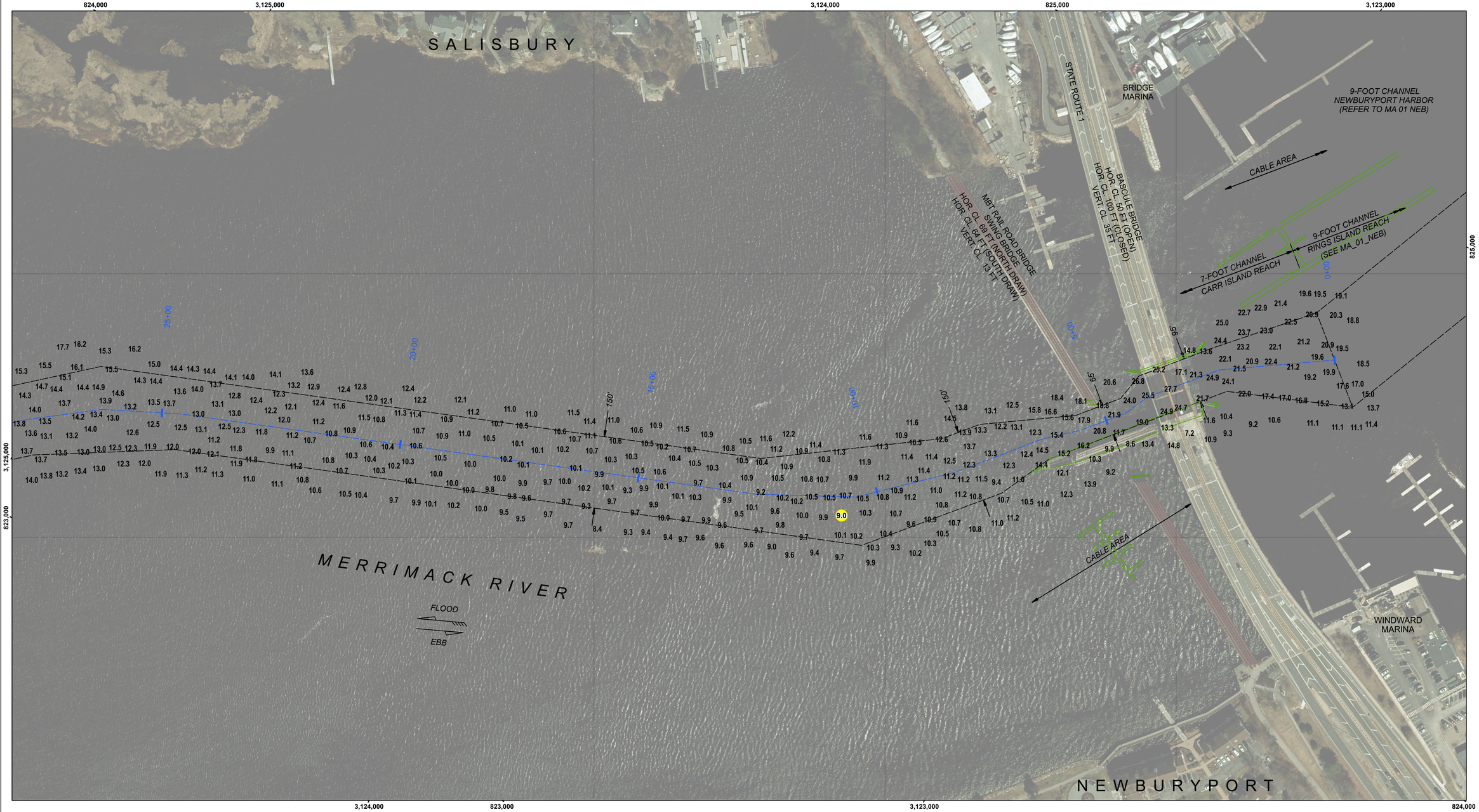
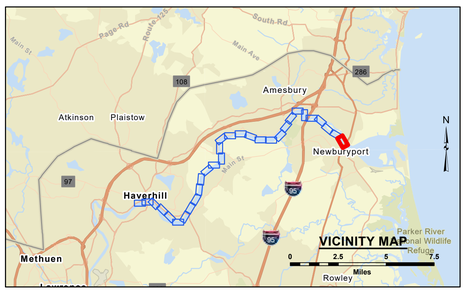




LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N E S W

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026

SIZE: ANSI D

MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY

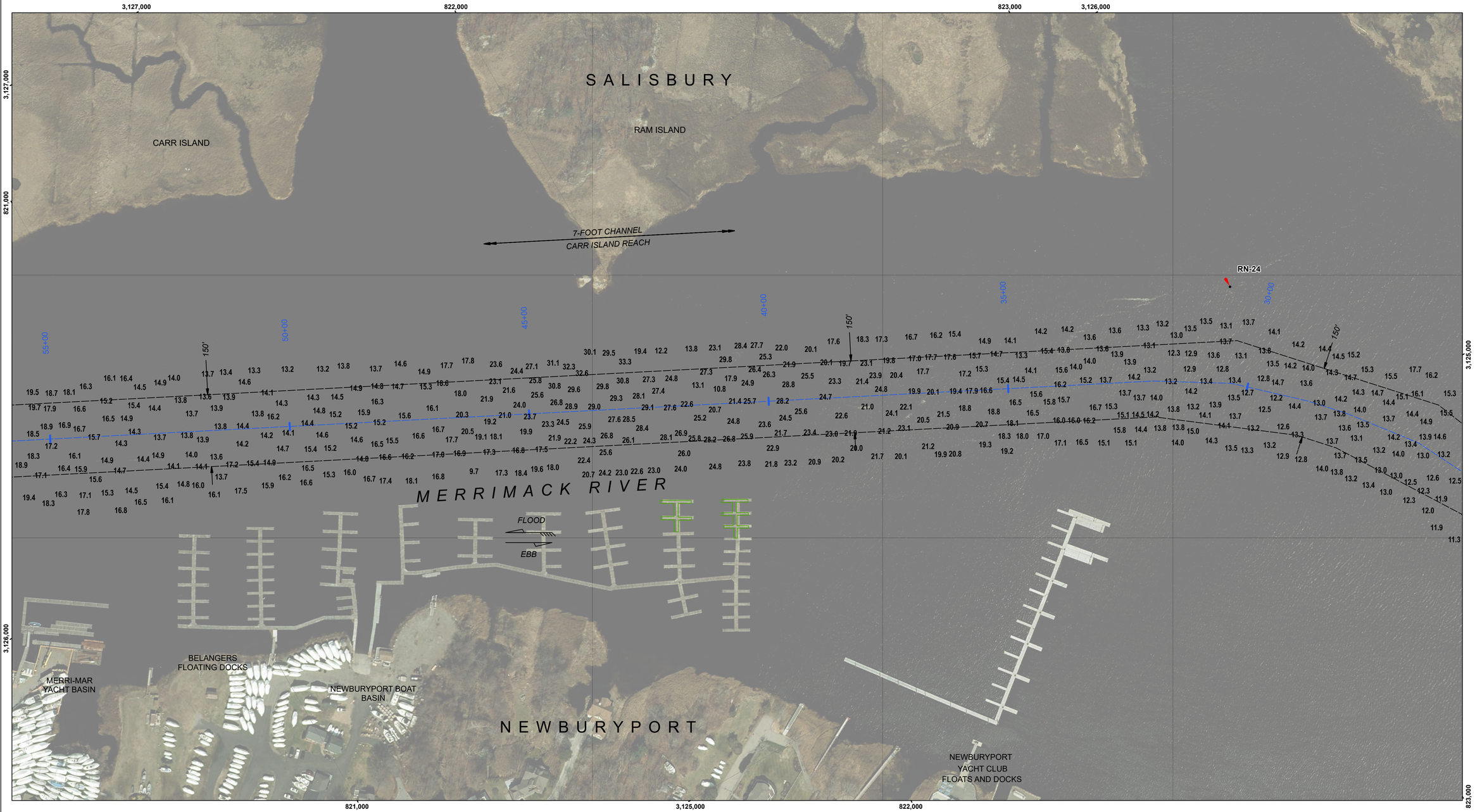
7-FOOT CHANNEL

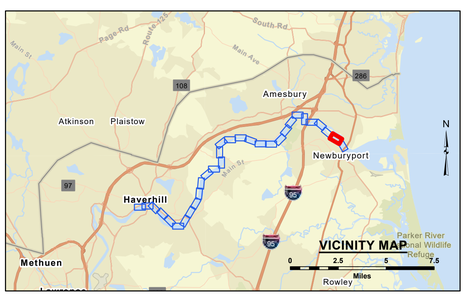
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 1 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N E S W

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Sounding Sort Distance: 30'
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

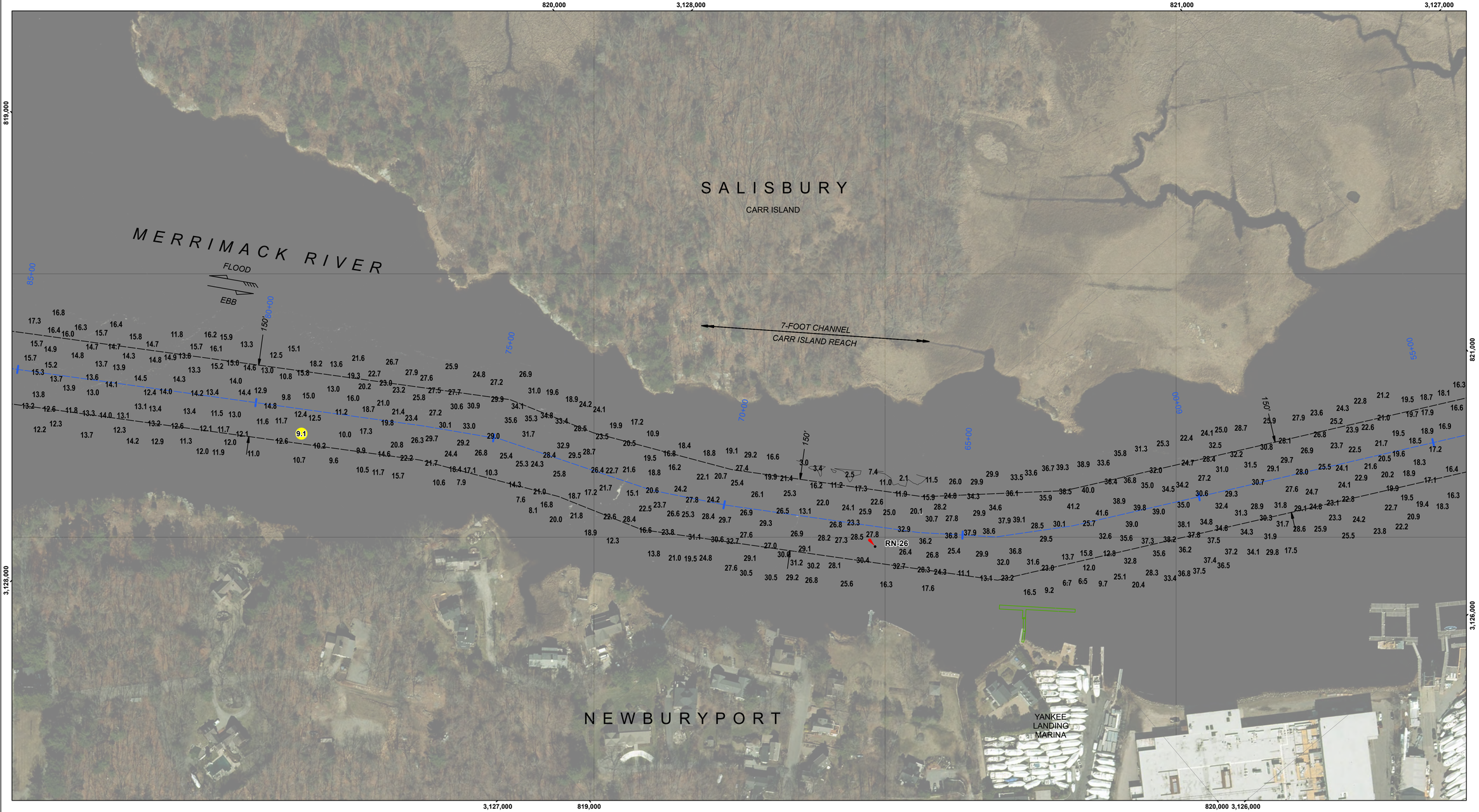
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERHILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

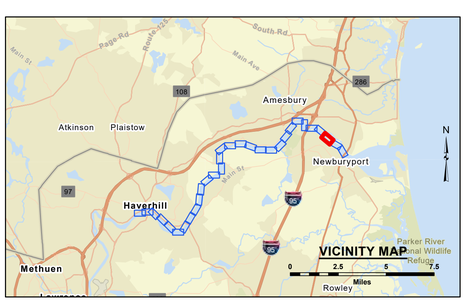
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 2 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE
100 0 100 200
1" = 100' Feet

Notes:
Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

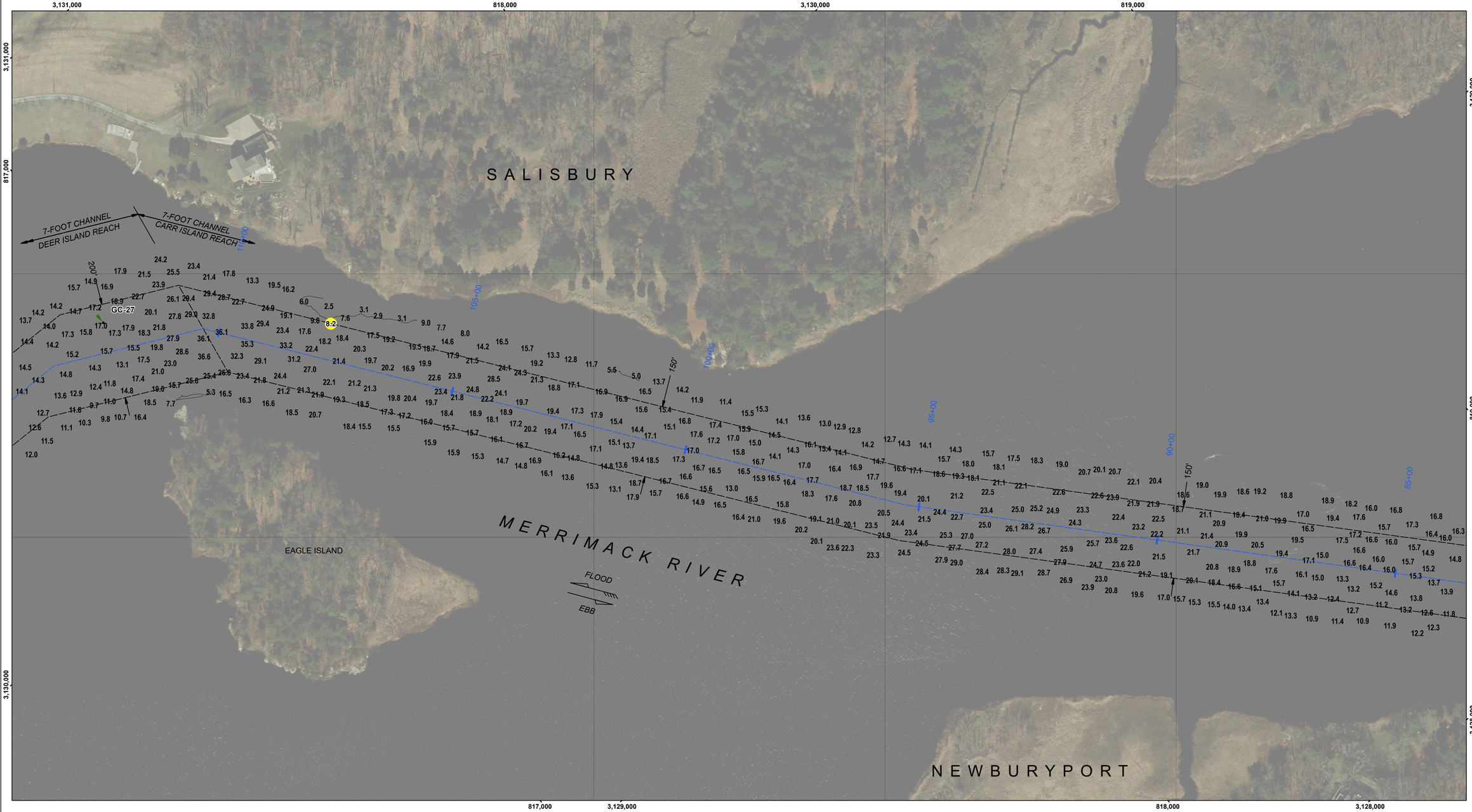
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
MAP DOCUMENT: MA_02_MER_20260831_CS_047
SIZE: ANSI D

