APPENDIX A

Agency Coordination

From: Nadal, Teresita I NAO
To: Scheler, Kristen L. NAO
Subject: FW: Wormley Creek EFH assessment (UNCLASSIFIED)
Date: Thursday, December 17, 2015 8:54:02 AM
Attachments: Wormley Creek _updated_EFH.pdf

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
Norfolk District
(757) 201-7299

-----Original Message-----
From: Nadal, Teresita I NAO
Sent: Wednesday, December 16, 2015 7:47 AM
To: 'David.L.O'Brien@noaa.gov' <David.L.O'Brien@noaa.gov>
Subject: RE: Wormley Creek EFH assessment (UNCLASSIFIED)

Dave,
Attached is an updated EFH for Wormley Creek.
Please let me know if you have questions.

Thank you.

Teri

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
Norfolk District
(757) 201-7299

-----Original Message-----
From: Nadal, Teresita I NAO
Sent: Wednesday, January 28, 2015 10:06 AM
To: 'David.L.O'Brien@noaa.gov' <David.L.O'Brien@noaa.gov>
Subject: Wormley Creek EFH assessment (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Dave,

Attached is an EFH assessment for Wormley Creek.

Please let me know if you have questions.

Thank you.

Teri

Teri Nadal
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
Norfolk District
(757) 201-7299

Classification: UNCLASSIFIED
Caveats: NONE

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES

PROJECT NAME: Wormley Creek Federal Navigation Project DATE: December 15, 2015

PROJECT NO.: Permit # 15-0075 LOCATION: Yorktown, VA

PREPARER: Teri Nadal

Step 1. Use the Habitat Conservation Division EFH webpage, Guide to Essential Fish Habitat Designations in the Northeastern United States to generate the list of designated EFH for federally-managed species for the geographic area of interest (http://www.nero.noaa.gov/hcd/index2a.htm). Use the species list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. Attach that list to the worksheet because it will be used in later steps. Make a preliminary determination on the need to conduct an EFH Consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	Yes	No
Is the action located in or adjacent to EFH designated for eggs?	x	
Is the action located in or adjacent to EFH designated for larvae?	x	
Is the action located in or adjacent to EFH designated for juveniles?	x	
Is the action located in or adjacent to EFH designated for adults?	x	
Is the action located in or adjacent to EFH designated for spawning adults?		x
If you answered no to all questions above, then EFH consultation is not required - go to Section 5. If you answered yes to any of the above questions proceed to Section 2 and complete remainder of the worksheet.		

Step 2. In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Please note that, there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts.

2. SITE CHARACTERISTICS	
Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	The dredging area site is tidal.
What are the sediment characteristics?	The dredge material consists of 7% sand and 93% silt/clay from station -2+50 to 23+.00. Station 23+00 to 62+00 consists of 82% sand and 18% silt/clay.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so what type, size, characteristics?	Shallow areas have been identified as HAPC for sandbar shark nursery and pupping grounds.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the spatial extent.	There are no SAV at or adjacent or adjacent to the project site. Determined using VIMS website. Attachment B.
What is typical salinity and temperature regime/range?	The average range in salinity is 15 to 24 ppt. The average range in temperature is 38º to 73º F.
What is the normal frequency of site disturbance, both natural and man-made?	This site is used year round to provide safe passage to USCG vessels and recreational vessels. Maintenance dredging may be required every 4 to 5 years.
What is the area of proposed impact (work footprint & far afield)?	If the entire project needed to be dredged the impact would be approximately 315,000 square feet.

Step 3. This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS			
Impacts	Y	N	Description
Nature and duration of activity(s)			Maintenance dredging of the channel will be conducted using a hydraulic and/or mechanical dredge. 75,000 cys of dredged material will be placed into a scow barge and transported for overboard placement at the Wolf Trap Alternate Placement Site (WTAPS). Dredging duration is approximately 8 to 12 weeks. Of the 75,000 cys, up to 25,000 cys may be placed along the USCG shoreline using a small hydraulic dredge with pipeline placement along the shoreline. Attachment C.
Will benthic community be disturbed?	x		Dredging will permanently impact non-motile benthic organisms within the dredging area through direct removal of substrate in the channel prism. Once dredging is complete, benthic organisms should begin to repopulate quickly.
Will SAV be impacted?		x	There are no SAV (identified through the VIMS website)
Will sediments be altered and/or sedimentation rates change?	x		Post dredge substrate characteristics will be the same as shoaled sediments removed by dredging. Short-term impacts will occur during dredging operations. There will be minor impacts to sedimentation rates in the dredging area.
Will turbidity increase?	x		Turbidity will temporarily increase at the dredging location and placement sites. Turbidity will increase due to the physical characteristics of the sediment.
Will water depth change?	x		Dredging will restore the channels to authorized depths, removing siltation that has occurred since the last dredging event.
Will contaminants be released into sediments or water column?		x	There is no reason to believe contaminants will be encountered during the dredging project. The material will be transported and placed at the overboard placement site within the Wolf Trap Alternate Placement Site and/or along the USCG shoreline.
Will tidal flow, currents or wave patterns be altered?		x	There will be a no significant change in tidal flow, currents, or wave patterns.
Will ambient salinity or temperature regime change?		x	The ambient salinity and temperature regime should not change as a result of the dredging or placement operations.
Will water quality be altered?	x		Short-term and isolated impacts to dissolved oxygen may occur through increased turbidity. Impacts should be temporary.

Step 4. This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species from the EFH species list (generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. The Guide to EFH Descriptions webpage (http://www.nero.noaa.gov/hcd/list.htm) should be used during this assessment to determine the ecological parameters/preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT			
Functions and Values	Y	N	Describe habitat type, species and life stages to be adversely impacted
Will functions and values of EFH be impacted for:			
Spawning		x	
Nursery	x		Demersal waters serve as nursery areas for juvenile and adult windowpane and summer flounder. Shallow areas of have been identified has HAPC for sandbar shark nursery and pupping grounds. There will be temporary impacts during dredging operations. However, these species are expected to relocate during operations and return upon completion of the work.
Forage	x		Juvenile and adult windowpane and summer flounder are benthic feeders. These species are motile benthic feeders and are expected to relocate during operations and return upon completion of the work.
Shelter	x		Shallow areas have been identified as HAPC for sandbar shark nursery and pupping grounds. However, these species are expected to relocate during operations and return upon completion of the work.
Will impacts be temporary or permanent?			Impacts are anticipated to be temporary. Species that may be present in the project area are expected to relocate during the dredging activity and return once the work is complete.
Will compensatory mitigation be used?		x	n/a

Step 5. This section provides the Federal agencys determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

5. DETERMINATION OF IMPACT		
		Federal Agencys EFH Determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: (check the appropriate statement)		There is no adverse effect on EFH EFH Consultation is not required
	X	The adverse effect on EFH is not substantial. This is a request for an abbreviated EFH consultation. This worksheet is being submitted to NMFS to satisfy the EFH Assessment requirement.
		The adverse effect on EFH is substantial. This is a request for an expanded EFH consultation. A detailed written EFH assessment will be submitted to NMFS expanding upon the impacts revealed in this worksheet.

Step 6. Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats. Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT	
Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat).
alewife	
blueback herring	
rainbow smelt	
Atlantic sturgeon	
Atlantic menhaden	
American shad	
American eel	
American lobster	
blue mussels	
soft-shell clams	
quahog	
Other species:	
Anadromous fish	

The Wormley Creek Federal Navigation Project provides access and safe navigation in support of the United States Coast Guard (USCG) Training Center (TRACEN), Boat Forces & Cutter Operations (BFCO) facility located in Yorktown. The facility has several schools that provide USCG mission essential requirements for boat crew training. Among the schools located at this facility are: Boatswain's Mate (BM) School, Coxswain C School, RBS/TANB School, and National Motor Lifeboat School. The facility maintains a fleet of twenty-eight vessels. In addition to training, the BFCO facility evaluates prototype equipment and boat alterations before final approval for use in the field and provides feedback from the fleet to the Office of Boat Forces that aid in the development of improved operational techniques and maintenance procedures. The purpose of dredging the project is to provide safe navigation and anchorage for USCG vessel operations.

The Wormley Creek Federal Navigation Project is -9 feet deep MLLW and consists of a channel from the entrance of Wormley Creek that is 30 feet wide and 6,200 feet long, turning/boat basin (300 feet wide and 430 feet long), and a channel to an existing boat ramp that is 50 feet wide and 200 feet long. The boat ramp is used to trailer several of the BFC vessels.

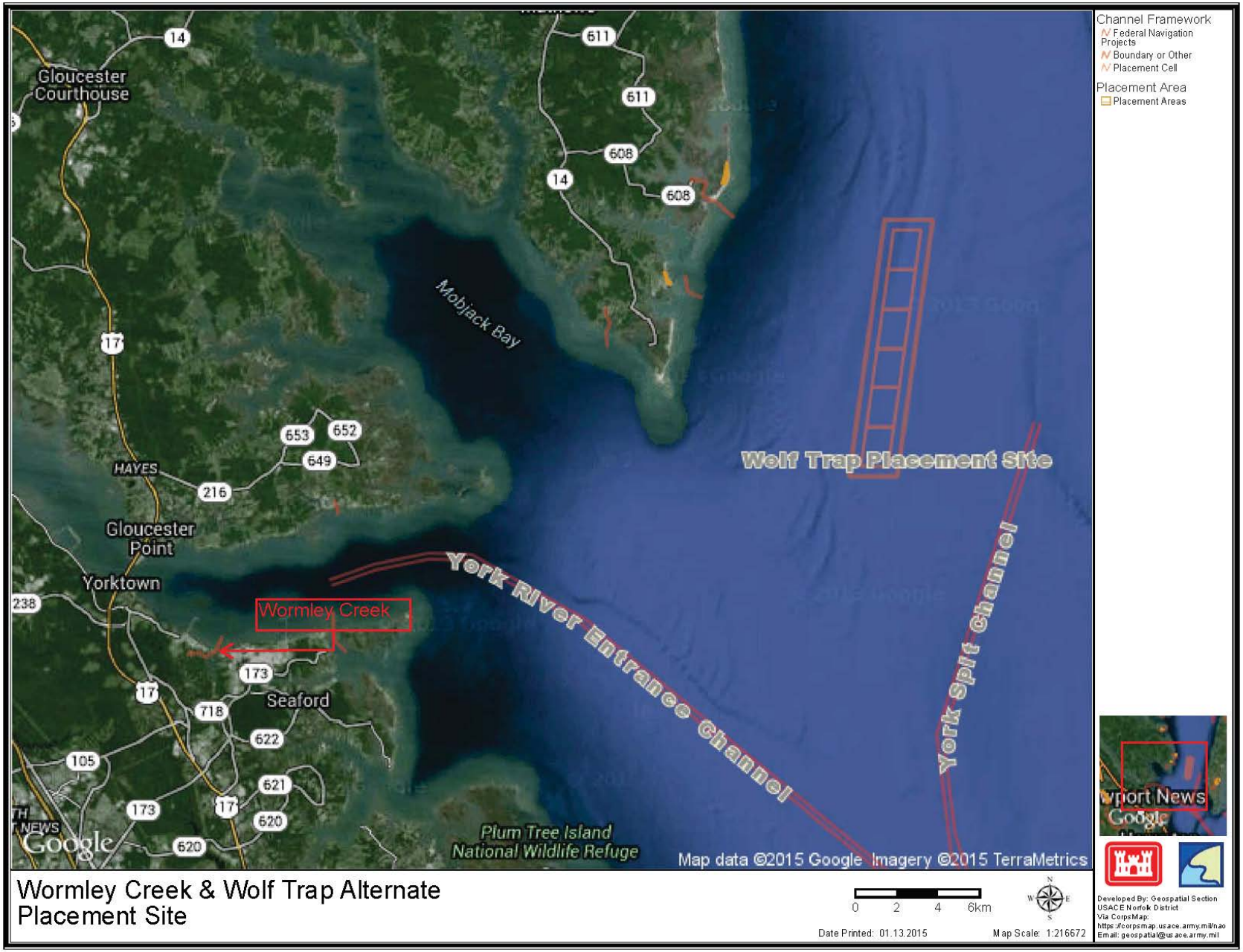
Dredging may be required every four to five years and will be performed by a small mechanical and/or small hydraulic cutterhead dredge over a fifteen year period. The dredged material will be transported by bottom dump barge/scow and placed overboard at the Wolf Trap Alternate Placement Site (WTAPS) which is located in the main stem of the Chesapeake Bay, approximately 16 miles from the USCG TRACEN Yorktown. The WTAPS Site has an area of approximately 2,543 acres in size (4,500 acres including the designated buffer zone). The site is located in the Chesapeake Bay, east of New Point Comfort and south of Wolf Trap light, east of Mathews County, Virginia. Approximately 75,000 cubic yards will be dredged each cycle. Of the total 75,000 cys of dredged material, up to 25,000 cys (Station 23+00 to 62+00) may be placed along the USCG shoreline.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, requires all Federal agencies to consult with the National Marine Fisheries Service (NMFS) on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). Congress defines EFH as, “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”. The MSA governs the EFH and requires the identification of EFH for managed species as well as measures to conserve and enhance the habitat necessary for fish to carry out their life cycles. The NMFS oversees the EFH designations, and gives guidance to minimize harm to EFH. Habitat Areas of Particular Concern (HAPC) are subsets of EFH and are given special consideration to adverse impacts. The project site lies adjacent to EFH for several species including: eggs, larvae, juvenile and adult Atlantic butterfish (*Peprilus triacanthus*); juvenile and adult black sea bass (*Centropristus striata*); juvenile and adult bluefish *(Pomatomus saltatrix*); eggs, larvae, juvenile, and adult stages of cobia (*Rachycentron canadum*); larvae and juvenile dusty shark *Charcharinus obscurus)*; eggs, larvae, juvenile, and adult king mackerel (*Scomberomorus cavalla*); eggs, larvae, juvenile, and adult red drum (*Sciaenops occelatus*); larvae, juvenile and adult sandbar shark *(Charcharinus plumbeus)*; eggs, larvae, juvenile, and adult Spanish mackerel (*Scomberomorus maculatus)*; larvae, juvenile and adult summer flounder (*Paralicthys dentatus*); juvenile whiting *(Merluccius bilinearis)*; juvenile and adult windowpane flounder (*Scopthalmus aquosus*); juvenile and adult Clearnose Skate, Little Skate and Winter Skate. In addition to these EFH designations, the area has been designated as a HAPC for larvae, juvenile and adult life cycles of the sandbar shark.

The proposed maintenance dredging duration is 8 to 12 weeks. Maintenance dredging and material placement site impacts to fish will be temporary. Any fish within the area would relocate and return once work is complete. This project does not have the potential to substantially adversely affect EFH for the species of concern by loss of forage and/or shelter habitat.

ATTACHMENT A: Project Maps

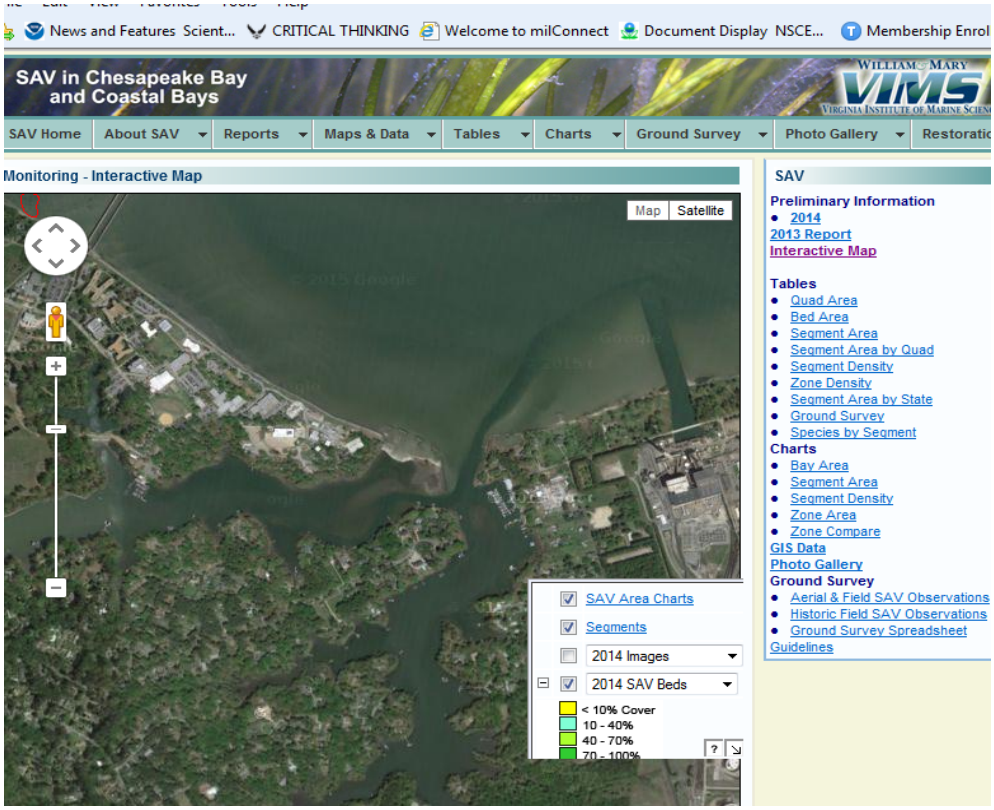
Womley Creek Federal Navigation Project



Wormley Creek & Wolf Trap Alternate Placement Site

ATTACHMENT B: SAV Map

Accessed December 14, 2015 http://web.vims.edu/bio/sav/maps.html



ATTACHMENT C: USCG Shoreline placement


238
Hamilton Rd
Ingham St
238
Perimeter Rd
Perimeter Rd
Yeaton Dr
Yeaton Dr
West Branch Wormley Creek
Map data ©2015 Google Imagery ©2015 , Commonwealth of Virginia, DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency
0
100
200
300m
Date Printed: 12.14.2015
Map Scale: 1:6771
Google
Developed By: Geospatial Section
USACE Norfolk District
Via CorpsMap:
https://corpsmap.usace.army.mil/nao
Email: geospatial@usace.army.mil

Summary of Essential Fish Habitat (EFH) Designations Wormley Creek Federal Navigation Project

10 x 10 Square Coordinates:

Boundary	North	East	South	West
Coordinate	37° 20.0 N	76° 20.0 W	37° 10.0 N	76° 30.0 W

Square Description (i.e. habitat, landmarks, coastline markers Atlantic Ocean waters within the square within Chesapeake Bay affecting the following: from Ship Point on the south (on the northern half of Fish Neck) north past Chisman Creek and Goose Creek, past Crab Neck, including on Crab Neck, both Baytree Pt. and Green Pt., past Claxton Creek, Back Creek, Dandy, VA. on Goodwin Neck, up to north of the York River Inlet. Also, affected are the following: the Perrin River, Perrin, VA., The Goodwin Is., Goodwin Thorofare, Allens I., Jenkins Neck, Guinea Marsh, Sandy Pt., Monday Creek, Bush Pt., King Creek, and Rowes Creek, all on Guinea Neck, Severn, VA., the Severn River, Stump Pt., Whittaker Creek, Mud Pt., all up to Caucus Bay north of the York River Inlet..

Species	Eggs	Larvae	Juveniles	Adults
Atlantic butterfish *(Peprilus triacanthus)*	X	X	X	X
black sea bass *(Centropristis striata)*	n/a		X	X
bluefish *(Pomatomus saltatrix)*			X	X
cobia *(Rachycentron canadum)*	X	X	X	X
dusky shark *(Carcharhinus obscurus)*		X	X	
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
red drum *(Sciaenops occelatus)*	X	X	X	X
sandbar shark *(Carcharhinus plumbeus)*		X	X	X
sandbar shark *(Carcharhinus plumbeus)*		HAPC	HAPC	HAPC
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
summer flounder *(Paralichthys dentatus)*		X	X	X
whiting *(Merluccius bilinearis)*			X	
windowpane flounder *(Scophthalmus aquosus)*			X	X

Accessed January 23, 2015
http://www.greateratlantic.fisheries.noaa.gov/hcd/STATES4/virginia/virginia/37107620.html

Summary of Essential Fish Habitat (EFH) Designations Wolftrap 10 x 10 Square Coordinates:

Boundary	North	East	South	West
Coordinate	37° 30.0 N	76° 10.0 W	37° 20.0 N	76° 20.0 W

Square Description (i.e. habitat, landmarks, coastline markers): Atlantic Ocean waters within Chesapeake Bay within the square affecting the following: from the south at Dyer Creek, north past New Pt., Horn harbor, Peary, VA., and Beach Pt., both on Potato Neck, Winter Harbor, past Garden Creek, Haven Beach, Whites Creek, Stoakes Creek, Billups Creek, Fitchetts, VA., Stutts Creek, Pt. Breeze on Crab Neck, Langs Creek, Cricket Hill, Queens Creek Inlet, up to just southeast of Burton Pt. on Cow Neck. Also, affected within the square on the southwest corner of the square is Pepper Creek and Inlet, along with other features such as Wolftrap, The Hole in the Wall, and the southern half of Glynn I., including Sandy Pt., along with, within the Bay, Milfordhaven.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic butterfish *(Peprilus triacanthus)*	X	X	X	X
bluefish *(Pomatomus saltatrix)*			X	X
cobia *(Rachycentron canadum)*	X	X	X	X
dusky shark *(Carcharhinus obscurus)*		X	X	
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
red drum *(Sciaenops occelatus)*	X	X	X	X
sandbar shark *(Carcharhinus plumbeus)*		X	X	X
sandbar shark *(Carcharhinus plumbeus)*		HAPC	HAPC	HAPC
scup *(Stenotomus chrysops)*	n/a	n/a	X	X
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
summer flounder *(Paralichthys dentatus)*		X	X	X
windowpane flounder *(Scophthalmus aquosus)*			X	X

Summary of Essential Fish Habitat (EFH) Designation Wolftrap 10 x 10 Square Coordinates:

Boundary	North	East	South	West
Coordinate	37° 20.0 N	76° 10.0 W	37° 10.0 N	76° 20.0 W

Square Description (i.e. habitat, landmarks, coastline markers Atlantic Ocean waters within the square within the Chesapeake Bay affecting the following: New Point Comfort Shoal, Poquoson Flats, York Spit, a large disposal area on the northeast corner, southeastern Mobjack Bay, Dutchman Pt., Motorun, VA., Dyer Creek, Deep Creek, and New Point Comfort.

Species	Eggs	Larvae	Juveniles	Adults
Atlantic butterfish *(Peprilus triacanthus)*	X	X	X	X
black sea bass *(Centropristis striata)*	n/a		X	X
bluefish *(Pomatomus saltatrix)*			X	X
cobia *(Rachycentron canadum)*	X	X	X	X
dusky shark *(Carcharhinus obscurus)*		X	X	
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
red drum *(Sciaenops occelatus)*	X	X	X	X
sandbar shark *(Carcharhinus plumbeus)*		X	X	X
sandbar shark *(Carcharhinus plumbeus)*		HAPC	HAPC	HAPC
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
summer flounder *(Paralichthys dentatus)*		X	X	X
windowpane flounder *(Scophthalmus aquosus)*			X	X

Accessed January 23, 2015 *http://www.nero.noaa.gov/hcd/STATES4/virginia/virginia/37107600.html*

From: Nadal, Teresita I NAO
To: Scheler, Kristen L. NAO
Subject: FW: USCG Yorktown Training Center Wormley Creek - (DHR File No. 2014-3872)
Date: Thursday, December 17, 2015 8:50:03 AM
Attachments: Wormley Cr Phase I UA Report-Final.pdf

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
Norfolk District
(757) 201-7299

-----Original Message-----
From: Nadal, Teresita I NAO
Sent: Wednesday, December 09, 2015 8:52 AM
To: 'LaBudde, Gregory (DHR)' <Gregory.LaBudde@dhr.virginia.gov>; 'Connolly, Jonathan' <jonathan_connolly@nps.gov>; Jennifer Flynn <jennifer_flynn@nps.gov>; Steven Williams <steven_williams@nps.gov>
Subject: USCG Yorktown Training Center Wormley Creek - (DHR File No. 2014-3872)

Greg,
Prior to dredging of the Wormley Creek Channel, the Corps initiated consultation with the Department of Historic Resources. Two submerged sites were identified within the area of potential effects (APE) within the Wormley Creek Channel from a Phase 1B Underwater Cultural Resources Survey performed in 1988. The survey employed marine proton magnetometer and side scan sonar. The two sites were identified from the remote sensing data (DHR ID: 44YO0502 and 44Y0503).

Phase I Submerged Cultural Resources Investigations were conducted in 2015 for the proposed Wormley Creek Navigation Project APE in Wormley Creek and the York River, York County, Virginia. In addition to the existing channel, an alternative channel alignment was investigated for the Wormley Creek Channel. The purposes of these investigations were twofold: to determine the presence or absence of potentially significant submerged cultural resources; and secondly to assess likely project impacts and identify recommendations as to the need for further submerged cultural resources studies.

Analysis of the remote sensing data confirms the presence of one potentially significant target or anomaly in the existing channel alignment that was considered to be suggestive of known signature types associated with submerged cultural resources. Additional underwater archaeological investigations are recommended at this target location in the APE in the existing channel alignment.

No potentially significant targets were identified within APE of the alternative channel alignment and therefore no additional underwater archaeological investigations are recommended in alternative channel alignment.

To avoid the potentially significant target or anomaly, the Corps will construct the alternative channel alignment.

Enclosed is the Phase I Submerged Cultural Resources Investigation.

We are seeking concurrence of no effect from VDHR within the APE for the alternative channel alignment of the Wormley Creek Channel.

Very respectfully,

Teri

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
Norfolk District
(757) 201-7299

Scheler, Kristen L. NAO

From: Nadal, Teresita I NAO
Sent: Wednesday, December 16, 2015 10:10 AM
To: Scheler, Kristen L. NAO
Subject: FW: [EXTERNAL] Re: FW: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
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(757) 201-7299

-----Original Message-----
From: Christine Vaccaro - NOAA Federal [mailto:christine.vaccaro@noaa.gov]
Sent: Wednesday, December 16, 2015 10:08 AM
To: Nadal, Teresita I NAO <Teresita.I.Nadal@usace.army.mil>
Subject: Re: [EXTERNAL] Re: FW: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)

Oh got it. In looking at the project, and based on the project revisions, it does not appear that re-initiation of consultation is necessary, as this new information does not change the level of effects beyond that which has already been analyzed.

Cheers,
Chris

Chris Vaccaro
Fisheries Biologist
Protected Resources Division
NOAA Fisheries, Greater Atlantic Region
Gloucester, MA
Phone: 978-281-9167
Email: christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov>

On Wed, Dec 16, 2015 at 9:56 AM, Nadal, Teresita I NAO <Teresita.I.Nadal@usace.army.mil <mailto:Teresita.I.Nadal@usace.army.mil> > wrote:

> It is the same action, except that part of the material may be place along the USCG shoreline.
>
> Teri Nadal
> Environmental Manager
> Ops Branch, Technical Support Section
> U.S. Army Corps of Engineers
> Norfolk District
> (757) 201-7299 <tel:%28757%29%20201-7299>

From:	Nadal, Teresita I NAO
To:	Scheler, Kristen L. NAO
Subject:	FW: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)
Date:	Wednesday, December 16, 2015 10:13:31 AM
Attachments:	Wormley_IC.pdf Letter Dated 3-4-15.pdf shoreline.pdf

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Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
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Norfolk District
(757) 201-7299

-----Original Message-----
From: Nadal, Teresita I NAO
Sent: Monday, December 14, 2015 8:50 AM
To: Christine Vaccaro - NOAA Federal <christine.vaccaro@noaa.gov>
Subject: FW: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)

Chris,
A section 7 consultation was completed in March for the Wormley Creek Channel.
The consultation addressed mechanical and cutterhead dredging with overboard material placement at the Wolf Trap Alternate Placement Site.
Of the 75,00 cubic yards that are being dredged, we may be placing with pipeline up to 25,000 cubic yards along the Coast Guard Shoreline.
The effects of dredging the Wormley Creek Channel and material placement along the shoreline (shoreline.pdf) are temporary in nature and not likely to adversely affect Atlantic sturgeon or sea turtles.
I am seeking your concurrence of this determination.

Please let me know if you need additional information.

Thank you.

Teri
757-270-7252

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
Norfolk District
(757) 201-7299

-----Original Message-----
From: Nadal, Teresita I NAO
Sent: Thursday, January 15, 2015 6:42 AM
To: 'Christine Vaccaro - NOAA Federal' <christine.vaccaro@noaa.gov>
Subject: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)

Classification: UNCLASSIFIED

-----Original Message-----
From: Christine Vaccaro - NOAA Federal [mailto:christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov>]
Sent: Wednesday, December 16, 2015 9:52 AM
To: Nadal, Teresita I NAO <Teresita.I.Nadal@usace.army.mil <mailto:Teresita.I.Nadal@usace.army.mil> >
Subject: [EXTERNAL] Re: FW: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)

Hi--I'm confused as to what this is--is this a new action different than the one you consulted on? Do you need a new consultation on a new action or is this the same action?

-Chris

Chris Vaccaro
Fisheries Biologist
Protected Resources Division
NOAA Fisheries, Greater Atlantic Region
Gloucester, MA
Phone: 978-281-9167 <tel:978-281-9167>
Email: christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov> <mailto:christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov> >

On Mon, Dec 14, 2015 at 8:50 AM, Nadal, Teresita I NAO <Teresita.I.Nadal@usace.army.mil <mailto:Teresita.I.Nadal@usace.army.mil> <mailto:Teresita.I.Nadal@usace.army.mil <mailto:Teresita.I.Nadal@usace.army.mil> > > wrote:

Chris,
A section 7 consultation was completed in March for the Wormley Creek Channel.
The consultation addressed mechanical and cutterhead dredging with overboard material placement at the Wolf Trap Alternate Placement Site.
Of the 75,00 cubic yards that are being dredged, we may be placing with pipeline up to 25,000 cubic yards along the Coast Guard Shoreline.
The effects of dredging the Wormley Creek Channel and material placement along the shoreline (shoreline.pdf) are temporary in nature and not likely to adversely affect Atlantic sturgeon or sea turtles.
I am seeking your concurrence of this determination.

Please let me know if you need additional information.

Thank you.

Teri
757-270-7252 <tel:757-270-7252> <tel:757-270-7252 <tel:757-270-7252> >

Teri Nadal
Environmental Manager
Ops Branch, Technical Support Section
U.S. Army Corps of Engineers
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-----Original Message-----
From: Nadal, Teresita I NAO
Sent: Thursday, January 15, 2015 6:42 AM
To: 'Christine Vaccaro - NOAA Federal' <christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov> <mailto:christine.vaccaro@noaa.gov <mailto:christine.vaccaro@noaa.gov> > >
Subject: Wormley Creek Federal Navigation Channel Section 7 Consultation (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Chris,

Attached is an informal Section 7 consultation for the Wormley Creek Federal Navigation Channel.

Please let me know if you have questions.

Thank you.

Teri

Teri Nadal
Ops Branch, Technical Support Section
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Classification: UNCLASSIFIED
Caveats: NONE

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Chris,

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Thank you.

Teri

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Classification: UNCLASSIFIED
Caveats: NONE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAR - 4 2015

Elizabeth G. Waring
Chief, Operations Branch
Department of the Army
US Army Corps of Engineers, Norfolk District
Fort Norfolk
803 Front Street
Norfolk, VA 23510-1011

Re: Dredging of Wormley Creek Federal Navigation Project

Dear Ms. Waring,

We have completed an Endangered Species Act (ESA) section 7 consultation in response to your letter of January 13, 2015, and additional information received on January 21, 2015 and January 27, 2015. We concur with your determination that the proposed project is not likely to adversely affect any species listed by us as threatened or endangered under the ESA of 1973, as amended. Our supporting analysis is provided below.

