

1 VICINITY MAP  
SCALE: 1" = 24,000'

TRAVEL DIRECTIONS FROM DILLON MT:

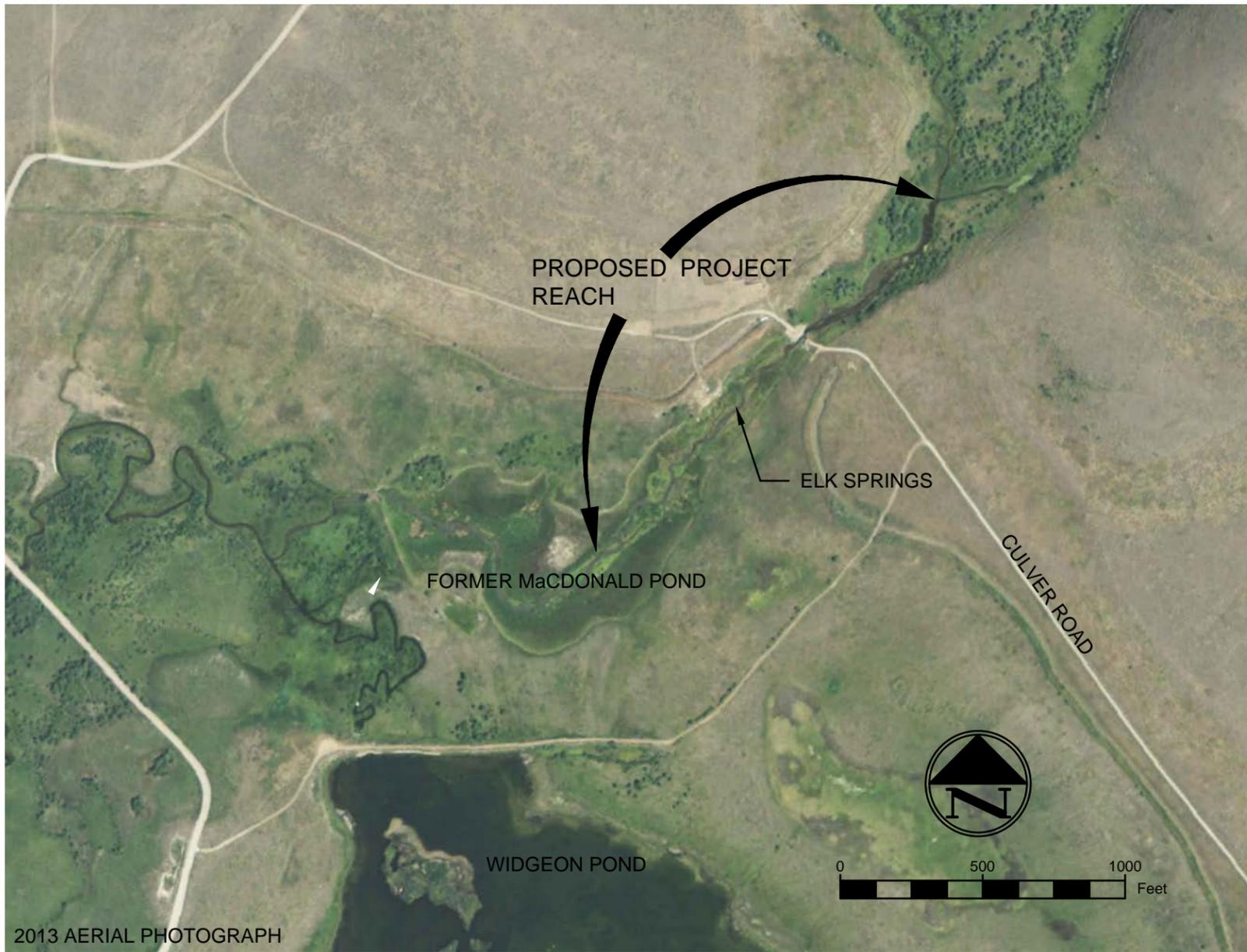
From Dillon, MT travel south on I-15 for 62 miles. Take exit 0 (toward Monida) to South Valley Road (unpaved) and proceed 28 miles past Lakeview, the USFWS headquarters. Continue for another 10 miles east on South Valley Road to Elk Lake Road junction (USFS Rd. 8384), and continue for 2.5 miles North to project reach, immediately North of Widgeon Pond.

