Upper Ninemile Creek Mine Reclamation and Sawpit Mine Reclamation

T17N, R24W

Vicinity Map

0	0.5	1	1.5	2

Miles
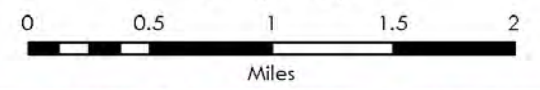
Project Area

Missoula County

Map Extent

MONTANA

Missoula

Bozeman

Billings

IDAHO

WYOMING

100 Miles

LOLO NATIONAL FOREST
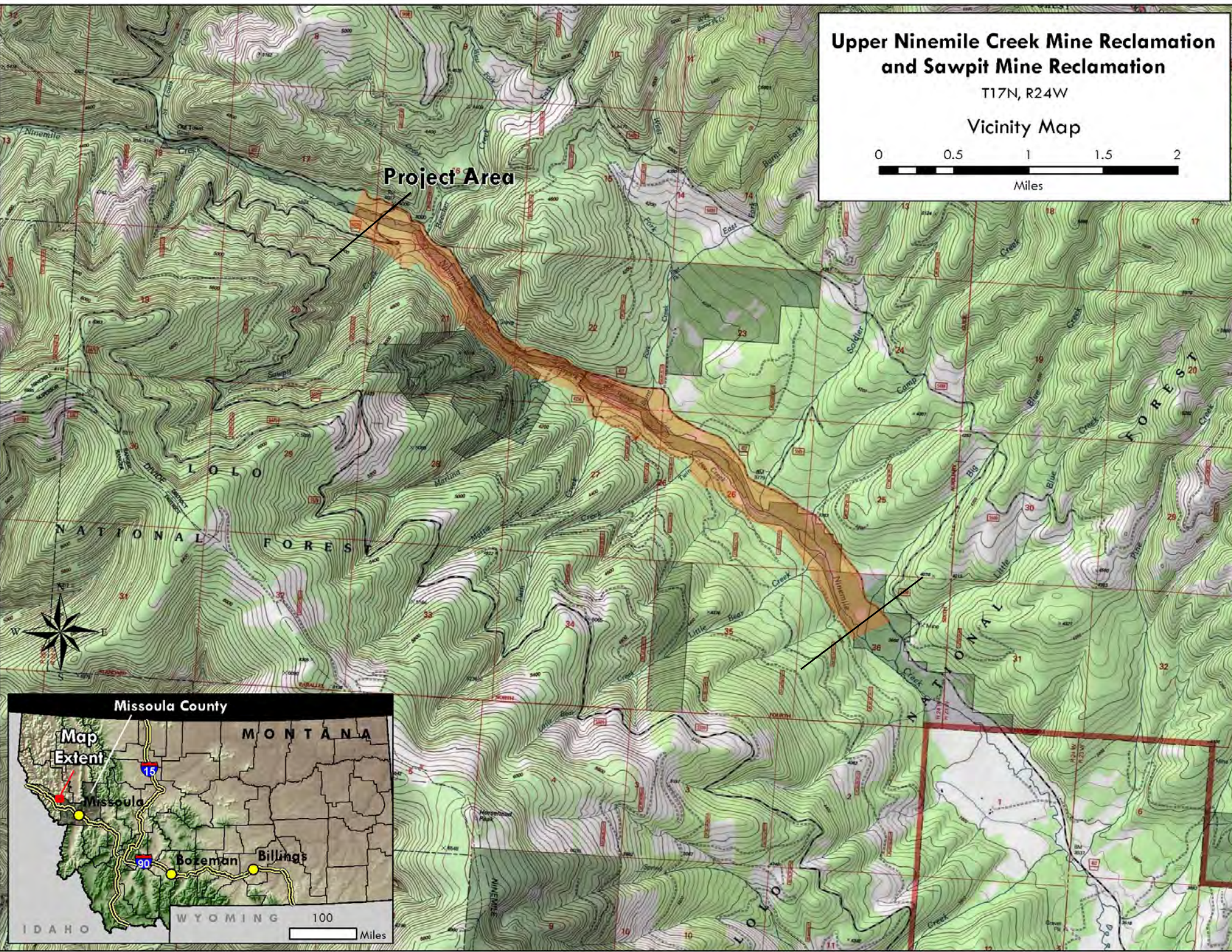
Site Photos
Sawpit Creek

