C-4	Enhancement	Ephemeral	781	1.45	0.00125	1.42
S26-TRIB3-(2a)	C	C-4	Restoration	Ephemeral	717	1.76	0.00125	1.58
S26-TRIB3-(2b)	C	C-4	Restoration	Ephemeral	1,480	1.76	0.00125	3.26
S26-TRIB3-(2c)	C	C-4	Restoration	Ephemeral	703	1.75	0.00125	1.54
S26-TRIB4-(0)	C	C-5	Re-Establishment	Ephemeral	588	1.48	0.00125	1.09
S26-TRIB4-(1)	C	C-5	Restoration	Ephemeral	1,492	1.75	0.00125	3.26
S26-TRIB5-(1)	C	C-4	Restoration	Ephemeral	487	1.53	0.00125	0.93
S26-TRIB6-(1a)	C	C-4	Restoration	Ephemeral	1,022	1.51	0.00125	1.93
S26-TRIB6-(1b)	C	C-4	Restoration	Ephemeral	1,571	1.51	0.00125	2.97
S26-TRIB7-(1)	C	C-8	Re-Establishment	Ephemeral	1,719	1.53	0.00125	3.29
S26-TRIB7-(2)	C	C-5	Restoration	Ephemeral	1,329	1.73	0.00125	2.87
S26-TRIB8-(1)	C	C-4, C-7	Restoration	Ephemeral	642	1.47	0.00125	1.18
S26-TRIB9-(1)	C	C-4, C-7	Restoration	Ephemeral	742	1.50	0.00125	1.39
S26-TRIB10-(1a)	C	C-7	Restoration	Ephemeral	1,524	1.52	0.00125	2.90
S26-TRIB10-(1b)	C	C-7	Restoration	Ephemeral	1,166	1.73	0.00125	2.52
S26-TRIB10-A1-(1)	C	C-7	Restoration	Ephemeral	748	1.50	0.00125	1.40
S26-TRIB10-A1-(2)	C	C-7	Restoration	Ephemeral	1,634	1.51	0.00125	3.08
S26-TRIB10-A2-(1)	C	C-7	Restoration	Ephemeral	349	1.49	0.00125	0.65
S26-TRIB10-A2-TRIBA-(1)	C	C-7	Restoration	Ephemeral	165	1.46	0.00125	0.30
S26-TRIB11-(1)	C	C-7	Enhancement	Ephemeral	459	1.43	0.00125	0.82
S26-TRIB11-(2)	C	C-7	Restoration	Ephemeral	308	1.53	0.00125	0.59
S26-TRIB12-(1)	C	C-7	Restoration	Ephemeral	378	1.54	0.00125	0.73
S26-TRIB13-(1)	C	C-8	Restoration	Ephemeral	1,202	1.52	0.00125	2.28
S26-TRIB13-(2)	C	C-8	Re-Establishment	Ephemeral	341	1.54	0.00125	0.66
S26-TRIB13-(3)	C	C-7	Restoration	Ephemeral	541	1.53	0.00125	1.03
S26-TRIB14-(1)	C	C-8	Restoration	Ephemeral	1,076	1.54	0.00125	2.07
S26-TRIB15-(1)	C	C-11	Enhancement	Ephemeral	152	1.44	0.00125	0.27
S26-TRIB15-(2)	C	C-11	Restoration	Ephemeral	976	1.52	0.00125	1.85

TABLE G-2
LAKE RALPH HALL
PROPOSED FUNCTIONAL CAPACITY OF STREAMS WITHIN MITIGATION ZONES A, B AND C[1]

Proposed Stream Assessment Reach (SAR) Name	Mitigation Zone	Panel No.	Mitigation Type	Stream Type	Proposed SAR Length (Linear Feet)[2]	Proposed Total Stream Functional Capacity Index (FCI)[3]	Multiplication Factor[4]	Proposed Stream Functional Capacity (FCU) Total at Maturity[5]
S26-TRIB15-(3)	C	C-11	Re-Establishment	Ephemeral	931	1.78	0.00125	2.07
S26-TRIB16-(4)	C	C-11	Restoration	Ephemeral	176	1.55	0.00125	0.34
S26-TRIB16-(5)	C	C-11	Enhancement	Ephemeral	600	1.43	0.00125	1.07
S26-TRIB16-A1-(1)	C	C-11	Restoration	Ephemeral	596	1.54	0.00125	1.15
S26-TRIB17-(1)	C	C-11	Enhancement	Ephemeral	252	1.44	0.00125	0.45
S26-TRIB17-(2)	C	C-11	Enhancement	Ephemeral	120	1.40	0.00125	0.21
S26-TRIB17-(3)	C	C-11	Enhancement	Ephemeral	134	1.44	0.00125	0.24
S26-TRIB18-(5)	C	C-11	Restoration	Ephemeral	542	1.54	0.00125	1.04
S26-TRIB19-(2)	C	C-14	Restoration	Ephemeral	794	1.77	0.00125	1.76
S26-TRIB19-A1-(1)	C	C-14	Restoration	Ephemeral	173	1.52	0.00125	0.33
C Subtotal	-	-	-	-	***84,114***	-	-	***170.57***
Subtotal	-	-	-	***Intermittent / Perennial Pools***	***17,894***	-	-	***130.36***
Subtotal	-	-	-	***Ephemeral***	***252,878***	-	-	***510.59***
TOTAL	-	-	-	-	**270,772**	-	-	**640.95**

Notes for Table G-2:

1. The stream lengths and functional capacities listed in this table are from designs for each stream segment. Within this Mitigation Plan UTRWD will use streams from these areas that will provide a minimum of 439.59 FCUs, plus the baseline FCUs for the proposed mitigation streams with an appropriate safety factor.

2. Proposed SAR Length is from design plans provided in ***Appendix F*** *.*

3. FCI values from designs for each stream segment ; Shown rounded to the nearest hundredth.

4. Multiplication Factor for stream segment. Perennial = 0.00380; Intermittent with Perennial Pools = 0.00315; Intermittent = 0.00250; Ephemeral = 0.00125.

*5. FCU = Reach Length, ft * FCI * Multiplication Factor; Shown rounded to the nearest hundredth.*

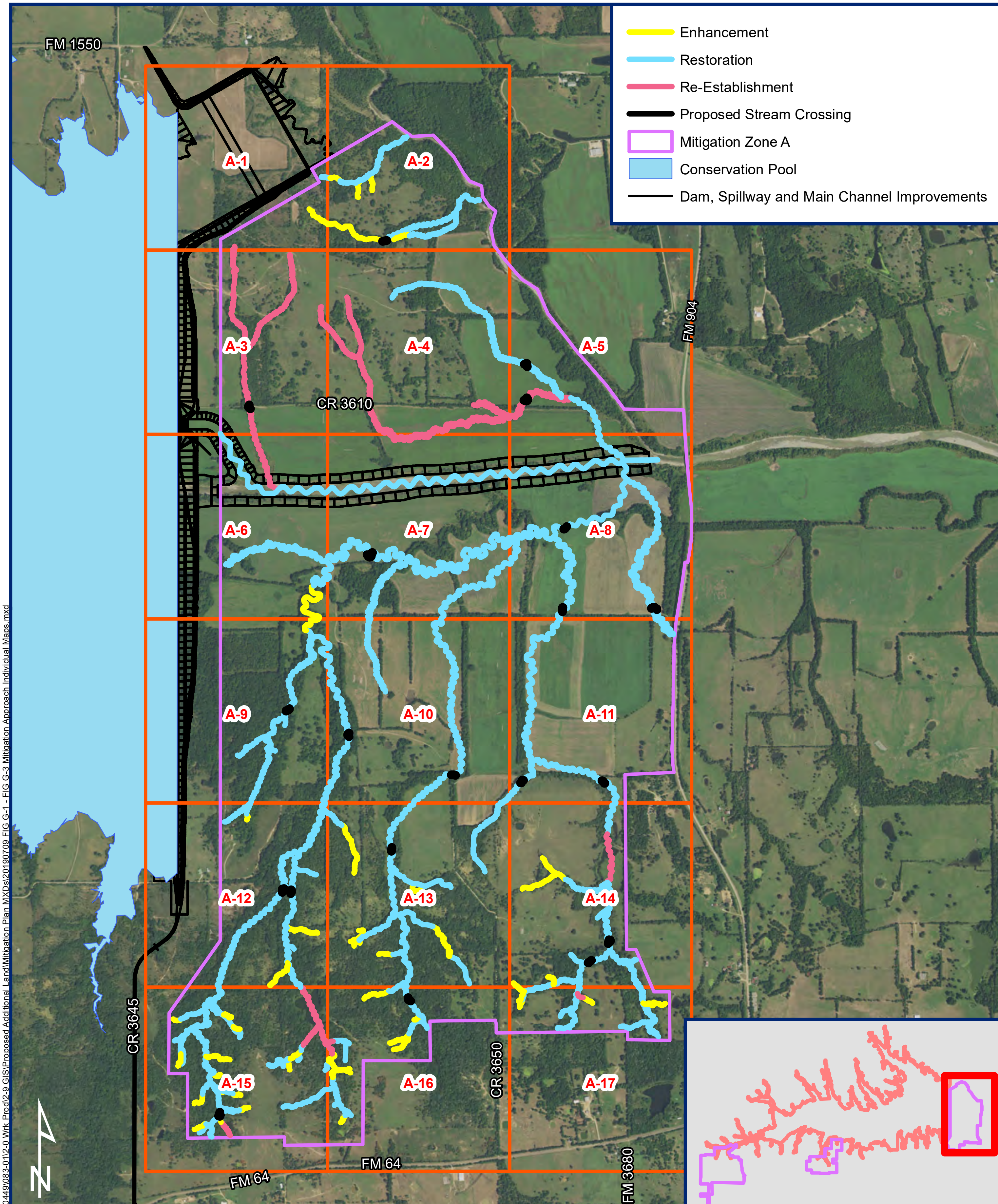

FIGURE G-1: MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH DRAFT

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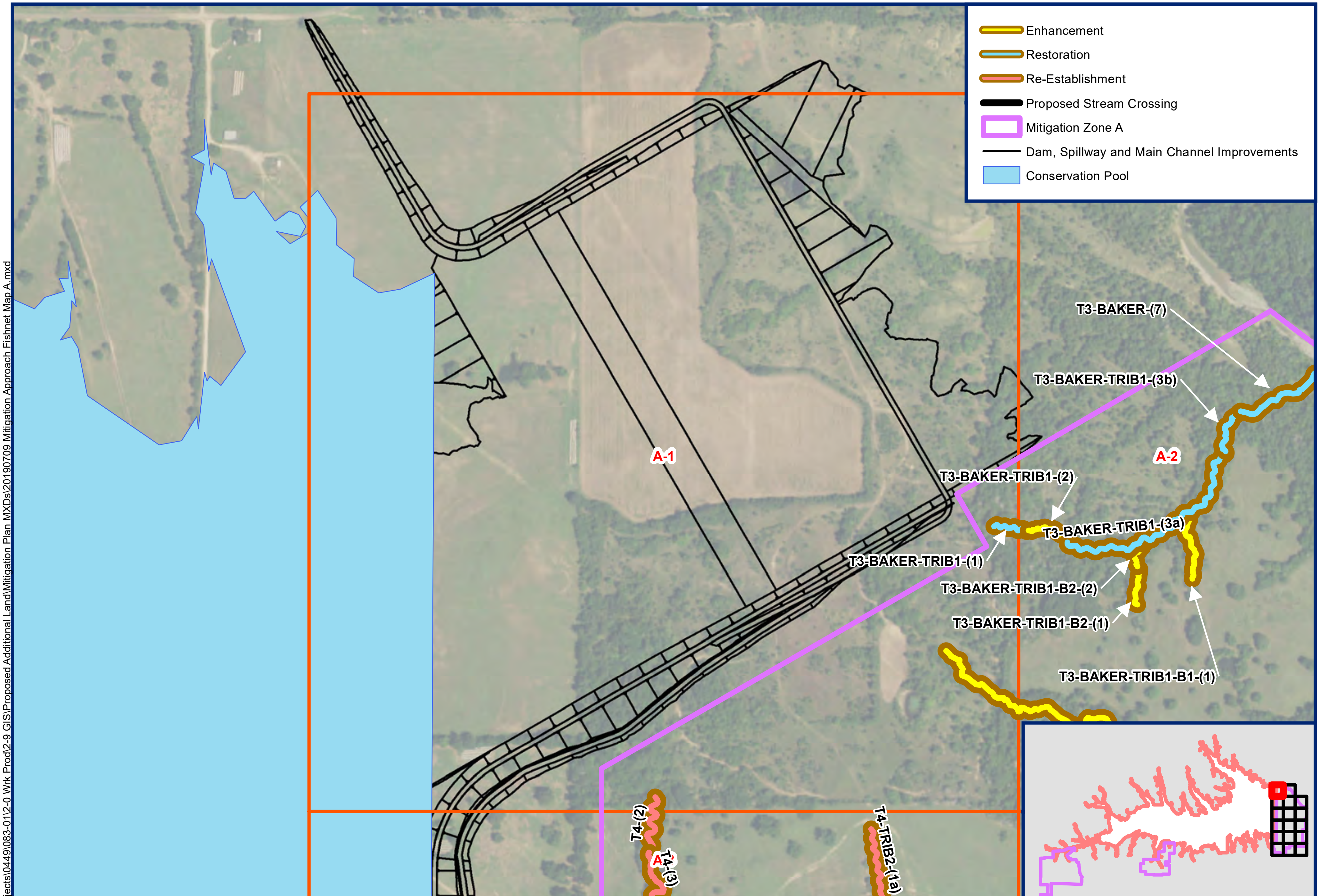

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FIGURE G-1: PANEL A-1, MITIGATION ZONE A

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STREAM MITIGATION APPROACH

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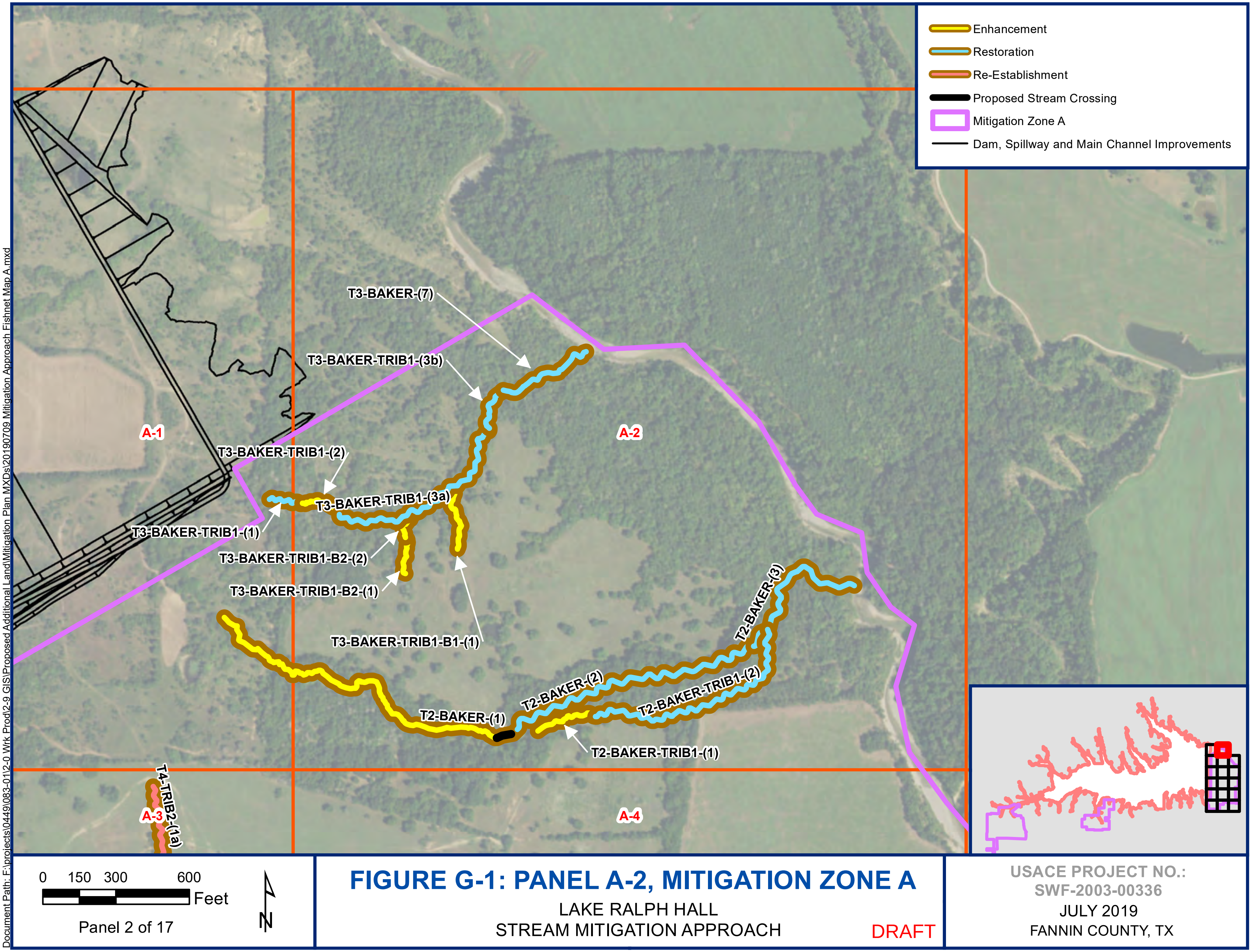

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FIGURE G-1: PANEL A-2, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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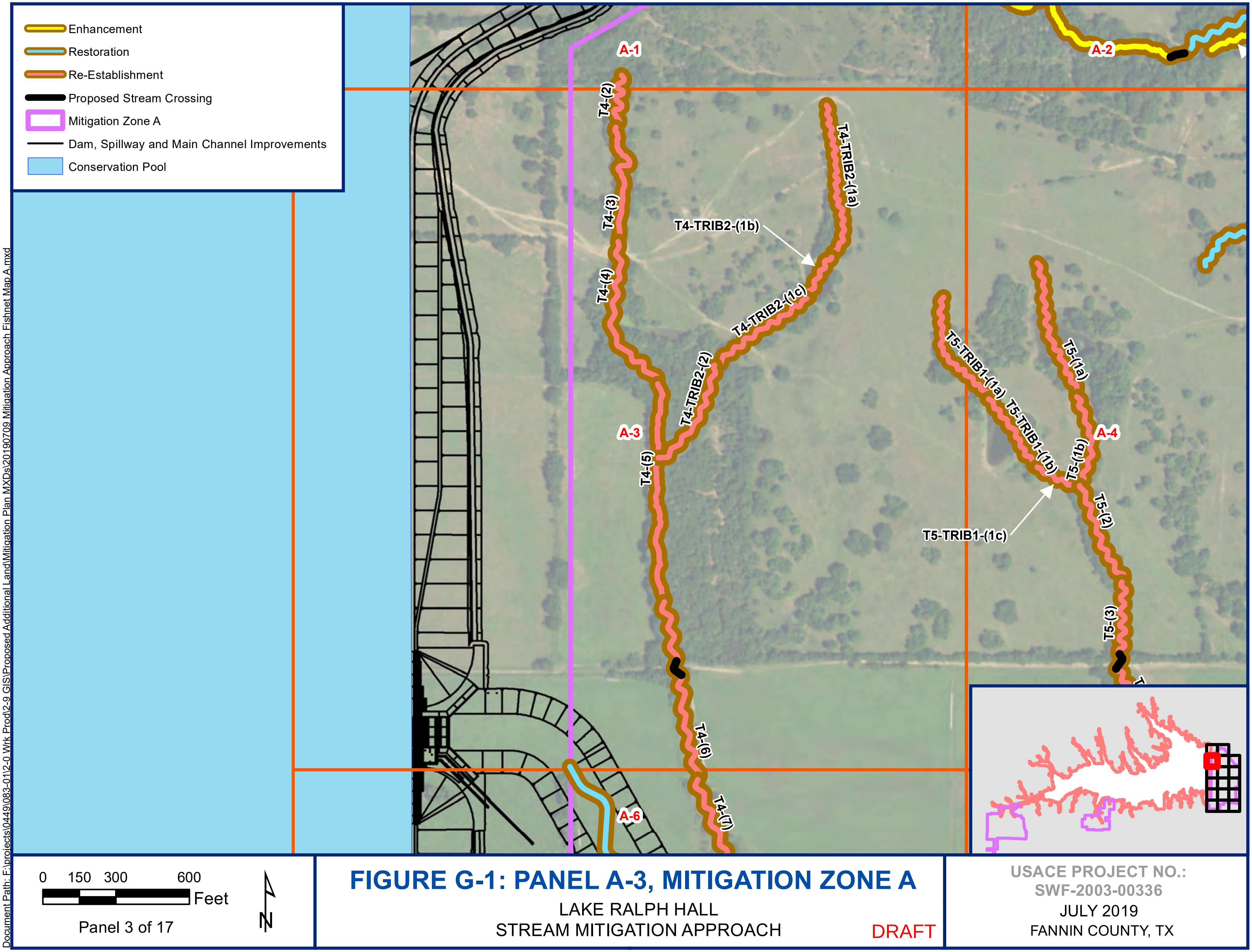

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FIGURE G-1: PANEL A-3, MITIGATION ZONE A

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STREAM MITIGATION APPROACH

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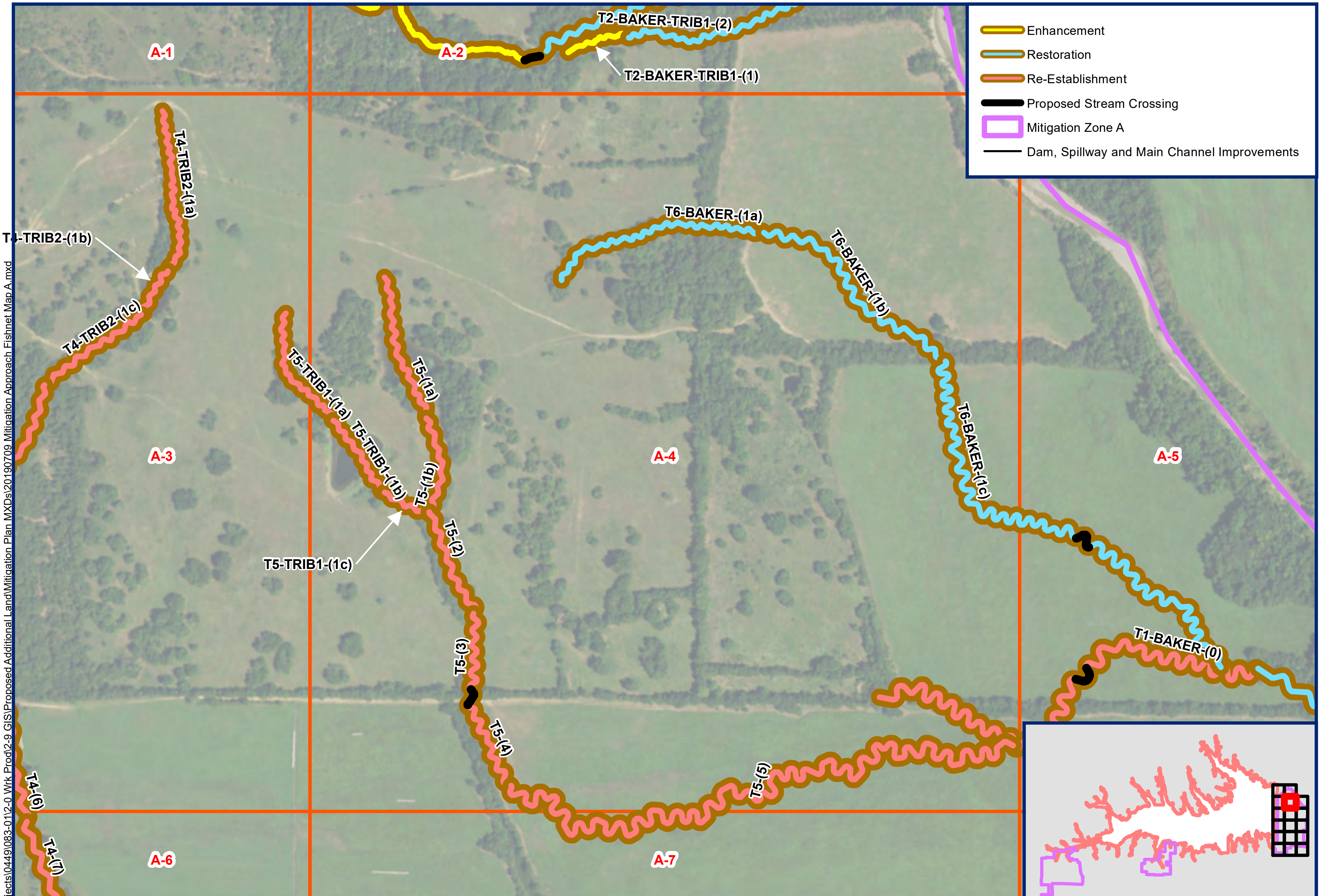

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FIGURE G-1: PANEL A-4, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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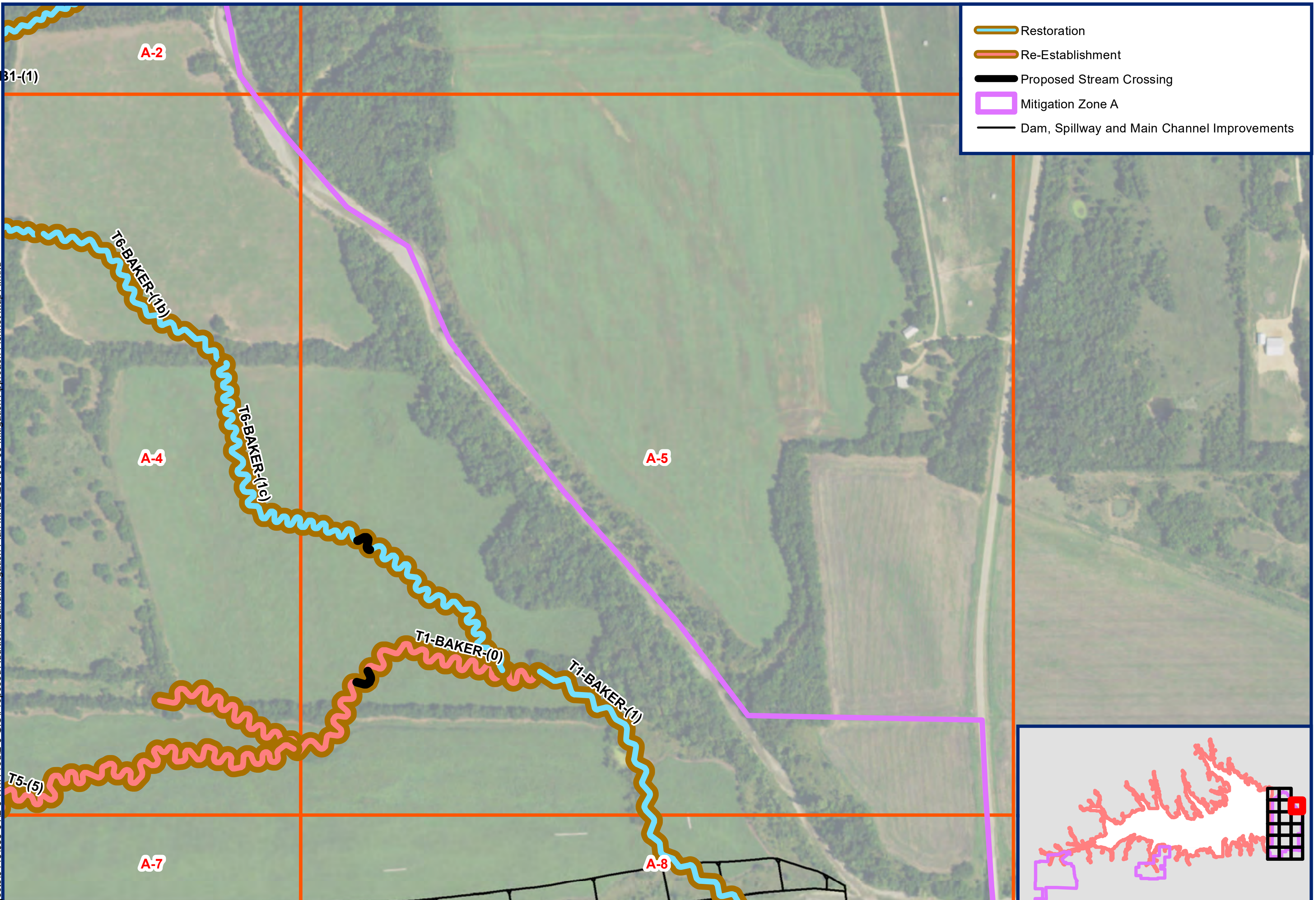

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FIGURE G-1: PANEL A-5, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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0 150 300 600 Feet