Proposed Project
The proposed maintenance dredging for the Wormley Creek Federal Navigation Project will be authorized for 15 years. Three channel segments will be dredged including: 1) a 10 foot deep channel that is approximately 5,950 feet long by 30 feet wide; 2) a turning/boat basin that is 430 feet long by 300 feet wide; and 3) a boat ramp that is 10 feet deep, 50 feet wide and 200 feet long. Dredging will occur, on average, every four to five years, removing approximately 75,000 cubic yards each cycle, for a total of 225,000 cubic yards. A total of three or four dredge cycles will occur over the 15 year life of the permit.

Dredging will be performed by a small mechanical or small hydraulic cutterhead dredge with an intake pipe of 14-18". The initial dredging is expected to take 8-12 weeks, beginning in September or October. Maintenance dredging will utilize the same type and size dredge, and also begin in September or October. Therefore, we anticipate the initial and subsequent dredge cycles will occur between September and January. The dredged material will be transported by a bottom dump barge/scow and placed overboard at the Wolftrap Alternative Placement Site (WTAPS) which is located in the main portion of the Chesapeake Bay. The approximate number of trips to WTAPS depends on the capacity of the scow, and will range from 50 to 100 trips per dredge cycle. The placement site consists of six individual placement cells for the regular deposition of material from federal channels in the Chesapeake Bay. You propose to utilize cell number six for disposal of the dredged material, which is the closest cell to the dredging action. Cell six is approximately 900 acres. The material will be evenly distributed within the four coordinate points that delineate the cell.

Description of the Action Area
The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR§402.02). Based on analyses of hydraulic cutterhead dredging, increased sediment levels are likely to be present no more than approximately 1,150 feet downstream of the dredge within the bottom six feet of the water column (ACOE 1983). The exact size of the plume is influenced by the particular dredge used, the dredge operator, sediment type, strength of current and tidal stage and is likely to vary throughout the project. Based upon analysis of mechanical dredging activities (Burton 1993; EPA and ACOE 2007), suspended sediment plumes are expected to be fully dissipated at a distance of 2,034 to 4,921 feet from the dredge site. During the discharge of sediment at an overboard disposal site, increases in suspended sediment may extend a maximum of 6,500 feet (ACOE 1983). For this project, the action area is the project footprint within Wormley Creek, cell six of the WTAPS, vessel transit routes between the dredge and disposal sites, as well as all underwater areas where NMFS listed species may be exposed to effects of the action (e.g. extent of increased turbidity). These areas are expected to encompass all of the effects of the proposed project.

Wormley Creek is a tributary to the York River. The creek enters the river approximately five miles from the confluence of the York River and Chesapeake Bay. The material in Wormley Creek tends to be extremely silty and subject to shoaling. This type of benthic habitat is unable to support seagrass beds, or aggregations of mollusks and crustaceans. Similarly, WTAPS is constantly disturbed by the regular deposition of dredge materials, and is also unable to support seagrass beds or aggregations of mollusks and crustaceans.

NMFS Listed Species in the Action Area
The following NMFS listed species may occur in the action area:

Sea Turtles
Four species of ESA-listed threatened or endangered sea turtles under the jurisdiction of NMFS are found seasonally in Chesapeake Bay: the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*), and the endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles, although the latter species is not as common in Chesapeake Bay.

The sea turtles in Virginia are typically juveniles, with the most abundant species being the loggerhead, followed by the Kemp's ridley sea turtle. Several studies have examined the seasonal distribution of sea turtles in the mid-Atlantic, including Virginia. Sea turtles begin appearing in nearshore habitats of the mid-Atlantic as water temperatures rise during the spring and then remain in the region throughout the summer and fall (Morreale and Standora 2005). As temperatures decline in the fall (usually beginning the first week of November), sea turtles tend to leave their coastal habitats and join a larger contingent of other turtles migrating southward to overwinter in southern waters. Consequently, by the end of November, sea turtles have left Virginia waters (Shoop and Kenney 1992; Musick and Limpus 1997; Morreale and Standora 2005).

Satellite tracking studies of sea turtles have found that foraging turtles mainly occurred in areas where the water depth was between approximately 16 and 49 feet (Ruben and Morreale 1999). This depth was interpreted not to be an upper physiological depth limit for turtles, but rather a natural limiting depth where light and food are most suitable for foraging turtles (Morreale and Standora 1998). Leatherback sea turtles feed almost exclusively on jellyfish in offshore marine environments, whereas green sea turtles tend to frequent seagrass beds. Loggerhead and Kemp's ridley sea turtles feed on mollusks and crustaceans in a variety of habitats.

Based on the shallow, silty nature of Wormley Creek, foraging sea turtles are not expected to be abundant; however, sea turtles could pass through the dredging area in search of other areas that do support foraging. Similarly, WTAPS is constantly disturbed by the regular deposition of dredge materials, and is also unable to support sea turtle foraging. However, sea turtles may seasonally be present in the vicinity of WTAPS or the vessel transit routes between the dredge and disposal sites. Sea turtles would potentially overlap with project activities in September, October and November.

Atlantic Sturgeon

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) originating from the New York Bight, Chesapeake Bay, South Atlantic, and Carolina DPSs are listed as endangered, while the Gulf of Maine DPS is listed as threatened. The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida (77 FR 5880; 77 FR 5914). Based on the best available information, Atlantic sturgeon originating from any of five DPSs could occur in the York River and its tributaries including Wormley Creek; however, it is likely that the majority of Atlantic sturgeon in the area would be from the Chesapeake Bay DPS (Damon-Randall *et al.* 2013).

The distribution of Atlantic sturgeon is strongly associated with prey availability, and Atlantic sturgeon may occur where suitable forage (e.g., benthic invertebrates, mollusks and crustaceans) and appropriate habitat conditions (e.g., sandy bottom, or areas of submerged aquatic vegetation (SAV)) are present. The material in Wormley Creek tends to be extremely silty and subject to shoaling. The Wolftrap Alternative Placement Site is regularly used for the deposition of sediment from other federal channels in Chesapeake Bay. As such, these types of benthic habitat are unable to support forage for Atlantic sturgeon which comprises of polycheates, isopods, amphipods, aggregations of mollusks and crustaceans (Johnson *et al.* 1997). Therefore, foraging Atlantic sturgeon are not expected to be in the area to be dredged and at the disposal site. Use of the areas will be limited to transient individuals.

Atlantic sturgeon spawn in their natal river, with spawning migrations generally occurring during April-May in Mid-Atlantic systems (Murawski and Pacheco 1977; Smith 1985; Bain 1997; Smith and Clugston 1997; Caron *et al.* 2002). Tagging and tracking studies have provided information about adult use of the James River including when and where spawning likely occurs. Based on these studies, we know that adult Atlantic sturgeon enter the James River in the spring, leave by early summer, and appear to be absent from the James River until late August when they return to the river and move upstream as far as Richmond (river kilometer 155), which is also the head-of-tide and the likely upstream extent of Atlantic sturgeon in the River given the presence of a dam at the fall line (Hager 2011; Balazik *et al.* 2012). In

general, adults occur further upstream during the late summer and early fall residency (e.g., river kilometer 108 to river kilometer132; Balazik *et al.* 2012) than during the spring and early summer residency (e.g., river kilometer 29 to river kilometer108; Hager 2011). Adults disperse through downriver sites and begin to move out of the river in late September to early October, occupying only lower river sites by November (Hager 2011; Balazik *et al.* 2012). Adults are undetected on the tracking array and are presumed to be out of the river by December (Hager 2011; Balazik *et al.* 2012). The condition of the tracked fish at capture (e.g., adults expressing milt or eggs), the rapid upstream movement of adults in both the spring and fall, and the aggregation of adults relative to the salt wedge provide further evidence of both a spring and fall Atlantic sturgeon spawning season in the James River (NMFS and USFWS; 2007; Hager 2011; Balazik *et al.* 2012). Additional evidence of fall spawning is supported by the capture of four age-0 Atlantic sturgeon in the York River, December 2011-January 2012, which were estimated to be 2.5-3.5 months posthatch, suggesting a late September spawn (Balazik *et al.* 2012).

As with the lower James River, Bushnoe *et al.* (2005) believe the York River possesses suitable nursery habitat characteristics for Atlantic sturgeon. We assume that seasonal use of the York River by adults would be consistent with adult use of the James River given the geographic proximity of the two rivers. Young remain in the river/estuary until approximately age 2 before emigrating to open ocean as subadults (Holland and Yelverton 1973; Dovel and Berggen 1983; Dadswell 2006; ASSRT 2007). After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters between 16 to 164 feet in depth, using coastal bays, sounds, and marine waters (Vladykov and Greeley 1963; Murawski and Pacheco 1977; Dovel and Berggren 1983; Smith 1985; Collins and Smith 1997; Welsh *et al.* 2002; Savoy and Pacileo 2003; Stein *et al.* 2004; Laney *et al.* 2007; Dunton *et al.* 2010; Erickson *et al.* 2011). Wormley Creek does not contain habitat suitable for Atlantic sturgeon spawning (i.e., low salinity, cobble habitat). Therefore, we expect juvenile, adult and sub-adult Atlantic sturgeon in the dredging area, passing through to upriver spawning grounds, or emigrating to the open ocean; however, early life stages (eggs and larvae) will not be present. Juvenile Atlantic sturgeon may also be present in the vicinity of WTAPS or the vessel transit routes between the dredge and disposal sites while emigrating to the open ocean and adult and sub-adult Atlantic sturgeon may pass through these areas while transiting to spawning grounds, or during seasonal migrations. Given that the proposed action will take place from September to January, we expect Atlantic sturgeon could be exposed to the project's effects from September to November.

Effects of the Action

Dredging

Direct interaction with vessels, the pipeline, or entrainment in dredges can kill or injure Atlantic sturgeon and/or sea turtles. Dredging will occur every four to five years over 15 years. As noted above, dredging will be carried out with a small mechanical or a small cutterhead dredge with an intake pipe of 14-18".

In 2012, USACE provided NMFS with a list of all documented interactions between dredges and sturgeon reported along the U.S. East Coast; reports dated as far back as 1990 (USACE 2012). This list includes four incidents of sturgeon captured in dredge buckets. These include the

capture of a decomposed Atlantic sturgeon in Wilmington Harbor in 2001; the condition of this fish indicated it was not killed during the dredging operations and was likely dead on the bottom or in the water column and merely scooped up by the dredge bucket. Another record is of the capture of an Atlantic sturgeon in Wilmington Harbor in 1998; however, this record is not verified and not considered reliable. The other two records listed in the report are a live Atlantic sturgeon captured at: the Bath Iron Works (BIW) facility in the Kennebec River, Maine in 2001 and a fresh dead shortnose sturgeon captured at BIW in 2003. Observer coverage at dredging operations at the BIW facility has been 100% for approximately 15 years, with dredging occurring every one to two years. Hundreds of mechanical dredging projects occur along the U.S. Atlantic coast each year; we are not aware of any other captures of sturgeon in mechanical dredges anywhere in the U.S prior to or after 2012.

The risk of interactions between sturgeon and dredges is thought to be highest in areas where large numbers of sturgeon are known to aggregate, such as overwintering sites or foraging concentrations. The BIW facility, where three of four recorded interactions between sturgeon and mechanical dredges have occurred, is in area where foraging sturgeon are known to aggregate in the summer months. The risk of capture may also be related to the behavior of the sturgeon in the area. While foraging, sturgeon are at the bottom of the river interacting with the sediment. This behavior may increase the susceptibility of capture with a dredge bucket. The risk may be higher in areas where high numbers of sturgeon are present in a small area as this could increase the likelihood of an interaction. We also expect the risk of capture to be higher in areas where sturgeon are overwintering in dense aggregations as overwintering sturgeon may be less responsive to stimuli which could reduce the potential for a sturgeon to avoid an oncoming dredge bucket.

Based on all available evidence, the risk of capture in a mechanical dredge is extremely low since the action area is not known to support high densities of sturgeon and is not in an area where sturgeon are known to overwinter or forage. Because of these factors, it is extremely unlikely that any sturgeon will be captured, injured or killed during mechanical dredging activities. The risk of a sea turtle being captured in a mechanical dredge is extremely low due to the slow speed at which the bucket moves and the relatively small area of the bottom it interacts with at any one time. Additionally, foraging sea turtles are not expected to be abundant in the area where dredging is occurring. It is extremely unlikely that any sea turtles will be captured, killed or injured in mechanical dredge buckets. Therefore, all effects to Atlantic sturgeon and sea turtles from the proposed dredging activities will be discountable.

Sea turtles are not known to be vulnerable to entrainment in cutterhead dredges. Impingement or entrainment is extremely unlikely to occur, due to the nature of the dredge. The cutterhead dredge proposed for this project has a relatively small intake pipe of 14-18", which is placed within the sediment at the dredge site. Clarke (2011) reports that suction is lowered as the diameter of the pipeline decreases, and individuals would need to be very close to the intake pipe to feel any suction at all; therefore, we expect any sea turtles in the action area are able to avoid interaction with the dredge because of the low intake velocity of the machinery. Therefore, effects to sea turtles as a result of dredging are extremely unlikely and will be discountable.

Studies by the Norfolk ACOE demonstrated, through telemetry in the James River, that Atlantic sturgeon were unaffected by the noise associated with dredges, or the presence of cutterhead

dredges themselves (Cameron 2009). They did not exhibit avoidance behavior. During the study, the cutterhead dredge in full operation did not impede their passage, and individuals were not entrained during dredging activities. Assuming that behavior would be similar in Wormley Creek, we do not anticipate any injury, mortality or disruption to behavior. This is a reasonable assumption because we expect sturgeon in the action area to be engaged in the same behaviors as sturgeon in the James River study and the same life stage. Therefore, effects to Atlantic sturgeon as a result of dredging are extremely unlikely and will be discountable.

Water Quality Effects

The proposed dredging will cause a temporary increase in the amount of turbidity in the action area; however, suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity will be short term. Based on a conservative (i.e., low) total suspended solids (TSS) background concentration of 5 mg/L, modeling results of cutterhead dredging indicated that elevated TSS concentrations (i.e., above background levels) would be present at the bottom six feet of the water column for a distance of approximately 1,150 feet.

Turbidity levels associated with cutterhead dredge sediment plumes typically range from 11.5 to 282 mg/L with the highest levels detected adjacent to the cutterhead and concentrations decreasing with greater distance from the dredge (U. Washington 2001). The turbidity plume associated with a typical mechanical dredging operation extends approximately 1,000 feet at the surface and 1,600 feet near the bottom (ACOE 1983). The maximum distance reported in the literature is 4,921 feet, which occurred in an area with very strong tidal currents (EPA and ACOE 2007), and serves as a conservative estimate for Wormley Creek, which does not have strong tidal currents. Several studies have monitored sediment plumes associated with dredging projects along the U.S. Atlantic coast. Turbidity levels associated with these sediment plumes typically range from 26 to 350 mg/L (Anchor Environmental 2003; EPA and ACOE 2007) with the highest levels detected adjacent to the dredge bucket and concentrations decreasing with greater distance from the dredge (see EPA and ACOE 2007).

In the action area, temporary TSS levels are expected at 11.5 to 282 mg/L for the cutterhead dredges, and 26 to 350 mg/L for mechanical dredges. These TSS levels are below those shown to have a detectable or measurable effect on fish species, including Atlantic sturgeon (Burton 1993). Based on this information, effects to Atlantic sturgeon of TSS resulting from dredging and disposal operations will be insignificant.

Suspended sediment may affect Atlantic sturgeon foraging habitat. However, within the overall action area, limited forage exists due to the silty nature of the substrate, relatively shallow depths in the channel, and due to anthropogenic influences (i.e. constant disturbance by boat traffic). The forage will not be as dense as other highly productive areas. To the extent that benthic resources do exist in the overall action area, sediment plumes that result from dredging are expected to be fully dissipated at 2,034 to 4,921 feet from the dredge site, would only affect benthic resources in those areas, and only last a few hours. With increasing distance from the dredge site, lower and lower levels of suspended sediments will be detected. Because the soft sediment York River and Wormley Creek are tidally influenced, turbidity occurs regularly due to shifting tides, and organisms surrounding the immediate dredge areas are adapted to disturbance regimes. Since these prey species are accustomed to turbid regimes, based on the sediment type

and the river characteristics (periods of high flow, tidal intrusion, etc.), temporary disturbance from sediment plumes will not affect the quality or quantity of benthic resources in a measurable or detectable way. As such, effects of suspended sediment to foraging Atlantic sturgeon are expected to be insignificant.

Sea turtles will not be adversely affected by water quality effects as they breathe air and are able to avoid sediment plumes if necessary. Sea turtle foraging is not expected to occur within the dredge footprints due to the shallow depths that are inconsistent with depths typically used by foraging sea turtles. Benthic resources within the area that may be affected by increased total suspended solids are extremely unlikely to have any change in abundance or quality because of the resilient nature of species adapted to living in a tidally influenced river with a soft-sediment substrate where high turbidity occurs. If sea turtles were to pass through the action area, the action will not substantially reduce their ability to opportunistically forage elsewhere, because the water quality effects of dredging and placement of dredge material are localized and temporary, and any changes in behavior to avoid the action area will not be measureable or detectable. Any effects to sea turtles that may forage on species in the action area will be insignificant.

Alteration of Habitat

Dredging can affect Atlantic sturgeon and sea turtles by reducing prey species through the alteration of the existing biotic assemblages and habitat, as well as removing potential prey species during sediment removal activities. The overall footprint of the first action will total 178,500 square feet within an existing marina in Wormley Creek. Marina basins do not provide adequate foraging habitat because of the frequency of disturbance from boat traffic and anthropogenic effects. The second action has a total footprint of 129,000 square feet, and the third action has a total footprint of 10,000 square feet. As discussed above, the area to be dredged supports limited benthic resources; many of these will be removed during dredging. However, because it is a constantly disturbed environment, recolonization is expected to be rapid. Any effect to sturgeon or sea turtles from a temporary reduction in benthic resources will be undetectable and therefore, insignificant. Project activities are not expected to alter the habitat in any way that prevents Atlantic sturgeon from using the action area as a migratory pathway to other areas of the creek that are suitable for foraging. It will also not affect the ability of sea turtles or sturgeon to pass through any part of the action area; therefore, there will be no change in normal use of the action area. Thus, disruption of essential behaviors such as migration because of the action is not expected. Based on this information, the effects of project activities within Wormley Creek on Atlantic sturgeon migration and foraging are expected to be insignificant.

As mentioned previously, water depths in the action area are inconsistent with the preferred depths of sea turtles in Virginia waters (16-49 feet), and the action area is not expected to support forage for sea turtle species (i.e., seagrass, mollusks and crustaceans, jellyfish). Thus, the action area is not foraging habitat for sea turtles, and it is extremely unlikely that dredging activities will remove significant amounts of sea turtle foraging habitat; therefore, all effects to forage will be discountable.

Vessel Interactions

The dredging and disposal operations will result in increased vessel traffic in the area, consisting of one dredge and one barge. Sea turtles and Atlantic sturgeon could be struck by a vessel involved with project operations. Atlantic sturgeon are known to be vulnerable to vessels strikes in rivers, by deep-draft vessels like tankers, where there is little area to maneuver, and when they are engaging in overwintering or foraging activity. Sea turtles and Atlantic sturgeon are also thought to be more vulnerable to being struck by fast moving vessels (Brown and Murphy 2010). This is not the case in the action area, since typical dredges and barges for this type of project move at slow speeds (i.e., on average 8-10 knots) and have shallow drafts. Additionally, the action area is not known to be an overwintering site for Atlantic sturgeon, and foraging Atlantic sturgeon are not expected to be abundant in the action area. Thus, it is extremely unlikely for Atlantic sturgeon or sea turtles to be struck by vessels during the dredging process or during the disposal of the material. The dredging of Wormley Creek is not expected to result in an increase in boat traffic, but rather in safer use by the existing boat traffic. Based on the best available information, it is extremely unlikely that a sea turtle or sturgeon will be struck by dredge or disposal vessels, and effects of vessel traffic on sea turtles and Atlantic sturgeon are discountable.

Disposal of Dredged Material

The use of offshore dredged material disposal sites can affect sea turtles and Atlantic sturgeon by exposing them to increased levels of turbidity and suspended sediments, and by affecting benthic resources. The dredged material from this project will be transported by a bottom dump barge/scow and placed overboard at the Wolftrap Alternative Placement Site (WTAPS) which is located in the main portion of the Chesapeake Bay. The placement site is made of six individual placement cells for the regular deposition of material from federal channels in the Chesapeake Bay.

During the discharge of sediment at offshore disposal sites, suspended sediment levels have been reported as high as 500.0 mg/l within 250 feet of the disposal vessel and decreasing to background levels (i.e., 15.0-100.0 mg/l depending on location and sea conditions) within 1,000-6,500 feet (ACOE 1983). Total suspended solids near the center of the dredged material placement plume body have been observed to reach near background levels in 35 to 45 minutes (Battele 1994 in USACE and EPA 2010). TSS is most likely to affect sea turtles and Atlantic sturgeon if a plume causes a barrier to normal behaviors or if sediment settles on the bottom and affects benthic prey. As sea turtles and Atlantic sturgeon are highly mobile, individuals are able to avoid any sediment plume that is present and any effect on their movements or behavior will not be measurable or detectable due to the small, temporary disruption from normal movements that may result from avoiding the sediment plume.

Since WTAPS is constantly disturbed for the regular deposition of dredge materials, it does not support preferred forage (seagrass beds, aggregations of mollusks and crustaceans) for sea turtles. Atlantic sturgeon feed on of polycheates, isopods, amphipods, aggregations of mollusks and crustaceans. Furthermore, Johnson *et al.* (2010) found sand in over 40% of the Atlantic sturgeon stomachs sampled, suggesting foraging in areas of sandy bottom, which is not consistent with WTAPS. As the disposal area is not known to contain benthic resources to

support Atlantic sturgeon or sea turtle foraging, effects to foraging sea turtles and sturgeon are extremely unlikely, and are discountable.

Conclusions

Based on the analysis that any effects to listed species will be insignificant or discountable, we concur with your determination that the Wormley Creek Federal Navigation Project is not likely to adversely affect any listed species or critical habitat under NMFS's jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required.

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. Should you have any questions about this correspondence, please contact Ms. Ainsley Smith at (978) 281-9291 or by email (Ainsley.Smith@Noaa.gov).

Essential Fish Habitat

The Magnuson Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with us on any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect essential fish habitat (EFH) identified under the MSA. If you have any questions about Essential Fish Habitat (EFH), and consultation requirements under the Magnuson-Stevens Fishery Conservation Act, please contact Dave O'Brien at 804-684-7828 or by email (David.l.O'Brien@noaa.gov).

Sincerely,

for John K. Bullard
Regional Administrator

EC: NMFS, Smith, O'Brien
ACOE, Nadal

File Code: Non-Fisheries\ACOE\Informal\2015\Norfolk District\Wormley Channel Dredging
PCTS: NER-2015-12056

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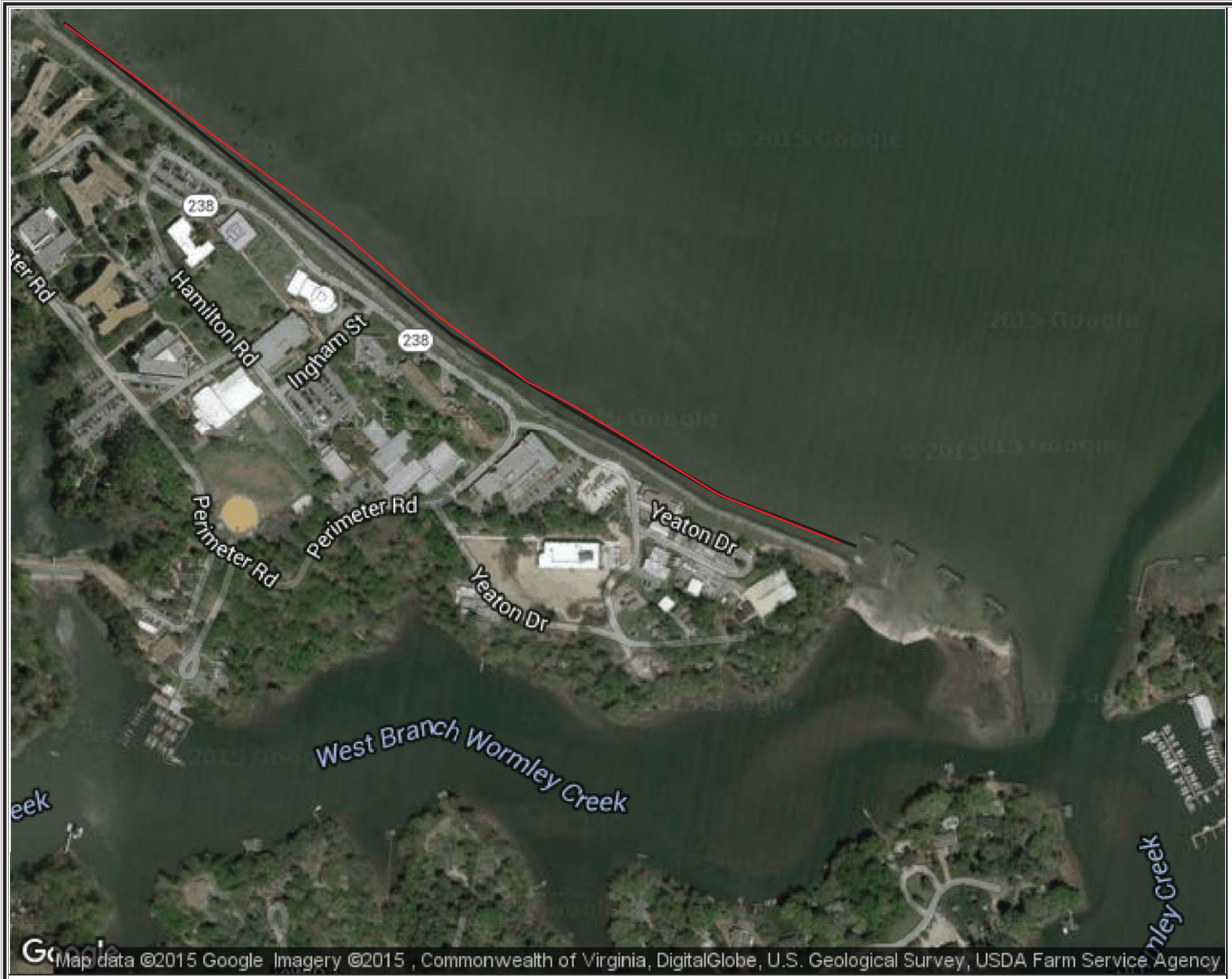

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Developed By: Geospatial Section
USACE Norfolk District
Via CorpsMap:
https://corpsmap.usace.army.mil/nao
Email: geospatial@usace.army.mil

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

Reply to
Attention of

January 13, 2015

Operations Branch

Ms. Mary Colligan, Assistant Regional Director for Protected Services
National Marine Fisheries Service
Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Ms. Colligan:

In order to comply with Section 7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), all major Federal actions that may affect listed species or species proposed to be listed must consult with the National Marine Fisheries Service (NMFS). The NMFS has listed the Chesapeake Bay distinct population segment (DPS) of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) as an endangered species. The final listing determination for the Chesapeake Bay DPS of Atlantic sturgeon was published in the Federal Register on February 6, 2012. I am requesting an informal Section 7 consultation to evaluate potential impacts from dredging of the Wormley Creek Federal Navigation Project on sea turtles and the Chesapeake Bay DPS of the Atlantic sturgeon.

The Wormley Creek Federal Navigation Project provides access and safe navigation in support of the United States Coast Guard (USCG) Training Center (TRACEN), Boat Forces & Cutter Operations (BFCO) facility located in Yorktown. The facility has several schools that provide USCG mission essential requirements for boat crew training. Among the schools located at this facility are: Boatswain's Mate (BM) School, Coxswain C School, RBS/TANB School, and National Motor Lifeboat School. The facility maintains a fleet of twenty-eight vessels. In addition to training, the BFCO facility evaluates prototype equipment and boat alterations before final approval for use in the field and provides feedback from the fleet to the Office of Boat Forces that aid in the development of improved operational techniques and maintenance procedures. The purpose of dredging the project is to provide safe navigation and anchorage for USCG vessel operations.

The project consists of a -10 feet deep channel and turning/boat basin. The channel is approximately 5,950 feet in length and 30 feet wide. The turning/boat basin is approximately 430 in length and 300 feet wide. In addition, a channel that is -10 feet deep, 50 feet wide and 200 feet long will be dredged to an existing boat ramp. The boat ramp is used to trailer several of the USCG vessels.

Dredging may be required every four to five years and will be performed by a small mechanical or small hydraulic cutterhead dredge. The dredged material will be transported by bottom dump barge/scow and placed overboard at the Wolftrap Alternate Placement Site (WTAPS) which is located in the main stem of the Chesapeake Bay, approximately 16 miles from the USCG TRACEN Yortown. The WTAPS Site has an area of approximately 2,543 acres in size (4,500 acres including the designated buffer zone). The site is located in the Chesapeake Bay, east of New Point Comfort and south of Wolf Trap light, east of Mathews County, Virginia. Approximately 75,000 cubic yards will be dredged each cycle.

There are four species of federally threatened or endangered sea turtles under the jurisdiction of the NMFS that may be found seasonally in the coastal waters of Virginia.

Leatherback sea turtle (*Dermochelys coriacea)*	Endangered
Loggerhead sea turtle (*Caretta caretta)*	Threatened
Kemp's ridley sea turtle (*Lepidochelys kempii)*	Endangered
Green sea turtle (*Chelonia mydas)*	Endangered

Leatherback sea turtles tend to frequent offshore habitats and are unlikely to be in the project area. The loggerhead sea turtle is the most abundant species of sea turtle in U.S. waters. In general, the listed sea turtles are seasonally distributed in the coastal U. S. Atlantic waters, migrating to and from habitats that extend from Florida to New England, with overwintering in southern waters.

Sea turtles are expected to be in the Virginia Chesapeake Bay during warmer months (April through November). Sea turtles are typically small juveniles with the most abundant species being the loggerhead followed by the Kemp's ridley sea turtle. Studies have examined the seasonal distribution of sea turtles in the mid-Atlantic, including Maryland and Virginia. Sea turtles begin appearing in nearshore habitats of the mid-Atlantic as water temperatures rise during spring and then remain in the region throughout the fall. As temperatures decline in the fall, sea turtles tend to leave their coastal habitats and join a larger contingent of other sea turtles migrating southward to overwinter in southern waters. By the end of November, the sea turtles have left the waters of the Virginia Chesapeake Bay.

A hydraulic cutterhead dredge uses a cutterhead to loosen or dislodge sediments to hydraulically capture the material. Sea turtles are not known to be vulnerable to entrainment in cutterhead dredges.

Mechanical dredges consist of clamshell type dredges or articulated mechanical (excavator) dredges. Mechanical dredging has a limited risk of entrainment, because of the manner in which the dredge is operated.

Dredging of the Wormley Creek Federal Navigation Project may have the potential to impact the Atlantic sturgeon and sea turtles. These impacts may include the following:

1) burial, removal, and/or alteration of benthic habitat at the dredging or placement site;
2) physical injury or death of adults or sub-adults due to entrainment by the dredge;
3) physical or biological impacts to water quality via:
   a) decreased dissolved oxygen levels
   b) predator/prey interactions
   c) primary productivity and respiration
   d) loss of benthic prey species
4) noise and presence of the dredge and related equipment

Enclosed are drawings of the project site. The Wormley Creek Federal Navigation Project is a high traffic area. It is unlikely that Atlantic sturgeon would be present in the project area. The site is not an area where spawning is known to occur. The incidence of Atlantic sturgeon being present in Wormley Creek is low. Small juveniles are not likely using the area, but adults and sub-adults may transit the project area during migration or to forage. Atlantic sturgeon has the ability to leave the area prior to commencement of dredging. Likewise, any sea turtles that may be in the project area have the ability to leave prior to commencement of dredging. Dredging of the Wormley Creek Federal Navigation Project will not augment threats to sea turtles. Sea turtles are not known to be vulnerable to entrainment by cutterhead dredge or mechanical dredge. The effects of dredging Wormley Creek Federal Navigation Project will be temporary in nature and are not likely to adversely affect Atlantic sturgeon or sea turtles in the project area. I am requesting your concurrence of this determination.