Headcutting and overland flow

Steep bank into dredge pit

Gullying into dredge pit

Sawpit Creek – existing conditions
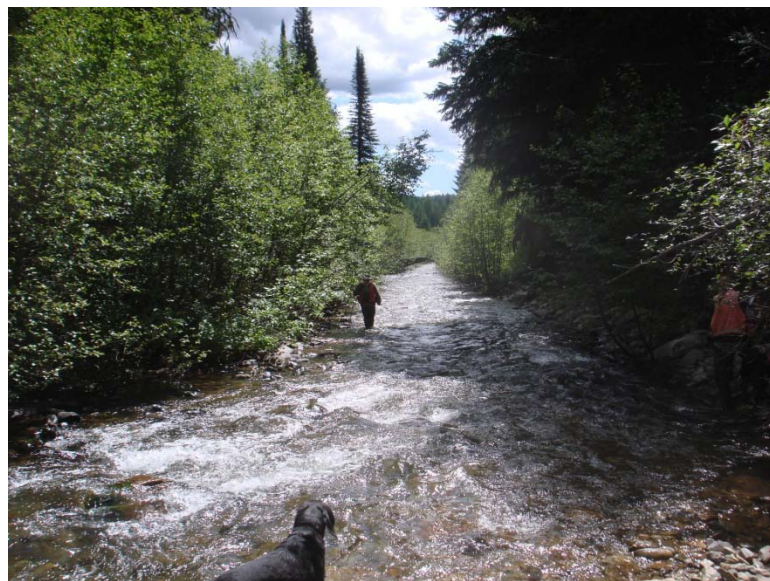
Site Photos
Ninemile Creek

Steep eroding banks

Dredge pond lined by knapweed

Straightened stream channel

Reference conditions

Data Collection Methods

Topographic data were collected using Light Detection and Ranging (LiDAR) technology in July 2011. Geomorphic channel data were collected with a Trimble 3303DR Total Station and a three-person survey crew during August and September 2011. Static observations were made with a Leica survey grade Global Positioning System (GPS). This step calibrated all control points to satellite GPS coordinates for elevation and location definition.

Data collection parameters and methods are summarized in the Table 1-1 below.

Table 1-1. Data collection parameters and methods.

Parameter	Method
Channel cross-section	Harrelson et al., 1994
Longitudinal channel profile	Harrelson et al., 1994
Planform geometry	Langbein and Leopold, 1966
Substrate characterization	Wolman, 1954
Riffle Stability Index	Kappeser, 1992
Bank erosion prediction	Rosgen, 2001(a)
Aquatic habitat characterization	Overton et al., 1997
Level I and II stream classification	Rosgen, 1996
Vegetation	Hansen et al., 1995

Total station survey data was processed and analyzed in RIVERMorph© version 4.2 (RIVERMorph LLC, 2005). RIVERMorph©, a geomorphic stream channel assessment and data storage software, merged all aspects of the surveys by transcribing the total station data from x, y and z coordinates to station and elevation formats. The software was used to process data and produce channel reach statistics.

Level I metrics were analyzed for stream Reaches 1-7 and tributaries. Detailed reach descriptions were developed for the main stem reaches. Aerial photos of the project area from 1934, 1964, 1982, 1995, 2005 and 2011 were collected and overlayed to describe channel migration and develop disturbance timelines. The photos reflect the general trends in land use and channel and floodplain conditions from 1934 through present.