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N

FIGURE G-1: PANEL A-6, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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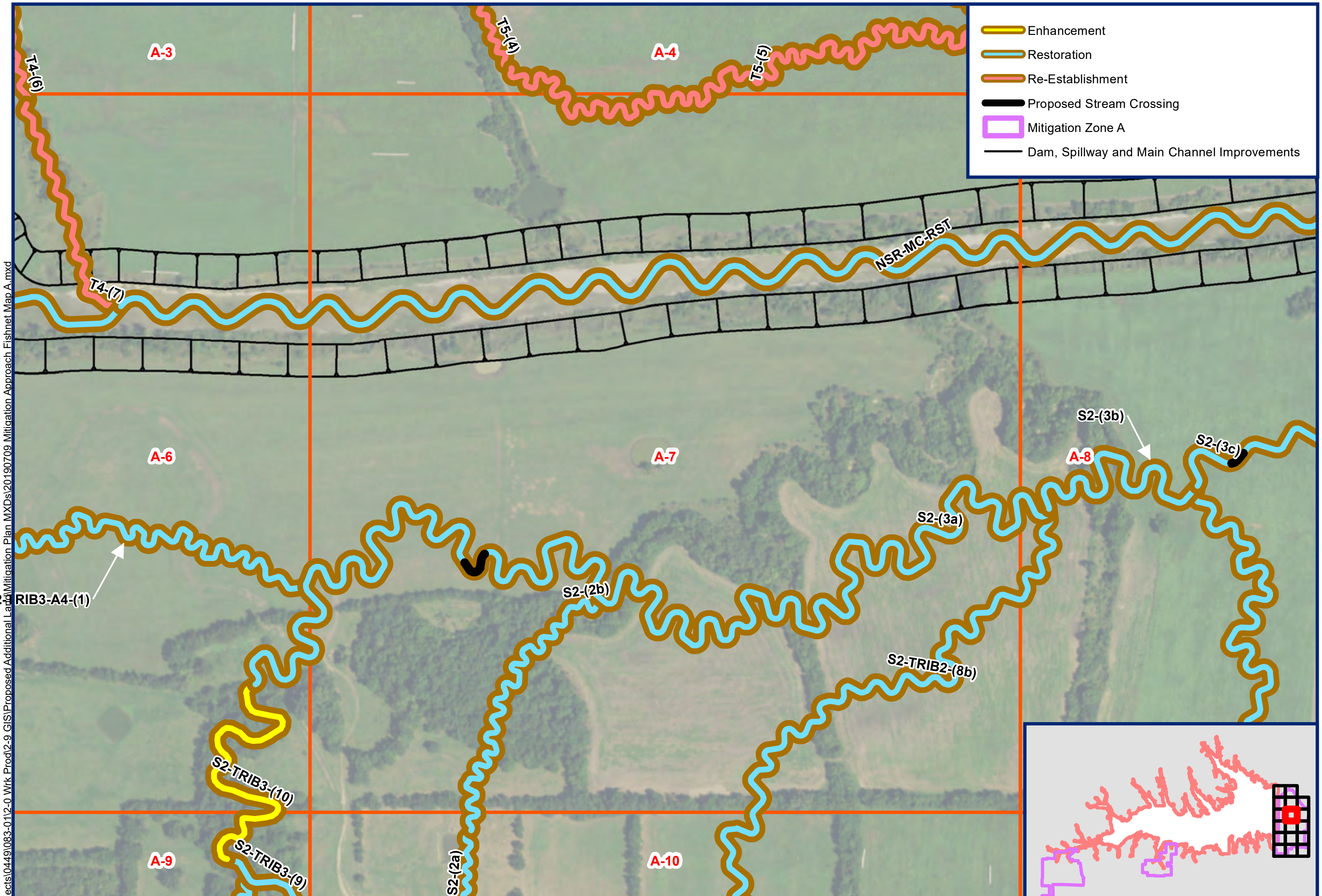

0 150 300 600 Feet

N

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FIGURE G-1: PANEL A-7, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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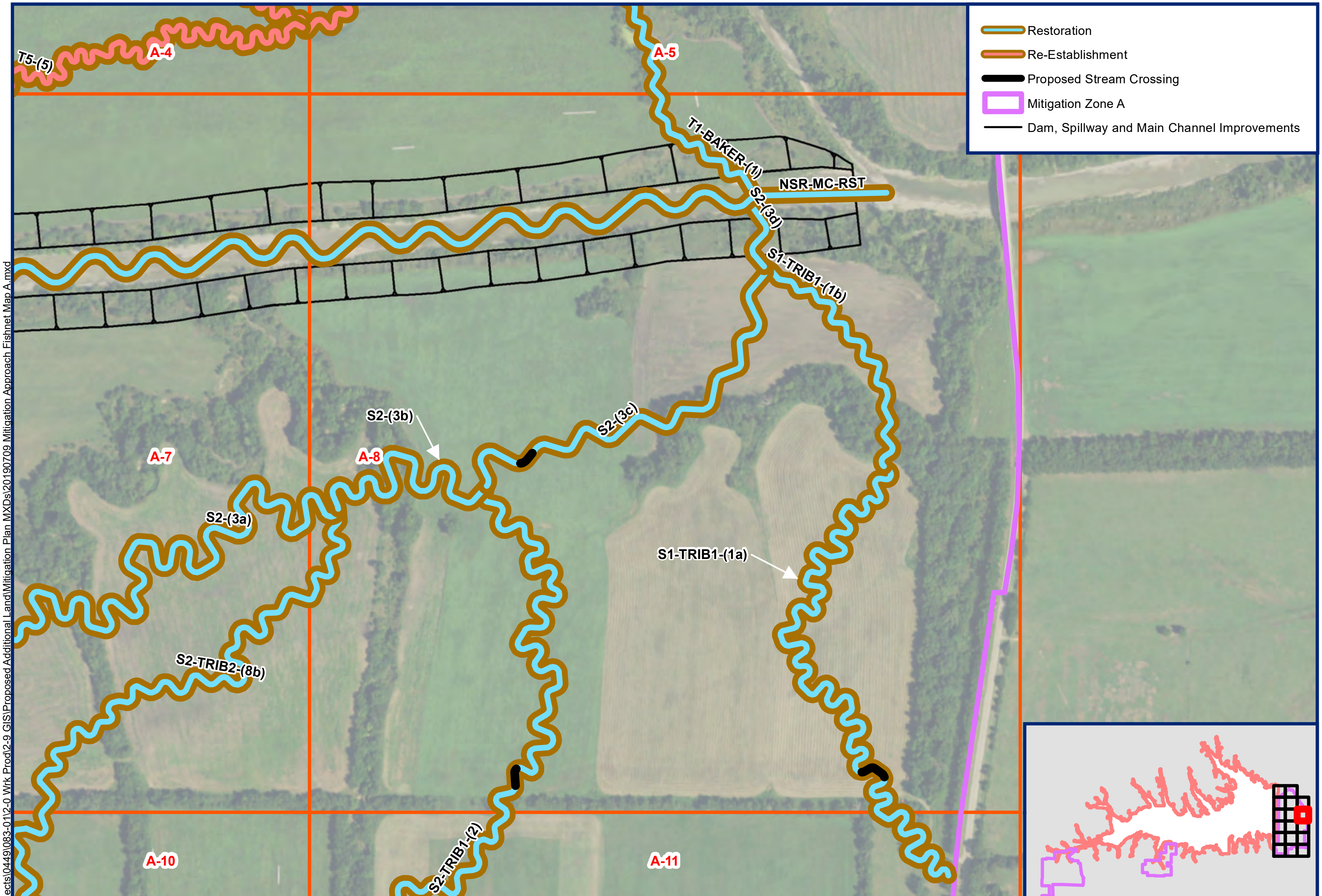

0 150 300 600 Feet

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N

FIGURE G-1: PANEL A-8, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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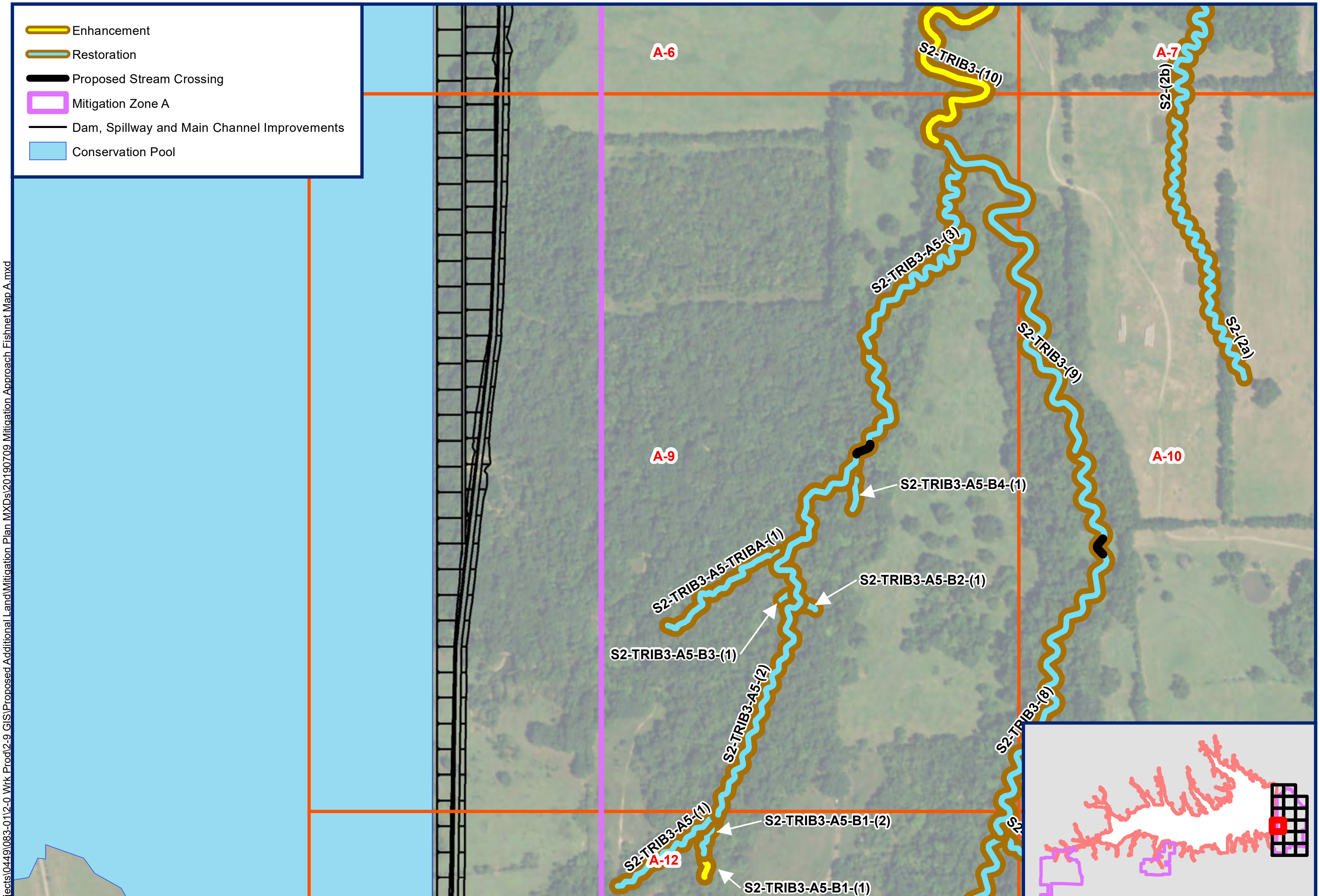

0 150 300 600 Feet

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N

FIGURE G-1: PANEL A-9, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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JULY 2019

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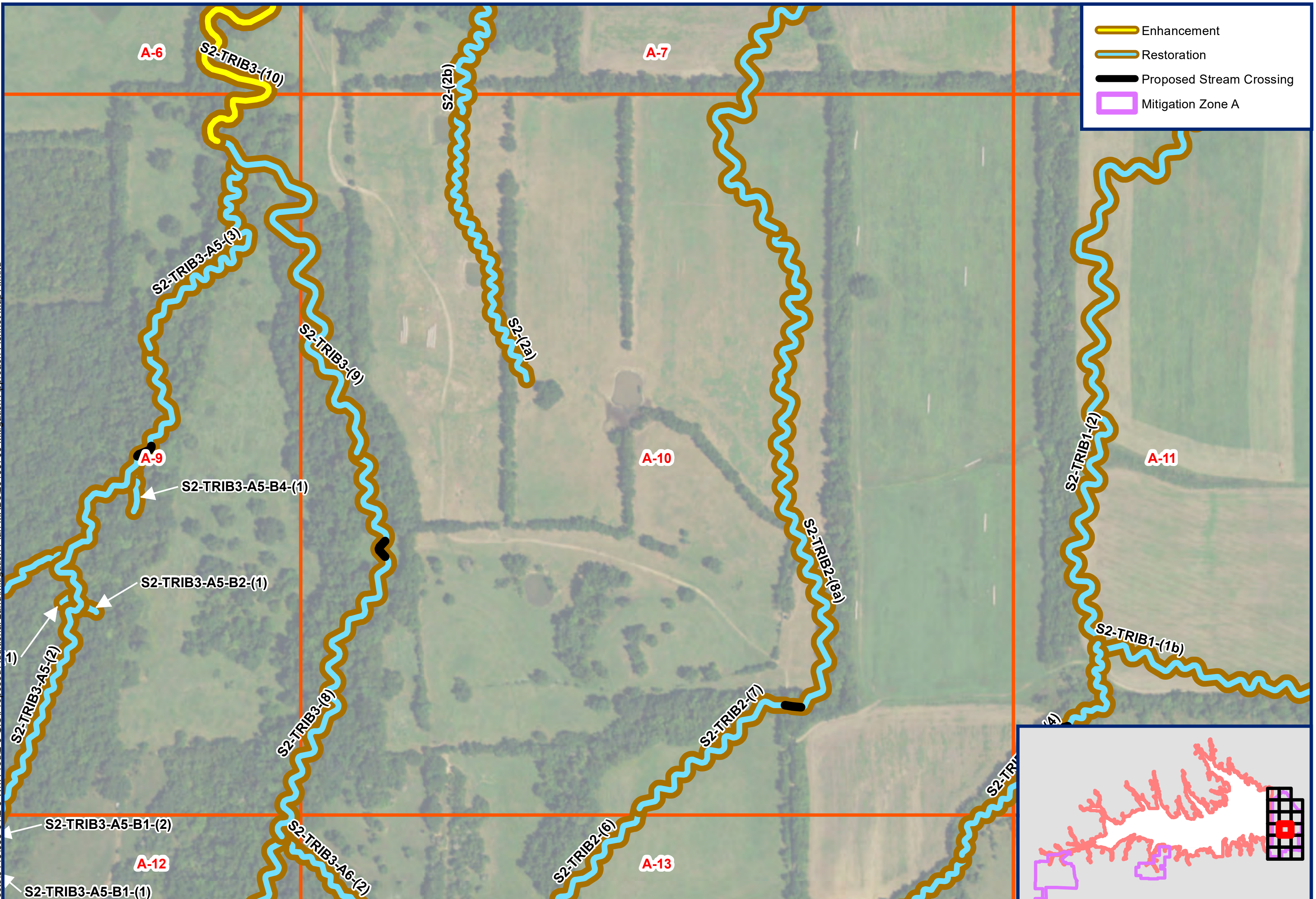

0 150 300 600 Feet

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FIGURE G-1: PANEL A-10, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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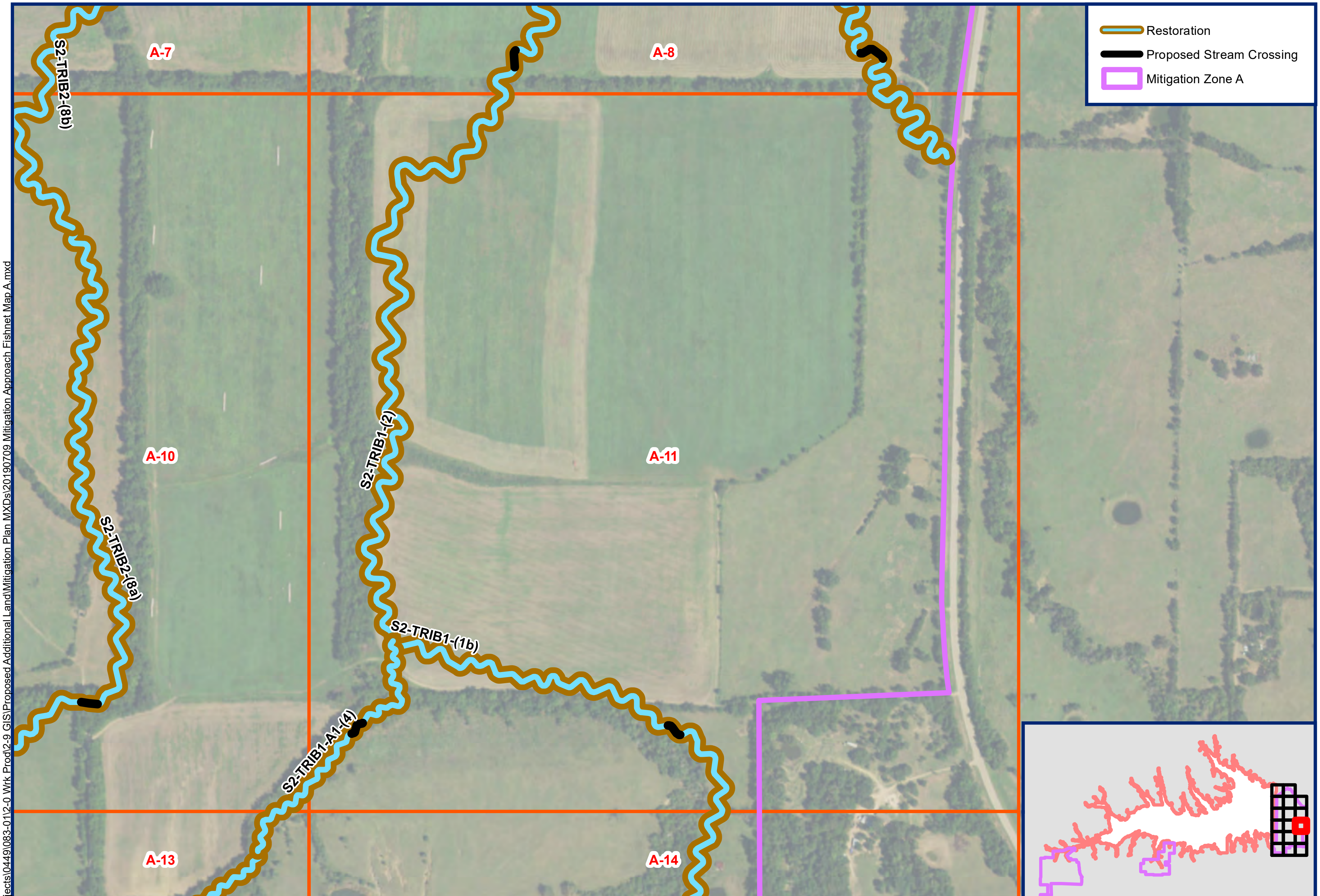

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FIGURE G-1: PANEL A-11, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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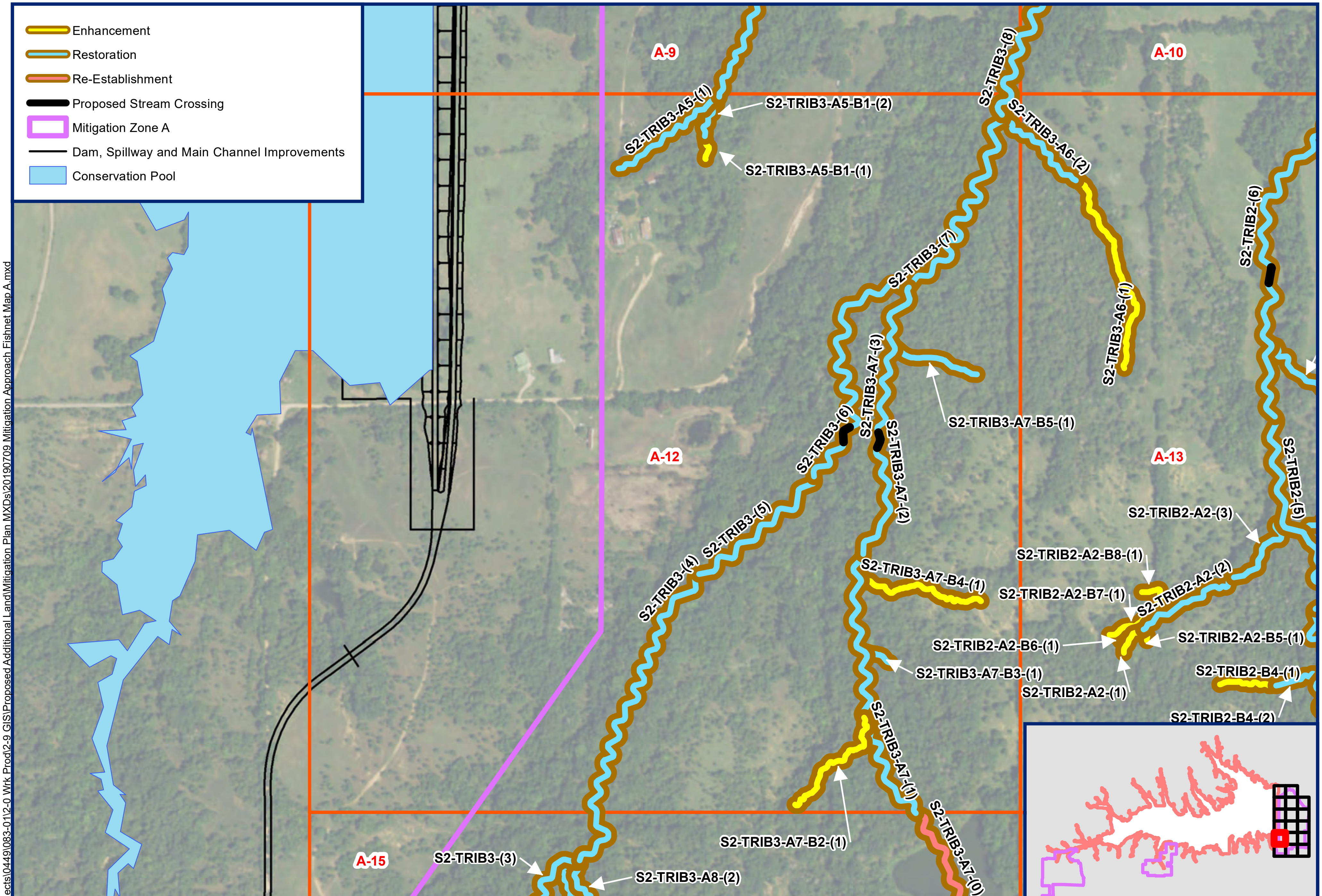

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0 150 300 600 Feet

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FIGURE G-1: PANEL A-12, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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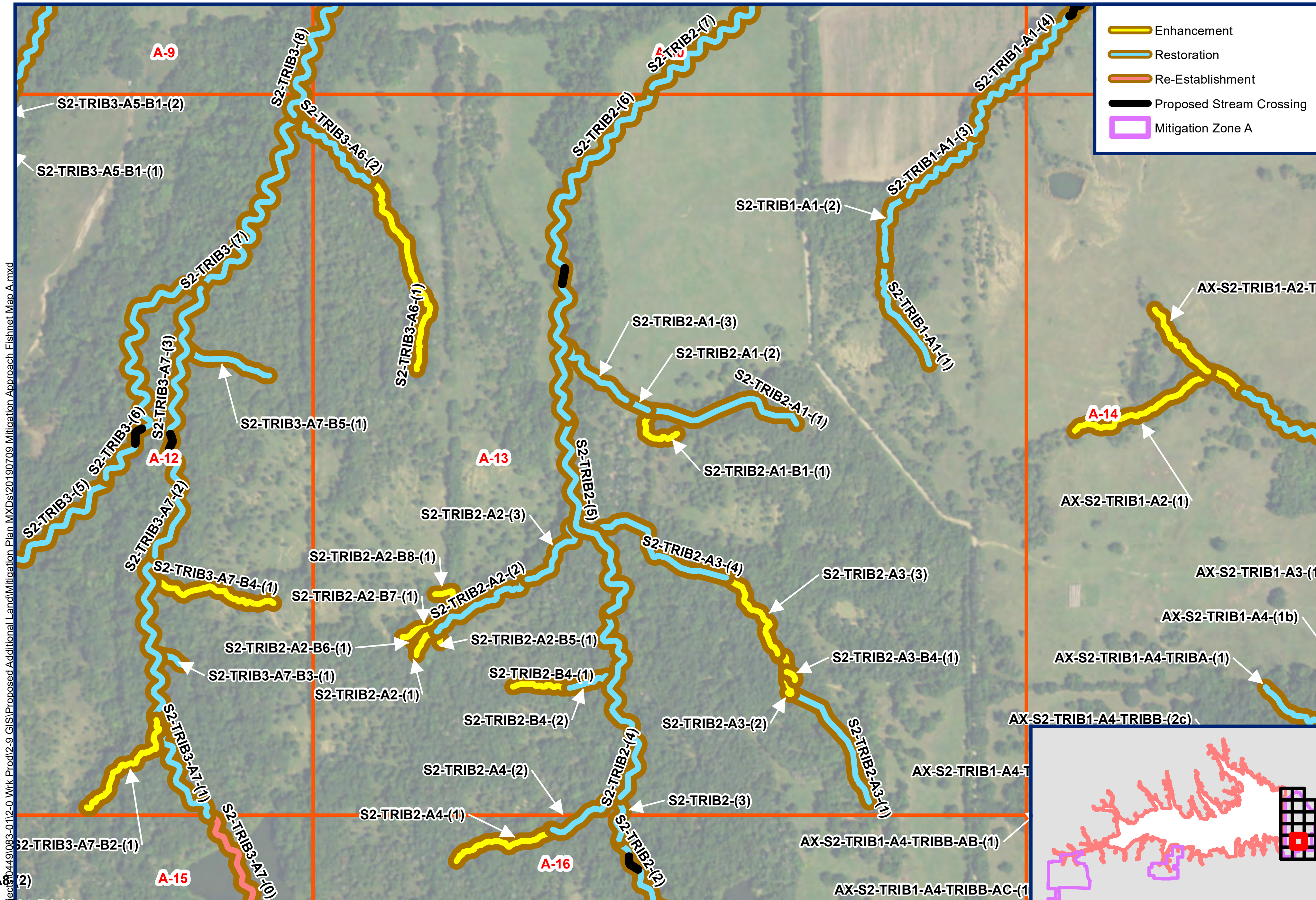

FIGURE G-1: PANEL A-13, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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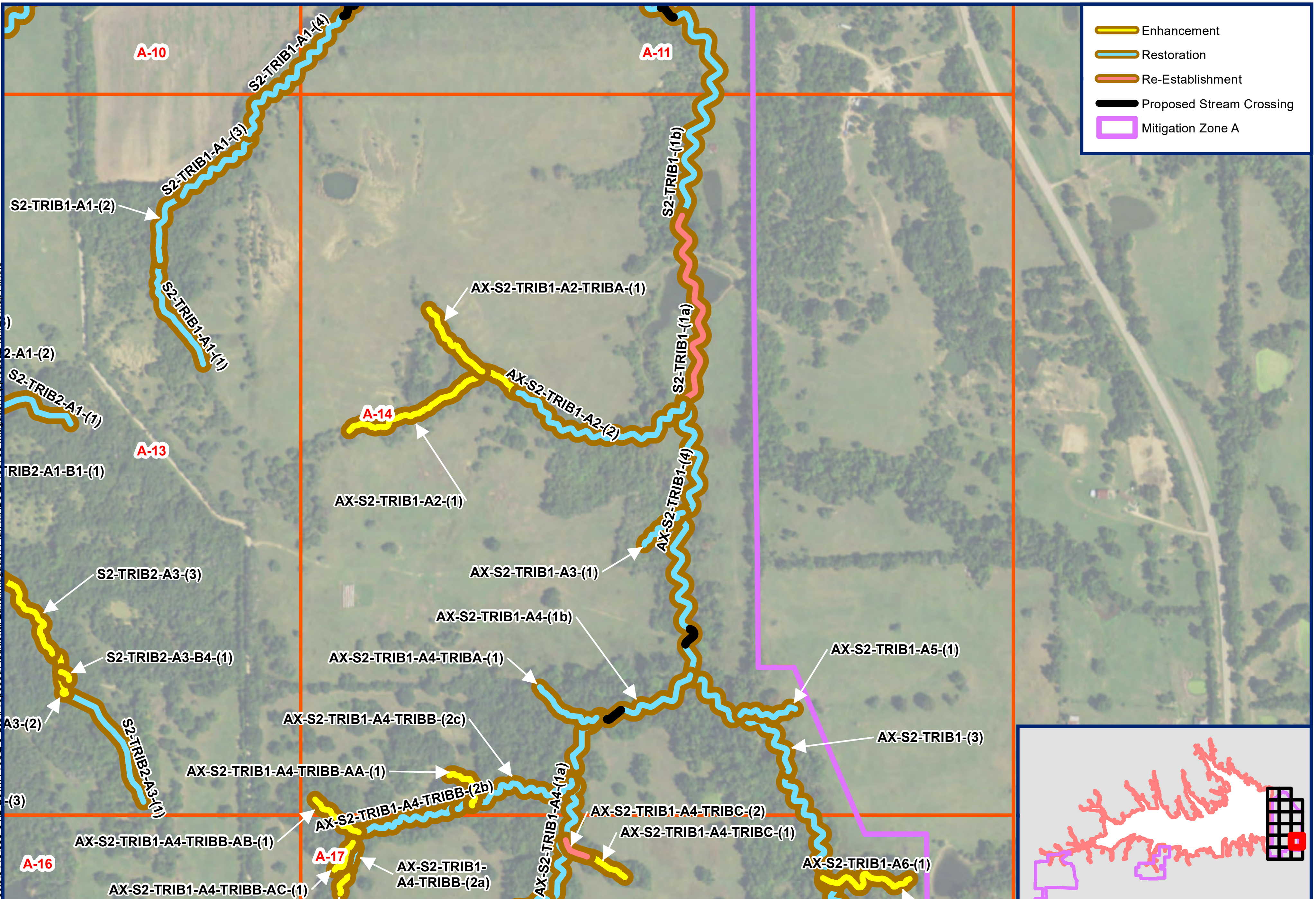

