Grand River Ecosystem Restoration Study

Final Integrated Feasibility Report and Environmental Assessment

Appendix M: Grand River Feasibility Design Plates

October 2020

US Army Corps of Engineers ®
Kansas City District

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ACRONYMS

El……..Elevation

FG……....Fountain Grove

H……..Horizontal

MDC……...Missouri Department of Conservation

PVC…….....Polyvinyl Chloride

RCB…….....Reinforced Concrete Box

RCP…….Reinforced Concrete Pipe

S……..Slope

SDR ……...Standard Dimension Ratio

V…….Vertical

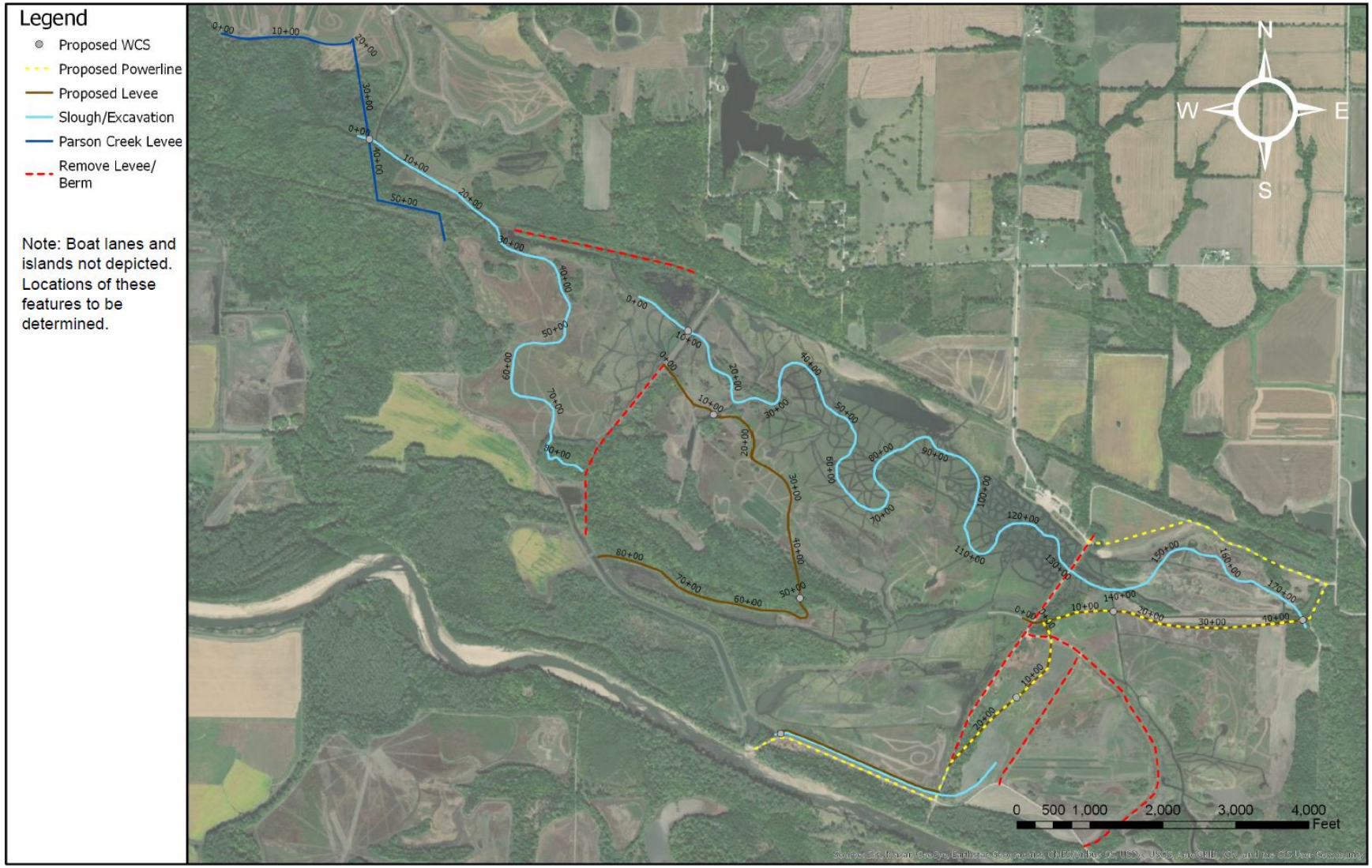
WCS……...Water Control Structure

The following appendix includes both plan view and typical cross sections of key features in the Grand River Feasibility design. These details require additional design and are subject to change. These plates demonstrate the overall concept and do not represent final designs. The below legend applies to the cross section details for both Fountain Grove and Locust Creek.

Legend

- Existing Ground
- Earthen Fill
- Excavation
- Riprap Placement
- Aggregate

M.1 FOUNTAIN GROVE PLATES


Legend
Proposed WCS
Proposed Powerline
Proposed Levee
Slough/Excavation
Parson Creek Levee
Remove Levee/ Berm
Note: Boat lanes and islands not depicted. Locations of these features to be determined.
N
W
E
S
0 500 1,000 2,000 3,000 4,000
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0+00
10+00
0 37.5 75 150 225 300
Feet

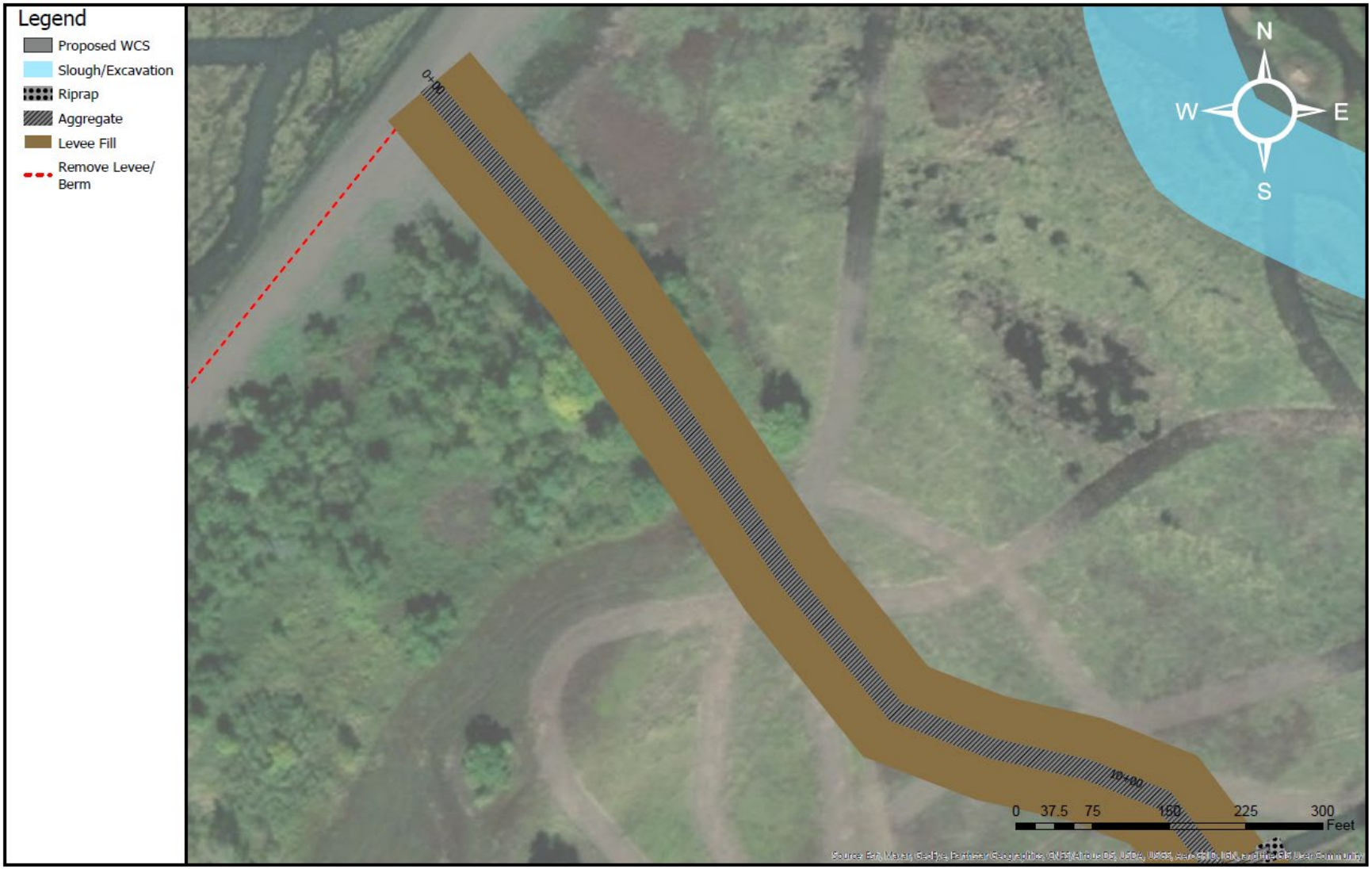
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
10+00
20+00
0 37.5 75 150 225 300
Feet

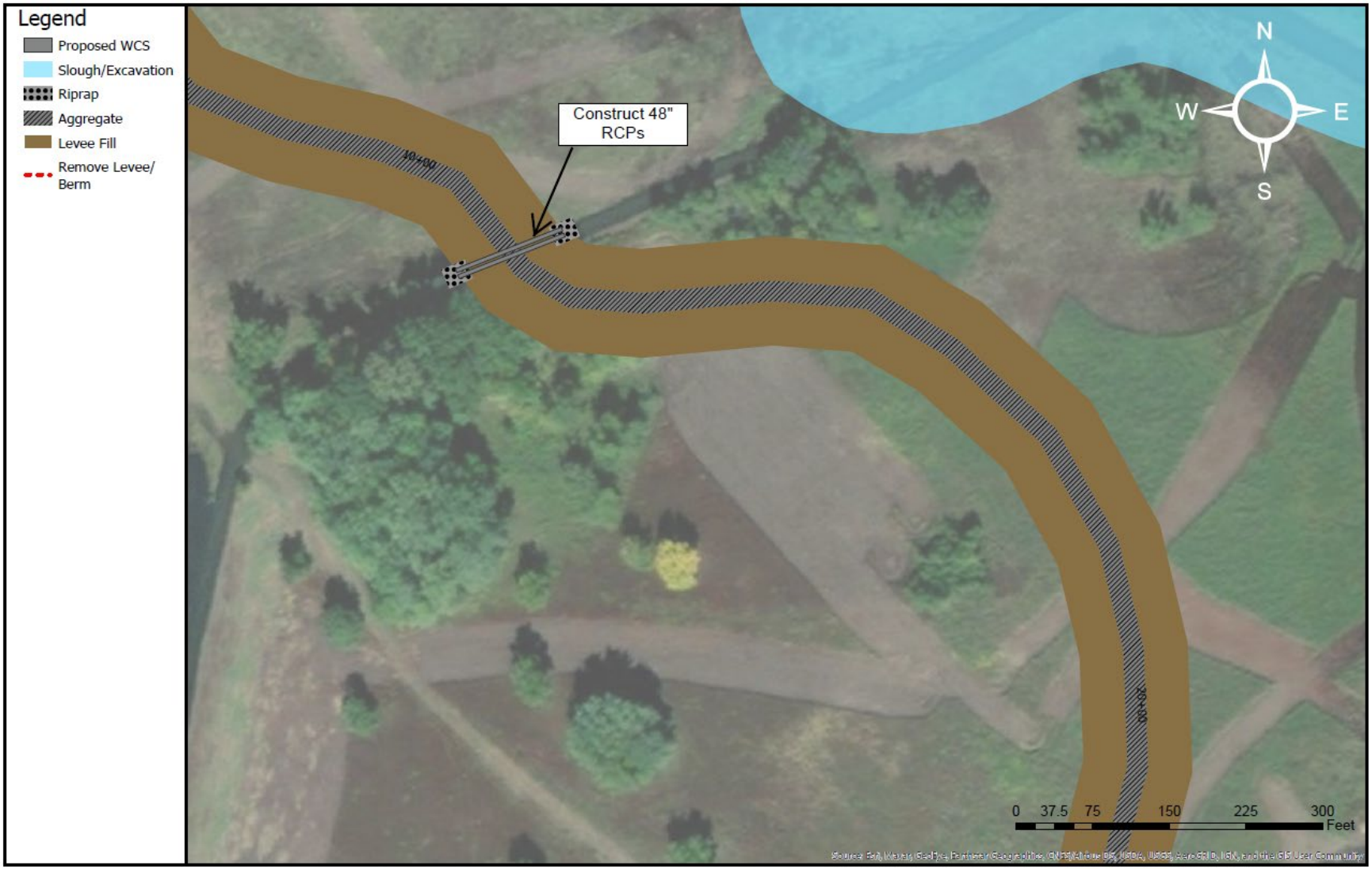
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
20+00
N
W
E
S
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
Construct 12'x4' RCBs
0+00
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
40+00
10+00
50+00
N
W
E
S
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
50+00
N
W
E
S
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0+00
10+00
0 37.5 75 150 225 300
Feet

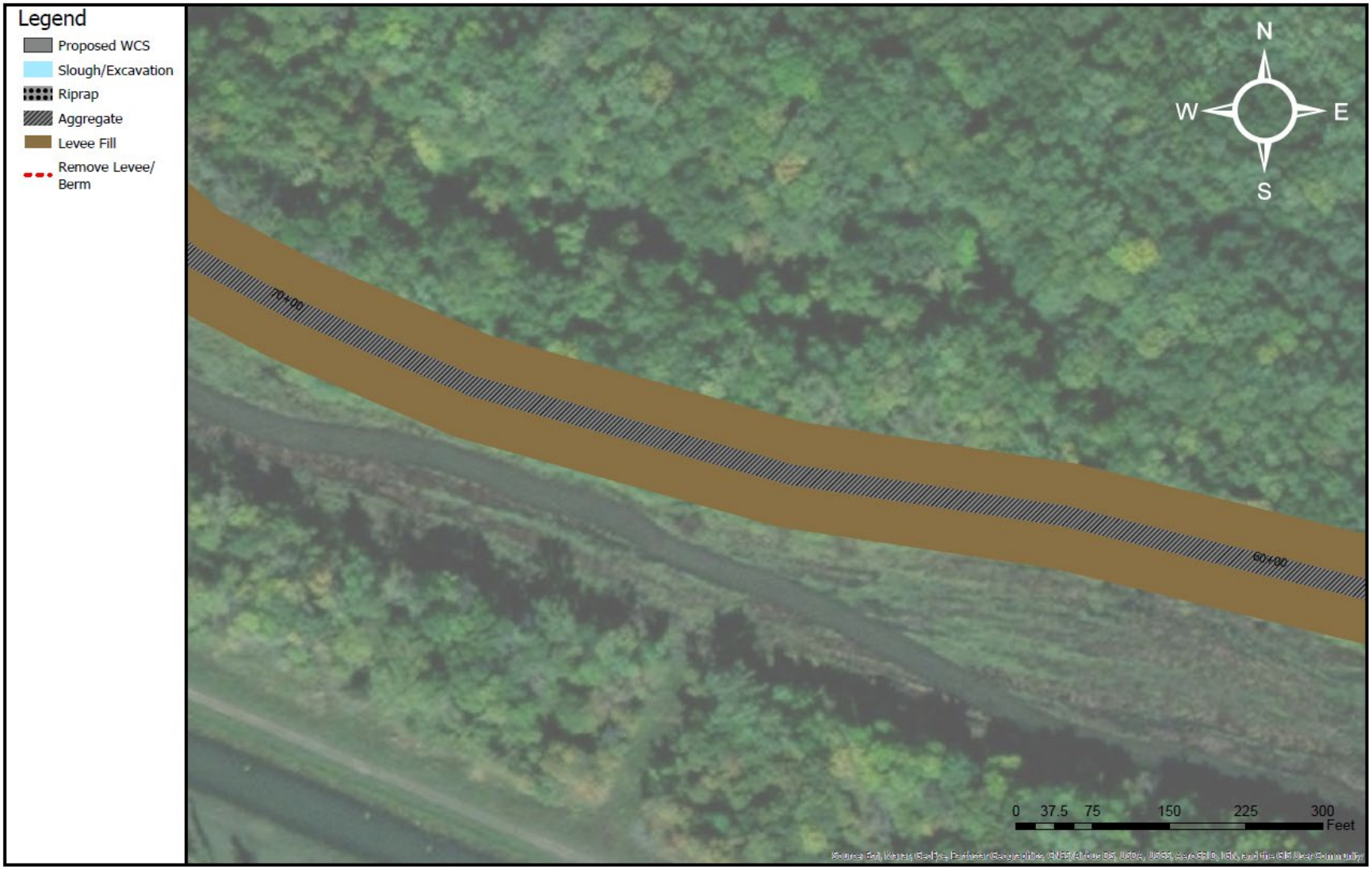

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
Construct 48" RCPs
40+00
20+00
N
W
E
S
0 37.5 75 150 225 300
Feet

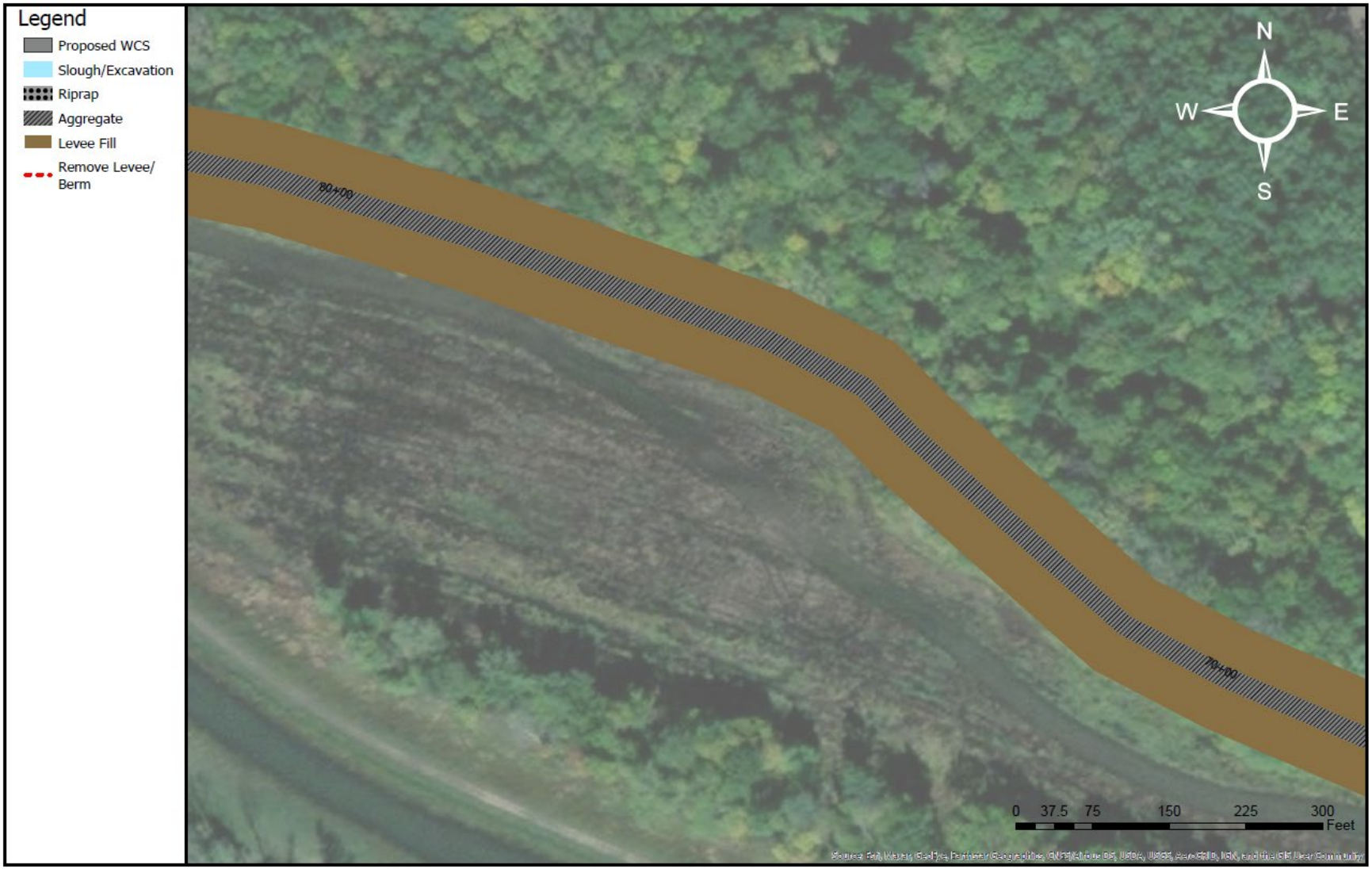
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
Construct 48" RCPs
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
Construct 48" RCPs
N
W
E
S
60+00
50+00
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
70+00
60+00
0 37.5 75 150 225 300
Feet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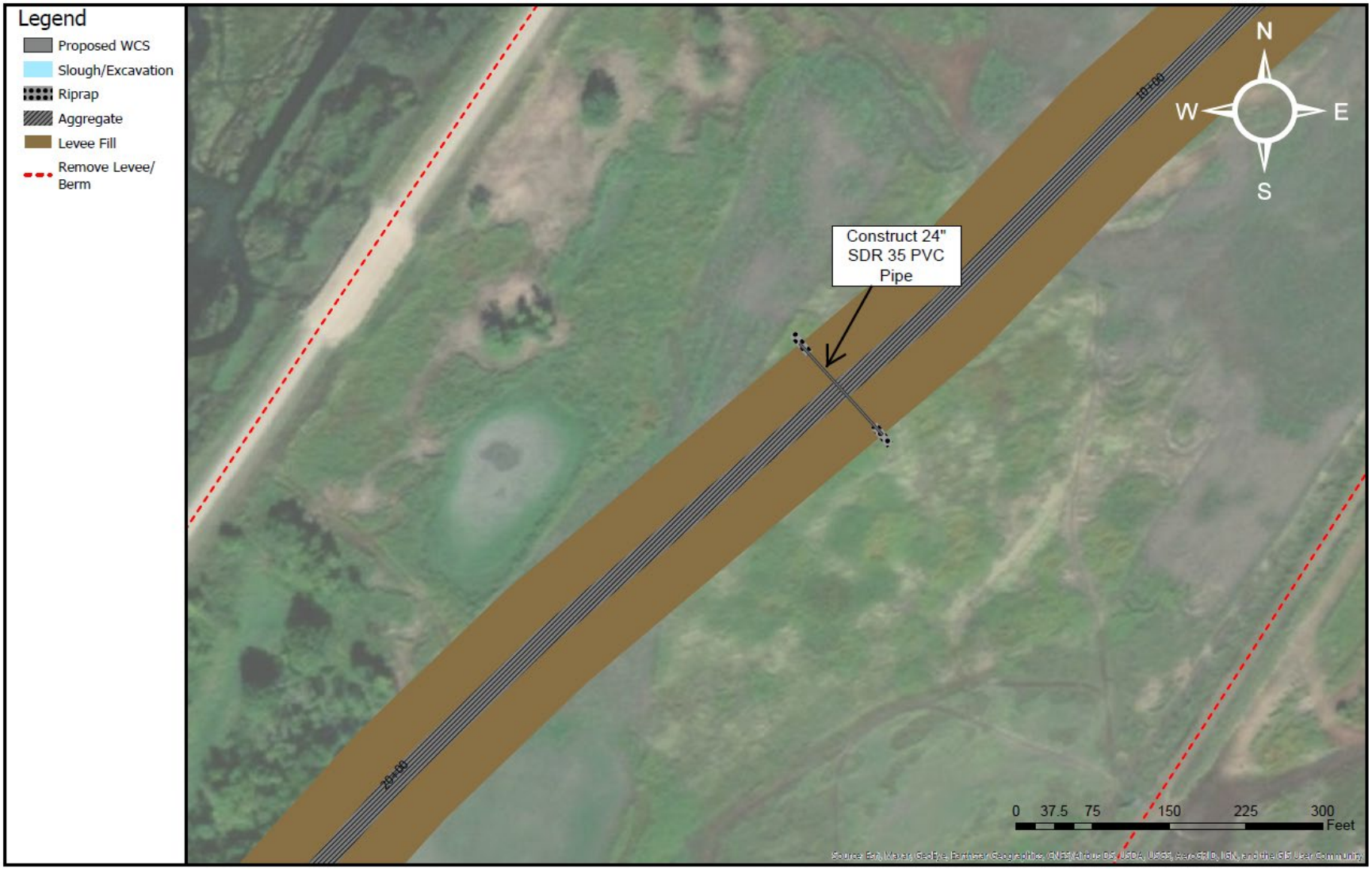
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
80+00
70+00
0 37.5 75 150 225 300
Feet

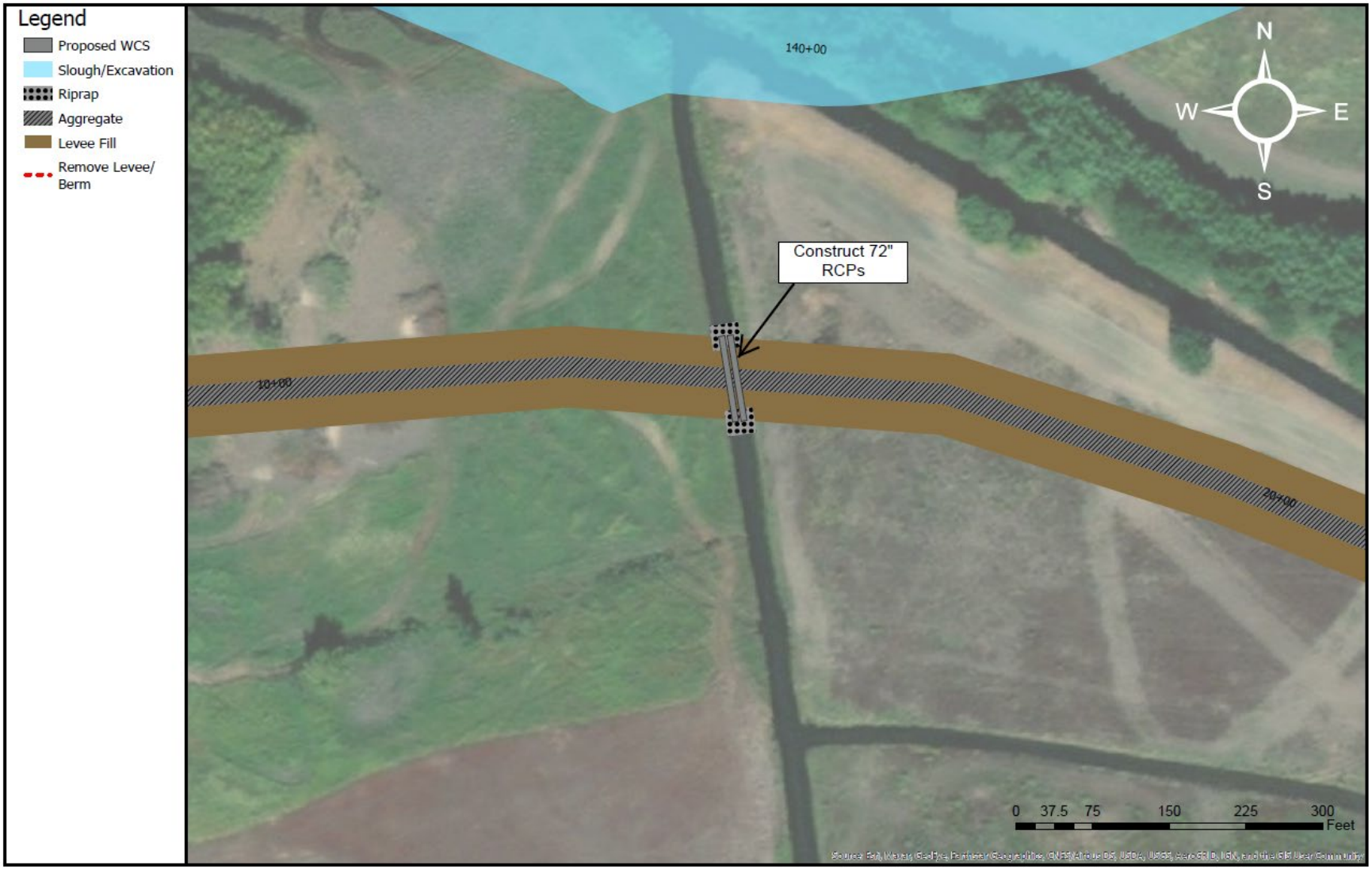
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
80+00
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0 37.5 75 150 225 300
Feet

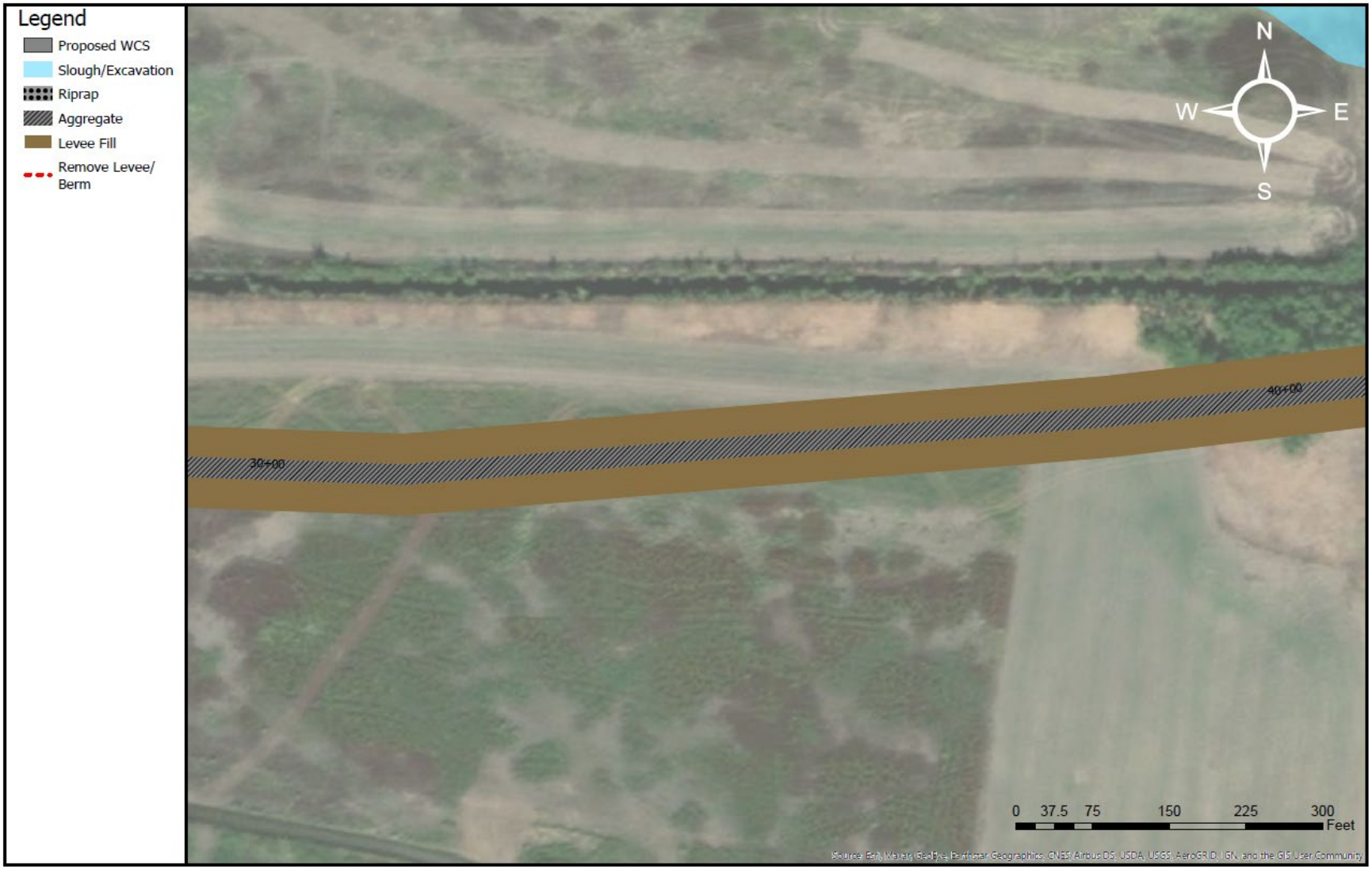

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
Construct 24" SDR 35 PVC Pipe
10+00
20+00
0 37.5 75 150 225 300
Feet