Upper Ninemile Creek Mine Reclamation
and Sawpit Mine Reclamation

Plan View Index

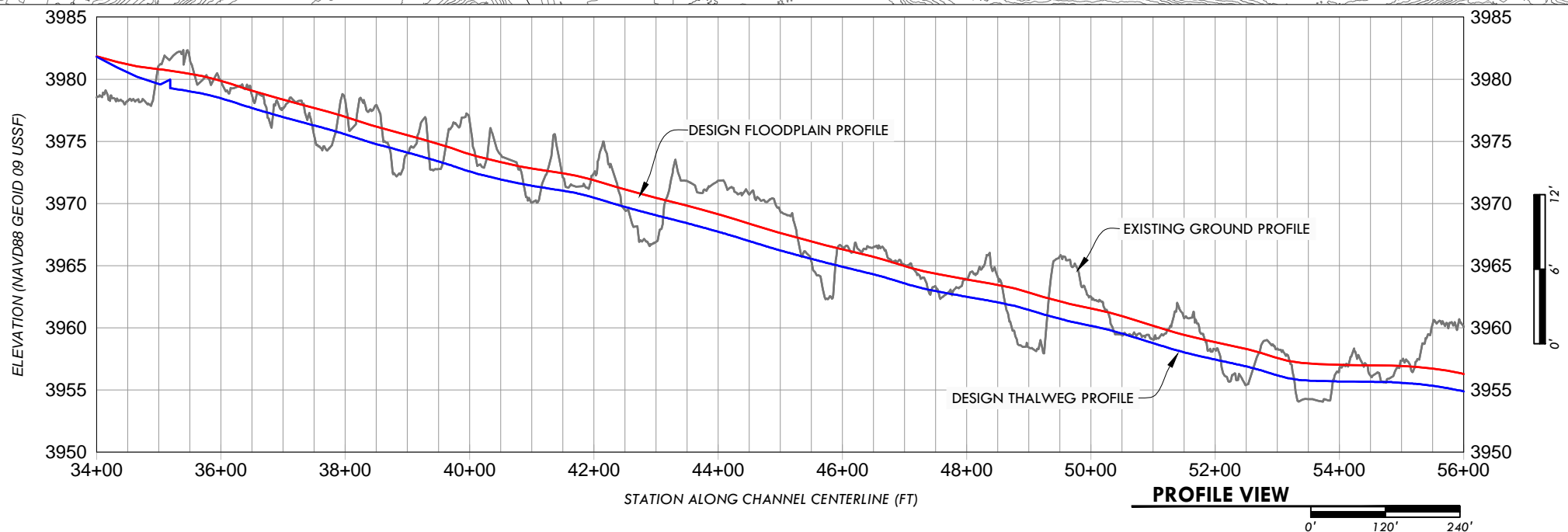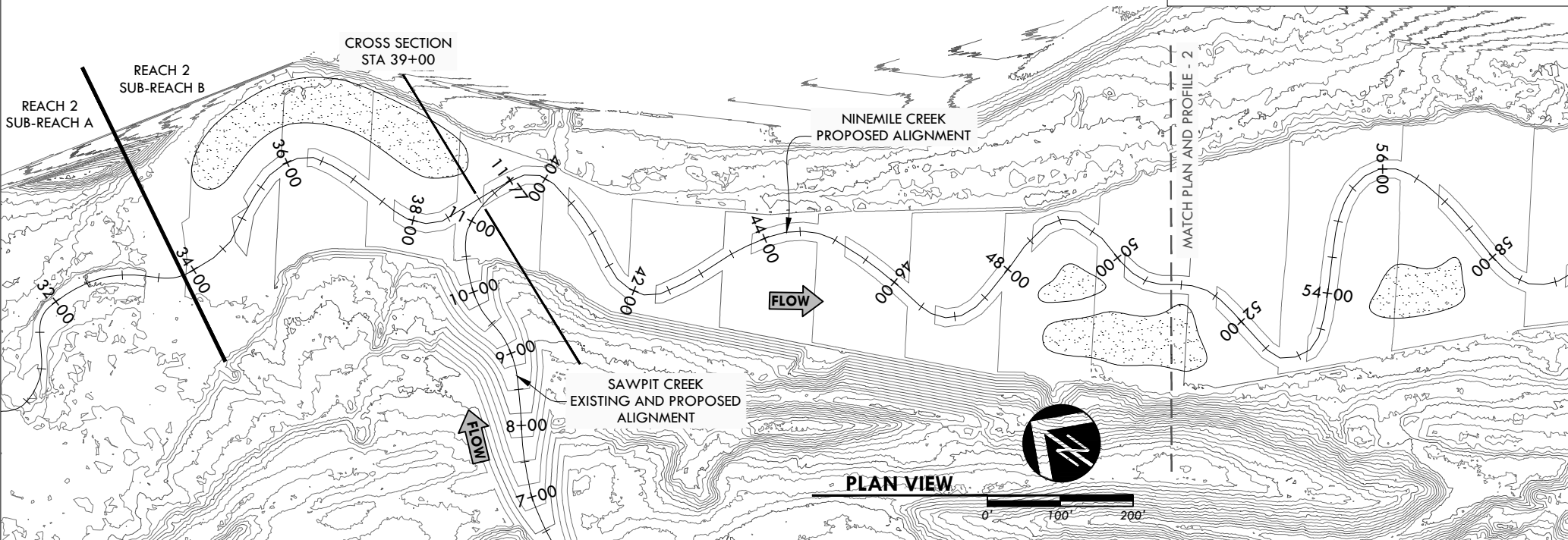FLOW