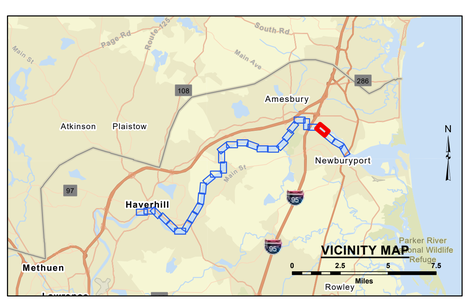
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 3 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100' (100 0 100 200 Feet)

N E S W

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERHILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 4 of 31

Revison Number: 5.26.04.06-5.26.04.06

814,000 815,000 816,000

3,131,000 3,130,000

AMESBURY

INTERSTATE 95

JOHN GREENLEAF WHITTIER FIXED BRIDGE
HOR CL 465 FT (MAIN) 271 (AUX)
VERT CL 55' (MAIN) 48 (AUX)

HINES MEMORIAL SWING BRIDGE
HOR CL 54' FT
VERT CL 14 FT

7-FOOT CHANNEL
DEER ISLAND REACH

MERRIMACK RIVER

FLOOD

EBB

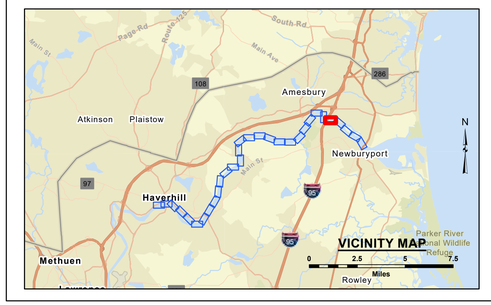
CABLE AREA

DEER ISLAND

ESSEX/MERRIMAC FIXED BRIDGE
HOR CL 220 FT
VERT CL 28 FT

145+00 140+00 135+00 130+00 125+00 120+00 115+00

150' 50'



LEGEND

- Federal Navigation Channel
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- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

MAP DOCUMENT: MA_02_MER_20260831_CS_047

SIZE: ANSI D

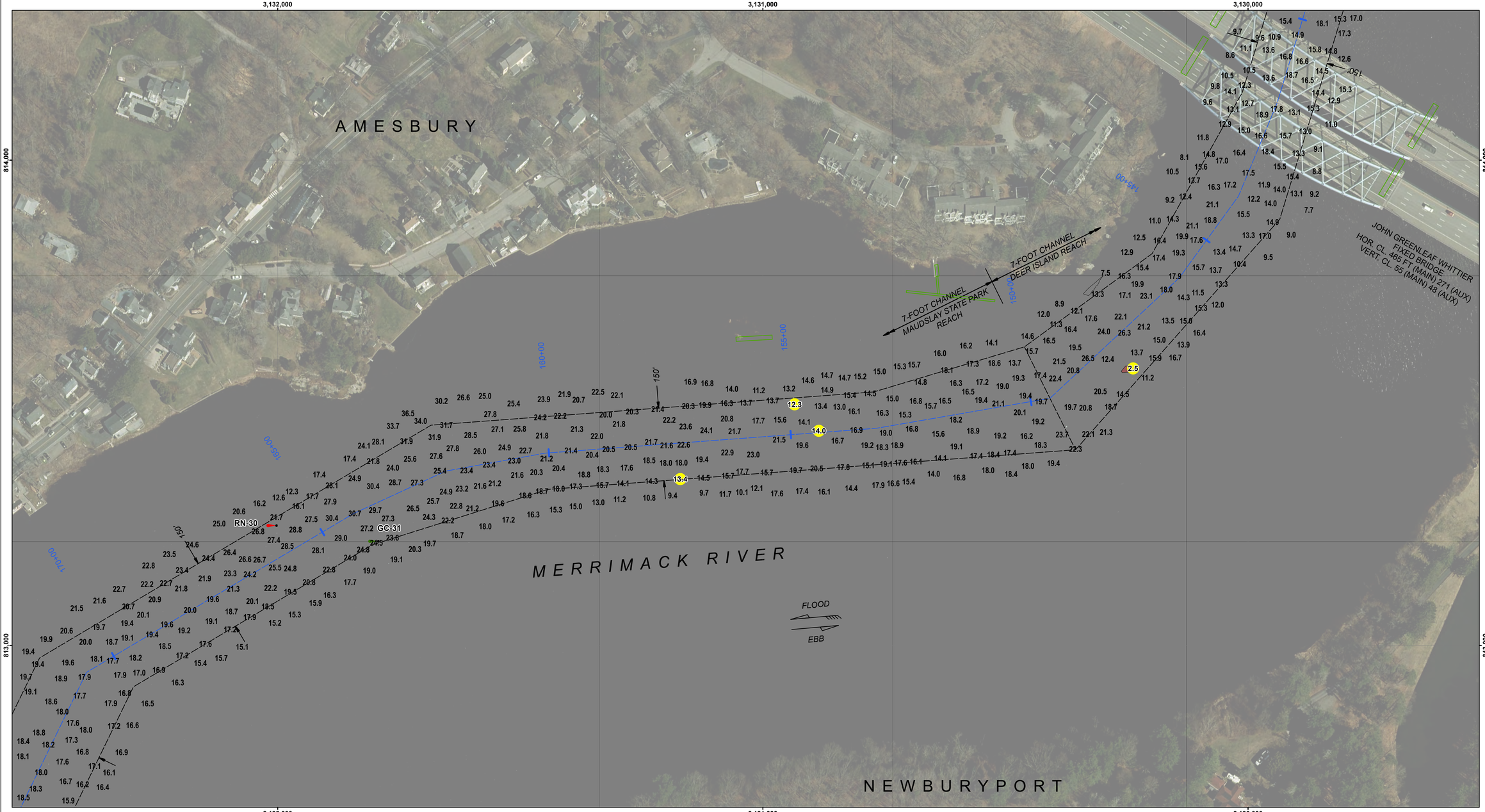
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

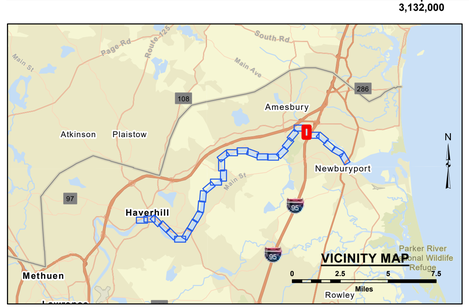
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 5 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
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- Green Navigation Buoy*
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- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

E N S W

Notes:

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Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
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Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
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RTK Base Station: MTS Smartnet Max
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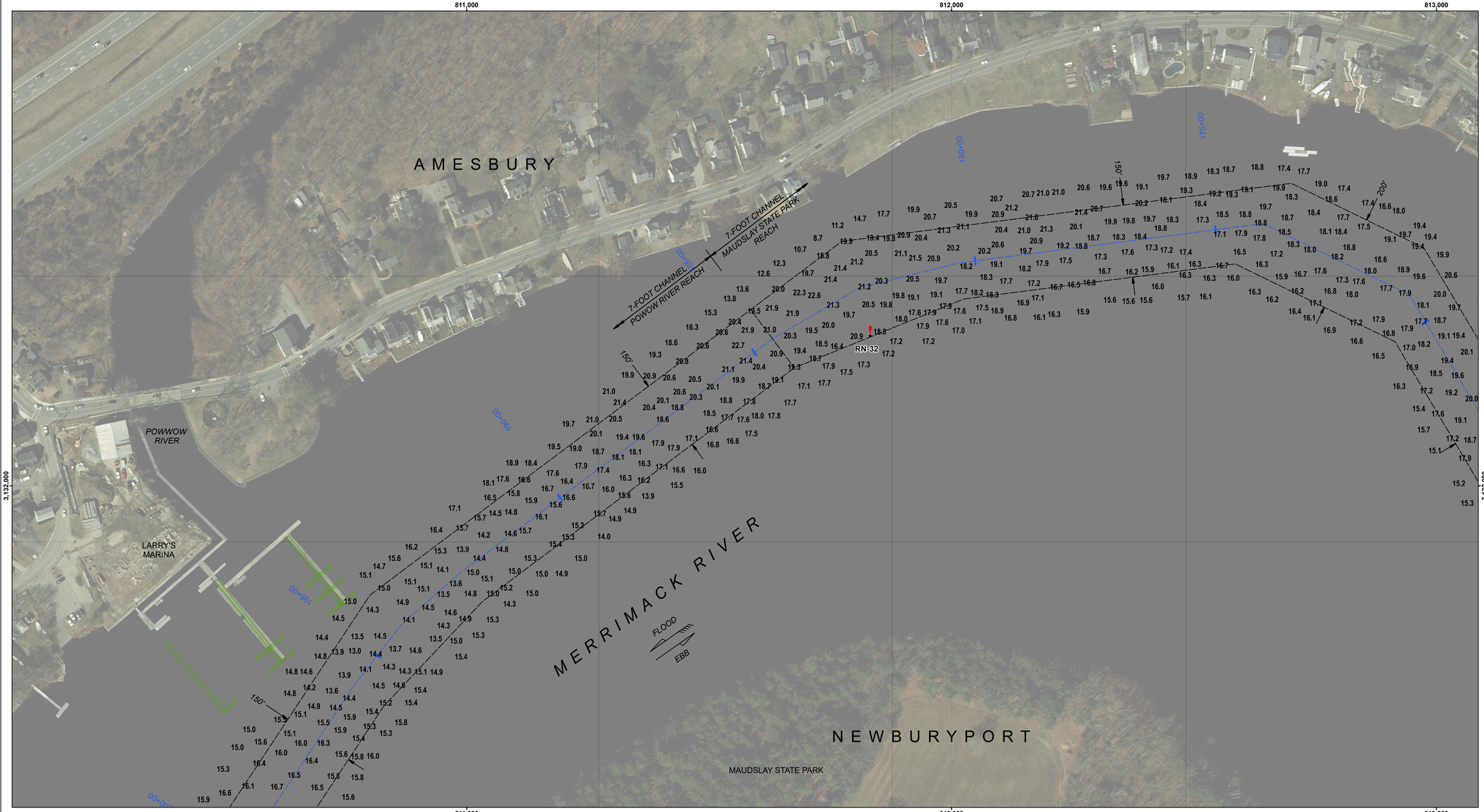
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

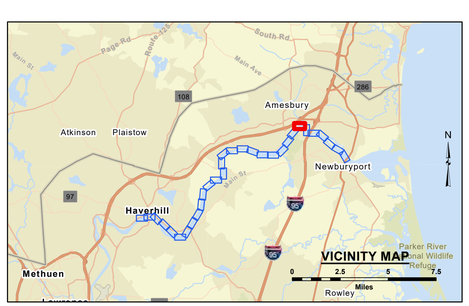
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
MAP DOCUMENT: MA_02_MER_20260831_CS_047
SIZE: ANSI D

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River
Sheet 6 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100' 100 0 100 200 Feet

N W E S

Notes:
Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks
Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information
Tides were recorded using RTK GPS.NAVD88 to MLLW corrections were logged utilizing a Hypack KTD file. The corrections in the project area range from 4.22 feet to 0.22 feet. From Carr Island Reach to Haverhill Heights Reach. MLLW is below NAVD88; therefore, the correction should be added to NAVD88 to convert to MLLW (e.g.-10 NAV88 = -8 MLLW when using a 2-foot correction).

US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

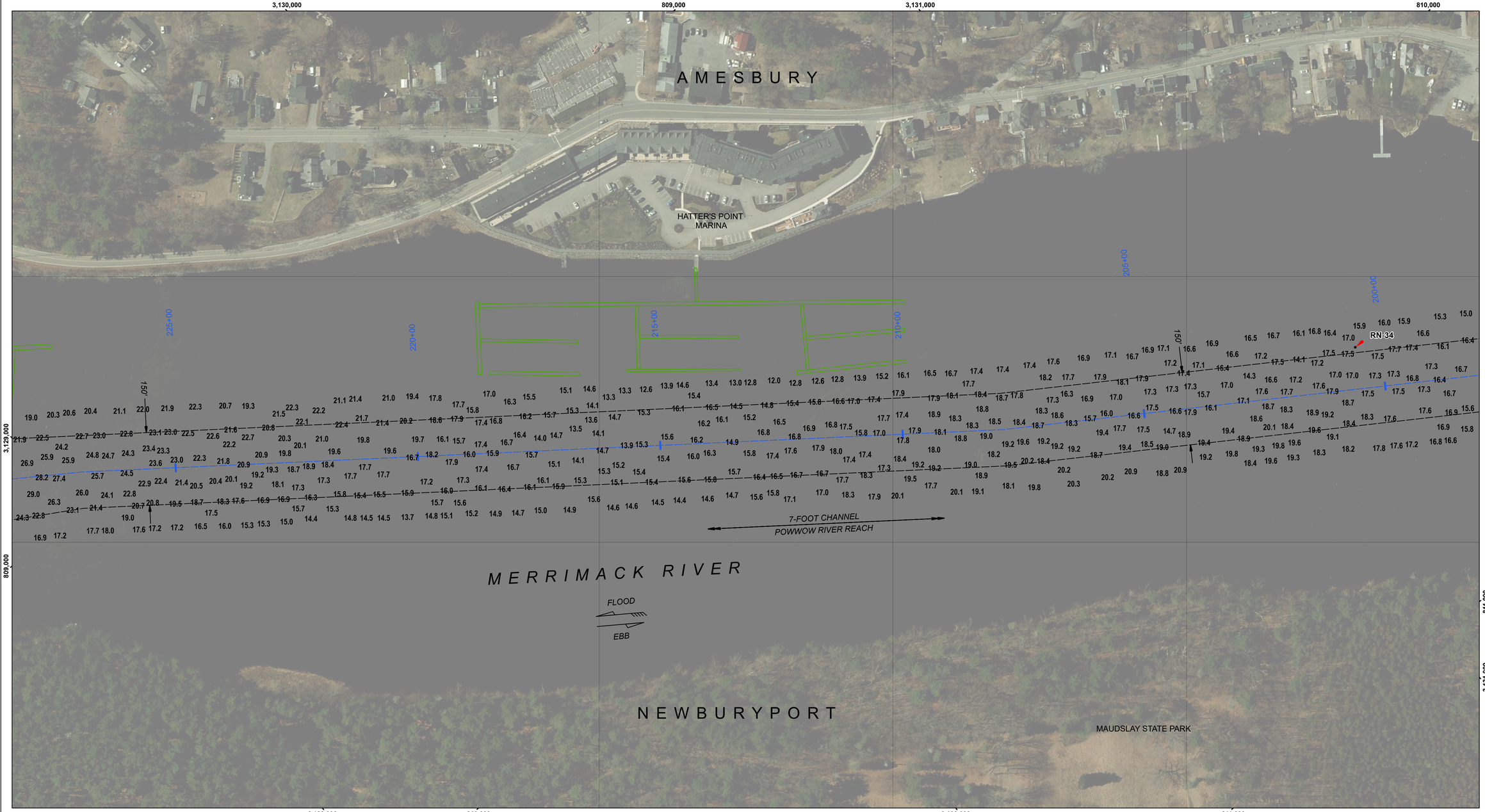
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