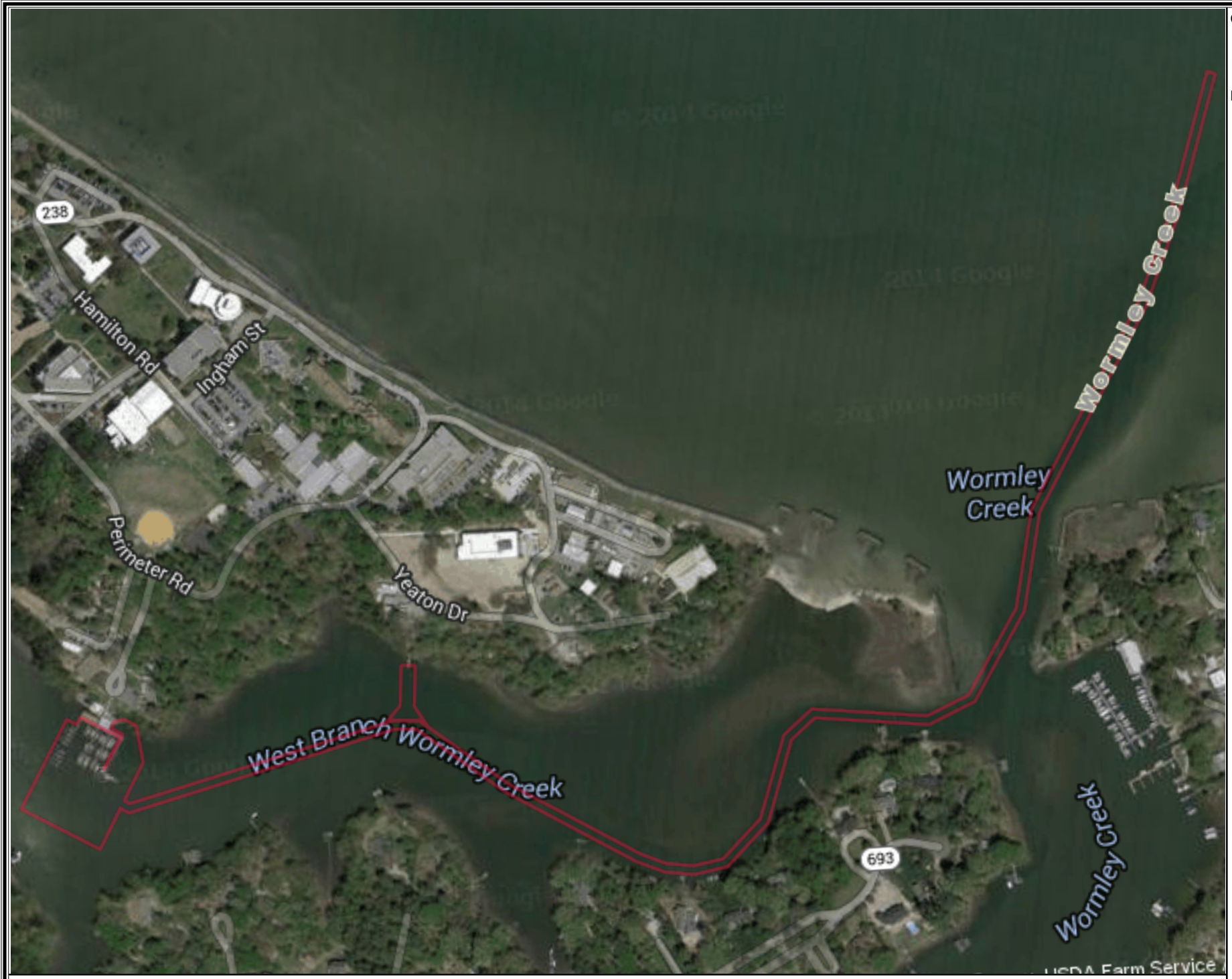
Should you have any questions or require further information on this submittal, please contact Ms. Teri Nadal of my staff at (757) 201-7299 or via email teresita.i.nadal@usace.army.mil. Thank you for your assistance.

Sincerely,

Elizabeth G. Waring

Elizabeth G. Waring
Chief, Operations Branch

Enclosure



Womley Creek Federal Navigation Project

Channel Framework
- Federal Navigation Projects
- Boundary or Other
- Placement Cell

Placement Area
- Placement Areas

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Date Printed: 01.13.2015

Map Scale: 1:6771

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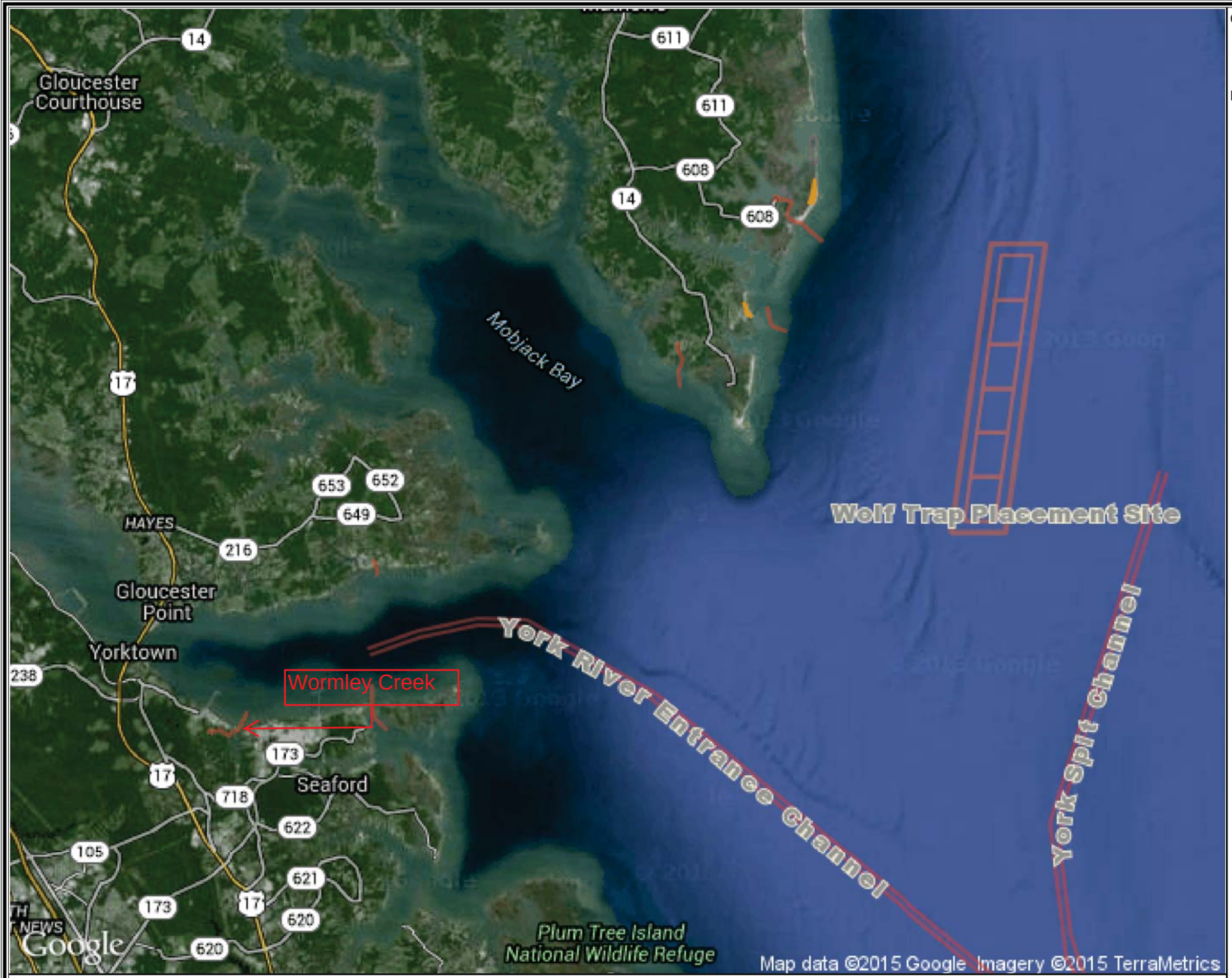
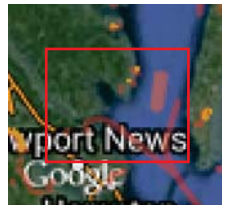
USACE Norfolk District
Via CorpsMap:
https://corpsmap.usace.army.mil/nao
Email: geospatial@usace.army.mil



Wormley Creek & Wolf Trap Alternate Placement Site

Channel Framework
- Federal Navigation Projects
- Boundary or Other
- Placement Cell

Placement Area
- Placement Areas



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Developed By: Geospatial Section
USACE Norfolk District
Via CorpsMap:
https://corpsmap.usace.army.mil/nao
Email: geospatial@usace.army.mil

APPENDIX B

Coastal Consistency Determination (CCD) and

Clean Air Act (CAA) General Conformity Rule

Coastal Zone Management Act (CZMA) Consistency Determination for Wormley Creek Federal Navigation Project at U.S. Coast Guard Training Center (USCG TRACEN) Yorktown in Yorktown, Virginia

On behalf of USCG TRACEN-Yorktown, this document provides the Commonwealth of Virginia with the U.S. Army Corps of Engineers, Norfolk District's (Corps) Coastal Consistency Determination (CCD) under CZMA section 307(c)(1) and 15 CFR Part 930, sub-part C, for the Wormley Creek Federal Navigation Project at the USCG TRACEN-Yorktown in Yorktown, Virginia. The information in this CCD is provided pursuant to 15 CFR Section 930.39.

Proposed Federal Agency Activity

The Proposed Action is to hydraulically or mechanically dredge the Wormley Creek Channel to a maintained depth of -7 feet mean lower low water (MLLW) plus -2 feet paid overdepth and -1 foot non-paid overdepth for a maximum depth of -10 feet MLLW. Dredging of the Wormley Creek Channel will remove approximately 75,000 cubic yards (CY) of dredged material in approximately 6.8 acres. Dredged material from the inner portion of the channel would be transported by barge/scow for overboard placement in the Wolf Trap Alternate Placement Site (WTAPS). Dredged material from the outer portion of the channel would be transported via hydraulic pipeline for beneficial use along the shoreline directly northwest of Wormley Creek Channel adjacent to the USCG TRACEN-Yorktown property. Once the shoreline placement site reaches capacity, any remaining dredged material from the outer portion of the channel would be placed at the WTAPS. (See drawings in Attachment A.)

The Wormley Creek Channel is currently maintained to -5 feet MLLW plus -2 feet for paid overdepth for a maximum depth of -7 feet MLLW. The channel is approximately 30 feet wide and extends from the 5 foot contour in the York River in to the West Branch of Wormley Creek to the USCG docks and turning basin. The turning basin is approximately 275 feet wide and 400 feet long.

The average depth ranges from -1 feet MLLW to -8.7 feet MLLW in the channel. Maintenance dredging would restore the site to its previously permitted depth and also remove an additional 2 feet of material to increase the maintained depth from -5 feet MLLW to -7 feet MLLW for adequate waterjet clearance. Currently, these vessels are required to back flush their jets when they transit Wormley Creek to remove sediments or debris that may have accumulated in the jets. As a result of the current channel depths, vessel down time and maintenance cost has increased due to additional repair/maintenance requirements. Reduced operating depths restrict efficient deployment of TRACEN-Yorktown vessels and inhibit the training center's ability to deploy for training activities and missions. Reduced depths may also inhibit or be a hazard to recreational boaters navigating the area.

Background

The Wormley Creek Channel provides access to the United States Coast Guard (USCG) Yorktown Training Center (TRACEN), in Yorktown, Virginia. The USCG Training Center occupies 154 acres of land and supports the Boat Forces and Cutter Operations (BFCO) facility. The BFCO has several schools that provide USCG mission essential requirements for boat crew training. Among the schools located at

this facility are: Boatswain's Mate (BM) School, Coxswain C School, RBS/TANB School, and National Motor Lifeboat School. The facility maintains a fleet of twenty-eight vessels. In addition to training, the BFCO facility evaluates prototype equipment and boat alterations before final approval for use in the field and provides feedback from the fleet to the Office of Boat Forces that aid in the development of improved operational techniques and maintenance procedures.

Enforceable Policies

The Virginia Coastal Resources Management Program (VCP) contains the below enforceable policies (A-I). More information can be found in the Final Environmental Assessment for this project.

A. Fisheries Management

This program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities.

Based on information from the Virginia Marine Resources Commission (VMRC) website, private oyster leases are present within the Federal navigation channel. The project will be coordinated with the VMRC through the NEPA and permitting process. Notifications to the impacted lease holders are handled through the joint permit application (JPA) process, and any necessary agreements, reductions, or transfers of leases would be completed prior to construction of the Proposed Action.

B. Subaqueous Lands Management

This management program for subaqueous lands establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the Department of Environmental Quality, Water Division.

Impacts to water quality will be minor and temporary, consisting of localized increases in turbidity due to dredging. A Section 401 Water Quality Certification from the Department of Environmental Quality (DEQ) is requested as part of the concurrence to this CCD. There is no Submerged Aquatic Vegetation within the project area; therefore, no impacts are anticipated. Dredging the Wormley Creek Channel to operational depths would maintain safe navigation and reduce risks to human health and safety that could occur if the current shoaling continues.

C. Wetlands Management

The purpose of the wetlands management program is to preserve tidal and non-tidal wetlands, prevent their despoliation, and accommodate economic development in a manner consistent with wetlands preservation.

Wetlands are located near the project area. There are no wetlands located in the project area; therefore, no impacts are anticipated.

D. Dunes Management

Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes.

There are no sand dunes located in the project area; therefore, no impacts are anticipated.

E. Non-point Source Pollution Control

Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth.

Erosion and sediment control (ESC) and storm water management (SWM) best management practices will be incorporated into the project design to ensure compliance with state programs. The contract plans and specifications will address requirements to achieve reduction of soil erosion and storm water management. On-site inspections will ensure compliance with government contract plans and specifications and the applicable state program to the maximum extent practicable.

F. Point Source Pollution Control

Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System permit program established pursuant to Section 402 of the Federal Clean Water Act and administered in Virginia as the Virginia Pollutant Discharge Elimination System permit program.

A Virginia Pollutant Discharge Elimination System (VPDES) permit is not required for this project. Dredged material discharges into waters of the United States are regulated under Section 404 of the Clean Water Act and receive appropriate water quality certifications under Section 401 of the Clean Water Act. Hence, dredged material discharges are not regulated under Section 402 of the Clean Water Act and CPDES regulations.

G. Shoreline Sanitation

The purpose of this program is to regulate the installation of septic tanks, set standards concerning soil types suitable for septic tanks, and specify minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth.

The proposed project does not include the installation, removal, or maintenance of septic tanks.

H. Air Pollution Control

The program implements the Federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS).

The Clean Air Act prohibits Federal entities from taking actions which do not conform to the State implementation plan (SIP) for attainment and maintenance of the national ambient air quality standards (NAAQS).

Air emissions due to the dredging and placement activities for this project will be minor and temporary. The use of heavy equipment and machinery will generate minor amounts of criteria pollutants. This project will conform to the Virginia's State Implementation Plan (SIP). The Environmental Protection Agency (EPA) has ruled that some Federal actions are exempt from the conformity requirement as these actions have been determined to result in no emission increase or an

increase that is clearly *de minimis*. Since the impacts to air quality would be negligible, a Record of Non-Applicability (RONA) was prepared in January 2016 (see Attachment B for RONA).

I. Coastal Lands Management

Coastal Lands Management is a state-local cooperative program administered by the DCR's Division of Stormwater Management – Local Implementation (previously the Division of Chesapeake Bay Local Assistance) and 88 localities in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act; Virginia Code §§ 10.1-2100 through 10.1-2114 and Chesapeake Bay Preservation Area Designation and Management Regulations; Virginia Administrative code 9 VAC10-20-10 et seq.

While NOAA has determined that the CZMA does not grant states regulatory authority over activities on federal lands, federal activities affecting Virginia's coastal resources must be consistent with the Bay Act and the Regulations as one of the enforceable programs of Virginia's Coastal Zone Management Program.

This project does not involve land development; therefore, this project is not subject to the Chesapeake Bay Preservation Act.

Advisory Policies for Geographic Area of Particular Concern

a. *Coastal Natural Resource Areas*

Coastal Natural Resource Areas are areas that have been designated as vital to estuarine and marine ecosystems and/or are of great importance to areas immediately inland of the shoreline. These areas include the following resources: wetlands, aquatic spawning, nursing, and feeding grounds, coastal primary sand dunes, barrier islands, significant wildlife habitat areas, public recreation areas, sand gravel resources, and underwater historic sites.

The project area may contain spawning, nursing, and/or feeding grounds for finfish and shellfish. Habitat for finfish and shellfish will not be harmed and may be improved as a result of this project. An Essential Fish Habitat (EFH) Assessment is being coordinated with NOAA Fisheries and will be included with the EA. Additionally, overboard placement will occur between April 1st through November 30th to avoid any potential impacts to overwintering blue crabs in WTAPS.

b. *Coastal Natural Hazard Areas*

This policy covers areas vulnerable to continuing and severe erosion and areas susceptible to potential damage from wind, tidal, and storm related events including flooding. New buildings and other structures should be designed and sited to minimize the potential for property damage due to storms or shoreline erosion. The areas of concern are highly erodible areas and coastal high hazard areas, including flood plains.

The project area contains no coastal natural hazard areas; therefore, adherence to this program is not applicable.

c. ***Waterfront Development Areas***
These areas are vital to the Commonwealth because of the limited number of areas suitable for waterfront activities. The areas of concern are commercial ports, commercial fishing piers, and community waterfronts.

While this project includes no onshore development, it does support waterfront activities by providing safe, reliable navigation to the Wormley Creek Federal Navigation project.

Advisory Policies for Shorefront Access Planning and Protection

a. ***Virginia Public Beaches***
These public shoreline areas will be maintained to allow public access to recreational resources.

There are no public beaches within the project area; consequently this project will not affect public access to beaches.

b. ***Virginia Outdoors Plan (VOP)***
The VOP, which is published by Virginia's Department of Conservation and Recreation (DCR), identifies recreational facilities in the Commonwealth that provide recreational access. Prior to initiating any project, consideration should be given to the proximity of the project site to recreational resources identified in the VOP.

This project is consistent with the Virginia Outdoor Plan for Region 23, Hampton Roads, whose main recreational activities revolve around water access and boating. This project will provide access to the Wormley Creek Federal Navigation project for USCG TRACEN-Yorktown and other related vessels.

c. ***Parks, Natural Areas, and Wildlife Management Areas***
The recreational values of these areas should be protected and maintained.

The project area contains no Parks, Natural Areas, or Wildlife Management Areas.

d. ***Waterfront Recreational Land Acquisition***
It is the policy of the Commonwealth to protect areas, properties, lands, or any estate or interest therein, of scenic beauty, recreational utility, historical interest, or unusual features which may be acquired, preserved, and maintained for the citizens of the Commonwealth.

This project does not limit the ability of the Commonwealth in any way to acquire, preserve, or maintain waterfront recreational lands.

e. ***Waterfront Recreational Facilities***
Boat ramps, public landings, and bridges shall be designed, constructed, and maintained to provide points of water access when and where practicable.

This project does not involve the design, construction, or maintenance of any boat ramps, public landings, or bridges. The project will enhance access to the existing MWR (Morale, Welfare, and Recreation) boat ramp which is currently used for recreational purposes.

f. ***Waterfront Historic Properties***

The Commonwealth has a long history of settlement and development, and much of that history has involved both shorelines and near-shore areas. The protection and preservation of historic shorefront properties is primarily the responsibility of the Virginia Department of Historic Resources.

The National Historic Preservation Act - Section 106 consultation with the Department of Historic Resources (VDHR) is currently ongoing. An area for potential affect was identified, and a magnetometer survey was performed. Channel realignment will ensure no impacts to potential historic sites or artifacts. This project will not affect historic properties or their viewshed; therefore, the Corps is requesting VDHR concurrence with the 'no effect' conclusion.

Determination

Based upon the following information, data, and analysis, the U.S. Army Corps of Engineers, Norfolk District, on behalf of the USCG at TRACEN-Yorktown in Yorktown, Virginia, finds that the dredging and placement activities of Wormley Creek Federal Navigation project is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Resources Management Program.

Pursuant to 15 CFR Section 930.41, the Virginia Coastal Resources Management Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR section 930.41(b). Virginia's concurrence will be presumed if its response is not received by the U.S. Army Corps of Engineers on the 60th day from receipt of this determination.

1/6/16
Date

Elizabeth G. Waring
Elizabeth G. Waring
Chief, Operations Branch

Attachment A

Project Drawings

US Army Corps
of Engineers

Norfolk District

US COAST GUARD TRAINING FACILITIES
WORMLEY CREEK
PERMIT DRAWING

SURVEY OF JUNE AND SEPTEMBER 2014
YORK RIVER, VIRGINIA

DRAWING INDEX	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	LOCATION MAP
3	LEGEND AND GENERAL NOTES
4	WOLF TRAP PLACEMENT SITE
5	WOLF TRAP PLACEMENT SITE (CELL 6)
6	OVERALL PROJECT PLAN
7	COAST GUARD DOCK & BOAT RAMP PLAN VIEW
8	MAPPING SHEET
9	MAPPING SHEET (CONT'D)
10	MAPPING SHEET (CONT'D)
11	PLAN & PROFILE 6-INCH FORCE MAIN
12	PLAN VIEW - BEACH PLACEMENT SITE
13	BEACH PLACEMENT CROSS-SECTIONS
14	BEACH PLACEMENT CROSS-SECTIONS (CONT'D)
15	CHANNEL & WOLFTRAP CROSS-SECTIONS
16	DOCK & BOAT RAMP CROSS-SECTIONS

SIGNATURES AFFIXED BELOW INDICATE OFFICIAL RECOMMENDATION AND APPROVAL OF ALL DRAWINGS IN THIS SET AS INDICATED ON INDEX TO DRAWINGS.

DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
NORFOLK, VIRGINIA

REVIEWED: CHIEF, NAVIGATION SUPPORT AND SURVEY SECTION	APPROVED: CHIEF, OPERATIONS BRANCH
SUBMITTED: CHIEF, DESIGN SECTION	APPROVED: CHIEF, WATER RESOURCES DIVISION

US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED:	CHECKED: M.L.A.	DATE: 31 JULY 14	
DRAWN: H.A.F.	SUBMITTED: K.L.G.	SCALE: AS SHOWN	
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(1)			
DRAWING NO.:			
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.			

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMLEY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
COVER SHEET

SHEET 1 OF 16

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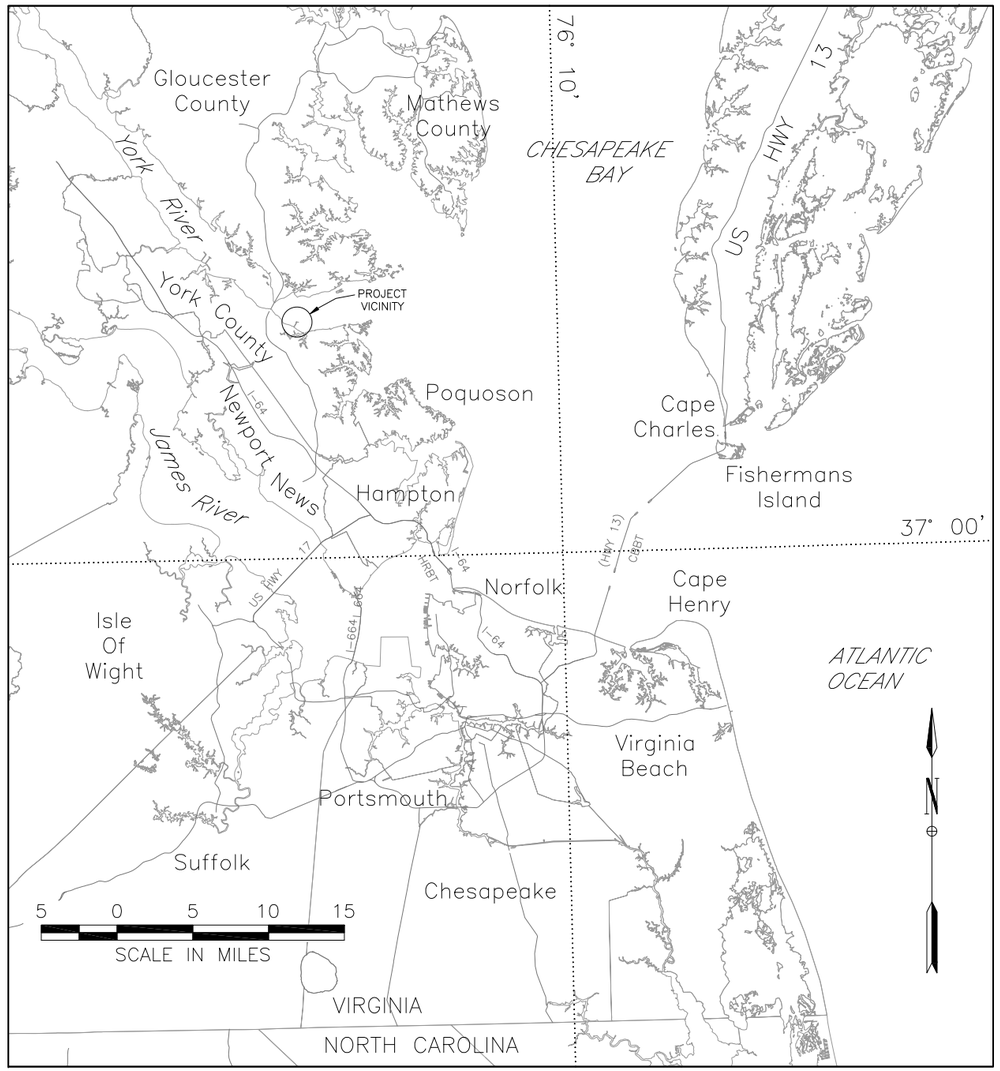
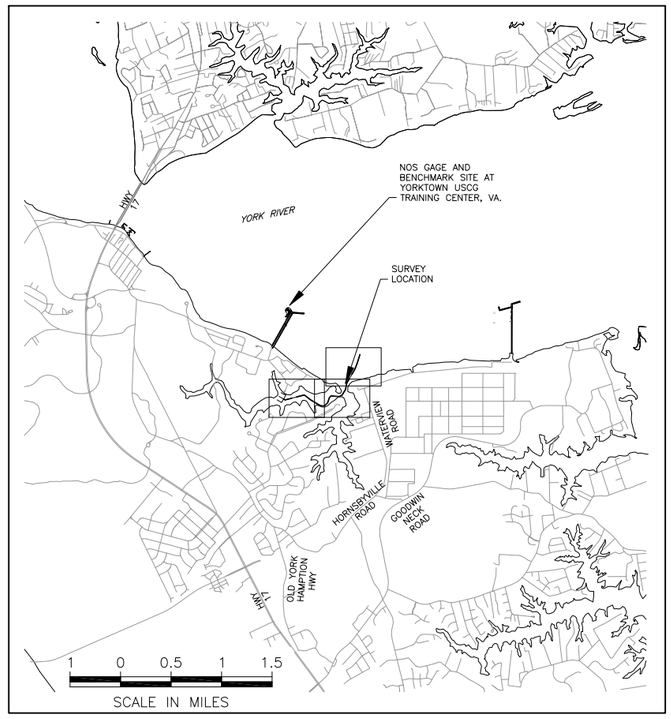
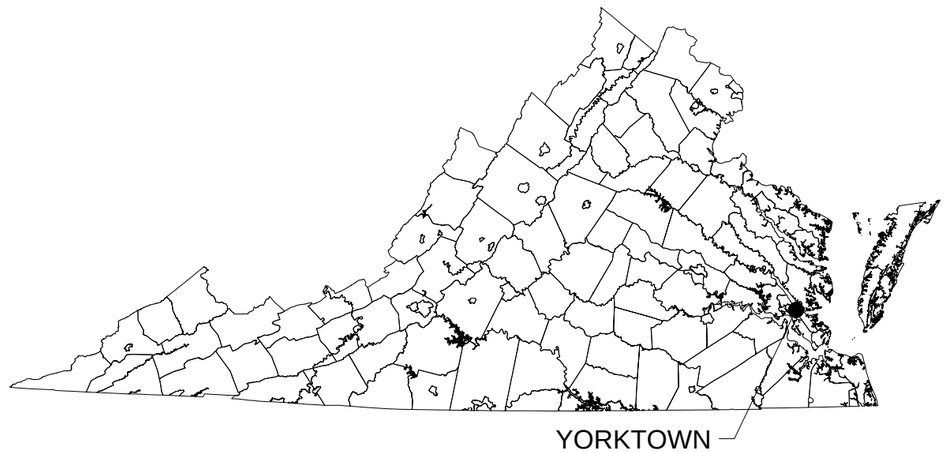


VICINITY MAP



LOCATION MAP



VIRGINIA

US Army Corps of Engineers Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED: M.L.A.
DRAWN: H.A.F.
CHECKED: 31 JULY 14
SUBMITTED: K.L.G.
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02-PS(2)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
LOCATION MAP

SHEET 2 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 9:59pm; Alroy

– NOTES –

PROJECT DIMENSIONS: A channel 5 feet deep and 30 feet wide extending from the 5 foot contour in the York River in to the West Branch of Wormley Creek to the U. S. Coast Guard docks and a turning basin 5 feet deep, 275 feet wide and 400 feet long.

MEAN LOWER LOW WATER (MLLW), National Tidal Datum Epoch (NTDE) of 1960–1978, was determined by the National Ocean Service (NOS) at the Yorktown American Oil Company dock, York River, and is 0.82 feet below the North Geodetic Vertical Datum (NGVD), of 1988.

SOUNDINGS are in feet referred to NOS MLLW and were taken on 24 June and 6 September 2014.

MEAN RANGE OF TIDE is 2.20 feet at Yorktown, York river, VA based on NOS observations, NTDE 1983–2001.

COORDINATES are referred to the Virginia State Plane Coordinate System, South Zone in U.S. survey feet, and are based on the North American Datum of 1983.

PLANIMETRIC FEATURES were developed by digitizing from existing data.

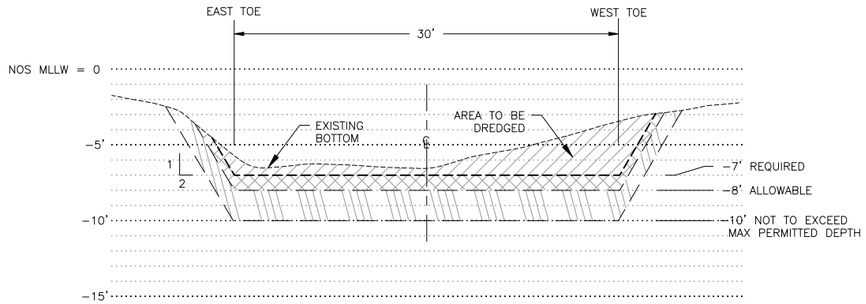
LAST DREDGED by Aqua–Dredge, Inc. in 1982 under U.S.C.G. 17 October Contract.