Ninemile Creek
Plan and Profile - 1

Sawpit Creek
Plan and Profile - 3

Ninemile Creek
Plan and Profile - 2

N
W E
S

0   250   500   750   1,000
Feet

04-2012, River Design Group, Inc. Imagery: 2008 Orthoimagery; 2011 NAIP

Ninemile Road

PROPOSED OFF-CHANNEL WETLANDS

REACH 2
SUB-REACH A

REACH 2
SUB-REACH B

CROSS SECTION
STA 39+00

NINEMILE CREEK
PROPOSED ALIGNMENT

MATCH PLAN AND PROFILE - 2

SAWPIT CREEK
EXISTING AND PROPOSED
ALIGNMENT

32+00 34+00 36+00 38+00 10+00 11+00 11+77 40+00 42+00 44+00 46+00 48+00 50+00 52+00 54+00 56+00 58+00

9+00 8+00 7+00

FLOW

FLOW

PLAN VIEW

0'   100'   200'

PROFILE VIEW

DESIGN FLOODPLAIN PROFILE

EXISTING GROUND PROFILE

DESIGN THALWEG PROFILE

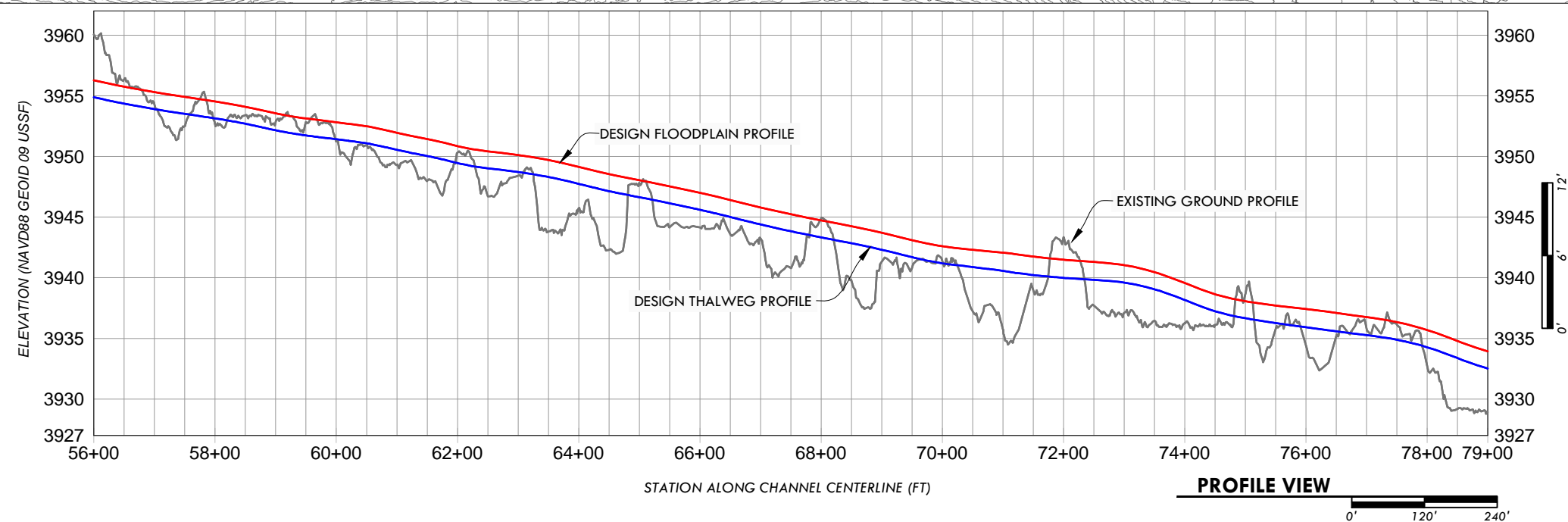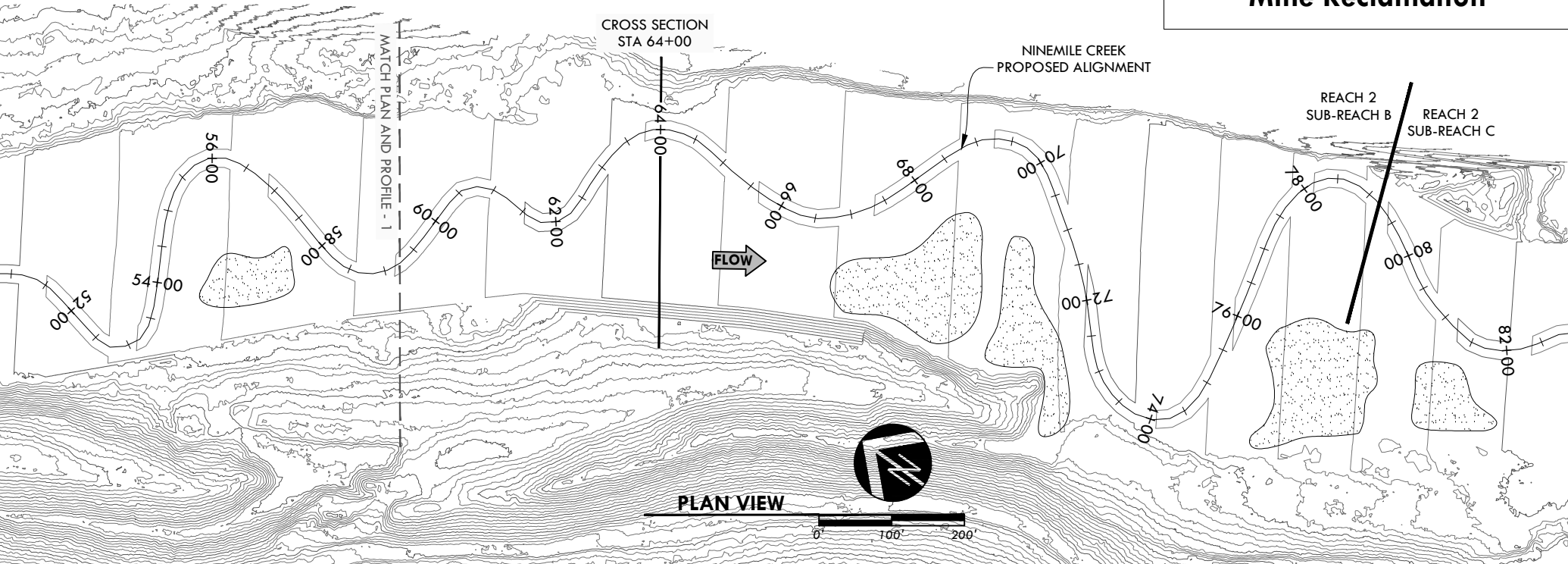ELEVATION (NAVD88 GEOID 09 USSF)