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FIGURE G-1: PANEL A-14, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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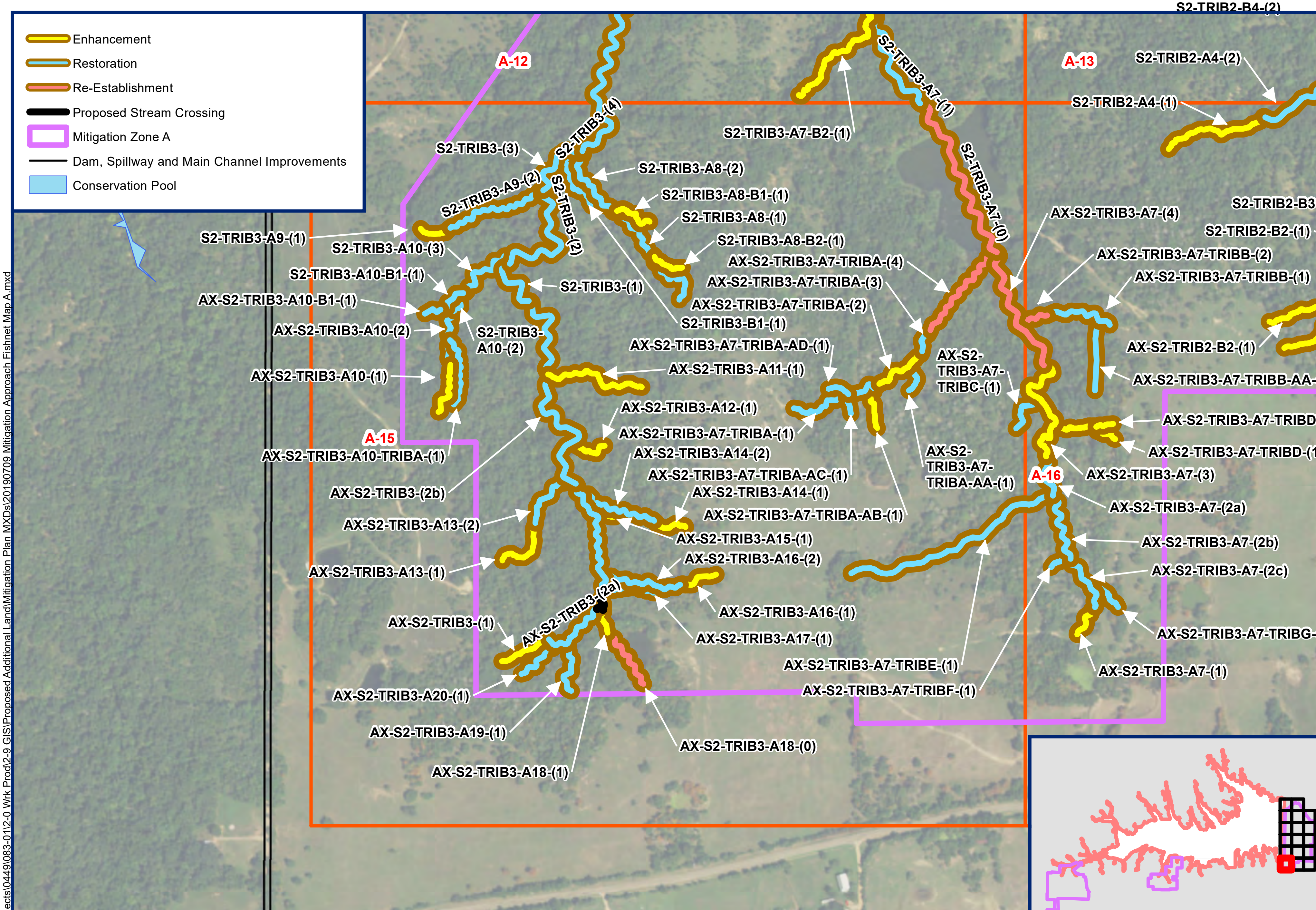

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FIGURE G-1: PANEL A-15, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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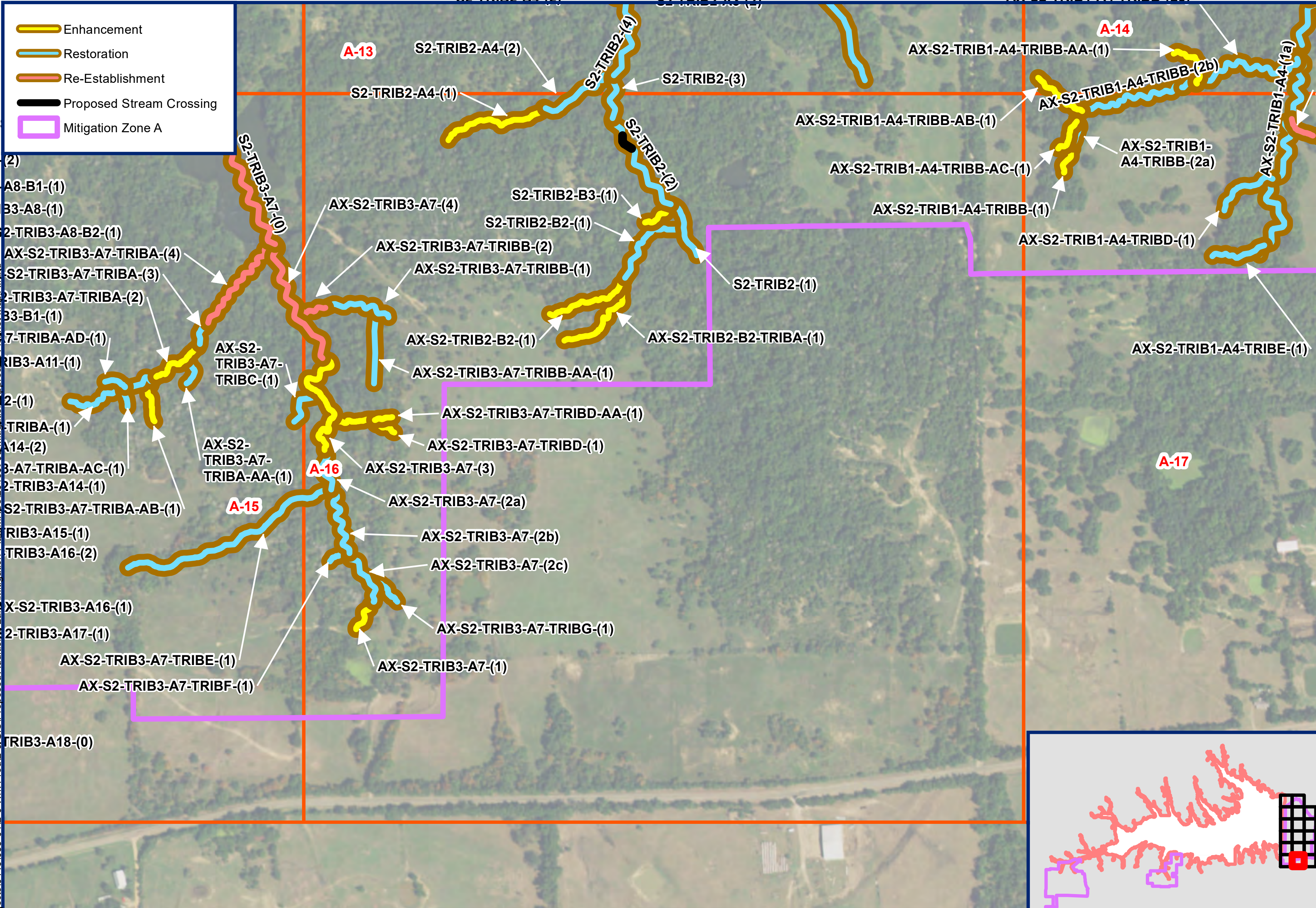

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FIGURE G-1: PANEL A-16, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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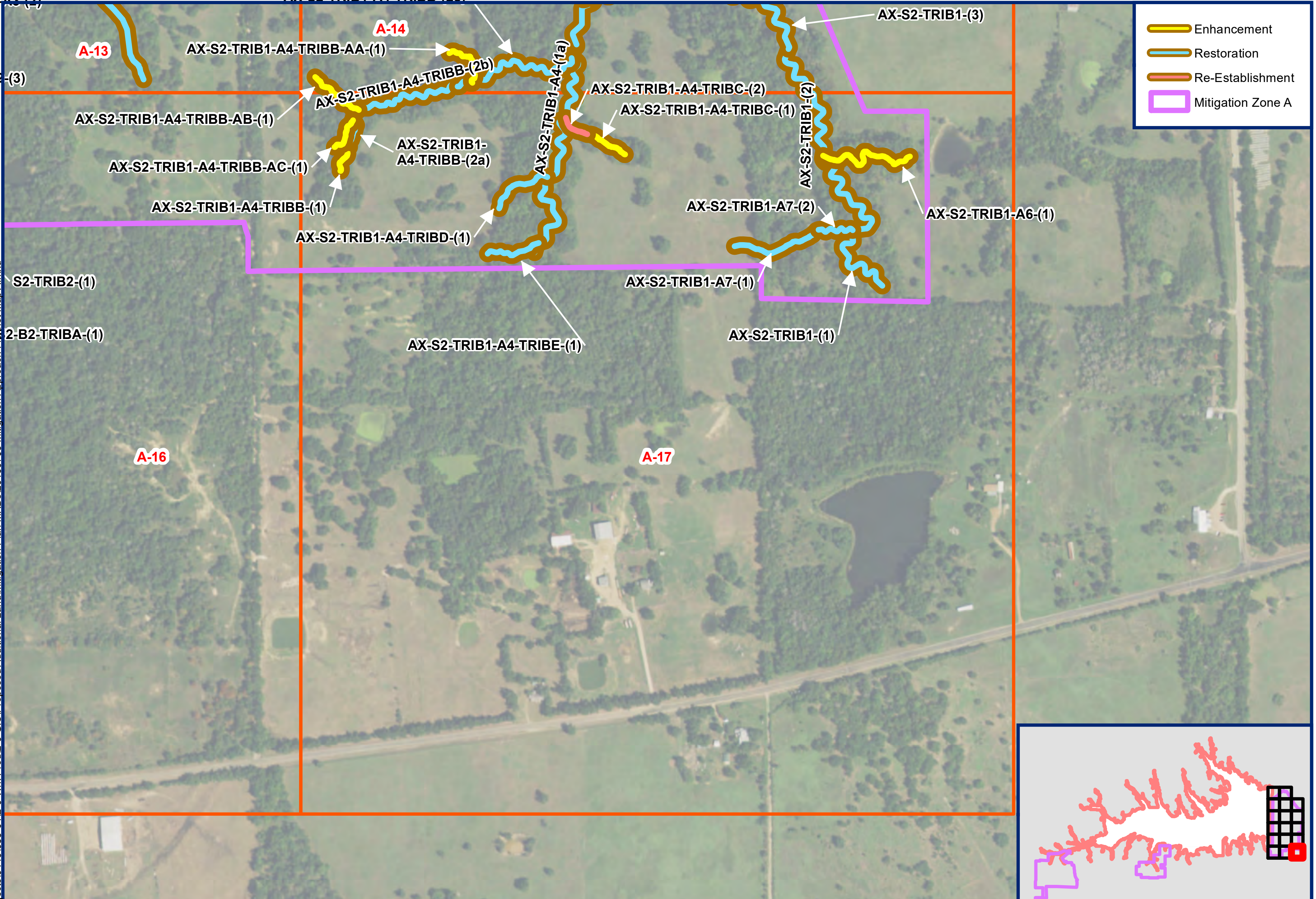

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FIGURE G-1: PANEL A-17, MITIGATION ZONE A

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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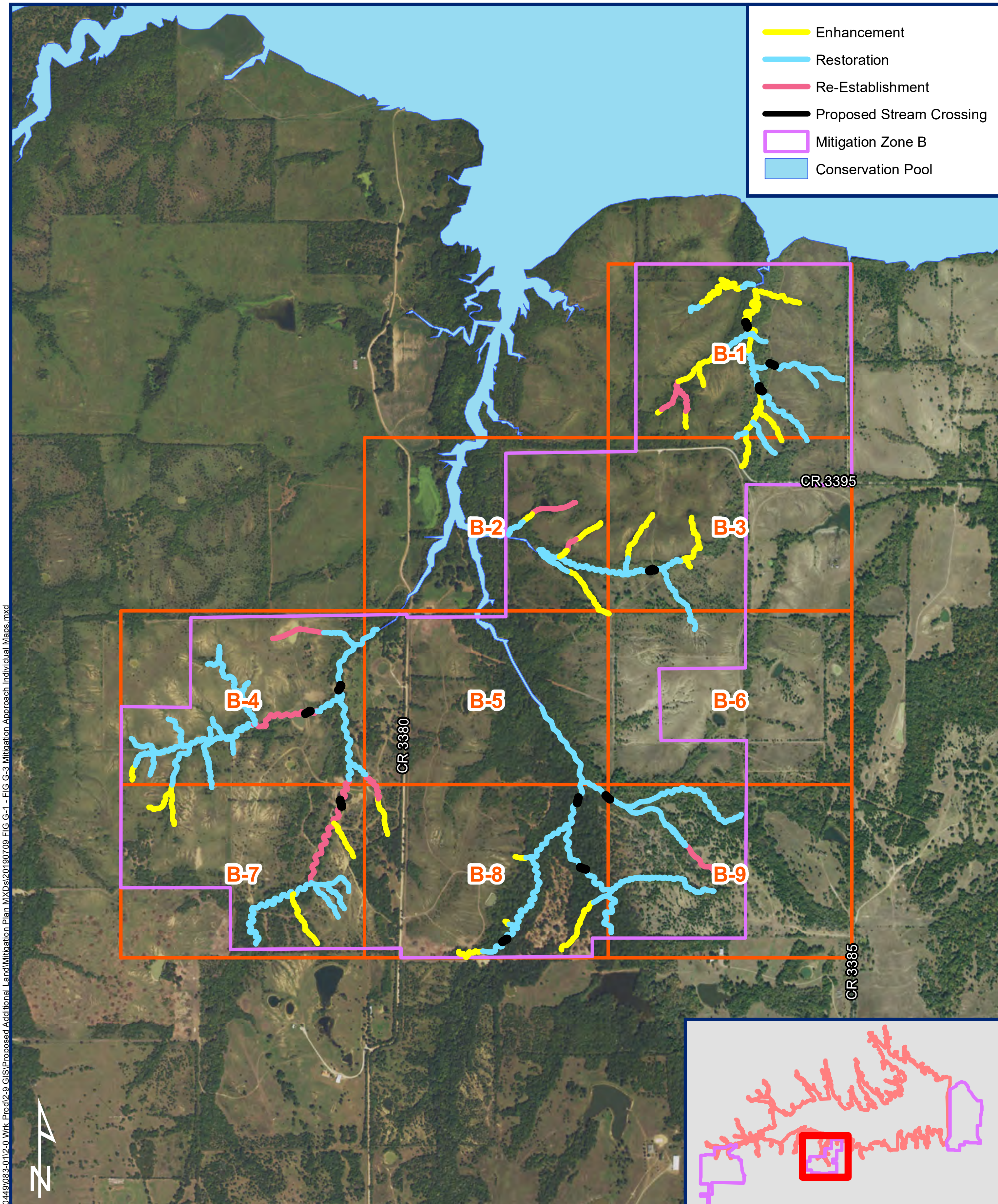

FIGURE G-2: MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH DRAFT

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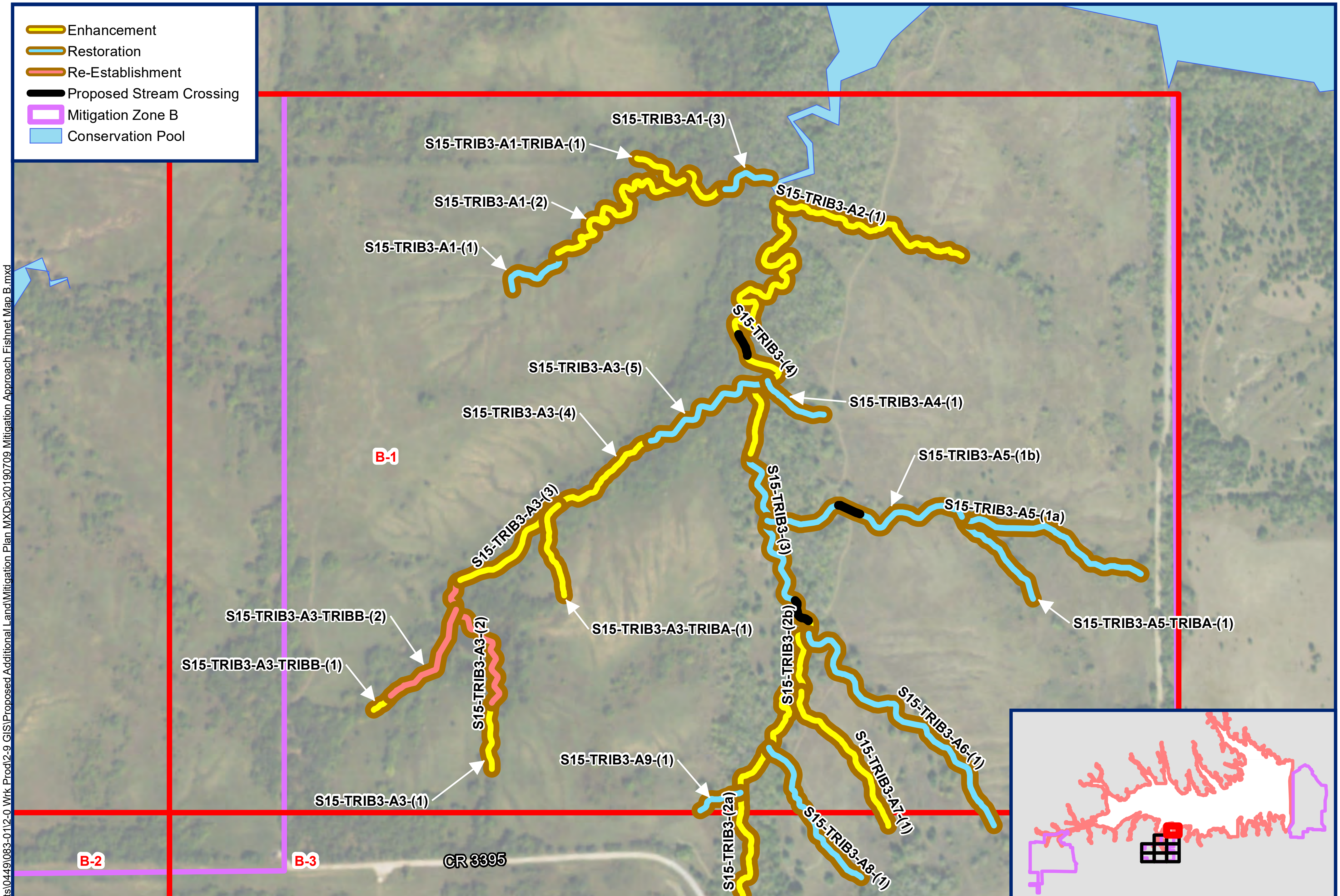

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FIGURE G-2: PANEL B-1, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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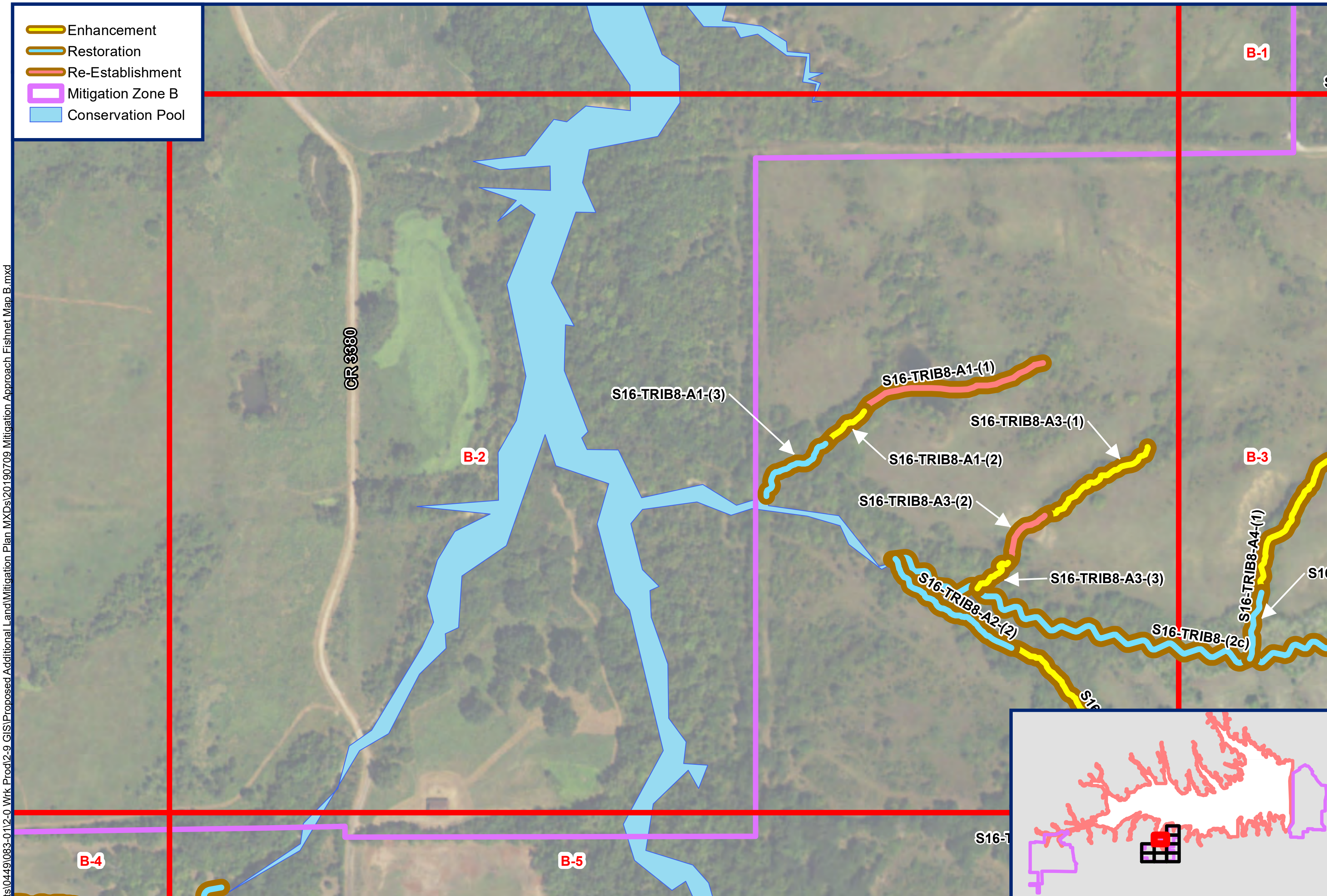

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FIGURE G-2: PANEL B-2, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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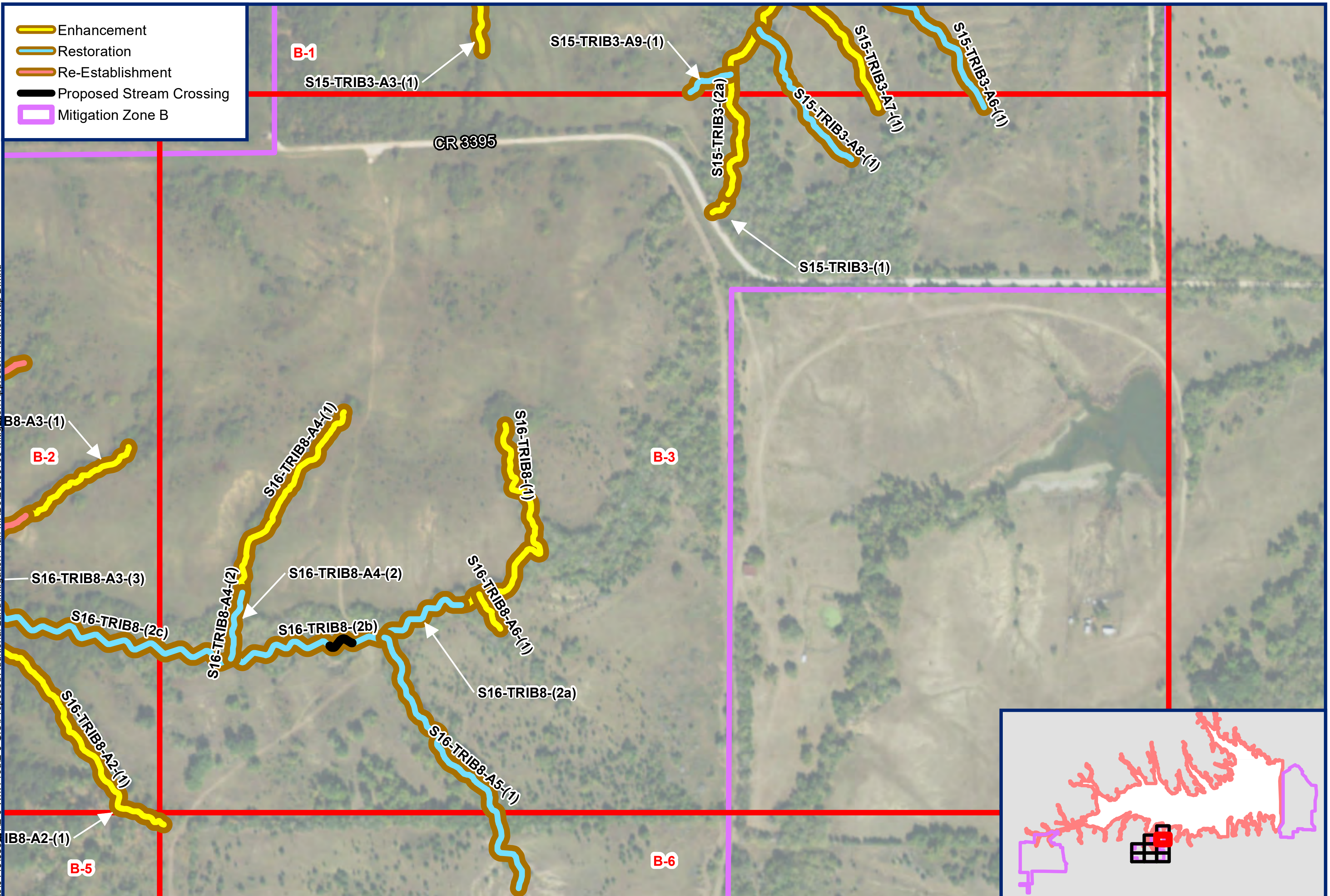