# ELK SPRINGS CREEK RESTORATION

## RED ROCK LAKES NATIONAL WILDLIFE REFUGE

LOCATED IN SW SE SECTION 31 TOWNSHIP 13S, RANGE 1E & NE NW SECTION 6, TOWNSHIP 14S, RANGE 1E  
 LATITUDE = 44° 39' 0" NORTH; LONGITUDE = 111° 38' 58.3" WEST  
 BEAVERHEAD COUNTY, MONTANA

JANUARY 15, 2016



2013 AERIAL PHOTOGRAPH

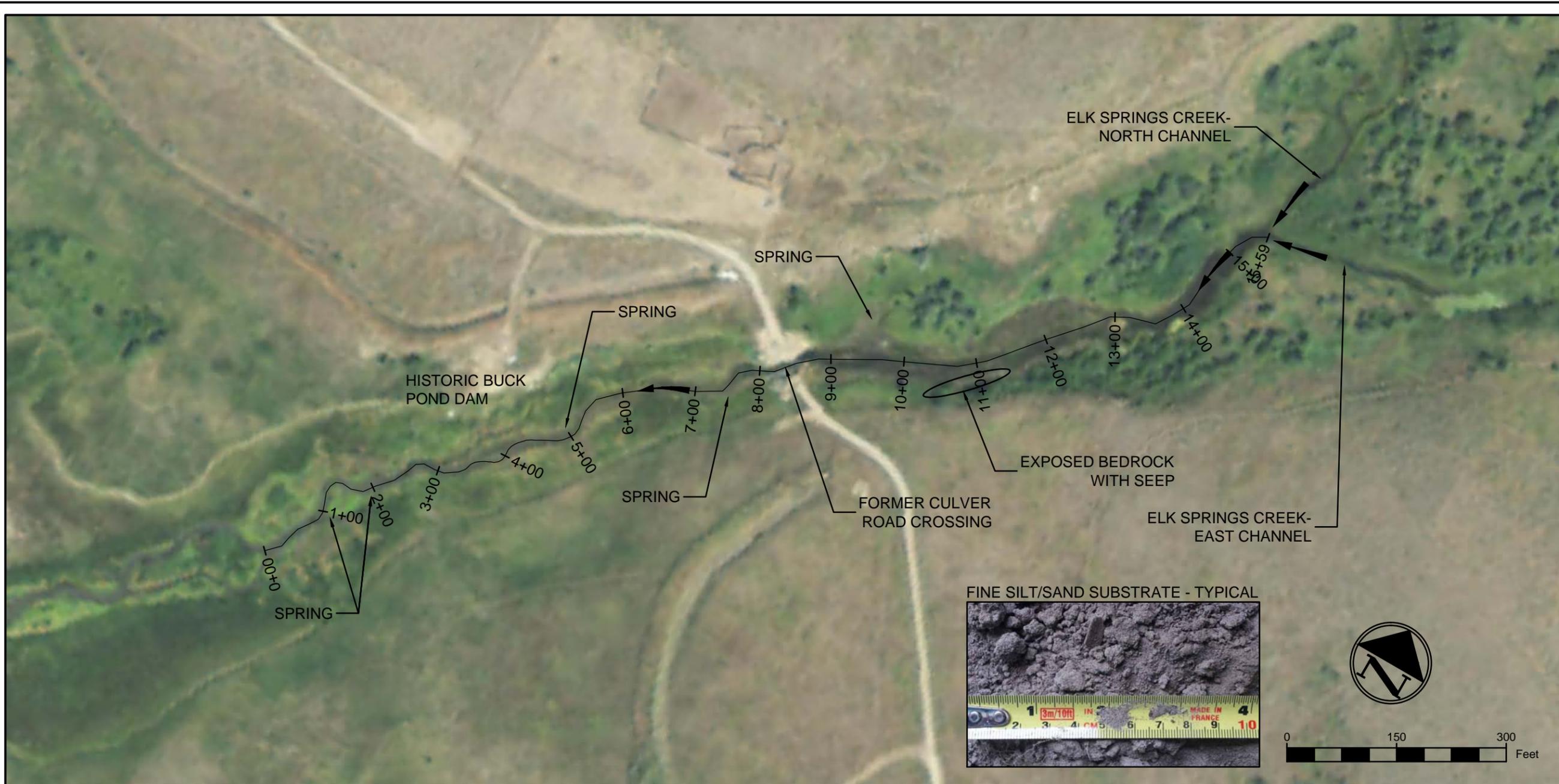
2 PROJECT SITE LOCATION  
SCALE: 1" = 500'