STATION ALONG CHANNEL CENTERLINE (FT)

0'   120'   240'

12' 6' 0'

PROPOSED OFF-CHANNEL WETLANDS

CROSS SECTION
STA 64+00

NINEMILE CREEK
PROPOSED ALIGNMENT

REACH 2
SUB-REACH B

REACH 2
SUB-REACH C

MATCH PLAN AND PROFILE - 1

56+00
54+00
52+00
58+00
60+00
62+00
64+00
66+00
68+00
70+00
72+00
74+00
76+00
78+00
80+00
82+00

FLOW

PLAN VIEW

0'   100'   200'

DESIGN FLOODPLAIN PROFILE

EXISTING GROUND PROFILE

DESIGN THALWEG PROFILE

ELEVATION (NAVD88 GEOID 09 USSF)

3960
3955
3950
3945
3940
3935
3930
3927

STATION ALONG CHANNEL CENTERLINE (FT)

PROFILE VIEW

0'   120'   240'

12'
6'
0'

CROSS SECTIONS

Upper Ninemile Creek
Mine Reclamation

39+00

ELEVATION (NAVD88 GEOID 09 USSF)

EXISTING GROUND SURFACE

REMOVE TAILINGS

DESIGN FLOODPLAIN SURFACE

OFF-CHANNEL WETLANDS

64+00

ELEVATION (NAVD88 GEOID 09 USSF)

EXISTING GROUND SURFACE

DESIGN FLOODPLAIN SURFACE

STATION ALONG CHANNEL CENTERLINE (FT)

LEGEND

CUT

FILL

PROFILE VIEW

0'   30'   60'

6'

3'