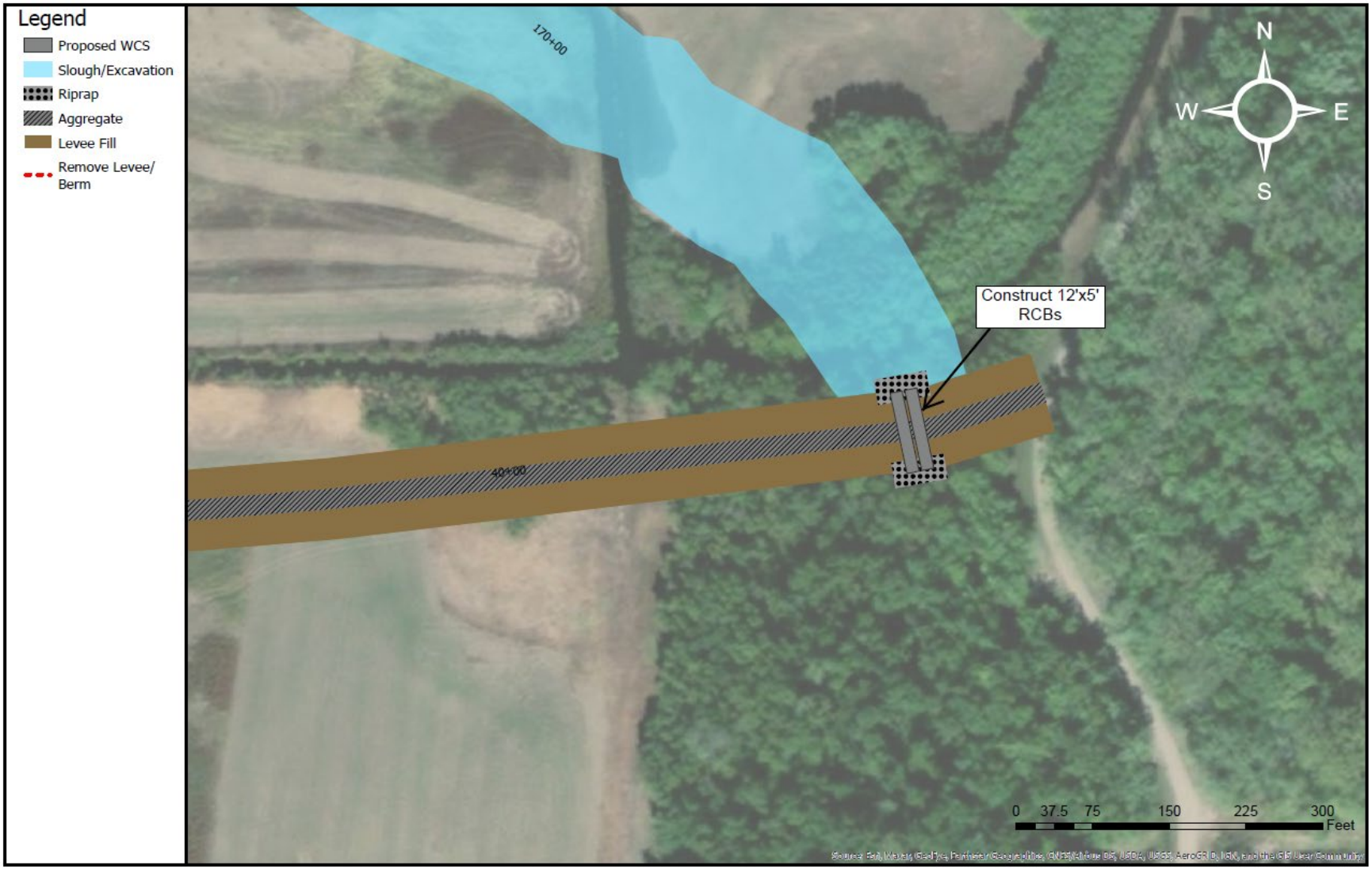
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
20+00
N
W
E
S
0 37.5 75 150 225 300
Feet

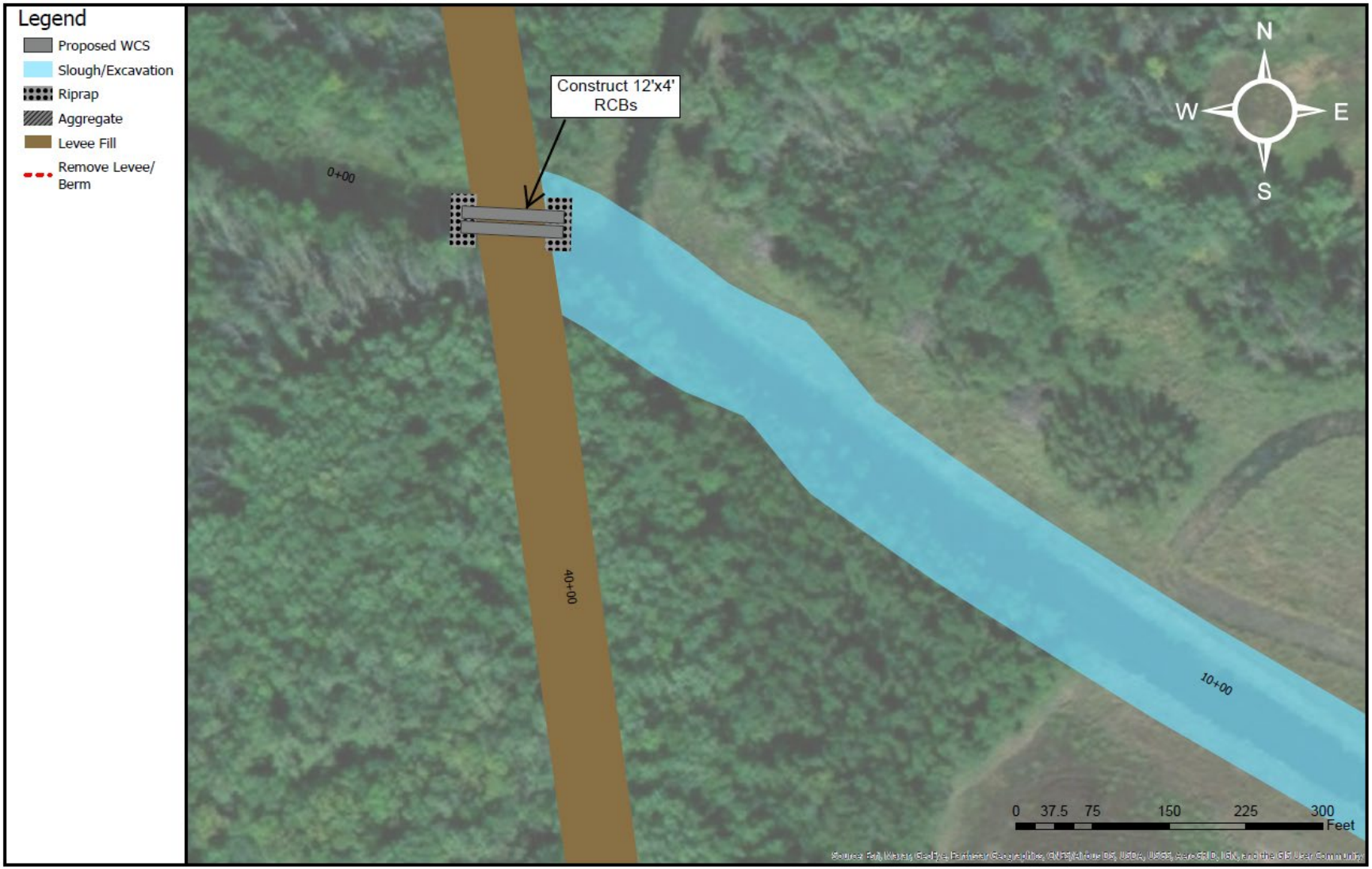
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0+00
10+00
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
140+00
N
W
E
S
Construct 72" RCPs
10+00
20+00
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
20+00
30+00
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
30+00
40+00
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
170+00
40+00
Construct 12'x5' RCBs
N
W
E
S
0 37.5 75 150 225 300
Feet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Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
Construct 12'x4' RCBs
0+00
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10+00
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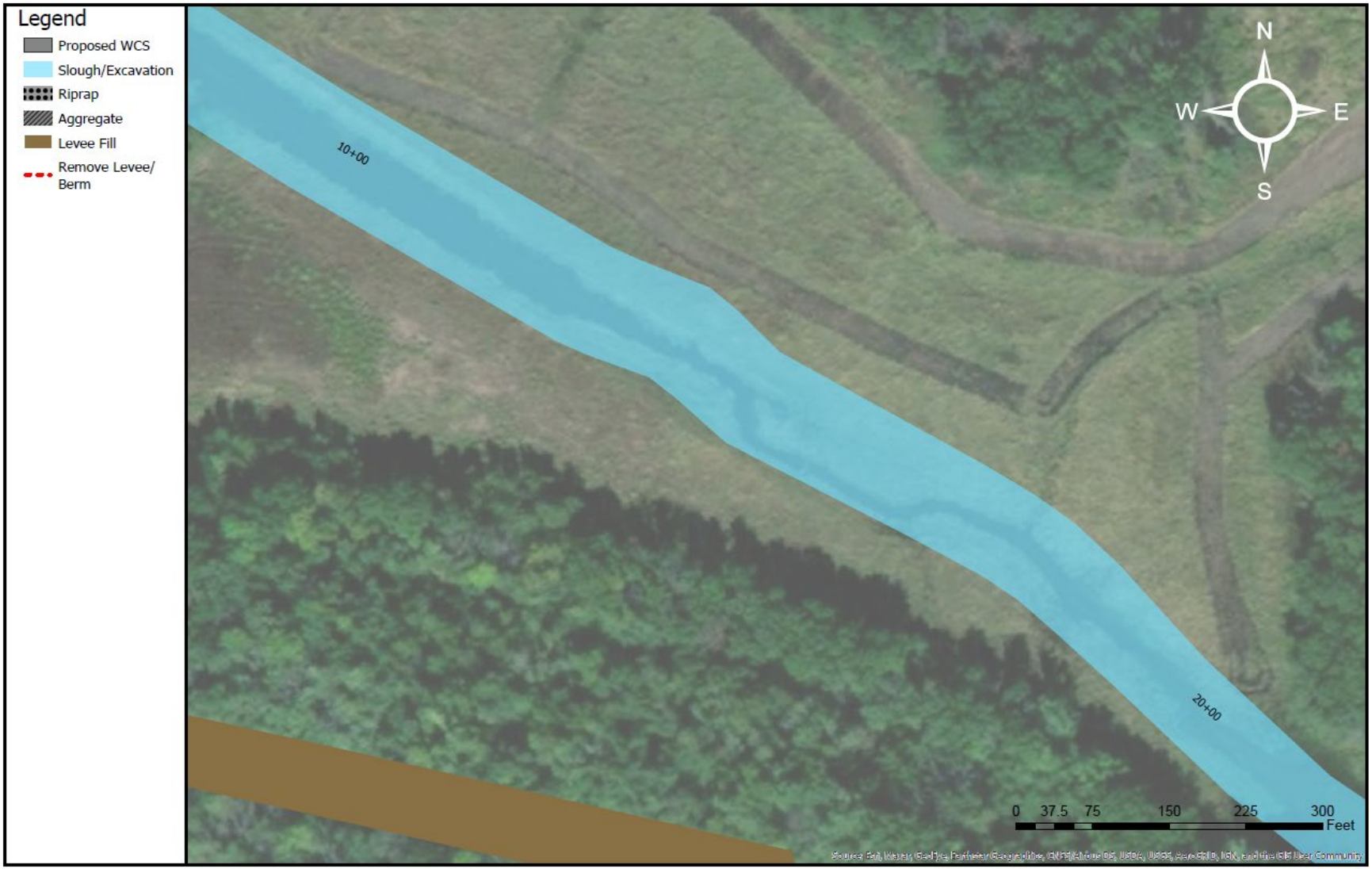
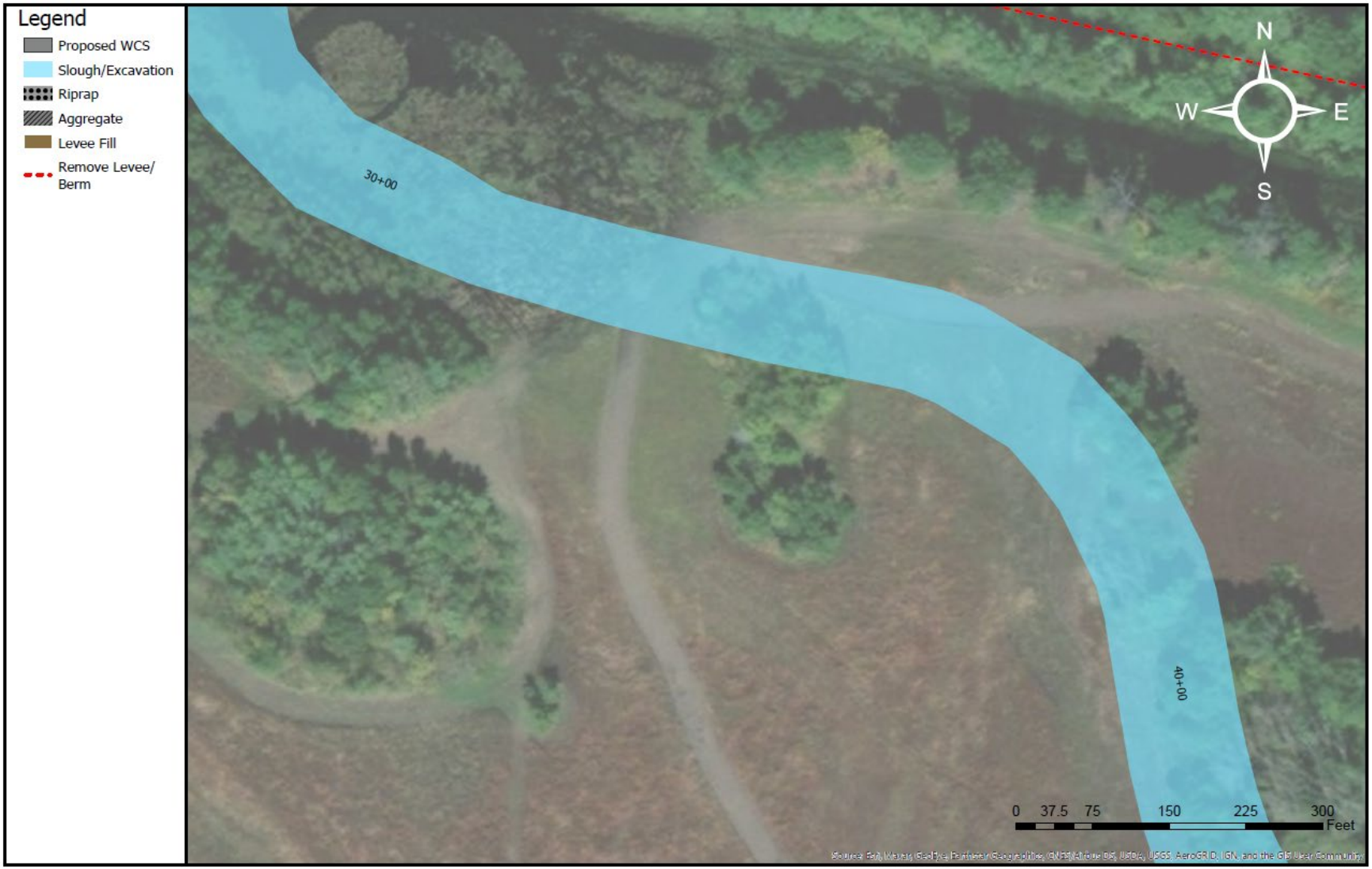
E
S
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
10+00
20+00
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
20+00
30+00
N
W
E
S
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
30+00
40+00
0 37.5 75 150 225 300
Feet

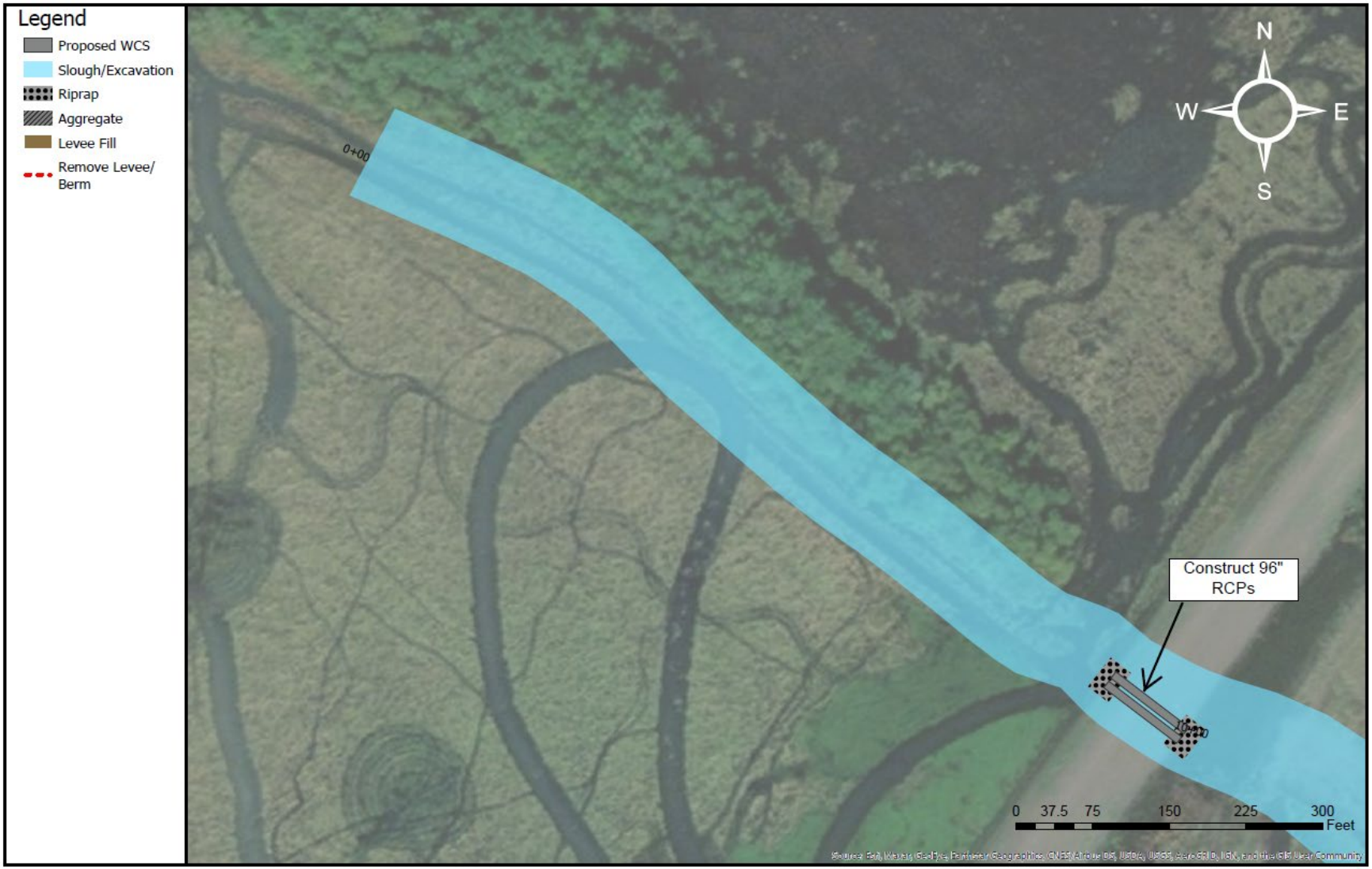
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
50+00
60+00
0 37.5 75 150 225 300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
60+00
70+00
N
W
E
S
0 37.5 75 150 225 300
Feet
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0 37.5 75 150 225 300
Feet
80+00

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
80+00
N
W
E
S
0
37.5
75
150
225
300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
0+00
N
W
E
S
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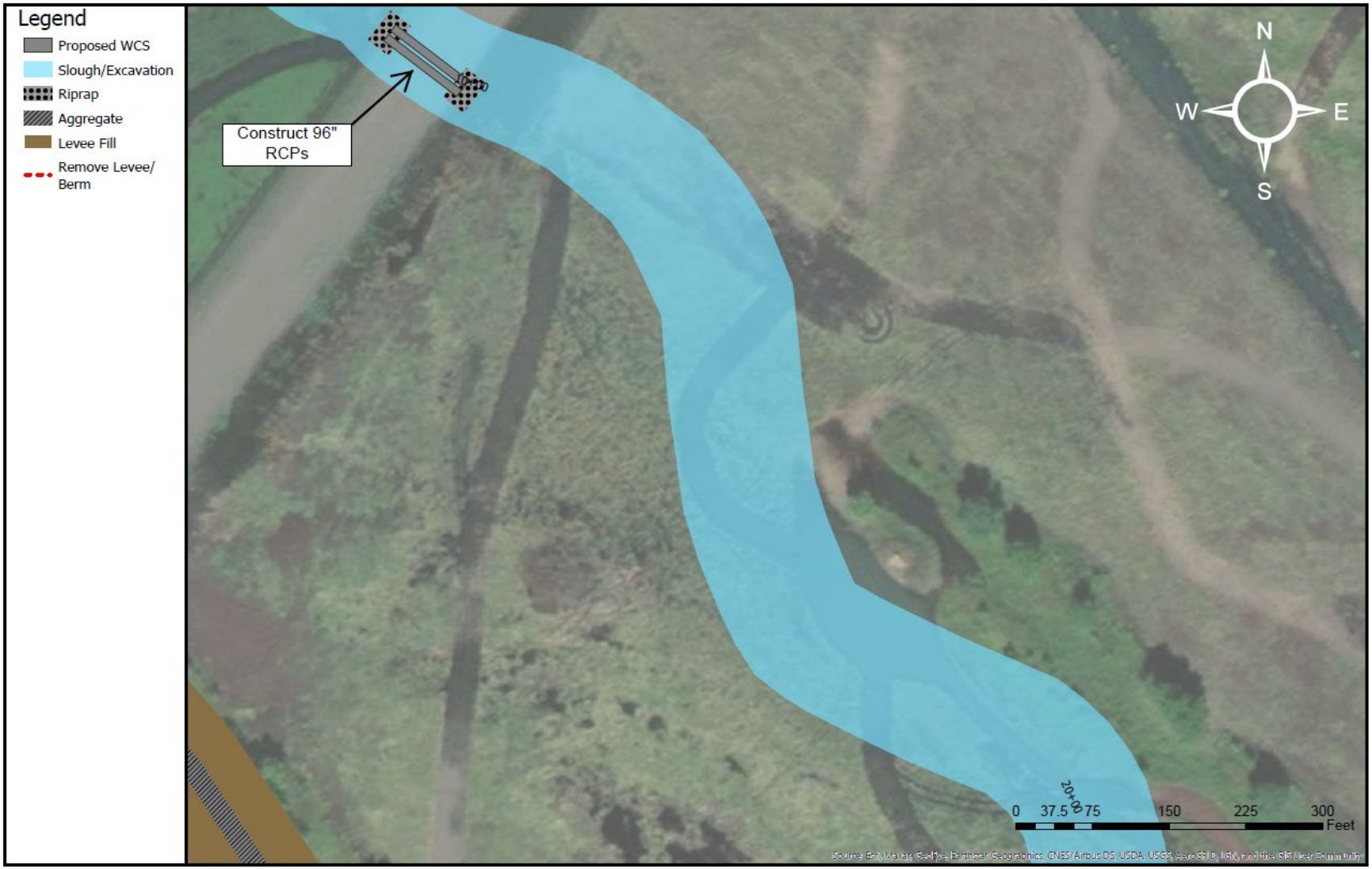
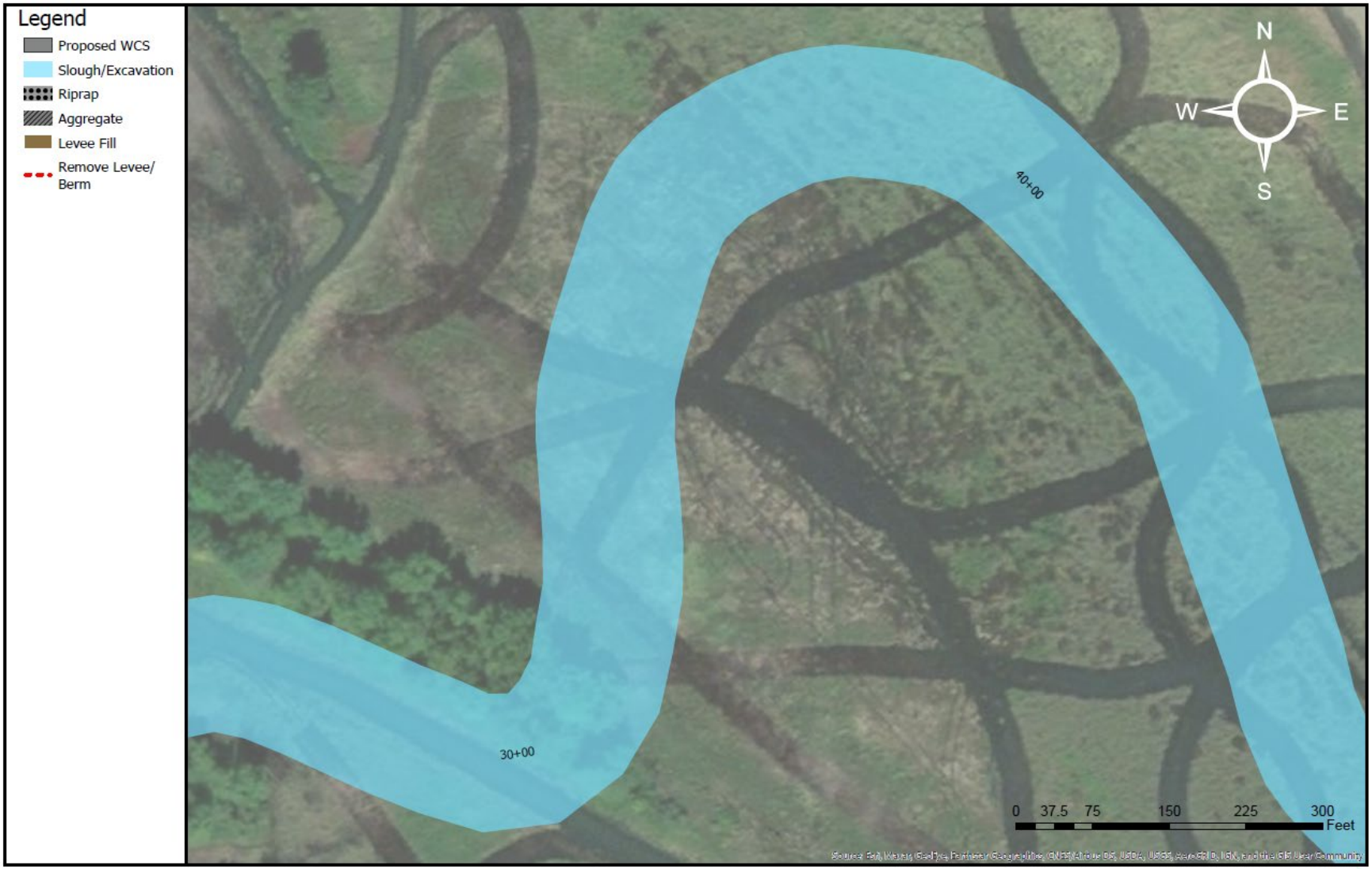
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
Construct 96" RCPs
N
W
E
S
20+00
0
37.5
75
150
225
300
Feet