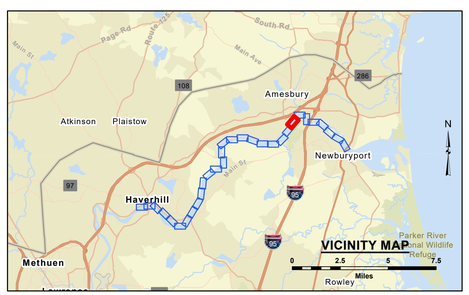
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River
Sheet 7 of 31

Revison Number: 5.26.04.06-5.26.04.06

CORPS OF ENGINEERS U.S. ARMY





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

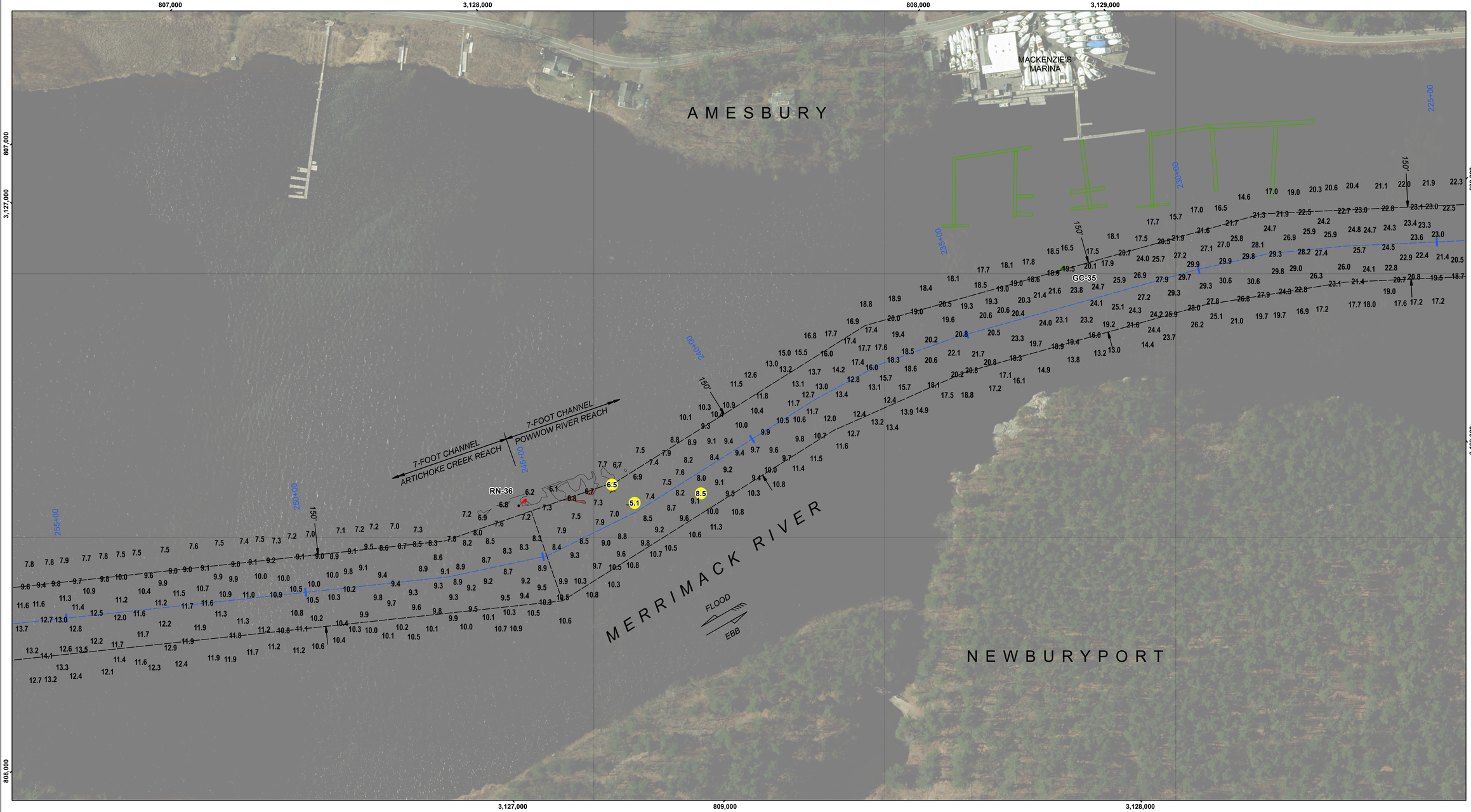
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

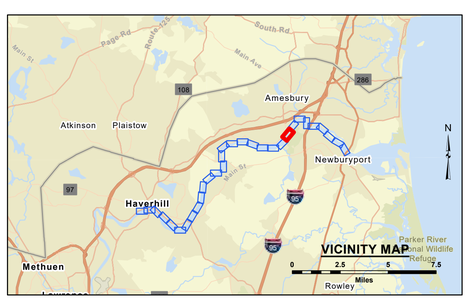
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 8 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE
100 0 100 200
1" = 100' Feet

Notes:
Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks
Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

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District: CENAE

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NEW ENGLAND DISTRICT

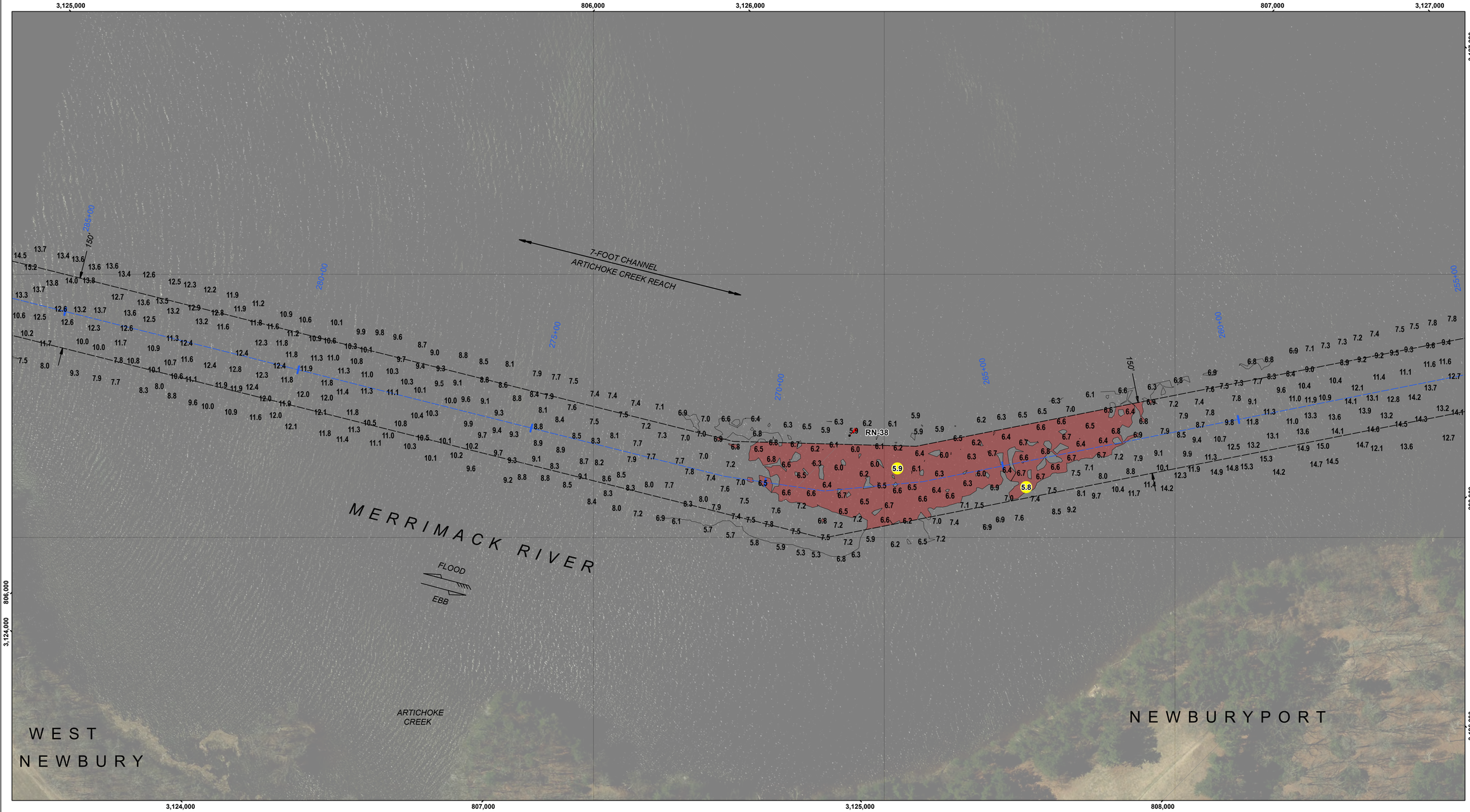
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
MAP DOCUMENT: MA_02_MER_20260831_CS_047
SIZE: ANSI D

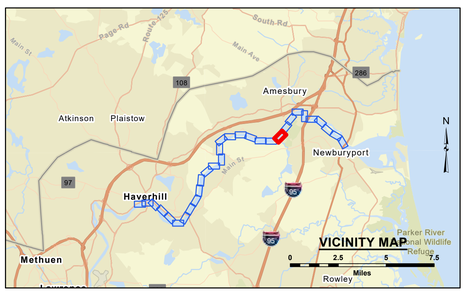
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 9 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

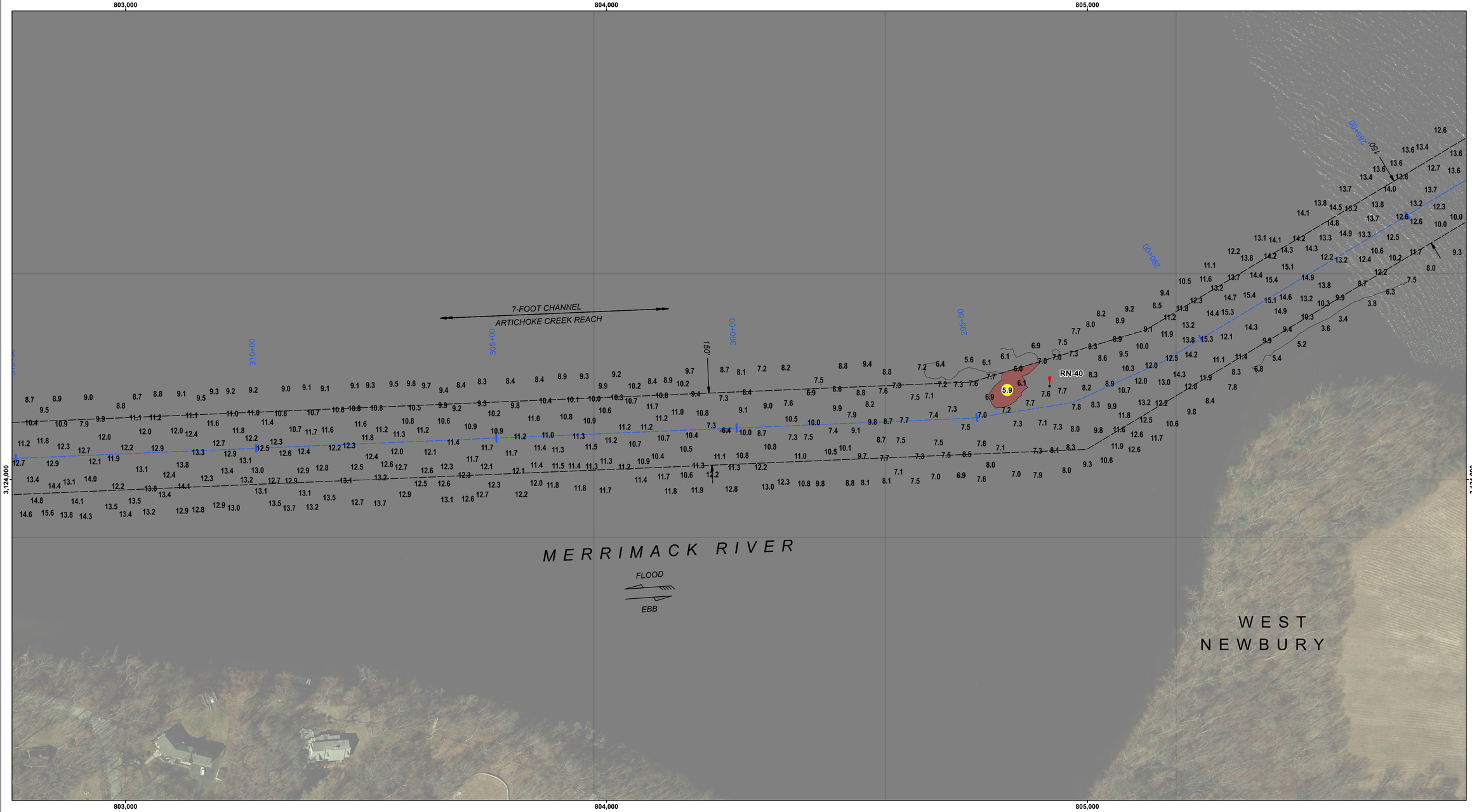
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

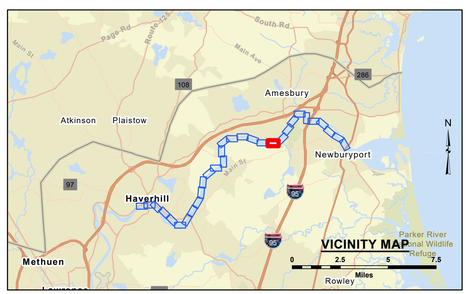
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 10 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERHILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 11 of 31

Revison Number: 5.26.04.06-5.26.04.06

800,000 801,000 802,000

3,125,000

AMESBURY

345+00 340+00 335+00 330+00 320+00 315+00

7-FOOT CHANNEL
COBBLER BROOK REACH

7-FOOT CHANNEL
ARTICHOKE CREEK REACH

150'

RN-42

6.4

3,124,000

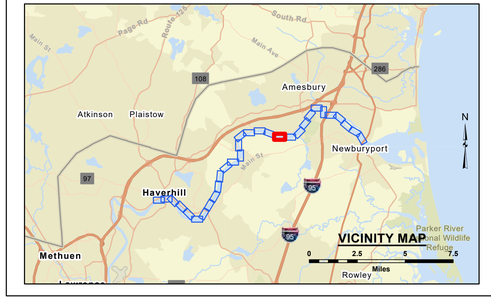
MERRIMACK RIVER

FLOOD

EBB

WEST NEWBURY

800,000 801,000 802,000



LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
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- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100'

100 0 100 200 Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
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Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Water Level Information

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US Army Corps of Engineers
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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026