SHEET  
C1

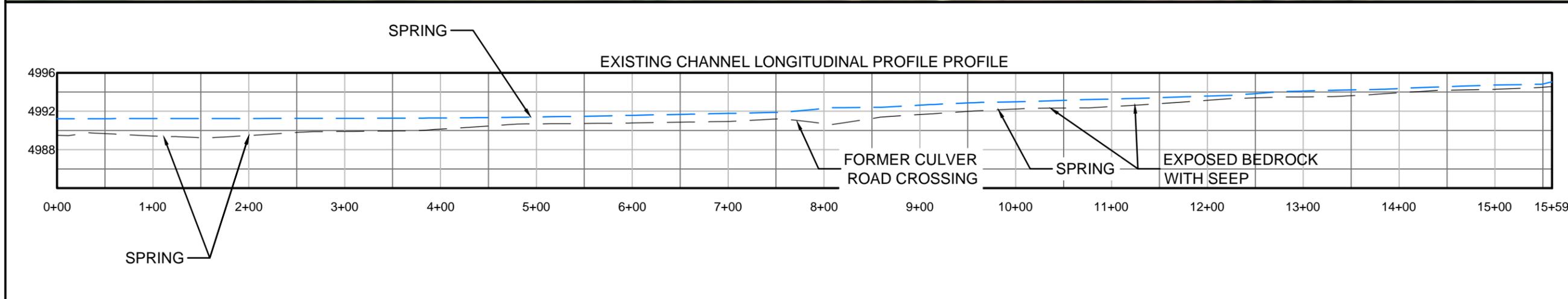
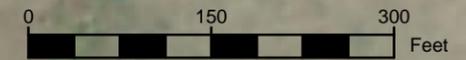
VICINITY AND SITE LOCATION MAP  
 ELK SPRINGS CREEK RESTORATION  
 RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 BEAVERHEAD COUNTY, MONTANA

DATE: 1/15/2016  
 CHKD: DD  
 DRAWN: TC  
 PROJ. No.: 101-15

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 PO BOX 356  
 CLYDE PARK, MT 59018  
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FINE SILT/SAND SUBSTRATE - TYPICAL



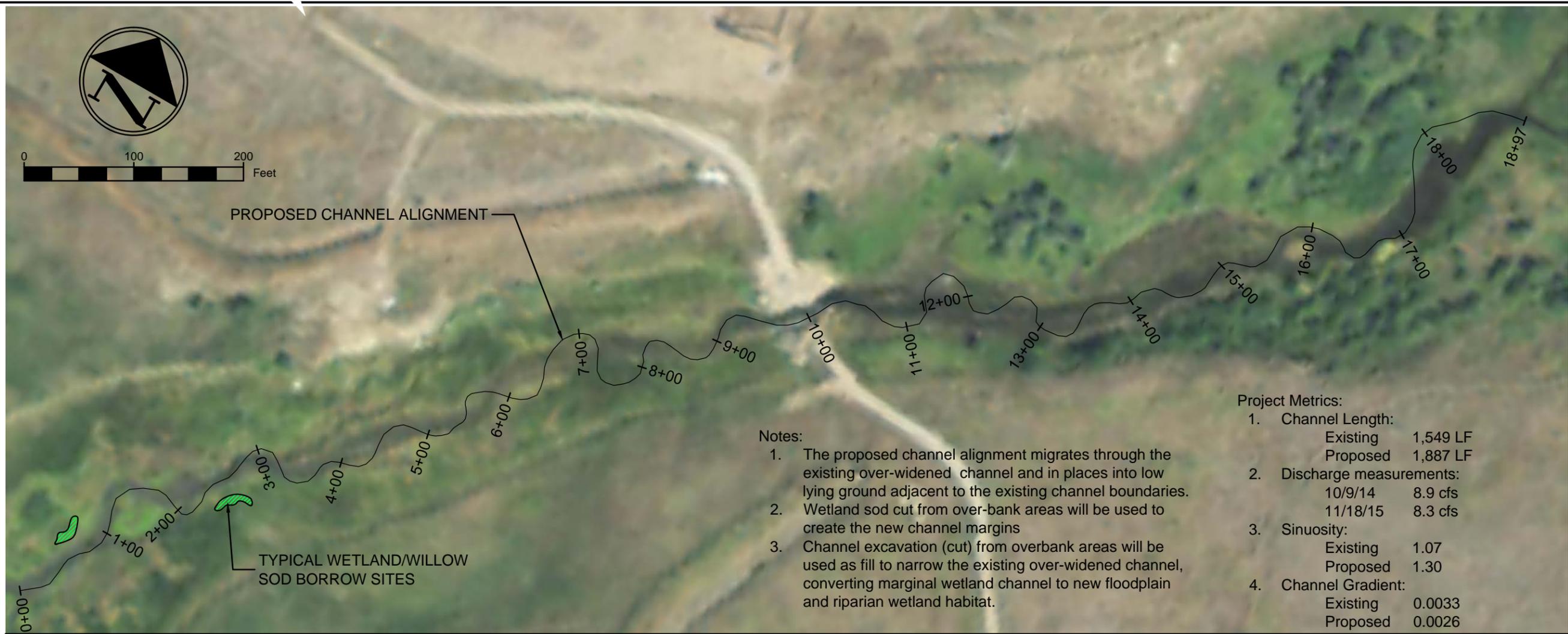
SHEET  
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EXISTING PLAN VIEW  
 ELK SPRINGS CREEK RESTORATION  
 RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 BEAVERHEAD COUNTY, MONTANA