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
20+00
30+00
0 37.5 75 150 225 300
Feet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Slough/Excavation
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Aggregate
Levee Fill
Remove Levee/ Berm
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S
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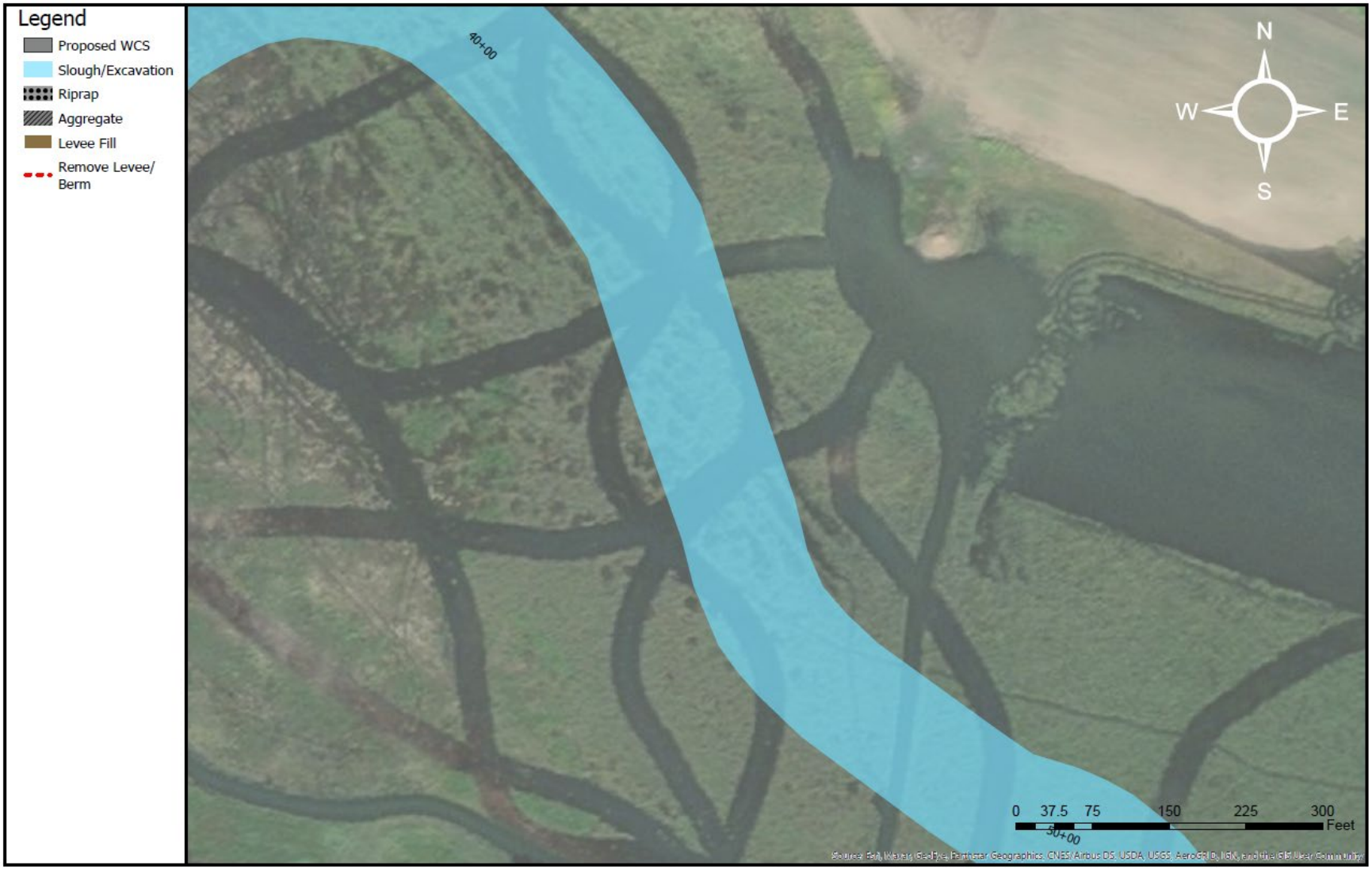
30+00
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
40+00
30+00
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W
E
S
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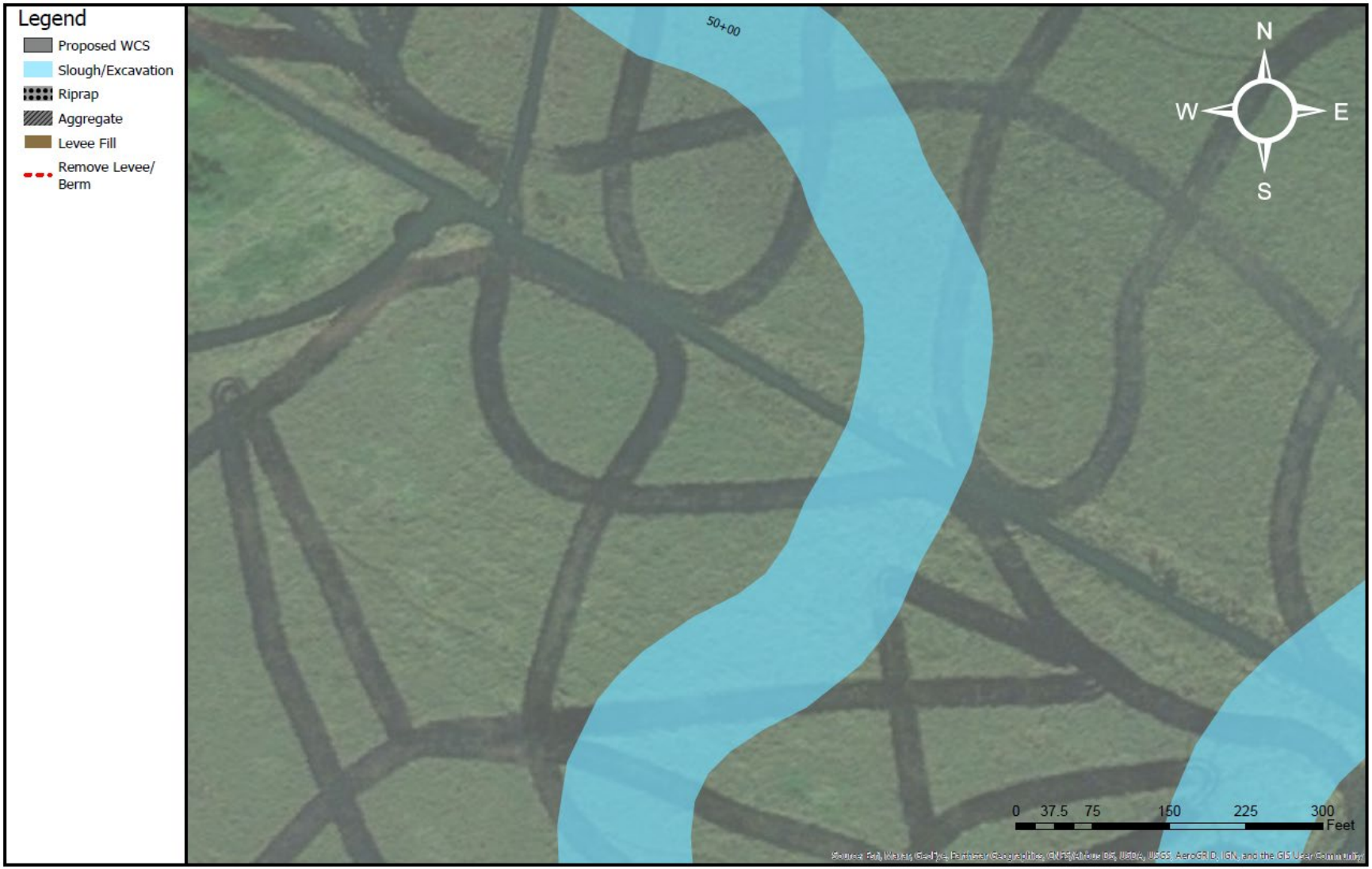
Feet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Slough/Excavation
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Levee Fill
Remove Levee/ Berm
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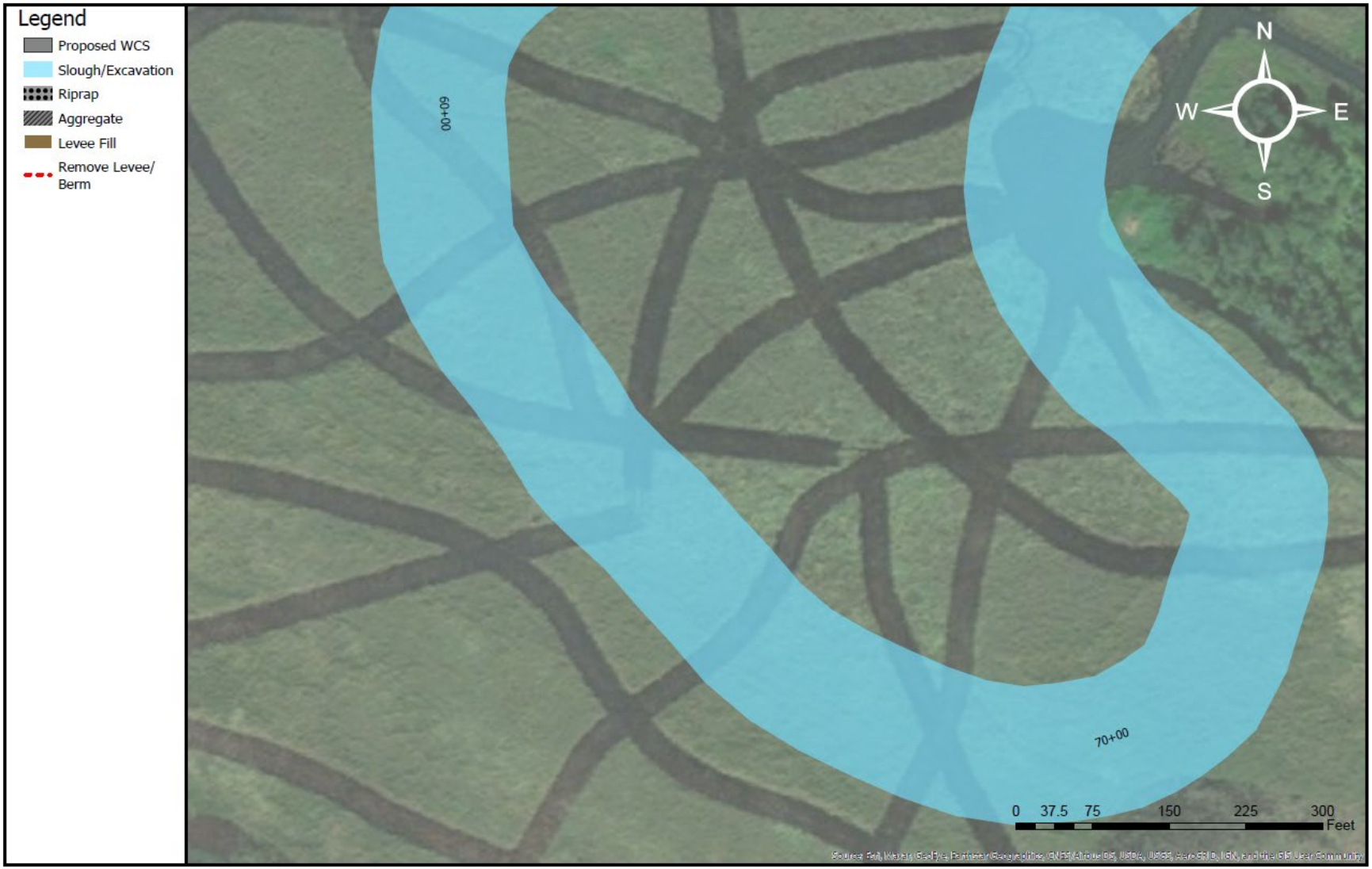
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
60+00
70+00
N
W
E
S
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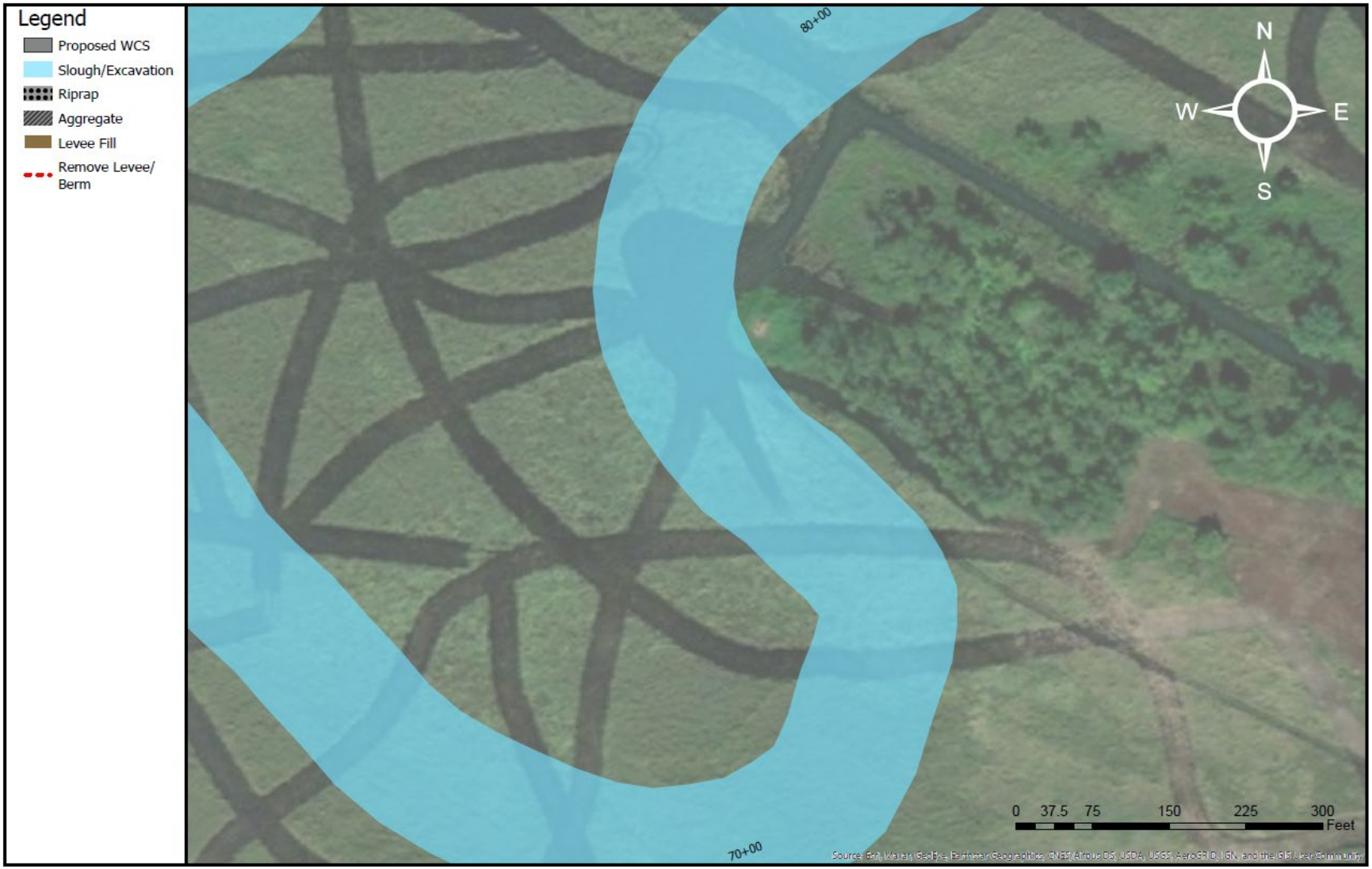
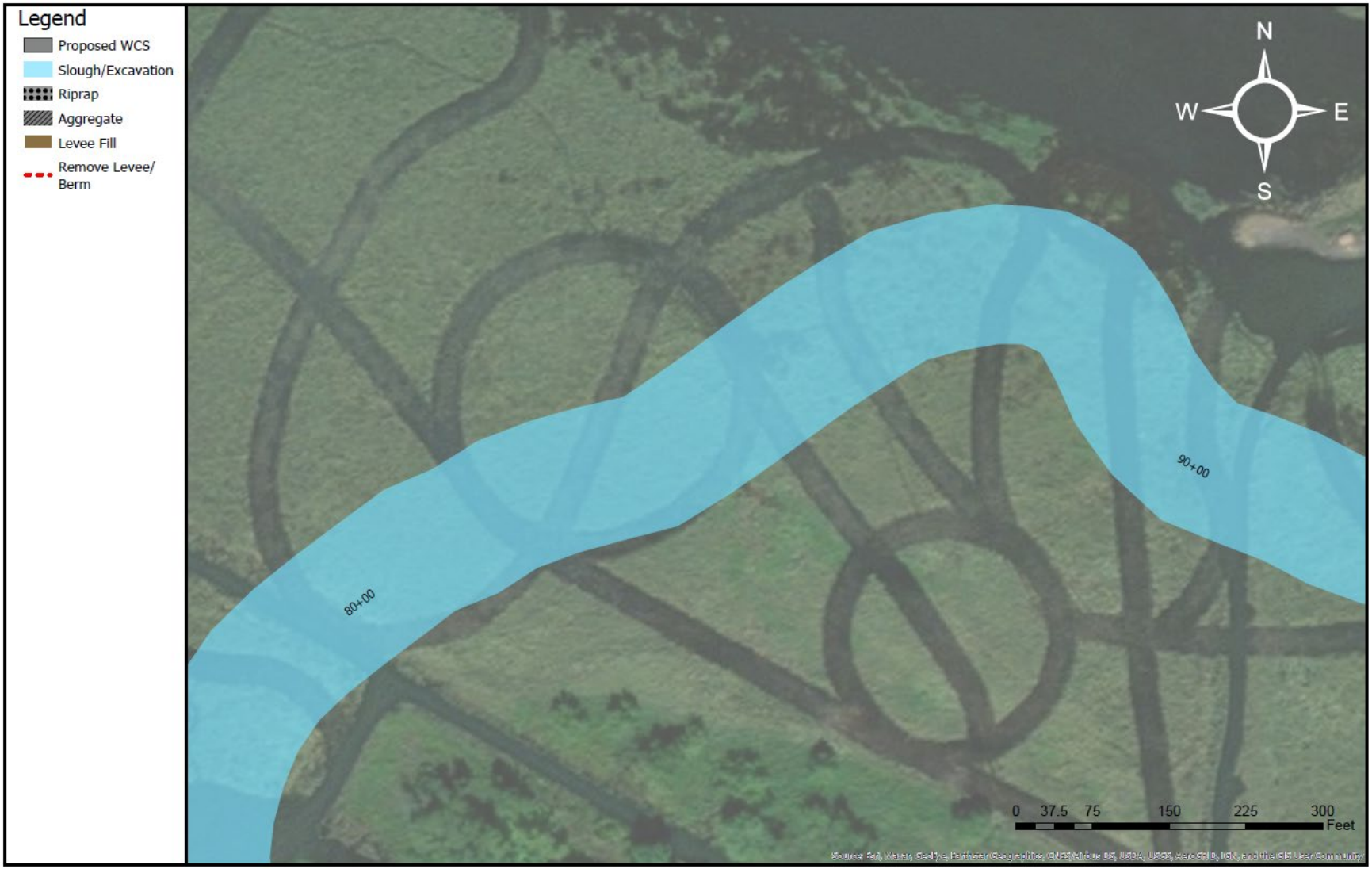
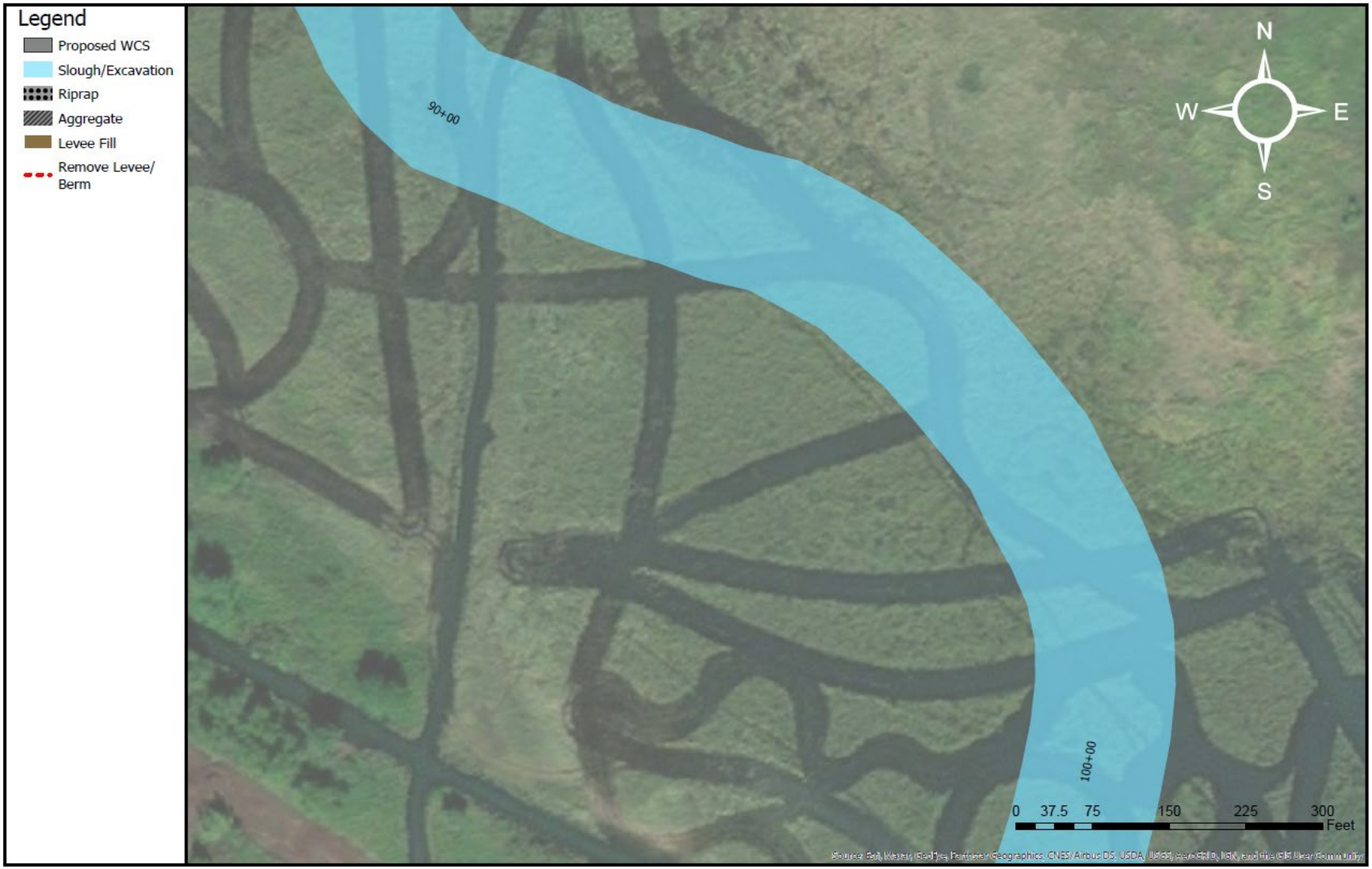
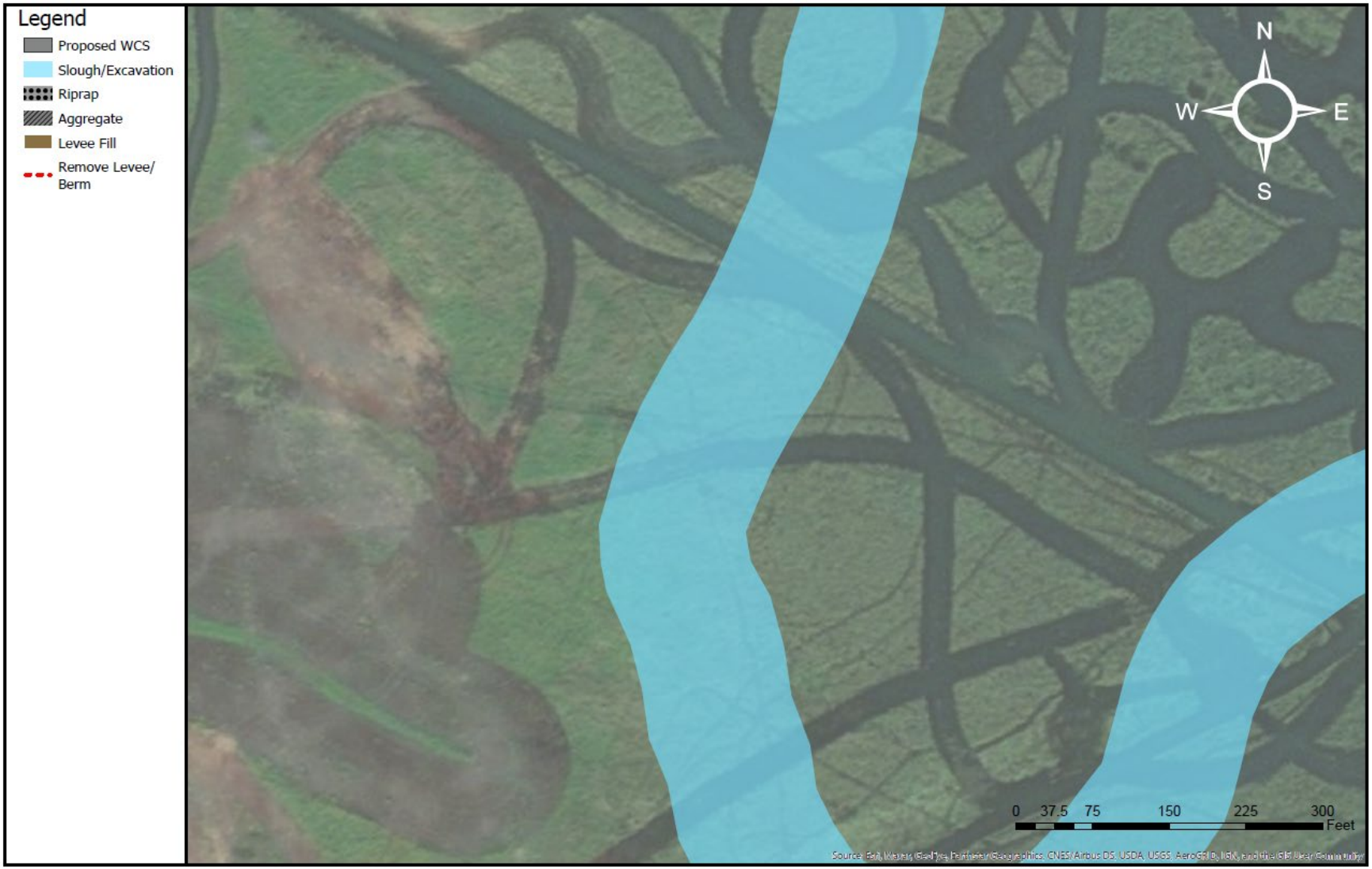
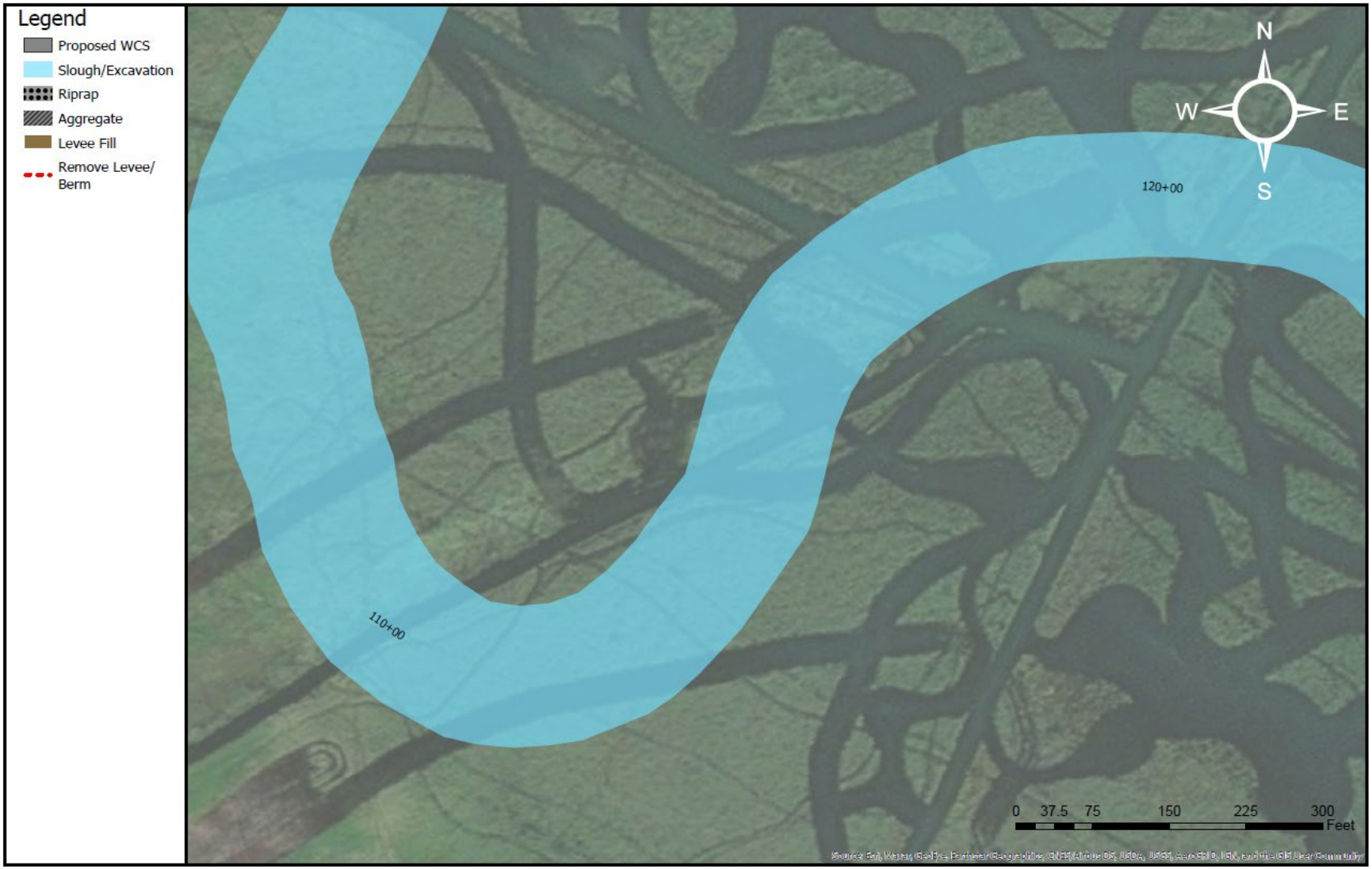
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
80+00
70+00
N
W
E
S
0 37.5 75 150 225 300
Feet

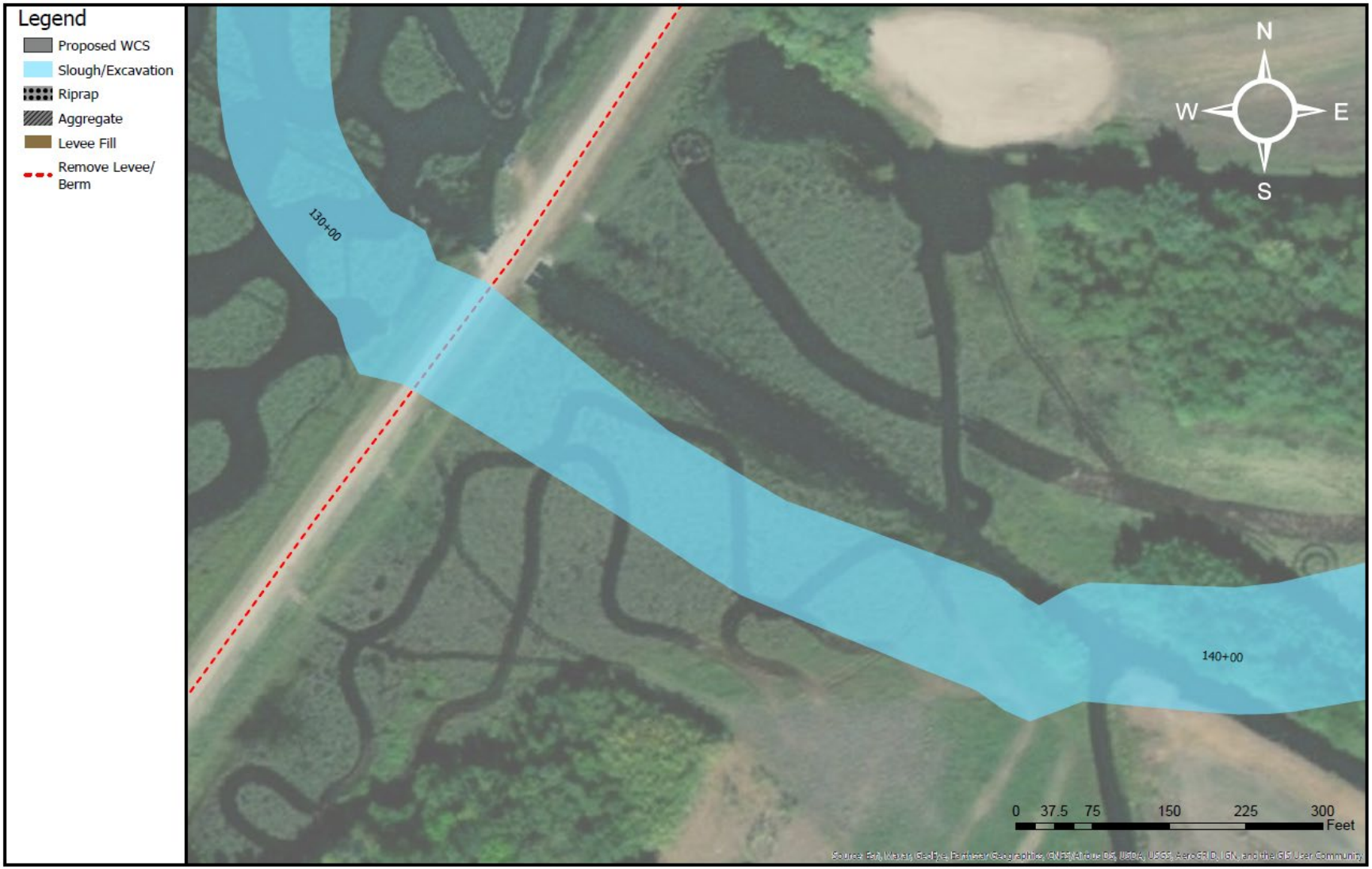

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
80+00
90+00
0 37.5 75 150 225 300
Feet