0'
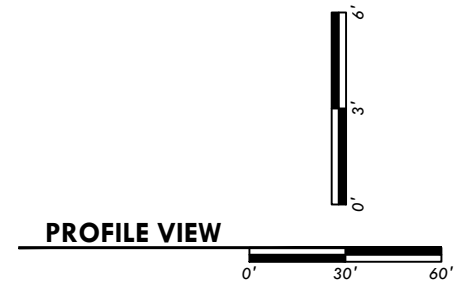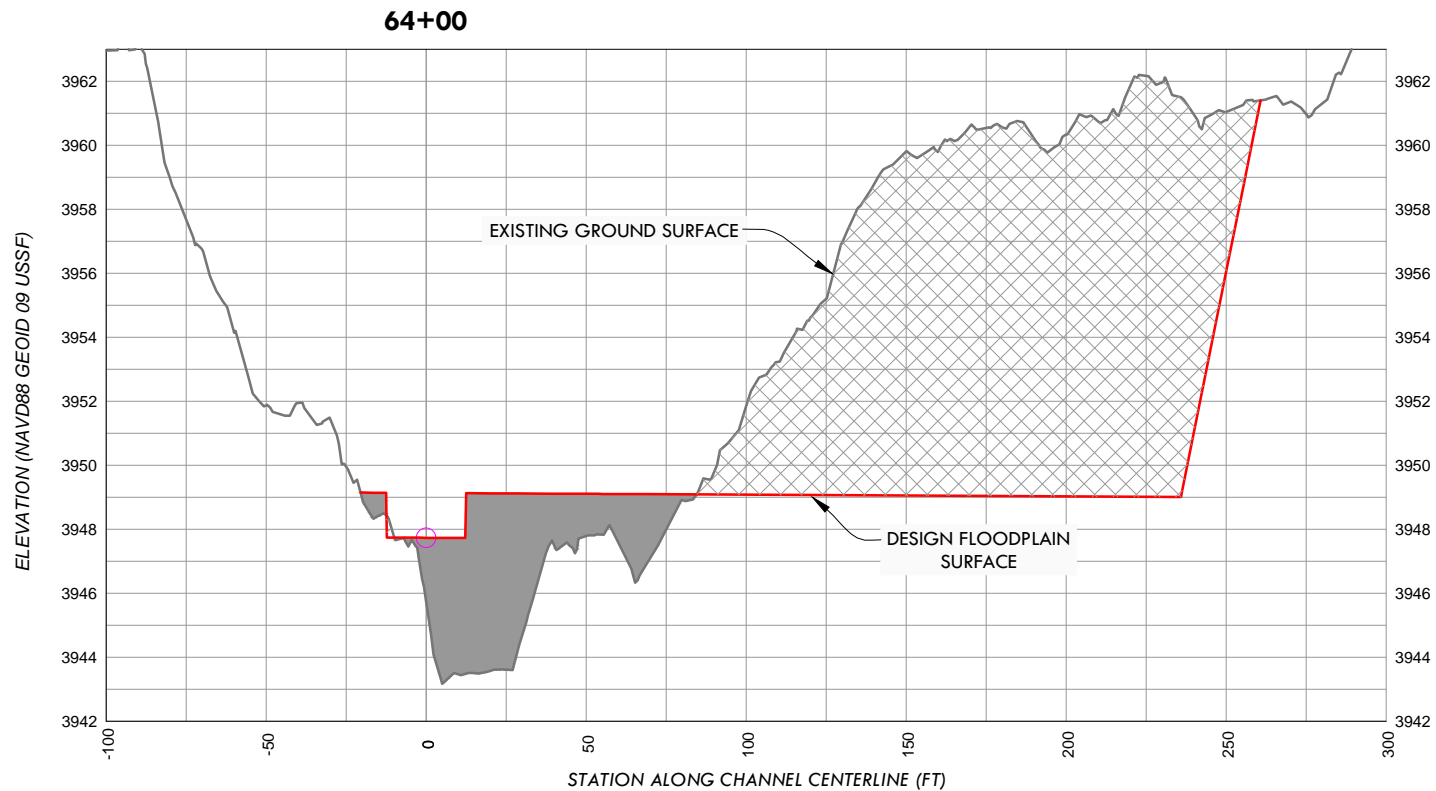