SIZE: ANSI D

MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY

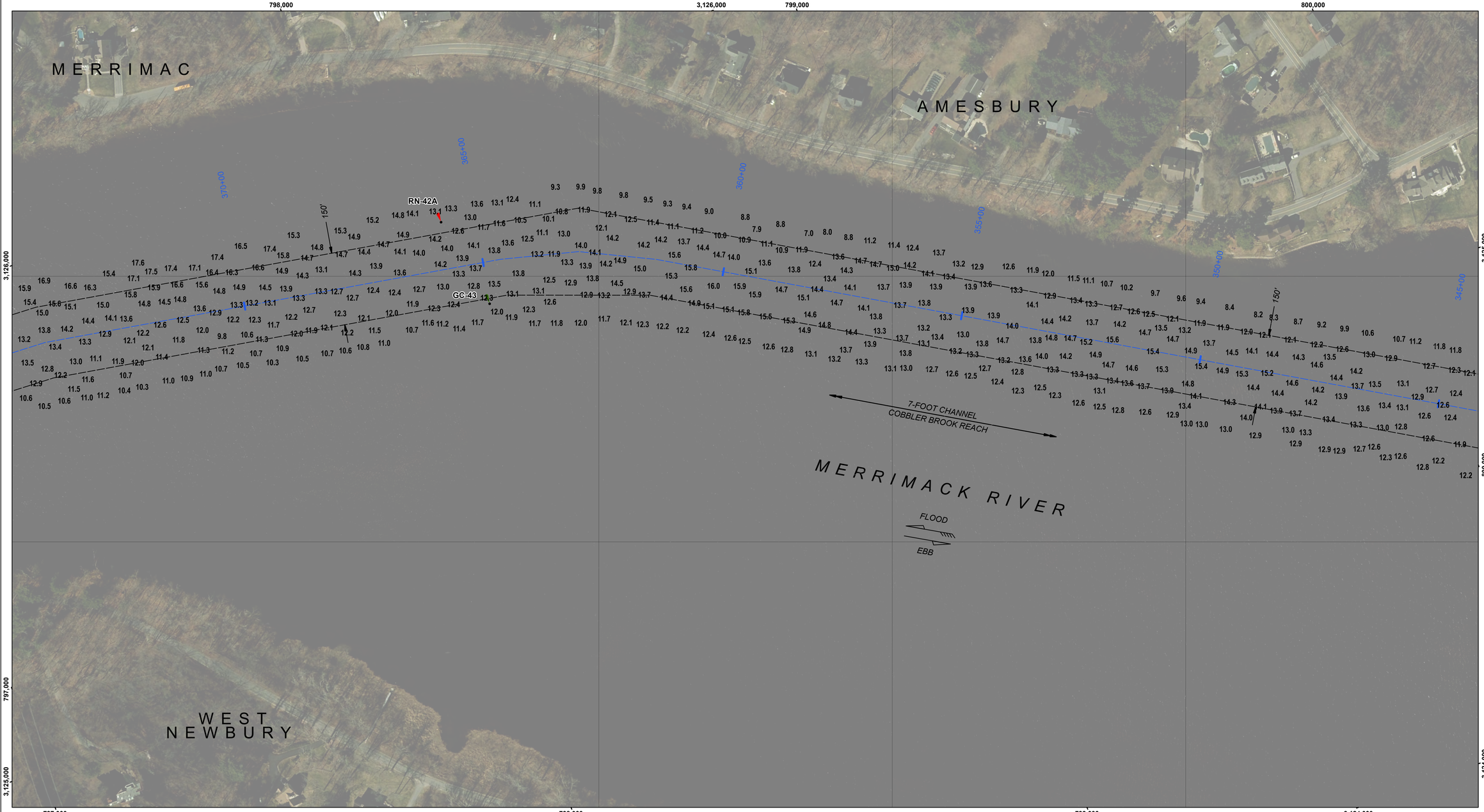
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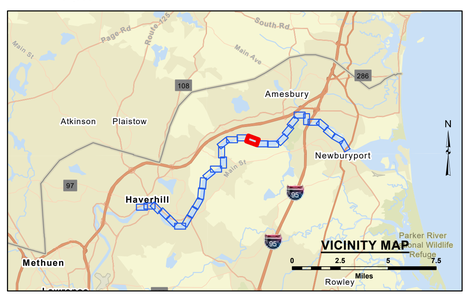
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 12 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N E S W

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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General Notes

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

Tides were recorded using RTK GPS.NAVD88 to MLLW corrections were logged utilizing a Hypack KTD file. The corrections in the project area range from 4.22 feet to 0.22 feet. From Carr Island Reach to Haverhill Heights Reach. MLLW is below NAVD88; therefore, the correction should be added to NAVD88 to convert to MLLW (e.g.-10 NAV88 = -8 MLLW when using a 2-foot correction).

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District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026

SIZE: ANSI D

MAP DOCUMENT: MA_02_MER_20260831_CS_047

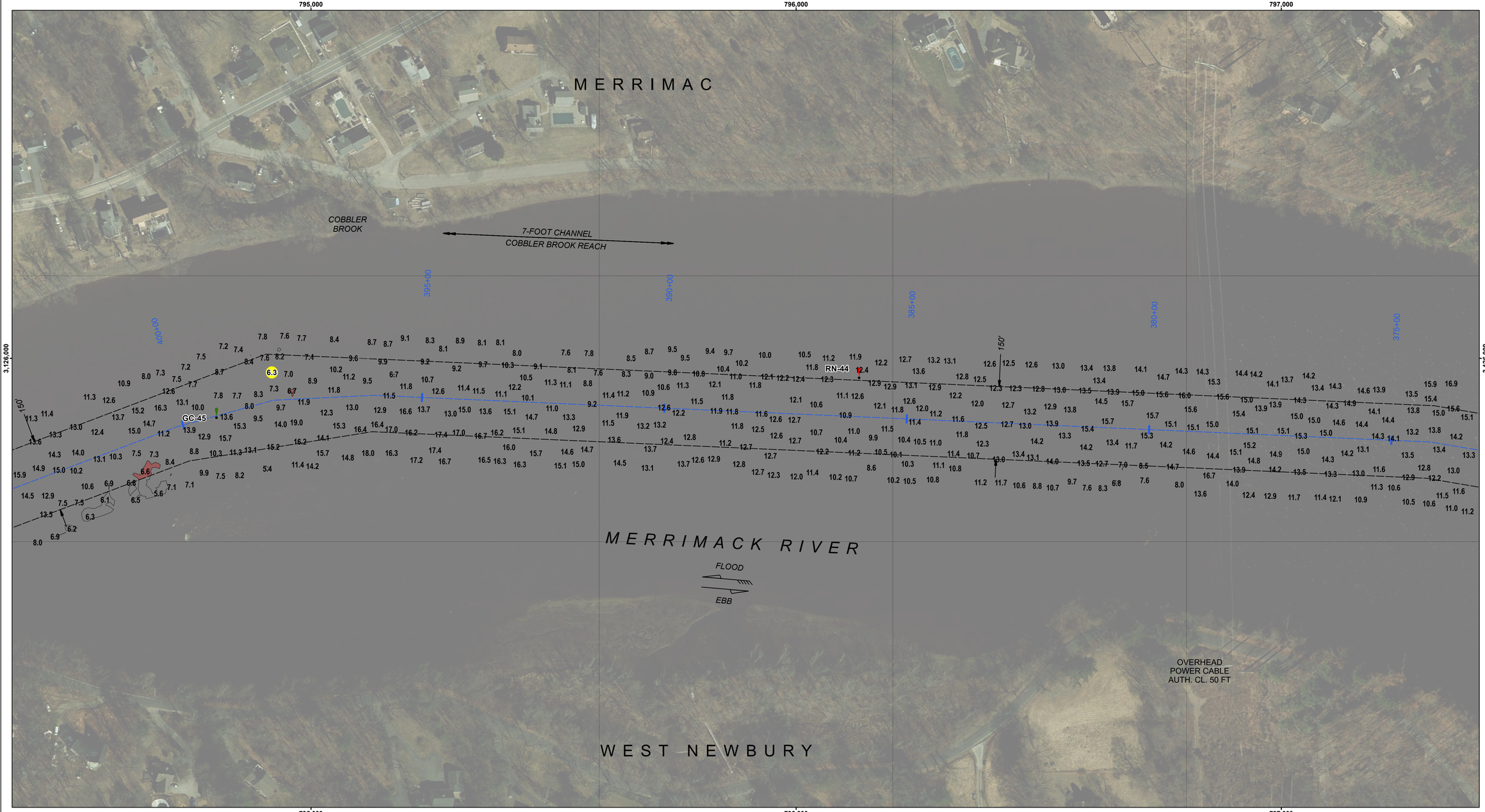
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

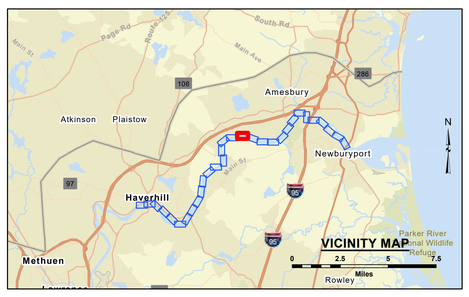
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SHEET IDENTIFICATION
Merrimack River

Sheet 13 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100' 100 0 100 200 Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

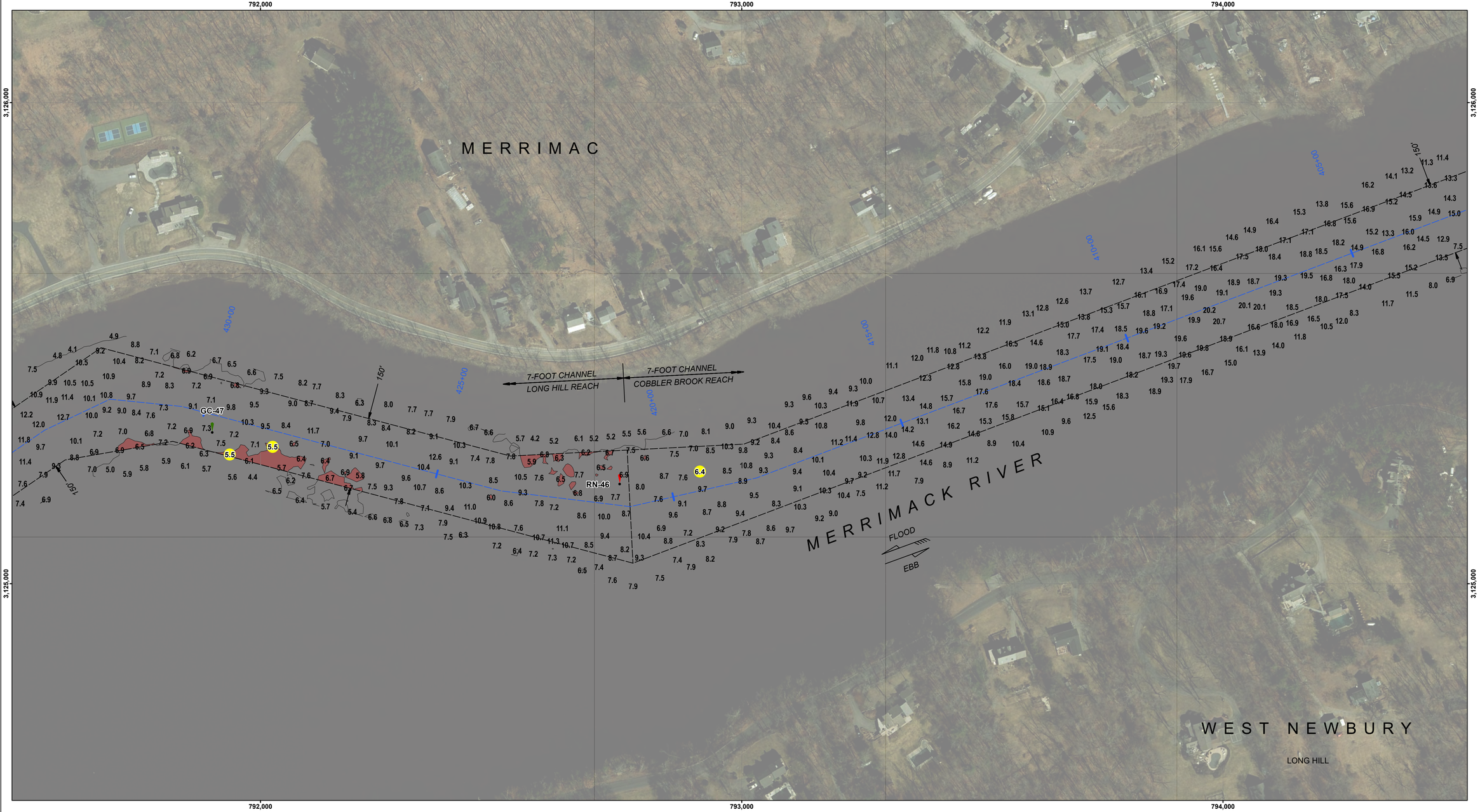
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

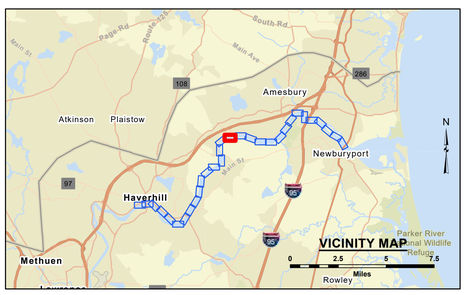
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 14 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

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District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

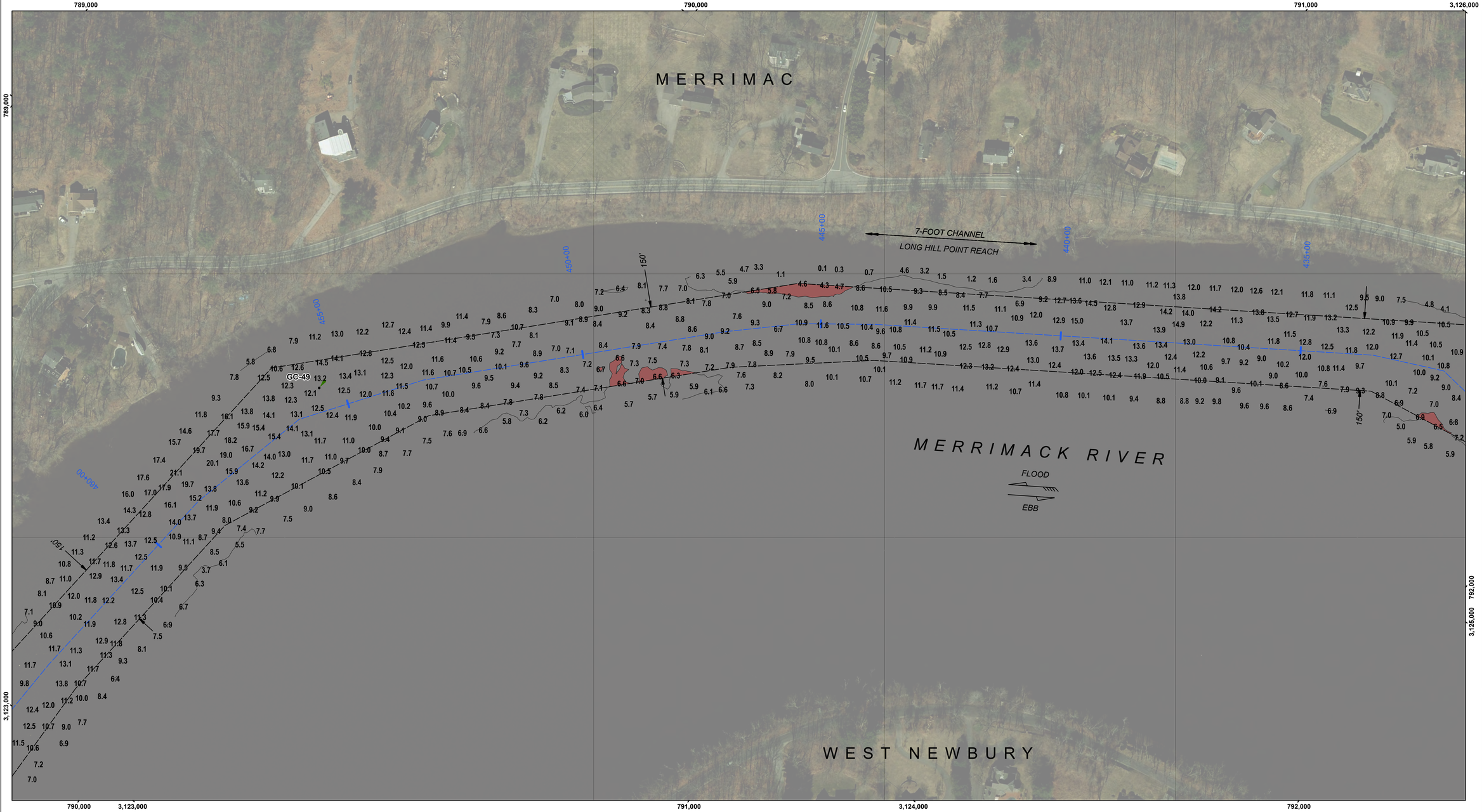
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERHILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