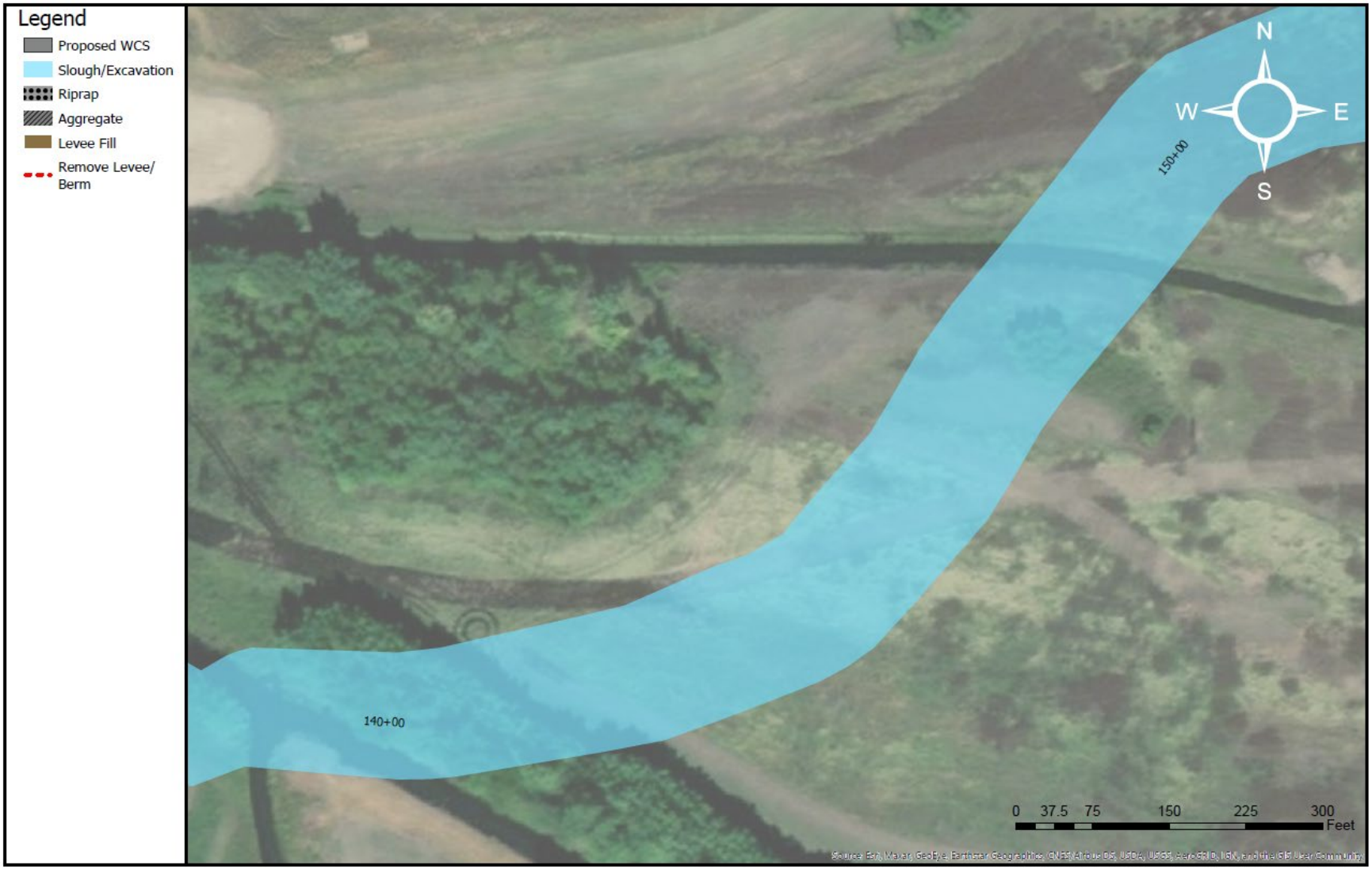

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
90+00
100+00
N
W
E
S
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
0 37.5 75 150 225 300
Feet

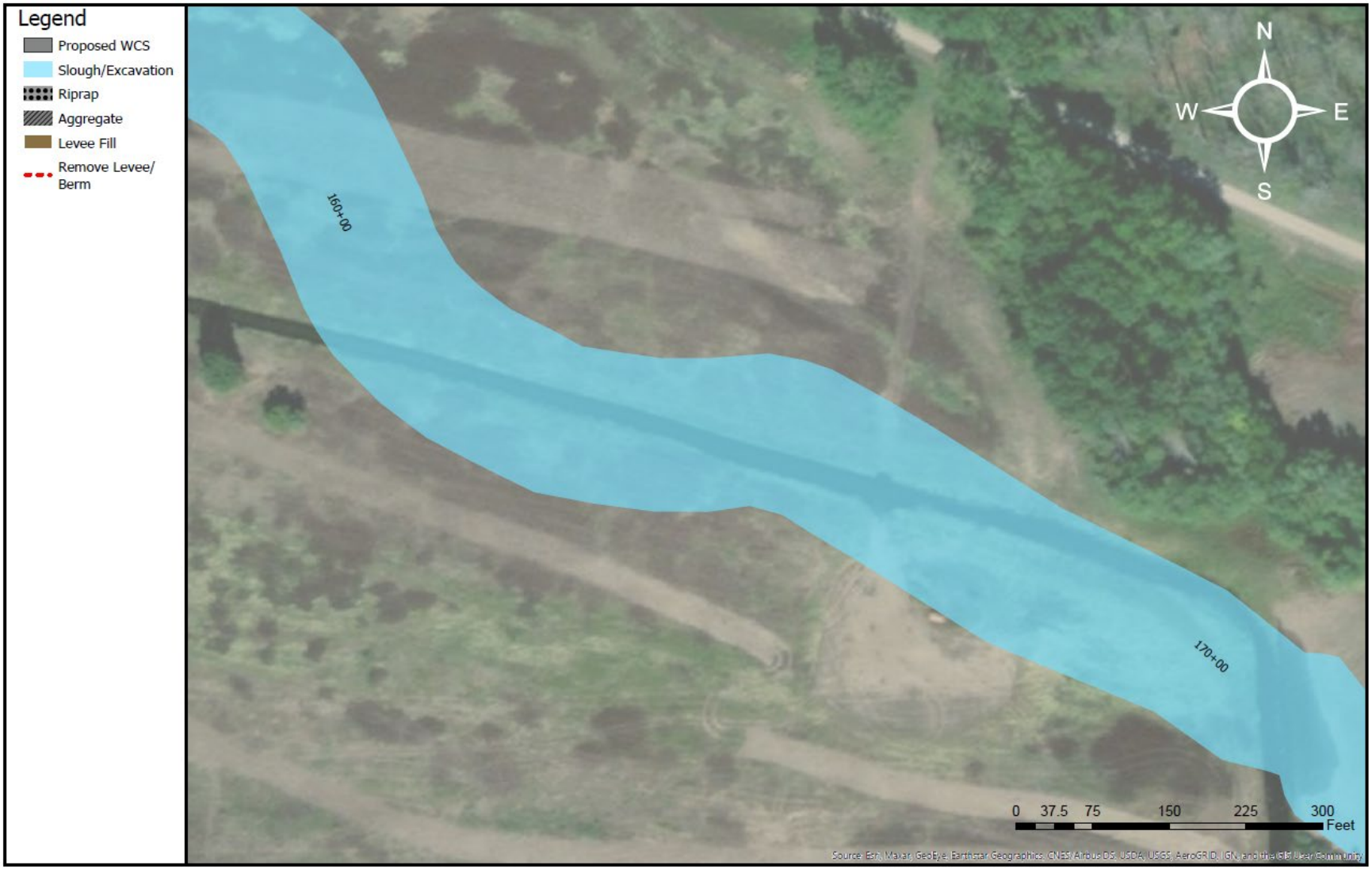

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
120+00
110+00
0 37.5 75 150 225 300
Feet

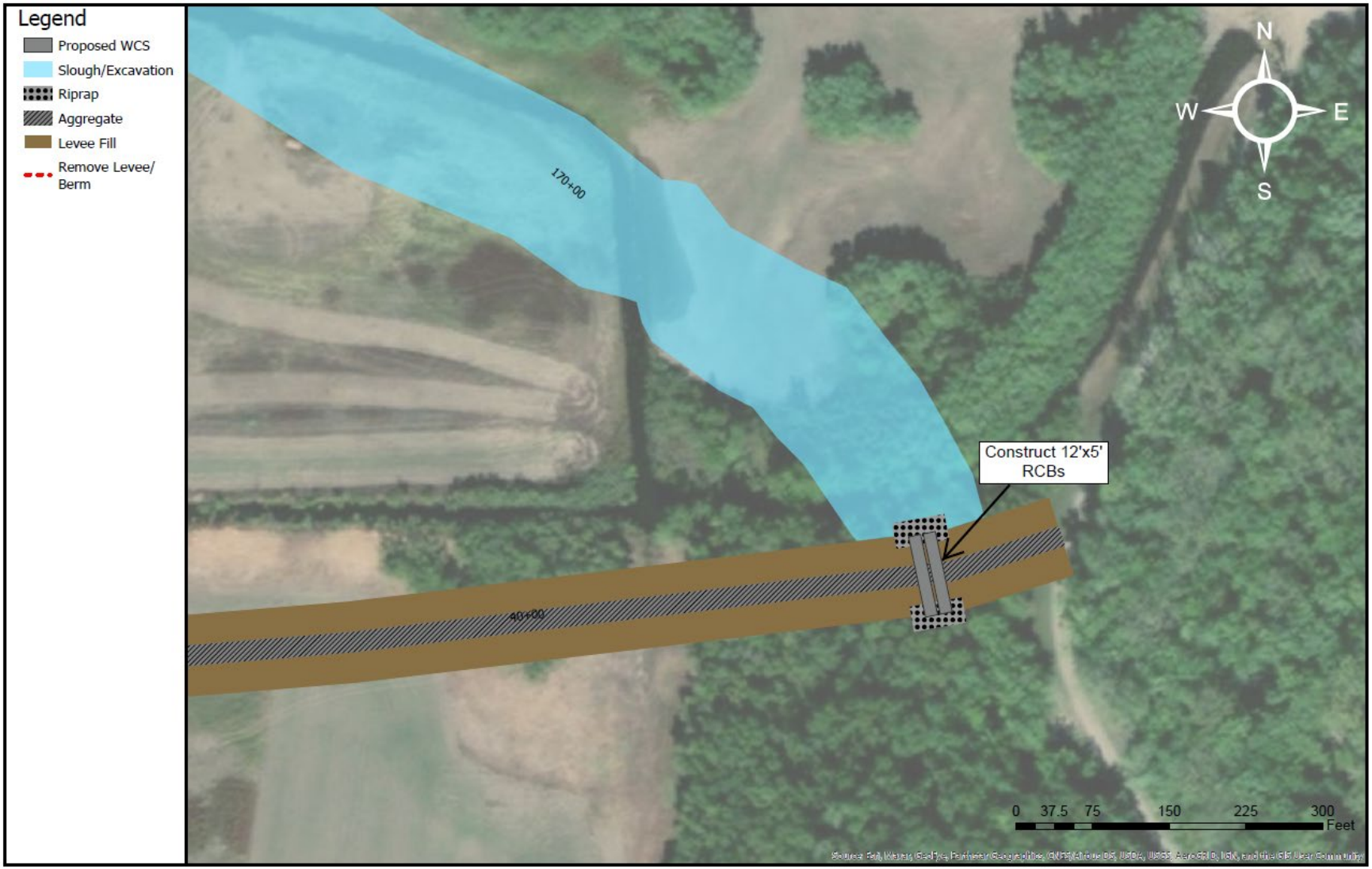
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
120+00
130+00
N
W
E
S
0 37.5 75 150 225 300
Feet

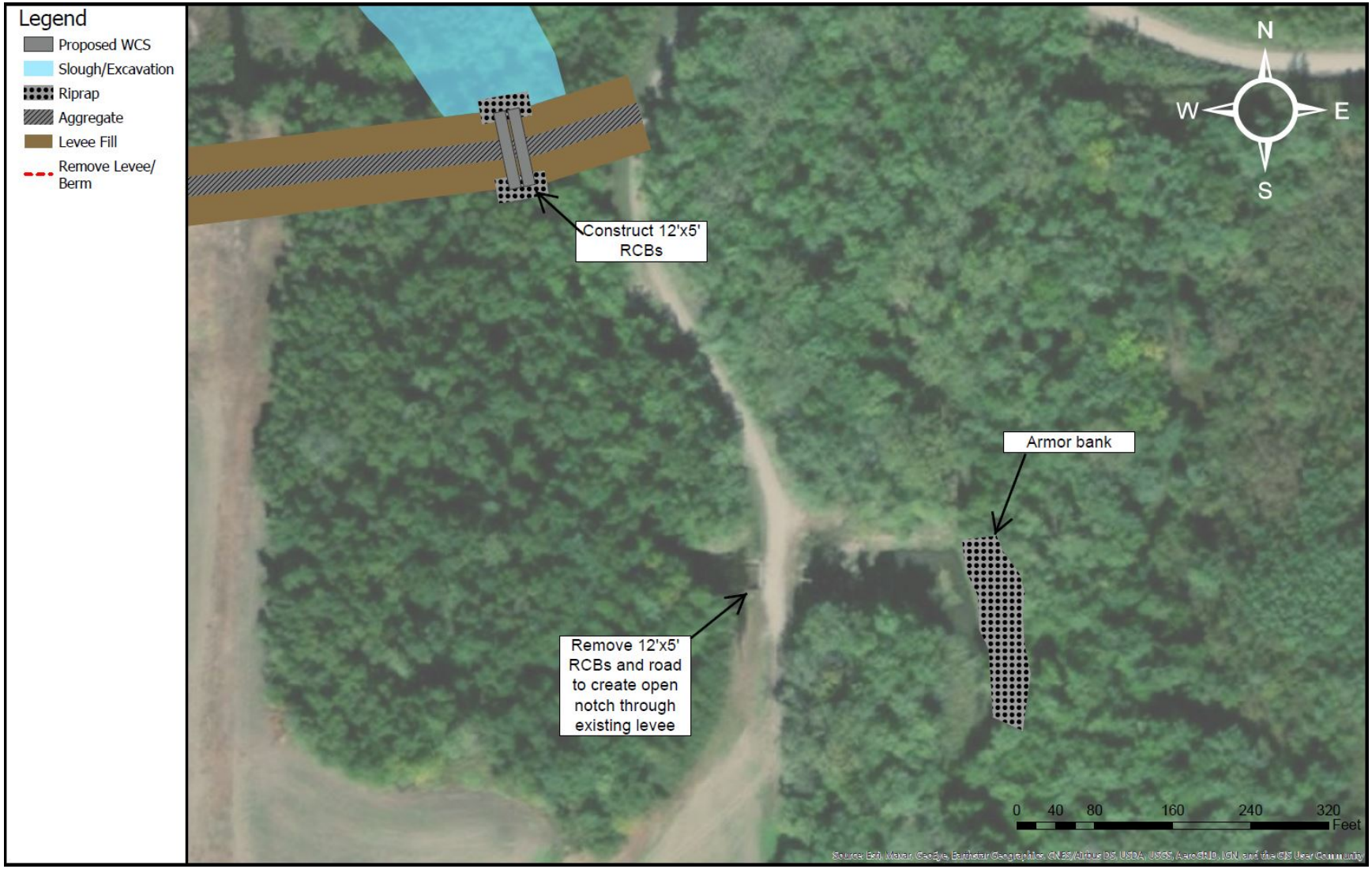

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
130+00
140+00
0 37.5 75 150 225 300
Feet

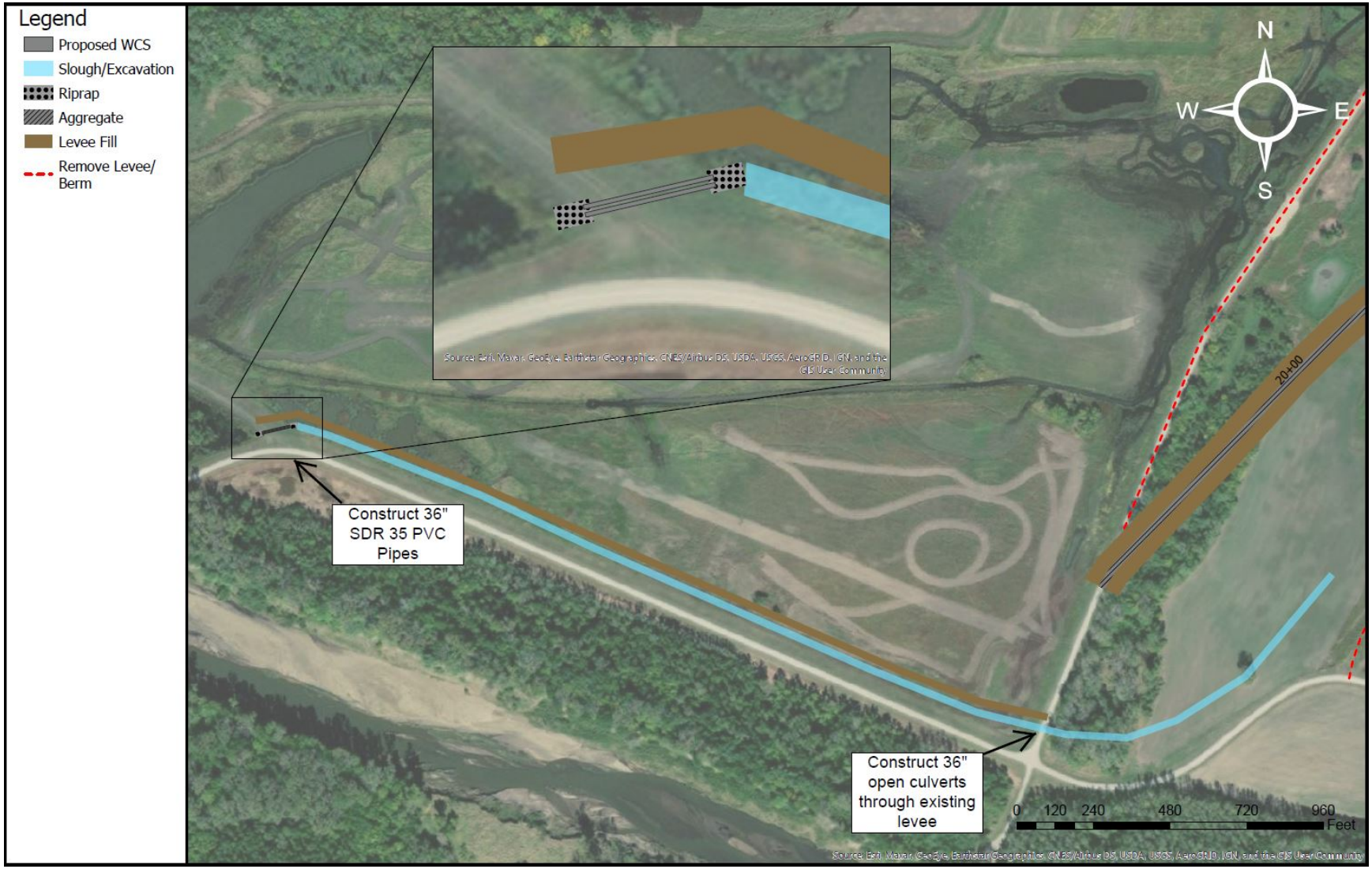

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
150+00
140+00
0 37.5 75 150 225 300
Feet

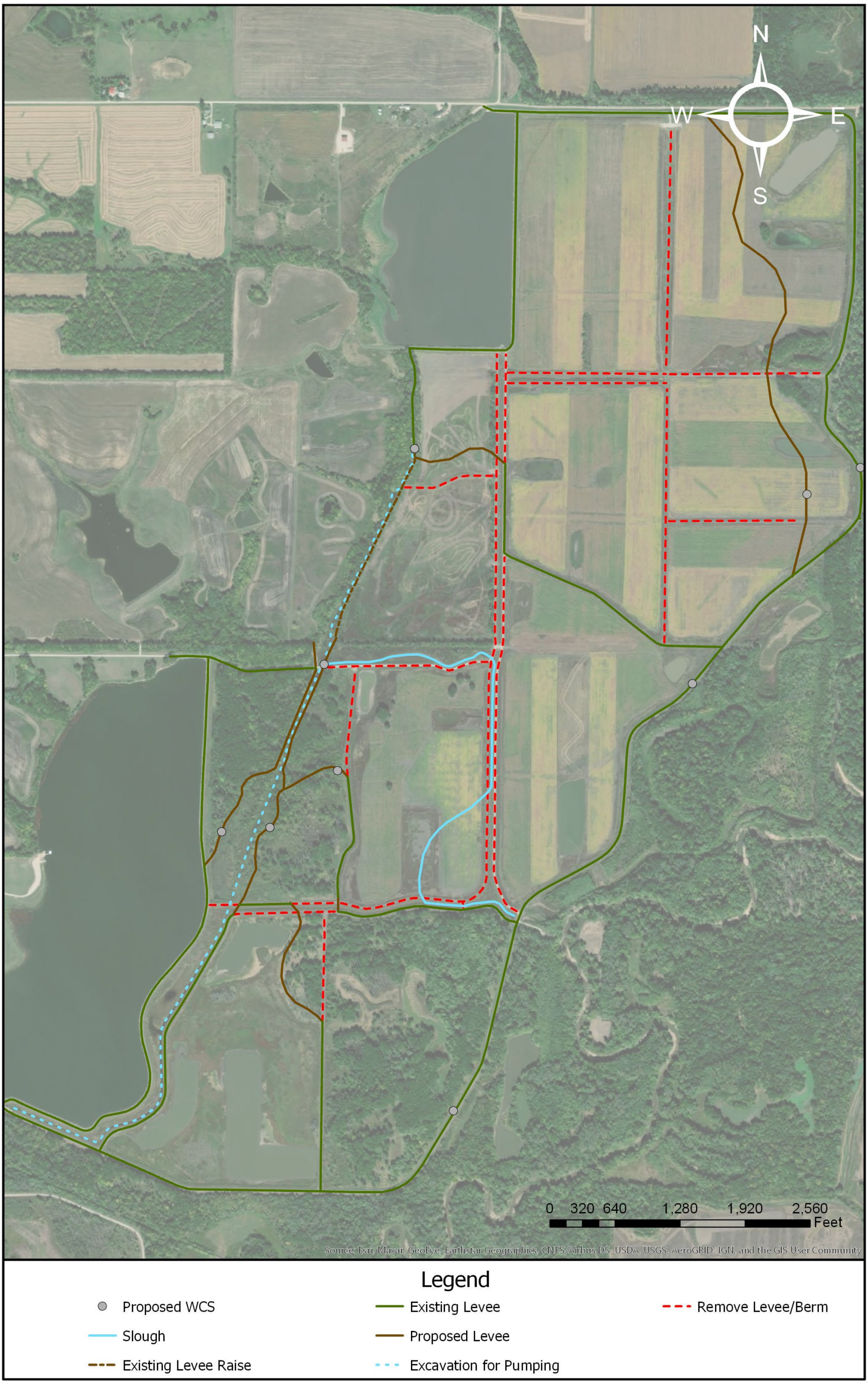
Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
150+00
160+00
0 37.5 75 150 225 300
Feet

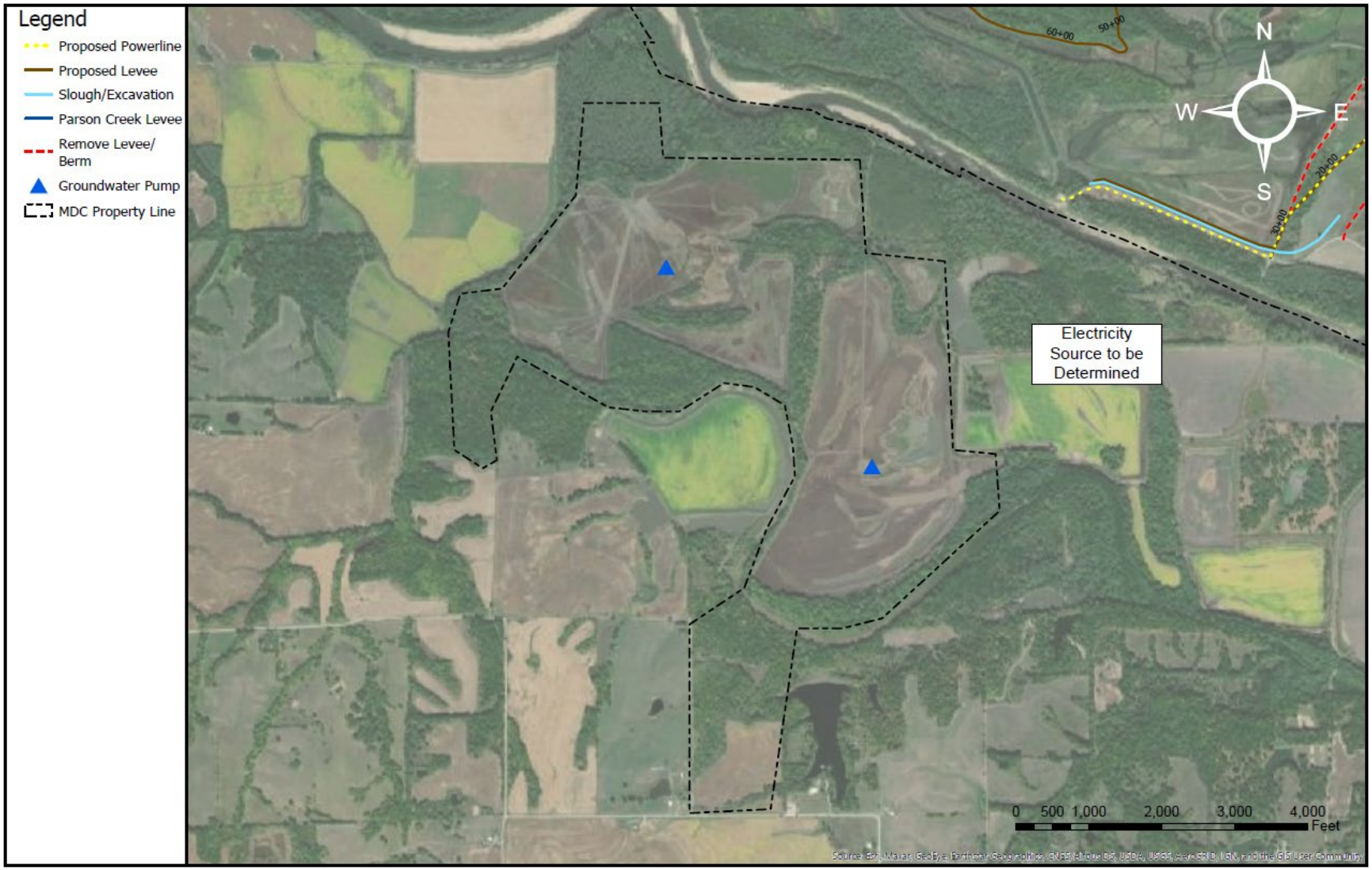

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
160+00
170+00
0 37.5 75 150 225 300
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
170+00
40+00
Construct 12'x5' RCBs
N
W
E
S
0 37.5 75 150 225 300
Feet

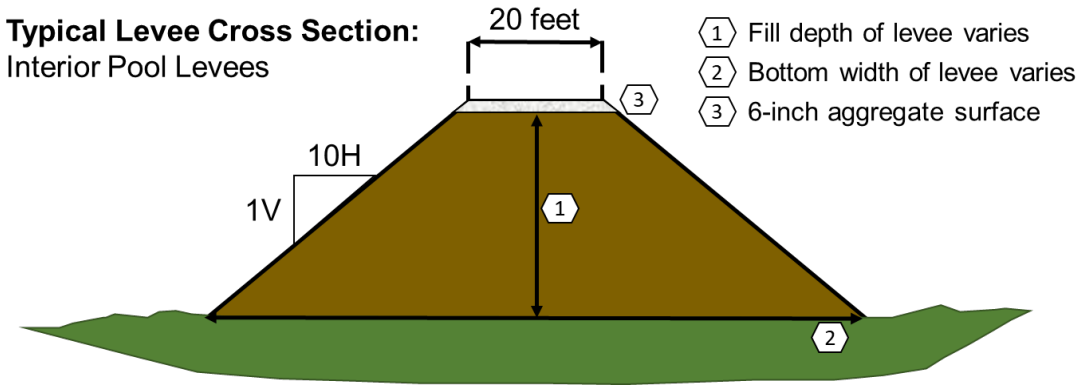

Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
Construct 12'x5' RCBs
Armor bank
Remove 12'x5' RCBs and road to create open notch through existing levee
0 40 80 160 240 320
Feet


Legend
Proposed WCS
Slough/Excavation
Riprap
Aggregate
Levee Fill
Remove Levee/ Berm
N
W
E
S
20+00
Construct 36" SDR 35 PVC Pipes
Construct 36" open culverts through existing levee
0 120 240 480 720 960
Feet

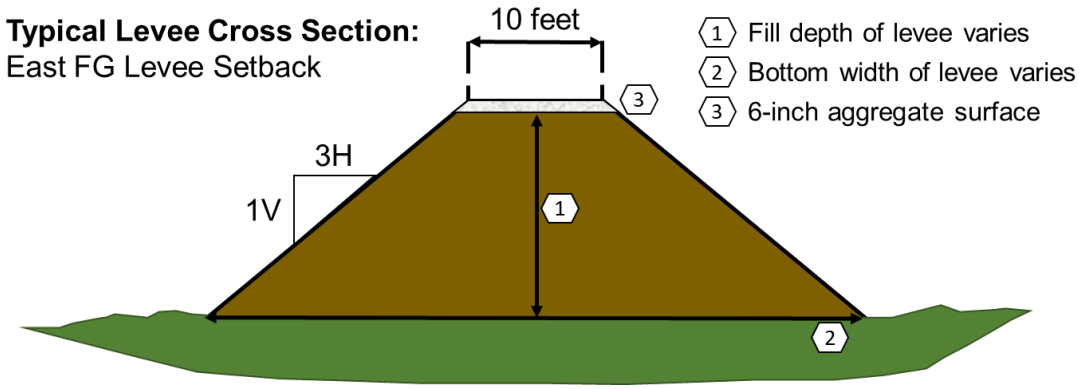

N
W
E
S
0 320 640 1,280 1,920 2,560
Feet
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Proposed WCS
Slough
Existing Levee Raise
Existing Levee
Proposed Levee
Excavation for Pumping
Remove Levee/Berm


Legend
Proposed Powerline
Proposed Levee
Slough/Excavation
Parson Creek Levee
Remove Levee/ Berm
Groundwater Pump
MDC Property Line
N
W
E
S
60+00
50+00
30+00
20+00
Electricity Source to be Determined
0 500 1,000 2,000 3,000 4,000
Feet

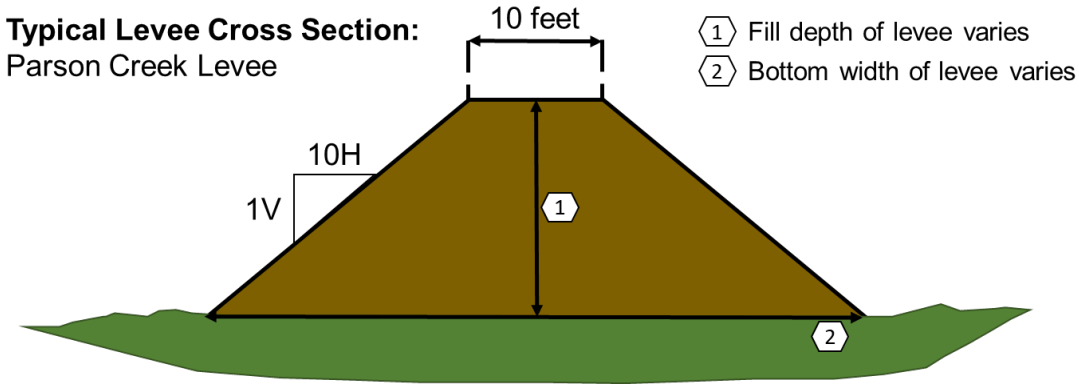
1.1 Interior Pool Levee Construction (Measures B and G)