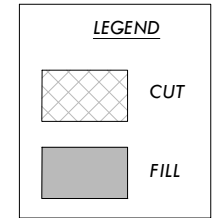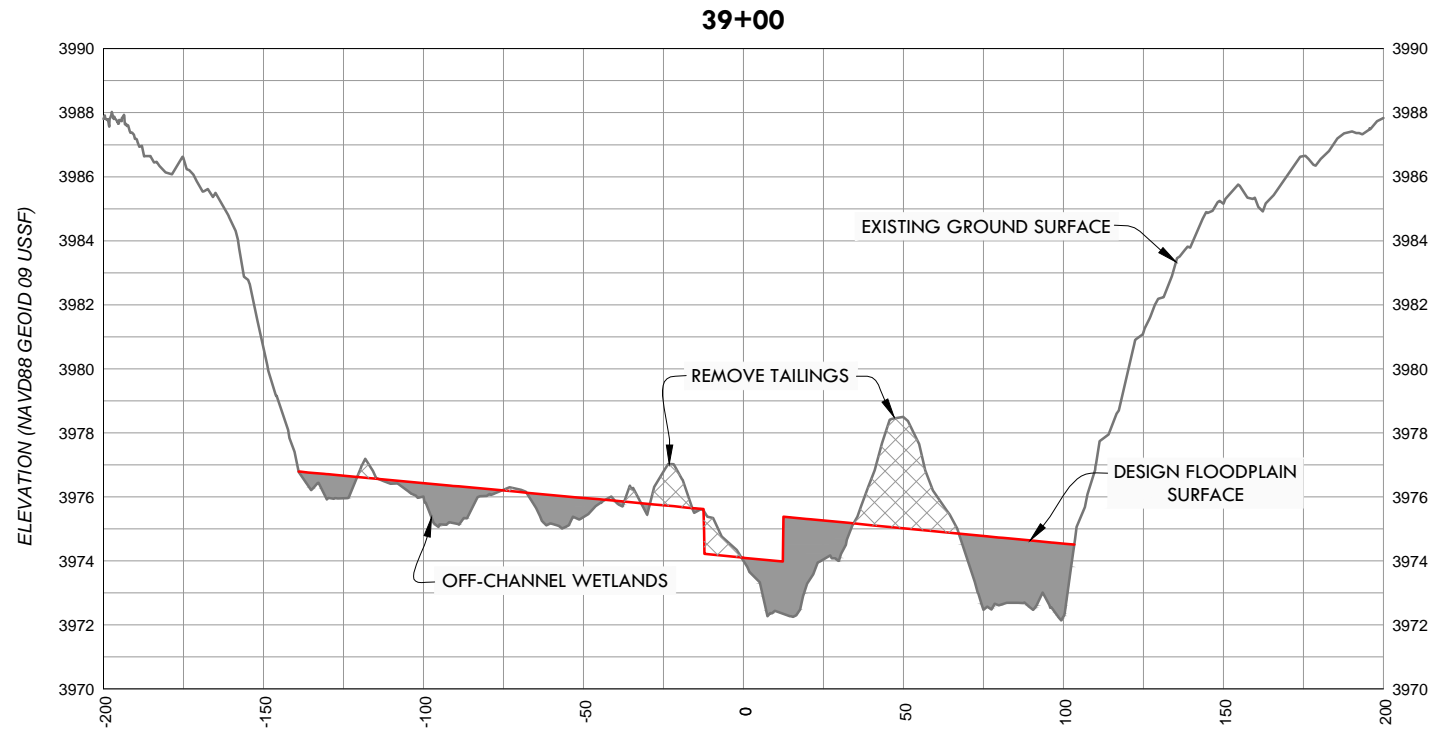
PLAN AND PROFILE - 3