ABBREVIATIONS

ELEV	ELEVATION
BOP	BEGINNING OF PROJECT
EOP	END OF PROJECT
PS	PLACEMENT SITE
NTDE	NATIONAL TIDAL DATUM EPOCH
inv	INVERT
HOR	HORIZONTAL SCALE
VERT	VERTICAL
MHW	MEAN HIGH WATER
MLW	MEAN LOW WATER
MLLW	MEAN LOWER LOW WATER
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NOS	NATIONAL OCEAN SERVICE
adj	ADJUSTMENT
USC&GS	UNITED STATES COAST AND GEODETIC SURVEY

– QUANTITY ESTIMATE –

LOCATION	TO 7 FEET (Required)	2 FOOT OVERDEPTH (Allowable)	TOTAL
STATION TO STATION	CUBIC YARDS, PLACE MEASUREMENT		
Basin (Sta. –2+50 – 0+92)	XX,XXX	XX,XXX	XX,XXX
Main Channel (Sta 0+92 – 62+00)	XX,XXX	XX,XXX	XX,XXX
Small Boat Channel (Sta. 0+00 – 2+27)	XX,XXX	XX,XXX	XX,XXX
Estimated Accretion to September 2012	XX,XXX	XX,XXX	XX,XXX
* TOTAL *	XX,XXX	XX,XXX	XX,XXX



TYPICAL SECTION SHOWING SIDESLOPES AND OVERDEPTH (NOT TO SCALE)

– LEGEND –

- LIMITS OF FEDERAL PROJECT
- WITHIN THIS AREA THE REMOVAL OF ALL MATERIAL TO A MAXIMUM ALLOWABLE DEPTH OF 10 FEET.
- OYSTER LEASE GROUNDS
- SHORELINE
- SEDIMENT SAMPLING LOCATIONS AND ANALYTICAL SAMPLE IDs
- AREA TO BE DREDGE
- BEACH FILL AREA 3.0' ELEVATION
- BEACH FILL SLOPES 30:1

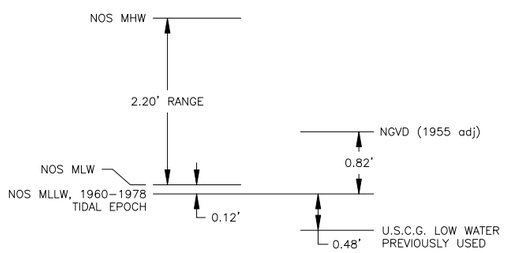
BENCHMARKS

BENCHMARKS	ELEVATIONS
USC&GS "L 418, 1963"	+9.80'
NOS "2200 B, 1980"	+9.90'
USCG "EL. 12.679 FT."	+13.10'
NOS "7689 B, 2004"	+11.43'
Elevations are relative to NOS MLLW, 1983–2001 NTDE	

WOLFTRAP PS OBSTRUCTION TABLE

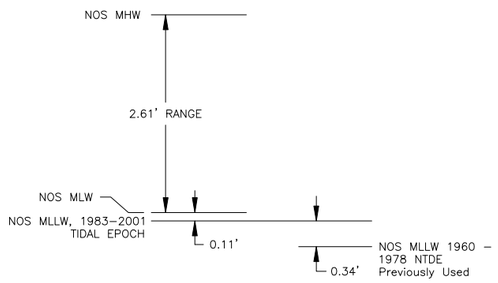
I.D. MAP NUMBER	M.O.D.	Method	Date Reported	COORDINATES (NAD 83) NORTH (Y)	COORDINATES (NAD 83) EAST (X)	FILE NUMBER USACE	FILE NUMBER AWOIS
"A"	N/A	SIDE SCAN	N/A	3,627,608	12,155,904	N/A	A962
"B"	N/A	N/A	N/A	3,640,448	12,154,717	N/A	A967

Additional information on these obstructions is on file with the U.S. Army Corps of Engineers, Norfolk District, Navigation Support and Survey Section.



DATUM DIAGRAM
WORMLEY CREEK
1960–1978 TIDAL EPOCH
(SCALE 1"–1')

KIPTOPEKE, CHESAPEAKE BAY



DATUM DIAGRAM
WOLFTRAP PS
1983–2001 TIDAL EPOCH
(SCALE 1"–1')

COORDINATES OF WOLF TRAP ALTERNATE DREDGED MATERIAL PLACEMENT AREA

POINT	EAST (X)	NORTH (Y)
1	12,157,316.49	3,664,185.37
2	12,163,374.66	3,664,334.07
3	12,153,628.17	3,631,895.34
4	12,159,686.35	3,632,043.34
5	12,158,468.56	3,662,925.67
6	12,161,927.52	3,663,010.57
7	12,157,901.26	3,657,959.11
8	12,161,360.22	3,658,044.01
9	12,157,333.96	3,652,992.56
10	12,160,792.92	3,653,077.46
11	12,156,766.66	3,648,026.01
12	12,160,225.61	3,648,110.91
13	12,156,209.92	3,643,151.94
14	12,159,668.88	3,643,236.84
15	12,155,642.62	3,638,185.39
16	12,159,101.57	3,638,270.29
17	12,155,075.31	3,633,218.84
18	12,158,534.27	3,633,303.74

COORDINATES OF WOLF TRAP ALTERNATE DREDGED MATERIAL PLACEMENT AREA (CELL 6)

POINT	EAST (X)	NORTH (Y)
15	12,155,642.62	3,638,185.39
16	12,159,101.57	3,638,270.29
17	12,155,075.31	3,633,218.84
18	12,158,534.27	3,633,303.74

CENTERLINE COORDINATES

STATION	EAST (X)	NORTH (Y)
–2+50.0	12,070,828.08	3,607,885.35
–0+60.0	12,070,992.66	3,607,790.41
0+00.0	12,071,044.63	3,607,760.43
0+25.0	12,071,066.29	3,607,747.94
1+20.0	12,071,148.64	3,607,700.47
10+95.0	12,072,091.65	3,607,947.41
11+76.0	12,072,172.65	3,607,942.41
15+61.0	12,072,476.66	3,607,706.40
20+78.0	12,072,921.67	3,607,443.39
21+80.0	12,073,015.67	3,607,390.39
22+81.0	12,073,115.67	3,607,390.39
23+93.0	12,073,225.67	3,607,410.38
25+93.0	12,073,369.68	3,607,550.38
28+96.0	12,073,465.68	3,607,837.38
30+19.0	12,073,559.68	3,607,916.38
34+22.0	12,073,960.69	3,607,873.37
35+93.0	12,074,116.69	3,607,942.37
39+46.0	12,074,301.69	3,608,243.37
42+00.0	12,074,352.60	3,608,492.14
51+16.0	12,074,599.90	3,609,374.06
62+03.0	12,075,135.72	3,610,319.63

US Army Corps of Engineers Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED: CHECKED: M.L.A.
DRAWN: H.A.F. SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014–10–02.PS(3)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
LEGEND AND GENERAL NOTES

SHEET 3 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C–HP1914.dwg; Nov 23, 2015 – 9:59pm; Alroy

A B C D E F G H

6 5 4 3 2 1

STATE HWY 615

US HWY 17 BUS

STATE HWY 629

ROBINS NECK RD

WARNER HALL RD

FREE SCHOOL RD

STATE HWY 614

FEATHERBED LN

STATE HWY 608

GUINEA CIR

KINGS CREEK RD

STATE HWY 649

STATE HWY 641

COLONIAL NATIONAL HISTORICAL PKWY

HWY 17

NEW POINT COMFORT

WOLFTRAP ALTERNATE PLACEMENT SITE

CELL 1

CELL 2

CELL 3

CELL 4

CELL 5

CELL 6

B 4 15

DREDGED MATERIAL TO BE PLACED IN CELL #6

A 4 15

CAPE CHARLES CITY

YORK SPIT CHANNEL

YORK RIVER ENTRANCE CHANNEL

CHESAPEAKE BAY

WORMLEY CREEK

LOCATION OF PROJECT

WILLIS CREEK ROAD

HORNSBY MILL ROAD

GOODWIN NECK ROAD

OLD TOWN HAMPTON HWY

STATE HWY 637

US HWY 17

STATE HWY 105

I 64

HWY 17

1 0.5 0 1 2 3

SCALE IN MILES

N

US Army Corps of Engineers Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED: M.L.A.
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(4)
DRAWING NO.:
DATE: 31 JULY 14
SCALE: AS SHOWN
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
WOLF TRAP PLACEMENT SITE

SHEET 4 OF 16

T:\W.Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 9:59pm; Alroy

US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

DESIGNED:
CHECKED: M.L.A.
DATE: 31 JULY 14
DRAWN: H.A.F.
SUBMITTED: K.L.G.
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(5)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
WOLF TRAP PLACEMENT SITE (CELL 6)

SHEET 5 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 9:59pm; Alroy

AREA TO BE DREDGE

BEACH FILL AREA
3.0' ELEVATION

BEACH FILL SLOPES 30:1

APPROX. 3,350 LF

BEACH PLACEMENT MATERIAL SITE

NEW CHANNEL
ALIGNMENT

VEPCO EASEMENT
115 KV SUBAQUEOUS CABLE

APPROXIMATE LOCATION OF
OBSTRUCTION IN CHANNEL

OLD CHANNEL
ALIGNMENT

BOAT RAMP

COAST GUARD BASE

SEWER FORCEMAIN
CROSSING CHANNEL

*WEST BRANCH
WORMLEY CREEK*

200 100 0 200 400 600
SCALE IN FEET

US Army Corps of Engineers
Norfolk District

REV.	DESCRIPTION	DATE	BY	APP.

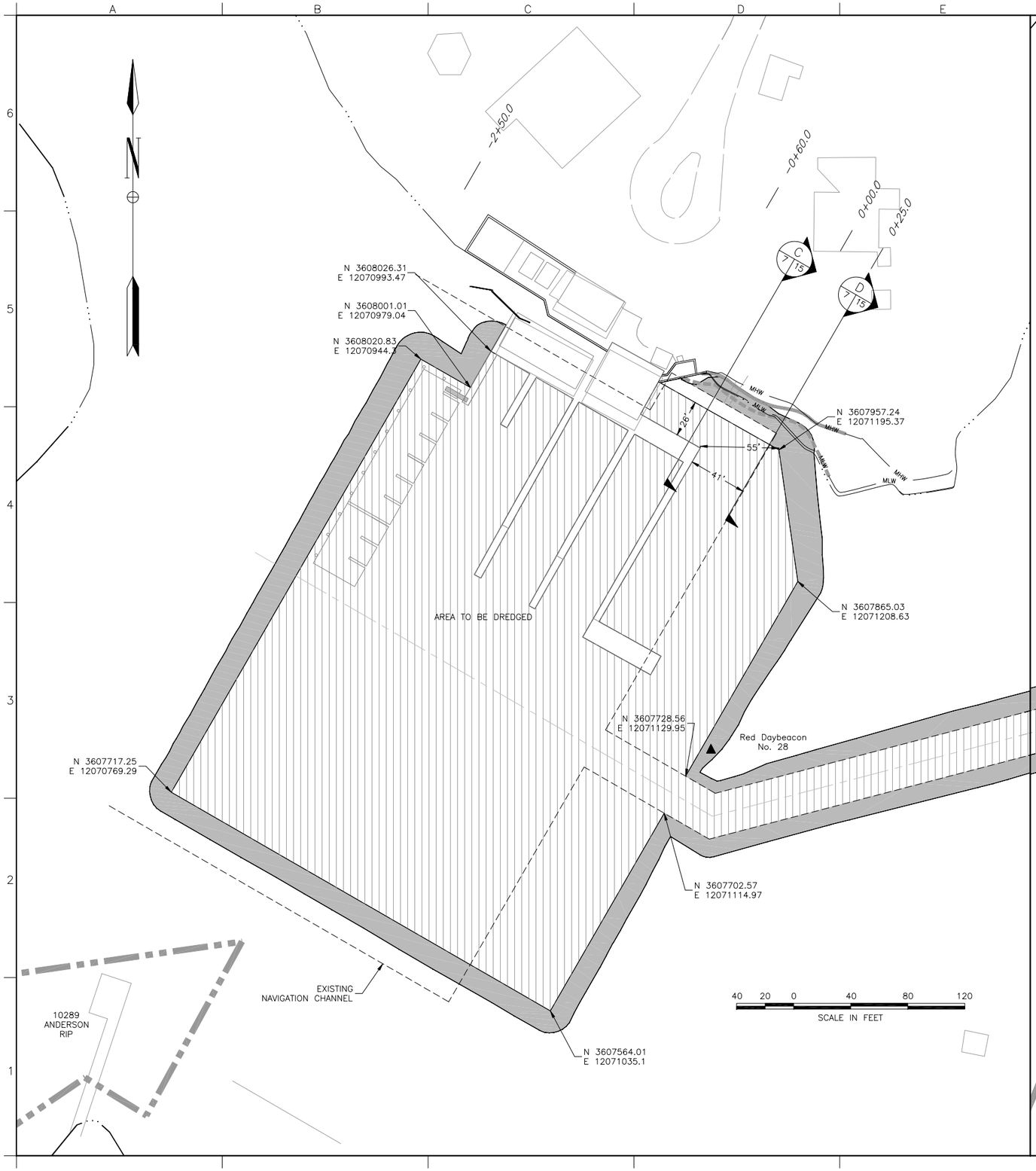
DESIGNED:	CHECKED: M.L.A.
DRAWN: H.A.F.	SUBMITTED: K.L.G.
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(6)	DATE: 31 JULY 14
DRAWING NO.:	SCALE: AS SHOWN
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd	

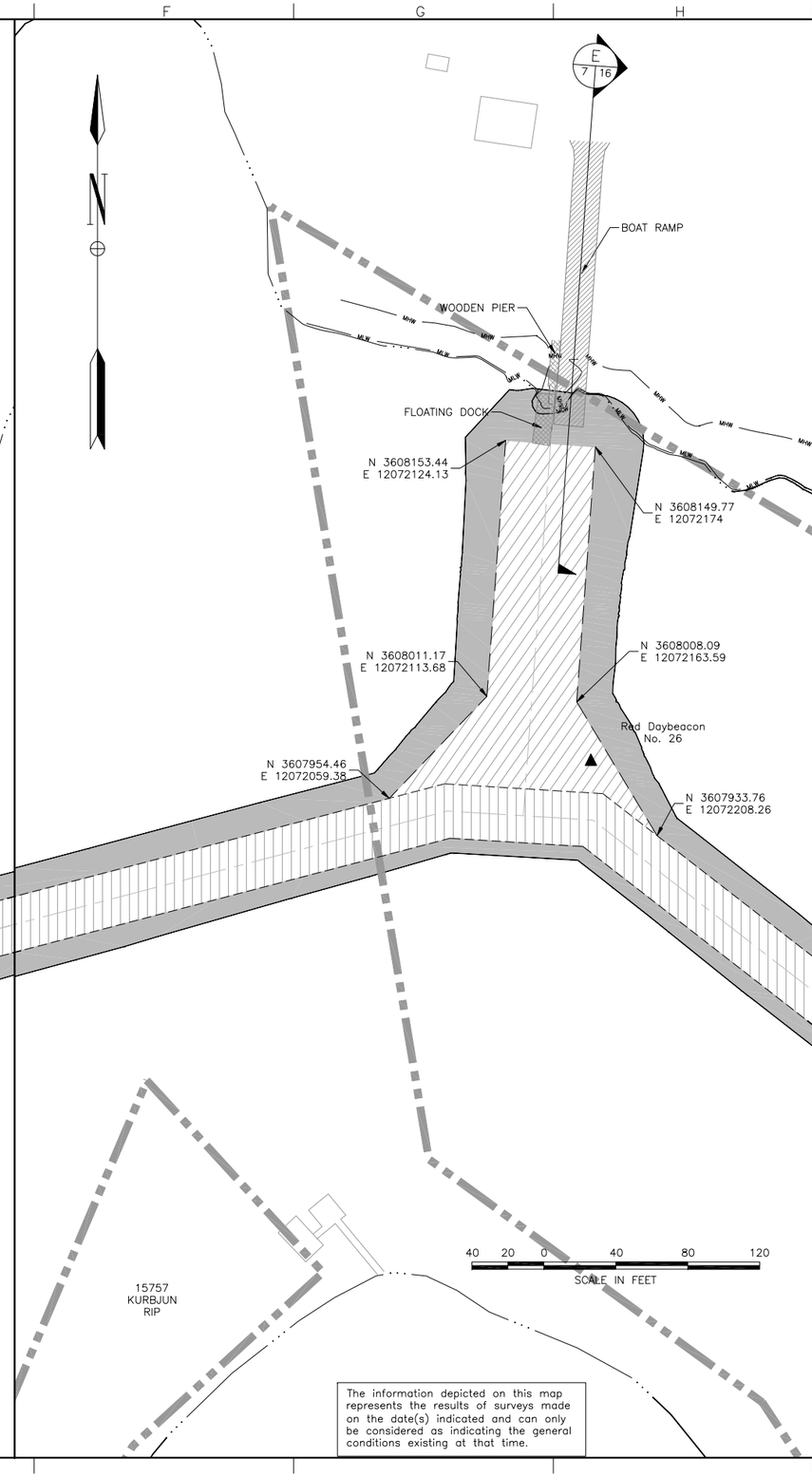
NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMLEY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
OVERALL PROJECT PLAN

SHEET 6 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:00pm; Alroy





The information depicted on this map represents the results of surveys made on the date(s) indicated and can only be considered as indicating the general conditions existing at that time.

US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED:
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(7)
DRAWING NO.:
SURVEYED BY:

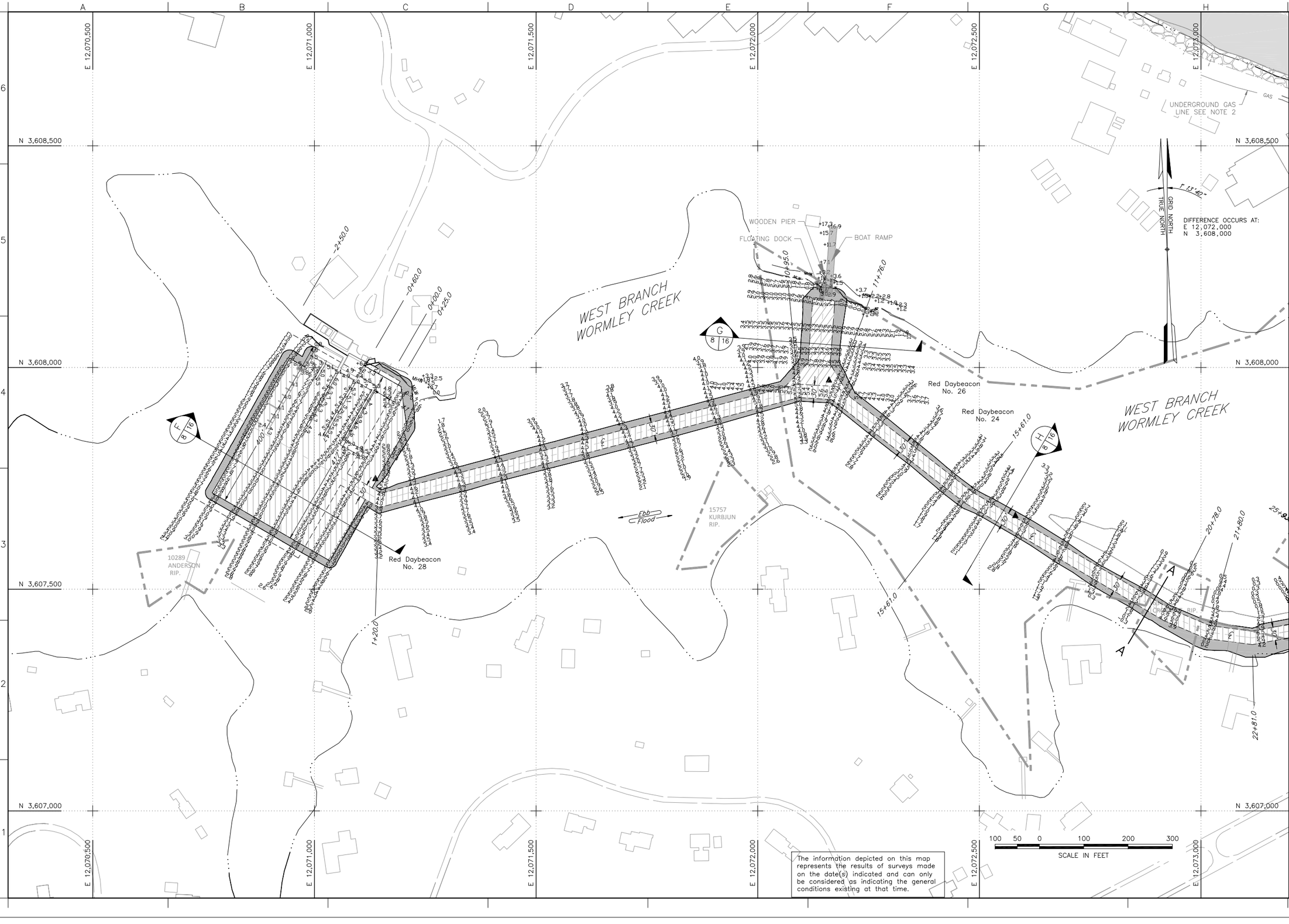
NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

WATERWAY SURVEYS & ENGINEERING, Ltd

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
COAST GUARD DOCK & BOAT RAMP PLAN VIEW

SHEET 7 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:00pm; Alroy



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US Army Corps of Engineers
Norfolk District

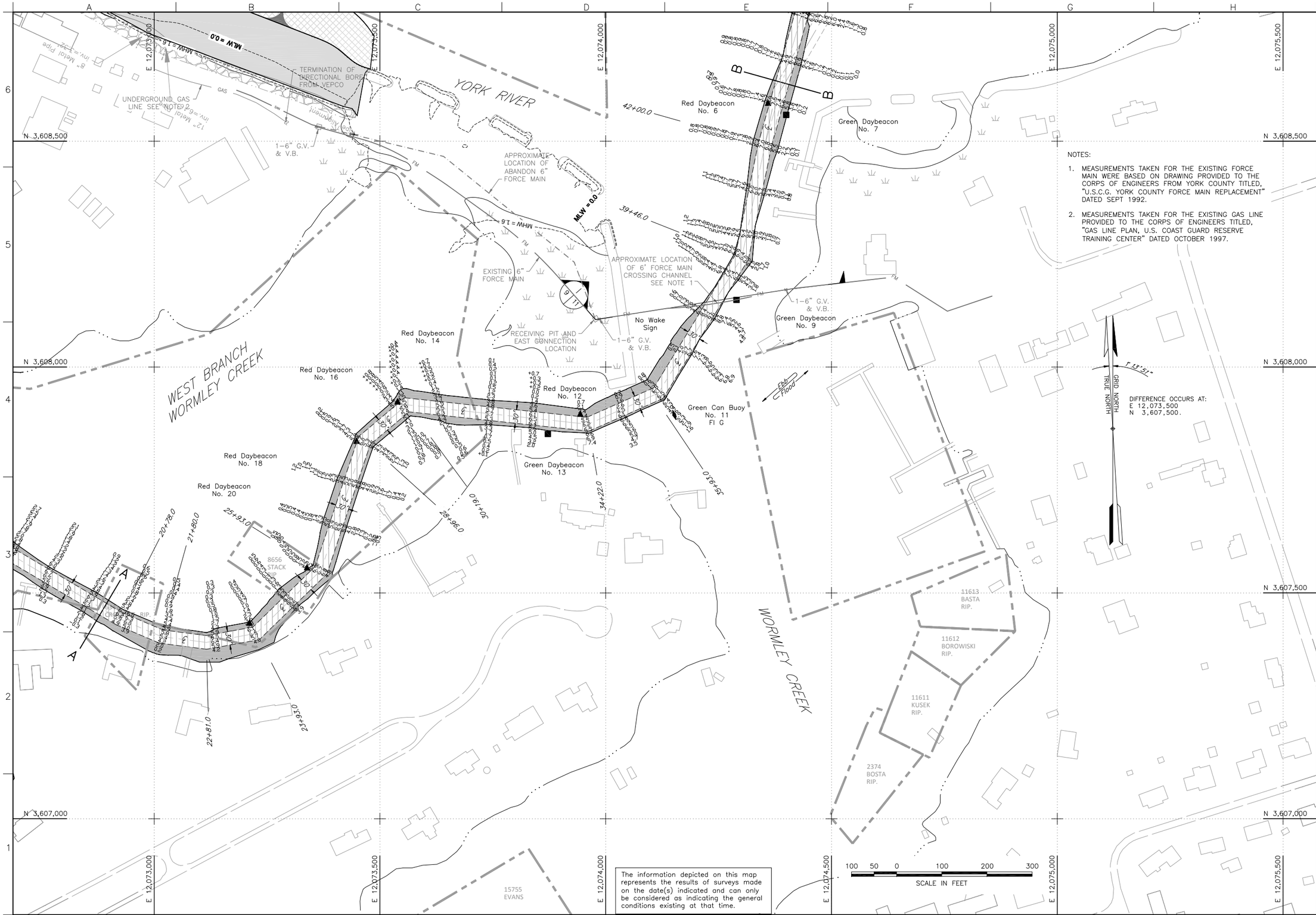
REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED:
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(8)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
MAPPING SHEET

SHEET 8 OF 16



NOTES:

1. MEASUREMENTS TAKEN FOR THE EXISTING FORCE MAIN WERE BASED ON DRAWING PROVIDED TO THE CORPS OF ENGINEERS FROM YORK COUNTY TITLED, "U.S.C.G. YORK COUNTY FORCE MAIN REPLACEMENT" DATED SEPT 1992.
2. MEASUREMENTS TAKEN FOR THE EXISTING GAS LINE PROVIDED TO THE CORPS OF ENGINEERS TITLED, "GAS LINE PLAN, U.S. COAST GUARD RESERVE TRAINING CENTER" DATED OCTOBER 1997.

The information depicted on this map represents the results of surveys made on the date(s) indicated and can only be considered as indicating the general conditions existing at that time.

US Army Corps of Engineers Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

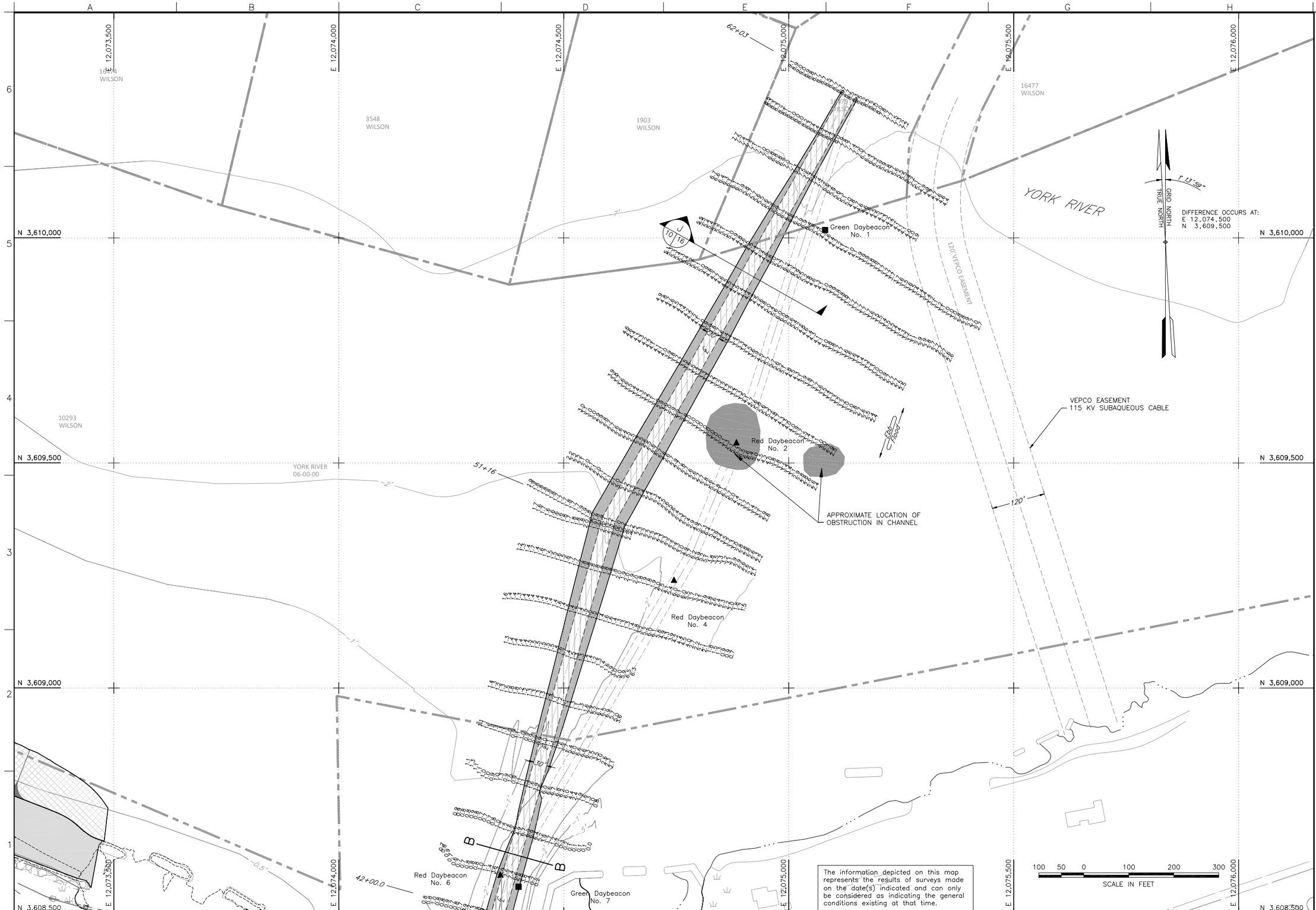
DESIGNED: M.L.A.
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM 2014-10-02 PS (9)
DRAWING NO.: 9
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
MAPPING SHEET (CONT'D)

SHEET 9 OF 16

T:\W Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:01pm; Alroy



US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED: CHECKED: M.L.A.
DRAWN: H.A.F. SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(10)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
MAPPING SHEET (CONT'D)

SHEET 10 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:01pm; Alroy

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US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

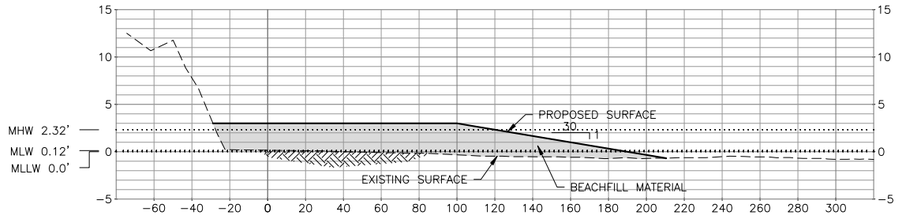
NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

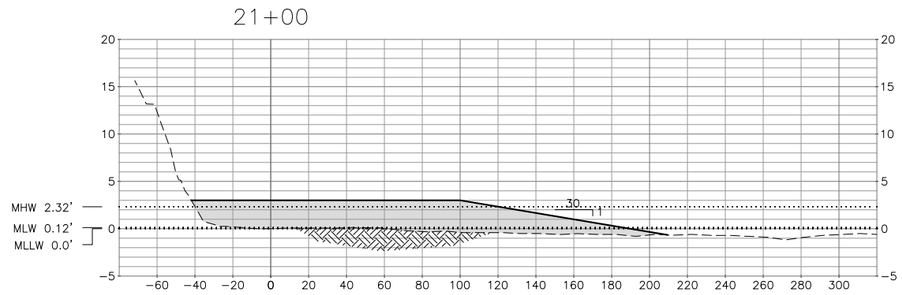
DESIGNED: M.L.A.
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(12)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