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FIGURE G-2: PANEL B-3, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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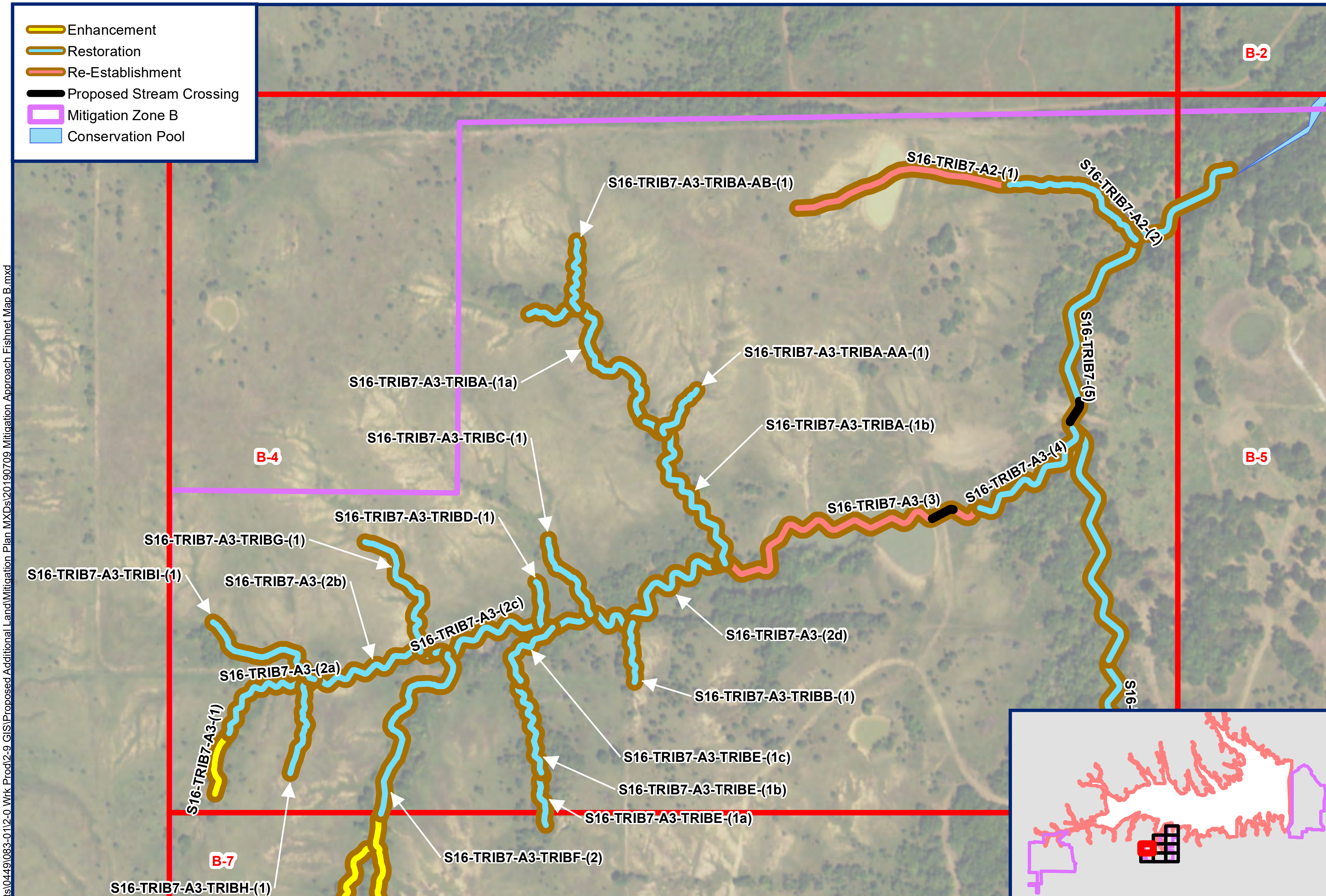

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FIGURE G-2: PANEL B-4, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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FANNIN COUNTY, TX

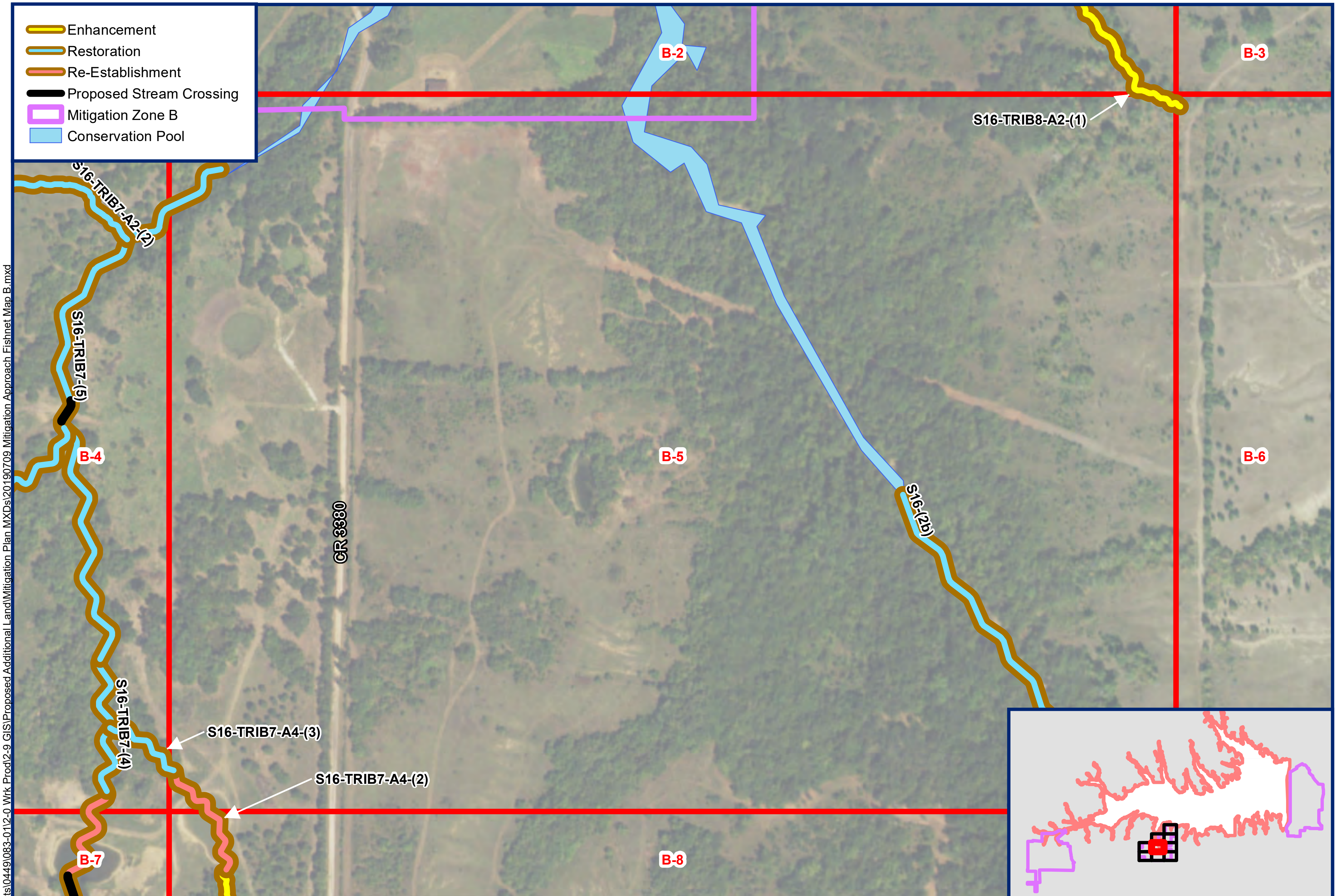

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FIGURE G-2: PANEL B-5, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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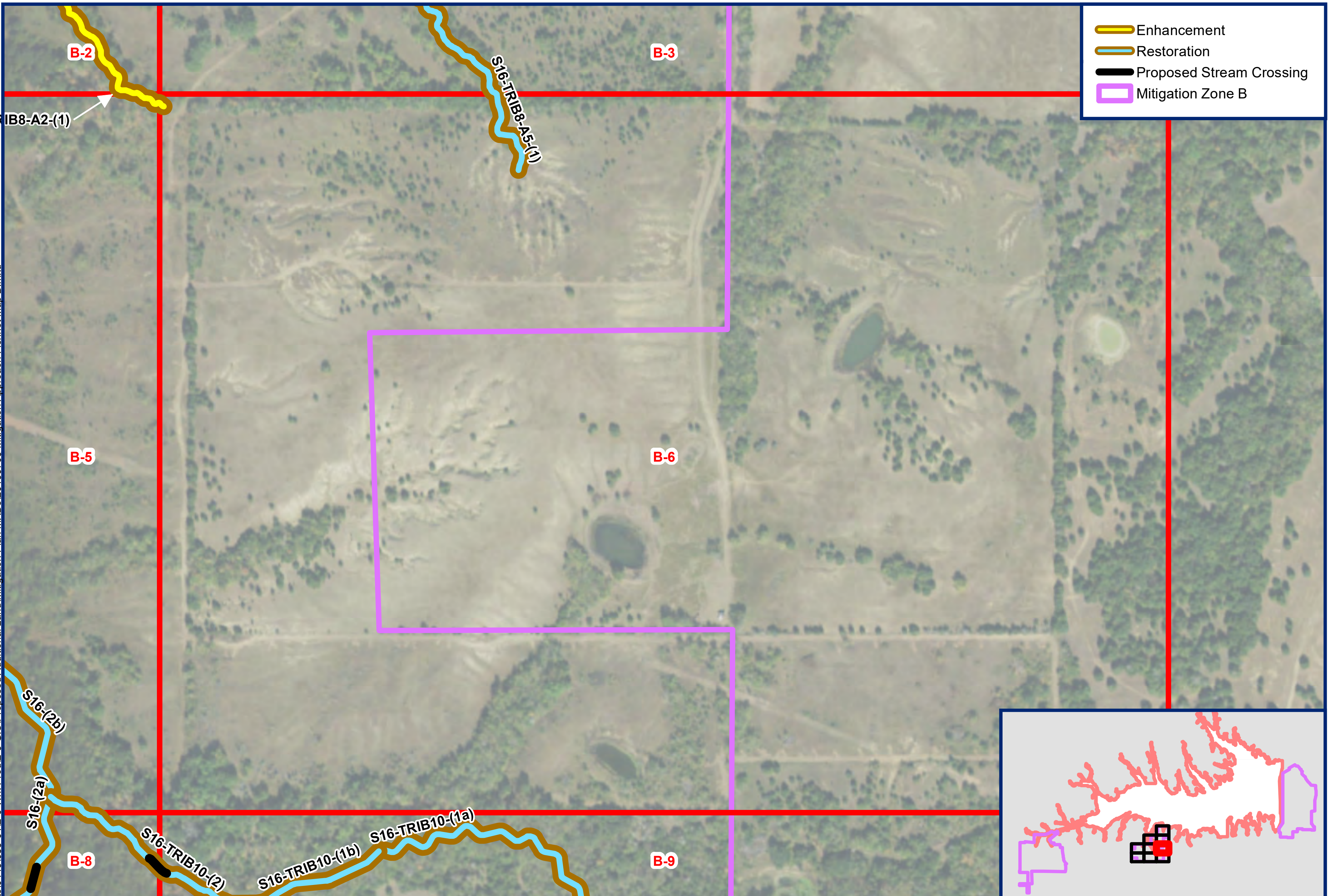

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FIGURE G-2: PANEL B-6, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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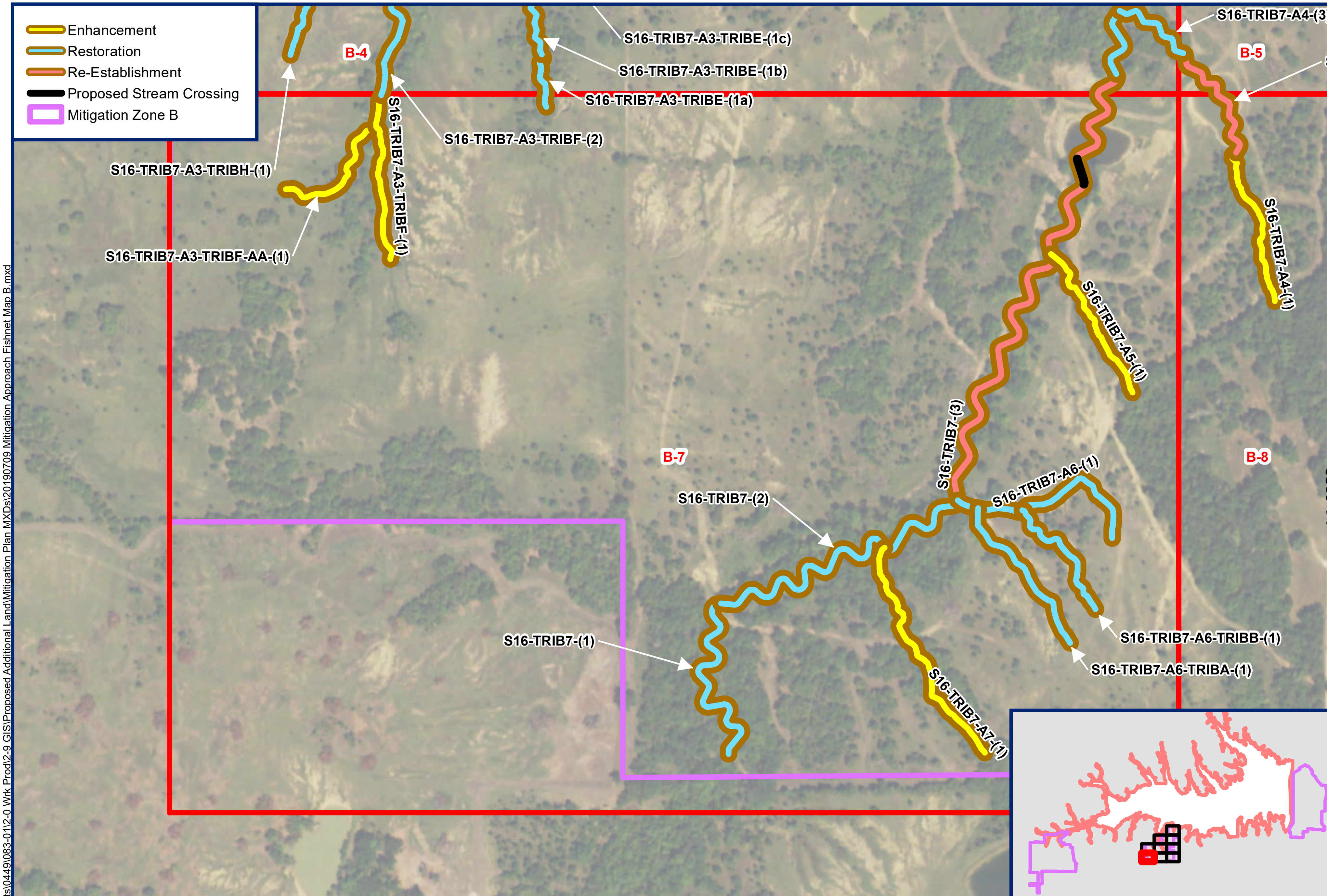

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FIGURE G-2: PANEL B-7, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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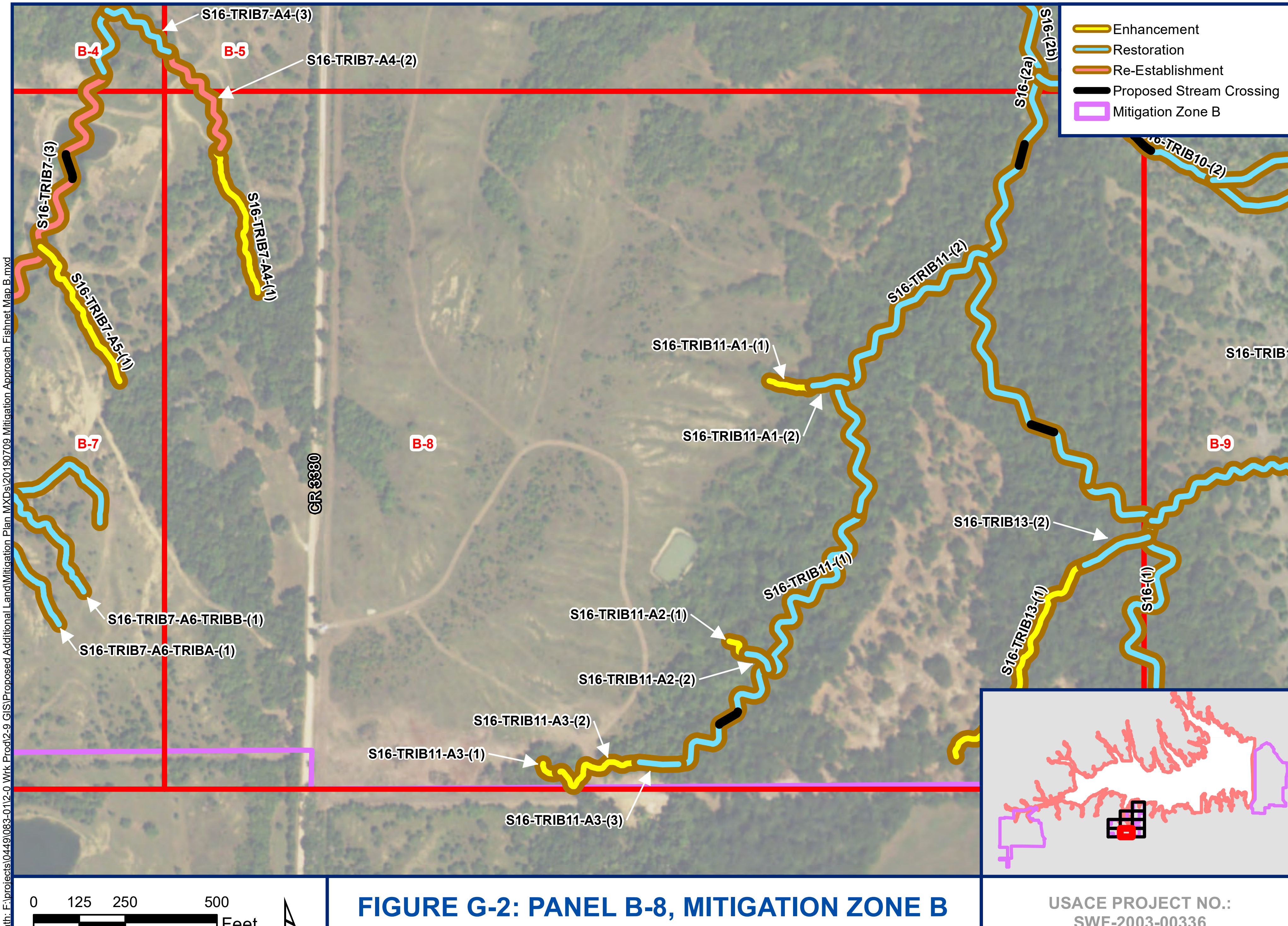

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FIGURE G-2: PANEL B-8, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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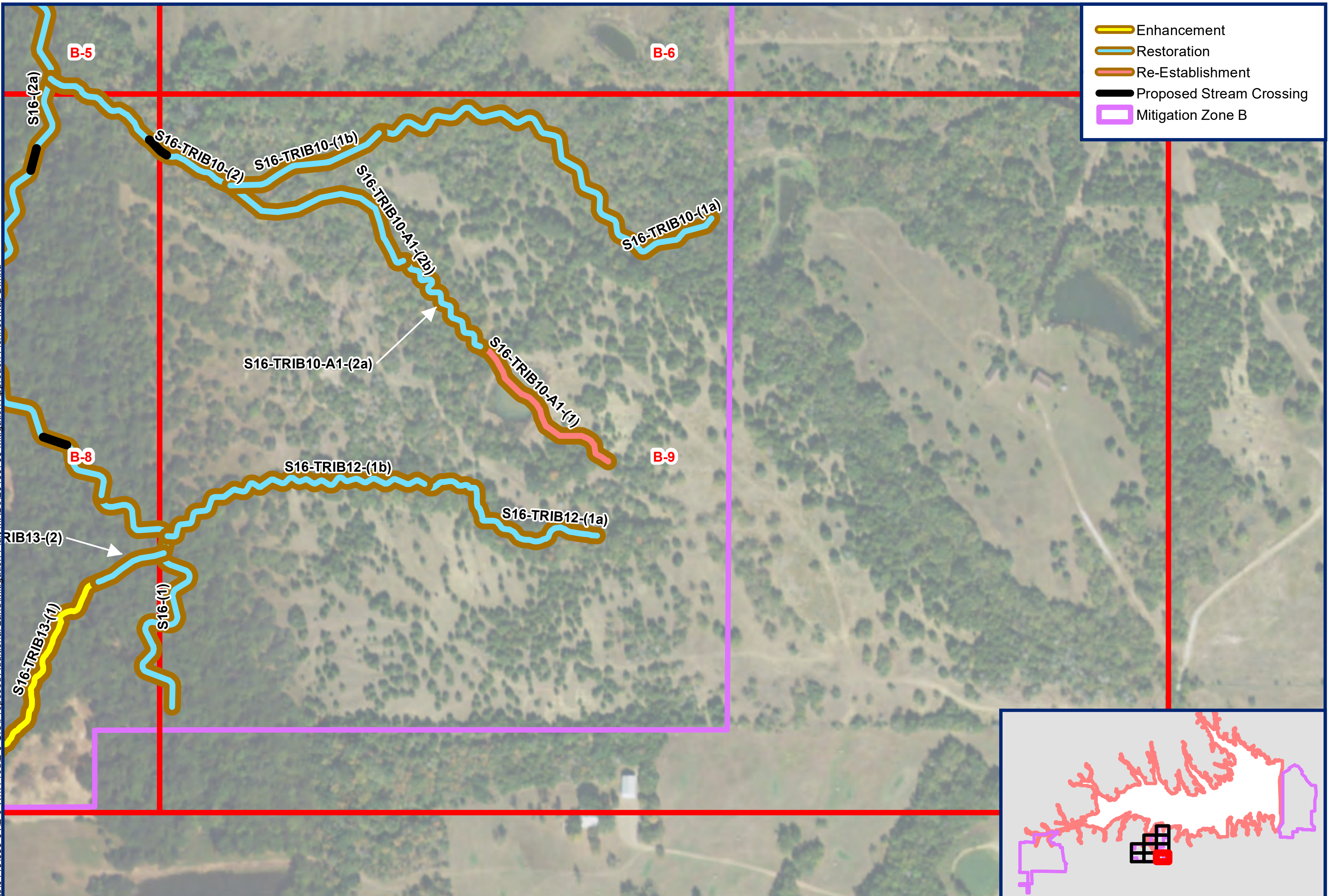

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FIGURE G-2: PANEL B-9, MITIGATION ZONE B

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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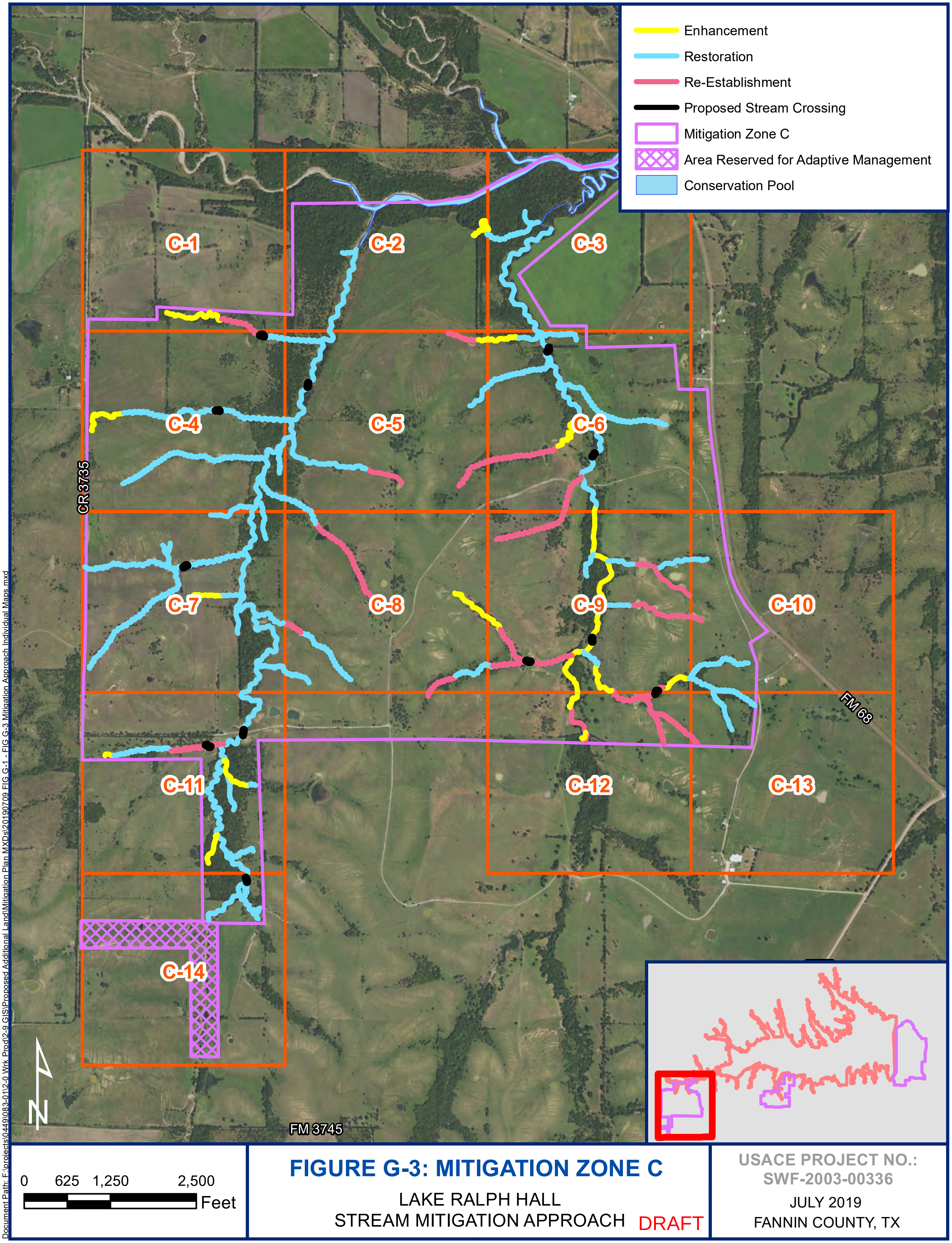

Document Path: F:\projects\0449\083-0112-0 Wrk Prod\2-9 GIS\Proposed Additional Land\Mitigation Plan MXDs\20190709 FIG G-1 - FIG G-3 Mitigation Approach Individual Maps.mxd

FIGURE G-3: MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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JULY 2019
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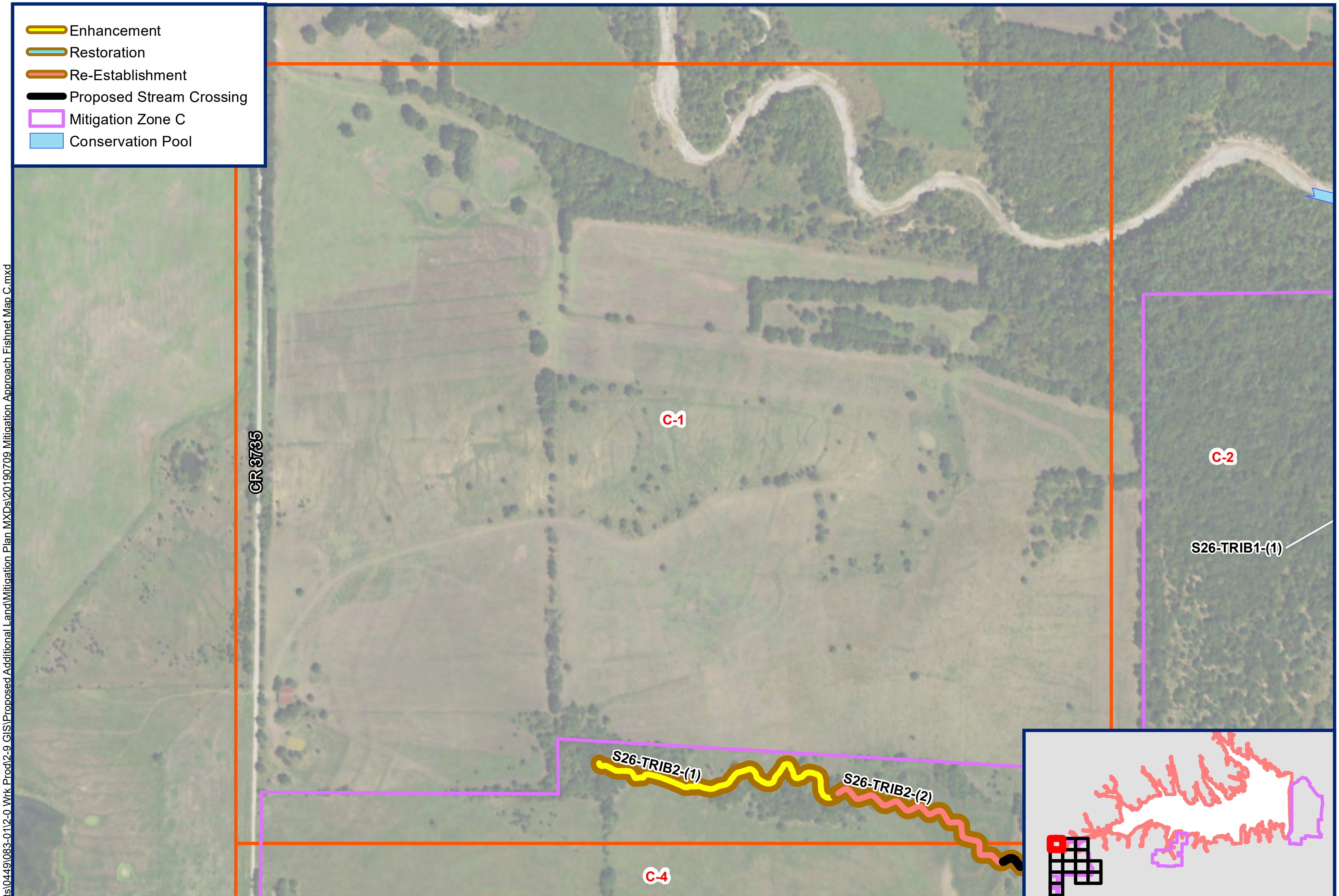