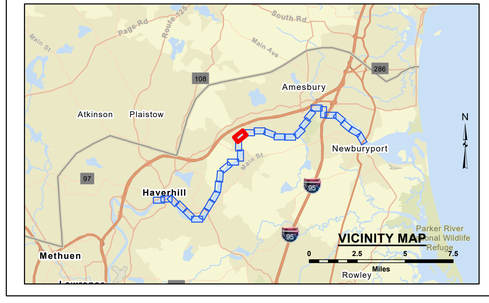
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 15 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

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Water Level Information

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D

MAP DOCUMENT: MA_02_MER_20260831_CS_047

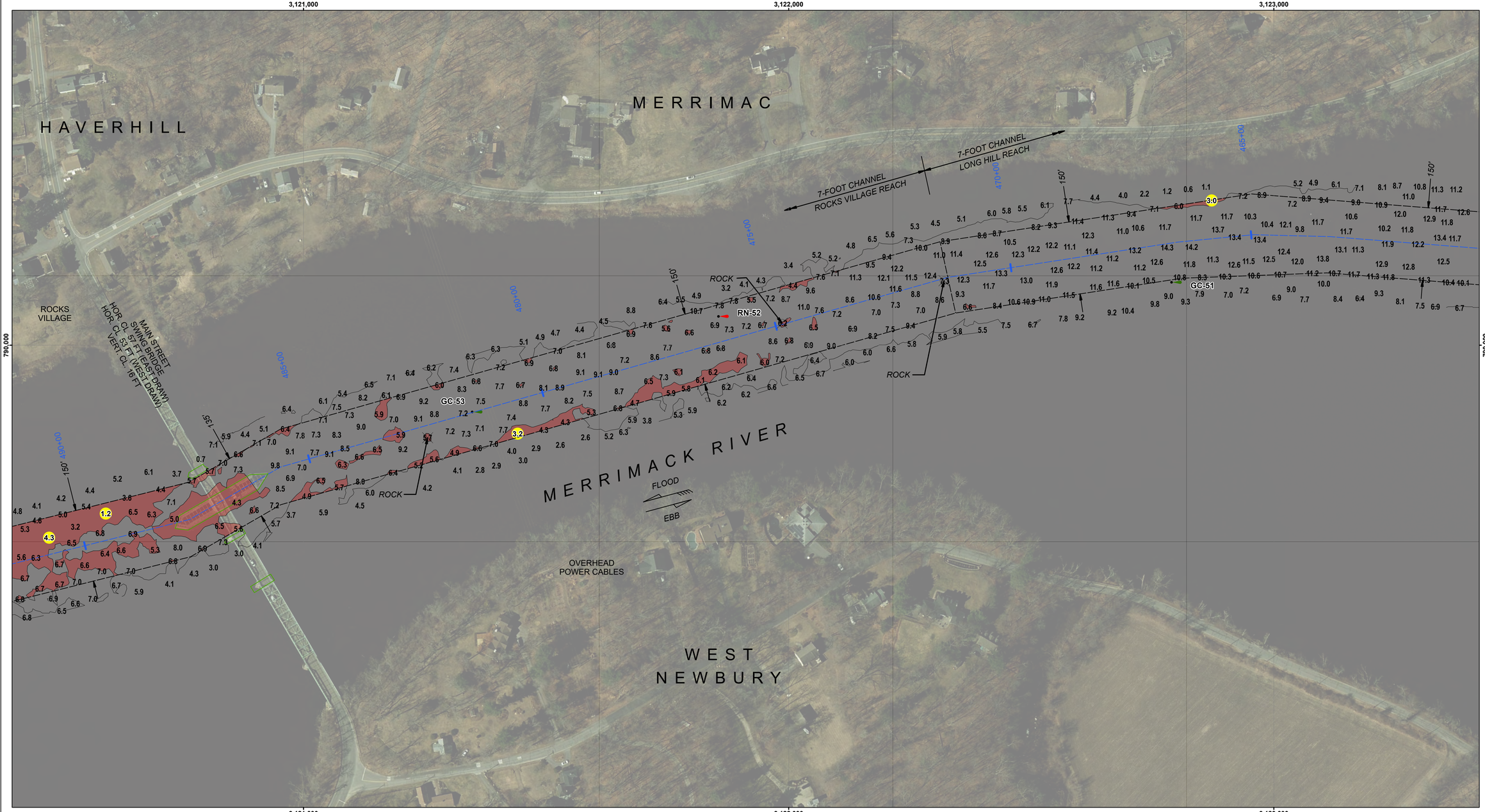
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
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AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

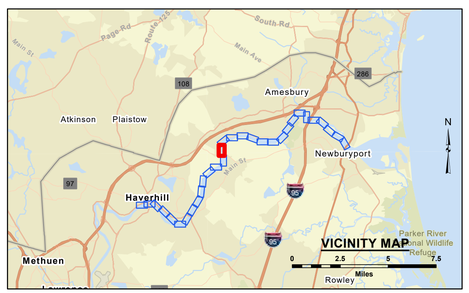
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SHEET IDENTIFICATION
Merrimack River

Sheet 16 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE
100 0 100 200
1" = 100' Feet

Notes:
Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks
Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information
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US Army Corps of Engineers
District: CENAE

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NEW ENGLAND DISTRICT

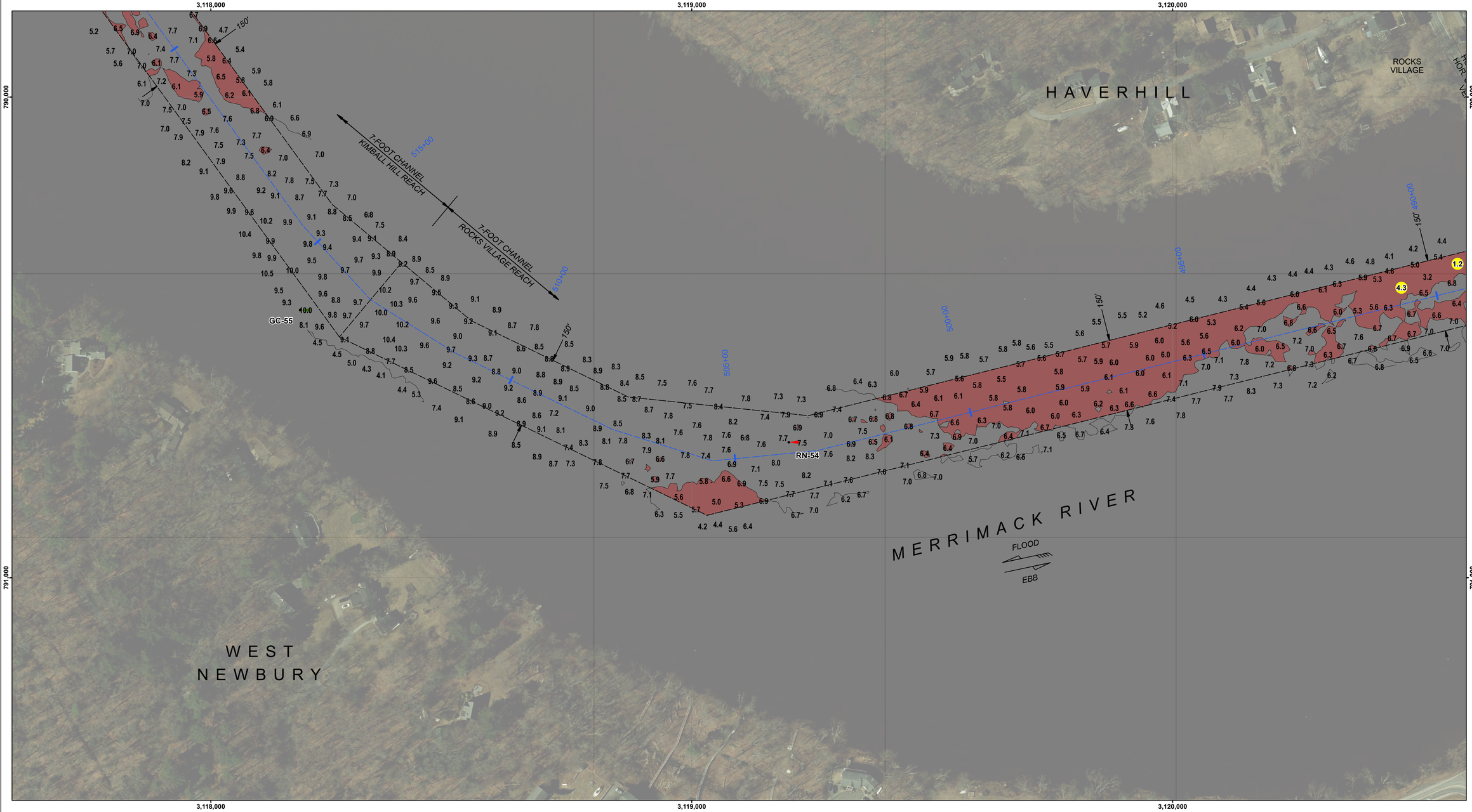
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

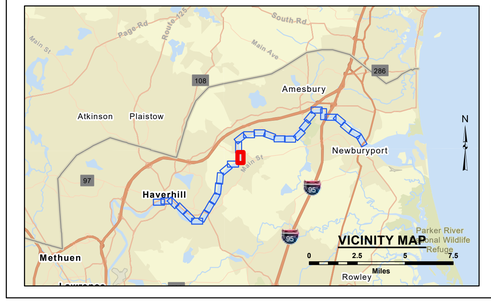
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 17 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100' 100 0 100 200 Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Sounding Sort Distance: 30'
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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General Notes

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

Tides were recorded using RTK GPS.NAVD88 to MLLW corrections were logged utilizing a Hypack KTD file. The corrections in the project area range from 4.22 feet to 0.22 feet. From Carr Island Reach to Haverhill Heights Reach. MLLW is below NAVD88; therefore, the correction should be added to NAVD88 to convert to MLLW (e.g.-10 NAV88 = -8 MLLW when using a 2-foot correction).

US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

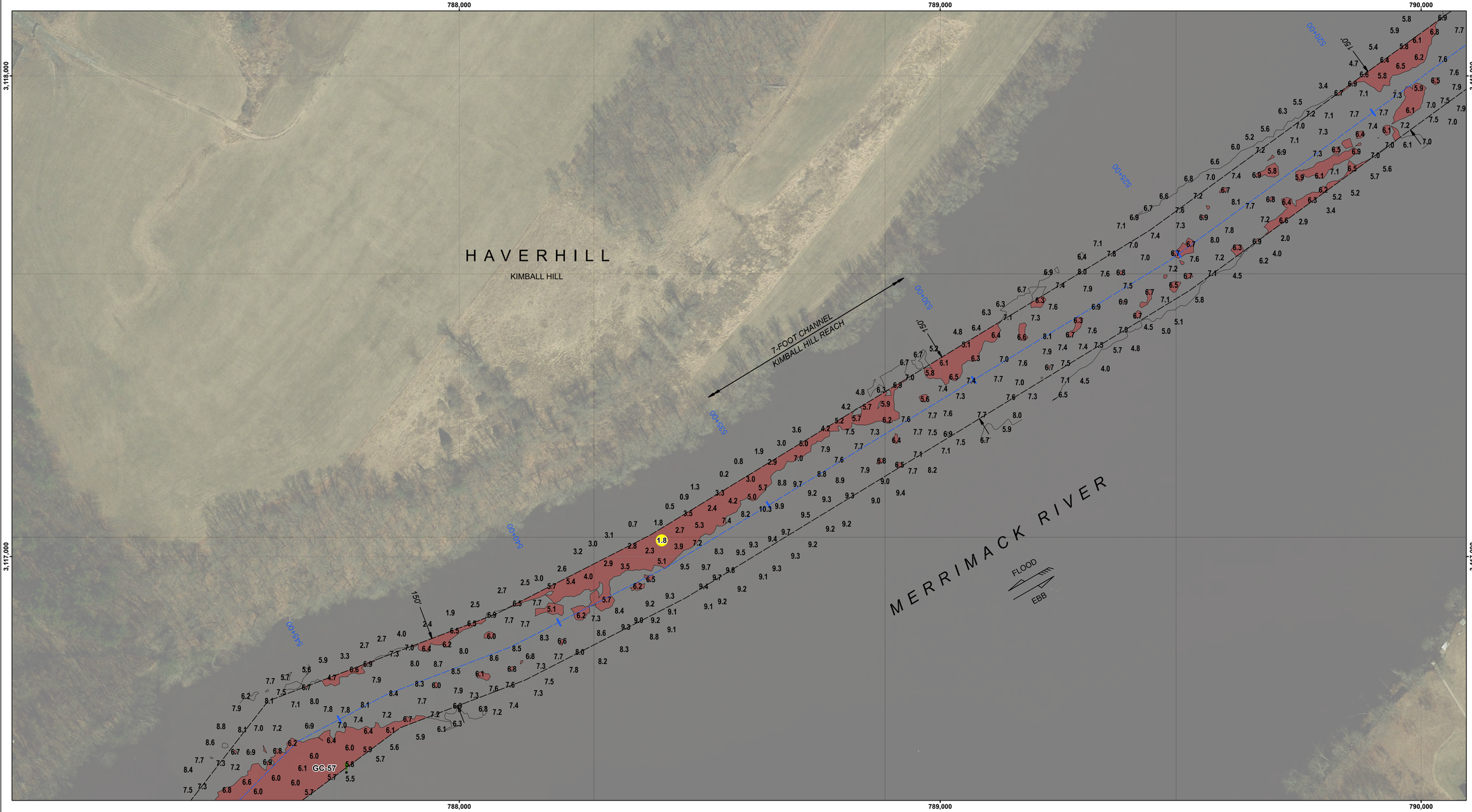
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERHILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

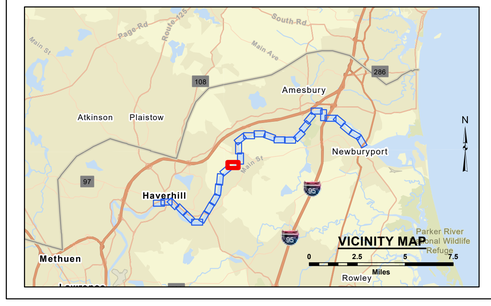
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 18 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D