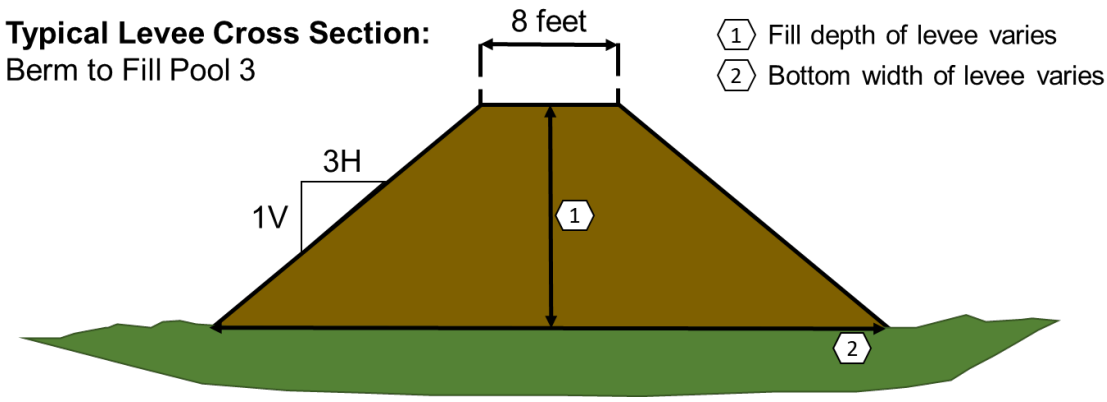
1.2 East Fountain Grove Levee Setback (Measure C)



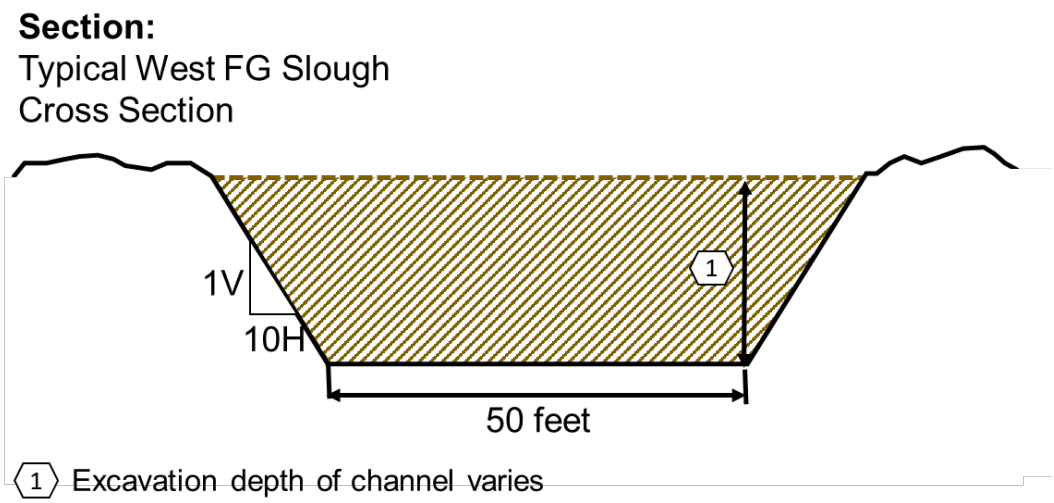
1.3 Parson Creek Levee (Measure P)



1.4 Berm for Filling Pool 3 (Measure B)

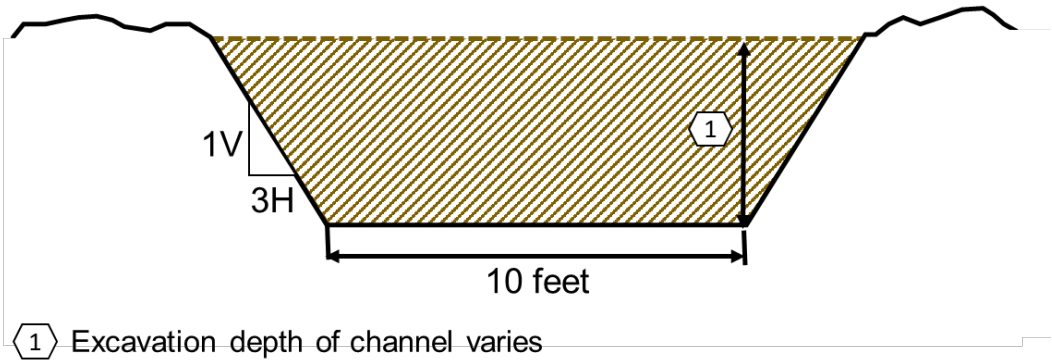


1.5 West Fountain Grove Sloughs (Measure R and S)



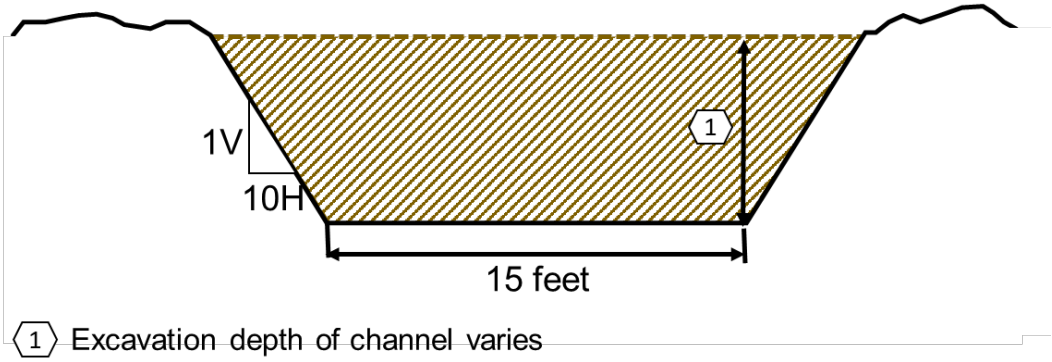
1.6 East Fountain Grove Excavation – Pumping (Measure G)

Section:
Typical East FG Excavation
for Pumping Cross Section



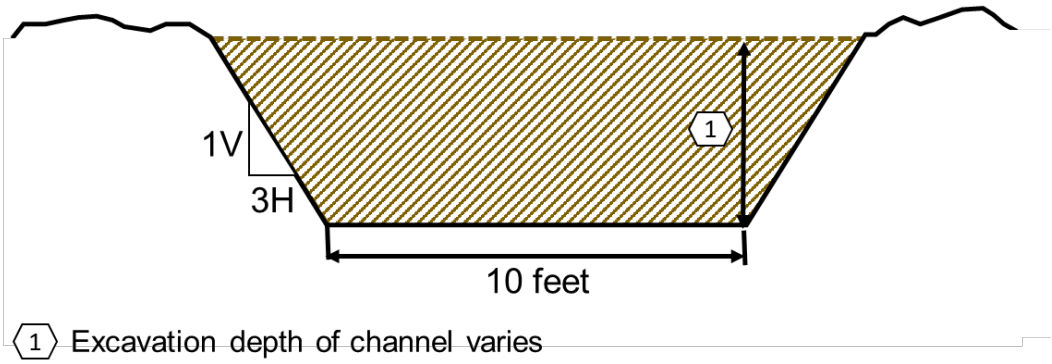
1.7 East Fountain Grove Slough (Measure G)

Section:
Typical East FG Slough
Cross Section



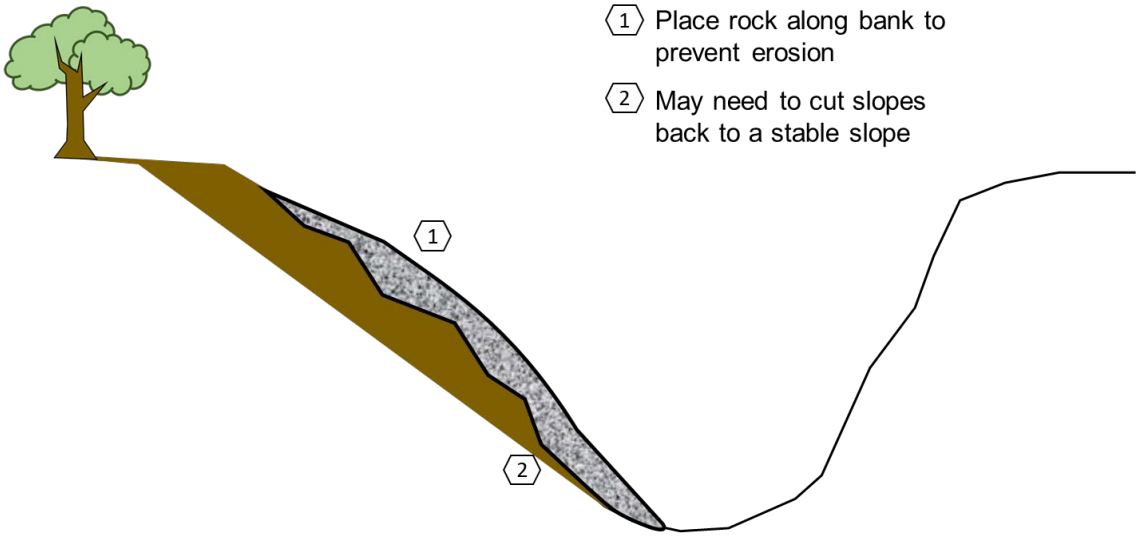
1.8 Channel Excavation Required to Fill Pool 3 (Measure B)

Section:
Typical Excavation to Fill
Pool 3 Cross Section



1.9 JACKSON'S DITCH BANK ARMORING (MEASURE A2)

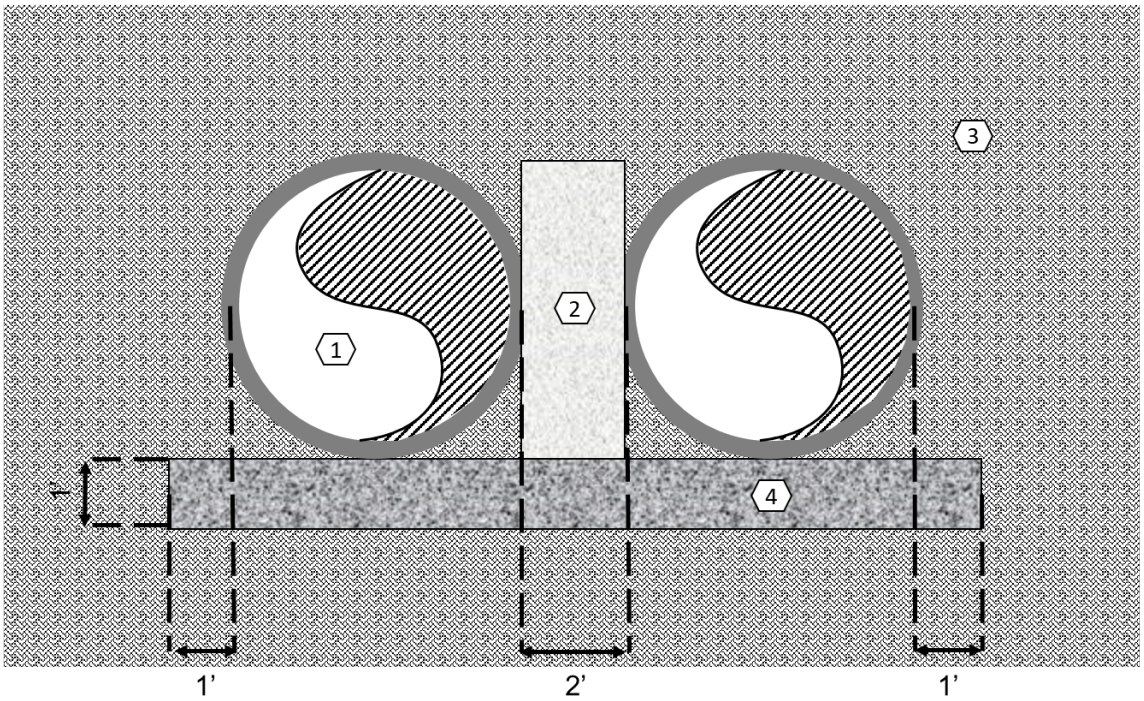
Section:
Jackson's Ditch Bank Armoring



1.10 TYPICAL WATER CONTROL STRUCTURE (MEASURE A2, A3, B, G, and P)

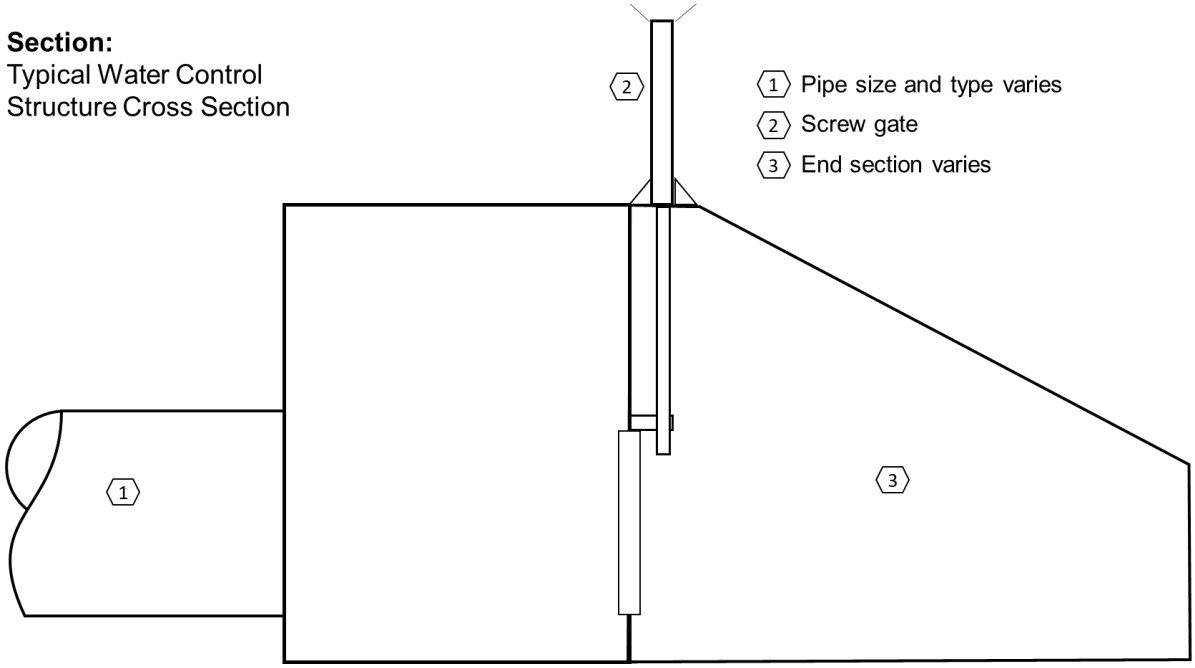
Section:
Typical Water Control
Structure Cross Section

1 Pipe size and type varies
2 Flowable fill
3 Compacted structural fill
4 Base Rock

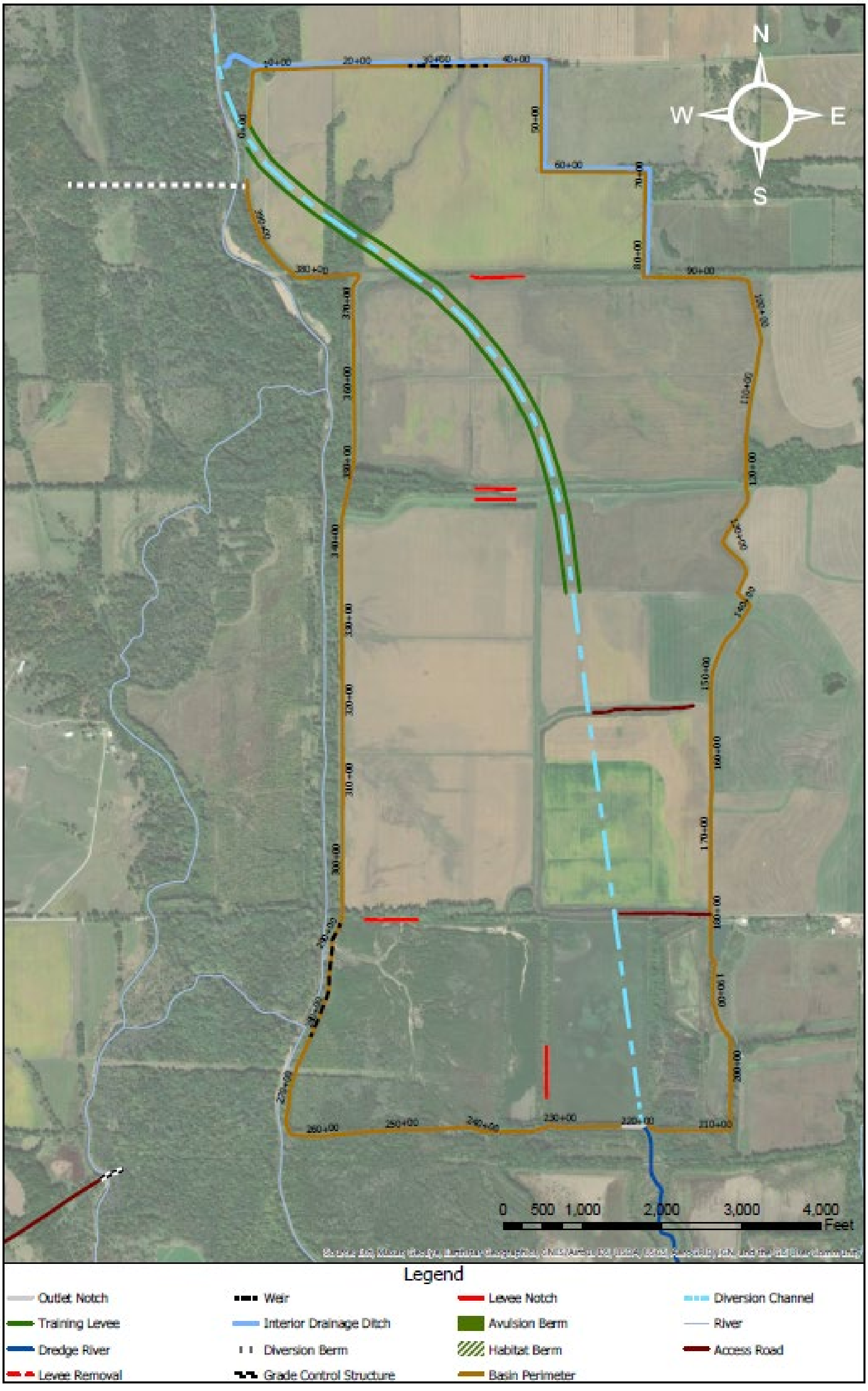


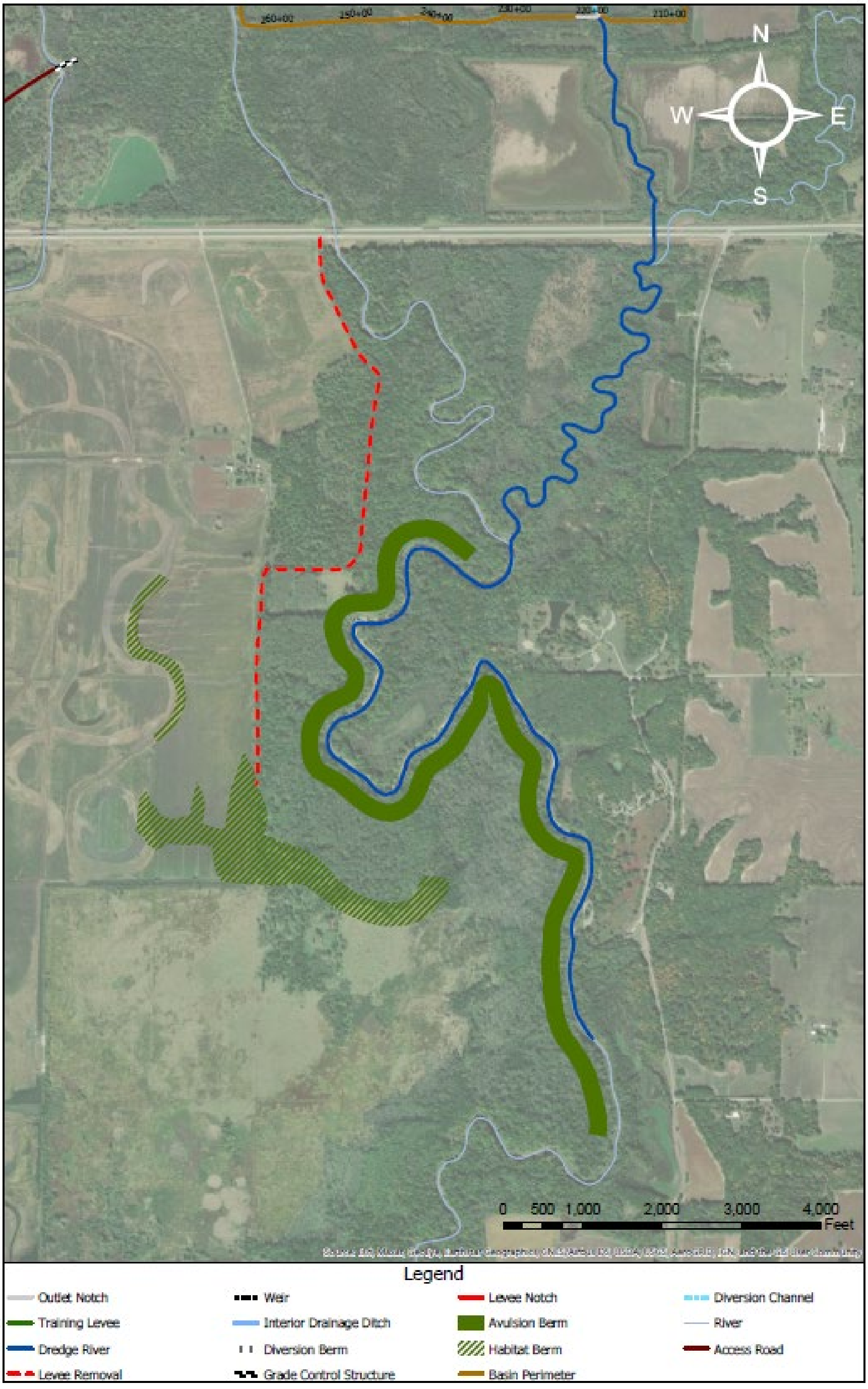
Section:
Typical Water Control
Structure Cross Section

1 Pipe size and type varies
2 Screw gate
3 End section varies

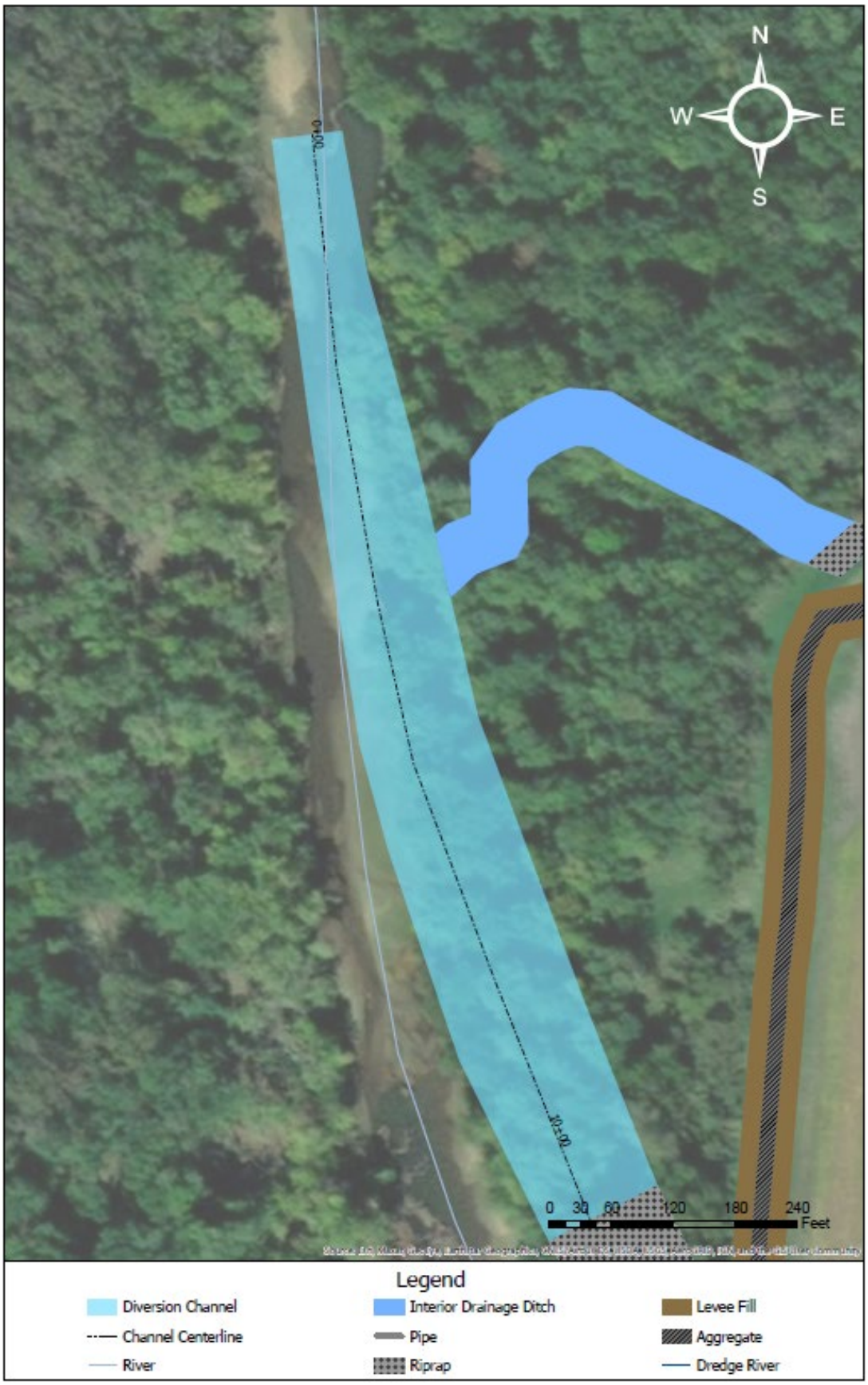


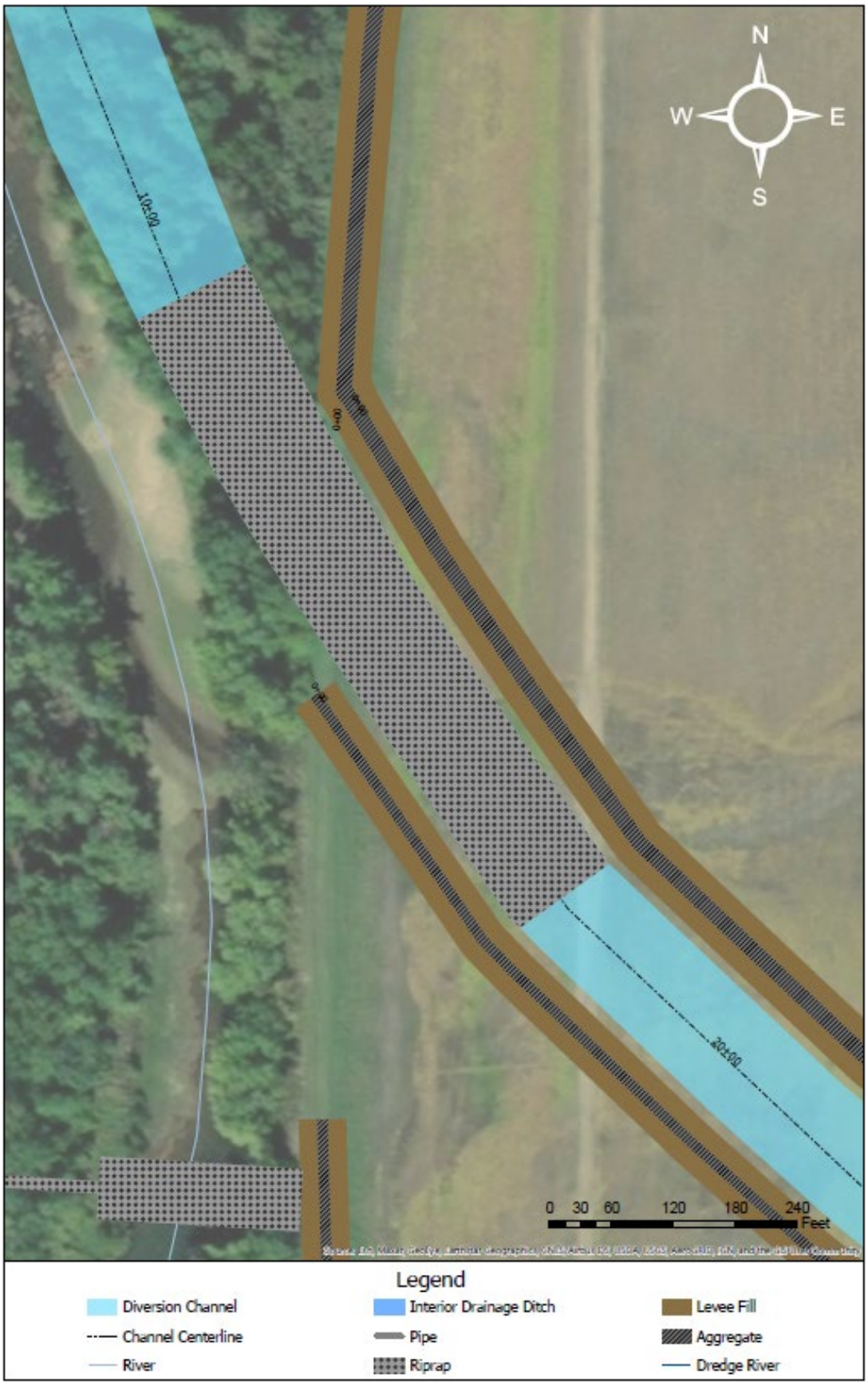
M.2. LOCUST CREEK PLATES


N
W
E
S
0 500 1,000 2,000 3,000 4,000
Feet
Legend
Outlet Notch
Weir
Levee Notch
Diversion Channel
Training Levee
Interior Drainage Ditch
Avulsion Berm
River
Dredge River
Diversion Berm
Habitat Berm
Access Road
Levee Removal
Grade Control Structure
Basin Perimeter


N
W
E
S
0 500 1,000 2,000 3,000 4,000
Feet
Legend
Outlet Notch
Weir
Levee Notch
Diversion Channel
Training Levee
Interior Drainage Ditch
Avulsion Berm
River
Dredge River
Diversion Berm
Habitat Berm
Access Road
Levee Removal
Grade Control Structure
Basin Perimeter