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FIGURE G-3: PANEL C-1, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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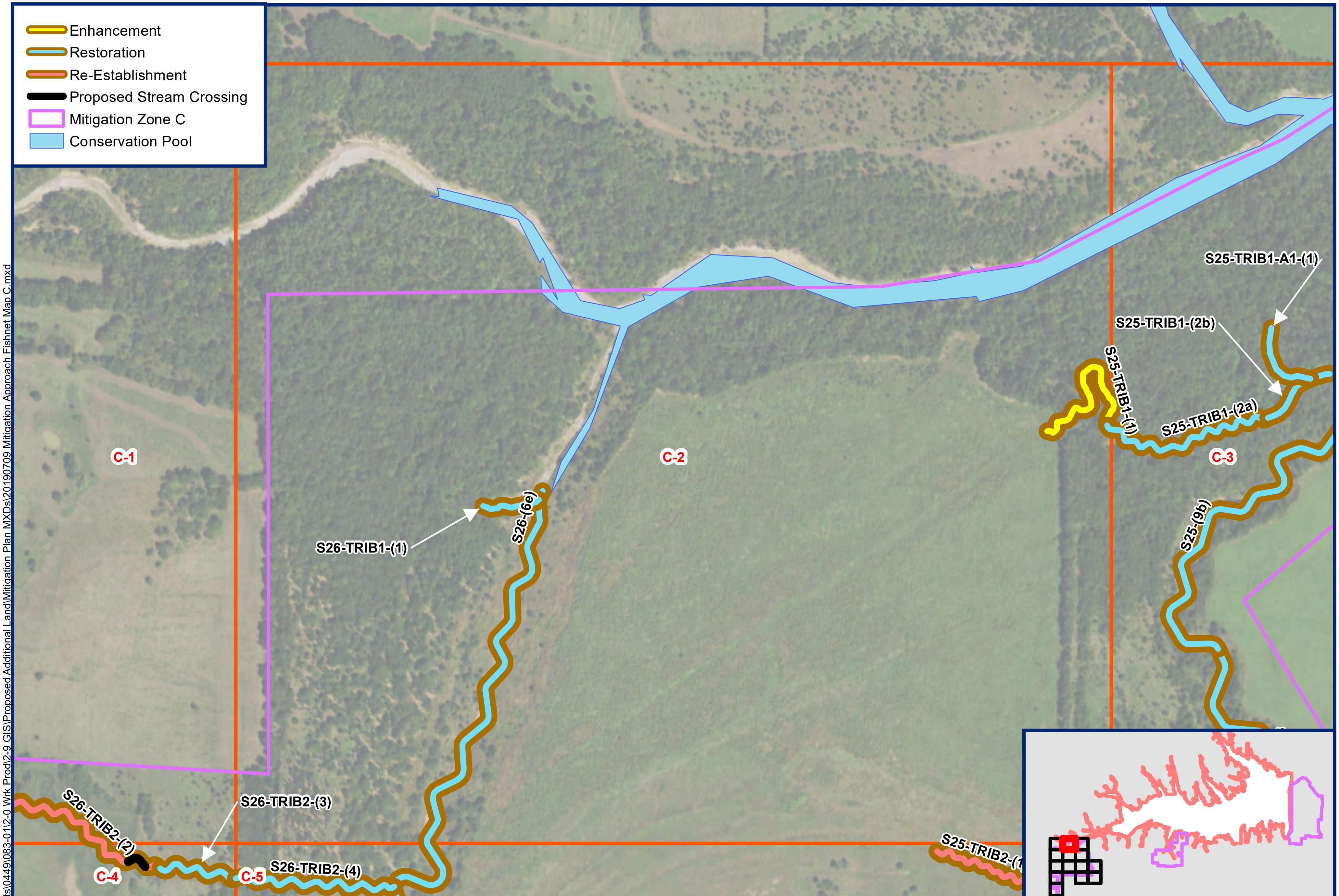

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FIGURE G-3: PANEL C-2, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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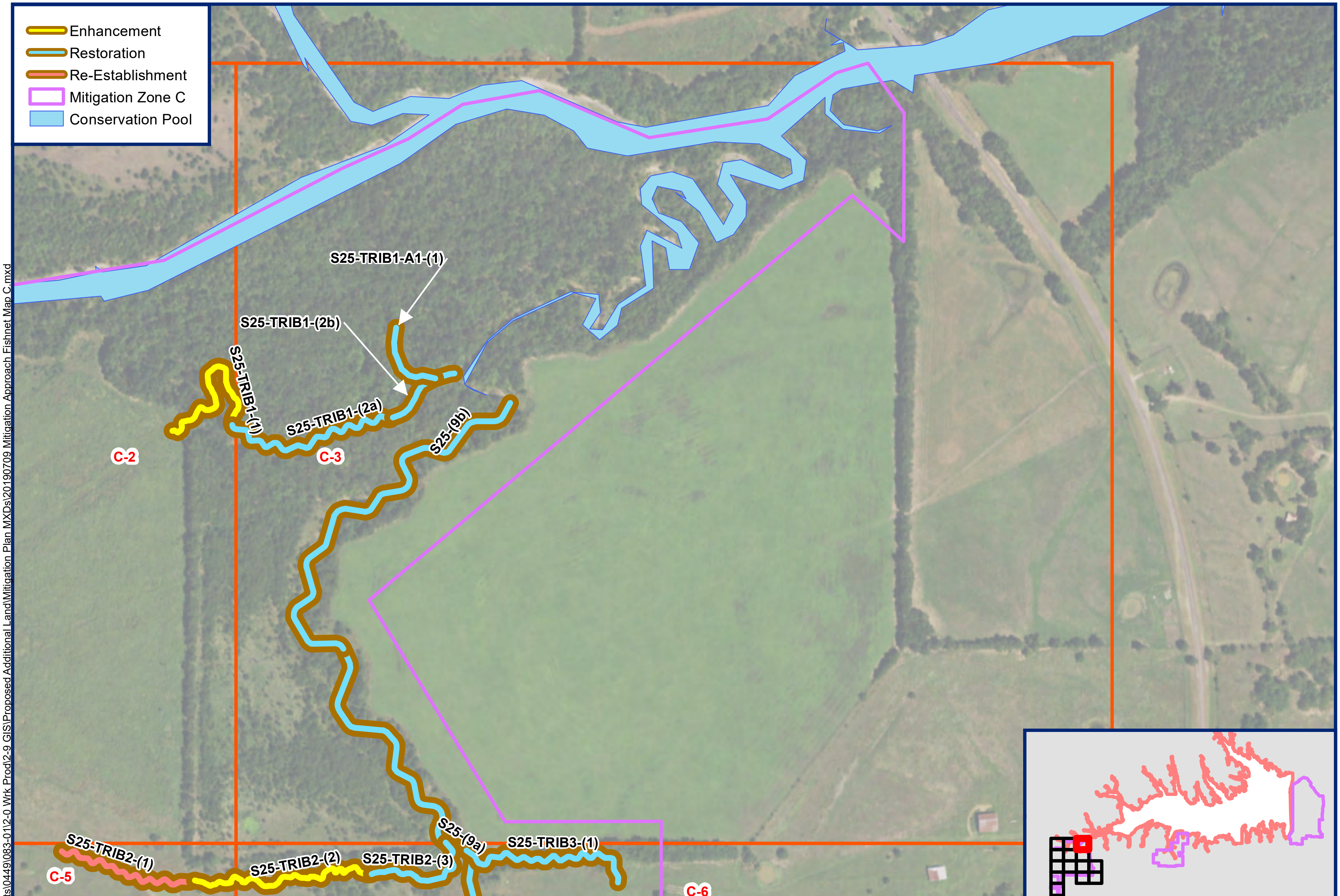

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FIGURE G-3: PANEL C-3, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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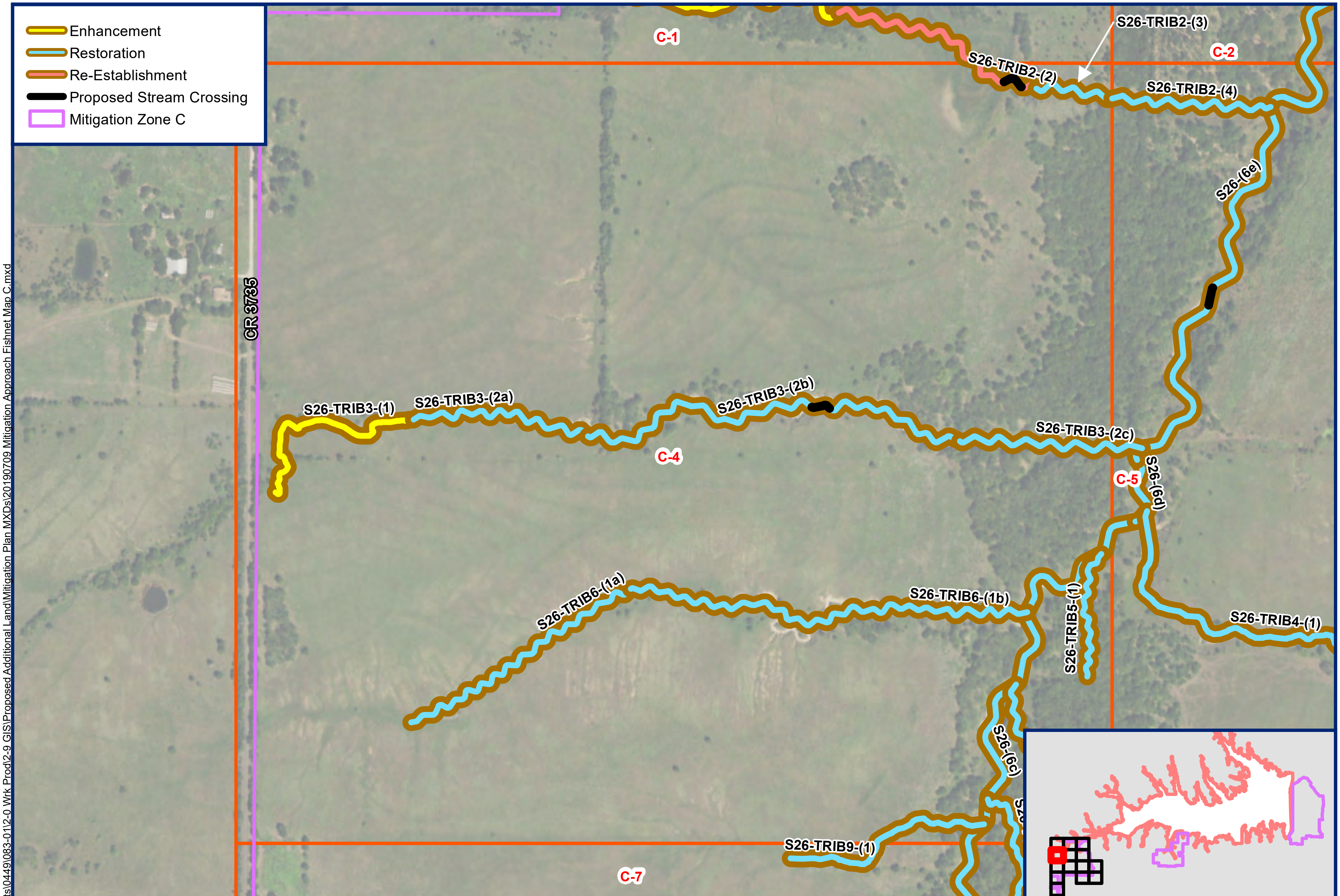

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Feet

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FIGURE G-3: PANEL C-4, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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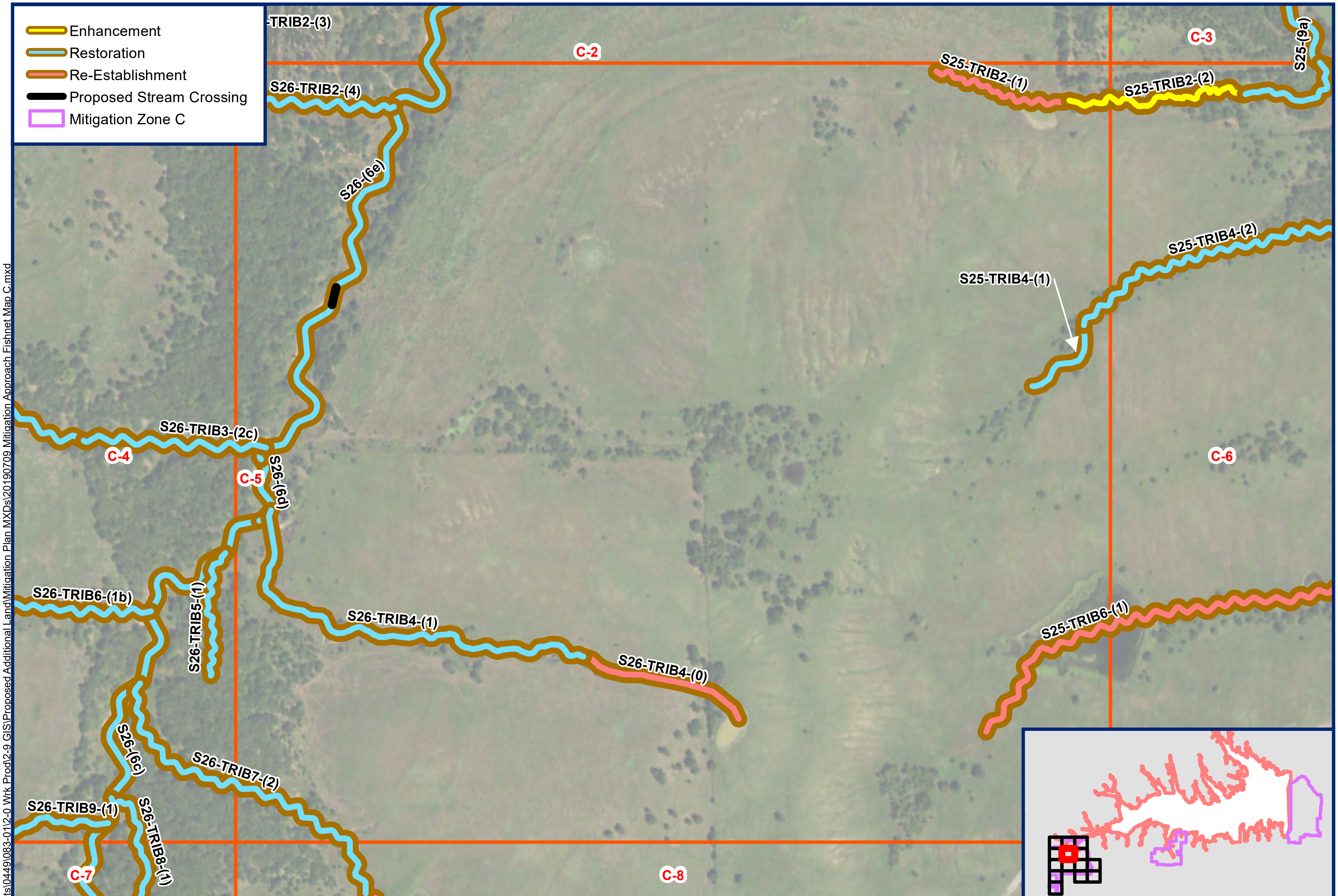

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FIGURE G-3: PANEL C-5, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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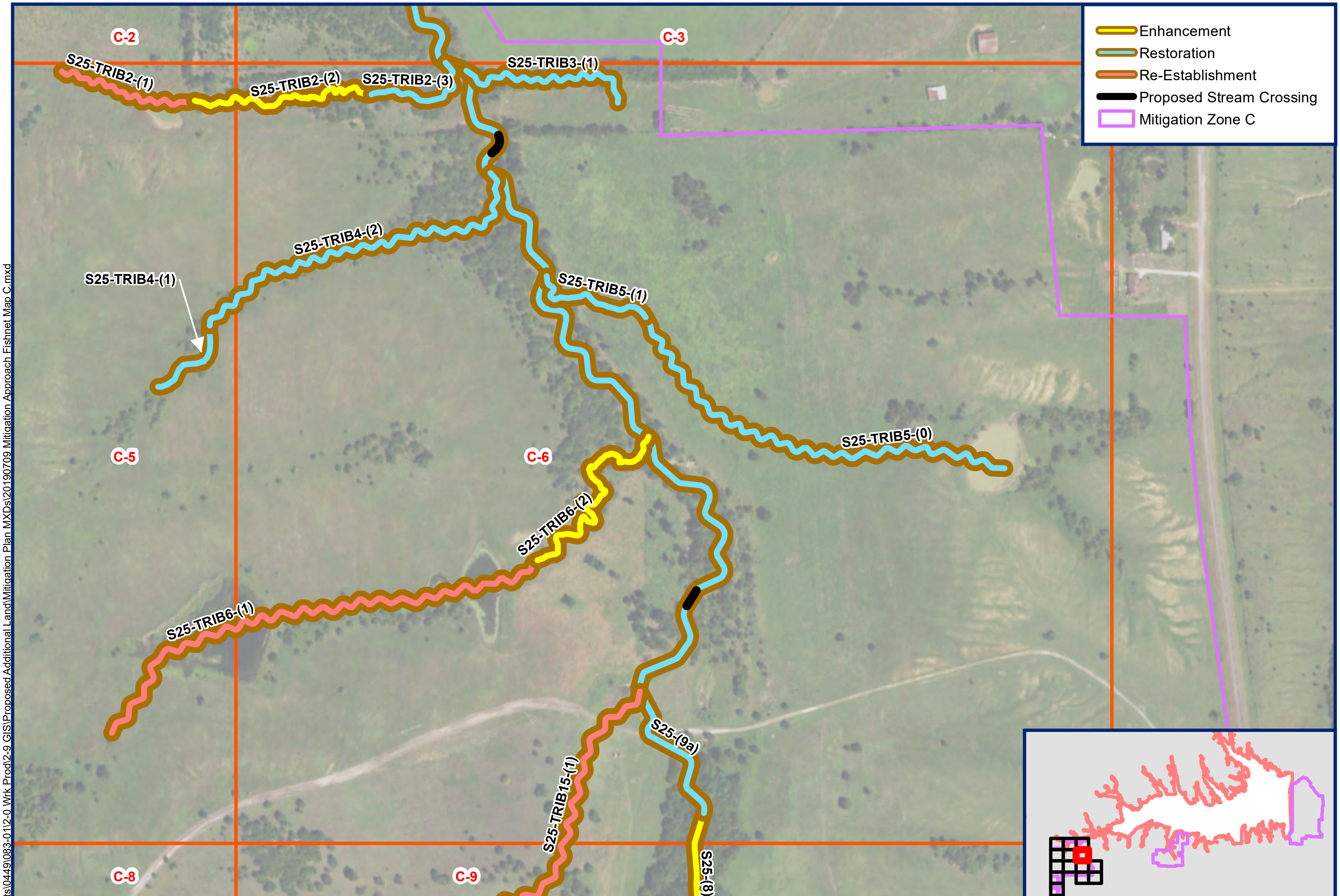

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FIGURE G-3: PANEL C-6, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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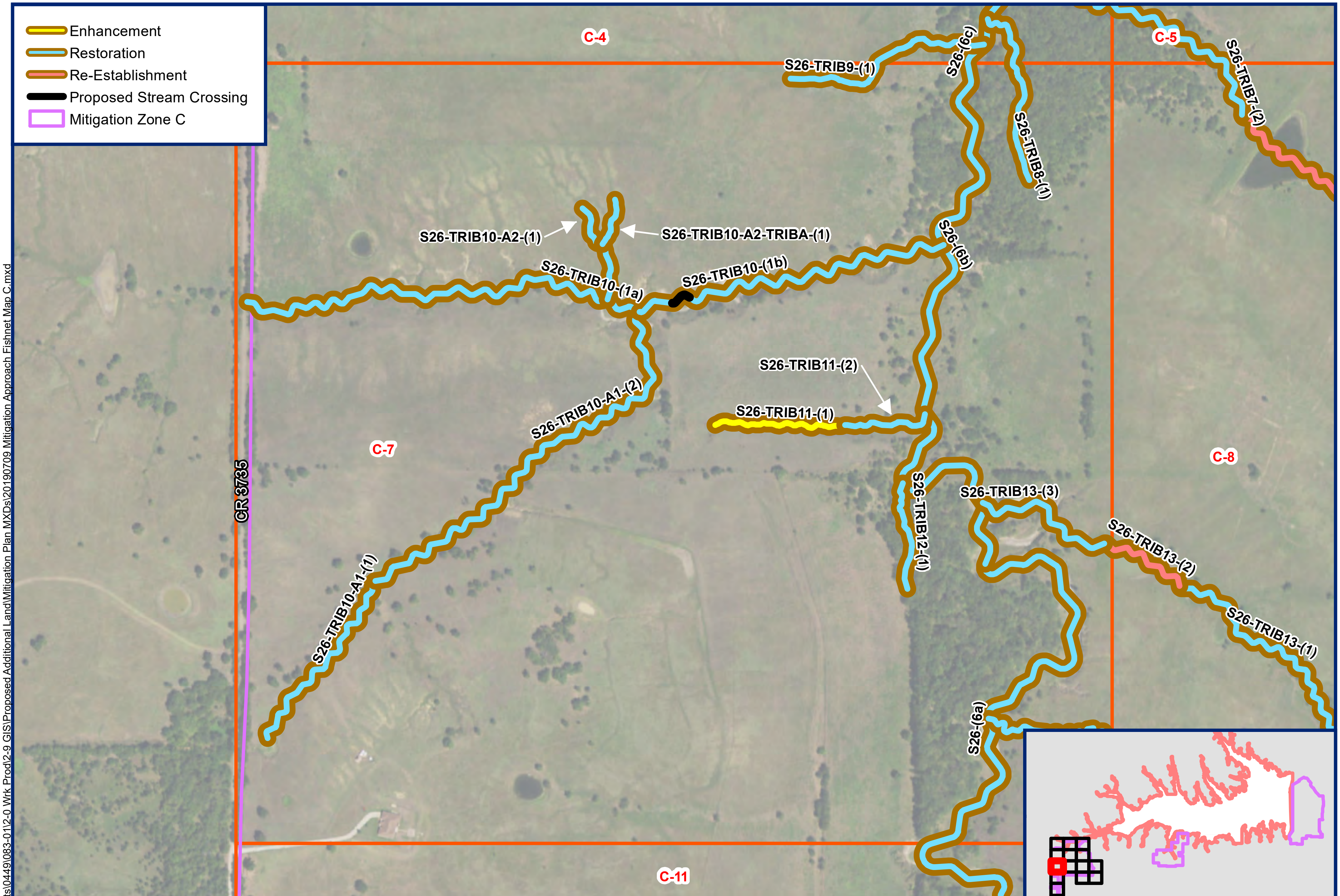

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N

FIGURE G-3: PANEL C-7, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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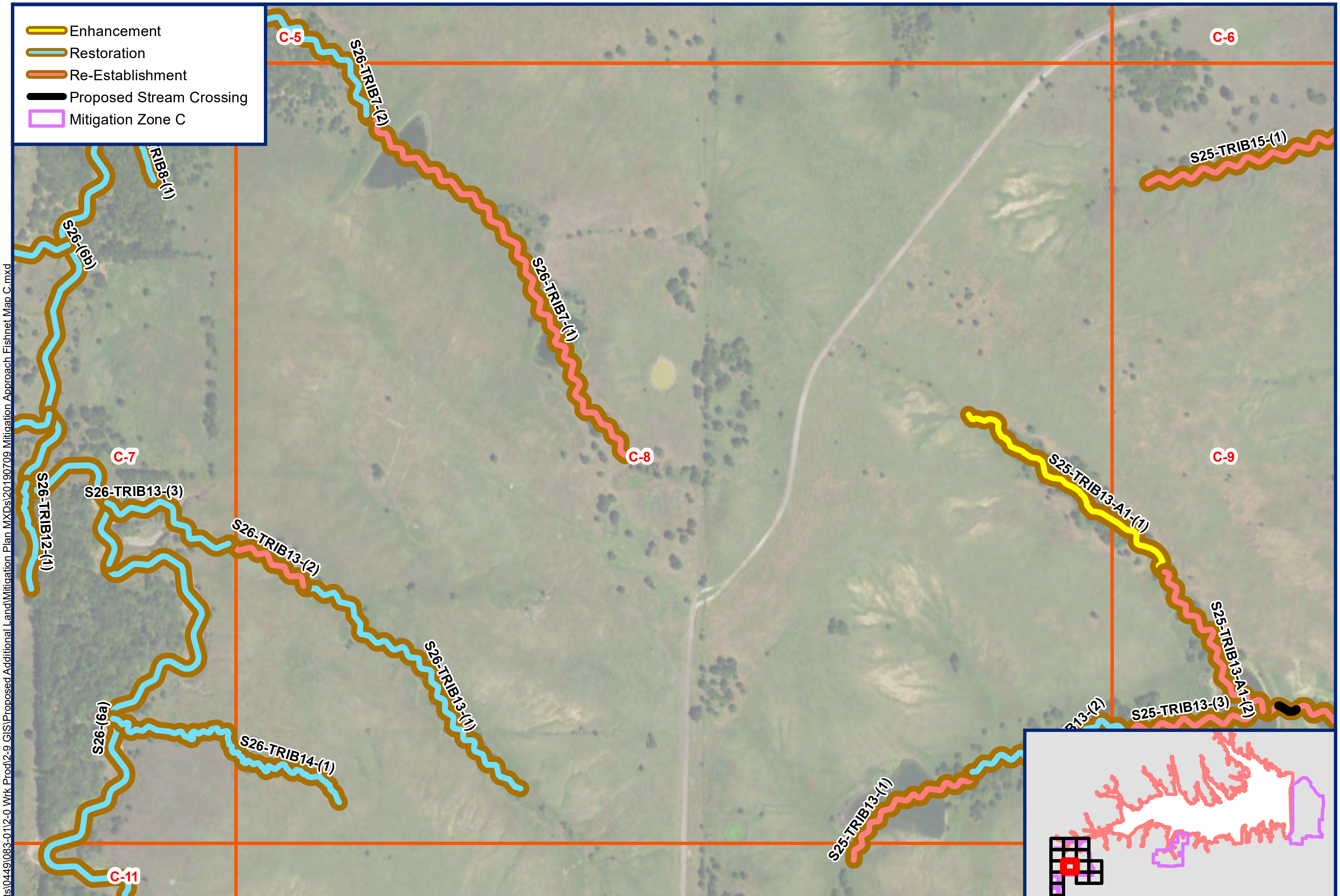