MAP DOCUMENT: MA_02_MER_20260831_CS_047

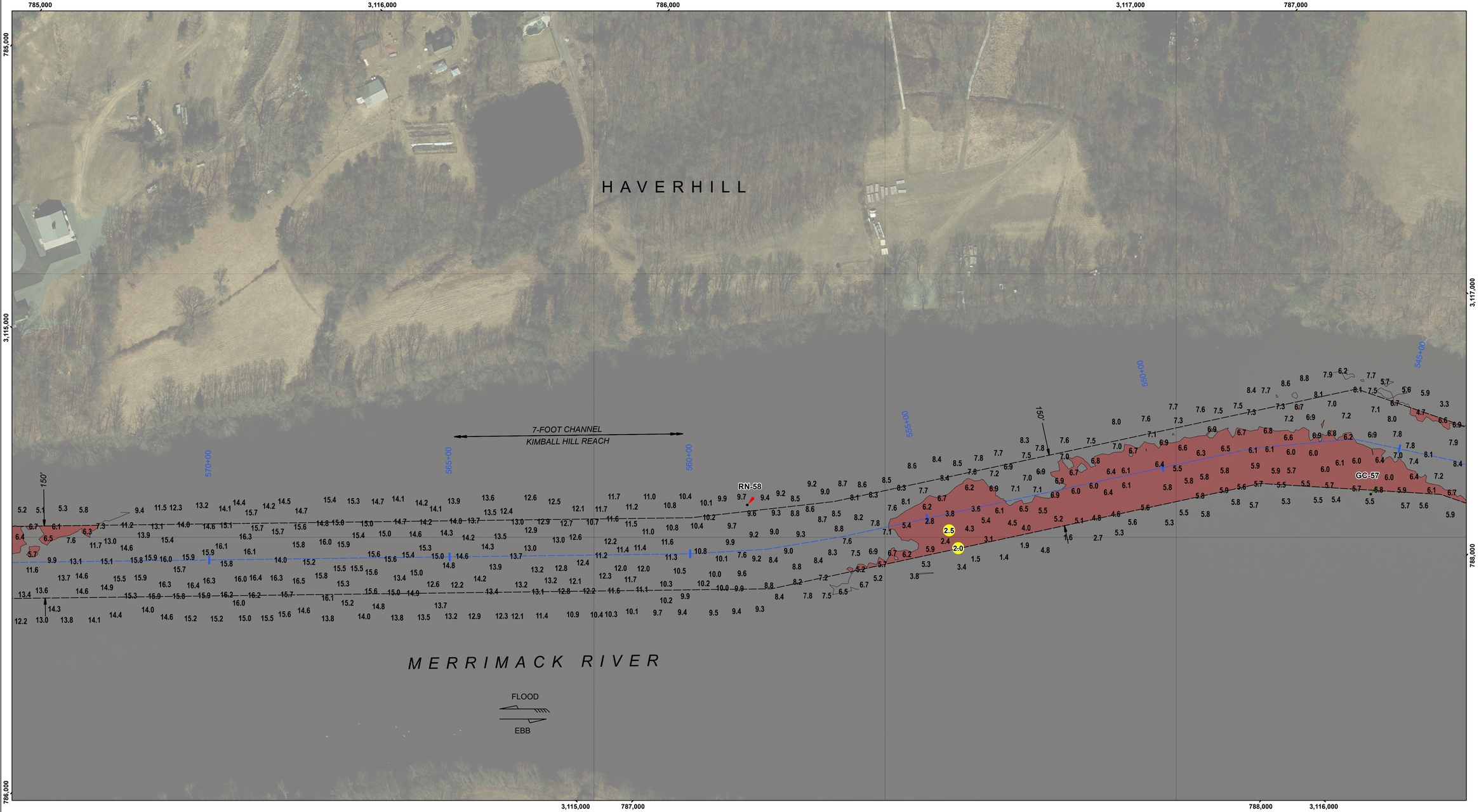
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

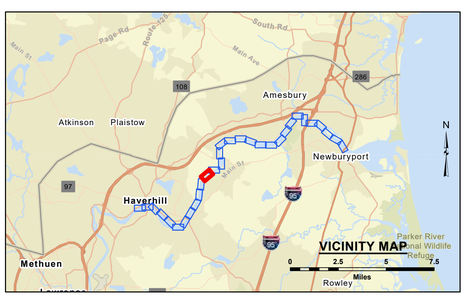
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 19 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

The information depicted on these charts represents the results of surveys made on the dates indicated, and can only be considered as indicating the conditions existing at that time.

General Notes

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

Tides were recorded using RTK GPS.NAVD88 to MLLW corrections were logged utilizing a Hypack KTD file. The corrections in the project area range from 4.22 feet to 0.22 feet. From Carr Island Reach to Haverhill Heights Reach, MLLW is below NAVD88; therefore, the correction should be added to NAVD88 to convert to MLLW (e.g.-10 NAV88 = -8 MLLW when using a 2-foot correction).

US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
MAP DOCUMENT: MA_02_MER_20260831_CS_047
SIZE: ANSI D

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 20 of 31

Revison Number: 5.26.04.06-5.26.04.06

3,112,000 3,113,000 3,114,000

785,000

HAVERHILL

MERRIMACK RIVER

FLOOD

EBB

WEST NEWBURY

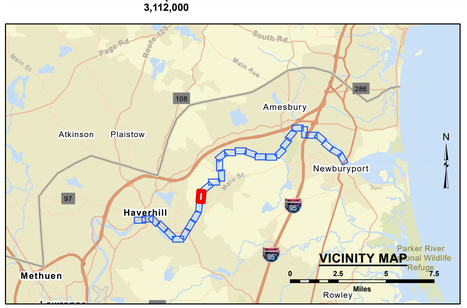
800+00 595+00 590+00 585+00 580+00 575+00

150' 150'

7-FOOT CHANNEL
COTTLES CREEK REACH

7-FOOT CHANNEL
KIMBALL HILL REACH

GC-61 GC-59



LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

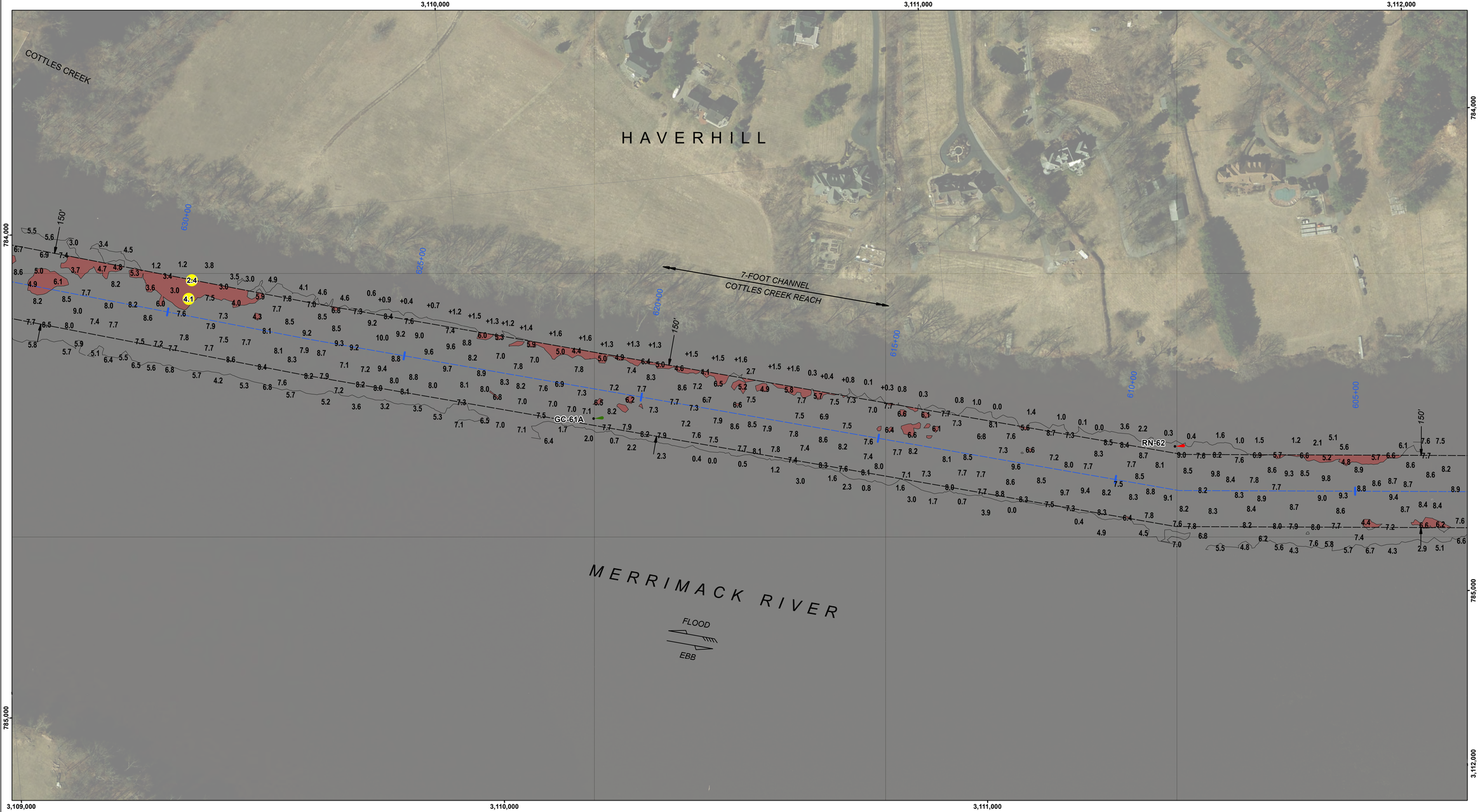
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
MAP DOCUMENT: MA_02_MER_20260831_CS_047
SIZE: ANSI D

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 21 of 31

Revison Number: 5.26.04.06-5.26.04.06



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US Army Corps of Engineers
District: CENAE

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

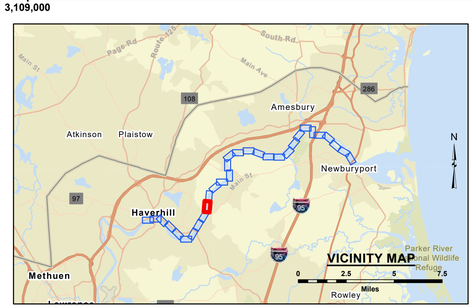
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 22 of 31



LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE
100 0 100 200
1" = 100' Feet

Notes:
Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

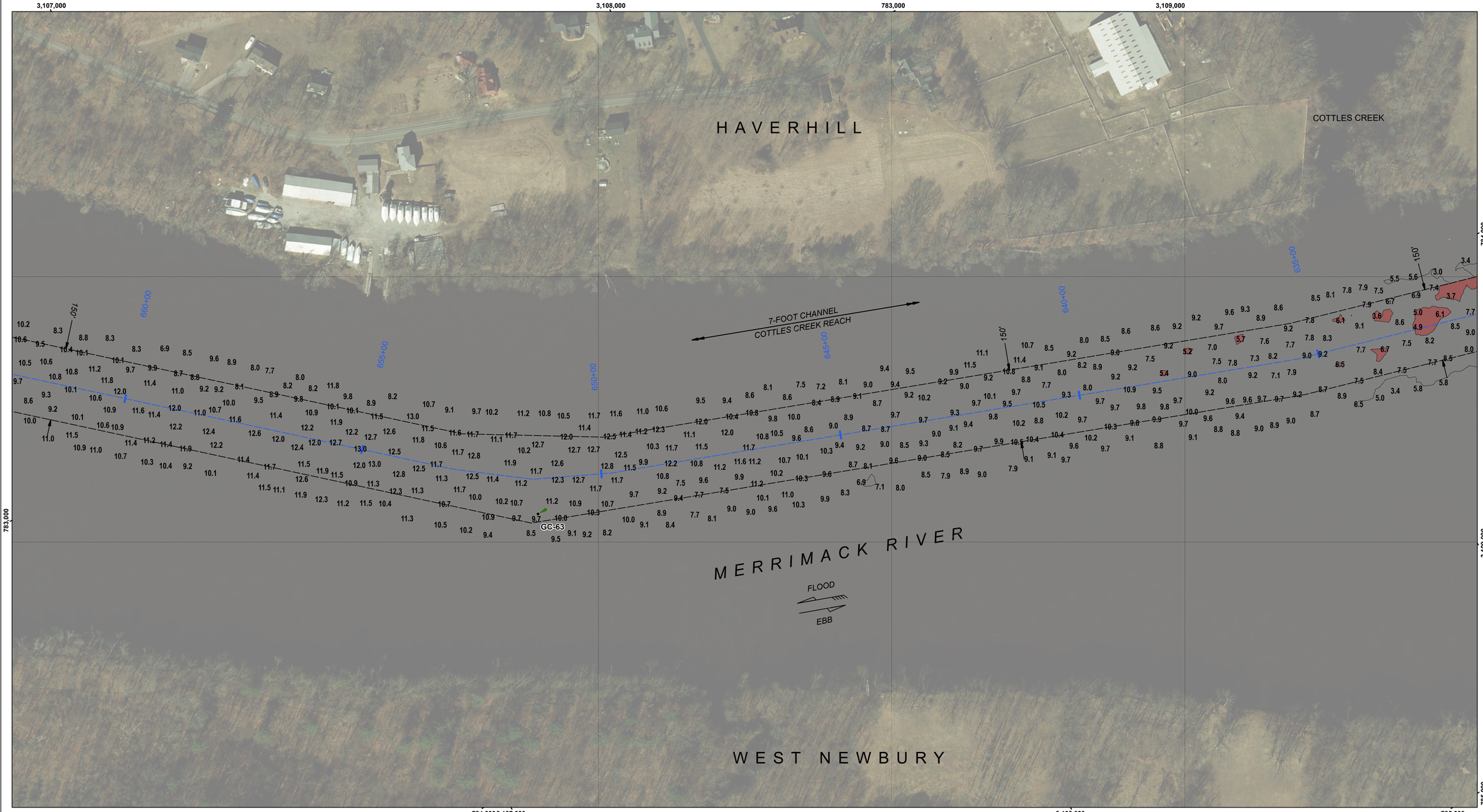
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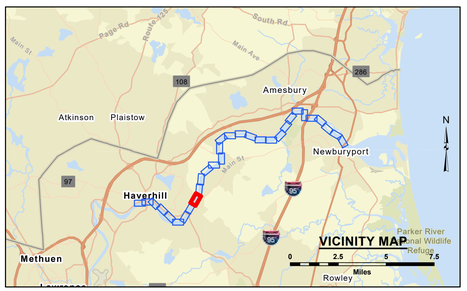
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Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