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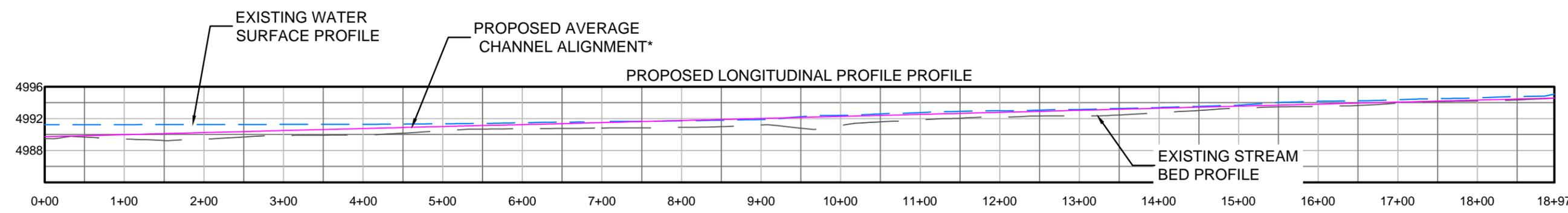
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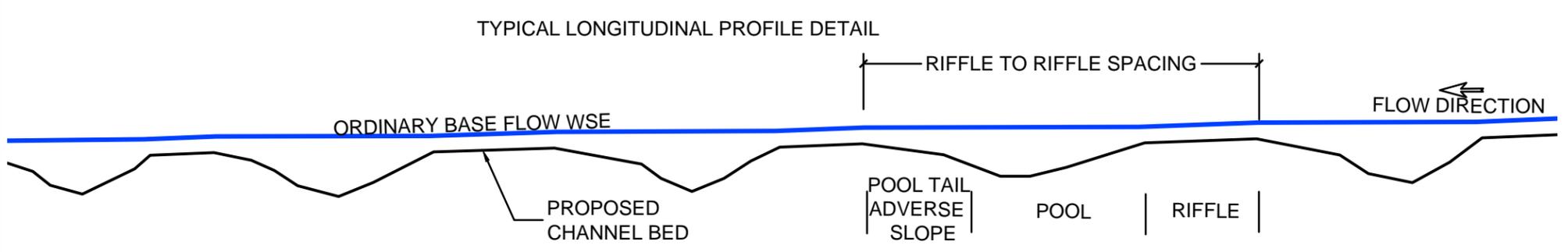
- Notes:**
1. The proposed channel alignment migrates through the existing over-widened channel and in places into low lying ground adjacent to the existing channel boundaries.
  2. Wetland sod cut from over-bank areas will be used to create the new channel margins
  3. Channel excavation (cut) from overbank areas will be used as fill to narrow the existing over-widened channel, converting marginal wetland channel to new floodplain and riparian wetland habitat.