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N

FIGURE G-3: PANEL C-8, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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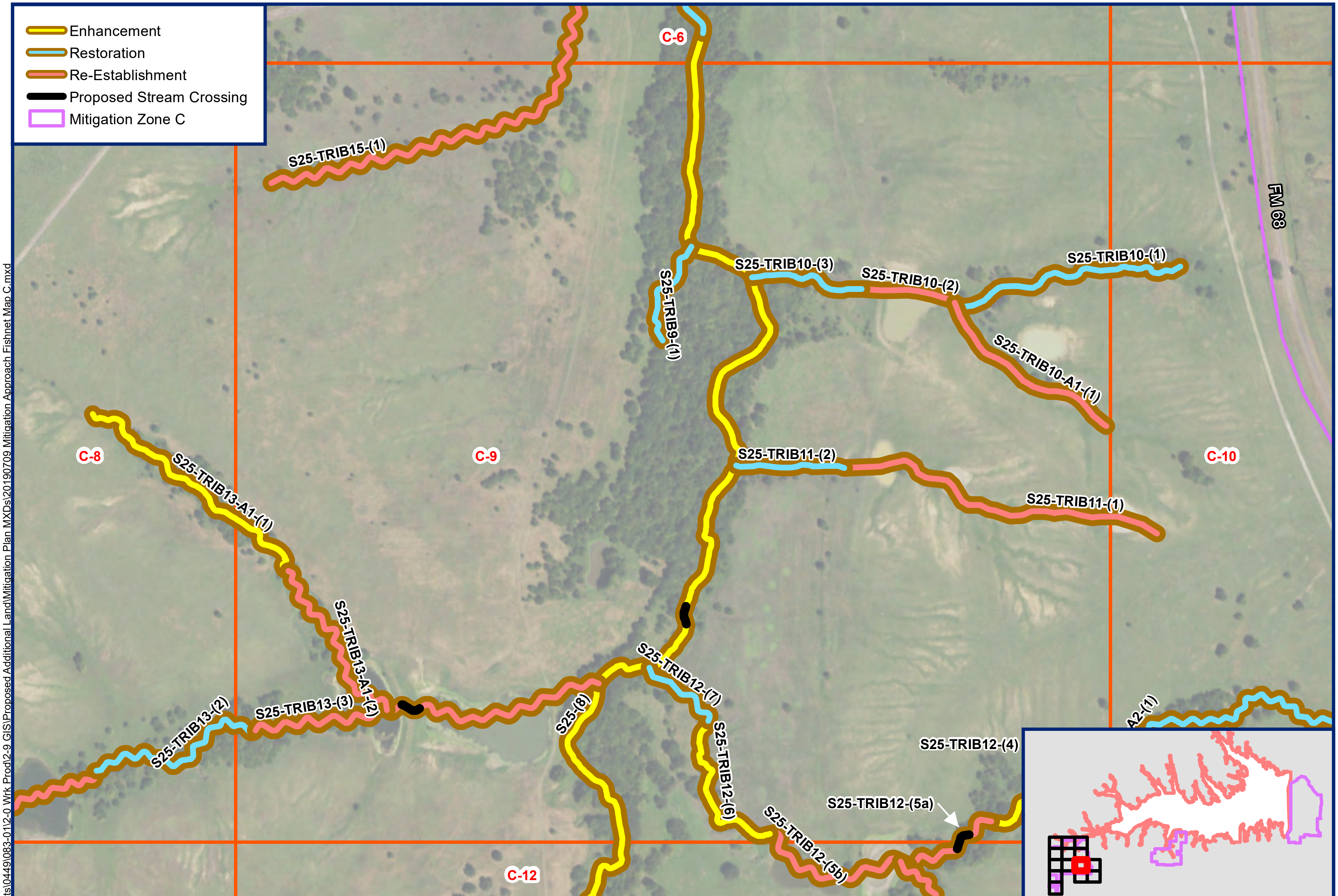

FIGURE G-3: PANEL C-9, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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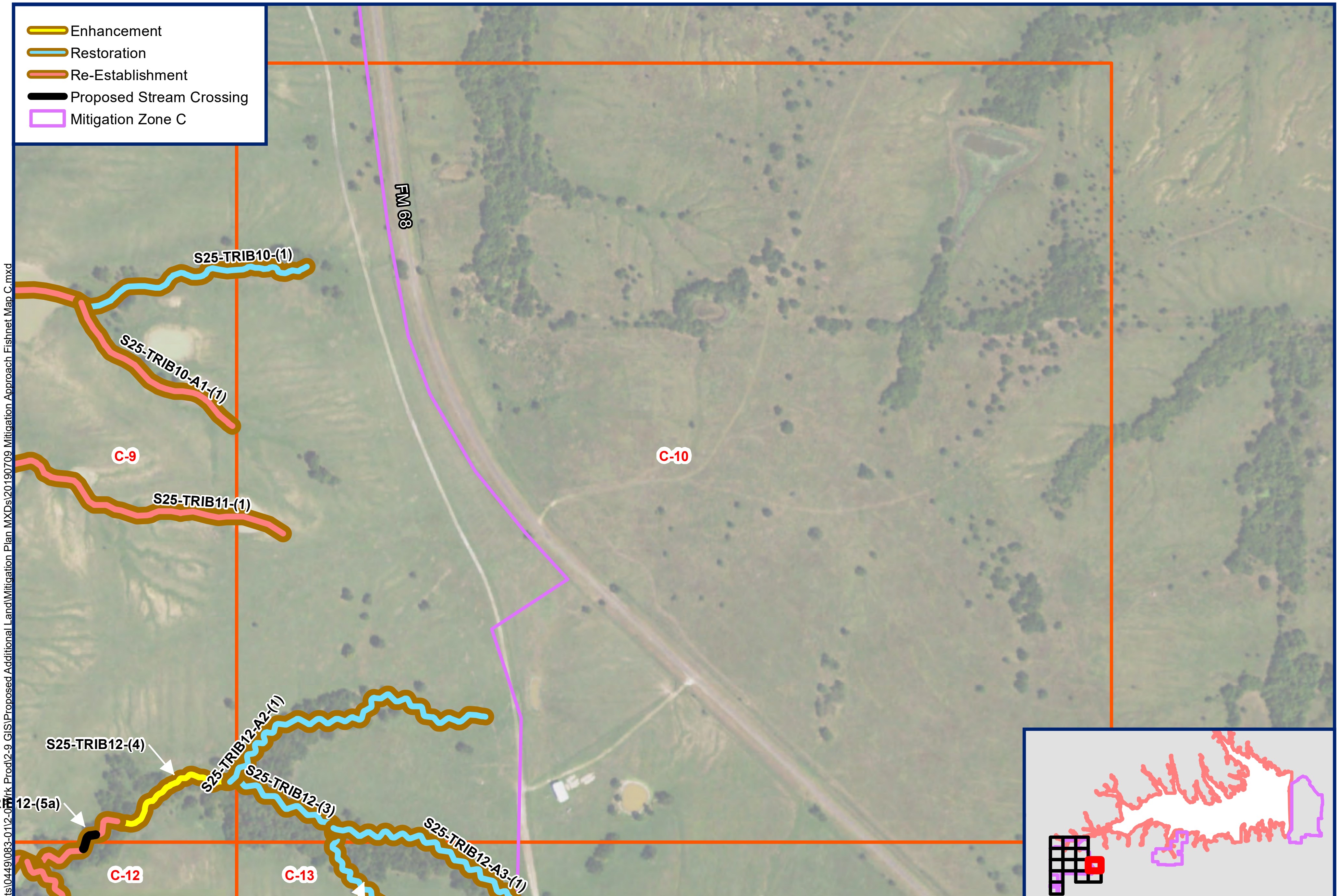

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FIGURE G-3: PANEL C-10, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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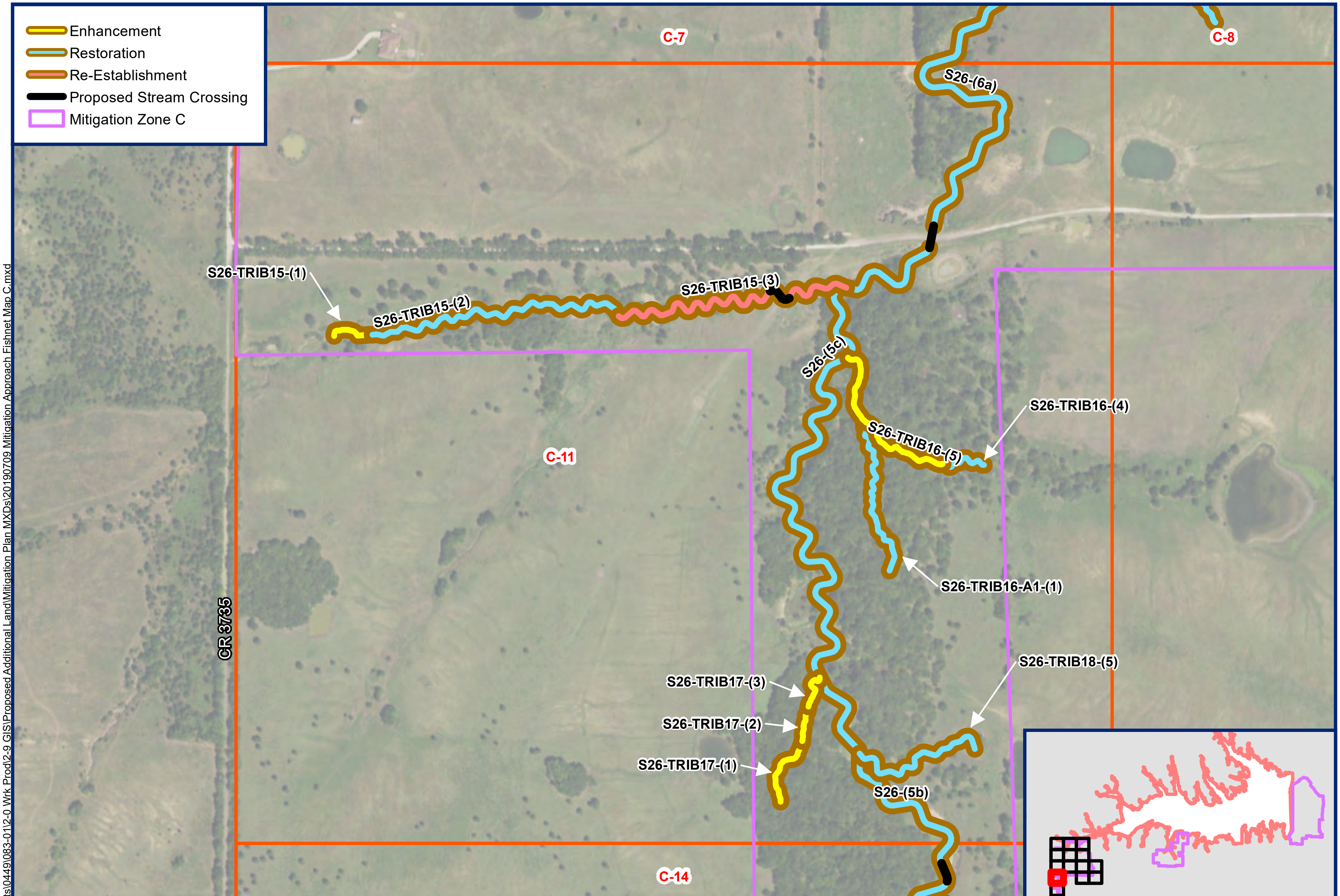

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FIGURE G-3: PANEL C-11, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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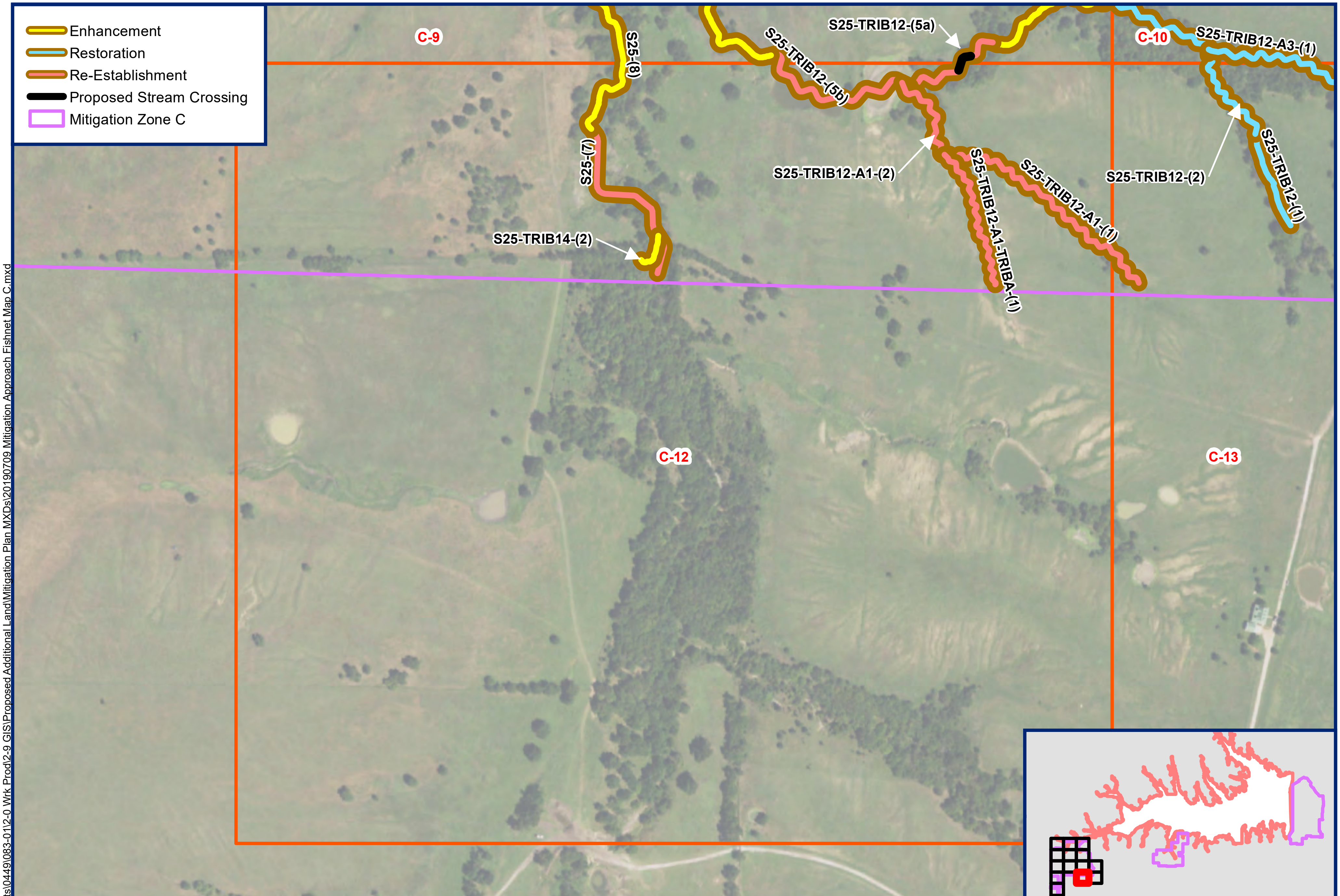

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FIGURE G-3: PANEL C-12, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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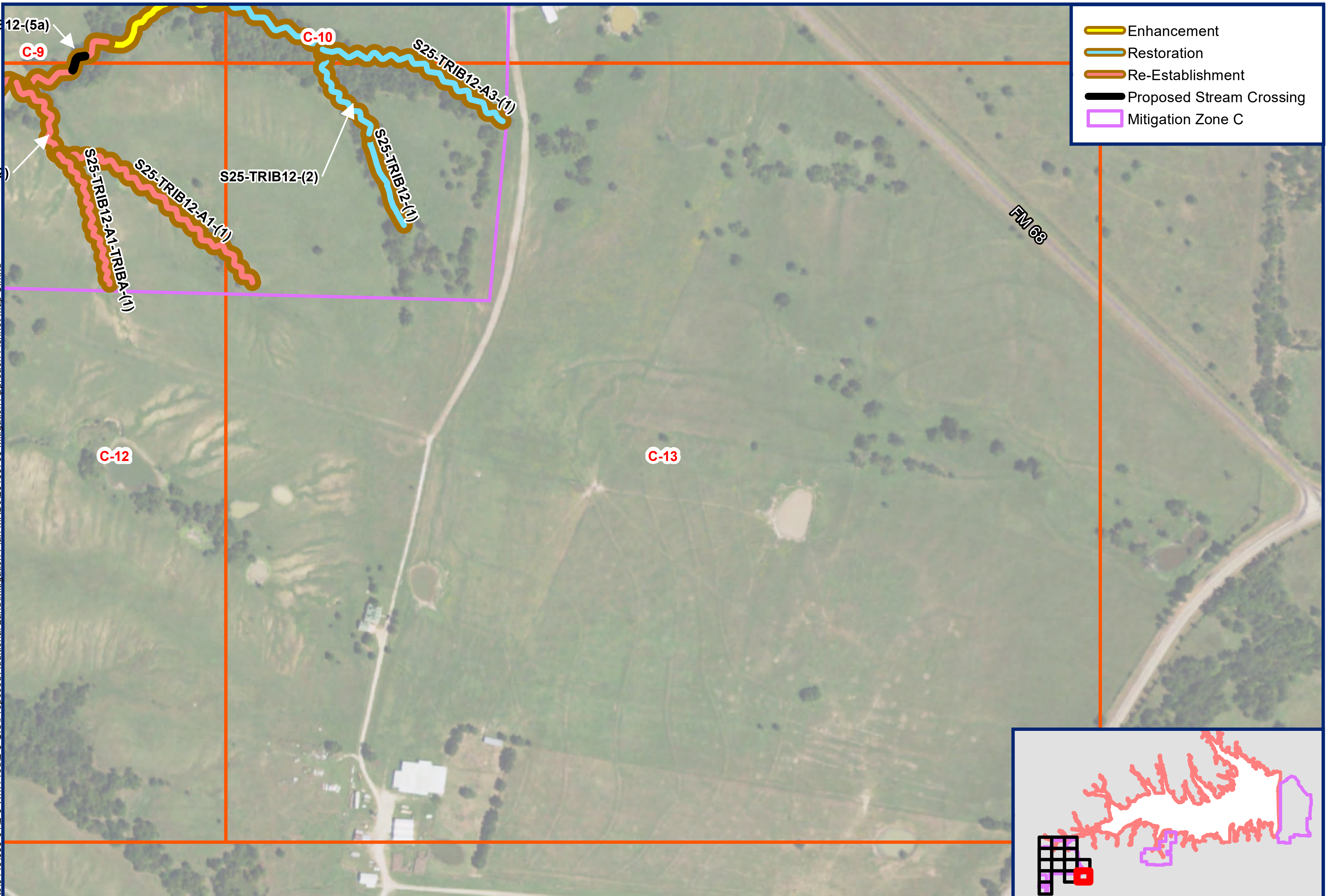

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FIGURE G-3: PANEL C-13, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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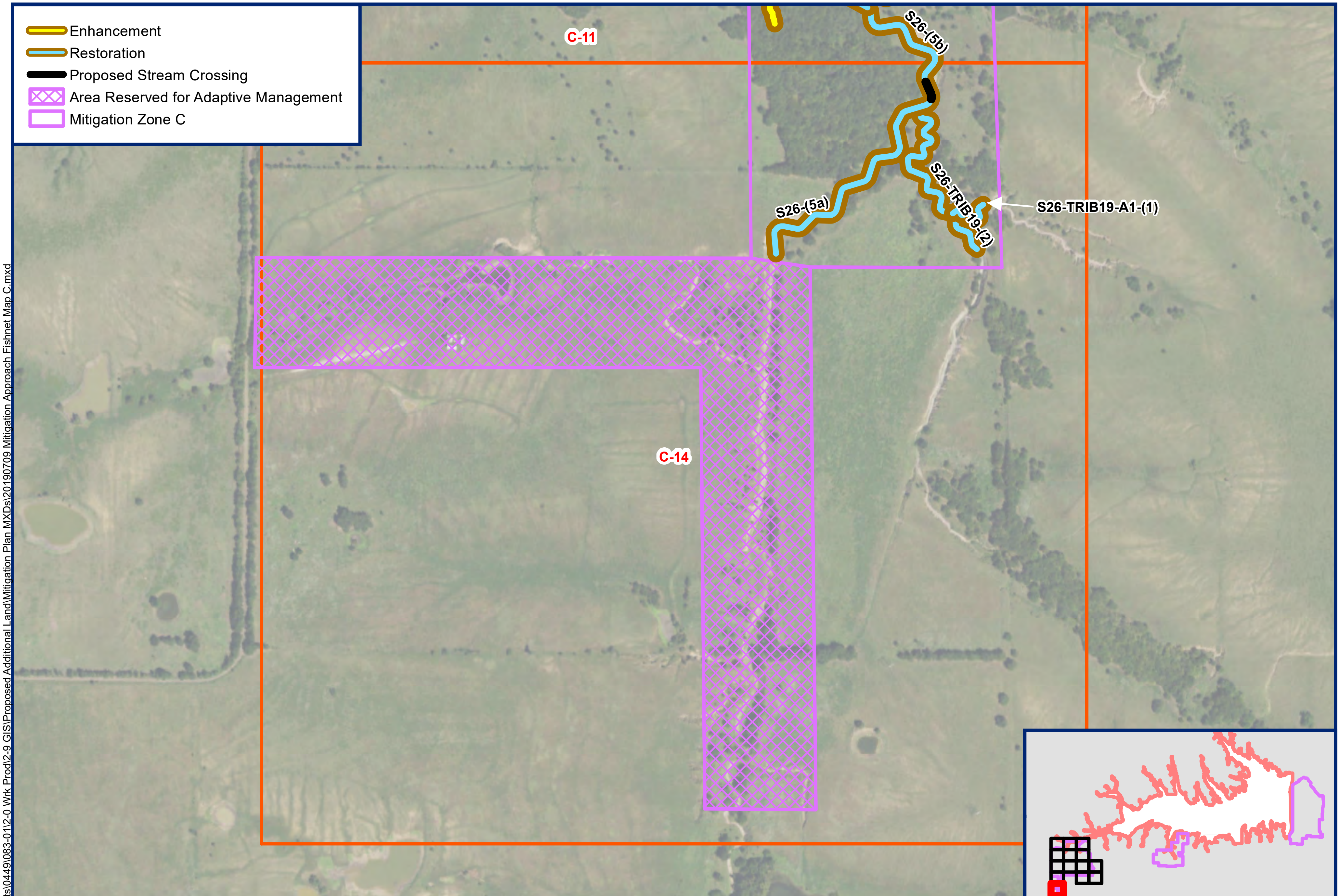