Sawpit Creek
Mine Reclamation

NINEMILE CREEK
PROPOSED ALIGNMENT

STA 10+50 TO 11+77
SAWPIT CREEK
PROPOSED ALIGNMENT
STREAM TYPE - B3

FILL EXISTING POND

FLOW

STA 0+00 TO 10+50
SAWPIT CREEK
EXISTING AND PROPOSED
ALIGNMENT
STREAM TYPE - B3ₐ

CROSS SECTION
STA 7+00

CROSS SECTION
STA 6+00

FLOW

PLAN VIEW

0'   100'   200'

DESIGN FLOODPLAIN PROFILE

EXISTING GROUND PROFILE

ELEVATION (NAVD88 GEOID 09 USSF)

STATION ALONG CHANNEL CENTERLINE (FT)

PROFILE VIEW

0'   100'   200'

0'   15'   30'

CROSS SECTIONS
Sawpit Creek
Mine Reclamation

6+00

ELEVATION (NAVD88 GEOID 09 USSF)

REMOVE TAILINGS

EXISTING GROUND SURFACE

DESIGN FLOODPLAIN SURFACE

7+00

ELEVATION (NAVD88 GEOID 09 USSF)

EXISTING GROUND SURFACE

DESIGN FLOODPLAIN SURFACE

STATION ALONG CHANNEL CENTERLINE (FT)

LEGEND

CUT

FILL

PROFILE VIEW

6'
3'
0'

0'   30'   60'