**Project Metrics:**

1. Channel Length:	Existing	1,549 LF
	Proposed	1,887 LF
2. Discharge measurements:	10/9/14	8.9 cfs
	11/18/15	8.3 cfs
3. Sinuosity:	Existing	1.07
	Proposed	1.30
4. Channel Gradient:	Existing	0.0033
	Proposed	0.0026



\*Does not reflect actual bed forms (See detail below)



- Notes:**
1. Channel bed will be constructed with undulating bedforms as shown
  2. Pools will be associated with channel bends
  3. The riffle to riffle spacing ranges from 50 feet to 70 feet

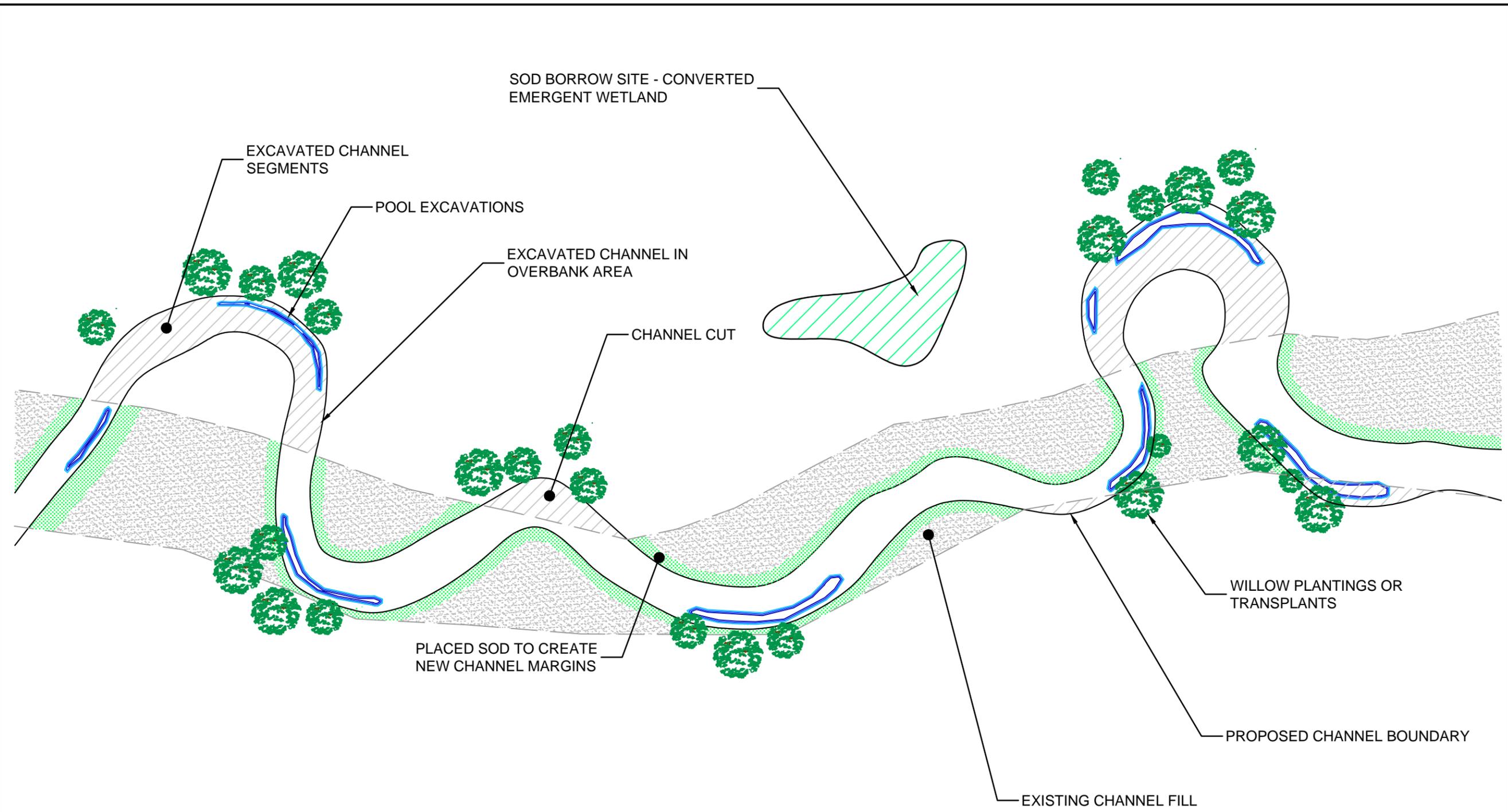
SHEET  
C3

PROPOSED PLAN & PROFILE PROPOSED CHANNEL  
ELK SPRINGS CREEK RESTORATION  
RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
BEAVERHEAD COUNTY, MONTANA

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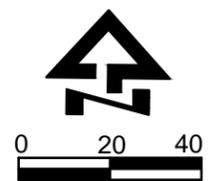
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Notes:

1. Treatment extents and locations will be applied to the approximate proportions shown on this sheet but this plan allows for field fitting of project features