FIGURE G-3: PANEL C-14, MITIGATION ZONE C

LAKE RALPH HALL
STREAM MITIGATION APPROACH

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FANNIN COUNTY, TX

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: NSR-MC-RST	H1. Flow Regime and Groundwater Interaction	7	7	7	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): NSR DS of Dam (Impact Area)	H2c. Channel Bank Stability *(e)*	9	9	9		
	H3a. Channel Sinuosity	4	4	4		
	H3b. Bottom Substrate Composition	6	6	6		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	5	6		
	H3d. Channel Incision	9	9	9		
	H4a. Pools	7	7	7		
	H4b. Channel Flow Status	6	6	6		
Proposed SAR Length (LF): 6,629	Hydrologic Subtotal	68	69	70		
	Hydrologic FCI = Subtotal / 100	**0.68**	**0.69**	**0.70**		
	WQ1a. Bank Stability *(e)*	9	9	9		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	9	9	9		
Stream Classification: Intermittent / Perennial Pools	WQ2. Water Clarity	6	6	6		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	7	7	7		
Multiplication Factor *(i)* : 0.00315	WQ4. Composition of Organic Matter	4	6	9		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	51	59	67		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.64**	**0.74**	**0.84**		
	HB1. Flow Regime	7	7	7		
Reference Figure(s): A-6, A-7, A-8	HB2. Epifaunal Substrate and Available Cover	9	9	9		
	HB3. Stream Bottom Substrate	6	6	6		
	HB4. Pool Variability	9	9	9		
	HB5. Sediment Deposition and Scouring	8	8	8		
	HB6. Channel Flow Status	6	6	6		
	HB7. Channel Alteration	9	9	9		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	9	9	9		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	75	84	91		
	Habitat FCI = Subtotal / 120	**0.63**	**0.70**	**0.76**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.95**	**2.13**	**2.30**		
	TOTAL FCU = SAR Length (6629) X Multiplication Factor (0.00315) X Total FCI	**40.72**	**44.48**	**48.03**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: NSR-MC-RST (SPILLWAY)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): NSR DS of Dam (Impact Area)	H2c. Channel Bank Stability *(e)*	8	8	8
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	2	2	2
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 1,600	Hydrologic Subtotal	49	49	50
	Hydrologic FCI = Subtotal / 100	**0.49**	**0.49**	**0.50**
	WQ1a. Bank Stability *(e)*	8	8	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8
Stream Classification: Ephemeral	WQ2. Water Clarity	5	5	5
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	5	5	5
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	4	5
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	45	52	58
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.56**	**0.65**	**0.73**
	HB1. Flow Regime	2	2	2
Reference Figure: A-6	HB2. Epifaunal Substrate and Available Cover	3	3	3
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	8	8	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	49	58	65
	Habitat FCI = Subtotal / 120	**0.41**	**0.48**	**0.54**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.46**	**1.62**	**1.77**
	TOTAL FCU = SAR Length (1600) X Multiplication Factor (0.00125) X Total FCI	**2.92**	**3.24**	**3.54**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S1-TRIB1-(1a)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S1-TRIB1-(1)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	8	8	8
	H3b. Bottom Substrate Composition	2	2	2
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 3,622	Hydrologic Subtotal	52	53	55
	Hydrologic FCI = Subtotal / 100	**0.52**	**0.53**	**0.55**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-8	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	4	4	4
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	4	4	4
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	50	60	68
	Habitat FCI = Subtotal / 120	**0.42**	**0.50**	**0.57**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.37**	**1.57**	**1.76**
	TOTAL FCU = SAR Length (3622) X Multiplication Factor (0.00125) X Total FCI	**6.20**	**7.11**	**7.97**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S1-TRIB1-(1b)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S1-(1), S1-(2), S1-(3)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	2	2	2
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 1,180	Hydrologic Subtotal	47	48	50
	Hydrologic FCI = Subtotal / 100	**0.47**	**0.48**	**0.50**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-8	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	4	4	4
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	49	59	67
	Habitat FCI = Subtotal / 120	**0.41**	**0.49**	**0.56**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.31**	**1.51**	**1.70**
	TOTAL FCU = SAR Length (1180) X Multiplication Factor (0.00125) X Total FCI	**1.93**	**2.23**	**2.51**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
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- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
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- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
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- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-(2a)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): N/A	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	6	6	6		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 1,425	Hydrologic Subtotal	49	50	52		
	Hydrologic FCI = Subtotal / 100	**0.49**	**0.50**	**0.52**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	5	5	5		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-10	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	58	66		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.29**	**1.49**	**1.68**		
	TOTAL FCU = SAR Length (1425) X Multiplication Factor (0.00125) X Total FCI	**2.30**	**2.65**	**2.99**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name:	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
S2-(2b)	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s):	H2c. Channel Bank Stability *(e)*	6	7	8		
S2-(2), S2-(3)	H3a. Channel Sinuosity	8	8	8		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF):	Hydrologic Subtotal	51	52	54		
1,785	**Hydrologic FCI = Subtotal / 100**	**0.51**	**0.52**	**0.54**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	5	5	5		
Stream Classification:	WQ2. Water Clarity	1	1	1		
Ephemeral	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* :	WQ4. Composition of Organic Matter	3	5	7		
0.00125	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type:	Water Quality / Biogeochemical Subtotal	32	41	49		
Restoration	**Water Quality / Biogeochemical FCI = Subtotal / 80**	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	2	2	2		
Reference Figure:	HB2. Epifaunal Substrate and Available Cover	4	4	4		
A-7	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	4	4	4		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	49	59	67		
	Habitat FCI = Subtotal / 120	**0.41**	**0.49**	**0.56**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.32**	**1.52**	**1.71**		
	TOTAL FCU = SAR Length (1785) X Multiplication Factor (0.00125) X Total FCI	**2.95**	**3.39**	**3.82**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-(3a)	H1. Flow Regime and Groundwater Interaction	7	7	7	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-(3), S2-TRIB3-(12), S2-TRIB3-A2-(1)	H2c. Channel Bank Stability *(e)*	9	9	9		
	H3a. Channel Sinuosity	8	8	8		
	H3b. Bottom Substrate Composition	4	4	4		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	5	6	7		
	H3d. Channel Incision	9	9	9		
	H4a. Pools	5	5	5		
	H4b. Channel Flow Status	6	6	6		
Proposed SAR Length (LF): 7,836	Hydrologic Subtotal	69	70	71		
	Hydrologic FCI = Subtotal / 100	**0.69**	**0.70**	**0.71**		
	WQ1a. Bank Stability *(e)*	9	9	9		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	9	9	9		
Stream Classification: Intermittent / Perennial Pools	WQ2. Water Clarity	6	6	6		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	7	7	7		
Multiplication Factor *(i)* : 0.00315	WQ4. Composition of Organic Matter	4	6	9		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	51	59	67		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.64**	**0.74**	**0.84**		
	HB1. Flow Regime	7	7	7		
Reference Figure: A-7	HB2. Epifaunal Substrate and Available Cover	9	9	9		
	HB3. Stream Bottom Substrate	6	6	6		
	HB4. Pool Variability	8	8	8		
	HB5. Sediment Deposition and Scouring	9	9	9		
	HB6. Channel Flow Status	6	6	6		
	HB7. Channel Alteration	9	9	9		
	HB8. Channel Sinuosity	5	5	5		
	HB9. Bank Stability *(e)*	9	9	9		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	77	86	93		
	Habitat FCI = Subtotal / 120	**0.64**	**0.72**	**0.78**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.97**	**2.16**	**2.33**		
	TOTAL FCU = SAR Length (7836) X Multiplication Factor (0.00315) X Total FCI	**48.63**	**53.32**	**57.51**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-(3b)	H1. Flow Regime and Groundwater Interaction	7	7	7
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB1-(4)	H2c. Channel Bank Stability *(e)*	9	9	9
	H3a. Channel Sinuosity	8	8	8
	H3b. Bottom Substrate Composition	4	4	4
	H3c. Instream Bottom Topography OR Manning's n *(f)*	5	6	7
	H3d. Channel Incision	9	9	9
	H4a. Pools	5	5	5
	H4b. Channel Flow Status	6	6	6
Proposed SAR Length (LF): 1,296	Hydrologic Subtotal	69	70	71
	Hydrologic FCI = Subtotal / 100	**0.69**	**0.70**	**0.71**
	WQ1a. Bank Stability *(e)*	9	9	9
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	9	9	9
Stream Classification: Intermittent / Perennial Pools	WQ2. Water Clarity	6	6	6
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	7	7	7
Multiplication Factor *(i)* : 0.00315	WQ4. Composition of Organic Matter	4	6	9
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	51	59	67
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.64**	**0.74**	**0.84**
	HB1. Flow Regime	7	7	7
Reference Figure: A-8	HB2. Epifaunal Substrate and Available Cover	9	9	9
	HB3. Stream Bottom Substrate	6	6	6
	HB4. Pool Variability	8	8	8
	HB5. Sediment Deposition and Scouring	9	9	9
	HB6. Channel Flow Status	6	6	6
	HB7. Channel Alteration	9	9	9
	HB8. Channel Sinuosity	5	5	5
	HB9. Bank Stability *(e)*	9	9	9
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	77	86	93
	Habitat FCI = Subtotal / 120	**0.64**	**0.72**	**0.78**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.97**	**2.16**	**2.33**
	TOTAL FCU = SAR Length (1296) X Multiplication Factor (0.00315) X Total FCI	**8.04**	**8.82**	**9.51**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-(3c)	H1. Flow Regime and Groundwater Interaction	7	7	7	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): N/A	H2c. Channel Bank Stability *(e)*	9	9	9		
	H3a. Channel Sinuosity	5	5	5		
	H3b. Bottom Substrate Composition	4	4	4		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	5	6	7		
	H3d. Channel Incision	9	9	9		
	H4a. Pools	5	5	5		
	H4b. Channel Flow Status	6	6	6		
Proposed SAR Length (LF): 1,821	Hydrologic Subtotal	66	67	68		
	Hydrologic FCI = Subtotal / 100	**0.66**	**0.67**	**0.68**		
	WQ1a. Bank Stability *(e)*	9	9	9		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	9	9	9		
Stream Classification: Intermittent / Perennial Pools	WQ2. Water Clarity	6	6	6		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	7	7	7		
Multiplication Factor *(i)* : 0.00315	WQ4. Composition of Organic Matter	4	6	9		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	51	59	67		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.64**	**0.74**	**0.84**		
	HB1. Flow Regime	7	7	7		
Reference Figure: A-8	HB2. Epifaunal Substrate and Available Cover	9	9	9		
	HB3. Stream Bottom Substrate	6	6	6		
	HB4. Pool Variability	8	8	8		
	HB5. Sediment Deposition and Scouring	9	9	9		
	HB6. Channel Flow Status	6	6	6		
	HB7. Channel Alteration	9	9	9		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	9	9	9		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	75	84	91		
	Habitat FCI = Subtotal / 120	**0.63**	**0.70**	**0.76**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.93**	**2.11**	**2.28**		
	TOTAL FCU = SAR Length (1821) X Multiplication Factor (0.00315) X Total FCI	**11.07**	**12.10**	**13.08**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-(3d)	H1. Flow Regime and Groundwater Interaction	7	7	7	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): N/A	H2c. Channel Bank Stability *(e)*	9	9	9		
	H3a. Channel Sinuosity	4	4	4		
	H3b. Bottom Substrate Composition	4	4	4		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	5	6	7		
	H3d. Channel Incision	9	9	9		
	H4a. Pools	5	5	5		
	H4b. Channel Flow Status	6	6	6		
Proposed SAR Length (LF): 312	Hydrologic Subtotal	65	66	67		
	Hydrologic FCI = Subtotal / 100	**0.65**	**0.66**	**0.67**		
	WQ1a. Bank Stability *(e)*	9	9	9		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	9	9	9		
Stream Classification: Intermittent / Perennial Pools	WQ2. Water Clarity	6	6	6		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	7	7	7		
Multiplication Factor *(i)* : 0.00315	WQ4. Composition of Organic Matter	4	6	9		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	51	59	67		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.64**	**0.74**	**0.84**		
	HB1. Flow Regime	7	7	7		
Reference Figure: A-8	HB2. Epifaunal Substrate and Available Cover	9	9	9		
	HB3. Stream Bottom Substrate	6	6	6		
	HB4. Pool Variability	8	8	8		
	HB5. Sediment Deposition and Scouring	9	9	9		
	HB6. Channel Flow Status	6	6	6		
	HB7. Channel Alteration	9	9	9		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	9	9	9		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	75	84	91		
	Habitat FCI = Subtotal / 120	**0.63**	**0.70**	**0.76**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.92**	**2.10**	**2.27**		
	TOTAL FCU = SAR Length (312) X Multiplication Factor (0.00315) X Total FCI	**1.89**	**2.06**	**2.23**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB1-(1a)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): N/A	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	4	4	4		
	H3b. Bottom Substrate Composition	2	2	2		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	3	3	4		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 878	Hydrologic Subtotal	40	41	43		
	Hydrologic FCI = Subtotal / 100	**0.40**	**0.41**	**0.43**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Re-Establishment	Water Quality / Biogeochemical Subtotal	32	41	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-14	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	4	4	4		
	HB5. Sediment Deposition and Scouring	5	5	5		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	44	54	62		
	Habitat FCI = Subtotal / 120	**0.37**	**0.45**	**0.52**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.17**	**1.37**	**1.56**		
	TOTAL FCU = SAR Length (878) X Multiplication Factor (0.00125) X Total FCI	**1.28**	**1.50**	**1.71**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB1-(1b)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB1-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	5	5	5		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 2,547	Hydrologic Subtotal	39	40	42		
	Hydrologic FCI = Subtotal / 100	**0.39**	**0.40**	**0.42**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-11, A-14	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	4	4	4		
	HB5. Sediment Deposition and Scouring	5	5	5		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	44	54	62		
	Habitat FCI = Subtotal / 120	**0.37**	**0.45**	**0.52**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.16**	**1.36**	**1.55**		
	TOTAL FCU = SAR Length (2547) X Multiplication Factor (0.00125) X Total FCI	**3.69**	**4.33**	**4.93**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB1-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB1-(2), S2-TRIB1-(3)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	8	8	8
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 5,589	Hydrologic Subtotal	44	45	47
	Hydrologic FCI = Subtotal / 100	**0.44**	**0.45**	**0.47**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**
	HB1. Flow Regime	1	1	1
Reference Figure: A-8, A-11	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	6	6	6
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	4	4	4
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	45	55	63
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.22**	**1.42**	**1.61**
	TOTAL FCU = SAR Length (5589) X Multiplication Factor (0.00125) X Total FCI	**8.52**	**9.92**	**11.25**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB1-A1-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB1-A1-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	1	1	1		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 471	Hydrologic Subtotal	35	36	38		
	Hydrologic FCI = Subtotal / 100	**0.35**	**0.36**	**0.38**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	31	39	46		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.39**	**0.49**	**0.58**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	1	1	1		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	43	53	61		
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.10**	**1.29**	**1.47**		
	TOTAL FCU = SAR Length (471) X Multiplication Factor (0.00125) X Total FCI	**0.65**	**0.76**	**0.87**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name:	H1. Flow Regime and Groundwater Interaction	1	1	1
S2-TRIB1-A1-(2)	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s):	H2c. Channel Bank Stability *(e)*	6	7	8
S2-TRIB1-A1-(2)	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF):	Hydrologic Subtotal	35	36	38
300	**Hydrologic FCI = Subtotal / 100**	**0.35**	**0.36**	**0.38**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification:	WQ2. Water Clarity	0	0	0
Ephemeral	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* :	WQ4. Composition of Organic Matter	3	5	7
0.00125	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type:	Water Quality / Biogeochemical Subtotal	32	41	49
Restoration	**Water Quality / Biogeochemical FCI = Subtotal / 80**	**0.40**	**0.51**	**0.61**
	HB1. Flow Regime	1	1	1
Reference Figure:	HB2. Epifaunal Substrate and Available Cover	4	4	4
A-13	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	43	53	61
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.11**	**1.31**	**1.50**
	TOTAL FCU = SAR Length (300) X Multiplication Factor (0.00125) X Total FCI	**0.42**	**0.49**	**0.56**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name:	H1. Flow Regime and Groundwater Interaction	1	1	1
S2-TRIB1-A1-(3)	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s):	H2c. Channel Bank Stability *(e)*	6	7	8
S2-TRIB1-A1-(3)	H3a. Channel Sinuosity	4	4	4
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF):	Hydrologic Subtotal	38	39	41
422	**Hydrologic FCI = Subtotal / 100**	**0.38**	**0.39**	**0.41**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification:	WQ2. Water Clarity	0	0	0
Ephemeral	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* :	WQ4. Composition of Organic Matter	3	5	7
0.00125	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type:	Water Quality / Biogeochemical Subtotal	32	41	49
Restoration	**Water Quality / Biogeochemical FCI = Subtotal / 80**	**0.40**	**0.51**	**0.61**
	HB1. Flow Regime	1	1	1
Reference Figure:	HB2. Epifaunal Substrate and Available Cover	4	4	4
A-13	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	4	4	4
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	46	56	64
	Habitat FCI = Subtotal / 120	**0.38**	**0.47**	**0.53**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.16**	**1.37**	**1.55**
	TOTAL FCU = SAR Length (422) X Multiplication Factor (0.00125) X Total FCI	**0.61**	**0.72**	**0.82**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB1-A1-(4)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB1-A1-(4), S2-TRIB1-(2)	H2c. Channel Bank Stability *(e)*	8	8	8		
	H3a. Channel Sinuosity	5	5	5		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 1,251	Hydrologic Subtotal	41	41	42		
	Hydrologic FCI = Subtotal / 100	**0.41**	**0.41**	**0.42**		
	WQ1a. Bank Stability *(e)*	8	8	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	42	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.53**	**0.61**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-11	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	4	4	4		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	8	8	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	57	64		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.53**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.24**	**1.42**	**1.56**		
	TOTAL FCU = SAR Length (1251) X Multiplication Factor (0.00125) X Total FCI	**1.94**	**2.22**	**2.44**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-(1)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 234	Hydrologic Subtotal	44	45	47		
	Hydrologic FCI = Subtotal / 100	**0.44**	**0.45**	**0.47**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	33	41	48		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.41**	**0.51**	**0.60**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	58	66		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.25**	**1.44**	**1.62**		
	TOTAL FCU = SAR Length (234) X Multiplication Factor (0.00125) X Total FCI	**0.37**	**0.42**	**0.47**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-(2)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-(2)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	2	2	2		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 385	Hydrologic Subtotal	45	46	48		
	Hydrologic FCI = Subtotal / 100	**0.45**	**0.46**	**0.48**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	33	41	48		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.41**	**0.51**	**0.60**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	58	66		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.26**	**1.45**	**1.63**		
	TOTAL FCU = SAR Length (385) X Multiplication Factor (0.00125) X Total FCI	**0.61**	**0.70**	**0.78**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-(3)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-(3)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	2	2	2		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 187	Hydrologic Subtotal	45	46	48		
	Hydrologic FCI = Subtotal / 100	**0.45**	**0.46**	**0.48**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	2	2	2		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	35	44	52		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.44**	**0.55**	**0.65**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	58	66		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.29**	**1.49**	**1.68**		
	TOTAL FCU = SAR Length (187) X Multiplication Factor (0.00125) X Total FCI	**0.30**	**0.35**	**0.39**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-(4)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-(4)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	6	6	6
	H3b. Bottom Substrate Composition	3	3	3
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 947	Hydrologic Subtotal	49	50	52
	Hydrologic FCI = Subtotal / 100	**0.49**	**0.50**	**0.52**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	48	58	66
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.32**	**1.52**	**1.71**
	TOTAL FCU = SAR Length (947) X Multiplication Factor (0.00125) X Total FCI	**1.56**	**1.80**	**2.02**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
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(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-(5)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-(5)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	6	6	6		
	H3b. Bottom Substrate Composition	4	4	4		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 994	Hydrologic Subtotal	50	51	53		
	Hydrologic FCI = Subtotal / 100	**0.50**	**0.51**	**0.53**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	3	3	3		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	36	45	53		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.45**	**0.56**	**0.66**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	58	66		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.35**	**1.55**	**1.74**		
	TOTAL FCU = SAR Length (994) X Multiplication Factor (0.00125) X Total FCI	**1.68**	**1.93**	**2.16**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-(6)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-(6)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	5	5	5
	H3b. Bottom Substrate Composition	2	2	2
	H3c. Instream Bottom Topography OR Manning's n *(f)*	3	3	4
	H3d. Channel Incision	8	8	8
	H4a. Pools	5	5	5
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 1,630	Hydrologic Subtotal	49	50	52
	Hydrologic FCI = Subtotal / 100	**0.49**	**0.50**	**0.52**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	4	4	4
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	49	59	67
	Habitat FCI = Subtotal / 120	**0.41**	**0.49**	**0.56**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.33**	**1.53**	**1.72**
	TOTAL FCU = SAR Length (1630) X Multiplication Factor (0.00125) X Total FCI	**2.71**	**3.12**	**3.50**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-(7)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-(7), S2-TRIB2-B9-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	5	5	5		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	5	5	5		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 889	Hydrologic Subtotal	49	50	52		
	Hydrologic FCI = Subtotal / 100	**0.49**	**0.50**	**0.52**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-10	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	4	4	4		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	49	59	67		
	Habitat FCI = Subtotal / 120	**0.41**	**0.49**	**0.56**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.33**	**1.53**	**1.72**		
	TOTAL FCU = SAR Length (889) X Multiplication Factor (0.00125) X Total FCI	**1.48**	**1.70**	**1.91**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-(8a)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-(8)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	6	6	6
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	5	5	5
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 2,582	Hydrologic Subtotal	50	51	53
	Hydrologic FCI = Subtotal / 100	**0.50**	**0.51**	**0.53**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-7, A-10	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	48	58	66
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.33**	**1.53**	**1.72**
	TOTAL FCU = SAR Length (2582) X Multiplication Factor (0.00125) X Total FCI	**4.29**	**4.94**	**5.55**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-(8b)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-(8), S2-TRIB2-(9)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	8	8	8
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	5	5	5
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 3,468	Hydrologic Subtotal	52	53	55
	Hydrologic FCI = Subtotal / 100	**0.52**	**0.53**	**0.55**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-7	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	5	5	5
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	50	60	68
	Habitat FCI = Subtotal / 120	**0.42**	**0.50**	**0.57**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.37**	**1.57**	**1.76**
	TOTAL FCU = SAR Length (3468) X Multiplication Factor (0.00125) X Total FCI	**5.94**	**6.81**	**7.63**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A1-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A1-(1)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	3	3	3
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 649	Hydrologic Subtotal	37	38	40
	Hydrologic FCI = Subtotal / 100	**0.37**	**0.38**	**0.40**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	31	39	46
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.39**	**0.49**	**0.58**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	43	53	61
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.12**	**1.31**	**1.49**
	TOTAL FCU = SAR Length (649) X Multiplication Factor (0.00125) X Total FCI	**0.91**	**1.06**	**1.21**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
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Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A1-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A1-(2)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 91	Hydrologic Subtotal	35	36	38
	Hydrologic FCI = Subtotal / 100	**0.35**	**0.36**	**0.38**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	43	53	61
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.11**	**1.31**	**1.50**
	TOTAL FCU = SAR Length (91) X Multiplication Factor (0.00125) X Total FCI	**0.13**	**0.15**	**0.17**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A1-(3)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A1-(3)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 369	Hydrologic Subtotal	39	40	42
	Hydrologic FCI = Subtotal / 100	**0.39**	**0.40**	**0.42**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	45	55	63
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.17**	**1.37**	**1.56**
	TOTAL FCU = SAR Length (369) X Multiplication Factor (0.00125) X Total FCI	**0.54**	**0.63**	**0.72**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

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(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A1-B1-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	3	5	8
	H2b. Channel Capacity to Flow Frequency	3	5	7
Baseline SAR Name(s): S2-TRIB2-A1-B1-(1)	H2c. Channel Bank Stability *(e)*	4	6	7
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	3	3
	H3d. Channel Incision	3	3	3
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 244	Hydrologic Subtotal	20	27	33
	Hydrologic FCI = Subtotal / 100	**0.20**	**0.27**	**0.33**
	WQ1a. Bank Stability *(e)*	4	6	7
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	4	6	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	4	6
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	5	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	3	6	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	7	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	22	36	47
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.28**	**0.45**	**0.59**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	2	2	2
	HB4. Pool Variability	1	2	3
	HB5. Sediment Deposition and Scouring	2	5	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	2	5	7
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	4	6	7
	HB10. Vegetative Protection *(e)*	4	7	9
	HB11. Riparian Zone *(e)*	3	6	9
	HB12. Riparian Habitat Condition	4	5	7
	Habitat Subtotal	27	44	58
	Habitat FCI = Subtotal / 120	**0.23**	**0.37**	**0.48**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**0.71**	**1.09**	**1.40**
	TOTAL FCU = SAR Length (244) X Multiplication Factor (0.00125) X Total FCI	**0.22**	**0.33**	**0.43**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

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STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A2-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	5	6	7
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A2-(1)	H2c. Channel Bank Stability *(e)*	8	8	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 129	Hydrologic Subtotal	34	35	37
	Hydrologic FCI = Subtotal / 100	**0.34**	**0.35**	**0.37**
	WQ1a. Bank Stability *(e)*	8	8	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	2	3	5
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	34	39	48
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.49**	**0.60**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	2	2	2
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	6	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	6	7	7
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	8	8	8
	HB10. Vegetative Protection *(e)*	5	7	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	4	5	7
	Habitat Subtotal	43	50	57
	Habitat FCI = Subtotal / 120	**0.36**	**0.42**	**0.48**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.13**	**1.26**	**1.45**
	TOTAL FCU = SAR Length (129) X Multiplication Factor (0.00125) X Total FCI	**0.18**	**0.20**	**0.23**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
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RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
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(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
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STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A2-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A2-(2)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	3	3	3		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 450	Hydrologic Subtotal	39	40	42		
	Hydrologic FCI = Subtotal / 100	**0.39**	**0.40**	**0.42**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	45	55	63		
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.17**	**1.37**	**1.56**		
	TOTAL FCU = SAR Length (450) X Multiplication Factor (0.00125) X Total FCI	**0.66**	**0.77**	**0.88**		

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(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A2-(3)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A2-(3)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	3	3	3		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 362	Hydrologic Subtotal	46	47	49		
	Hydrologic FCI = Subtotal / 100	**0.46**	**0.47**	**0.49**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	48	58	66		
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.29**	**1.49**	**1.68**		
	TOTAL FCU = SAR Length (362) X Multiplication Factor (0.00125) X Total FCI	**0.58**	**0.67**	**0.76**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A2-B5-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	5	6	7
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A2-B5-(1)	H2c. Channel Bank Stability *(e)*	8	8	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 49	Hydrologic Subtotal	34	35	37
	Hydrologic FCI = Subtotal / 100	**0.34**	**0.35**	**0.37**
	WQ1a. Bank Stability *(e)*	8	8	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	1	3	5
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	32	38	47
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.48**	**0.59**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	3	3	3
	HB4. Pool Variability	1	2	2
	HB5. Sediment Deposition and Scouring	4	5	6
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	6	7	8
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	8	8	8
	HB10. Vegetative Protection *(e)*	5	7	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	4	5	7
	Habitat Subtotal	40	48	57
	Habitat FCI = Subtotal / 120	**0.33**	**0.40**	**0.48**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.07**	**1.23**	**1.44**
	TOTAL FCU = SAR Length (49) X Multiplication Factor (0.00125) X Total FCI	**0.07**	**0.08**	**0.09**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A2-B6-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	5	6	7		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A2-B6-(1)	H2c. Channel Bank Stability *(e)*	8	8	8		
	H3a. Channel Sinuosity	1	1	1		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 61	Hydrologic Subtotal	34	35	37		
	Hydrologic FCI = Subtotal / 100	**0.34**	**0.35**	**0.37**		
	WQ1a. Bank Stability *(e)*	8	8	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	5		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9		
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	33	38	47		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.41**	**0.48**	**0.59**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3		
	HB3. Stream Bottom Substrate	3	3	3		
	HB4. Pool Variability	1	2	2		
	HB5. Sediment Deposition and Scouring	4	5	6		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	6	7	7		
	HB8. Channel Sinuosity	1	1	1		
	HB9. Bank Stability *(e)*	8	8	8		
	HB10. Vegetative Protection *(e)*	5	7	9		
	HB11. Riparian Zone *(e)*	6	7	9		
	HB12. Riparian Habitat Condition	4	5	7		
	Habitat Subtotal	40	48	56		
	Habitat FCI = Subtotal / 120	**0.33**	**0.40**	**0.47**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.08**	**1.23**	**1.43**		
	TOTAL FCU = SAR Length (61) X Multiplication Factor (0.00125) X Total FCI	**0.08**	**0.09**	**0.11**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A2-B7-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	5	6	6
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A2-B7-(1)	H2c. Channel Bank Stability *(e)*	8	8	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 230	Hydrologic Subtotal	34	35	36
	Hydrologic FCI = Subtotal / 100	**0.34**	**0.35**	**0.36**
	WQ1a. Bank Stability *(e)*	8	8	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	1	4	5
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	32	39	47
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.59**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	3	3	3
	HB4. Pool Variability	2	2	2
	HB5. Sediment Deposition and Scouring	4	5	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	6	6	7
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	8	8	8
	HB10. Vegetative Protection *(e)*	5	7	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	4	5	7
	Habitat Subtotal	41	47	57
	Habitat FCI = Subtotal / 120	**0.34**	**0.39**	**0.48**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.08**	**1.23**	**1.43**
	TOTAL FCU = SAR Length (230) X Multiplication Factor (0.00125) X Total FCI	**0.31**	**0.35**	**0.41**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
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- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
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Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A2-B8-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	5	6	7		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A2-B8-(1)	H2c. Channel Bank Stability *(e)*	5	6	7		
	H3a. Channel Sinuosity	1	1	1		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	4	6	7		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 183	Hydrologic Subtotal	27	31	35		
	Hydrologic FCI = Subtotal / 100	**0.27**	**0.31**	**0.35**		
	WQ1a. Bank Stability *(e)*	5	6	7		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	5	6	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	1	3	5		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9		
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	27	35	46		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.34**	**0.44**	**0.58**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	4	*Notes:*	
	HB3. Stream Bottom Substrate	2	2	2		
	HB4. Pool Variability	1	2	4		
	HB5. Sediment Deposition and Scouring	6	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	6	7	8		
	HB8. Channel Sinuosity	1	1	1		
	HB9. Bank Stability *(e)*	5	6	7		
	HB10. Vegetative Protection *(e)*	5	7	9		
	HB11. Riparian Zone *(e)*	6	7	9		
	HB12. Riparian Habitat Condition	4	5	7		
	Habitat Subtotal	38	47	59		
	Habitat FCI = Subtotal / 120	**0.32**	**0.39**	**0.49**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**0.93**	**1.14**	**1.42**		
	TOTAL FCU = SAR Length (183) X Multiplication Factor (0.00125) X Total FCI	**0.21**	**0.26**	**0.32**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A3-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): N/A	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 549	Hydrologic Subtotal	35	36	38
	Hydrologic FCI = Subtotal / 100	**0.35**	**0.36**	**0.38**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	39	46
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.58**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	43	53	61
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.11**	**1.29**	**1.47**
	TOTAL FCU = SAR Length (549) X Multiplication Factor (0.00125) X Total FCI	**0.76**	**0.89**	**1.01**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A3-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	3	5	8
	H2b. Channel Capacity to Flow Frequency	3	5	8
Baseline SAR Name(s): S2-TRIB2-A3-(2)	H2c. Channel Bank Stability *(e)*	6	7	7
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	7	5	7
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 202	Hydrologic Subtotal	26	29	38
	Hydrologic FCI = Subtotal / 100	**0.26**	**0.29**	**0.38**
	WQ1a. Bank Stability *(e)*	6	7	7
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	5	6	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	3	6	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	29	38	48
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.36**	**0.48**	**0.60**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	1	2	2
	HB5. Sediment Deposition and Scouring	2	4	6
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	2	4	7
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	7
	HB10. Vegetative Protection *(e)*	2	5	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	3	4	7
	Habitat Subtotal	31	43	58
	Habitat FCI = Subtotal / 120	**0.26**	**0.36**	**0.48**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**0.88**	**1.13**	**1.46**
	TOTAL FCU = SAR Length (202) X Multiplication Factor (0.00125) X Total FCI	**0.22**	**0.29**	**0.37**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
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- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A3-(3)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-A3-(3)	H2c. Channel Bank Stability *(e)*	8	8	8
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	2	2	2
	H3c. Instream Bottom Topography OR Manning's n *(f)*	3	3	4
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	1	1	1
Proposed SAR Length (LF): 410	Hydrologic Subtotal	45	45	46
	Hydrologic FCI = Subtotal / 100	**0.45**	**0.45**	**0.46**
	WQ1a. Bank Stability *(e)*	8	8	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8
Stream Classification: Ephemeral	WQ2. Water Clarity	4	4	4
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	4	4	4
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	5	6	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	6	7	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	47	51	58
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.59**	**0.64**	**0.73**
	HB1. Flow Regime	2	2	2
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	1	2	2
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	1	1	1
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	8	8	8
	HB10. Vegetative Protection *(e)*	5	7	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	5	6	7
	Habitat Subtotal	52	57	62
	Habitat FCI = Subtotal / 120	**0.43**	**0.48**	**0.52**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.47**	**1.57**	**1.71**
	TOTAL FCU = SAR Length (410) X Multiplication Factor (0.00125) X Total FCI	**0.75**	**0.80**	**0.88**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A3-(4)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A3-(4)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	1	1	1		
	H3b. Bottom Substrate Composition	4	4	4		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 640	Hydrologic Subtotal	45	46	48		
	Hydrologic FCI = Subtotal / 100	**0.45**	**0.46**	**0.48**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	3	3	3		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	3	3	3		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	38	47	55		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.48**	**0.59**	**0.69**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	2	2	2		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	1	1	1		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	45	55	63		
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.31**	**1.51**	**1.70**		
	TOTAL FCU = SAR Length (640) X Multiplication Factor (0.00125) X Total FCI	**1.05**	**1.21**	**1.36**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A3-B4-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	5	6	6		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A3-B4-(1)	H2c. Channel Bank Stability *(e)*	8	8	8		
	H3a. Channel Sinuosity	1	1	1		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	9	9	9		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 49	Hydrologic Subtotal	35	36	37		
	Hydrologic FCI = Subtotal / 100	**0.35**	**0.36**	**0.37**		
	WQ1a. Bank Stability *(e)*	8	8	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	1	2	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	5	9		
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	31	37	47		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.39**	**0.46**	**0.59**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	1	2	3		
	HB3. Stream Bottom Substrate	2	2	2		
	HB4. Pool Variability	1	2	3		
	HB5. Sediment Deposition and Scouring	6	6	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	3	5	7		
	HB8. Channel Sinuosity	1	1	1		
	HB9. Bank Stability *(e)*	8	8	8		
	HB10. Vegetative Protection *(e)*	2	5	9		
	HB11. Riparian Zone *(e)*	6	7	9		
	HB12. Riparian Habitat Condition	3	5	7		
	Habitat Subtotal	34	44	57		
	Habitat FCI = Subtotal / 120	**0.28**	**0.37**	**0.48**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.02**	**1.19**	**1.44**		
	TOTAL FCU = SAR Length (49) X Multiplication Factor (0.00125) X Total FCI	**0.06**	**0.07**	**0.09**		