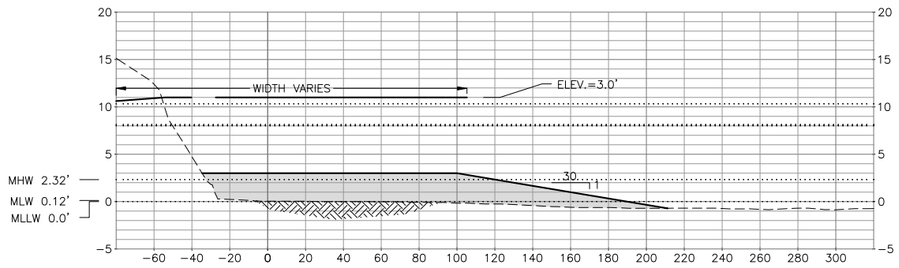
U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
PLAN VIEW - BEACH PLACEMENT SITE

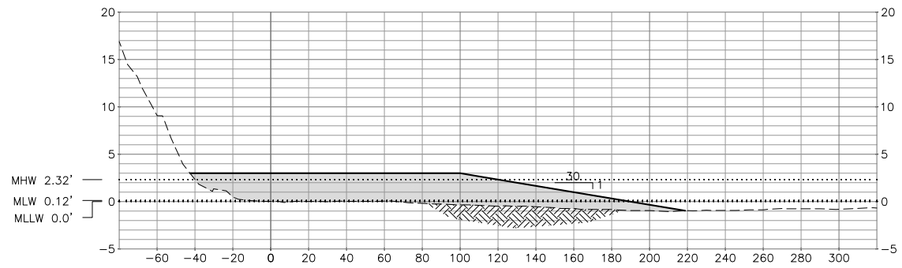
SHEET 12 OF 16

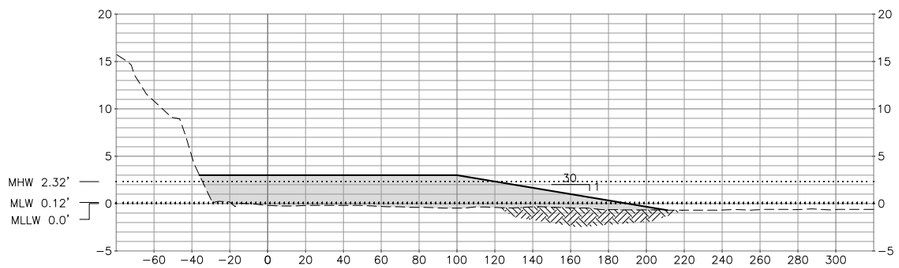
T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:02pm; Alroy

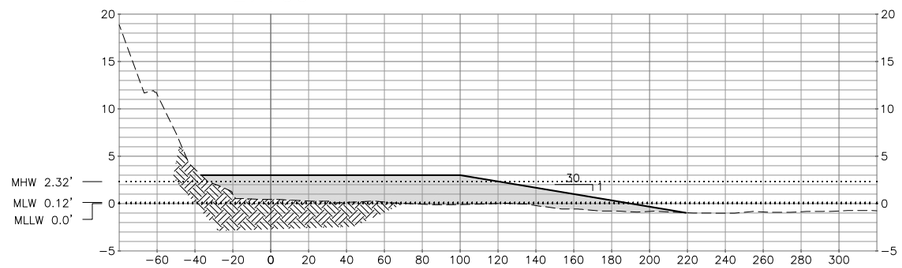


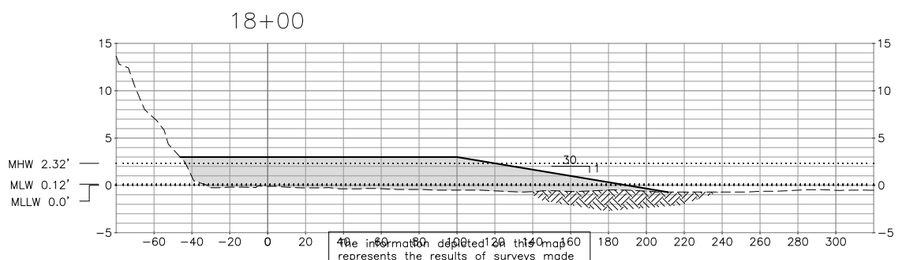


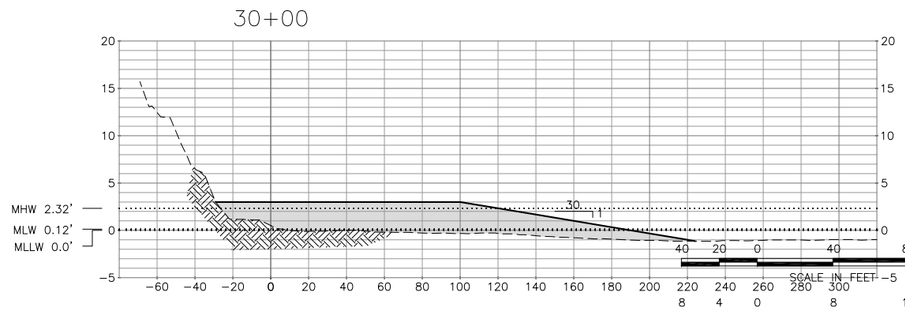












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US Army Corps of Engineers
Norfolk District

REV.	DATE	BY	APP.	DESCRIPTION

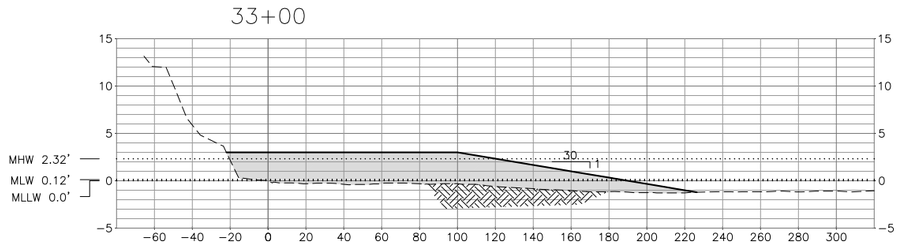
DESIGNED:
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM:2014-10-02.PS(13)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd

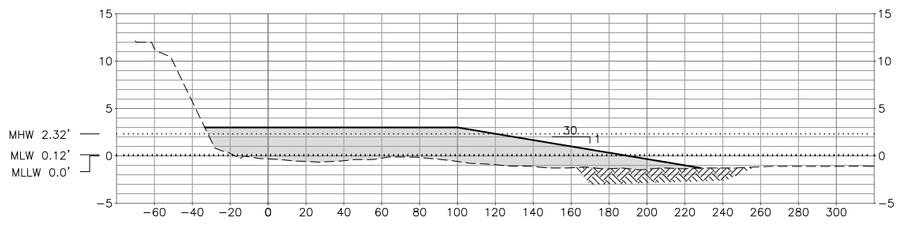
NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

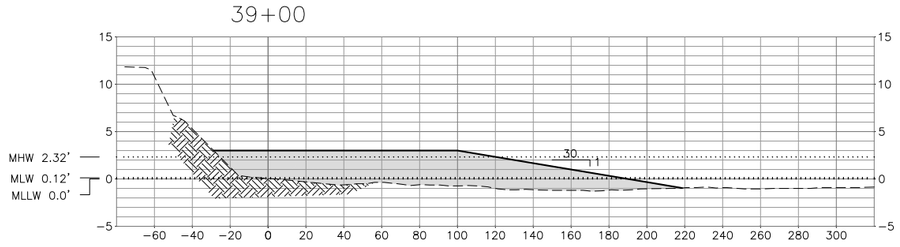
U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
BEACH PLACEMENT CROSS-SECTIONS

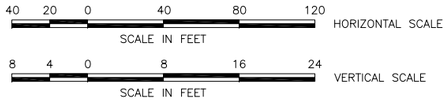
SHEET 13 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:02pm; Alroy









The information depicted on this map represents the results of surveys made on the date(s) indicated and can only be considered as indicating the general conditions existing at that time.

US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

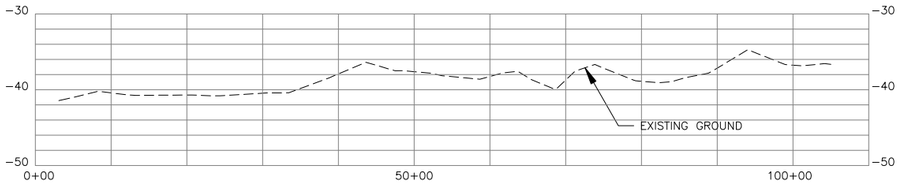
NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

DESIGNED:
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(14)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

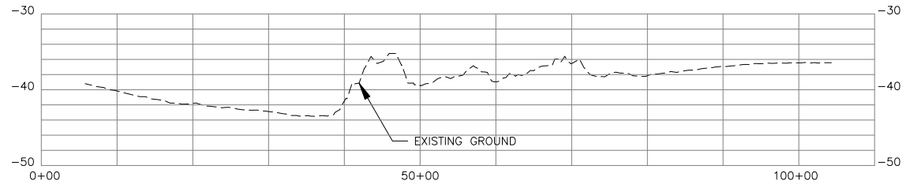
U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
BEACH PLACEMENT CROSS-SECTIONS (CONTD)

SHEET 14 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:02pm; Alroy



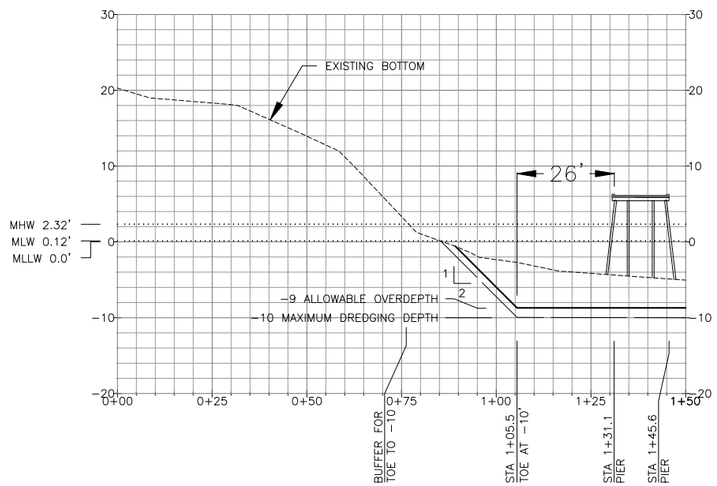
A 4|15 TYPICAL PLACEMENT SITE CROSS–SECTION
SCALE: AS SHOWN



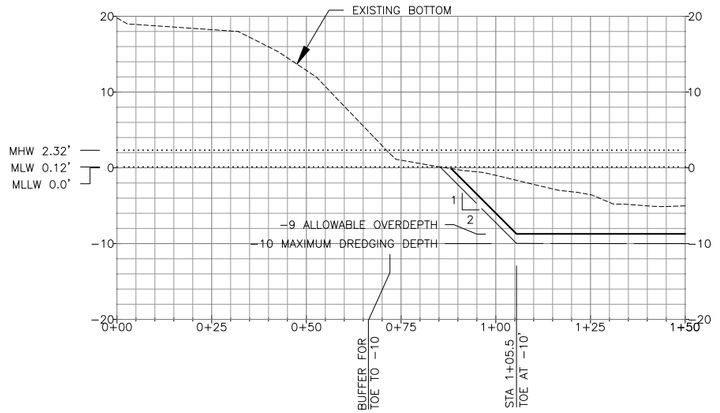
B 4|15 TYPICAL PLACEMENT SITE CROSS–SECTION
SCALE: AS SHOWN

1000 500 0 1000 2000 3000
SCALE IN FEET
HORIZONTAL SCALE

10 5 0 10 20 30
SCALE IN FEET
VERTICAL SCALE



C 7|15 STATION −0+25
SCALE: AS SHOWN



D 7|15 STATION 0+25
SCALE: AS SHOWN

20 10 0 20 40 60
SCALE IN FEET
HORIZONTAL SCALE

10 5 0 10 20 30
SCALE IN FEET
VERTICAL SCALE

20 10 0 20 40 60
SCALE IN FEET
HORIZONTAL SCALE

10 5 0 10 20 30
SCALE IN FEET
VERTICAL SCALE

US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

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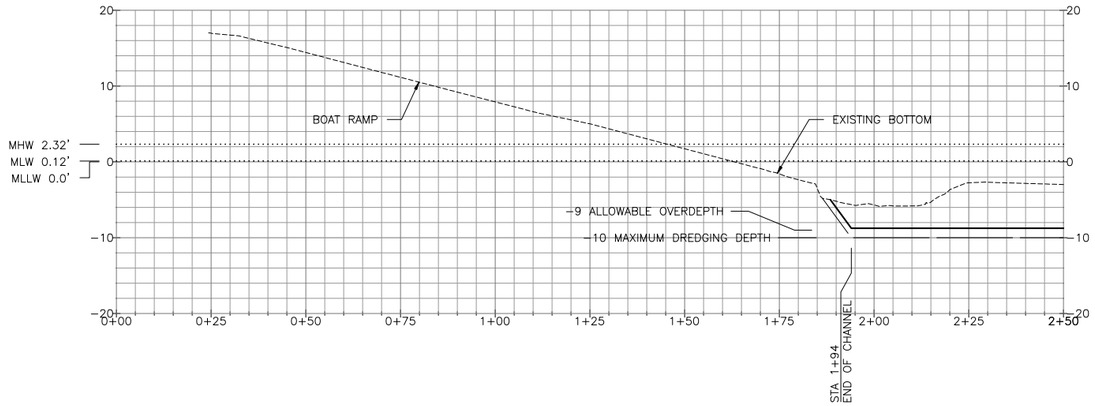
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM.2014-10-02.PS(15)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
CHANNEL & WOLFTRAP CROSS-SECTIONS

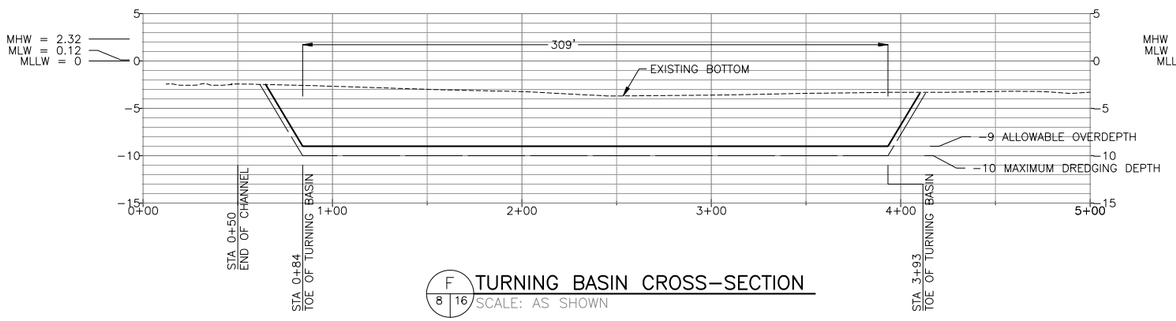
SHEET 15 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:03pm; Alroy

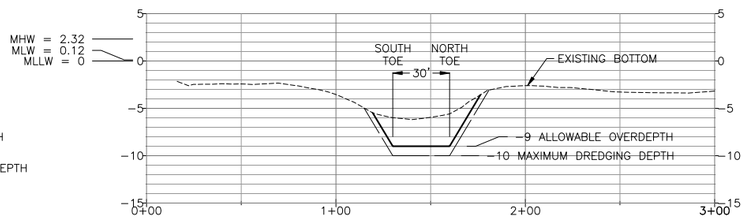


E 7 16 BOAT RAMP – CROSS–SECTION
SCALE: AS SHOWN

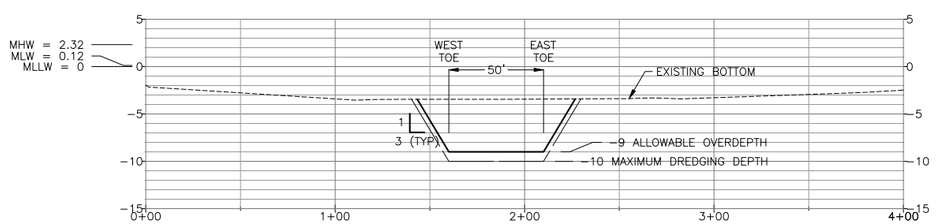
20 10 0 20 40 60 HORIZONTAL SCALE
SCALE IN FEET
10 5 0 10 20 30 VERTICAL SCALE
SCALE IN FEET



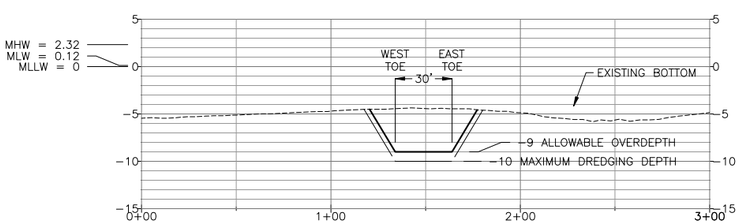
F 8 16 TURNING BASIN CROSS–SECTION
SCALE: AS SHOWN



H 8 16 CHANNEL CROSS–SECTION
SCALE: AS SHOWN



G 8 16 NEW NAVAL ENTRANCE CHANNEL CROSS–SECTION
SCALE: AS SHOWN



J 10 16 CHANNEL CROSS–SECTION
SCALE: AS SHOWN

40 20 0 40 80 120 HOR
SCALE IN FEET
8 4 0 8 16 24 VERT
SCALE IN FEET

US Army Corps of Engineers
Norfolk District

REV.	DATE	DESCRIPTION	BY	APP.

DESIGNED:
DRAWN: H.A.F.
CHECKED: M.L.A.
SUBMITTED: K.L.G.
DATE: 31 JULY 14
SCALE: AS SHOWN
NORFOLK DISTRICT FILE NO.: CPM:2014-10-02.PS(16)
DRAWING NO.:
SURVEYED BY: WATERWAY SURVEYS & ENGINEERING, Ltd.

NORFOLK DISTRICT
CORPS OF ENGINEERS
NORFOLK, VIRGINIA

U.S. COAST GUARD TRAINING FACILITIES
WORMELY CREEK
PERMIT DRAWING
YORK RIVER, VIRGINIA
DOCK & BOAT RAMP CROSS-SECTIONS

SHEET 16 OF 16

T:\W\Wormley Creek\2014 Permit Drawing\WRMPS14C-HP1914.dwg; Nov 23, 2015 - 10:03pm; Alroy

Attachment B

Record of Non-Applicability (RONA)

Clean Air Act – General Conformity Rule
Record of Non-Applicability
for the Wormley Creek Channel Federal Navigation project
at the United States Coast Guard (USCG) Training Center (TRACEN) Yorktown
located in Yorktown, Virginia

The Clean Air Act as amended requires Federal actions to conform to an approved state implementation plan (SIP) designed to achieve or maintain an attainment designation for air pollutants as defined by the National Ambient Air Quality Standard (NAAQS). The General Conformity Rule (40 CFR Parts 51 and 93) implements these requirements for actions occurring in air quality nonattainment areas.

The Wormley Creek Channel Federal Navigation project site is located in the Air Quality Control Region (AQCR) known as Hampton Roads Intrastate ACQR in Virginia (42 CFR 481.93). This region is in attainment for all the NAAQSs.

The Proposed Action is to hydraulically or mechanically dredge the Wormley Creek Channel to a maintained depth of -7 feet mean lower low water (MLLW) plus -2 feet paid overdepth and -1 foot non-paid overdepth for a maximum depth of -10 feet MLLW. Dredged material from the inner portion of the channel would be transported by barge/scow for overboard placement in the Wolf Trap Alternate Placement Site (WTAPS). Dredged material from the outer portion of the channel would be transported via hydraulic pipeline for beneficial use along the shoreline directly northwest of Wormley Creek Channel adjacent to the USCG TRACEN-Yorktown property. Once the shoreline placement site reaches capacity, any remaining dredged material from the outer portion of the channel would be placed at the WTAPS.

The Wormley Creek Channel is currently maintained to -5 feet MLLW plus -2 feet for paid overdepth for a maximum depth of -7 feet MLLW. The channel is approximately 30 feet wide and extends from the 5 foot contour in the York River in to the West Branch of Wormley Creek to the USCG docks and turning basin. The turning basin is approximately 275 feet wide and 400 feet long.

The average depth ranges from -1 feet MLLW to -8.7 feet MLLW in the channel. Maintenance dredging would restore the site to its previously permitted depth and also remove an additional 2 feet of material to increase the maintained depth from -5 feet MLLW to -7 feet MLLW for adequate waterjet clearance. Currently, these vessels are required to back flush their jets when they transit Wormley Creek to remove sediments or debris that may have accumulated in the jets. As a result of the current channel depths, vessel down time and maintenance cost has increased due to additional repair/maintenance requirements. Reduced operating depths restrict efficient deployment of TRACEN-Yorktown vessels and inhibit the training center's ability to deploy for

training activities and missions. Reduced depths may also inhibit or be a hazard to recreational boaters navigating the area.

The Environmental Protection Agency (EPA) has ruled that some Federal actions are exempt from the conformity requirement as these actions have been determined to result in no emission increase or an increase that is clearly *de minimis*. Because the activities taking place are similar in scope and operation to activities currently being conducted, this project meets the exemption requirements for non-applicability to the general conformity rule.

To the best of my knowledge the information provided is correct and accurate. I concur in the finding that the proposed action meets the exemptions stated above and thus will conform to the SIP.

1/6/16
Date

Elizabeth G. Waring
Elizabeth G. Waring
Chief, Operations Branch

APPENDIX C

CLEAN WATER ACT SECTION 404(b)1

Final Evaluation of 404(b)(1) Guidelines
Contained in Vol. 45 No. 249 of the
Federal Register dated 24 December 1980

Wormley Creek Channel Federal Navigation Project
January 2016

1. Technical Evaluation Factors

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (230.20-230.25)(Subpart C)

	N/A	Not Significant	Significant
(1) Substrate impacts	☐	☒	☐
(2) Suspended particulates/turbidity impacts	☐	☒	☐
(3) Water Quality Control	☐	☒	☐
(4) Alteration of current patterns and water circulation	☐	☒	☐
(5) Alteration of normal water fluctuations/hydroperiod	☐	☒	☐
(6) Alteration of salinity gradients	☐	☒	☐

Dredging operations will increase turbidity at the dredging location, as well as the proposed overboard placement area, but this will be minor, short-term impacts that will dissipate once dredging has ceased.

b. Biological Characteristics of the Aquatic Ecosystem(230.30-230.32) (Subpart D)

	N/A	Not Significant	Significant
(1) Effect on threatened/endangered species and their habitat	☐	☒	☐
(2) Effect on the aquatic food web	☐	☒	☐
(3) Effect on other wildlife (mammals, birds, reptiles, and amphibians)	☐	☒	☐

Based on a search of Virginia's endangered species databases, the project will not affect any federally or state listed threatened or endangered species.

c. Special Aquatic Site (230.40-230.45) (Subpart E)

	N/A	Not Significant	Significant
(1) Sanctuaries and refuges	☒	☐	☐
(2) Wetlands	☐	☒	☐
(3) Mud flats	☒	☐	☐
(4) Vegetated shallows	☒	☐	☐
(5) Coral reefs	☒	☐	☐
(6) Riffle and pool complexes	☒	☐	☐

Wetlands are located near the project area. There are no special aquatic sites located in the project area; therefore, no impacts are anticipated.

d. Human Use Characteristics (230.50-230.54) (Subpart F)

	N/A	Not Significant	Significant
(1) Effects on municipal and private water supplies	☒	☐	☐
(2) Recreational and Commercial fisheries impacts	☐	☒	☐
(3) Effects on water-related recreation	☐	☒	☐
(4) Aesthetic impacts	☐	☒	☐
(5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves	☒	☐	☐

2. Evaluation of Dredged or Fill Material (230.60) (Subpart G)

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. **(Check only those appropriate)**

☒ (1) Physical characteristics
☐ (2) Hydrography in relation to known or anticipated sources of contaminants
☐ (3) Results from previous testing of the material in the vicinity of the project
☐ (4) Known, significant, sources of persistent pesticides from land runoff or percolation
☐ (5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances
☐ (6) Other public records of significant introduction of contaminants from industries, municipalities or other sources
☐ (7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge
☐ (8) Other sources (specify)

Proposed dredged material was sampled and characterized in December 2015 to ensure placement site compatibility. There is no reason to suspect contamination.

b. An evaluation of the appropriate information in 2a above indicated that there is reason to believe the proposed dredged or fill material is not a carrier of contaminants, of that levels of contaminants are substantively similar at extraction and disposal sites and not likely to exceed constraints. The material meets the testing exclusion criteria.

YES ☒ NO ☐

3. Disposal Site Delineation (Section 230.11(f))

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

☒ (1) Depth of water at disposal site
☒ (2) Current velocity, direction, and variability at disposal site
☐ (3) Degree of turbulence
☐ (4) Water volume stratification

☐ (5) Discharge vessel speed and direction
☒ (6) Rate of discharge
☒ (7) Dredged material characteristics (constituents, amount, and type of material, settling velocities)
☐ (8) Number of discharges per unit of time
☐ (9) Other factors affecting rates and patterns of mixing (specify)

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable.

YES ☒ NO ☐

4. Actions to Minimize Adverse Effects (Section 230.70-230.77)(Subpart H)

All appropriate and practicable steps have been taken, through application of recommendation of Section 230.70-230.77 to ensure minimal adverse effects of the proposed discharge.

YES ☒ NO ☐

5. Factual Determination (Section 230.11)

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short or long-term environmental effects of the proposed discharge as related to:

☒ a. Physical substrate at the disposal site (review sections 2a, 3, 4, & 5)
☒ b. Water circulation, fluctuation & salinity (review sections 2a 3, 4, & 5)
☒ c. Suspended particulates/turbidity (review sections 2a, 3, 4, & 5)
☒ d. Contaminant availability (review sections 2a, 3, & 4)
☒ e. Aquatic ecosystem structure and function (review sections 2b, c; 3, & 5)
☒ f. Disposal site (review sections 2, 4, & 5)
☒ g. Cumulative impact on the aquatic ecosystem
☒ h. Secondary impacts on the aquatic ecosystem

6. Review of Compliance (230.10(a)-(d) (Subpart B)

A review of the permit application indicates that:

a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative);

YES ☒ NO ☐

b. The activity does not appear to 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally designated marine sanctuary(if no, see section 2b and check responses from resource and water quality certifying agencies;

YES ☒ NO ☐

c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2); YES ☒ NO ☐

d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5);

YES ☒ NO ☐

The proposed discharge of fill or dredged material is the least environmentally damaging practicable alternative and meets the Federal Standard.

7. Findings

☒ a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404 (b)(1) guidelines

☐ b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions:

c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reason(s):

☐ (1) There is a less damaging practicable alternative
☐ (2) The proposed discharge will result in significant degradation of the aquatic ecosystem
☐ (3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem

4/6/16
DATE

Elizabeth G. Waring
Chief, Operations Branch

APPENDIX D

Threatened and Endangered Species Lists

Visitor Options

Species Information

By Name

By Land Management

References

Geographic Search

By Map

By Coordinates

By Place Name

Help

Show This Page as Printer Friendly

VaFWIS Search Report Compiled on 12/16/2014, 11:15:33 AM

Help

Known or likely to occur within a **3 mile radius around point 37,12,51.1 -76,28,16.6** in **073 Gloucester County, 199 York County, VA**

View Map of Site Location

541 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 37) (37 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus
040183	FESE	IV	Tern, roseate	Sterna dougallii dougallii
030074	FESE		Turtle, Kemp's ridley sea	Lepidochelys kempii
030075	FESE		Turtle, leatherback sea	Dermochelys coriacea
030071	FTST	I	Turtle, loggerhead sea	Caretta caretta
040120	FTST	I	Plover, piping	Charadrius melodus
030072	FTST		Turtle, green sea	Chelonia mydas
040110	SE	I	Rail, black	Laterallus jamaicensis
020052	SE	II	Salamander, eastern tiger	Ambystoma tigrinum
030013	SE	II	Rattlesnake, canebrake	Crotalus horridus
040096	ST	I	Falcon, peregrine	Falco peregrinus
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii
020044	ST	II	Salamander, Mabee's	Ambystoma mabeei
020002	ST	II	Treefrog, barking	Hyla gratiosa
040144	FP	IV	Knot, red	Calidris canutus rufa
050022	FP		Bat, northern long-eared	Myotis septentrionalis
010038	FC	IV	Alewife	Alosa pseudoharengus
010045	FC		Herring, blueback	Alosa aestivalis
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus
100001	FS	IV	fritillary, Diana	Speyeria diana
030067	CC	II	Terrapin, northern diamond-backed	Malaclemys terrapin terrapin
030063	CC	III	Turtle, spotted	Clemmys guttata
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens
040306		I	Warbler, golden-winged	Vermivora chrysoptera
040038		II	Bittern, American	Botaurus lentiginosus
040052		II	Duck, American black	Anas rubripes
040029		II	Heron, little blue	Egretta caerulea caerulea
040036		II	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040114		II	Oystercatcher, American	Haematopus palliatus
040105		II	Rail, king	Rallus elegans
040381		II	Sparrow, saltmarsh sharp-tailed	Ammodramus caudacutus
040186		II	Tern, least	Sterna antillarum
040187		II	Tern, royal	Sterna maxima maximus
040320		II	Warbler, cerulean	Dendroica cerulea
040266		II	Wren, winter	Troglodytes troglodytes

To view **All 541 species** View 541

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams (1 records)

View Map of All Anadromous Fish Use Streams

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C81	York River	Confirmed	6	FC	IV	Yes

Impediments to Fish Passage (1 records)

View Map of All Fish Impediments

ID	Name	River	View Map
669	WORMLEY POND	WEST BRANCH OF WORML	Yes

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests (3 records)

View Map of All Query Results
Bald Eagle Nests

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
GL1102	2	Apr 19 2011	RECENTLY ACTIVE	Yes
YK0401	13	Apr 19 2010	HISTORIC	Yes
YK1003	4	Apr 19 2011	RECENTLY ACTIVE	Yes

Displayed 3 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species (1 Reach)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species					View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name				
Pamunkey River (20801071)		010032	FESE	II	Sturgeon, Atlantic Acipenser oxyrinchus	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species (8 Species)

View Map of Combined Terrestrial Habitat Predicted for 8 WAP Tier I & II Species Listed Below

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040110	SE	I	Rail, black	Laterallus jamaicensis	Yes
020052	SE	II	Salamander, eastern tiger	Ambystoma tigrinum	Yes
030013	SE	II	Rattlesnake, canebrake	Crotalus horridus	Yes
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii	Yes
020044	ST	II	Salamander, Mabee's	Ambystoma mabeei	Yes
030067	CC	II	Terrapin, northern diamond-backed	Malaclemys terrapin terrapin	Yes
040114		II	Oystercatcher, American	Haematopus palliatus	Yes
040186		II	Tern, least	Sterna antillarum	Yes

Virginia Breeding Bird Atlas Blocks (8 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
59076	Achilles, SE	57		II	Yes
59075	Achilles, SW	1			Yes
58076	Clay Bank, SE	17		II	Yes
59064	Poquoson West, CE	1		III	Yes
59062	Poquoson West, NE	28		II	Yes
59061	Poquoson West, NW	1			Yes
58064	Yorktown, CE	65	FS	II	Yes
58062	Yorktown, NE	68	ST	I	Yes

Public Holdings: (3 names)

Name	Agency	Level
Colonial National Historical Park	National Park Service	Federal
US Coast Guard Reservation	U.S. Coast Guard	Federal
Yorktown Naval Weapons Station	U.S. Dept. of Navy	Federal

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
073	Gloucester	409	FESE	I
199	York	431	FESE	I

USGS 7.5' Quadrangles:
Yorktown
Clay Bank
Poquoson West
Achilles

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
CB21	Lower Chesapeake Bay-Poquoson River	84	FPSE	I
JL38	Warwick River	81	FPSE	II
YO68	York River-Carter Creek	77	FESE	I
YO69	York River-Sarah Creek	77	FESE	I

Compiled on 12/16/2014, 11:15:34 AM V613516.0 report=V searchType= R dist= 4827 poi= 37,12,51.1 -76,28,16.6

Natural Heritage Resources

Your Criteria

Taxonomic Group: Select All

Global Conservation Status Rank: Select All

State Conservation Status Rank: Select All

Federal Legal Status: Select All

State Legal Status: Select All

County: York

Search Run: 12/16/2015 14:34:41 PM

Result Summary

Total Species returned: 8

Total Communities returned: 0

Click scientific names below to go to NatureServe report.