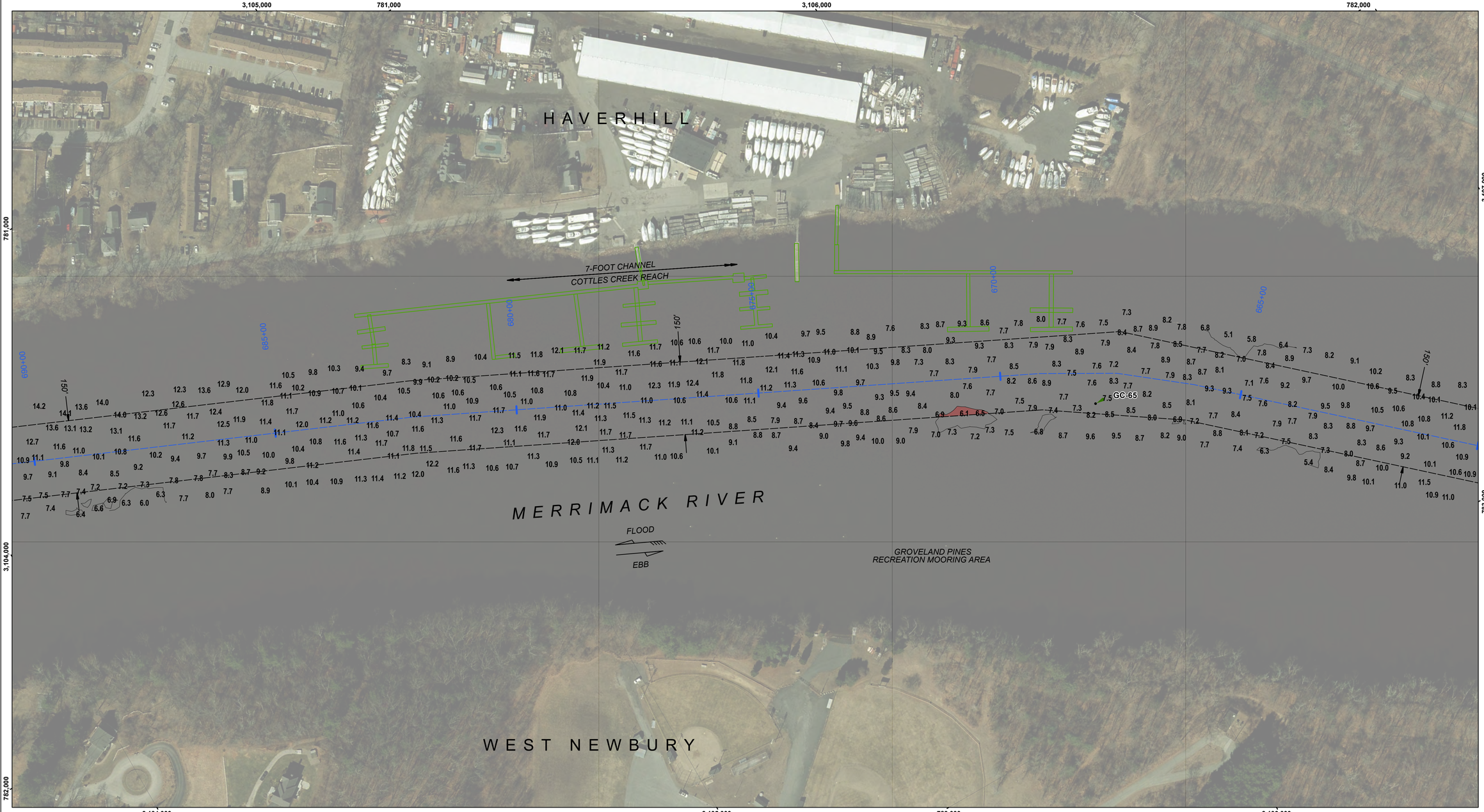
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

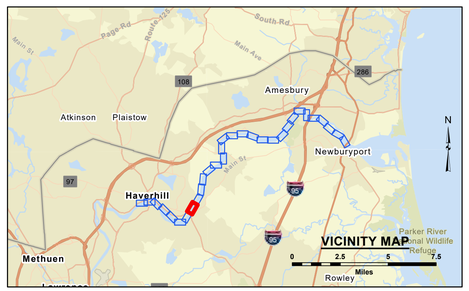
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 23 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100' 100 0 100 200 Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

Tides were recorded using RTK GPS.NAVD88 to MLLW corrections were logged utilizing a Hypack KTD file. The corrections in the project area range from 4.22 feet to 0.22 feet. From Carr Island Reach to Haverhill Heights Reach. MLLW is below NAVD88; therefore, the correction should be added to NAVD88 to convert to MLLW (e.g.-10 NAV88 = -8 MLLW when using a 2-foot correction).

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US Army Corps of Engineers
District: CENAE

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

File Name: **MA_02_MER_20260831_CS_047**

SHEET IDENTIFICATION
Merrimack River

Sheet 24 of 31

Revison Number: 5.26.04.06-5.26.04.06

3,103,000 780,000 3,104,000

3,102,000 781,000 780,000 782,000

HAVERHILL

GROVELAND

MERRIMACK RIVER

FLOOD

EBB

WILLIAM H. BATES BRIDGE
BASCULE BRIDGE
HOR. CL. 70 FT
VERT. CL. 16 FT (CLOSED)

LIGHTHOUSE LANDING MARINA

7-FOOT CHANNEL
RIVERSIDE PARK REACH

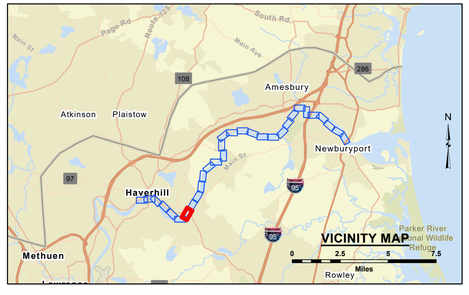
7-FOOT CHANNEL
COTTLES CREEK REACH

715+00 710+00 705+00 700+00 695+00 690+00

GC-67

4.2 6.1

3,102,000 781,000 3,103,000 782,000



LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey

MAP DOCUMENT: MA_02_MER_20260831_CS_047

SIZE: ANSI D

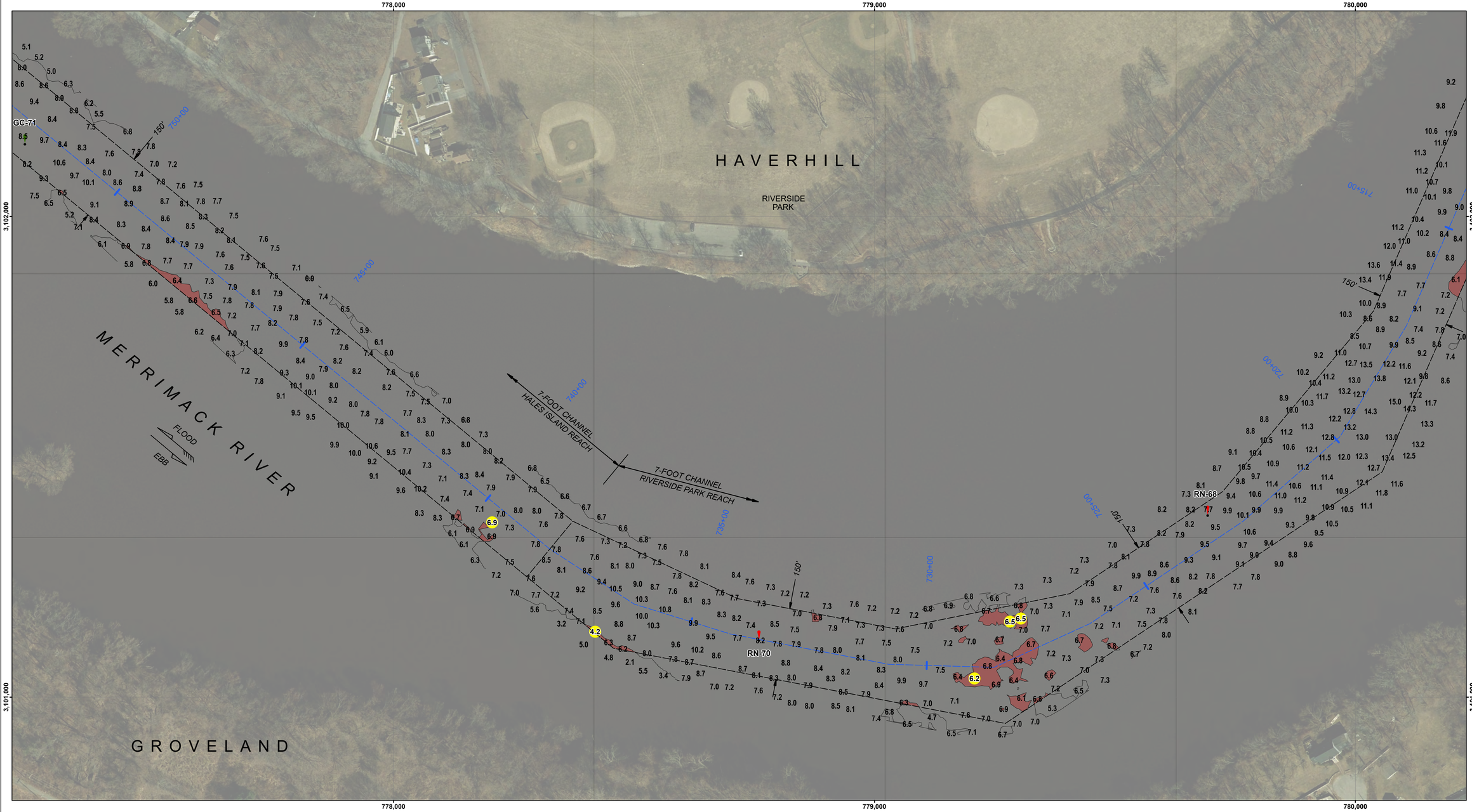
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

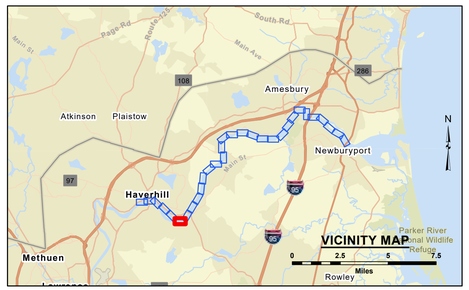
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 25 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

1" = 100' 100 0 100 200 Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

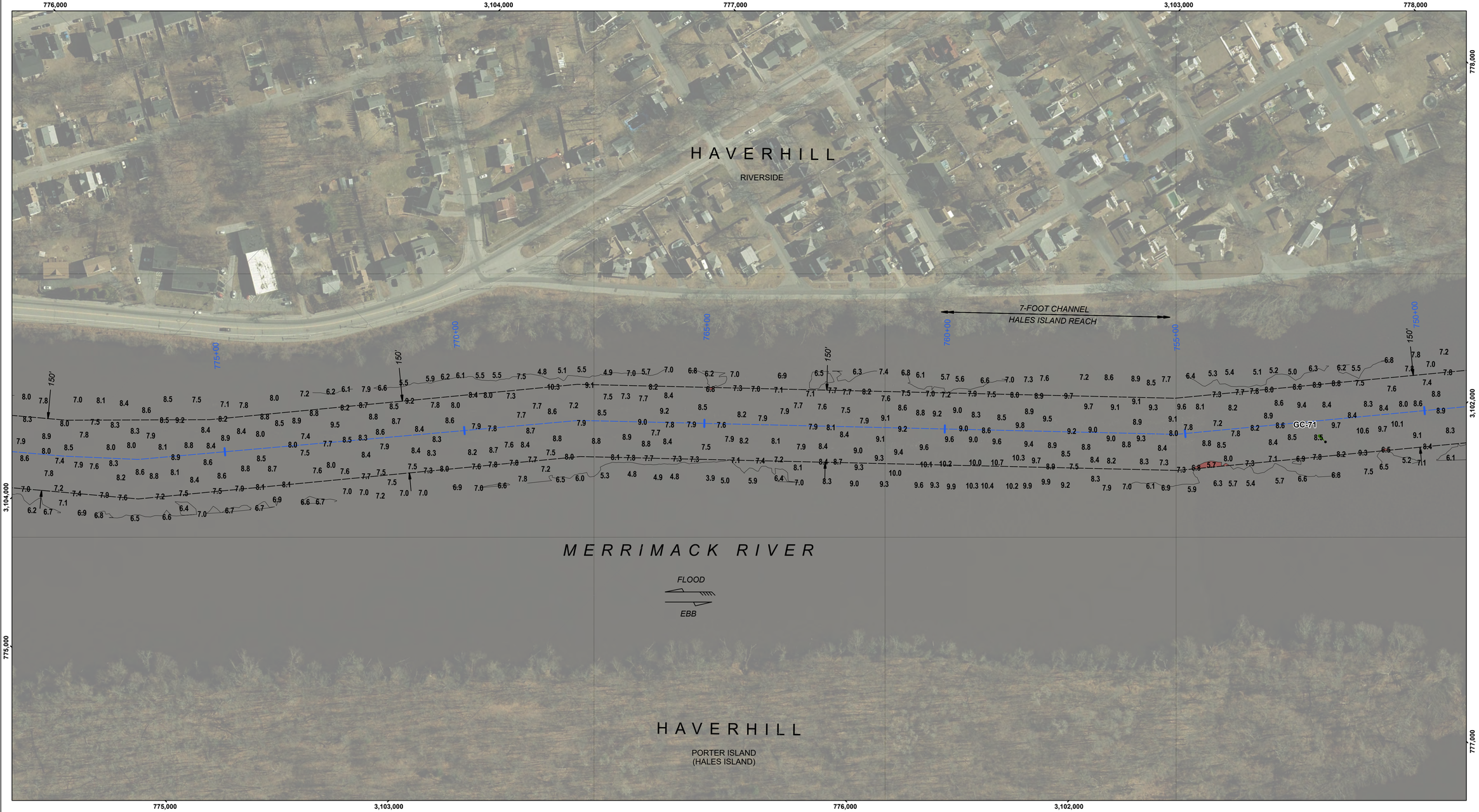
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

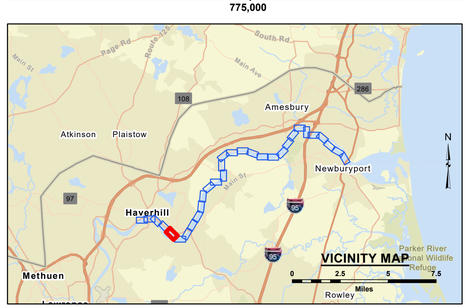
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 26 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