Notes:
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(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-A4-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	4	5	6
	H2b. Channel Capacity to Flow Frequency	2	4	6
Baseline SAR Name(s): S2-TRIB2-A4-(1)	H2c. Channel Bank Stability *(e)*	6	7	7
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	2	4	6
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 438	Hydrologic Subtotal	21	27	33
	Hydrologic FCI = Subtotal / 100	**0.21**	**0.27**	**0.33**
	WQ1a. Bank Stability *(e)*	6	7	7
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	6	6	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	5
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	30	36	46
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.38**	**0.45**	**0.58**
	HB1. Flow Regime	1	1	1
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	2	2	2
	HB4. Pool Variability	1	2	2
	HB5. Sediment Deposition and Scouring	6	6	6
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	2	5	7
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	7
	HB10. Vegetative Protection *(e)*	2	5	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	6	6	7
	Habitat Subtotal	36	46	56
	Habitat FCI = Subtotal / 120	**0.30**	**0.38**	**0.47**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**0.89**	**1.10**	**1.38**
	TOTAL FCU = SAR Length (438) X Multiplication Factor (0.00125) X Total FCI	**0.49**	**0.60**	**0.76**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB2-A4-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB2-A4-(2)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 334	Hydrologic Subtotal	37	38	40		
	Hydrologic FCI = Subtotal / 100	**0.37**	**0.38**	**0.40**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	45	55	63		
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.15**	**1.35**	**1.54**		
	TOTAL FCU = SAR Length (334) X Multiplication Factor (0.00125) X Total FCI	**0.48**	**0.56**	**0.64**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-B2-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB2-B2-(1)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 359	Hydrologic Subtotal	37	38	40
	Hydrologic FCI = Subtotal / 100	**0.37**	**0.38**	**0.40**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	39	46
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.58**
	HB1. Flow Regime	1	1	1
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	45	55	63
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.15**	**1.33**	**1.51**
	TOTAL FCU = SAR Length (359) X Multiplication Factor (0.00125) X Total FCI	**0.52**	**0.60**	**0.68**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
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STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-B3-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	2	4	6
	H2b. Channel Capacity to Flow Frequency	2	4	7
Baseline SAR Name(s): S2-TRIB2-B3-(1)	H2c. Channel Bank Stability *(e)*	2	4	7
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	2	4	7
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 139	Hydrologic Subtotal	13	21	33
	Hydrologic FCI = Subtotal / 100	**0.13**	**0.21**	**0.33**
	WQ1a. Bank Stability *(e)*	2	4	7
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	2	4	6
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	2	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	6	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	3	6	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	21	31	44
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.26**	**0.39**	**0.55**
	HB1. Flow Regime	1	1	1
Reference Figure: A-16	HB2. Epifaunal Substrate and Available Cover	1	2	3
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	1	2	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	2	4	6
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	2	4	7
	HB10. Vegetative Protection *(e)*	2	5	9
	HB11. Riparian Zone *(e)*	6	7	9
	HB12. Riparian Habitat Condition	6	6	7
	Habitat Subtotal	33	43	57
	Habitat FCI = Subtotal / 120	**0.28**	**0.36**	**0.48**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**0.67**	**0.96**	**1.36**
	TOTAL FCU = SAR Length (139) X Multiplication Factor (0.00125) X Total FCI	**0.12**	**0.17**	**0.24**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
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- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
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STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB2-B4-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	5	6	7
	H2b. Channel Capacity to Flow Frequency	7	5	7
Baseline SAR Name(s): S2-TRIB2-B4-(1)	H2c. Channel Bank Stability *(e)*	5	6	7
	H3a. Channel Sinuosity	1	1	1
	H3b. Bottom Substrate Composition	5	5	5
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	7	6	7
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 234	Hydrologic Subtotal	33	32	38
	Hydrologic FCI = Subtotal / 100	**0.33**	**0.32**	**0.38**
	WQ1a. Bank Stability *(e)*	5	6	7
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	6	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	2	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	5	7	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	5	9
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	26	34	45
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.33**	**0.43**	**0.56**
	HB1. Flow Regime	1	1	1
Reference Figure: A-13	HB2. Epifaunal Substrate and Available Cover	2	3	3
	HB3. Stream Bottom Substrate	2	2	2
	HB4. Pool Variability	2	3	3
	HB5. Sediment Deposition and Scouring	2	4	6
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	2	4	6
	HB8. Channel Sinuosity	1	1	1
	HB9. Bank Stability *(e)*	5	6	7
	HB10. Vegetative Protection *(e)*	2	5	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	4	7
	Habitat Subtotal	26	40	54
	Habitat FCI = Subtotal / 120	**0.22**	**0.33**	**0.45**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**0.88**	**1.08**	**1.39**
	TOTAL FCU = SAR Length (234) X Multiplication Factor (0.00125) X Total FCI	**0.26**	**0.32**	**0.41**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
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RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
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(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

<table>
<tr><th>STREAM ASSESSMENT REACH (SAR) INFORMATION</th><th>SWAMPIM METRICS (a, b, c, d)</th><th>END OF CONSTRUCTION</th><th>END OF MONITORING</th><th>AT MATURITY</th><th>MITIGATION ACTIVITIES / WORK PERFORMED</th><th>RATIONALE FOR LIFT</th></tr>
<tr><td rowspan="3">Proposed SAR Name:
S2-TRIB2-B4-(2)</td><td>H1. Flow Regime and Groundwater Interaction</td><td>1</td><td>1</td><td>1</td><td rowspan="30">- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
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- Monitoring and management</td><td rowspan="30">- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
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<tr><td>H2a. Channel Condition/ Alteration</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td>H2b. Channel Capacity to Flow Frequency</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td rowspan="8">Baseline SAR Name(s):
S2-TRIB2-B4-(2)</td><td>H2c. Channel Bank Stability (e)</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>H3a. Channel Sinuosity</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>H3b. Bottom Substrate Composition</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>H3c. Instream Bottom Topography OR Manning's n (f)</td><td>3</td><td>3</td><td>4</td></tr>
<tr><td>H3d. Channel Incision</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td>H4a. Pools</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>H4b. Channel Flow Status</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Hydrologic Subtotal</td><td>39</td><td>40</td><td>42</td></tr>
<tr><td rowspan="2">Proposed SAR Length (LF):
204</td><td>Hydrologic FCI = Subtotal / 100</td><td>0.39</td><td>0.40</td><td>0.42</td></tr>
<tr><td>WQ1a. Bank Stability (e)</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>Mitigation Zone:
Zone A</td><td>WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition (e, g)</td><td>7</td><td>7</td><td>7</td></tr>
<tr><td rowspan="2">Stream Classification:
Ephemeral</td><td>WQ2. Water Clarity</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation (h)</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td rowspan="4">Multiplication Factor (i) :
0.00125</td><td>WQ4. Composition of Organic Matter</td><td>3</td><td>5</td><td>7</td></tr>
<tr><td>WQ5. Land Use Pattern Beyond Immediate Riparian Zone (e)</td><td>9</td><td>9</td><td>9</td></tr>
<tr><td>WQ6a. Riparian Zone Width (from stream edge to field) (e)</td><td>5</td><td>7</td><td>9</td></tr>
<tr><td>WQ6b. Riparian Zone Vegetation Protection/Completeness (e)</td><td>2</td><td>6</td><td>9</td></tr>
<tr><td rowspan="3">Mitigation Design Type:
Restoration</td><td>Water Quality / Biogeochemical Subtotal</td><td>32</td><td>41</td><td>49</td></tr>
<tr><td>Water Quality / Biogeochemical FCI = Subtotal / 80</td><td>0.40</td><td>0.51</td><td>0.61</td></tr>
<tr><td>HB1. Flow Regime</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td rowspan="16">Reference Figure:
A-13</td><td>HB2. Epifaunal Substrate and Available Cover</td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>HB3. Stream Bottom Substrate</td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>HB4. Pool Variability</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>HB5. Sediment Deposition and Scouring</td><td>7</td><td>7</td><td>7</td></tr>
<tr><td>HB6. Channel Flow Status</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>HB7. Channel Alteration</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td>HB8. Channel Sinuosity</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>HB9. Bank Stability (e)</td><td>6</td><td>7</td><td>8</td><td colspan="2" rowspan="9">Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.</td></tr>
<tr><td>HB10. Vegetative Protection (e)</td><td>2</td><td>6</td><td>9</td></tr>
<tr><td>HB11. Riparian Zone (e)</td><td>5</td><td>7</td><td>9</td></tr>
<tr><td>HB12. Riparian Habitat Condition</td><td>2</td><td>5</td><td>7</td></tr>
<tr><td>Habitat Subtotal</td><td>45</td><td>55</td><td>63</td></tr>
<tr><td>Habitat FCI = Subtotal / 120</td><td>0.38</td><td>0.46</td><td>0.53</td></tr>
<tr><td>TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI</td><td>1.17</td><td>1.37</td><td>1.56</td></tr>
<tr><td>TOTAL FCU = SAR Length (204) X Multiplication Factor (0.00125) X Total FCI</td><td>0.30</td><td>0.35</td><td>0.40</td></tr>
</table>

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	7	7	7		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 255	Hydrologic Subtotal	41	42	44		
	Hydrologic FCI = Subtotal / 100	**0.41**	**0.42**	**0.44**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	3	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	39	46		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.58**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-15	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	45	55	63		
	Habitat FCI = Subtotal / 120	**0.38**	**0.46**	**0.53**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.19**	**1.37**	**1.55**		
	TOTAL FCU = SAR Length (255) X Multiplication Factor (0.00125) X Total FCI	**0.38**	**0.44**	**0.49**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-(2)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-(2)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	6	6	6		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	1	1	1		
Proposed SAR Length (LF): 558	Hydrologic Subtotal	46	47	49		
	Hydrologic FCI = Subtotal / 100	**0.46**	**0.47**	**0.49**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	3	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	41	48		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.51**	**0.60**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-15	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	1	1	1		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	47	57	65		
	Habitat FCI = Subtotal / 120	**0.39**	**0.48**	**0.54**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.28**	**1.46**	**1.63**		
	TOTAL FCU = SAR Length (558) X Multiplication Factor (0.00125) X Total FCI	**0.89**	**1.02**	**1.14**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-(3)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB3-(3)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	5	5	5
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	1	1	1
Proposed SAR Length (LF): 295	Hydrologic Subtotal	45	46	48
	Hydrologic FCI = Subtotal / 100	**0.45**	**0.46**	**0.48**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	41	48
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.51**	**0.60**
	HB1. Flow Regime	2	2	2
Reference Figure: A-15	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	4	4	4
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	1	1	1
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	48	58	66
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.28**	**1.45**	**1.63**
	TOTAL FCU = SAR Length (295) X Multiplication Factor (0.00125) X Total FCI	**0.47**	**0.53**	**0.60**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
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STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-(4)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB3-(4)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	6	6	6
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	3	3	4
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	1	1	1
Proposed SAR Length (LF): 1,613	Hydrologic Subtotal	47	48	50
	Hydrologic FCI = Subtotal / 100	**0.47**	**0.48**	**0.50**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**
	HB1. Flow Regime	2	2	2
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	1	1	1
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	47	57	65
	Habitat FCI = Subtotal / 120	**0.39**	**0.48**	**0.54**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.29**	**1.50**	**1.68**
	TOTAL FCU = SAR Length (1613) X Multiplication Factor (0.00125) X Total FCI	**2.60**	**3.02**	**3.39**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

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STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-(5)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-(5)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	4	4	4		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	3	3	4		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	1	1	1		
Proposed SAR Length (LF): 707	Hydrologic Subtotal	45	46	48		
	Hydrologic FCI = Subtotal / 100	**0.45**	**0.46**	**0.48**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	34	43	51		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.43**	**0.54**	**0.64**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	1	1	1		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	47	57	65		
	Habitat FCI = Subtotal / 120	**0.39**	**0.48**	**0.54**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.27**	**1.48**	**1.66**		
	TOTAL FCU = SAR Length (707) X Multiplication Factor (0.00125) X Total FCI	**1.12**	**1.31**	**1.47**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-(6)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-(6)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	5	5	5		
	H3b. Bottom Substrate Composition	2	2	2		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	2	2	2		
Proposed SAR Length (LF): 1,191	Hydrologic Subtotal	49	50	52		
	Hydrologic FCI = Subtotal / 100	**0.49**	**0.50**	**0.52**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	2	2	2		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	35	44	52		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.44**	**0.55**	**0.65**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	4	4	4		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	2	2	2		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	49	59	67		
	Habitat FCI = Subtotal / 120	**0.41**	**0.49**	**0.56**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.34**	**1.54**	**1.73**		
	TOTAL FCU = SAR Length (1191) X Multiplication Factor (0.00125) X Total FCI	**1.99**	**2.29**	**2.58**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-(7)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB3-(7)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	7	7	7
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	2	2	2
Proposed SAR Length (LF): 1,089	Hydrologic Subtotal	50	51	53
	Hydrologic FCI = Subtotal / 100	**0.50**	**0.51**	**0.53**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	1	1	1
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	2	2	2
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	35	44	52
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.44**	**0.55**	**0.65**
	HB1. Flow Regime	2	2	2
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	3	3	3
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	2	2	2
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	48	58	66
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.34**	**1.54**	**1.73**
	TOTAL FCU = SAR Length (1089) X Multiplication Factor (0.00125) X Total FCI	**1.82**	**2.10**	**2.35**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name:	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
S2-TRIB3-(8)	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s):	H2c. Channel Bank Stability *(e)*	6	7	8		
S2-TRIB3-(8)	H3a. Channel Sinuosity	6	6	6		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	1	1	1		
Proposed SAR Length (LF):	Hydrologic Subtotal	48	49	51		
2,018	**Hydrologic FCI = Subtotal / 100**	**0.48**	**0.49**	**0.51**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification:	WQ2. Water Clarity	1	1	1		
Ephemeral	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	1	1	1		
Multiplication Factor *(i)* :	WQ4. Composition of Organic Matter	3	5	7		
0.00125	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type:	Water Quality / Biogeochemical Subtotal	34	43	51		
Restoration	**Water Quality / Biogeochemical FCI = Subtotal / 80**	**0.43**	**0.54**	**0.64**		
	HB1. Flow Regime	2	2	2		
Reference Figure:	HB2. Epifaunal Substrate and Available Cover	4	4	4		
A-10	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	1	1	1		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	47	57	65		
	Habitat FCI = Subtotal / 120	**0.39**	**0.48**	**0.54**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.30**	**1.51**	**1.69**		
	TOTAL FCU = SAR Length (2018) X Multiplication Factor (0.00125) X Total FCI	**3.28**	**3.81**	**4.26**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-(9)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-(9)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	7	7	7		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 1,935	Hydrologic Subtotal	43	44	46		
	Hydrologic FCI = Subtotal / 100	**0.43**	**0.44**	**0.46**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-10	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	4	4	4		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	46	56	64		
	Habitat FCI = Subtotal / 120	**0.38**	**0.47**	**0.53**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.21**	**1.42**	**1.60**		
	TOTAL FCU = SAR Length (1935) X Multiplication Factor (0.00125) X Total FCI	**2.93**	**3.43**	**3.87**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-(10)	H1. Flow Regime and Groundwater Interaction	2	2	2	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-(10)	H2c. Channel Bank Stability *(e)*	8	8	8		
	H3a. Channel Sinuosity	8	8	8		
	H3b. Bottom Substrate Composition	2	2	2		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	4	4	4		
	H4b. Channel Flow Status	6	6	6		
Proposed SAR Length (LF): 1,473	Hydrologic Subtotal	58	58	59		
	Hydrologic FCI = Subtotal / 100	**0.58**	**0.58**	**0.59**		
	WQ1a. Bank Stability *(e)*	8	8	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8		
Stream Classification: Ephemeral	WQ2. Water Clarity	4	4	4		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	4	4	4		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	5	6	7		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	5	7	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	5	7	9		
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	44	51	58		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.55**	**0.64**	**0.73**		
	HB1. Flow Regime	2	2	2		
Reference Figure: A-6	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	6	7	7		
	HB6. Channel Flow Status	6	6	6		
	HB7. Channel Alteration	6	7	8		
	HB8. Channel Sinuosity	5	5	5		
	HB9. Bank Stability *(e)*	8	8	8		
	HB10. Vegetative Protection *(e)*	5	7	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	4	5	7		
	Habitat Subtotal	58	65	72		
	Habitat FCI = Subtotal / 120	**0.48**	**0.54**	**0.60**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.61**	**1.76**	**1.92**		
	TOTAL FCU = SAR Length (1473) X Multiplication Factor (0.00125) X Total FCI	**2.96**	**3.24**	**3.54**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-A4-(1)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): N/A	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	8	8	8
	H3b. Bottom Substrate Composition	4	4	4
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	1	1	1
Proposed SAR Length (LF): 2,824	Hydrologic Subtotal	53	54	56
	Hydrologic FCI = Subtotal / 100	**0.53**	**0.54**	**0.56**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8
Stream Classification: Ephemeral	WQ2. Water Clarity	2	2	2
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	2	2	2
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	4	7	8
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	38	48	55
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.48**	**0.60**	**0.69**
	HB1. Flow Regime	2	2	2
Reference Figure: A-6	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	6	6	6
	HB4. Pool Variability	4	4	4
	HB5. Sediment Deposition and Scouring	8	8	8
	HB6. Channel Flow Status	1	1	1
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	4	4	4
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	52	62	70
	Habitat FCI = Subtotal / 120	**0.43**	**0.52**	**0.58**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.44**	**1.66**	**1.83**
	TOTAL FCU = SAR Length (2824) X Multiplication Factor (0.00125) X Total FCI	**5.08**	**5.86**	**6.46**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-A5-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-A5-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 528	Hydrologic Subtotal	37	38	40		
	Hydrologic FCI = Subtotal / 100	**0.37**	**0.38**	**0.40**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	39	46		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.58**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	4	4	4	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	3	3	3		
	HB5. Sediment Deposition and Scouring	5	5	5		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	43	53	61		
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.13**	**1.31**	**1.49**		
	TOTAL FCU = SAR Length (528) X Multiplication Factor (0.00125) X Total FCI	**0.75**	**0.86**	**0.98**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-A5-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB3-A5-(2)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	4	4	4
	H3b. Bottom Substrate Composition	3	3	3
	H3c. Instream Bottom Topography OR Manning's n *(f)*	3	3	4
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 2,407	Hydrologic Subtotal	41	42	44
	Hydrologic FCI = Subtotal / 100	**0.41**	**0.42**	**0.44**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	41	49
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.51**	**0.61**
	HB1. Flow Regime	1	1	1
Reference Figure: A-9	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	2	2	2
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	44	54	62
	Habitat FCI = Subtotal / 120	**0.37**	**0.45**	**0.52**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.18**	**1.38**	**1.57**
	TOTAL FCU = SAR Length (2407) X Multiplication Factor (0.00125) X Total FCI	**3.55**	**4.15**	**4.72**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
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- Supplemental plantings of native trees, shrubs, and herbaceous species
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- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
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- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
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Notes:
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(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
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(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-A5-(3)	H1. Flow Regime and Groundwater Interaction	2	2	2
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB3-A5-(3), S2-TRIB3-(9)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	8	8	8
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	4	4	5
	H3d. Channel Incision	8	8	8
	H4a. Pools	4	4	4
	H4b. Channel Flow Status	1	1	1
Proposed SAR Length (LF): 1,333	Hydrologic Subtotal	50	51	53
	Hydrologic FCI = Subtotal / 100	**0.50**	**0.51**	**0.53**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	2	2	2
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	2	2	2
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	5	7
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	36	45	53
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.45**	**0.56**	**0.66**
	HB1. Flow Regime	2	2	2
Reference Figure: A-9	HB2. Epifaunal Substrate and Available Cover	5	5	5
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	2	2	2
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	1	1	1
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	4	4	4
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	48	58	66
	Habitat FCI = Subtotal / 120	**0.40**	**0.48**	**0.55**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.35**	**1.55**	**1.74**
	TOTAL FCU = SAR Length (1333) X Multiplication Factor (0.00125) X Total FCI	**2.25**	**2.58**	**2.90**

MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-A5-B1-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-A5-B1-(1)	H2c. Channel Bank Stability *(e)*	8	8	8		
	H3a. Channel Sinuosity	3	3	3		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 98	Hydrologic Subtotal	39	39	40		
	Hydrologic FCI = Subtotal / 100	**0.39**	**0.39**	**0.40**		
	WQ1a. Bank Stability *(e)*	8	8	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	8	8	8		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	1	2	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	5	7	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	6	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	4	6	9		
Mitigation Design Type: Enhancement	Water Quality / Biogeochemical Subtotal	32	38	47		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.48**	**0.59**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	1	2	3	*Notes:* *(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.* *(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.* *(c) FCI = Functional Condition Index.* *(d) FCU = Functional Capacity Unit.* *(e) Score shown is the average of the left and right bank scores.* *(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.* *(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.* *(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.* *(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.*	
	HB3. Stream Bottom Substrate	2	2	2		
	HB4. Pool Variability	1	2	2		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	7	7	7		
	HB8. Channel Sinuosity	3	3	3		
	HB9. Bank Stability *(e)*	8	8	8		
	HB10. Vegetative Protection *(e)*	4	6	9		
	HB11. Riparian Zone *(e)*	6	7	9		
	HB12. Riparian Habitat Condition	5	6	7		
	Habitat Subtotal	45	51	58		
	Habitat FCI = Subtotal / 120	**0.38**	**0.43**	**0.48**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.17**	**1.30**	**1.47**		
	TOTAL FCU = SAR Length (98) X Multiplication Factor (0.00125) X Total FCI	**0.14**	**0.16**	**0.18**		

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY
Proposed SAR Name: S2-TRIB3-A5-B1-(2)	H1. Flow Regime and Groundwater Interaction	1	1	1
	H2a. Channel Condition/ Alteration	8	8	8
	H2b. Channel Capacity to Flow Frequency	8	8	8
Baseline SAR Name(s): S2-TRIB3-A5-B1-(2)	H2c. Channel Bank Stability *(e)*	6	7	8
	H3a. Channel Sinuosity	3	3	3
	H3b. Bottom Substrate Composition	1	1	1
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3
	H3d. Channel Incision	8	8	8
	H4a. Pools	0	0	0
	H4b. Channel Flow Status	0	0	0
Proposed SAR Length (LF): 172	Hydrologic Subtotal	37	38	40
	Hydrologic FCI = Subtotal / 100	**0.37**	**0.38**	**0.40**
	WQ1a. Bank Stability *(e)*	6	7	8
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0
Multiplication Factor *(i)*: 0.00125	WQ4. Composition of Organic Matter	3	3	4
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	39	46
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.58**
	HB1. Flow Regime	1	1	1
Reference Figure: A-12	HB2. Epifaunal Substrate and Available Cover	4	4	4
	HB3. Stream Bottom Substrate	4	4	4
	HB4. Pool Variability	2	2	2
	HB5. Sediment Deposition and Scouring	7	7	7
	HB6. Channel Flow Status	0	0	0
	HB7. Channel Alteration	8	8	8
	HB8. Channel Sinuosity	3	3	3
	HB9. Bank Stability *(e)*	6	7	8
	HB10. Vegetative Protection *(e)*	2	6	9
	HB11. Riparian Zone *(e)*	5	7	9
	HB12. Riparian Habitat Condition	2	5	7
	Habitat Subtotal	44	54	62
	Habitat FCI = Subtotal / 120	**0.37**	**0.45**	**0.52**
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.14**	**1.32**	**1.50**
	TOTAL FCU = SAR Length (172) X Multiplication Factor (0.00125) X Total FCI	**0.25**	**0.28**	**0.32**

MITIGATION ACTIVITIES / WORK PERFORMED

- Protection within large contiguous mititgation area
- Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement
- Supplemental plantings of native trees, shrubs, and herbaceous species
- Use of large woody debris (LWD) or other native material for in-channel structures
- Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate
- Creation of pools in combination with LWD and GCS and other locations where appropriate
- Creation of riparian buffer zones around channel (minimum of 60' width on each side)
- Creation of protected natural area adjacent to riparian buffer zone
- Monitoring and management

RATIONALE FOR LIFT

- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency)
- LWD will increase channel roughness and improve bank stability
- Created pools will retain water
- Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality
- Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.

STREAM ASSESSMENT REACH (SAR) INFORMATION	SWAMPIM METRICS *(a, b, c, d)*	END OF CONSTRUCTION	END OF MONITORING	AT MATURITY	MITIGATION ACTIVITIES / WORK PERFORMED	RATIONALE FOR LIFT
Proposed SAR Name: S2-TRIB3-A5-B2-(1)	H1. Flow Regime and Groundwater Interaction	1	1	1	- Protection within large contiguous mititgation area - Implementation of measures to prevent uncontrolled access (cattle, etc.) from outside conservation easement - Supplemental plantings of native trees, shrubs, and herbaceous species - Use of large woody debris (LWD) or other native material for in-channel structures - Adjustment of channel gradient by installing grade control structures (GCS) made from native material (rock or woody debris) where appropriate - Creation of pools in combination with LWD and GCS and other locations where appropriate - Creation of riparian buffer zones around channel (minimum of 60' width on each side) - Creation of protected natural area adjacent to riparian buffer zone - Monitoring and management	- GCS will reduce channel downcutting and improve stream stability, sediment transport, and floodplain connectivity (through increased overbank frequency) - LWD will increase channel roughness and improve bank stability - Created pools will retain water - Protection, plantings, and measures to prevent uncontrolled access will improve bank stability, filter runoff, and enhance water quality - Woody debris, leaf litter, and overhanging herbaceous vegetation from established buffer zones will enhance in-stream habitat and biological productivity
	H2a. Channel Condition/ Alteration	8	8	8		
	H2b. Channel Capacity to Flow Frequency	8	8	8		
Baseline SAR Name(s): S2-TRIB3-A5-B2-(1)	H2c. Channel Bank Stability *(e)*	6	7	8		
	H3a. Channel Sinuosity	2	2	2		
	H3b. Bottom Substrate Composition	1	1	1		
	H3c. Instream Bottom Topography OR Manning's n *(f)*	2	2	3		
	H3d. Channel Incision	8	8	8		
	H4a. Pools	0	0	0		
	H4b. Channel Flow Status	0	0	0		
Proposed SAR Length (LF): 69	Hydrologic Subtotal	36	37	39		
	Hydrologic FCI = Subtotal / 100	**0.36**	**0.37**	**0.39**		
	WQ1a. Bank Stability *(e)*	6	7	8		
Mitigation Zone: Zone A	WQ1b. Channel Bottom Bank Stability OR Channel Sediments or Substrate Composition *(e, g)*	7	7	7		
Stream Classification: Ephemeral	WQ2. Water Clarity	0	0	0		
	WQ3. Nutrient Enrichment OR Presence of Aquatic Vegetation *(h)*	0	0	0		
Multiplication Factor *(i)* : 0.00125	WQ4. Composition of Organic Matter	3	3	4		
	WQ5. Land Use Pattern Beyond Immediate Riparian Zone *(e)*	9	9	9		
	WQ6a. Riparian Zone Width (from stream edge to field) *(e)*	5	7	9		
	WQ6b. Riparian Zone Vegetation Protection/Completeness *(e)*	2	6	9		
Mitigation Design Type: Restoration	Water Quality / Biogeochemical Subtotal	32	39	46		
	Water Quality / Biogeochemical FCI = Subtotal / 80	**0.40**	**0.49**	**0.58**		
	HB1. Flow Regime	1	1	1		
Reference Figure: A-9	HB2. Epifaunal Substrate and Available Cover	4	4	4		
	HB3. Stream Bottom Substrate	4	4	4		
	HB4. Pool Variability	2	2	2		
	HB5. Sediment Deposition and Scouring	7	7	7		
	HB6. Channel Flow Status	0	0	0		
	HB7. Channel Alteration	8	8	8		
	HB8. Channel Sinuosity	2	2	2		
	HB9. Bank Stability *(e)*	6	7	8		
	HB10. Vegetative Protection *(e)*	2	6	9		
	HB11. Riparian Zone *(e)*	5	7	9		
	HB12. Riparian Habitat Condition	2	5	7		
	Habitat Subtotal	43	53	61		
	Habitat FCI = Subtotal / 120	**0.36**	**0.44**	**0.51**		
	TOTAL FCI = Hydrologic FCI + Water Quality / Biogeochemical FCI + Habitat FCI	**1.12**	**1.30**	**1.48**		
	TOTAL FCU = SAR Length (69) X Multiplication Factor (0.00125) X Total FCI	**0.10**	**0.11**	**0.13**		

Notes:
(a) Refer to SWAMPIM Assessment Protocol Documentation (included in Appendix C of Mitigation Plan) for scoring methodology.
(b) "H" = Hydrologic Functions; "WQ" = Water Quality / Biogeochemical Functions; "HB" = Habitat Functions.
(c) FCI = Functional Condition Index.
(d) FCU = Functional Capacity Unit.
(e) Score shown is the average of the left and right bank scores.
(f) Instream bottom topography was globally used in lieu of Manning's N as it allows for a visual assessment of the stream reach.
(g) Channel Bottom Bank Stability was used globally instead of Channel Sediment/Substrate Composition because it more accurately represents the channel condition within the Lake Ralph Hall project watershed.
(h) Nutrient Enrichment was used globally for scoring because Aquatic Vegetation does not provide an accurate representation of ephemeral stream channel condition within the Lake Ralph Hall project watershed.
(i) The Multiplication Factor is determined by the stream's flow regime; the multiplication factors for Perennial, Intermittent with Perennial Pools, Intermittent, and Ephemeral Streams are 0.0038, 0.00315, 0.0025, and 0.00125, respectively.