Click column headings for an explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences	Virginia Coastal Zone
York							
AMPHIBIANS							
Mabee's Salamander	Ambystoma mabeei	G4	S1S2	None	LT	17	Y
Tiger Salamander	Ambystoma tigrinum	G5	S1	None	LE	7	Y
Barking Treefrog	Hyla gratiosa	G5	S1	None	LT	22	Y
BIRDS							
Peregrine Falcon	Falco peregrinus	G4	S1B,S2N	None	LT	35	Y
REPTILES							
Canebrake Rattlesnake	Crotalus horridus [Coastal Plain population]	G4T4	S1	None	LE	19	Y
VASCULAR PLANTS							
Harper's fimbry	Fimbristylis perpusilla	G2	S1	SOC	LE	2	Y
Small Whorled Pogonia	Isotria medeoloides	G2	S2	LT	LE	48	Y
Virginia Least Trillium	Trillium pusillum var. virginianum	G3T2	S2	SOC	None	33	Y

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

For Additional Information on locations of Natural Heritage Resources please submit an information request.

To Contribute information on locations of natural heritage resources, please fill out and submit a rare species sighting form.

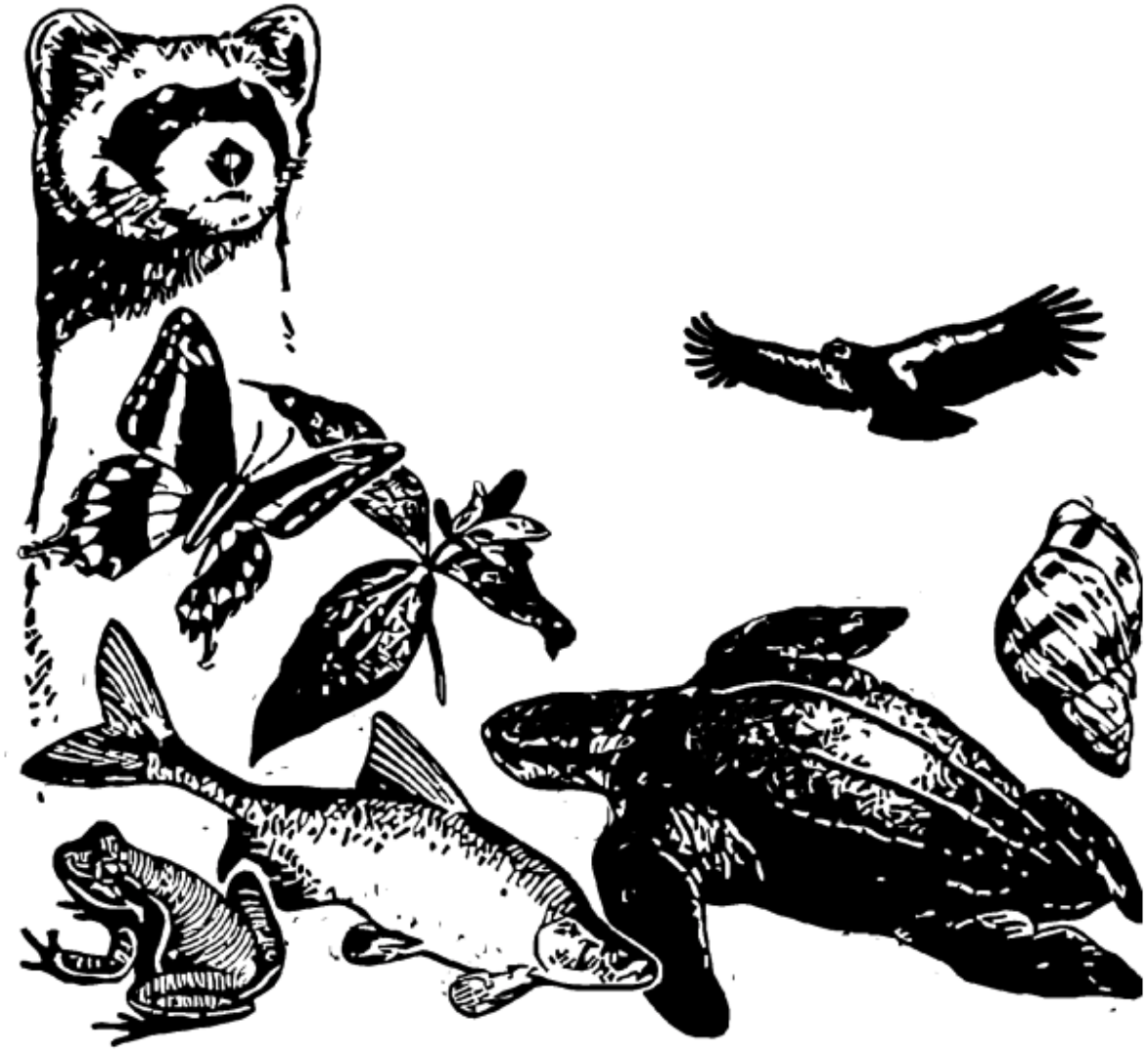
U.S. Fish & Wildlife Service

Wormley Creek Channel

IPaC Trust Resource Report

Generated December 01, 2015 06:10 AM MST

This report is for informational purposes only and should not be used for planning or analyzing project-level impacts. For projects that require FWS review, please return to this project on the IPaC website and request an official species list from the Regulatory Documents page.



US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

Wormley Creek Channel

PROJECT CODE

3MPXM-EHVEF-HH7CU-V7GHK-GSUIXM

LOCATION

York County, Virginia

DESCRIPTION

Located near USCG-TRACEN

U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under Section 7 of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an official species list on the Regulatory Documents page.

Mammals

Northern Long-eared Bat Myotis septentrionalis — Threatened

CRITICAL HABITAT

No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0JE

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Oystercatcher Haematopus palliatus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B008

Black Rail Laterallus jamaicensis — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09A

Black Skimmer Rynchops niger — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0EO

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HI

Brown-headed Nuthatch Sitta pusilla — Bird of conservation concern
Year-round

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Gull-billed Tern Gelochelidon nilotica — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JV

Horned Grebe Podiceps auritus — Bird of conservation concern
Season: Wintering

Hudsonian Godwit Limosa haemastica — Bird of conservation concern
Season: Migrating

Kentucky Warbler Oporornis formosus — Bird of conservation concern
Season: Breeding

Least Bittern Ixobrychus exilis — Bird of conservation concern
Season: Breeding

Least Tern Sterna antillarum — Bird of conservation concern
Season: Breeding

Lesser Yellowlegs Tringa flavipes — Bird of conservation concern
Season: Wintering

Marbled Godwit Limosa fedoa — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JL

Nelson's Sparrow Ammodramus nelsoni — Bird of conservation concern
Season: Wintering

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
Season: Breeding

Prothonotary Warbler Protonotaria citrea — Bird of conservation concern
Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
Season: Wintering

Red Knot Calidris canutus rufa — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DM

Red-headed Woodpecker Melanerpes erythrocephalus — Bird of conservation concern
Year-round

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
Season: Wintering

Saltmarsh Sparrow Ammodramus caudacutus — Bird of conservation concern
Year-round

Seaside Sparrow Ammodramus maritimus — Bird of conservation concern
Year-round

Short-billed Dowitcher Limnodromus griseus — Bird of conservation concern
Season: Wintering

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD

Snowy Egret Egretta thula — Bird of conservation concern
Season: Breeding

Whimbrel Numenius phaeopus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JN

Wood Thrush Hylocichla mustelina — Bird of conservation concern
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum Bird of conservation concern

Season: Breeding

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to NWI wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland data is unavailable at this time.

APPENDIX E:

Dredged Material Sediment Grain Size Analysis Summary Table

TABLE #. PHYSICAL CHARACTERISTICS OF SEDIMENT

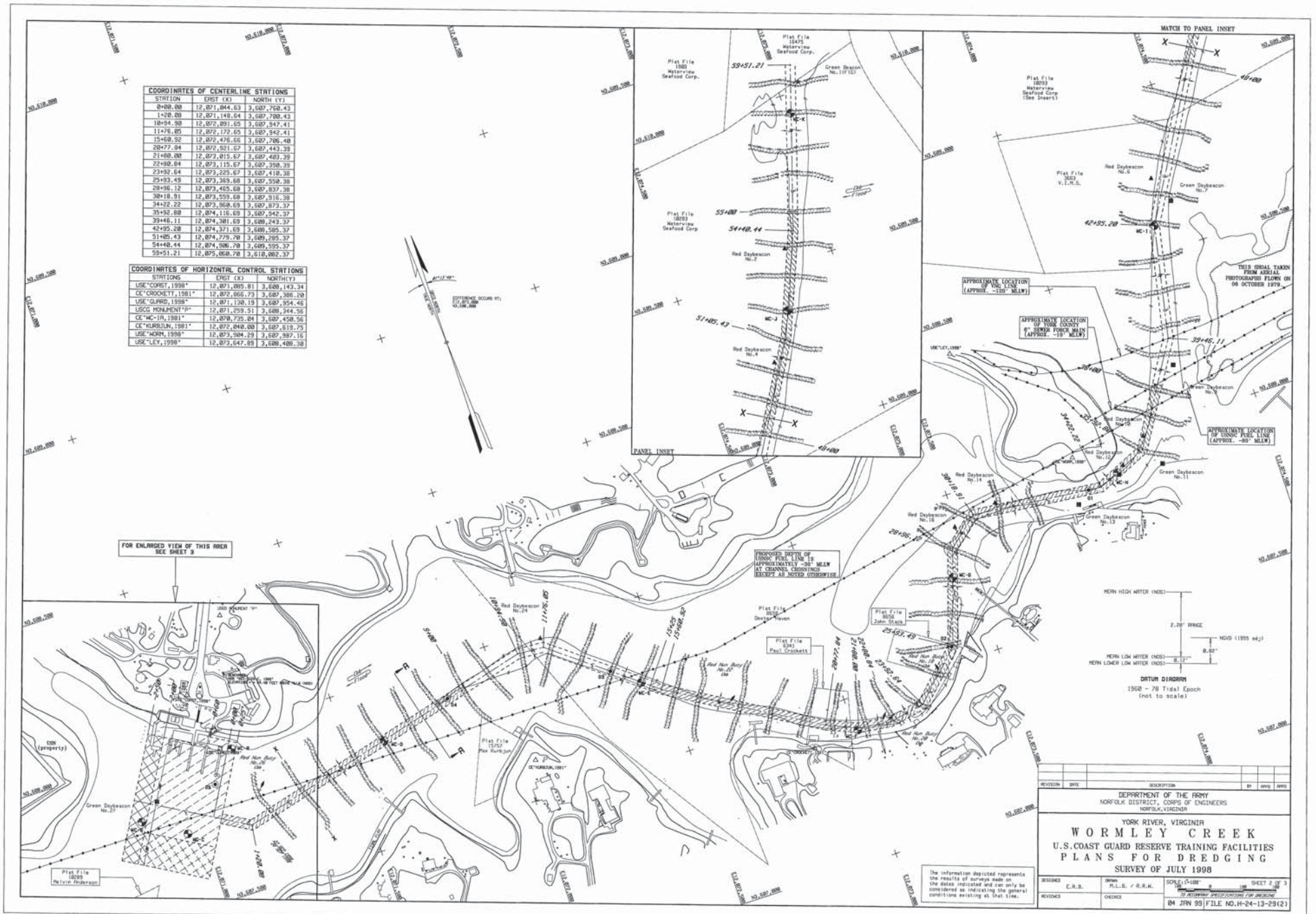
WORMLEY CREEK CHANNEL, YORKTOWN, VIRGINIA (DECEMBER 2014)

MAINTENANCE (SEDIMENT SURFACE TO -7 FT) AND NEW WORK (-7 FT TO -10 FT) SEDIMENTS

ANALYTE	UNITS	WORMLEY CREEK CHANNEL									
		WCC-01-SS-M	WCC-01-SS-NW	WCC-02-SS-M	WCC-02-SS-NW	WCC-03-SS-M	WCC-03-SS-NW	WCC-04-SS-M	WCC-04-SS-NW	WCC-05-SS-M	WCC-05-SS-NW
GRAIN SIZE ASTM D422											
Sieve Size 3 inch (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sieve Size 2 inch (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sieve Size 1.5 inch (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sieve Size 1 inch (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sieve Size 0.75 inch (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sieve Size 0.375 inch (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**98.9**
Sieve Size #4 (Percent Finer)	%	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**99.8**	**99.2**	**99.6**	**100.0**	**96.2**
Sieve Size #10 (Percent Finer)	%	**100.0**	**100.0**	**99.4**	**100.0**	**99.8**	**99.4**	**96.7**	**99.0**	**99.4**	**93.2**
Sieve Size #20 (Percent Finer)	%	**99.9**	**99.4**	**99.0**	**99.7**	**96.0**	**99.1**	**96.3**	**98.7**	**99.2**	**91.0**
Sieve Size #40 (Percent Finer)	%	**99.7**	**98.9**	**98.7**	**99.4**	**91.7**	**98.6**	**95.6**	**97.8**	**98.8**	**88.6**
Sieve Size #60 (Percent Finer)	%	**99.3**	**98.1**	**98.3**	**98.8**	**89.0**	**98.2**	**94.4**	**95.6**	**97.8**	**86.2**
Sieve Size #80 (Percent Finer)	%	**99.0**	**96.6**	**98.0**	**97.8**	**86.0**	**97.3**	**92.2**	**91.8**	**93.2**	**82.1**
Sieve Size #100 (Percent Finer)	%	**98.5**	**93.7**	**97.7**	**95.7**	**70.0**	**87.2**	**81.1**	**65.2**	**54.6**	**57.5**
Sieve Size #200 (Percent Finer)	%	**97.0**	**90.5**	**95.9**	**89.8**	**24.0**	**31.2**	**14.6**	**11.3**	**8.5**	**15.4**
Hydrometer Reading 1 (Percent Finer)	%	**68.8**	**68.7**	**81.8**	**68.4**	**17.0**	**21.2**	**11.4**	**7.8**	**6.4**	**10.4**
Hydrometer Reading 2 (Percent Finer)	%	**49.0**	**52.6**	**54.7**	**51.4**	**13.3**	**18.3**	**9.0**	**7.8**	**4.4**	**8.8**
Hydrometer Reading 3 (Percent Finer)	%	**39.1**	**47.6**	**42.4**	**45.1**	**11.4**	**16.3**	**7.7**	**7.0**	**4.4**	**8.1**
Hydrometer Reading 4 (Percent Finer)	%	**35.8**	**42.6**	**32.6**	**40.8**	**10.5**	**15.4**	**6.5**	**5.8**	**3.8**	**7.7**
Hydrometer Reading 5 (Percent Finer)	%	**30.3**	**37.6**	**27.7**	**35.5**	**9.6**	**13.5**	**5.9**	**5.0**	**3.3**	**5.8**
Hydrometer Reading 6 (Percent Finer)	%	**23.4**	**30.3**	**22.4**	**28.9**	**7.6**	**10.5**	**4.5**	**3.4**	**2.7**	**4.9**
Hydrometer Reading 7 (Percent Finer)	%	**17.3**	**19.8**	**16.9**	**19.9**	**5.5**	**8.1**	**3.6**	**2.6**	**1.9**	**3.8**
GRAVEL	%	0	0	0	0	0	**0.2**	**0.8**	**0.4**	0	**3.8**
COARSE SAND	%	0	0	**0.6**	0	**0.2**	**0.4**	**2.5**	**0.6**	**0.6**	3
MEDIUM SAND	%	**0.3**	**1.1**	**0.7**	**0.6**	**8.1**	**0.8**	**1.1**	**1.2**	**0.6**	**4.6**
FINE SAND	%	**2.7**	**8.4**	**2.8**	**9.6**	**67.7**	**67.4**	**81**	**86.5**	**90.3**	**73.2**
SILT	%	**66.7**	**52.9**	**68.2**	**54.3**	**14.4**	**17.7**	**8.7**	**6.3**	**5.1**	**9.6**
CLAY	%	**30.3**	**37.6**	**27.7**	**35.5**	**9.6**	**13.5**	**5.9**	**5**	**3.3**	**5.8**
SILT+CLAY	%	**97**	**90.5**	**95.9**	**89.8**	**24**	**31.2**	**14.6**	**11.3**	**8.4**	**15.4**
SANDS	%	**3**	**9.5**	**4.1**	**10.2**	**76**	**68.8**	**85.4**	**88.7**	**91.6**	**84.6**
TOTAL ORGANIC CARBON (Lloyd Kahn)											
TOC	MG/KG	**25000**	**19000**	**29000**	**22000**	**8300**	**3400**	**9400**	**6100**	**5400**	**5800**
TOC	%	**2.5**	**1.9**	**2.9**	**2.2**	**0.83**	**0.34**	**0.94**	**0.61**	**0.54**	**0.58**
PERCENT SOLIDS (ASTM D2216)											
PERCENT SOLIDS	%	**100**	**45**	**33**	**45**	**71**	**73**	**65**	**75**	**72**	**68**

APPENDIX F

Wormley Creek Channel Utility Crossing


COORDINATES OF CENTERLINE STATIONS
STATION | EAST (X) | NORTH (Y)
0+00.00 | 12,071,844.63 | 3,607,760.43
1+20.00 | 12,071,148.64 | 3,607,700.43
10+94.90 | 12,072,091.65 | 3,607,547.41
11+76.85 | 12,072,172.65 | 3,607,542.41
15+50.92 | 12,072,476.66 | 3,607,706.40
20+77.94 | 12,072,821.67 | 3,607,443.39
21+80.00 | 12,072,915.67 | 3,607,403.39
22+90.84 | 12,073,115.67 | 3,607,398.39
23+92.64 | 12,073,225.67 | 3,607,410.38
25+93.49 | 12,073,369.68 | 3,607,550.38
28+96.12 | 12,073,465.68 | 3,607,837.38
30+10.91 | 12,073,559.68 | 3,607,916.38
34+22.22 | 12,073,868.69 | 3,607,873.37
35+92.80 | 12,074,116.69 | 3,607,942.37
39+46.11 | 12,074,381.69 | 3,608,243.37
42+95.28 | 12,074,371.69 | 3,608,585.37
51+85.43 | 12,074,279.70 | 3,609,285.37
54+40.44 | 12,074,986.70 | 3,609,595.37
59+51.21 | 12,075,868.70 | 3,610,802.37
COORDINATES OF HORIZONTAL CONTROL STATIONS
STATIONS | EAST (X) | NORTH(Y)
USE"CORST,1998" | 12,071,085.81 | 3,608,143.34
CE"CROCKETT,1981" | 12,072,866.73 | 3,607,386.20
USE"GUARD,1998" | 12,071,130.19 | 3,607,954.46
USCG MONUMENT"P" | 12,071,259.51 | 3,608,344.56
CE"MC-1R,1981" | 12,070,735.84 | 3,607,450.56
CE"KURBJUN,1981" | 12,072,840.80 | 3,607,619.75
USE"HORM,1998" | 12,073,984.29 | 3,607,887.16
USE"LEY,1998" | 12,073,647.88 | 3,608,400.38
MATCH TO PANEL INSET
PANEL INSET
FOR ENLARGED VIEW OF THIS AREA SEE SHEET 3
PROPOSED DEPTH OF USNSC FUEL LINE IS APPROXIMATELY -39' MLW AT CHANNEL CROSSINGS EXCEPT AS NOTED OTHERWISE
APPROXIMATE LOCATION OF YORK COUNTY FORCE MAIN (APPROX. -12G' MLLW)
APPROXIMATE LOCATION OF YORK COUNTY SEWER FORCE MAIN (APPROX. -10' MLLW)
APPROXIMATE LOCATION OF USNSC FUEL LINE (APPROX. -60' MLLW)
THIS SHOAL TAKEN FROM AERIAL PHOTOGRAPHS FLOWN ON 06 OCTOBER 1979.
MEAN HIGH WATER (NOS)
2.26' RANGE
NGVD (1955 adj)
MEAN LOW WATER (NOS)
MEAN LOWER LOW WATER (NOS)
0.12'
0.02'
DATUM DIAGRAM
1960 - 78 Tidal Epoch
(not to scale)
The information depicted represents the results of surveys made on the dates indicated and can only be considered as indicating the general conditions existing at that time.
DEPARTMENT OF THE ARMY
NORFOLK DISTRICT, CORPS OF ENGINEERS
NORFOLK,VIRGINIA
YORK RIVER, VIRGINIA
WORMLEY CREEK
U.S.COAST GUARD RESERVE TRAINING FACILITIES
PLANS FOR DREDGING
SURVEY OF JULY 1998
DESIGNED E.R.B.
DRAWN M.L.B. / R.R.M.
CHECKED
SCALE 1"=100'
SHEET 2 OF 3
04 JAN 99
FILE NO.H-24-13-29(2)

Sheet 2 of 3

APPENDIX G

Wormley Creek Channel Magnetometer Survey

Phase I
Underwater Archaeological Investigation
Wormley Creek Navigation Project
Wormley Creek and York River,
York County, Virginia

FINAL REPORT

To:
Waterway Surveys and Engineering, Inc.
321 Cleveland Place
Virginia Beach, VA 23462

By:
Dolan Research, Inc
30 Paper Mill Road
Newtown Square, PA 19073

J. Lee Cox, Jr.
Principal Investigator

September 2015

ABSTRACT

Phase I Submerged Cultural Resources Investigations were conducted for the proposed Wormley Creek Navigation Project areas of potential effects (APE) in Wormley Creek and York River, York County, Virginia. Dredging is planned for the existing channel or an alternative channel alignment that connect Wormley Creek with the York River. The purposes of these investigations were twofold: to determine the presence or absence of potentially significant submerged cultural resources; and secondly to assess likely project impacts and make recommendations as to the need for further submerged cultural resources studies.

Analysis of the remote sensing data confirms the presence of one potentially significant target or anomaly in the existing channel alignment that was considered to be suggestive of known signature types associated with submerged cultural resources. Additional underwater archaeological investigations are recommended at this target location in the APE in the existing channel alignment.

No potentially significant targets were identified within APE of the alternative channel alignment and therefore no additional underwater archaeological investigations are recommended in alternative channel alignment.

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1.0 Introduction

The following technical report describes a Phase I Submerged Cultural Resources Investigation that was conducted for the proposed Wormley Creek Navigation Project. Dredging activities associated with a navigation improvement project include maintenance dredging in the existing channel, in addition to potential dredging of a new alternate channel at the mouth of Wormley Creek as it enters the York River. The 60-foot wide (30' wide channel plus side slope) Area of Potential Effect (APE) extends approximately 4,200 feet north along both channels from the mouth of the Wormley Creek into the York River (Figures 1 & 2).

In addition to completing the remote sensing investigation for potential submerged cultural resources, magnetic data were collected to locate the path of a submerged six-inch Sewer Force Main pipeline under Wormley Creek. The location of the pipeline was slightly south (upstream) from the archaeological investigation in the navigational channel(s). The results of that investigation are not included in this archaeological report.

This comprehensive remote sensing survey and literature search were conducted to identify potential submerged cultural resources that might be impacted by dredging activities in Wormley Creek. Project tasks performed included: limited background and documentary research; magnetic and acoustic remote sensing with follow-up target analysis; analysis of assembled research and field data; and preparation of a draft findings and a technical report. The purposes of these investigations were twofold: to determine the presence or absence of potentially significant submerged cultural resources; and secondly to assess likely project impacts and make recommendations as to the need for further submerged cultural resources studies.

These investigations were conducted in accordance with the instructions and intents of various applicable Federal and State legislation and guidelines governing the evaluation of project impacts on archaeological resources, notably: Section 101(b)(4) of the National Environmental Policy Act of 1969; Section 1(3) and 2(b) of Executive Order 11593; Section 106 of the National Historic Preservation Act; 23 CFR 771, as amended October 30, 1980; the guidelines developed by the Advisory Council on Historic Preservation published November 26, 1980; the amended Procedures for the Protection of Historic and Cultural Properties as set forth in 36 CFR Part 800 (October 1, 1986); and Executive Order 215.

Historical research confirmed extensive maritime activities in this portion of the York River since the middle of the 18th century and earlier. Analysis of the remote sensing data resulted in the identification of one potentially significant target or target cluster in the existing navigational channel that is considered suggestive of a submerged cultural resource. This anomaly was previously identified during a 1988 underwater archaeological survey and a Virginia Division of Historic Landmarks Archaeological Site Inventory Form has been established for this location (44YO502). If dredging activities are planned for the existing (natural) channel, additional underwater archaeological investigations are recommended to identify and evaluate the significance of the source material of this magnetic anomaly.

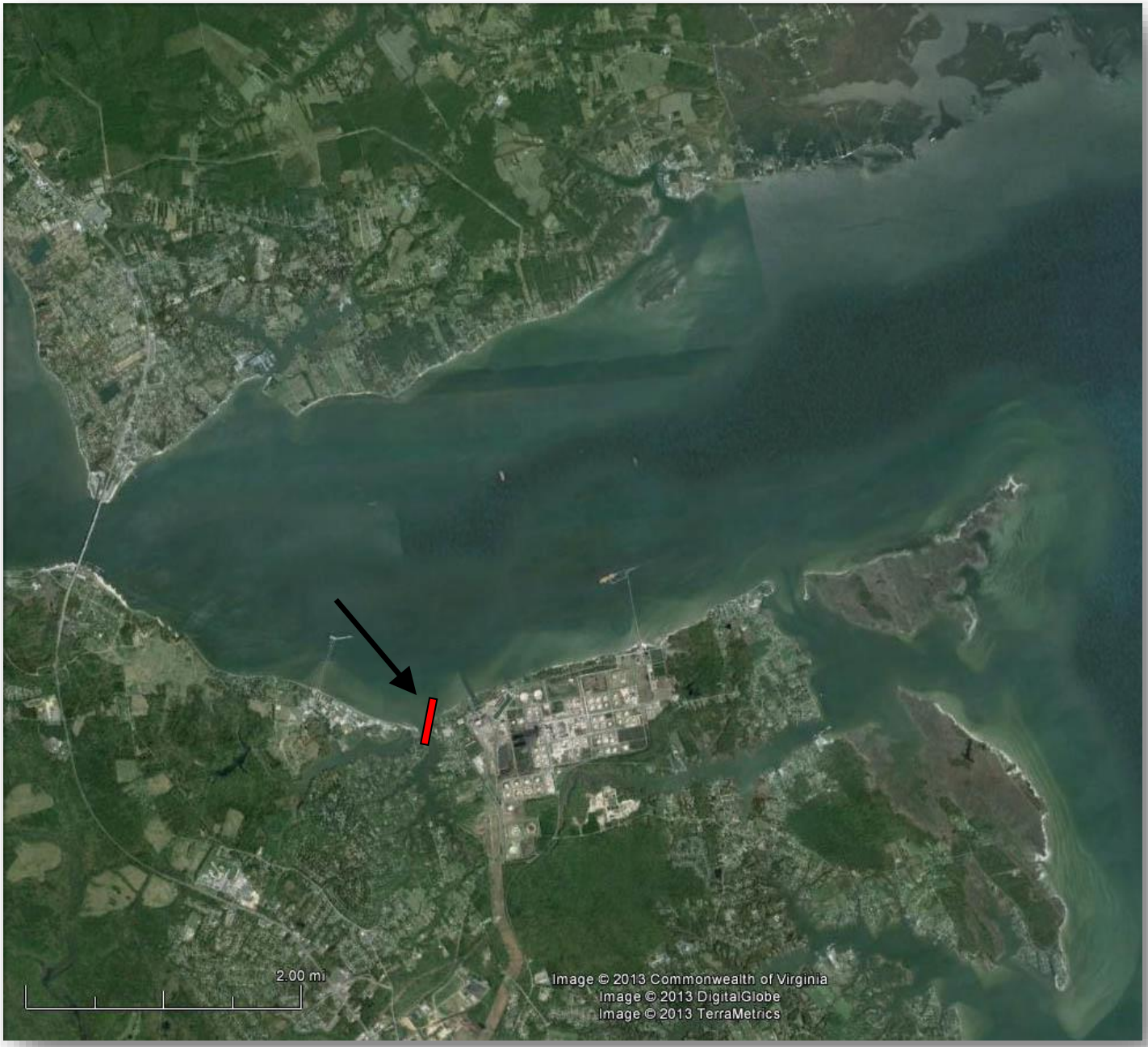


Figure 1. Location of Wormley Creek Navigation Project Area, York County, Va.

(Source: Google Earth)

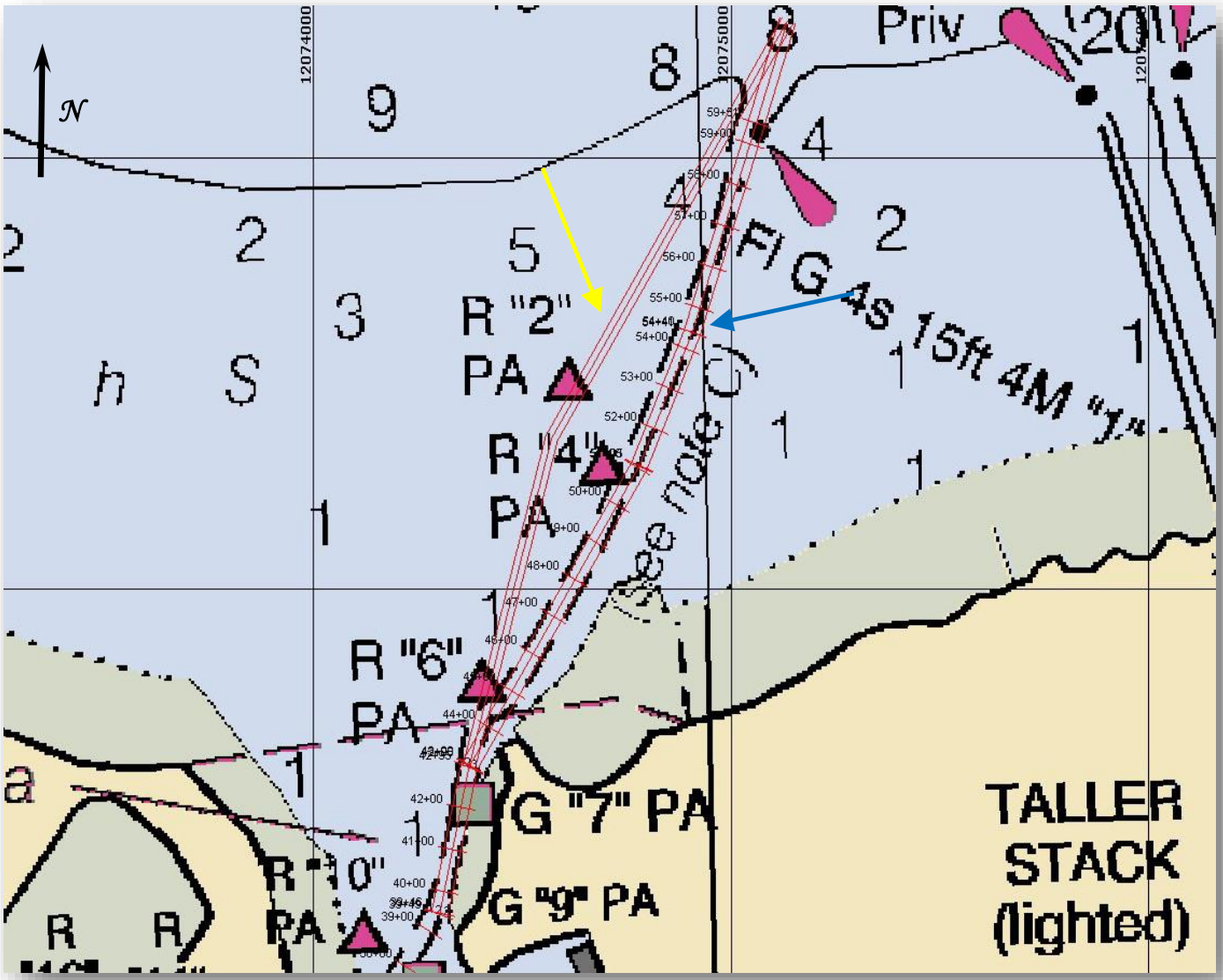


Figure 2. Theoretical Survey Lanes - Wormley Creek/York River Project Area, York County, Va.