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Water Level Information

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

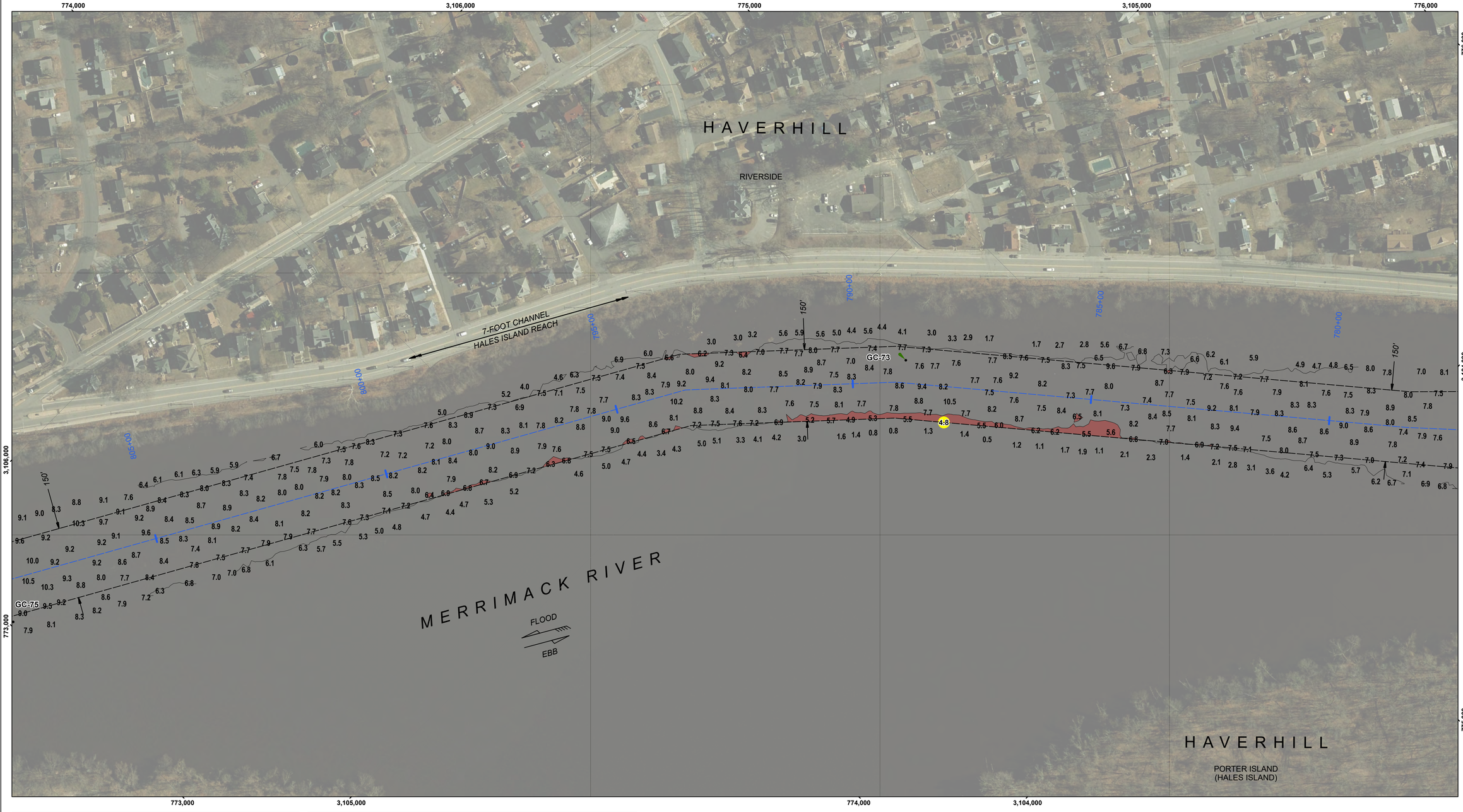
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

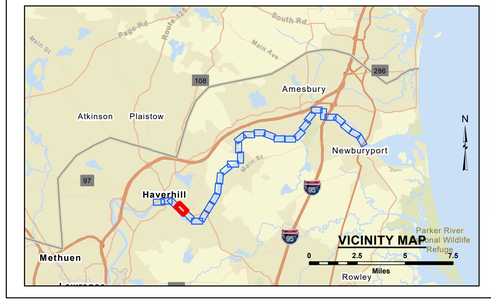
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 27 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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Project Remarks

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US Army Corps of Engineers
District: CENAE

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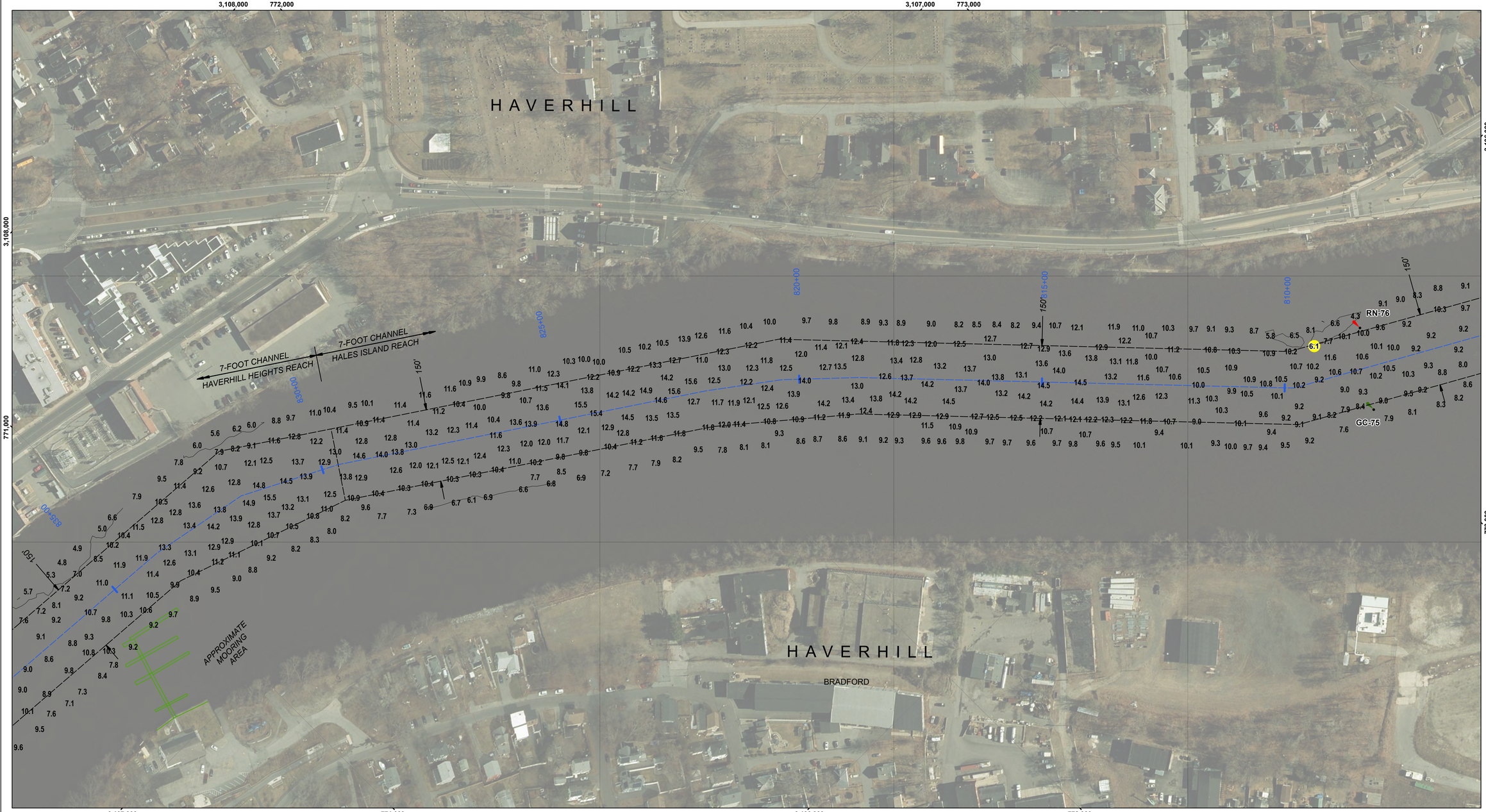
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

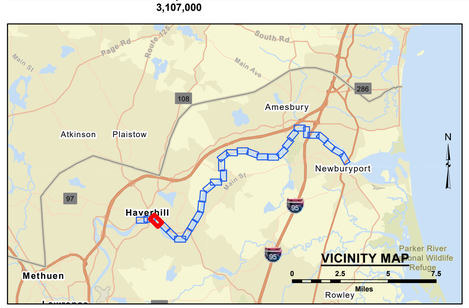
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
MAP DOCUMENT: MA_02_MER_20260831_CS_047
SIZE: ANSI D

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY,
WEST NEWBURY, MERRIMAC, GROVELAND,
AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River
Sheet 28 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
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Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

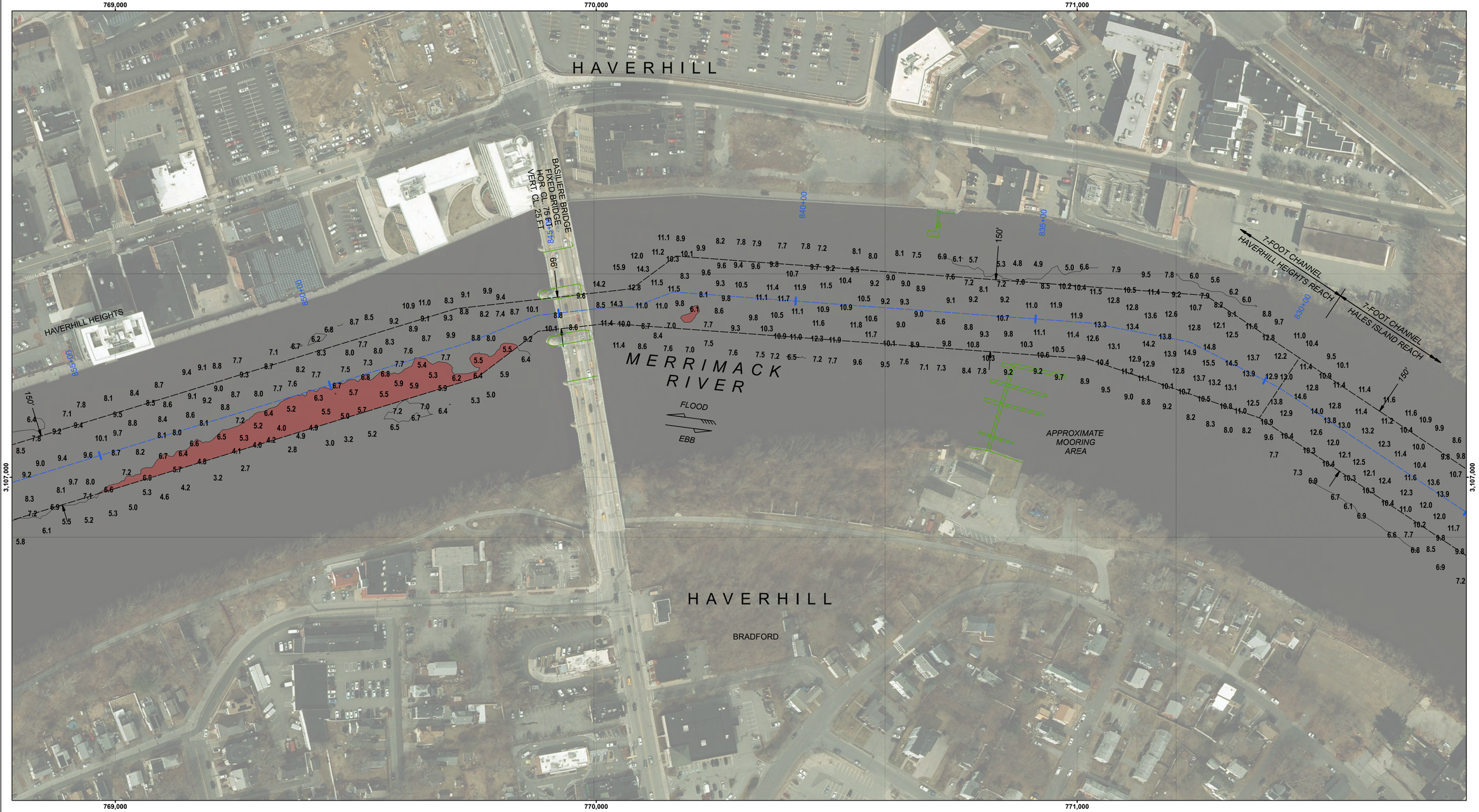
MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL

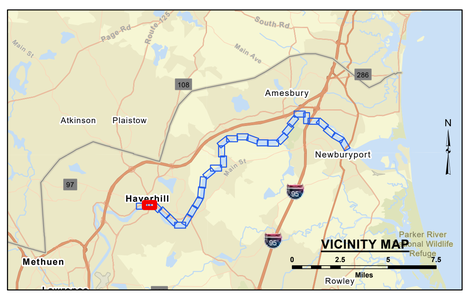
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SHEET IDENTIFICATION
Merrimack River

Sheet 29 of 31

Revison Number: 5.26.04.06-5.26.04.06





LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N
W E
S

Notes:
Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
Vessel Name: SV Kennebec
Sonar System: Reson T50 (Multibeam Sonar)
Sounding Frequency: 300 kHz
Survey Method: RTK GPS Tides
GPS_System: INS Integrated Reson (RTK)
RTK Base Station: MTS Smartnet Max
Software Used: Hypack
Sounding Sort Distance: 30'
Field Books: R&H 4986
Survey No.: MA_02_MER_20260831_CS_047
Reference NOAA Chart No.: US5MA1V(E,F,G,H), US5MA1W(F,G,H)

The information depicted on these charts represents the results of surveys made on the dates indicated, and can only be considered as indicating the conditions existing at that time.

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Project Remarks
Marine infrastructure surveyed with ship-mounted LIDAR. Rocks identified in prior surveys and this survey identified on plot.

Water Level Information
Tides were recorded using RTK GPS.NAVD88 to MLLW corrections were logged utilizing a Hypack KTD file. The corrections in the project area range from 4.22 feet to 0.22 feet. From Carr Island Reach to Haverhill Heights Reach. MLLW is below NAVD88; therefore, the correction should be added to NAVD88 to convert to MLLW (e.g.-10 NAV88 = -8 MLLW when using a 2-foot correction).

US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

SUBMITTED BY: Zachary McAvoy
APPROVED BY: NAE Survey
SURVEYED BY: MJD
CHECKED BY: JAB
ISSUE DATE: 9/22/2026
SIZE: ANSI D
MAP DOCUMENT: MA_02_MER_20260831_CS_047

MERRIMACK RIVER
NEWBURYPORT, SALISBURY, AMESBURY, WEST NEWBURY, MERRIMAC, GROVELAND, AND HAVERILL, MASSACHUSETTS
CONDITION SURVEY
7-FOOT CHANNEL
File Name: MA_02_MER_20260831_CS_047

SHEET IDENTIFICATION
Merrimack River

Sheet 30 of 31

Revison Number: 5.26.04.06-5.26.04.06

767,000 768,000 769,000

3,107,000

HAVERHILL

HAVERHILL HEIGHTS

RAILROAD BRIDGE
FIXED BRIDGE
HOR. CL. 121 FT
VERT. CL. 31 FT
(UNDER CONSTRUCTION)

COMEAU BRIDGE
(COUNTY)
FIXED BRIDGE
HOR. CL. 139 FT
VERT. CL. 30 FT

MERRIMACK RIVER

PIPELINE AREA

7-FOOT CHANNEL
HAVERHILL HEIGHTS REACH

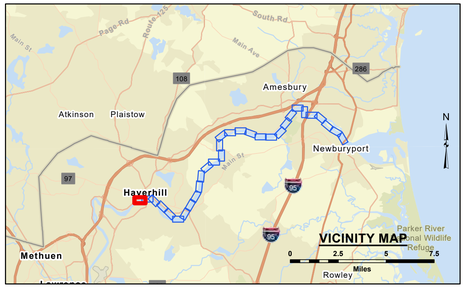
FLOOD
EBB

OVERHEAD
POWER CABLES

HAVERHILL

BRADFORD

767,000 768,000 769,000



LEGEND

- Federal Navigation Channel
- Cable or Pipe Areas
- Marine Infrastructure*
- Channel Center Line
- Contour Line
- Obstruction Point
- Fixed Navigation Aids
- Red Navigation Buoy*
- Green Navigation Buoy*
- Shoaling Area
- Shoalest Sounding**

** Shoalest Sounding per Quarter per Reach
* Present at Time of Survey

GRAPHIC SCALE

100 0 100 200

1" = 100' Feet

N W E S

Notes:

Horizontal Datum: Mass Mainland, MA-2001 NAD 83
Distance Units: U.S. Survey Feet
Vertical Datum: MLLW
Depth Units: U.S. Survey Feet
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US Army Corps of Engineers
District: CENAE

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U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

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NEWBURYPORT, SALISBURY, AMESBURY,
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CONDITION SURVEY

7-FOOT CHANNEL

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Sheet 31 of 31

Revison Number: 5.26.04.06-5.26.04.06