2. Sod borrow sites may consist of current channel margins, channel excavations outside of the existing channel and adjacent wetland sites
3. Sod borrow sites will be irregularly shaped and left as depressional wetlands or filled with fine grained sediments
4. Construction should proceed from the upstream project limit to the downstream limit
5. Tracked low ground pressure equipment should be used within the channel corridor
6. Additional fill necessary to construct design channel and floodplain will originate from re-countour efforts and final restoration of the former Culver Road crossing area (Sta. 9+25 to 10+25) and/or the former MacDonald Pond earthen dam embankment.
7. Approximately 400 cubic yards of native 'pit run' fill is necessary to achieve final project dimensions.



SHEET  
C4

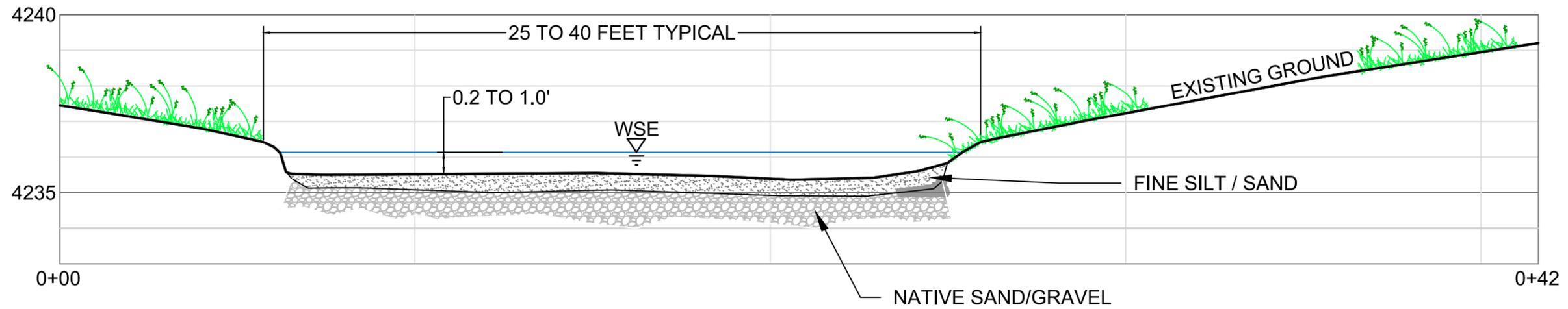
TYPICAL PLAN VIEW DETAIL  
ELK SPRINGS CREEK RESTORATION  
RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
BEAVERHEAD COUNTY, MONTANA

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### TYPICAL EXISTING SECTION