Notes: 1) Existing Channel is right (blue arrow) and Alternate Channel is left (yellow arrow)
2) Background Map: NOAA Chart No. 12241, York River, Yorktown and Vicinity)
3) 100’ interval stationing (COE) is visible on the main channel layout

2.0 Geographical Setting

The APE at the mouth of Wormley Creek and the York River includes the existing 30-foot wide (with side slopes) navigational channel from station 42+95 to 62+00 (2,254'), in addition to a potential alternative channel of a similar width that would be aligned approximately 200' west of the existing channel between those two stations. Overall, the project area was more 4,200' long and 50' wide extending out from the mouth of Wormley Creek in the York River, as depicted in Figure 2.

At the APE, the York River is tidal and a three-foot difference between low and high tides is typical. Depths in this portion of Wormley Creek and the York River ranged from three (3) feet to more than 12 feet (mean low water) at the offshore end of the project area. At the APE, the York River is slightly more than two miles wide and approximately four miles upstream from the confluence with the Chesapeake Bay. The APE is approximately 2.1 miles downstream of the George P. Coleman (Rt. 17) Bridge that crosses the York River between Yorktown and Gloucester Point, Virginia.

Overall, the York River is more than 34 miles long and drains an area in coastal Viginia, north and east of Richmond that includes 17 counties. The York is formed at West Point, approximately 35 miles east of Richmond, by the confluence if the Mattaponi and Pamunkey rivers. It flows into the Chesapeake Bay towards the southeast, entering the bay approximately five miles east of Yorktown.

3.0 Background Literature Research

At the Virginia Department of Historic Resources (VDHR) information was sought on previously conducted cultural resource surveys and previously identified sites within one mile of the proposed APE. In addition, archival research was completed at the Library of Virginia in Richmond, Virginia and The Mariner's Museum Library in Newport News, Virginia. Information was used to produce a brief historical context for the project area. In addition, a brief prehistoric context was developed for the York County project site.

The Wormley Creek project site exists in a area crucial to American history. The survey area represents the location of the first land grants provided to early 17th century colonial settlers on the York River, as well as an area heavily participated in the Revolutionary and Civil Wars. From prehistoric through the historic period, the York River regularly carried river traffic in the forms of canoes, sailing vessels, and steamboats. The following section presents overarching prehistoric and historic themes and site-specific historical context significant to the proposed survey location.

3.1 Prehistoric Context

Prehistory in Virginia is divided into three categories: Paleoindian, Archaic, and Woodland periods. The proposed site exists within the coastal region of Native American settlement. Most periods exhibit sparse populations primarily oriented around areas with natural resource abundance.

3.1.1 Paleoindian Period (Prior to 10,000BC)

The Paleoindian period is subdivided into Early (9,500BC-9,000BC), Middle (9,000BC-8,500BC), and Late Paleoindian (8,500BC-8,000BC). The Early Paleoindian period populations explored and colonized the southeast while the Middle Paleoindian period established regional population in concentrations and cultural variants. The switch to modern flora and fauna characterizes the Late Paleoindian period with an adoptions of a way of life that would late become prevalent in the Early Archaic period (Anderson and Sassaman 1996:8). The clovis projectile point is the Paleoindian period's most datable artifact. Paleoindians constructed the clovis point from high quality cryptocrystalline materials such as chalcedony, chert, and

jasper. Late Paleoindian points include the smaller clovis-like and Cumberland variants, small Mid-Paleoindian points, and, specifically in southeastern Virginia, the Dalton, Hardaway-Dalton, and Haradaway Side-notched points. Other diagnostics include formalized tools such as end-scrappers and side-scrappers (Humphries et al. 2009:7).

Eastern Paleoindians emphasized hunting but included foraging. They organized socially in small bands and traveled a wide territory. Two significant Paleoindian sites exist in Virginia: Williamson Site in Dinwiddie County and Thunderbird Site in Warren County. Both sites exhibit large base camps and are associated with a local source of high-grade cryptocrystalline lithic materials. It is the Thunderbird Site specifically along with its environs that best defines a Paleoindian site: lithic quarries, quarry related base camps, quarry reduction stations, base camp maintenance stations, outlying hunting sites, and isolated point sites (Humphries et al. 2009:8).

3.1.2 Archaic Period (8,000BC-1,200BC)
The Archaic Period commencement coincided with flora and fauna diversification as the climate warmed. Band-level social groups formed, moving in small familial groups from large base camps situated in rich resource areas near river fall lines to distant seasonally available resources. Lithic debatage characterizes archaeological site formation with a distinct lack of diagnostic artifacts. Corner and side-notches defines the Early Archaic Period (8,000BC-6,500BC) projectile points and represent a change in hafting technology. The Middle Archaic Period (6,500BC-3,000BC) is noted for the appearance of stemmed projectile points. The Late Archaic Period (3,000BC-1,200BC) signifies another change in projectile technology. The blades are broad, stemmed, and notched. The projectile sizes diminish toward the period's end. During this sub-period, plant domestication began, and a greater disbursement and density of archaeological sites portray a rise in population that increased exponentially throughout the entire Archaic Period (Humphries et al. 2009:20).

3.1.3 Woodland Period (1,200BC-1,600AD)
The development of ceramic technology, a greater reliance on agriculture, and the development of permanent villages defined the Woodland Period. The sub-periods are primarily based on ceramic style and manufacture. Early Woodland Period (1,200BC-500BC) gave rise to the appearance of ceramics in the archaeological context. Middle Woodland Period (500BC-900AD) began with ceramic manufacture variation. Pope's Creek ceramics characterize the beginning of this sub-period with medium to course sand temper, interior scouring, and net-impressed surfaces. Shell tempered Mockley ceramics appear around 200AD in Virginia, and typically have plain, cord-marked, or net-impressed surface treatments. The Late Woodland Period (900AD-1600AD) is defined by familial village sites located on or adjacent to large expanses of fertile floodplain soils for agricultural use (Egloff and Potter 1982:99, 103; Humphries et al. 2009:20-21; McLearen and Mouer 1989:5; Potter 1993:62).

3.2 Historic Context
The historic context section describes the contact period during early English settlement of the James and York Rivers through the industrial growth post Civil War, paying particular attention to the historical events that potentially affected and shaped the area of the York River where the project area exists.

3.2.1 Contact Period and English Settlement (1607-1700)
At the time of initial English settlement of the James River at Jamestown, the Powhatans, a collective of Algonquians-speaking groups, controlled the territory and its surrounding environs. All Algonquian groups lived along the major watercourses and their tributaries that served as vital food and communication sources. Adjacent fertile land functioned as living, farming, and hunting grounds. The territory between the Piankatank and York Rivers acted as a hunting preserve and agricultural field. A small group called Chiskiack by the English settlers inhabited the area east of Indian Field Creek in York County, three miles upriver from Yorktown (Rountree 1989:7, 11, 29, 109).

After Jamestown's initial settlement in 1607, John Smith reported that Native Americans settled on the York River viewed the English with "scorn and discontent." By 1627, with colonists and the Powhatans at odds after recent skirmishes, the colonists had pushed the natives out of the York River territory. With the Powhatans resettled along the Piankatank River, the York River became the buffer zone for the Jamestown settlement (Rountree 1990:77, 79) (Figure 3).

In 1630, Sir John Harvey, Crown Governor of Virginia, enacted

Figure 3. Map of Virginia as described by John Smith showing the York River and an arrow indicating the Crishiack village location (Smith 1624).

a bounty of 50 acres each in the York County region in order to establish boundary protection for Jamestown and the James River settlers. Captain Christopher Wormeley received the 1,420 acres land grant for the project site's location south of Wormley Creek in York County, VA on January 27, 1638. Just opposite was Nicholas Martain, a military engineer and tobacco farmer who received a 1,3000 acre land grant on the York River north of Wormley Creek. Martain resided here until his death in 1657 when the land was passed to his children and would later give rise to Yorktown (Meyer and Dorman 1987:417-18; Martain 1639; Wormeley 1638).

3.2.2 Colonial Period (1650-1774)

A settlement pattern arose in York County that was indicative of the colonial south. The landscape was a patchwork of plantations participating directly in the Atlantic trade with towns serving as government and religious centers. Water served as the primary means of transportation and became the conduit for development and prosperity. Waterfront landings and features, such as wharves, served as the connection between colonial towns, rural plantations, manufacturing facilities, and the British Atlantic trade network. In Notes on the State of Virginia, Thomas Jefferson lauded the York River highlighting the importance water transit systems.

"York River, at Yorktown, affords the best harbor in the state for vessels of the largest size. The river there narrows to the width of a mile, and is contained within very high banks, close under which the vessels may ride. It holds 4 fathom water at high tide for 25 miles." (Jefferson 1781-1785).

Tobacco developed as the Chesapeake's cash crop, and Yorktown served as the York River's primary inspection station. Most tobacco cultivation throughout the seventeenth century occurred in the tidewater region of the Chesapeake Bay along the navigable streams and estuaries. Tobacco production increased over 300 times from the 119,000 pounds exported in 1620 to 36 million pounds by 1700. As population in the tobacco producing colonies increased, so did the tobacco production rate. The English market became saturated with tobacco resulting in extremely low prices. Lower qualities of tobacco entered the market as farmers sought to increase their profit by increasing the volume sold. Eventually, colonial authorities attempted to fix the problem by reducing the amount of tobacco produced, standardizing the size of hogsheads, prohibiting farmers from shipping bulk tobacco, and regulating the quality of tobacco exported By the close of the eighteenth century, production slowed as colonial population increased and settled all quality fertile land accessible to inexpensive water transportation (Middleton 1953:112-113; Walton and Shepherd 1979:42-43).

The reliance on water transportation resulted in a number of documented York River shipwrecks in or near the vicinity of the project site. A newspaper reported one such case in 1769. Captain Banks, sailing down the York River to Liverpool during a storm, ran shore and carried 11 feet of water in her hold. It was deemed improbable that the vessel would sail again (10/06/1769 Connecticut Journal). Storms caused turmoil and loss of crew, ship, and cargo, as did warfare.

3.2.3 Revolutionary War and the Battle of Yorktown (1774-1783)

Yorktown and its environs felt the same pressure of economic instability and government dissatisfaction as the entirety of the American colonies. Yorktown residents staged a smaller version of the Boston Tea Party in 1774, and tensions ultimately rose when Royal Governor Dunmore confiscated gunpowder from the Williamsburg armory. Ultimately, he returned the powder but declared martial law in 1775 (Humphries et al. 2009:24).

The first major event to occur in the proposed project's vicinity was the siege of Yorktown in 1781 leading to Cornwallis' surrender at the Moore House located on the North side of Wormley Creek. While no major portion of the battle occurred on the land adjacent to the project site, in 1781 Cornwallis' engineers felled all the trees along the York River and Wormley Creek during the construction of the inner and outer defense lines guarding Yorktown. Cornwallis understood the raised tract or gorge between the York River and Wormley Creek was a significant defense location because it was the converging point for the Hampton and Williamsburg roads. The allied siege had Lafayette and Lincoln's Divisions and Nelson's Virginia Militia deployed on Wormley Creek's northern and western sides, within the vicinity of the project site to warrant archaeological investigations (Greene 2005:59, 62-63) (Figure 4).

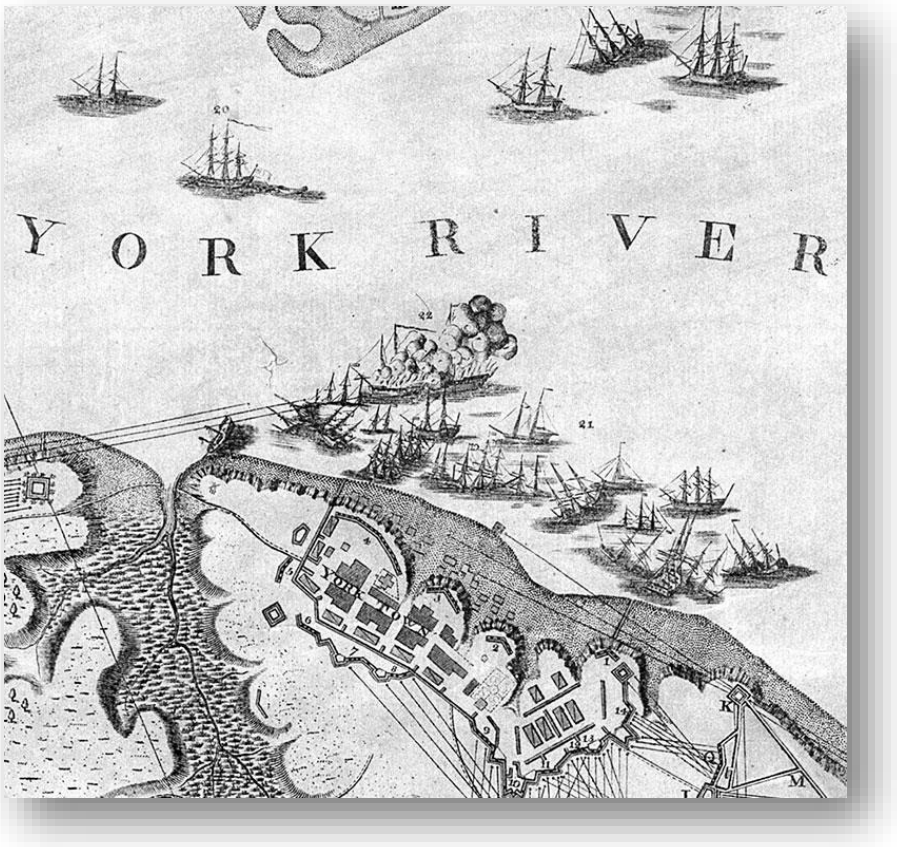


Figure 4. Detail of the Siege of Yorktown depicting the sinking of Royal naval ships (Bauman 1782).

Significant to the project location was the sinking of Cornwallis' Navy. It was reported that some 50-60 ships and vessels sailed during the 1781 siege along the York River shoreline, of which 25 vessels could potentially have sunk in the York River (Figure 4). The Yorktown Shipwreck Archaeology Project conducted in the 1980s identified nine shipwrecks along Yorktown and Gloucester: 44Yo12, 44Yo85, 44Yo86, 44Yo88, 44Yo89, 44Yo94, 44Yo222, 44GL106, 44GL136. In August 2010, newspapers reported that archaeologists were exploring another shipwreck off Yorktown Beach that could date to the Revolutionary War, but also potentially to the 1862 Battle of Yorktown (Erickson 2010).

3.2.4 Civil War and the Battle of Yorktown (1850-1865)

Prior to the Civil War, farmers inhabited and cultivated the land adjacent to the project area. A system of farm roads connected the adjacent plantations to the main roads leading to regional port towns of Yorktown, Williamsburg, and Hampton. Newspapers regularly reported the shipwrecks on the York River. The schooner *William and Thomas* sunk in a gale in 1837, and the schooner *Evelina* capsized near in the mouth of the river in 1841 (10/21/1837 *Public Ledger*; 02/27/1841 *North American)*. The river remained the primary method of moving people and products, as major improvements to land based thoroughfares did not occur until the Civil War.

Virginia entered the Civil War on April 15, 1861, and Richmond became the confederate capital. Rivers served as lines of communication, transportation, and battlegrounds. Capture and control of major rivers and their port towns became a primary objective for the competing militaries. With the destruction of the

CSS Virginia in March 1862 in Hampton Roads, union forces took steps to gain control of the York River, bringing the war to Yorktown (McPhearson 1992:154).

In 1862 Union forces closed in on the confederate controlled fort in Yorktown. Civil War maps and documented recollections identified Richard Farenholt and his wife, Amanda, as occupants on the property bordering the project site and other several key structures that could have impacted the project site. Of significance to the project site, the plantation's landing is shown located adjacent to the mouth of Wormley Creek on an 1862 map (Figure 5). Historically significant to the land adjacent to the project area, Federal forces constructed Battery No. 1 on the Farenholt property (Figure 7), a bridge connecting the Farenholt property to the Moore House on the north side of Wormley Creek, a signal station, and a hospital (Figure 6). Accounts of the Battle of Yorktown describe union officers such as General McClellan and Major Barnum and various union troops as having occupied the Farenholt property and potentially making use of the Farenholt landing (James 1961; Sneden 1861-1865; 05/08/1862 *The Cabinet*; 05/03/1862 *Public Ledger*; 04/17/1862 and 04/26/1862 *Philadelphia Inquirer*; 05/07/1862 *Macon Telegraph*). There was one documented account of action occurring on the river near Wormley Creek. In late April 1862, the Confederates exchanged cannon fire with Battery No. 1 attempting to prevent three canal boats from entering into Union controlled Wormley Creek. It was reported that on the 19th shot, one of the canal boats exploded creating the potential to find sunken vessel remains in the project area (*Patriot* 05/01/1862).

Figure 5. **April 1862 map from an 1861 description depicts the Farenhold landing located at the mouth of Wormley Creek with confederate schooners potentially within the project site's boundaries** (Sneden 05/1862).

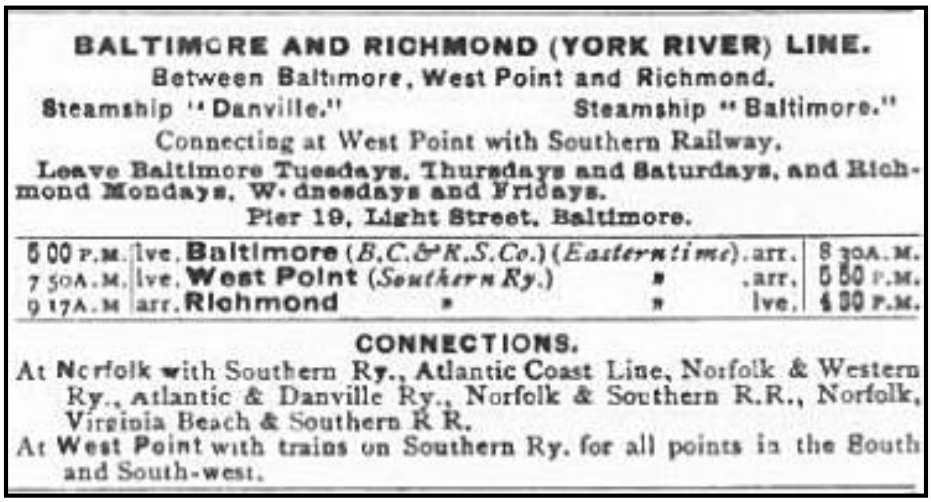
Figure 6. **Map of the Battle of Yorktown depicting troop movements, ship locations, and changes to transportation infrastructure** (Sneden 04/1862).

Figure 7. **Photograph of the Farenholt house with Federal Battery no. 1 to the left in the background** (Gibson 1862).

Ultimately, the Confederate army abandoned Yorktown prior to the advent of a potentially major battle. The memoir of C. Rosser James suggested that it was Amanda Farenholt, a staunch confederate supporter, who tipped off the Confederates of the day in which the Union soldiers intended to attack, allowing for a successful retreat without lives lost (James 1961).

3.2.5 Steam on the York River and Industrial Expansion (1865-1920s)

Rivers continued to have a major impact on transportation post-Civil War. The invention of steam allowed scheduled departures and arrivals to develop and quickened the movement of people and goods. Enquirer published an article in 1852 regarding the introduction of steam navigation to the York River and the development of the York River Steam Navigation Company to connect York River settlements with Baltimore and Norfolk. It mentioned involving a Mr. Wright of the steamer Star to be involved in these proceedings. Unfortunately, there were no other surviving publications regarding the York River Steam Navigation Company and whether it succeeded in developing (02/23/1852 Enquirer); however, interest in steam navigation did not wane for the York River residents. Publications show that steamers regularly plied the York River by the late eighteenth century. The Baltimore and Richmond (York River) Line offered travelers easy connections to major cities such as Richmond and Baltimore as well as access to railway stations (Figure 8; Allen 1898:798).



BALTIMORE AND RICHMOND (YORK RIVER) LINE.

Between Baltimore, West Point and Richmond.

Steamship "Danville." Steamship "Baltimore."

Connecting at West Point with Southern Railway.

Leave Baltimore Tuesdays, Thursdays and Saturdays, and Richmond Mondays, Wednesdays and Fridays.

Pier 19, Light Street, Baltimore.

5 00 P.M.	lve.	**Baltimore** (*B.C.&R.S.Co.*) (*Eastern time*)			arr.	8 30A.M.
7 50A.M.	lve.	**West Point** (*Southern Ry.*)		»	arr.	6 50 P.M.
9 17A.M.	arr.	**Richmond**	»	»	lve.	4 30 P.M.

CONNECTIONS.

At Norfolk with Southern Ry., Atlantic Coast Line, Norfolk & Western Ry., Atlantic & Danville Ry., Norfolk & Southern R.R., Norfolk, Virginia Beach & Southern R R.

At West Point with trains on Southern Ry. for all points in the South and South-west.

Figure 8. **Steamboats connected the York River to major cities such as Baltimore, West Point, and Richmond** (Allen 1898:798).

River traffic declined in the early 20th century with the expansion of the railroad and the introduction of motor vehicles, making the river system obsolete for traffic other than large commercial ships and pleasure craft. Thus Yorktown declined as a significant port town and river activity in the project area decreased.

4.0 Previous Underwater Archaeological Projects

Previous Phase I archaeological investigations were carried out in areas adjacent to the project site. Figure 9 depicts the location of underwater archaeological sites within a ½ mile radius of the project area. All cultural resource sites (including terrestrial) within a one-mile radius are discussed below. Unfortunately, not all cultural resource management reports were available at the Virginia Department of Historic Resources (VA DHR) at the time of this report's investigation.

Site 44Yo0430

In 1982, Carmen Weber carried out a phase I archaeological survey of land on the east side of Wormley Creek and consisted of 10 shovel test pits. No archaeological artifacts were found. The report for 44Yo0430, previously identified as Yo8, mentioned another survey carried out within its vicinity. Virginia Historic Landmarks Commission in 1974 (Outlaw) conducted an archaeological survey and discovered construction material identifying the location as a possible building site. While the site report was unable to be located at the VA DHR, the site location description corresponded with Civil War maps depicting the location of the Farenholt house on the corner of the Wormley Creek and the York River (Weber 1982).

Sites 44Yo0431, 44Yo0432, 44Yo0433, 44Yo0434, 44Yo0435, and 44Yo0436

The George F. Coleman Bridge Expansion Technical Report Phase 1A, Historic and Archaeological Resources (Luccketti 1987) that analyzed 44Yo0431, 44Yo0432, 44Yo0433, 44Yo0434, 44Yo0435, and 44Yo0436 could not be located at the VA DHR. However, other site reports and the VA DHR access database described these sites as a compilation of unidentified prehistoric Woodland and eighteenth through twentieth century historic domestic sites. These sites were not deemed significant enough to be evaluated for the National Register for Historic Places (NRHP) or Phase II investigations.

Sites 44Yo0499, 44Yo0500, 44Yo0501, 44Yo0502, and 44Yo0503

In 1988 (Koski-Karell), Karell Archaeological Services performed a Phase I archaeological survey of the York River employing a proton magnetometer and side scan sonar. Of the five possible archaeological sites located, he recommended two, 44Yo0501 and 44Yo0502 for further evaluation. A visual survey was never carried out. Dutton and Associates reviewed the survey data in 2009 (O'Donnell 2009a-b) and identified only 44Yo0502 as being of significant mass and dimension for a possible shipwreck. All other sites identified in the 1988 report were thought to be crab pots. Dutton and Associates did not further investigate 44Yo0502.

Site 44Yo0587

The James River Institute for Archaeology carried out a Phase I survey on a small rise of land overlooking the York River and Wormley Creek (McDonald 1993). Two pottery sherds and one fire cracked rock within a 40x60 square foot area identified the site as a small woodland period seasonal microband base camp. McDonald deemed the site as being a potentially significant archaeological site, but carried out no further investigations.

Sites 44Yo1119 and 44Y01120

Dutton and Associates as part of the Hayes-Yorktown 230 kV Transmission Line survey identified two archaeological sites on the land east of Wormley Creek (O'Donnell 2009a-b). 44Yo1119 was a twentieth century trash scatter, and 44Yo1120 a late nineteenth century-early twentieth century domestic site. Only one fragment of Blue and Gray stoneware was identified as being an indicator of a possible historic site. Both sites were deemed ineligible for the NRHP and executed no further investigations.

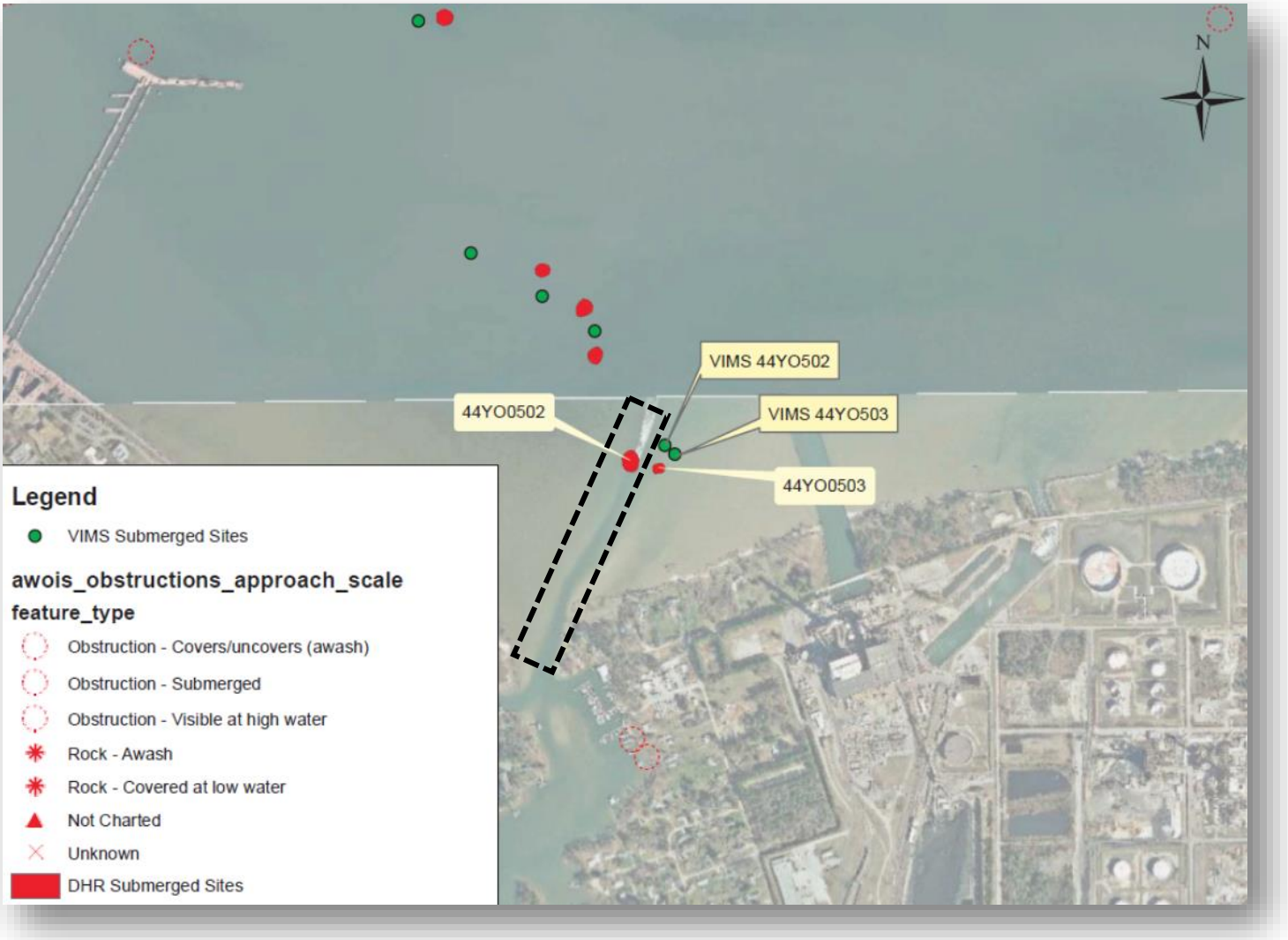


Figure 9. **Aerial map depicting Archaeological Sites within the vicinity of the Project Location** (Approximate project site depicted in black dashed area. Source: VDHR, 2015).

5.0 Submerged Cultural Resources Potential

This chapter addresses in broad terms the potential for submerged cultural resources within the Wormley Creek/York River APE. First, potential survival of prehistoric and historic terrestrial resources is discussed (i.e., resources that were formed on land and have since been inundated by water or sediment as a result of rising sea level and other offshore depositional activity). Second, the potential for underwater resources is examined (i.e., resources such as shipwrecks, wharves, or jetties, whose original formation occurred in a marine environment).

5.1 Inundated Terrestrial Resources

While few prehistoric and historic terrestrial sites have been documented from submerged environments, the potential for such sites exists. The affect of geomorphic processes should be considered when assessing the potential presence of prehistoric and historic terrestrial resources within the APE. A considerable effort has been expended over the past quarter century in attempting to develop effective predictive models that can guide researchers intent on locating submerged prehistoric resources and assessing site preservation potential. Much of this work has taken place in the Gulf of Mexico and along the Continental Shelf of the Atlantic seaboard in connection with offshore gas and oil leasing activities. One noteworthy site was documented off the coast of St. Lucie County, Florida. In a publication by Murphy (1990) examining the coastal processes affecting a multi- component site south of Fort Pierce Inlet, he identified waves, longshore currents, sea-level rise, barrier-island formation, migration and erosion as the principal natural forces that impact inundated terrestrial archaeological sites. During the examination of the natural site-formation processes of the Douglas Beach Site (Florida Site # 8SL17), Murphy concluded that a well preserved prehistoric component has survived beneath a near-shore, early eighteenth-century shipwreck site, in a high energy area because of the dynamics of barrier-island formation and migration. "Sedimentary and geochemical analysis together indicate the prehistoric strata are discrete, well-preserved and have suffered no mechanical disturbance. The analyses demonstrated archeological data sets that survive inundation and submersion" (Murphy 1990:52)

5.2 Underwater Resources

As with inundated terrestrial resources, the effect of coastal geomorphic processes may either erode or bury underwater resources, and the processes may occur rapidly or slowly over time. However, because of the "accidental" and rapid manner in which many underwater resources (notably shipwrecks) are formed, and the shorter elapsed time involved before their remains are sought, they are frequently better preserved and generally more easily discovered. Underwater resources, such as shipwrecks, because they usually constitute a stronger physical (topographic, magnetic) anomaly than most inundated terrestrial resources, are also far more easily identified with remote sensing techniques involving the use of magnetic or acoustic (sonar) detection equipment.

At many shipwreck sites, sand and light muds similar to the bottom sediments in portions of the York River study area have provided an excellent environment for preservation. Given the level of maritime activity in the York River, and the level of preservation at shipwreck sites in other similar riverine environments, it is highly possible that well-preserved shipwreck and wharf sites could exist in the vicinity of the study area. Just upstream from the project location, are the very well preserved remains of an 18th century vessel that was part of Admiral Cornwallis' fleet (44Yo88) were completely excavated within the confines of a steel cofferdam during the 1980s. This vessel was only one of nine 18th century wrecks that were discovered in the York River during the Yorktown Shipwreck Project. Also, historic records indicate that a canal boat was likely sunk at the mouth of the creek during a Civil War action in April, 1862.