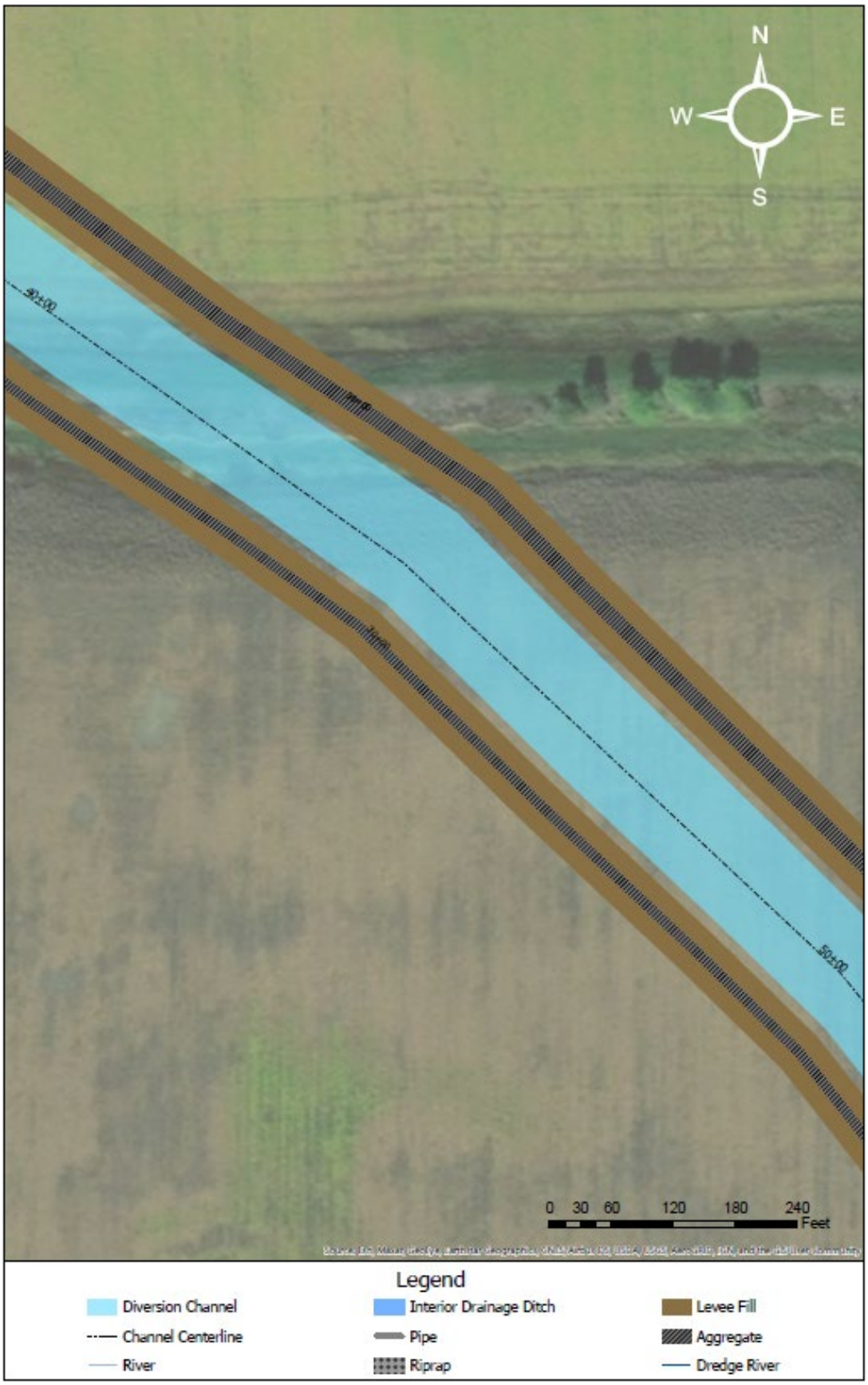
Legend
Riprap
Aggregate
Levee Fill
River
N
W
E
S
0 75 150 300 450 600
Feet


N
W
E
S
0+00
10+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River


N
W
E
S
10+00
0+00
20+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River


N
W
E
S
30+00
40+00
50+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
50+00
60+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
60+00
65+00
70+00
75+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
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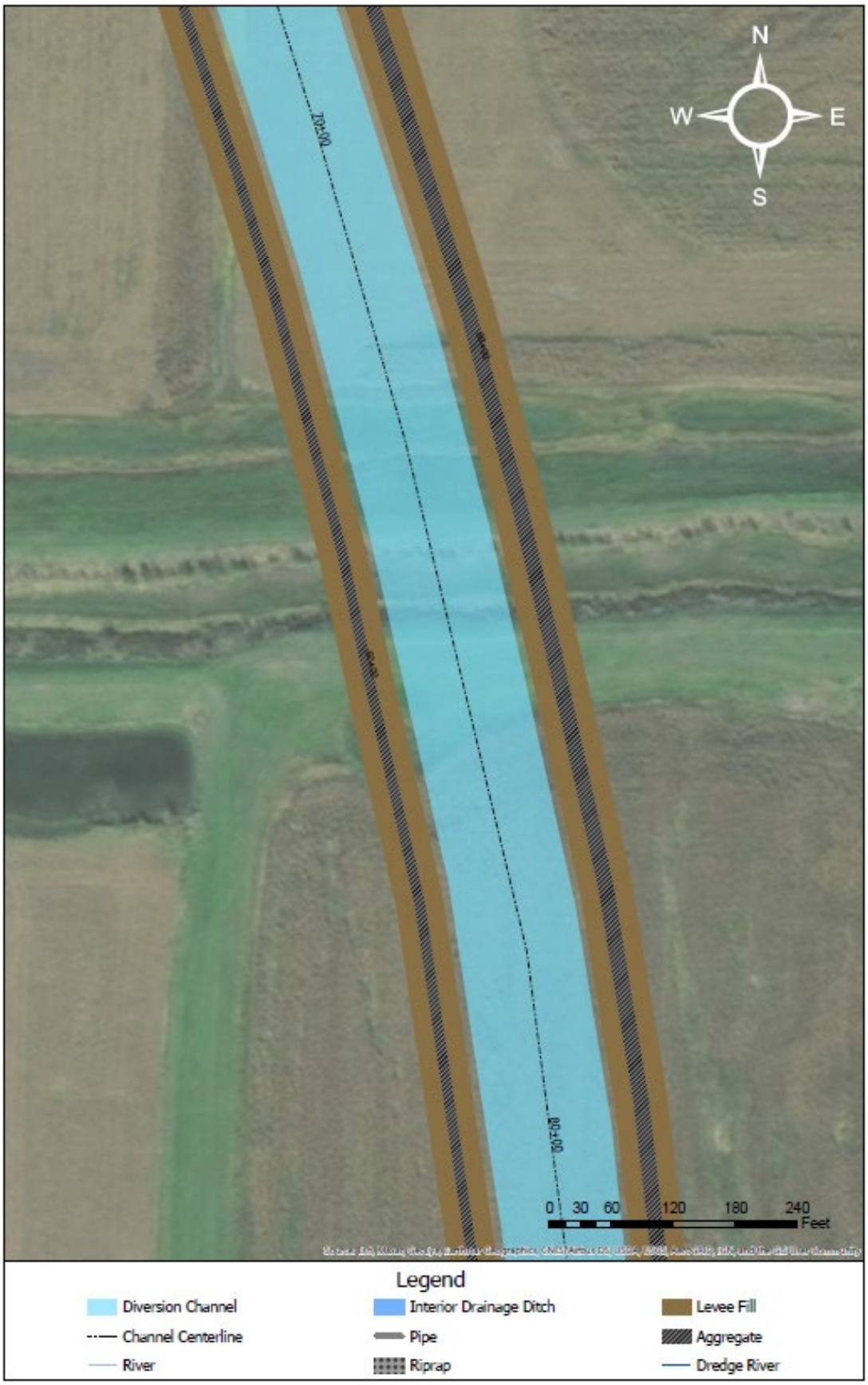
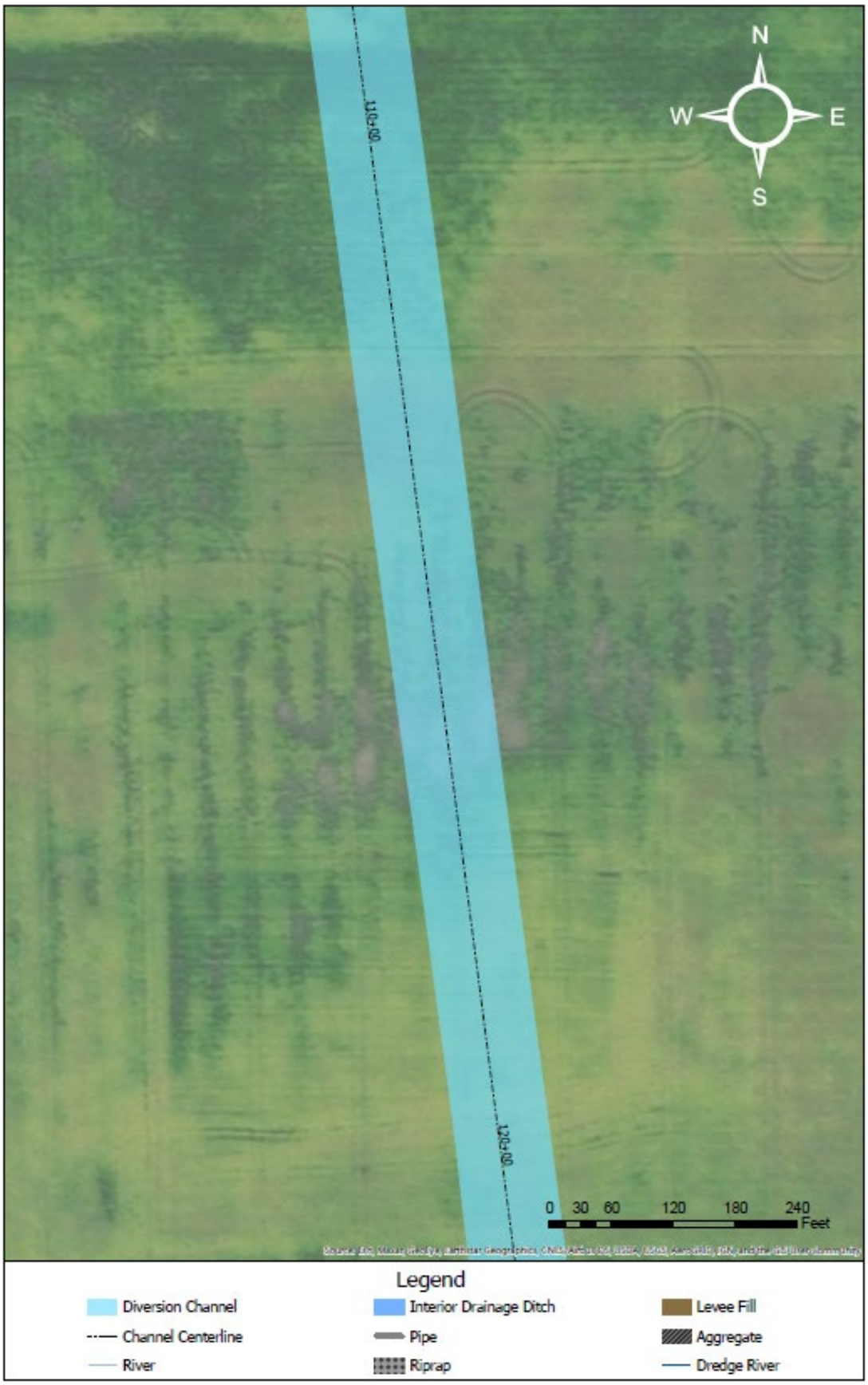
Pipe
Aggregate
River
Riprap
Dredge River

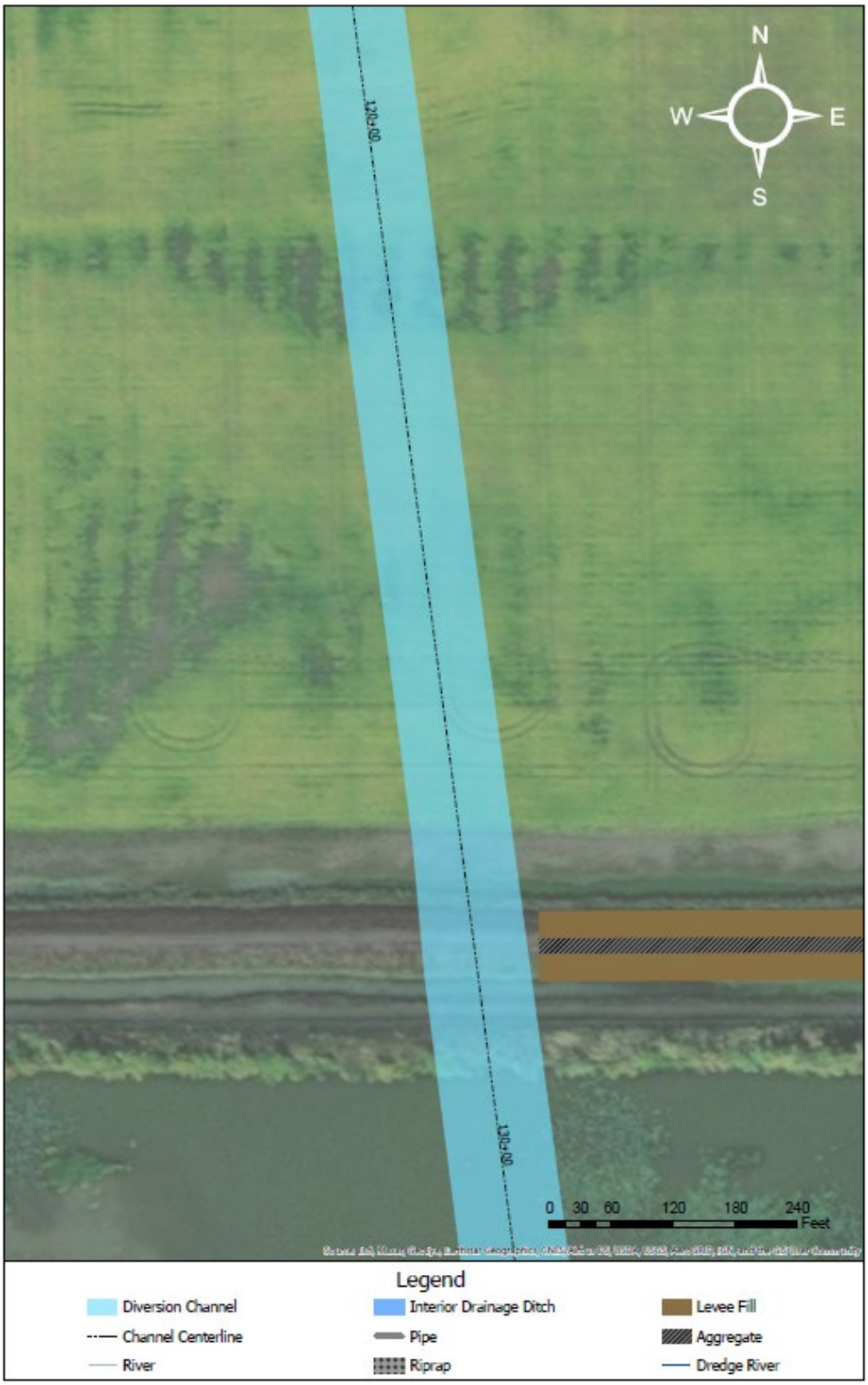

N
W
E
S
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

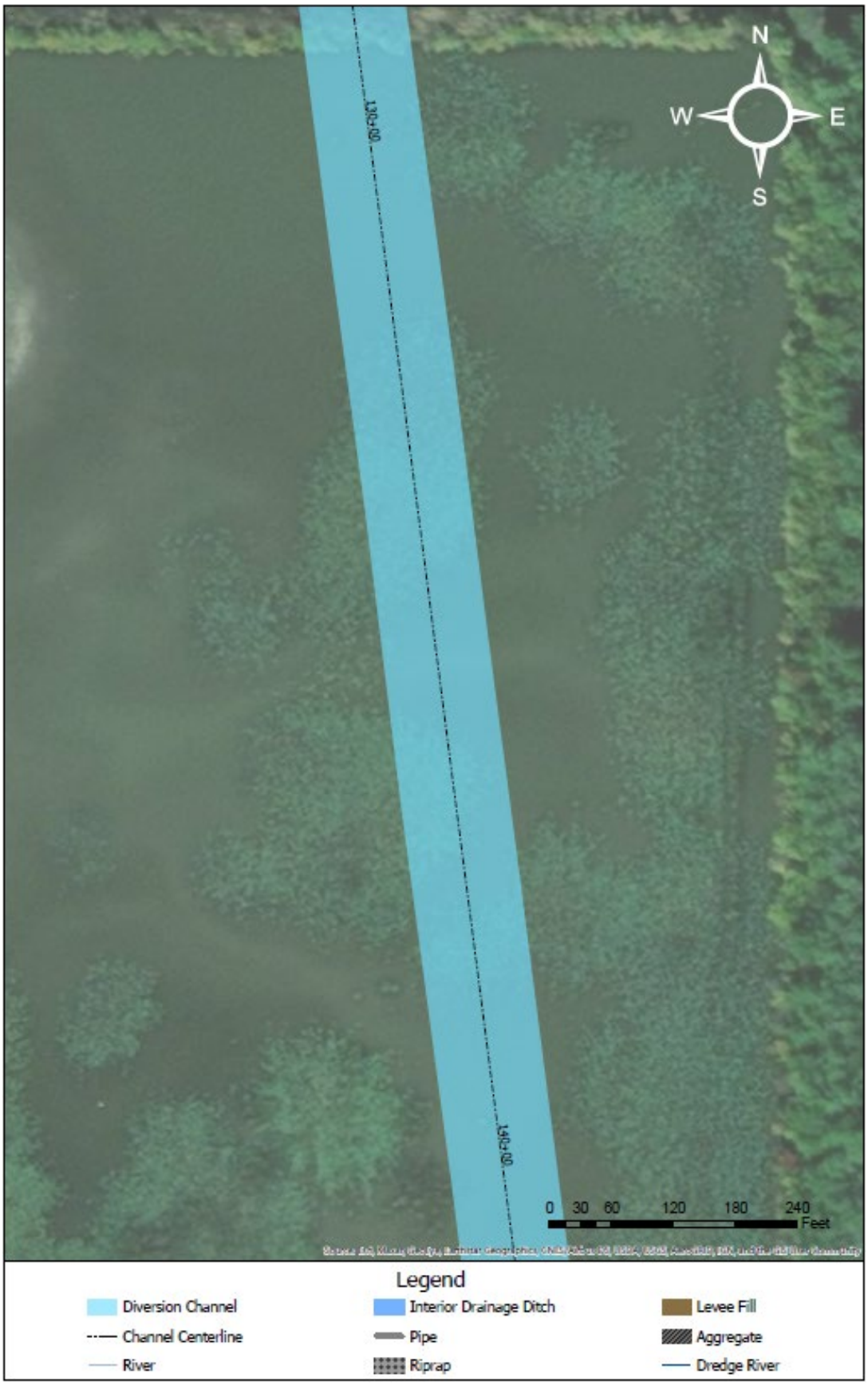
N
W
E
S
80+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
90+00
100+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
100+00
110+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

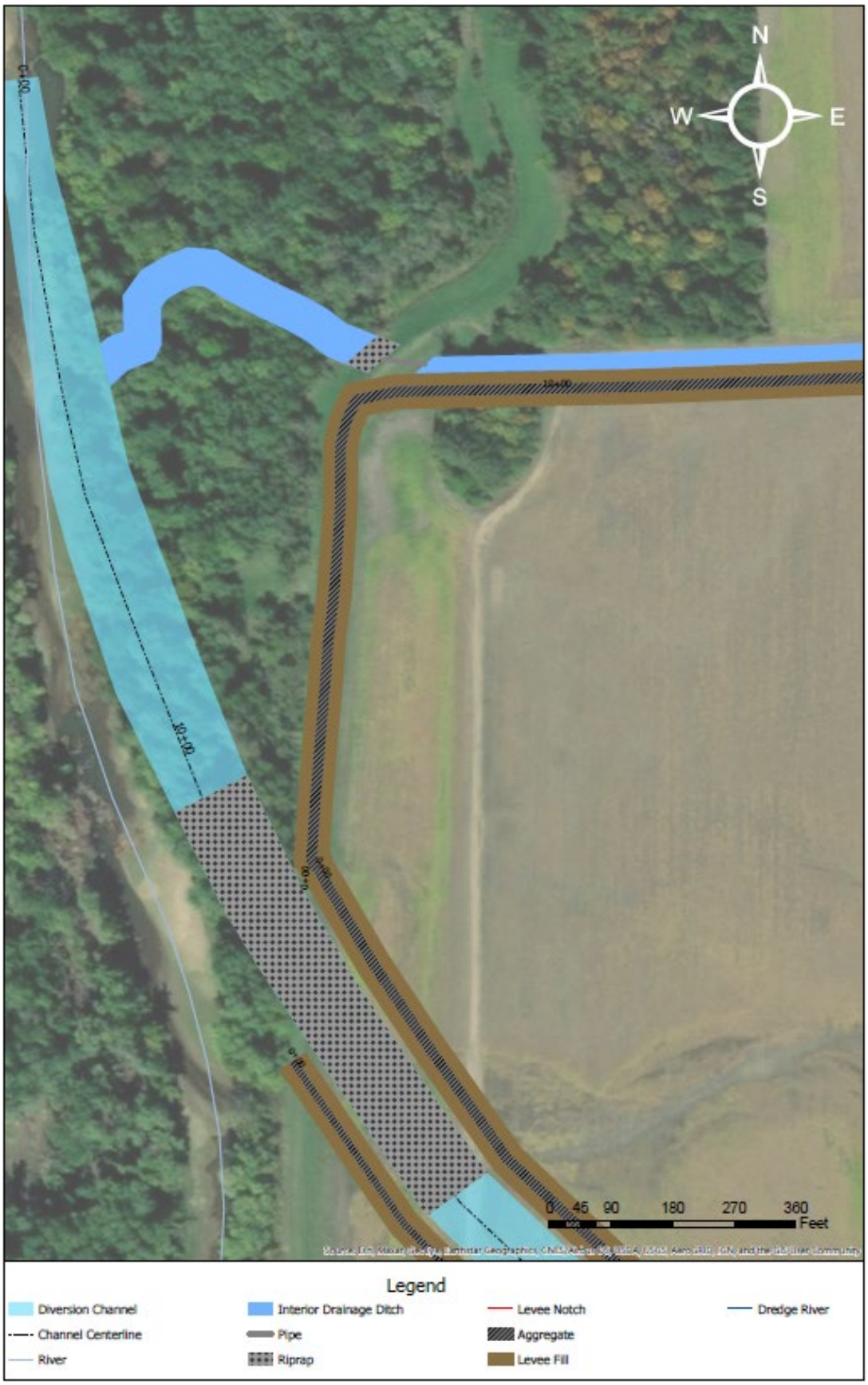

N
W
E
S
110+00
120+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River


N
W
E
S
126+00
136+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River


N
W
E
S
130+00
140+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
140+00
150+00
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River

N
W
E
S
150.00
Outlet Notch
0 30 60 120 180 240
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Fill
Channel Centerline
Pipe
Aggregate
River
Riprap
Dredge River


N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
North Spillway
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
North Spillway
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

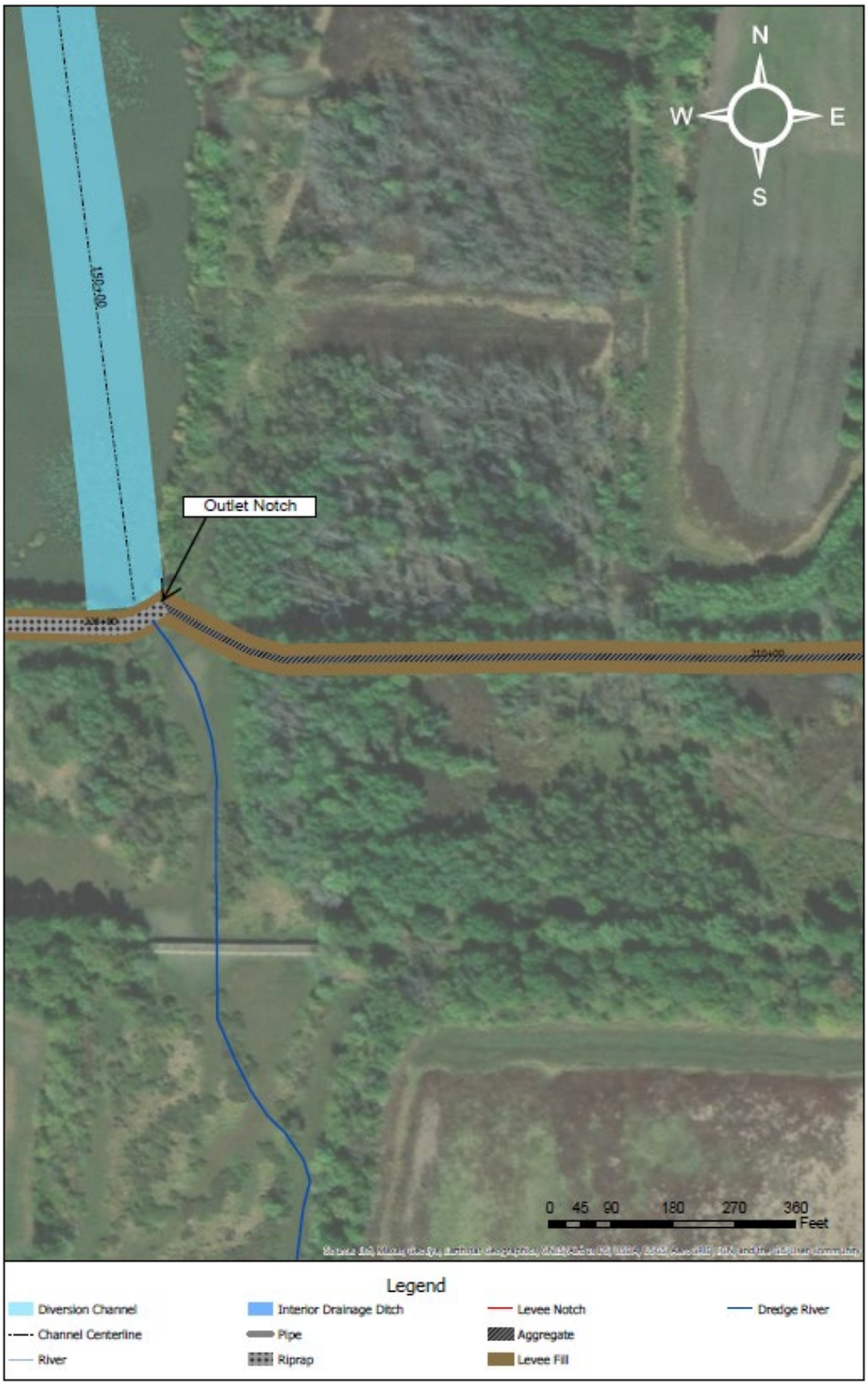
N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill


N
W
E
S
150+00
Outlet Notch
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
150+00
Outlet Notch
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
West Spillway
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
West Spillway
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

N
W
E
S
West Spillway
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

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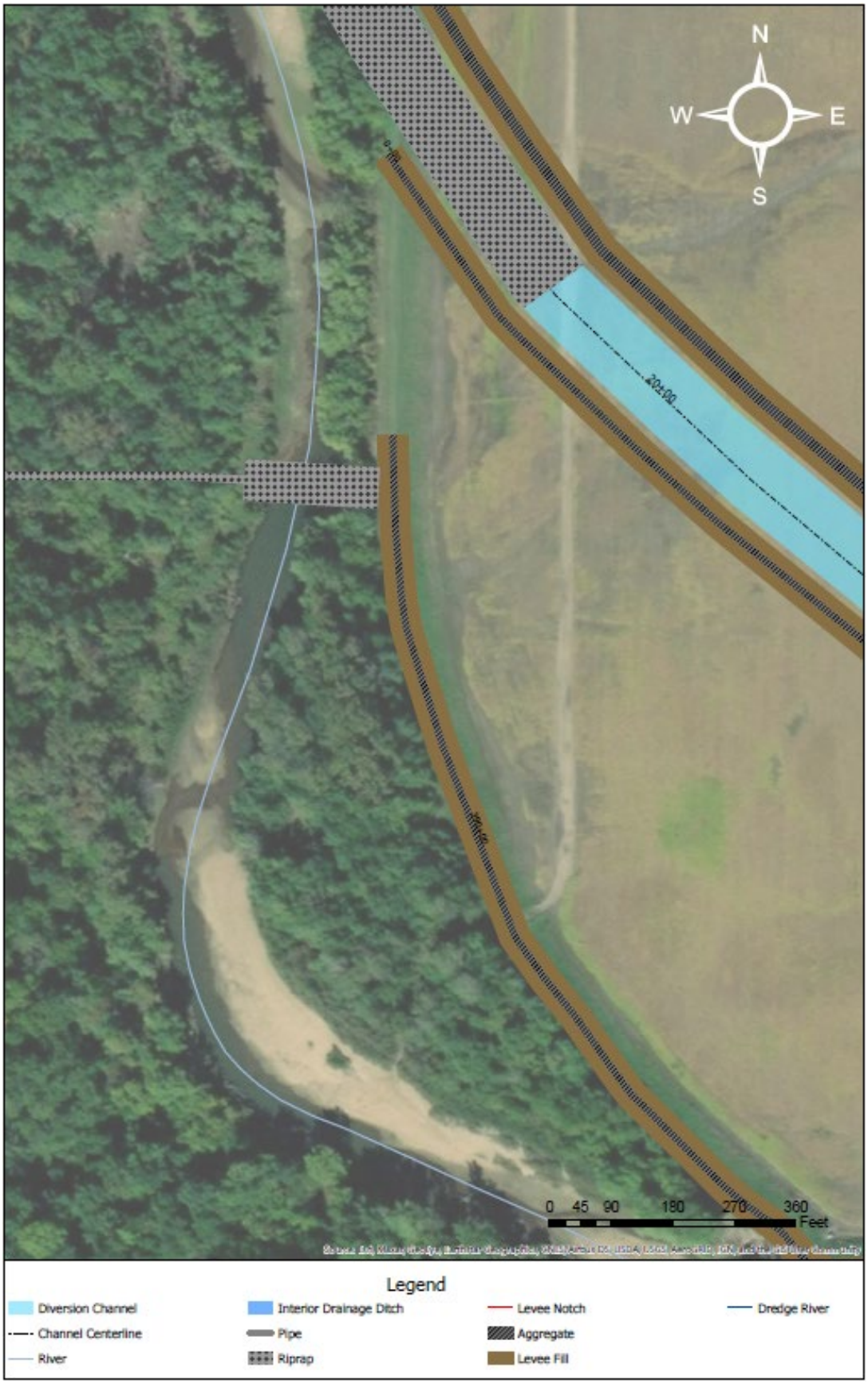
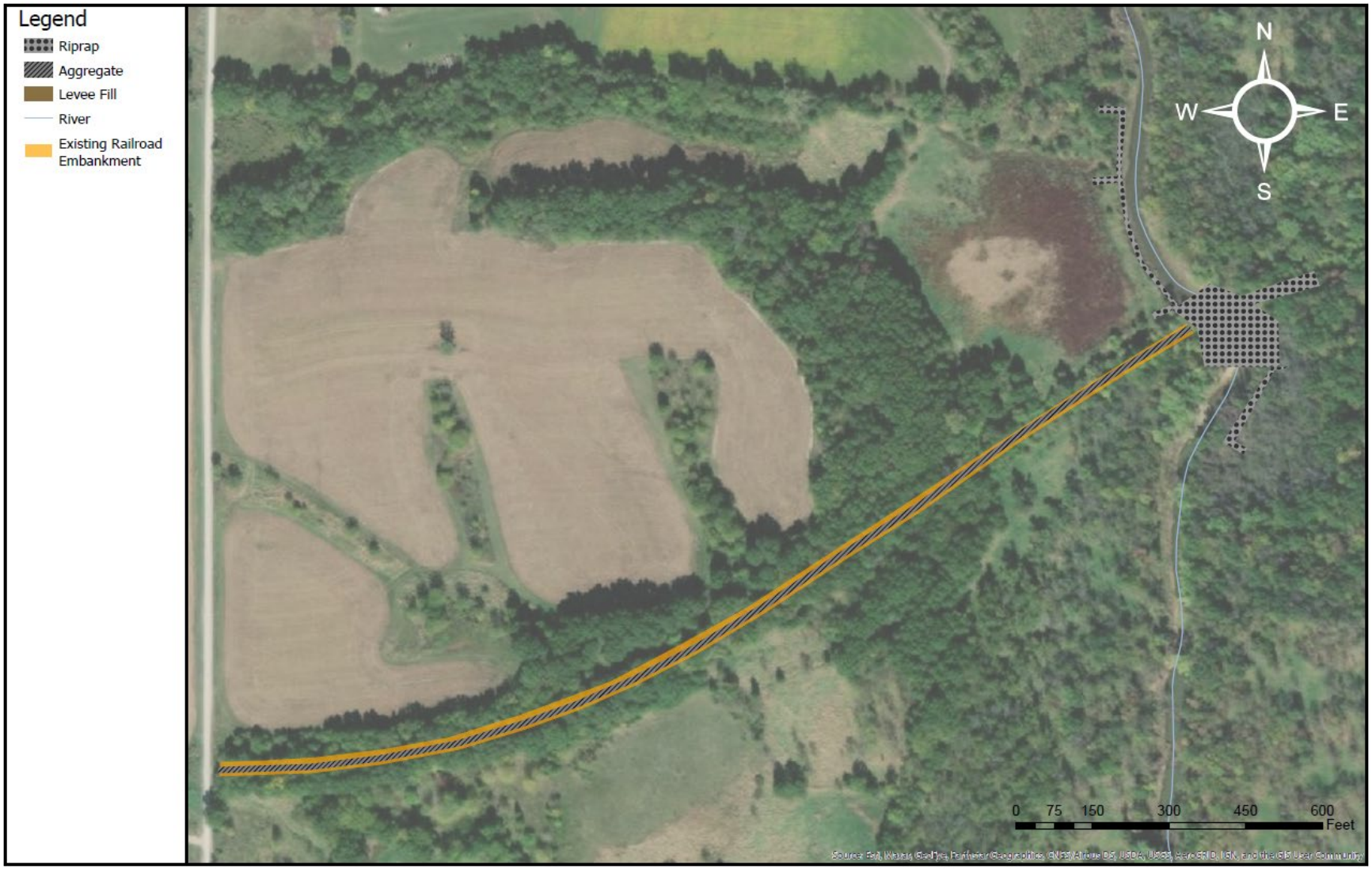
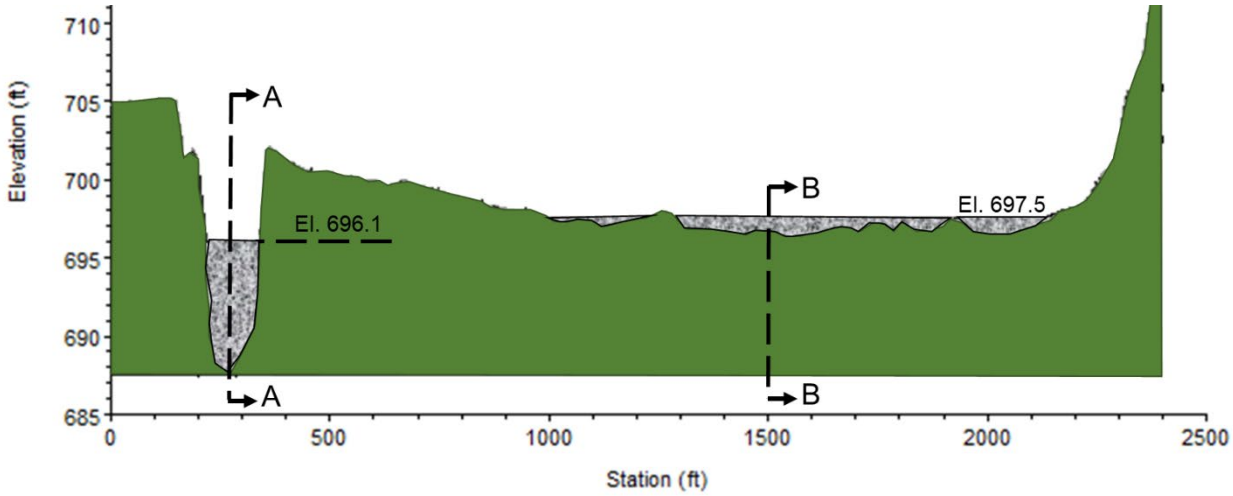
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill

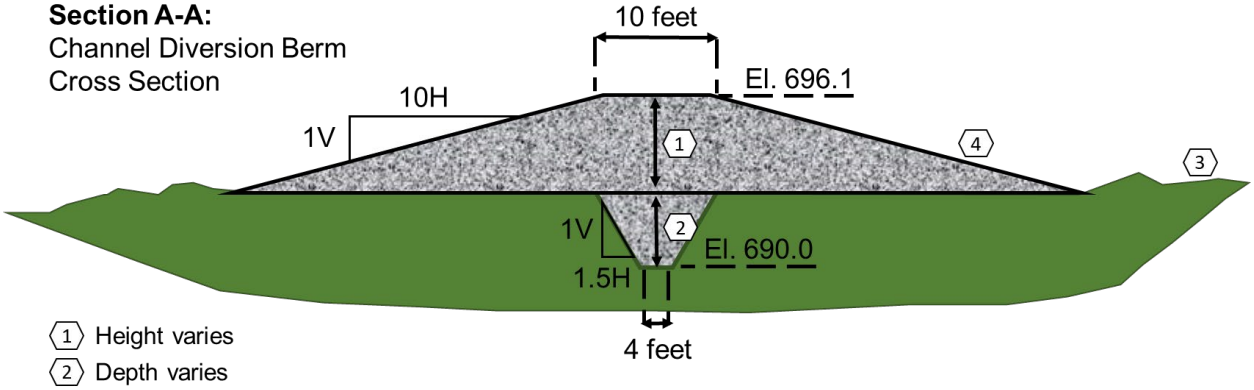

N
W
E
S
20+00
0 45 90 180 270 360
Feet
Legend
Diversion Channel
Interior Drainage Ditch
Levee Notch
Dredge River
Channel Centerline
Pipe
Aggregate
River
Riprap
Levee Fill


Legend
Riprap
Aggregate
Levee Fill
River
Existing Railroad Embankment
N
W
E
S
0 75 150 300 450 600
Feet

2.1 Diversion and Avulsion Prevention Berm (Measure B)

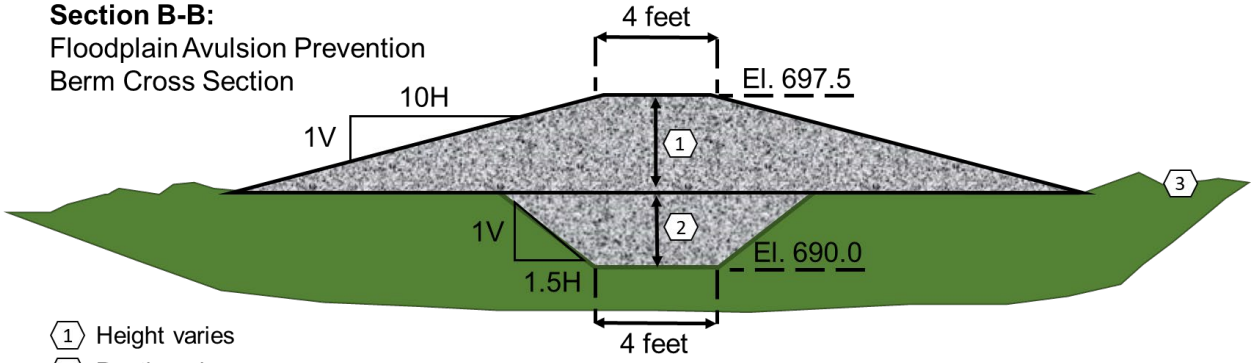


Section A-A:
Channel Diversion Berm
Cross Section



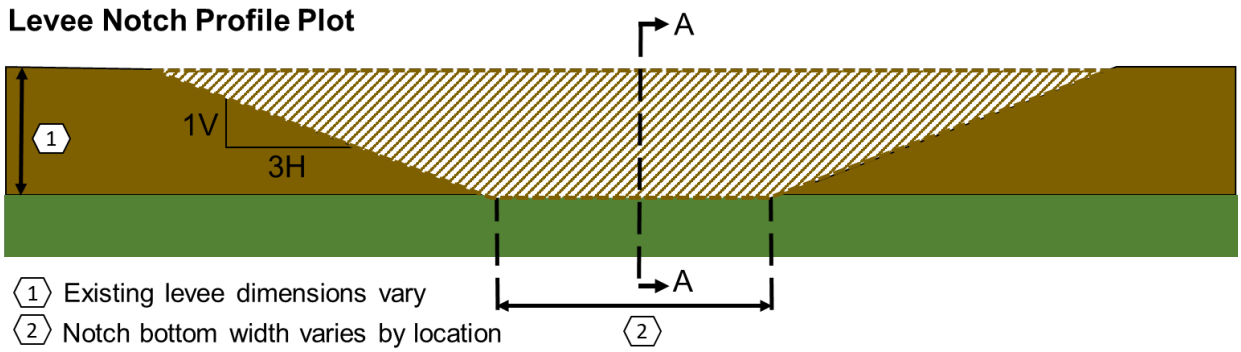
1 Height varies
2 Depth varies
3 Existing ground elevation
4 Additional features and adjustments may be included to facilitate fish passage

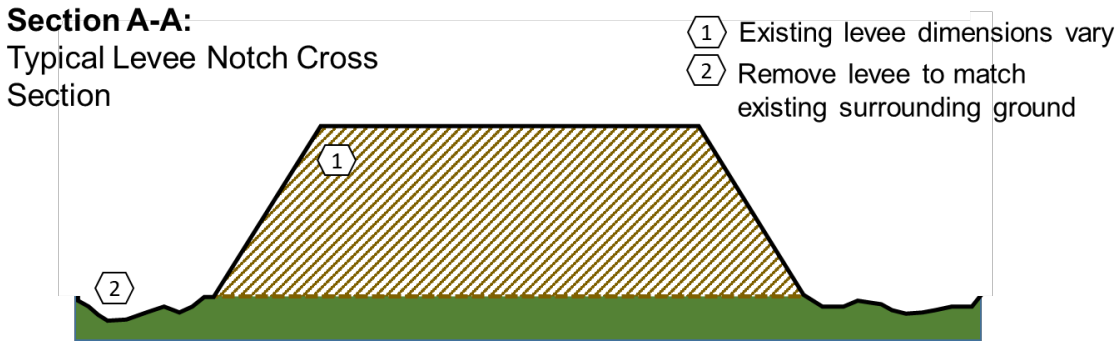
Section B-B:
Floodplain Avulsion Prevention
Berm Cross Section



1 Height varies
2 Depth varies
3 Existing ground elevation

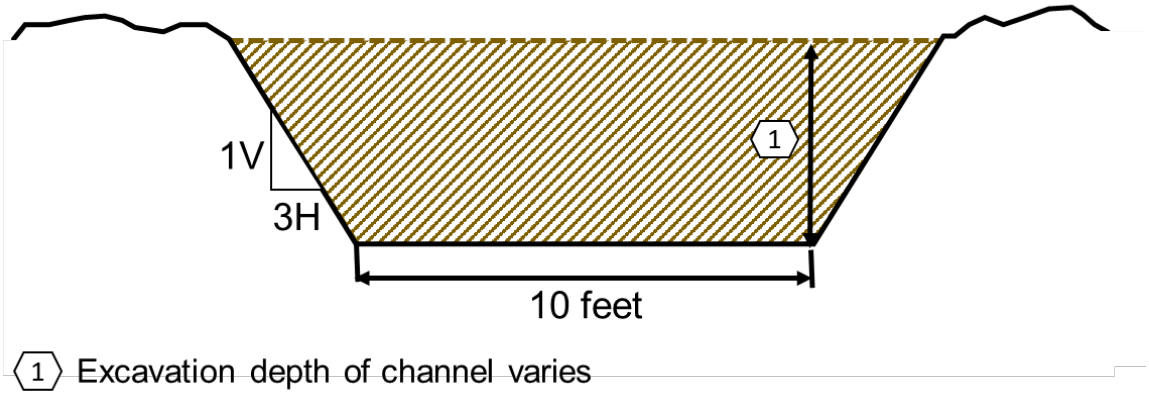
2.2 Levee Notch and Removal (Measures A, V, and VV)



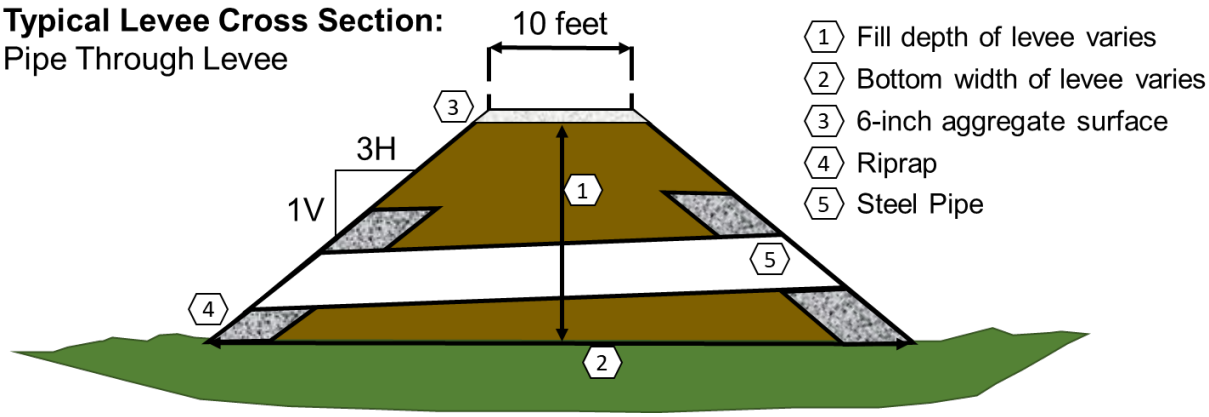


2.3 Interior Drainage Ditch (Included as Part of Measure F)

Section:
Typical Interior Drainage
Cross Section

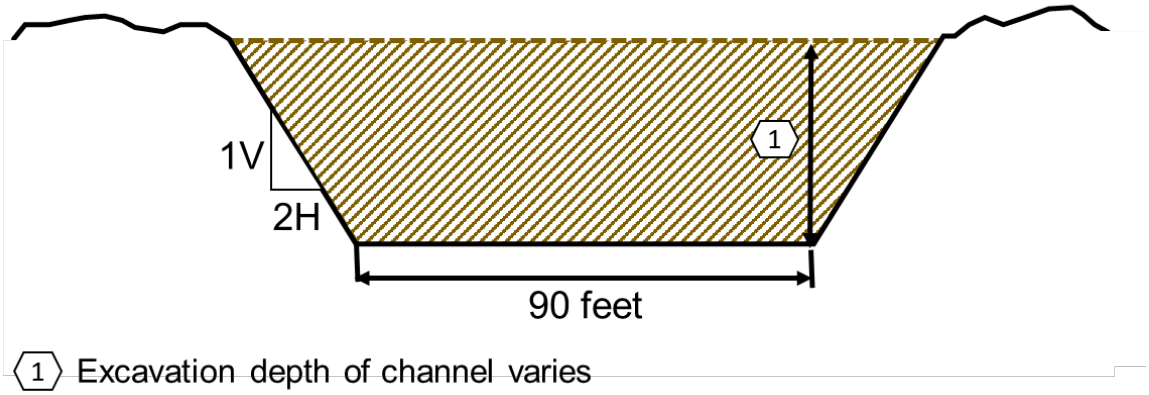


Typical Levee Cross Section:
Pipe Through Levee

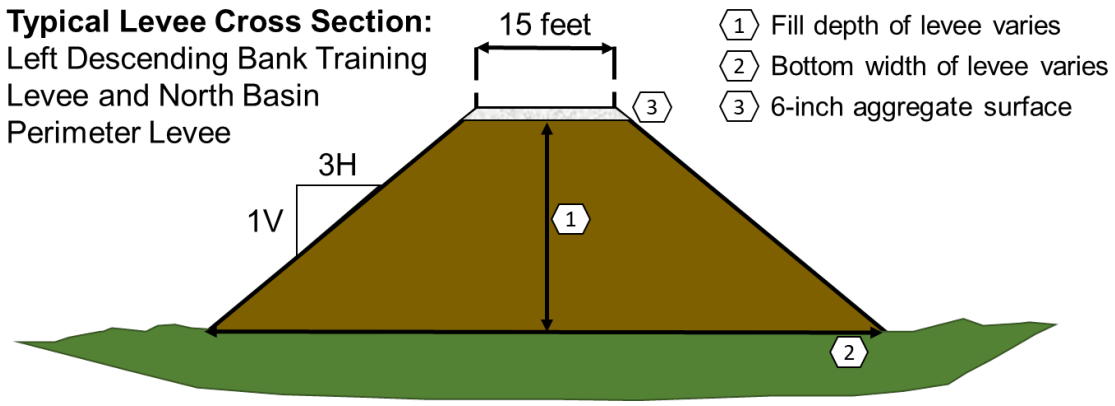


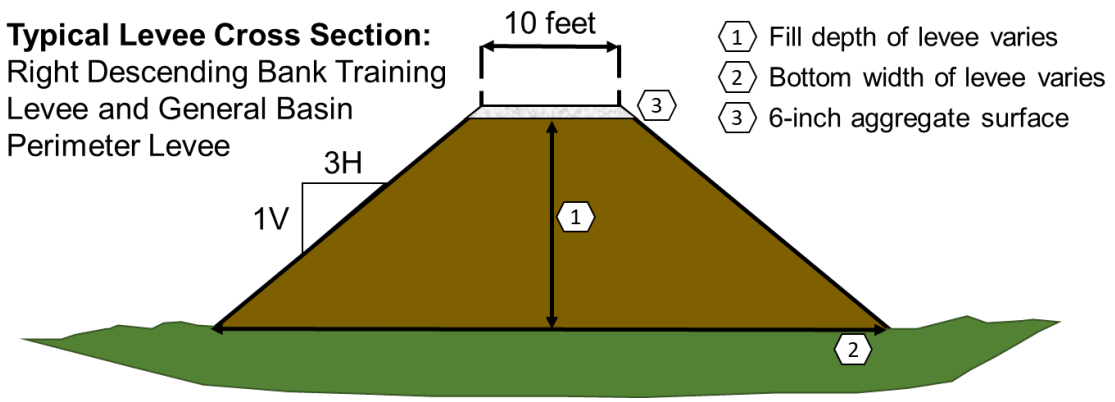
2.4 DIVERSION CHANNEL (MEASURE C)

Section:
Typical Diversion Channel
Cross Section



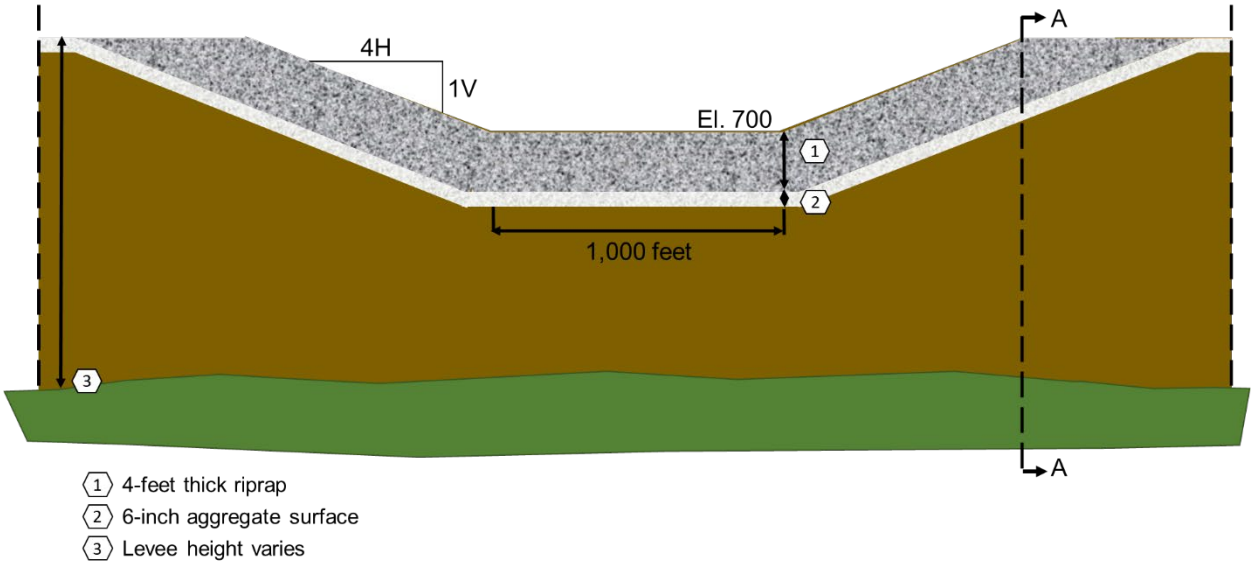
2.5 Typical Levee Cross Sections (Part of Measures C, F, and G)



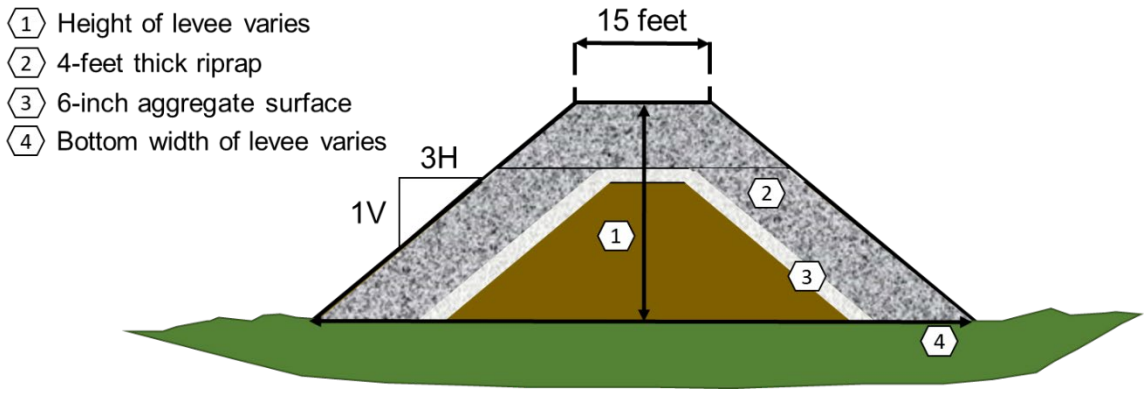


2.6 WEIRS (INCLUDED AS PART OF MEASURE F)

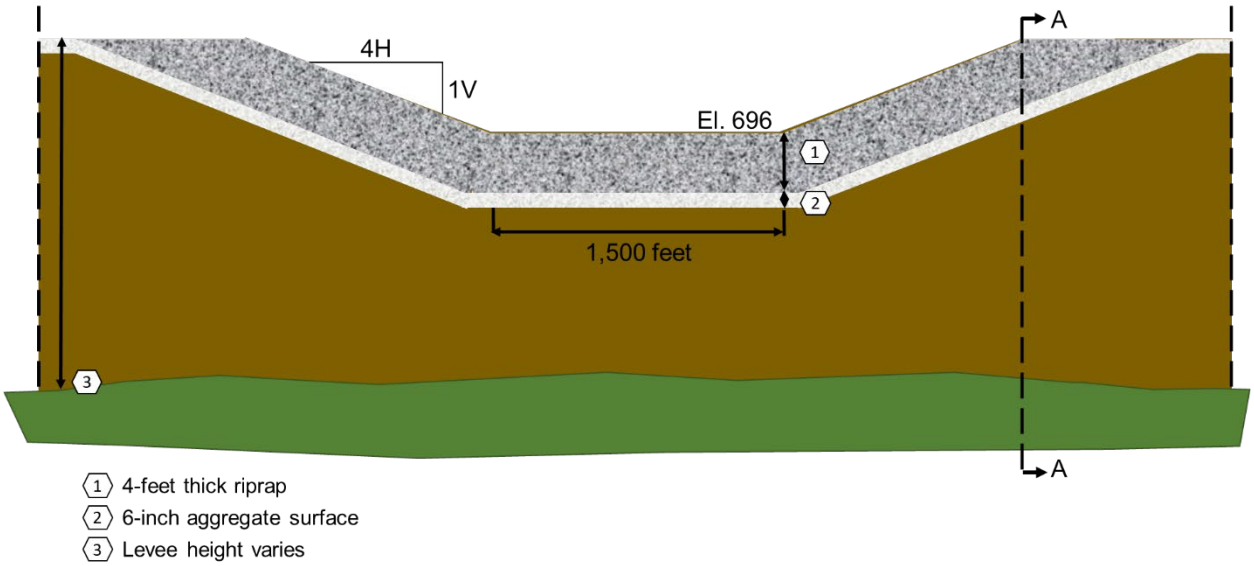
North Spillway:



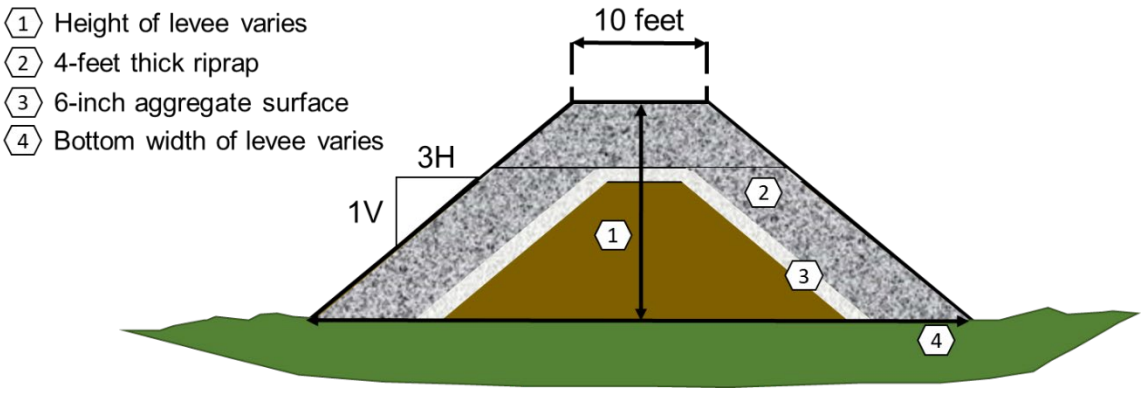
Section A-A:
North Spillway Cross Section



West Spillway:

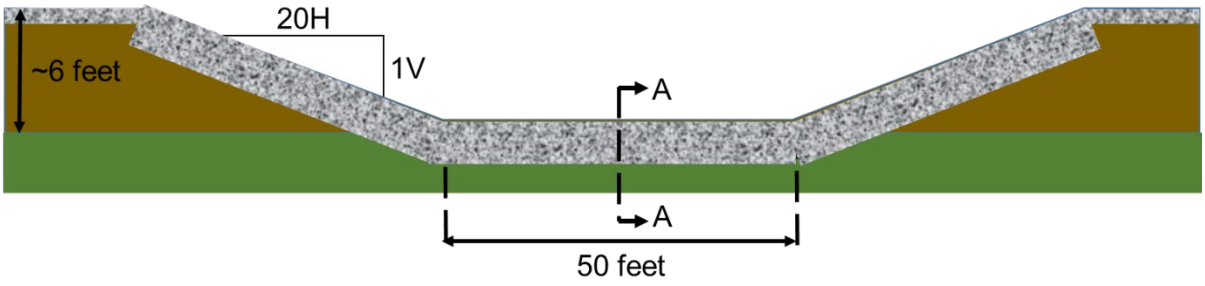


Section A-A:
West Spillway Cross Section

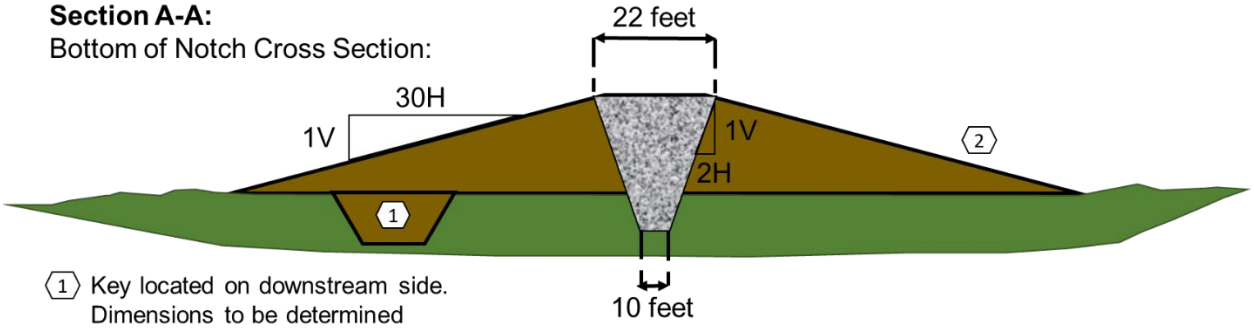


2.7 Outlet Notch (Measure T)

General Notch Geometry:



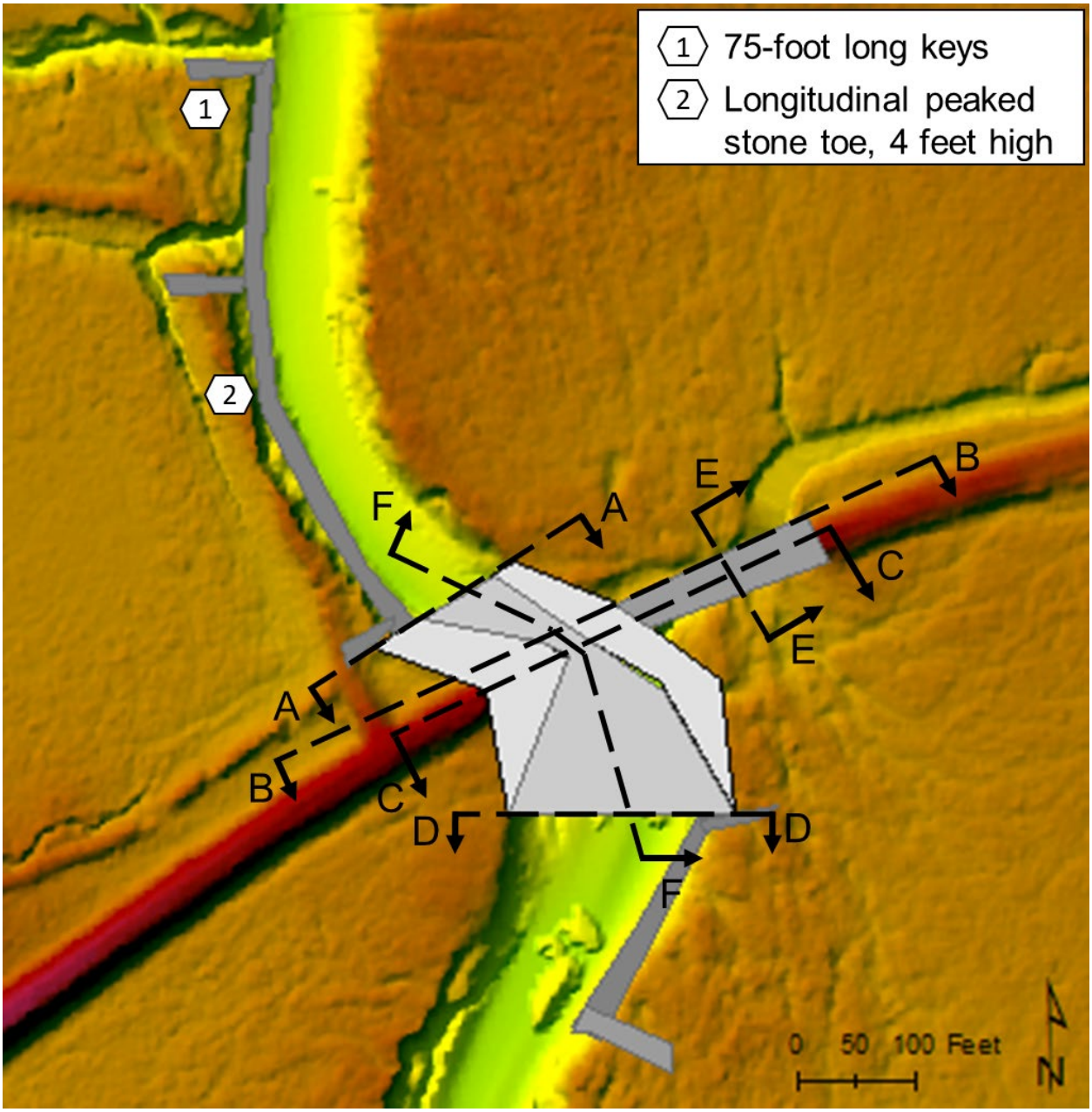
Section A-A:
Bottom of Notch Cross Section:



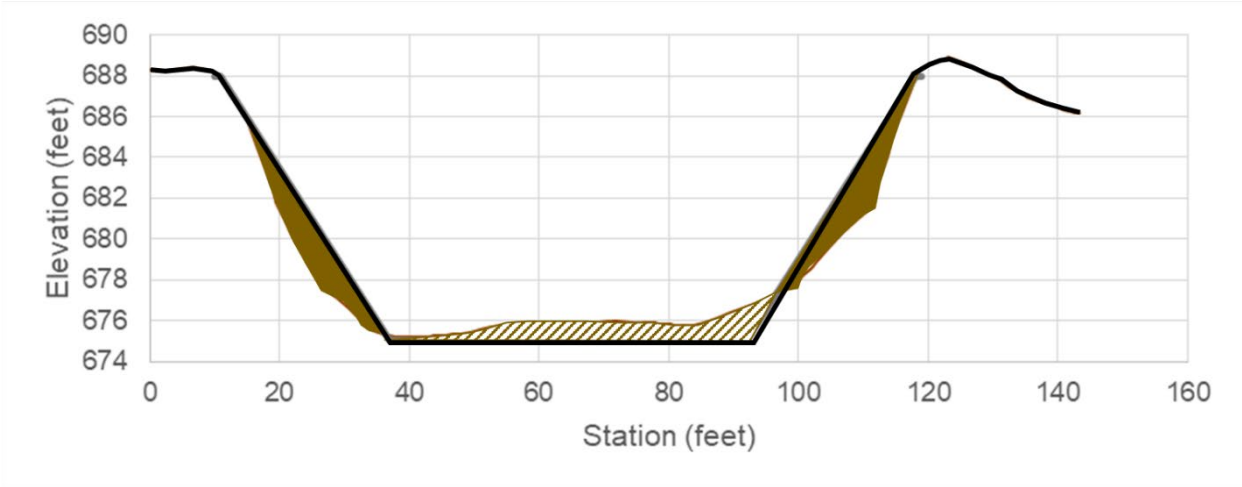
(1) Key located on downstream side. Dimensions to be determined

(2) Additional features and adjustments may be included to facilitate fish passage

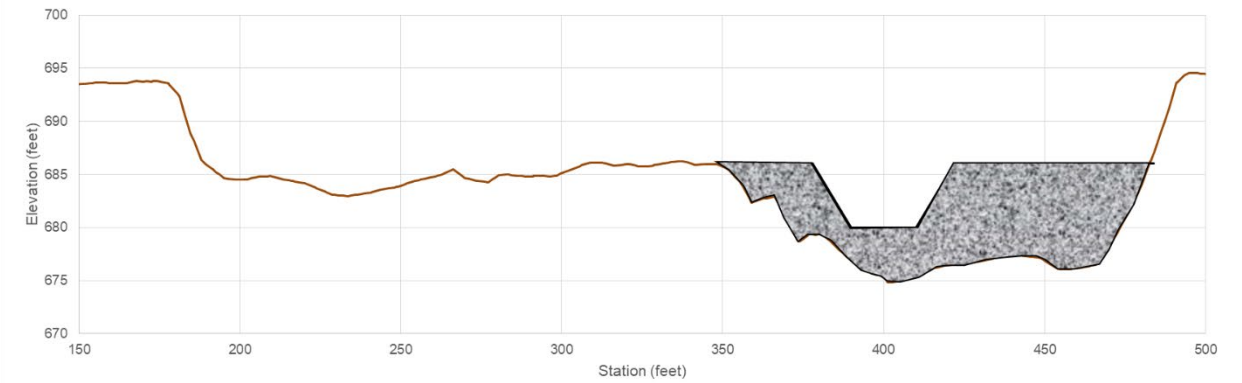
2.8 Higgins Ditch Grade Control (Measure I)



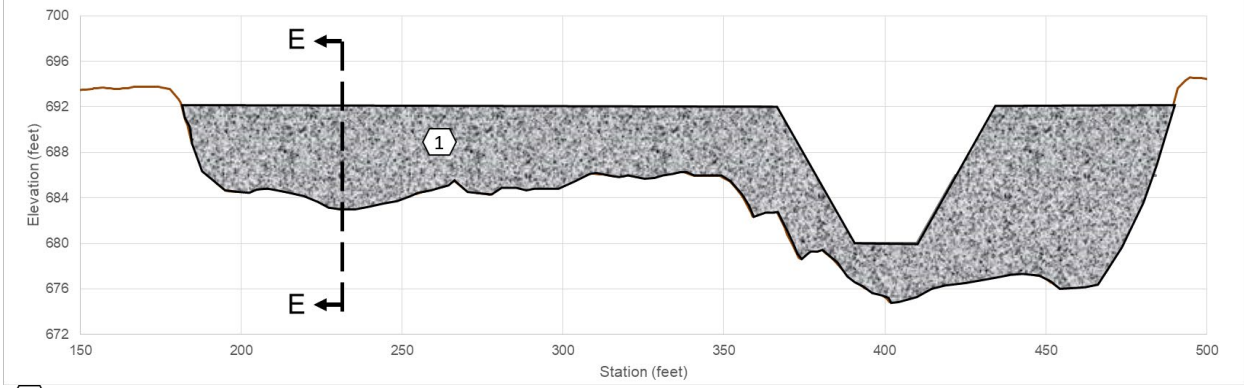
Section A-A:



Section B-B:

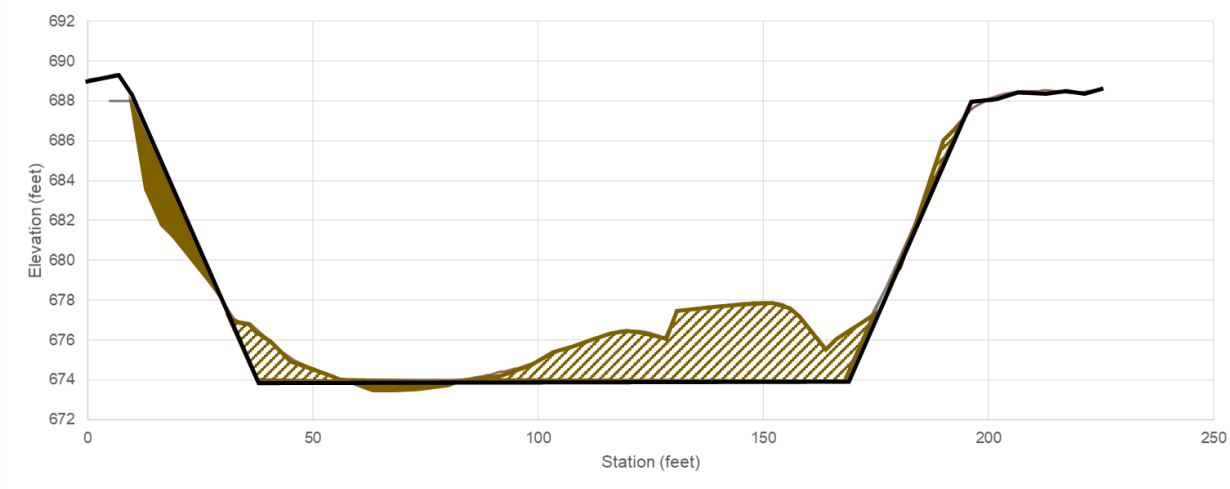


Section C-C:



1 Berm extension

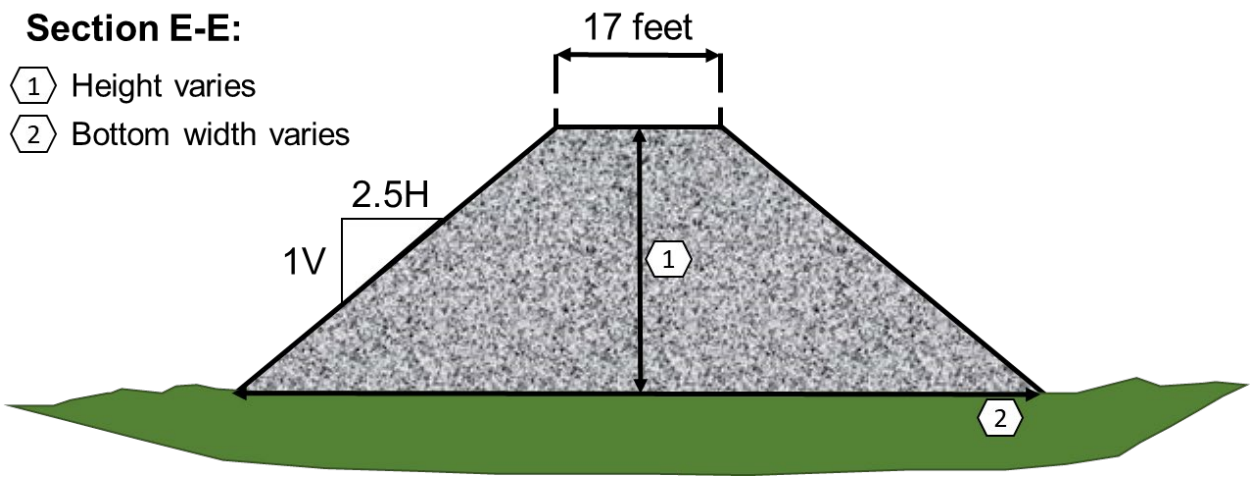
Section D-D:



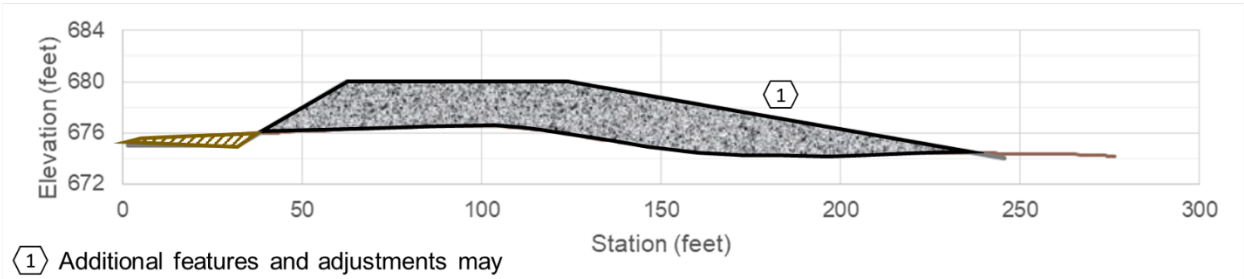
Section E-E:

1 Height varies

2 Bottom width varies

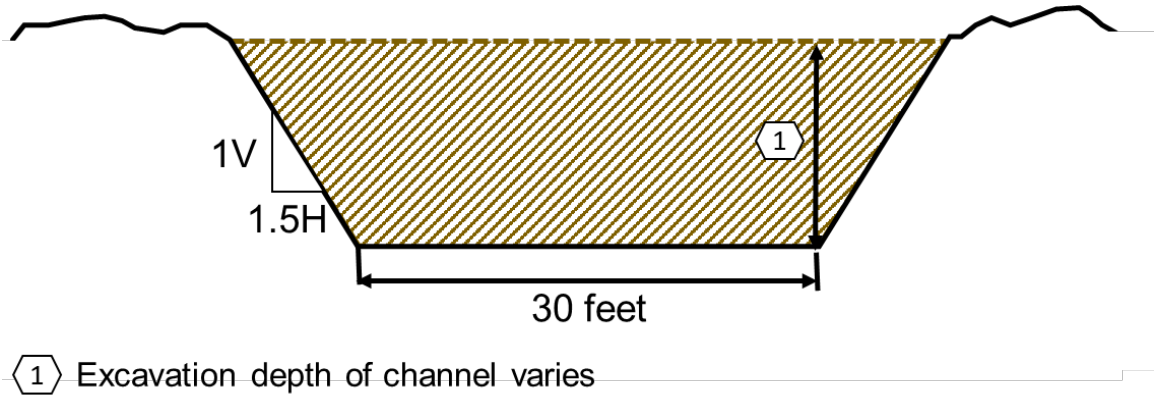


Section F-F:

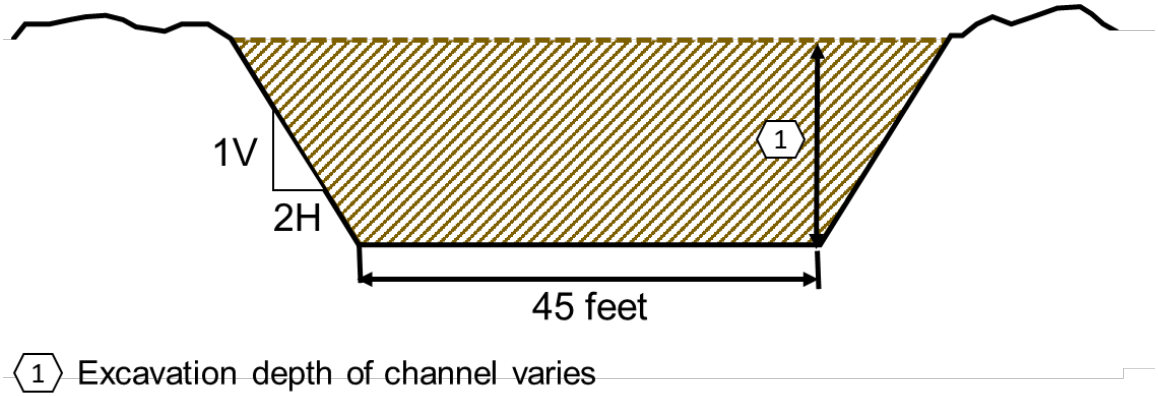


1 Additional features and adjustments may be included to facilitate fish passage

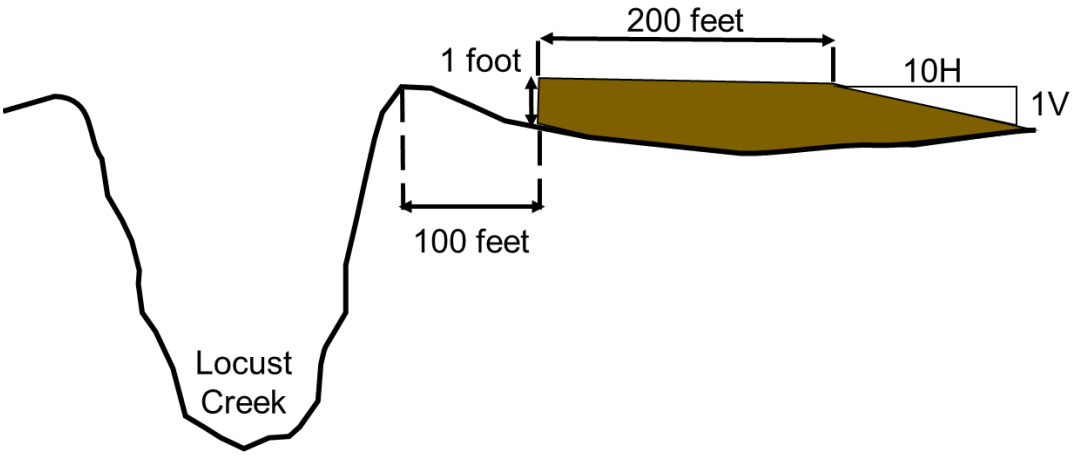
2.9 Muddy Creek Typical Dredging Cross Section (Measure H)



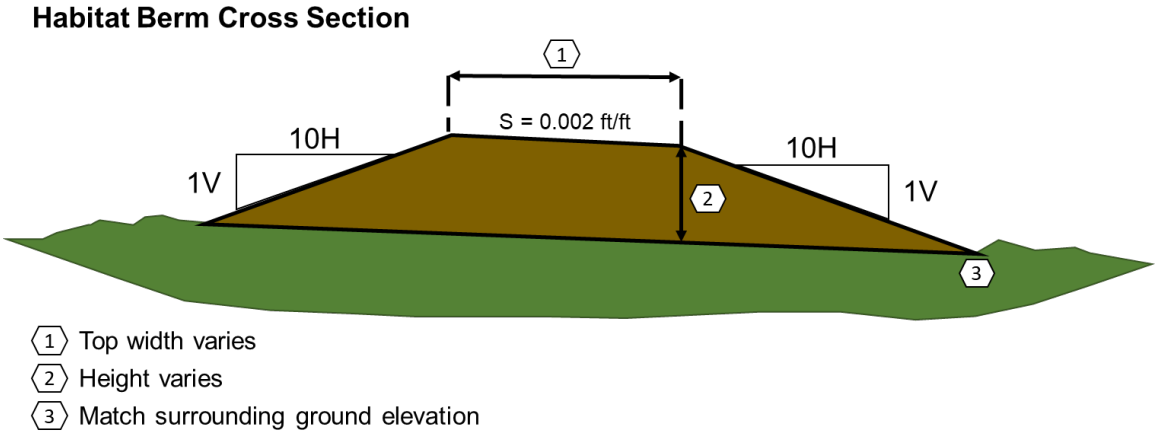
2.10 Locust Creek Typical Dredging Cross Section (Measure H)



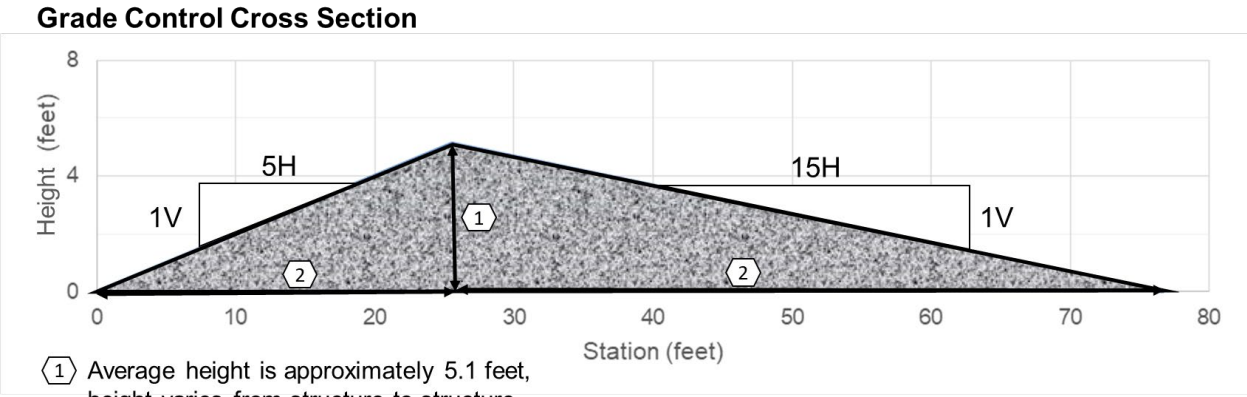
2.11 LOCUST CREEK HORSE HEAD AVULSION PREVENTION BERMS (MEASURE S)



2.12 HABITAT BERM CROSS SECTION (MEASURE SS)



2.13 TYPICAL GRADE CONTROL (MEASURE D)



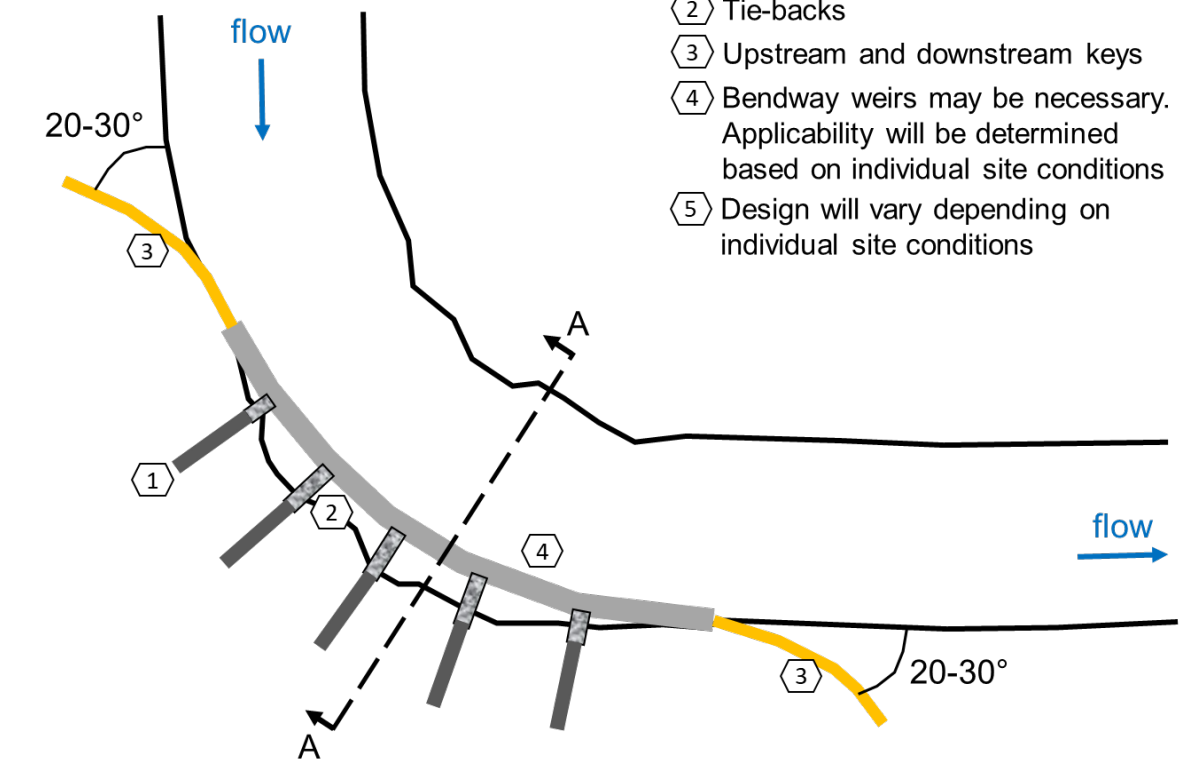
1 Average height is approximately 5.1 feet, height varies from structure to structure

2 Length varies depending on channel bathymetry

2.14 UPSTREAM ACTIONS (MEASURE Y)

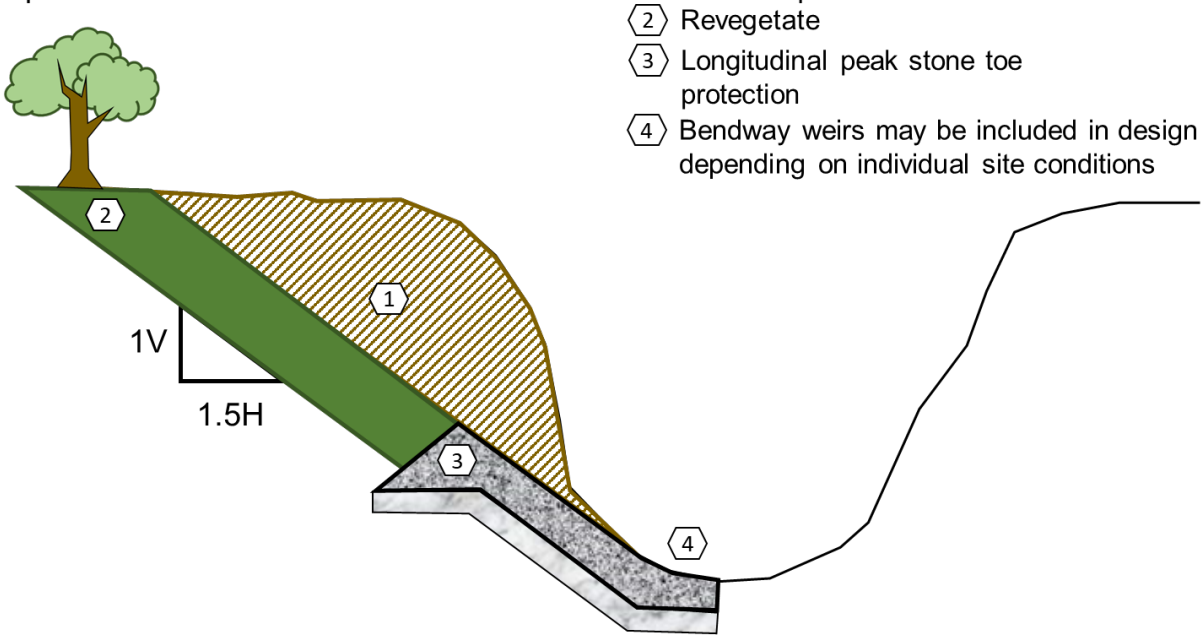
Bank stabilization is site specific and dependent upon the location and severity of erosion. Upstream sites may consist of an array of measures. The following figures are conceptual ideas for some of the measures that may be applied to upstream bank stabilization and degradation sites. Design will vary depending on individual site conditions.

Upstream Bank Stabilization:
Plan View: Longitudinal Peak Stone Toe Protection



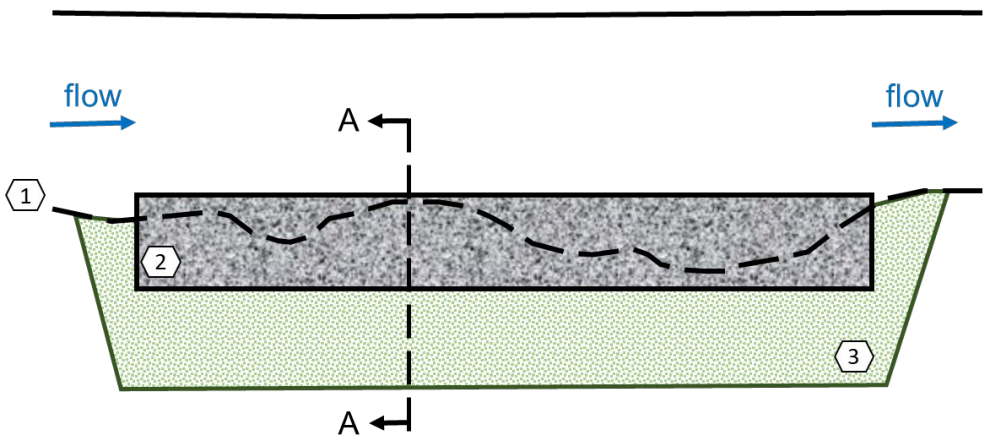
1. Mid project keys
2. Tie-backs
3. Upstream and downstream keys
4. Bendway weirs may be necessary. Applicability will be determined based on individual site conditions
5. Design will vary depending on individual site conditions

Section A-A:
Upstream bank stabilization



1. Cut existing bank to stable slope
2. Revegetate
3. Longitudinal peak stone toe protection
4. Bendway weirs may be included in design depending on individual site conditions

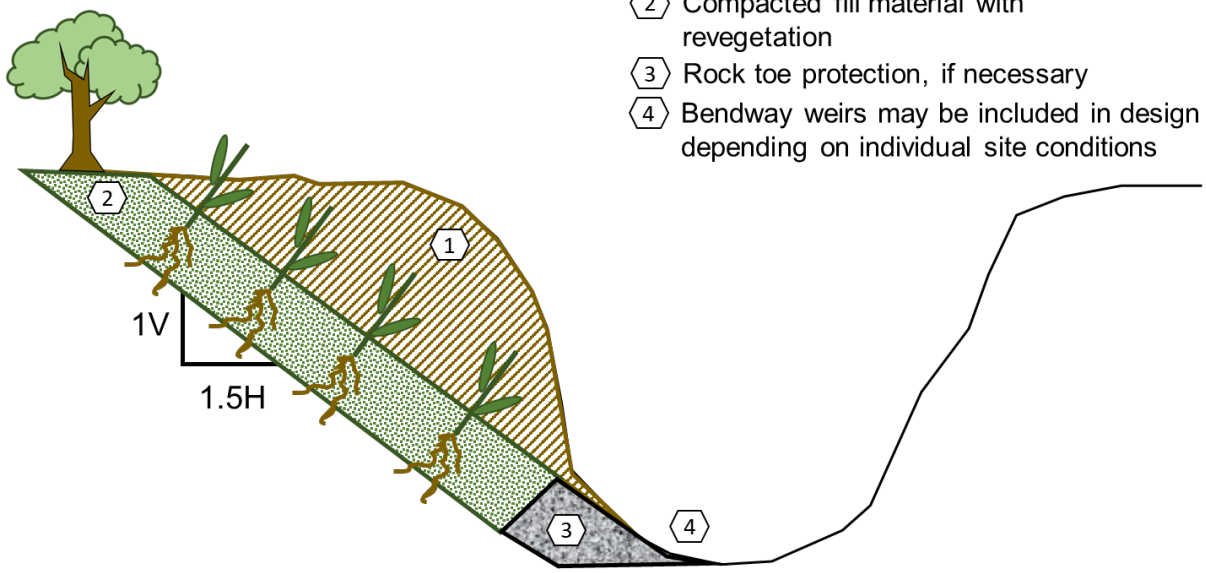
Upstream Bank Stabilization:
Rock Toe Plan View



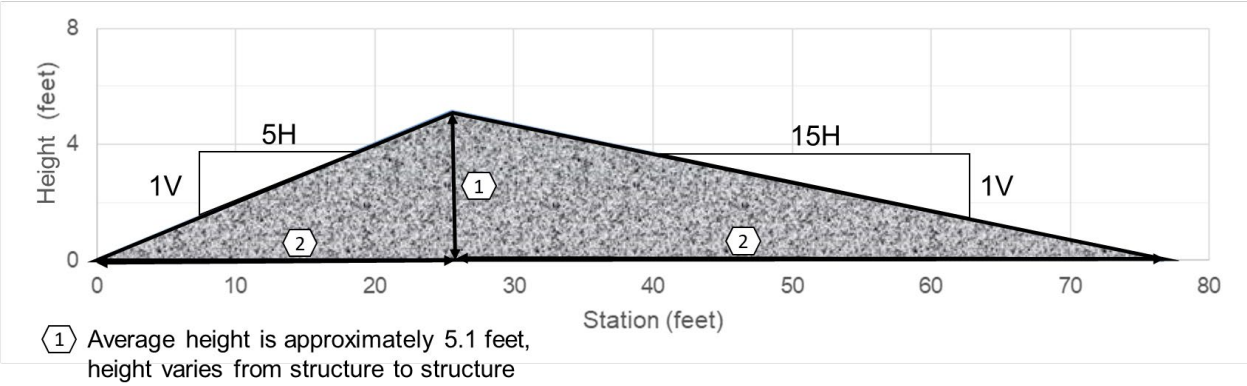
1 Eroding bank
2 Rock toe protection
3 Cut bank to stable slope, fill, and revegetate
4 Bendway weirs may be necessary. Applicability will be determined based on individual site conditions
5 Design will vary depending on individual site conditions

Section A-A:
Upstream bank stabilization

1 Cut existing bank to stable slope, if necessary
2 Compacted fill material with revegetation
3 Rock toe protection, if necessary
4 Bendway weirs may be included in design depending on individual site conditions



Grade Control Cross Section



(1) Average height is approximately 5.1 feet, height varies from structure to structure

(2) Length varies depending on channel bathymetry