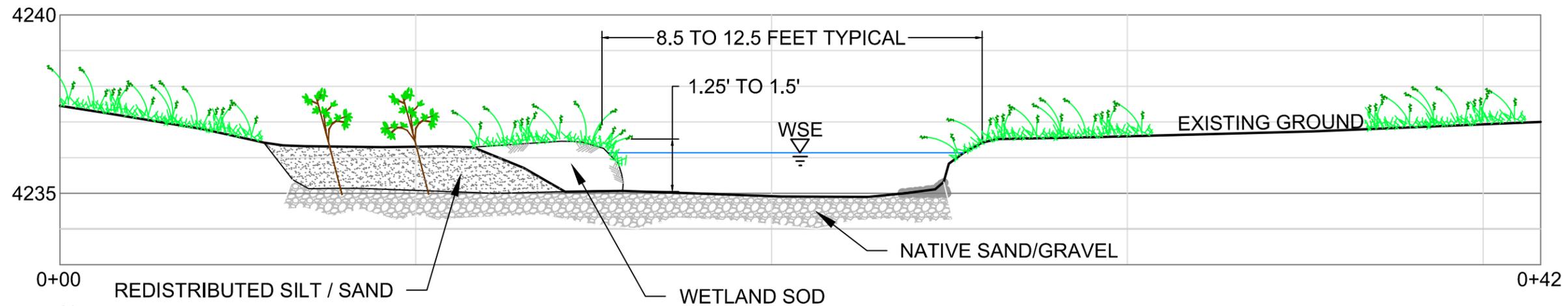
Notes:

1. Gravel and sand underlie most reaches of the creek with overlying fine sand and silt.
2. Silt depths range from 0 to 2.0 feet.
3. Fine channel substrates and former MacDonald Pond lake bed deposits generally fills and levels habitat features in the over-widened channel.



REPRESENTATIVE NATIVE GRAVEL SUBSTRATE

### TYPICAL RIFFLE TREATMENT



Notes:

1. Treatment applies to riffle and run type habitats
2. Silt will be removed from the active channel to expose the sand/gravel substrates
3. Wetland sod will be placed as shown to create a new channel margin.
4. The sod will be rolled to ensure that bank face is fully vegetated adjacent to flowing water
5. In channel silt/fine sand will be redistributed to channel fill areas behind the placed sod bank margins and seeded with native wetland seed mix.
6. Native gravel substrate will be selectively mined and redistributed from the existing channel bed (Proposed Sta. 17+00 - 18+87) to augment pool tailouts and riffle-spawning habitat.

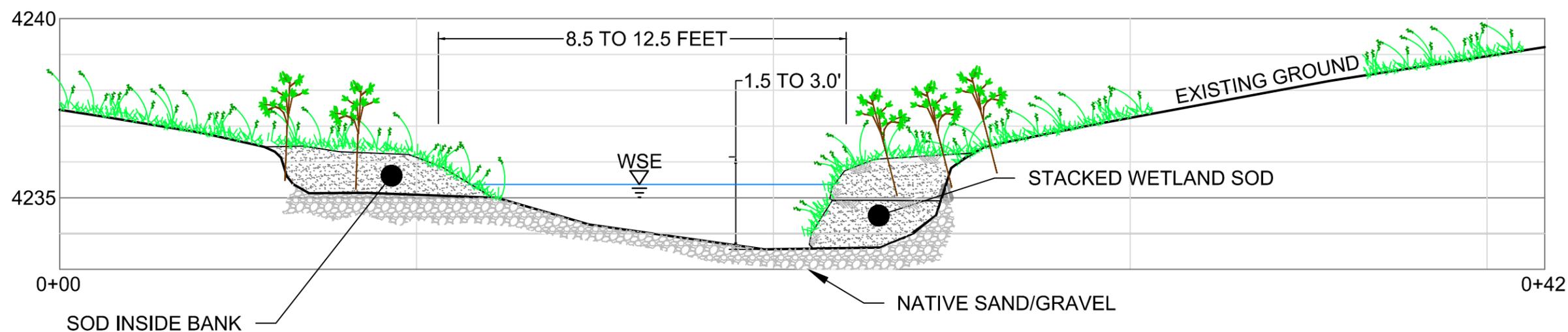
SHEET  
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RIFFLE CROSS SECTION TREATMENTS  
ELK SPRINGS CREEK RESTORATION  
RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
BEAVERHEAD COUNTY, MONTANA

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### TYPICAL STACKED SOD BANK POOL TREATMENT



**Notes:**

1. Treatment applies to pool habitats
2. The lower bank will be constructed in lifts using a combination of live willow cuttings backfilled and compacted with sand/gravel.
3. Upper banks will be constructed by placing sod on the prepared bank toe
4. As available willow transplants and willow plantings will be integrated into the bank

SHEET  
C6

POOL CROSS SECTION TREATMENT  
ELK SPRINGS CREEK RESTORATION  
RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
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