5.3 Criteria of Evaluation

The information generated by these investigations was considered in terms of the criteria for evaluation outlined by the U.S. Department of the Interior, National Register Program. Nautical vessels and shipwreck sites, generally excepting reconstructions and reproductions, are considered historic if they are eligible for listing in the National Register of Historic Places at a local, regional, national, or international level of significance. To be eligible for the National Register of Historic Places, a vessel or site "must be significant in American history, architecture, archaeology, engineering, or culture, and possess integrity of location, design, setting, materials, workmanship, feeling, and association." To be considered significant the vessel or site must meet one or more of four National Register criteria:

> **A.** Association with events that have made a significant contribution to the broad patterns of our history; or
>
> **B.** Association with the lives of persons significant in our past; or
>
> **C.** Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> **D.** Sites that have yielded, or may be likely to yield, information important in prehistory or history.

National Register of Historic Places Bulletin 20 clarifies the National Register review process with regard to shipwrecks and other submerged cultural resources. Shipwrecks must meet at least one of the above criteria and retain integrity of location, design, settings, materials, workmanship, feelings and association. Determining the significance of a historic vessel depends on establishing whether the vessel is:

> **1.** the sole, best, or a good representative of a specific vessel type; or
>
> **2.** is associated with a significant designer or builder; or
>
> **3.** was involved in important maritime trade, naval recreational, government, or commercial activities.

Properties which qualify for the *National Register*, must have significance in one or more "Areas of Significance" that are listed in *National Register Bulletin 16A*. Although 29 specific categories are listed, only some are relevant to the submerged cultural resources in Wormley Creek/York River. Architecture, commerce, engineering, industry, invention, maritime history and transportation are potentially applicable data categories for the type of submerged cultural resources which may be expected in the Wormley Creek/York River study area.

Potential wreck types in the York River based on historical maritime activities may include a variety of material dating from the first half of the 17th century through the Second World War. To discuss the types of vessels potentially present, it is necessary to include vessels from all phases of the commercial and maritime activity in tidewater Virginia. Wood-hulled ships, ranging from small fishing sloops, shallops, barges, canal boats, recreational sailing craft, and ferries to coastal schooners, have been undoubtedly been lost in the York River and may be expected in the archaeological record.

6.0 Fieldwork Investigations – Remote Sensing Survey

A comprehensive Phase I Underwater Archaeological Investigation, utilizing magnetic and acoustic remote sensing equipment was conducted in the Wormley Creek/York River APE. The purpose of this investigation was to locate, identify, and preliminarily assess the significance of potential submerged cultural resources that might be impacted by dredging activities. The underwater survey was designed to generate sufficient magnetic and acoustic remote sensing data to identify anomalies suggestive of submerged cultural resources. Analysis of the remote sensing data aimed to isolate targets of potential historical significance that might require further investigation or avoidance.

All survey data were gathered on 16 June, 2015.

6.1 Remote Sensing Survey Field Methods

The magnetic and acoustic remote sensing fieldwork was carried out from a 25-foot, *Parker* fiber-glass-hulled survey vessel suitable for open and shallow water operations. A *Geometrics*, G-882, cesium magnetometer, capable of +/- one gamma resolution, was employed to collect magnetic remote sensing data. A ½ -second sampling rate by the magnetometer's towed sensor, coupled with a three-knot vessel speed assured a magnetic sample every two feet.

A *Marine Sonic HDS* all digital side scan sonar system equipped with a dual frequency, 600/1200 kHz, side scan sensor was employed to collect acoustic data. The sonar sensor was towed off the bow of the survey boat in an effort to obtain the most diagnostic acoustic "pictures" of the Wormley Creek/York River bottom. Sonar data were collected using a range of 80 feet per channel to provide comprehensive coverage and detail of the entire project area. *Marine Sonic* data acquisition software was used to merge the acoustic data with real-time positioning data. Data were further processed used *Chesapeake Technology, Inc*. software.

Survey vessel track-line control and position fixing were obtained by using a laptop PC-based software *(Hypack)* package in conjunction with a *Hemisphere* Differential Global Positioning System (DGPS) onboard the survey vessel. A U.S. Coast Guard beacon provided differential corrections. The onboard survey computer was interfaced with the DGPS satellite positioning system and the magnetic data. DGPS positioning data were converted by the computer to Virginia (South) NAD 83 X,Y coordinates in real time. These X,Y coordinates were used to guide the survey vessel precisely along predetermined track-lines that were oriented parallel to the shoreline. While surveying, vessel positions were continually updated on the computer monitor to assist the vessel operator, and the processed X,Y data were continually logged on computer disk for post processing and plotting.

A background plan of the two navigational channel(s) in *AutoCad* format, was loaded into the onboard navigation system on the survey vessel. Theoretical survey lanes were then designed for the entire survey to provide comprehensive over-coverage of the project area. Magnetic and acoustic data were collected separately.

To allow for the detection of subtle magnetic anomalies typically associated with smaller wooden vessels, survey lane spacing for the magnetic survey was established at 30-foot offsets. Three survey lanes were completed to collect magnetic data. After magnetic data were gathered, two sonar survey lanes were completed. Sonar lanes were offset 30 feet from either side of the channel(s) centerline (spaced 60 feet apart). During the survey, DGPS position fixes were recorded five times a second along each survey lane (Figure 10). All remote sensing data were interfaced with positioning data. This allowed researchers to rapidly integrate all survey records into a survey map and to pinpoint the location of any identified targets.

Magnetic data were contour plotted at 5-gamma intervals (Figures 11-13). All acoustic records were inspected for potential man-made features present on the bottom surface and a sonar mosaic of the project area was generated (Figures 14 & 15). After reviewing and evaluating all the remote sensing data targets of potential significance were identified. Additional investigation or avoidance is recommended for target signatures with the potential to yield submerged cultural resources.

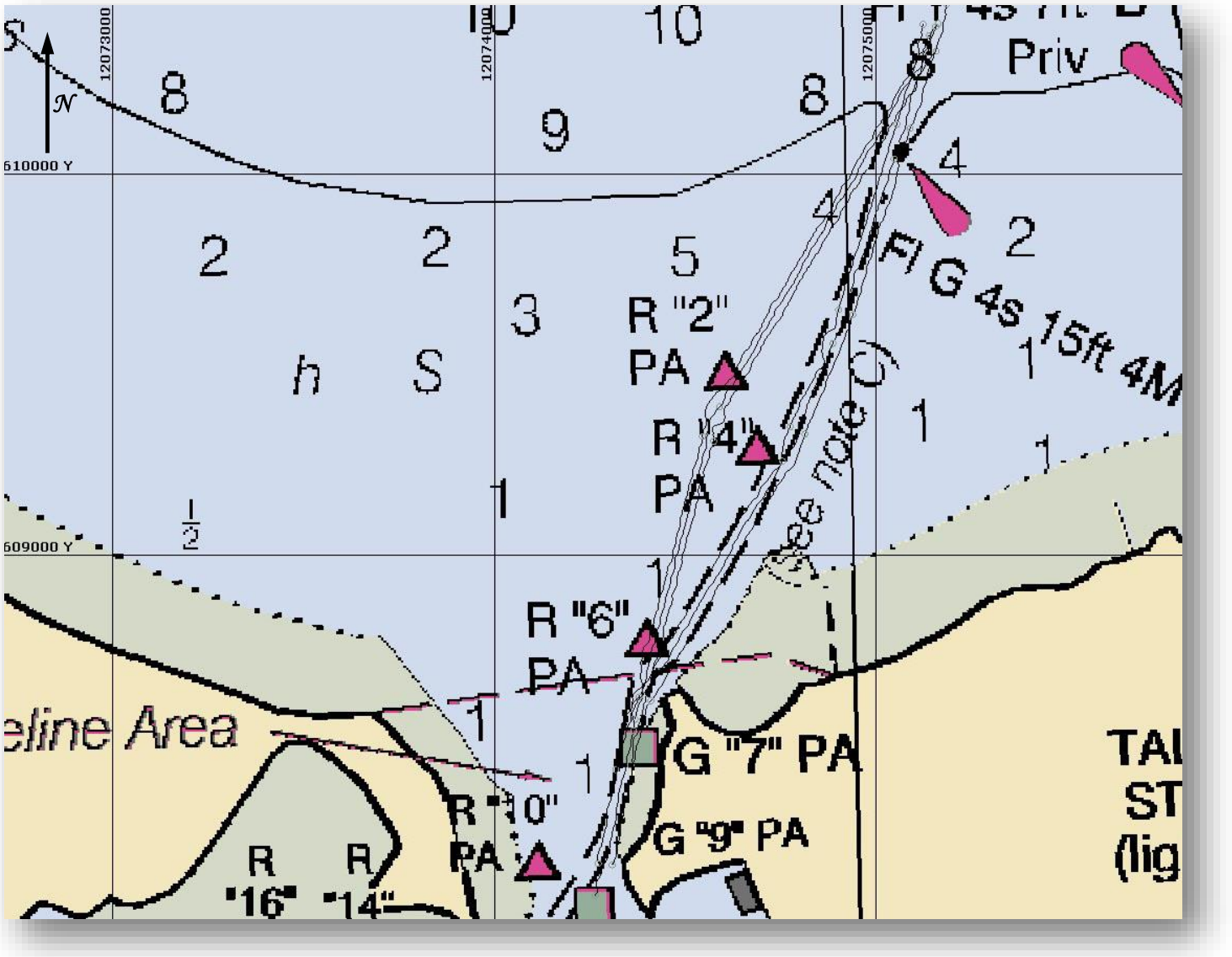


Figure 10. Survey Track Lines for Magnetic Survey (30' intervals) overlaid on NOAA Chart # 12241

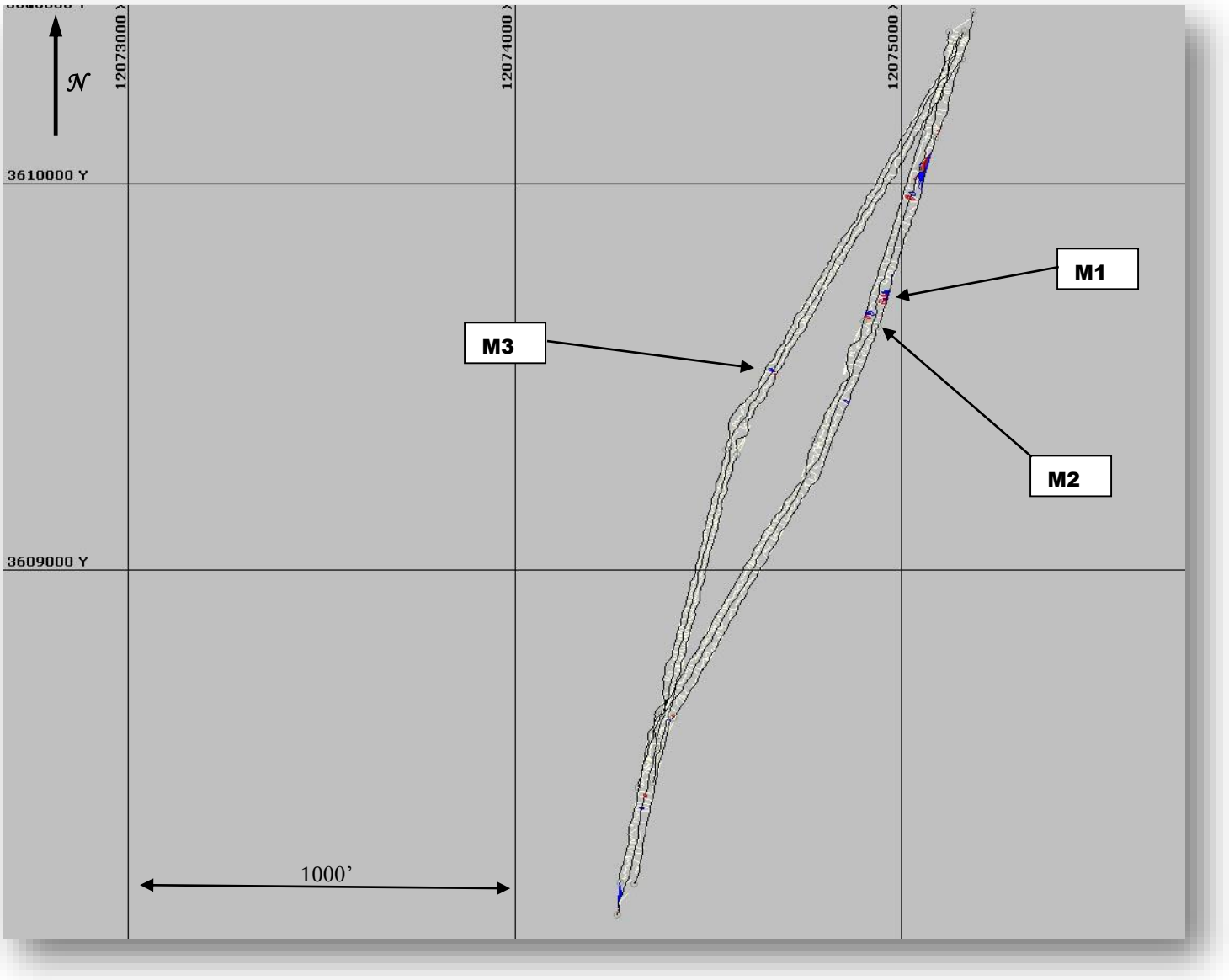


Figure 11. Magnetic Contour Map (5 gamma intervals)

Notes:
1) Contour Interval is 5 gamma
2) Magnetic data are reduced to pole: all positive readings are depicted as red and negative readings as blue; tan lines are zero readings (≤5 gammas)
3) Background grid = Virginia (South) State Plane System, NAD83, feet

Figure 12. Detail of Magnetic Contour Map – Targets M1 & M2, Existing Channel

Notes:
1) Contour Interval is 5 gamma
2) Magnetic data are reduced to pole: all positive readings are depicted as red and negative readings as blue; tan lines are zero readings (≤5 gammas)
3) Survey vessel tracks = black lines
3) Background grid = Virginia (South) State Plane System, NAD83, feet

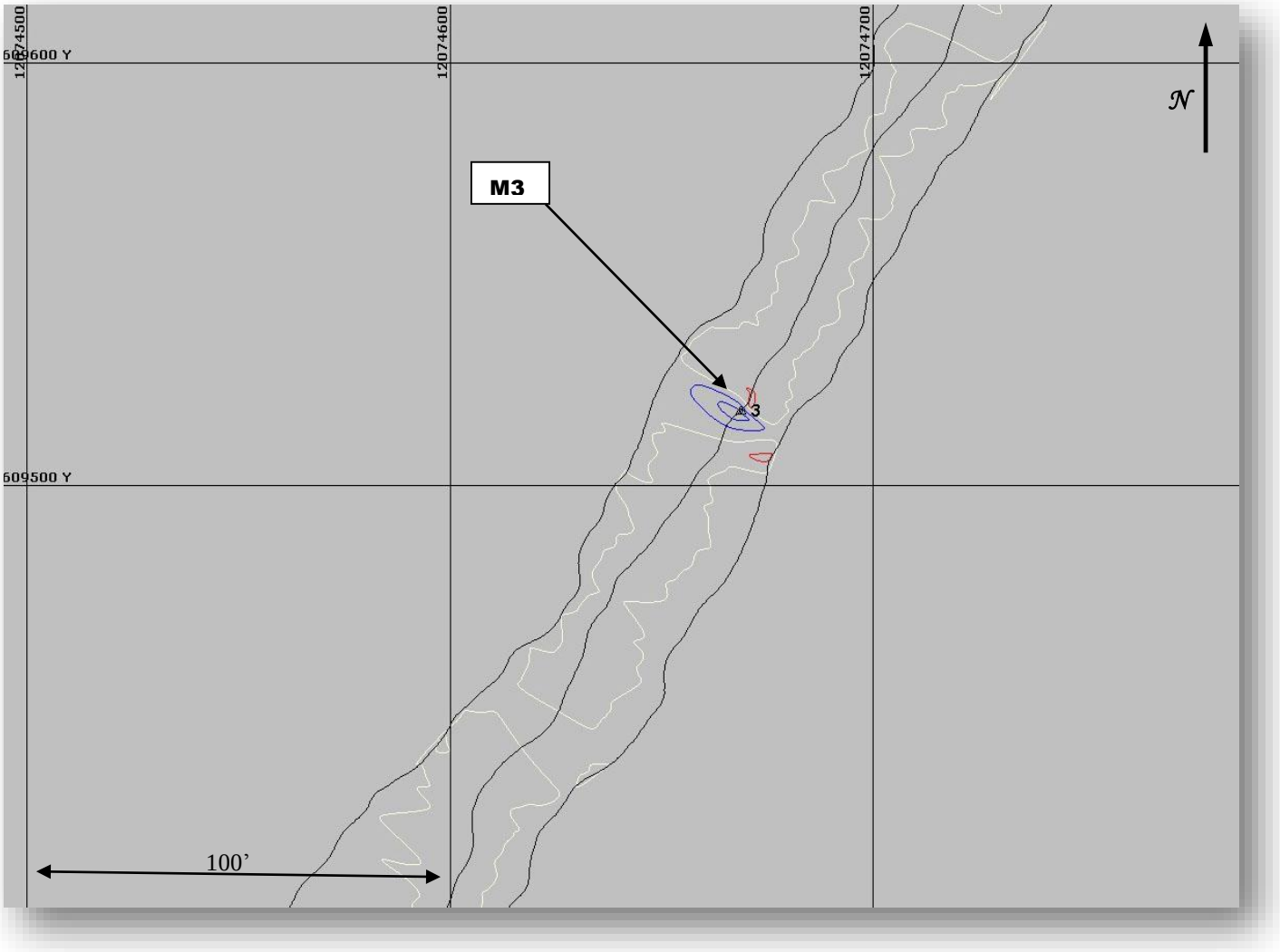


Figure 13. Detail of Magnetic Contour Map – Target M3, Alternate Channel

Notes:
1) Contour Interval is 5 gamma
2) Magnetic data are reduced to pole: all positive readings are depicted as red and negative readings as blue; tan lines are zero readings (≤5 gammas)
3) Survey vessel tracks = black lines
3) Background grid = Virginia (South) State Plane System, NAD83, feet

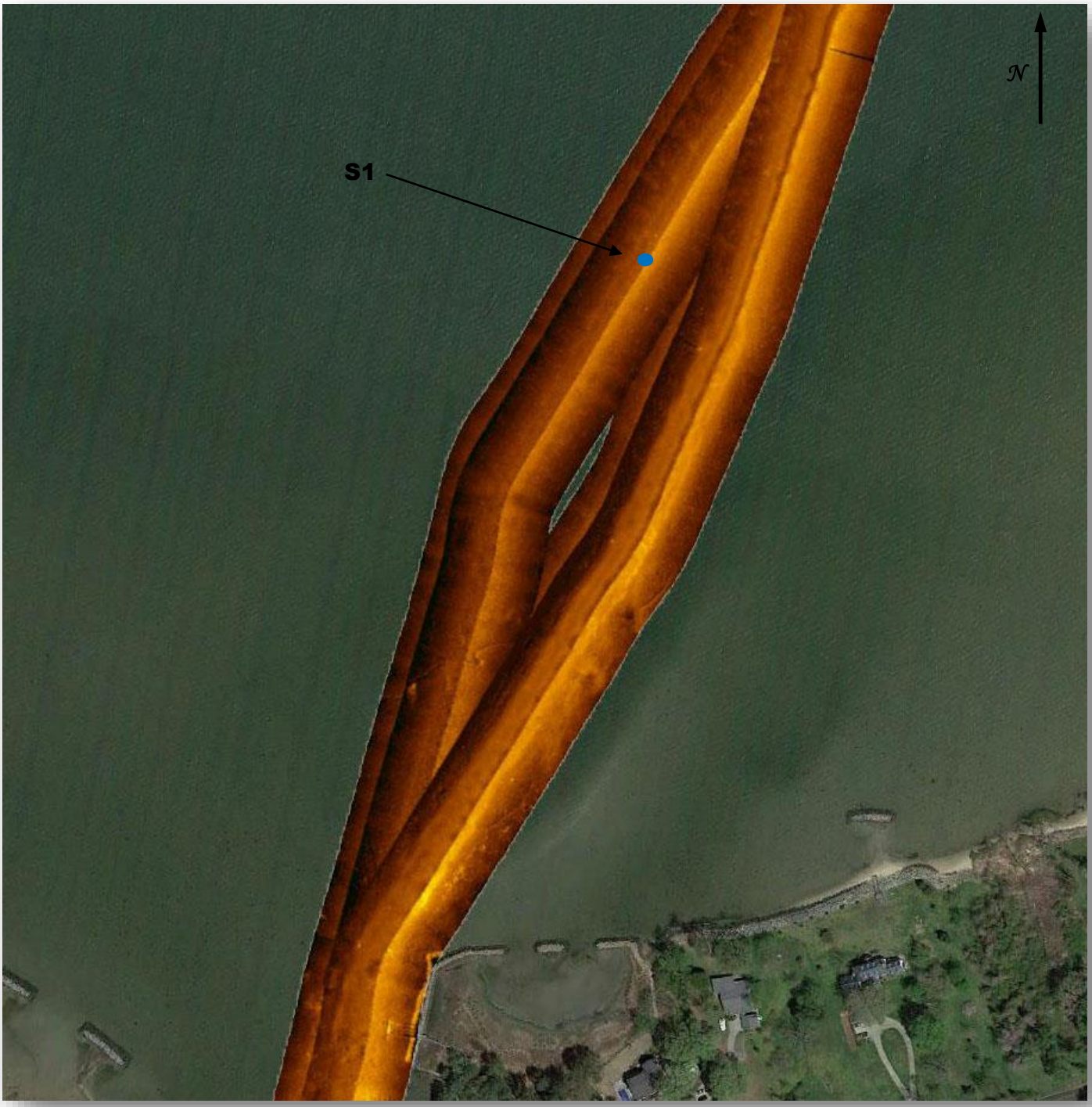


Figure 14. Sonar Mosaic

Note: One sonar target (S1) was identified in the alternative navigational channel.

Figure 15. Oblique View of Sonar Mosaic – Looking Onshore

Note: One sonar target (S1) was identified in the alternative navigational channel

6.1.1 Data Products - Magnetometer

Magnetic data were edited for detailed analysis. Also, the editing process was used to remove background noise, diurnal change, and to create a magnetic contour map with five-gamma intervals across the project area.

Magnetic data editing consisted of using *Hypack's* single-beam editing program to review raw data (of individual survey lines) and to delete any artificially induced noise or data spikes. Once all survey lines for an area were edited, the edited data were converted to an XYZ file also using Hypack (easting, and northing coordinates, and magnetometer data – measured in gammas). Next, the XYZ files were imported into a Triangular Irregular Network (TIN) modeling program in Hypack) that was used to contour the data in one-gamma intervals. A second major analytical technique employed included the subtraction of general background from each successive data sample to develop the actual field gradient. The gradient is the vertical difference (z) between samples. By subtracting successive data samples one from the other the effects of diurnal change is completely eliminated. The resulting data represents only the localized changes in the magnetic background created by ferrous objects (i.e. anomalies) or geological features. When graphically represented by contouring, only the intensity of variation is represented.

6.1.2 Data Products - Side Scan Sonar

The side scan sonar derives its information from reflected acoustic energy. Side looking sonar, which transmits and receives swept high frequency bandwidth signals from transducers mounted on a sensor that is towed from a survey vessel. Two sets of transducers mounted in an array along both sides of the tow fish generate the short duration acoustic pulses required for high resolution images. The pulses are emitted in a thin, fan-shaped pattern that spreads downward to either side of the tow fish in a plane perpendicular to its path. As the fish is towed along the survey trackline this acoustic beam sequentially scans the bottom from a point beneath the fish outward to each side of the trackline.

Acoustic energy reflected from any bottom discontinuities (exposed pipelines, rocks, or other obstructions) is received by the set of transducers, amplified and transmitted to the survey vessel via a tow cable. The digital output from state of the art units is essentially analogous to a high angle oblique photograph provided detailed representations of bottom features and characteristics. Sonar allows display of positive relief (features extending above the bottom) and negative relief (such as depressions) in either light or dark opposing contrast modes on a video monitor. Examination of the images thus allows a determination of significant features and objects present on the bottom within a survey area.

Raw sonar records were inspected for potential man-made features and obstructions present on the bottom surface. Sonar data were saved in files that covered each survey lane. Individual acoustic data files were initially examined using SeaScan™ acoustic data review software to identify any unnatural or man-made features in the records. Once identified, acoustic features were described using visible length, width, and height from the bottom surface. Acoustic targets are normally defined according to their spatial extent, configuration, location and environmental context. The coordinates of the acoustic features also were recorded.

Later, raw sonar data files were edited using software from Chesapeake Technology™ to remove the water column from the records and the processed sonar files were inspected for man-made features. Finally, edited acoustic data were merged into a geo-referenced sonar mosaic. The location of sonar target(s) were then overlaid onto the sonar mosaic.

6.2 Remote Sensing Findings

A moderate intensity (60+ gamma, that extended across 20 sample intervals – more than 40 feet), multi-component magnetic anomaly was identified near the eastern edge of the existing navigational channel (Target M1). Two other lesser magnetic anomalies (suggestive of a single source object or modern debris scatters) were also identified (M2 & M3). M-2 was located in the existing navigational channel and M-3 was identified in the alternative channel.

The location of target M-1 appears to correspond with the approximate location of archaeological site 44Yo502. 44Yo502 was established at the site of a magnetic anomaly (14-25) identified during a 1988 underwater archaeological investigation completed as part of the York River Crossing/Coleman Bridge Phase IB Study (Koski-Karell, 1988). The magnetic target was reported as a cluster of magnetic anomalies of significant mass and dimension to resemble a shipwreck site. The report stated that the area had not been dredged but is a natural channel. While UTM coordinates (in meters) were provided in the 1988 report, subsequent studies seem to place the targets slightly further to the east. (O'Donnell 2009a-b). While acoustic data indicates a generally flat, featureless bottom surface at magnetic target M-1, additional archaeological investigations (or avoidance) are recommended at this location due to the extended nature of this multi-component magnetic signature within a very high probability area for containing submerged cultural resources.

Inspection of the sonar records confirms the presence of just one target (S1). For the most part, sonar records revealed a flat, featureless, muddy bottom with occasional crab traps and other small rounded objects scattered across the river bottom. Drag marks (from boat hulls) were identified across the shallow sections of the project area. S1 was a five-foot long linear feature that had no corresponding magnetic signature – suggesting a non-ferrous object. The shape of the feature is suggestive of a piece of timber.

A complete listing of information/data from the magnetic anomalies is provided in Table 1, below. A complete listing of information/data from the sonar features is provided in Table 2, below.

Additional Phase IB underwater work, or avoidance, is recommended to identify the source material for magnetic target M-1, which is located within the existing channel alignment. However, no potentially significant remote sensing targets were located within the alternative channel alignment and no additional underwater archaeological investigations are recommended along the alignment.

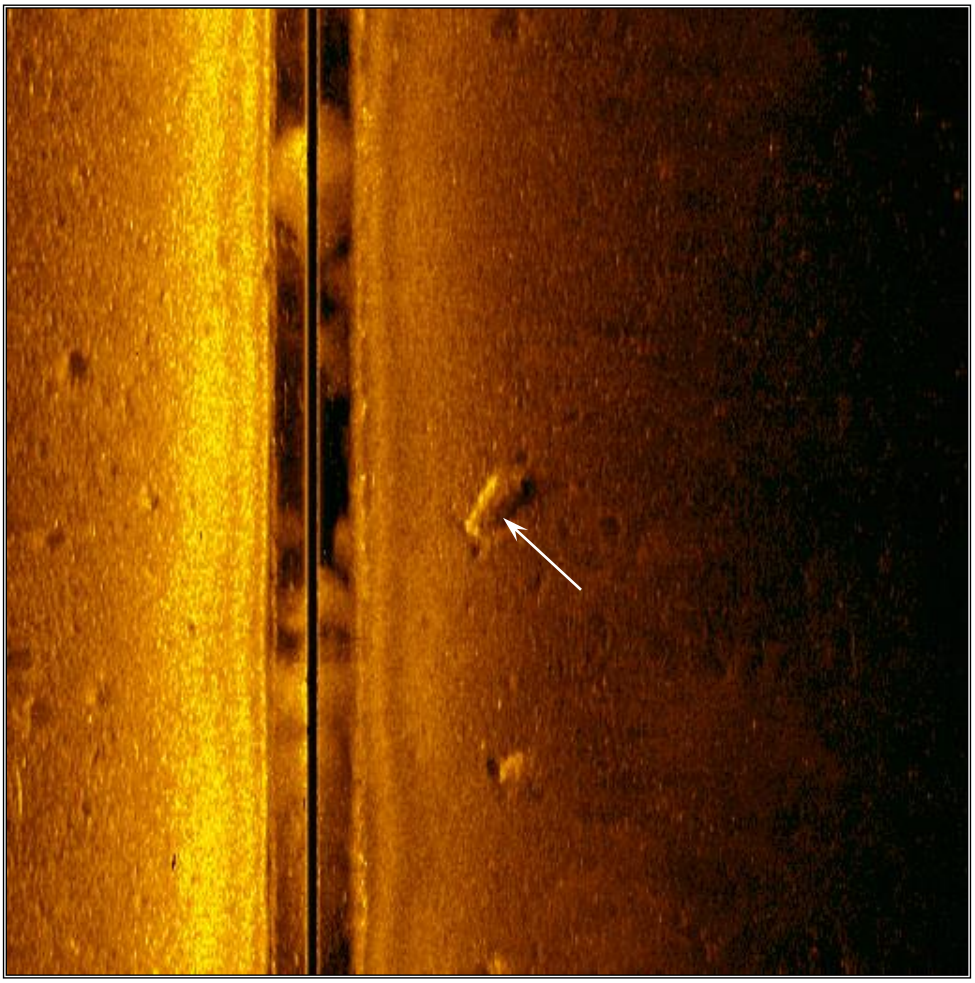
Table 1. Magnetic Targets in Wormley Creek/York River APE

Note: Coordinates are expressed in the Virginia (South) State Plane Coordinate System, NAD83, feet.

Anomaly #	Easting (X)	Northing (Y)	Characteristics
M1	12,074,962	3,609,708	60 gamma, multi-component anomaly that extended across 40' along the bottom. Anomaly was identified on the eastern outside lane in the existing navigational channel. Sonar records confirm a variety of a generally flat bottom with some small rounded features. Nothing conclusive was found on the bottom surface with the sonar records. However, additional archaeological investigations (or avoidance) are recommended at this location due to the extended nature of this multi-component magnetic signature within a very high probability area for containing submerged cultural.
M2	12,074,907	3,609,663	21 gamma, negative monopolar signature that extended across an area 9' long in the existing navigational channel. This target is located slightly west and inshore of M1. However, they do not appear to be associated. Limited signature is suggestive of small, single source object. No further archaeological investigations are recommended here (NFI).
M3	12,074,668	3,609,517	9 gamma, negative monopolar signature that extended across an area 5' across in the alternative navigational channel. Small, single source anomaly (NFI).

Table 2. Sonar Target(s) in Wormley Creek/York River APE

S-1



Contact Info: S-1	Comments
• Sonar Time at Target: 06/16/2015 13:25:23 • Click Position (Lat/Lon Coordinates) 37° 13.14466' N 076° 28.03173' W (WGS84) • Click Position (Projected Coordinates) (X) 12074777.98 (Y) 3609695.15 • Map Proj: VA83-SF • Acoustic Source File: I:\Sonar Data\Yorktown 15\20150616\2015JUN16_0008.sds • Ping Number: 28639 • Range to Target: 1.65 US Feet • Line Name: 2015JUN16_0008	Target Height: = 0.4 US Feet Target Length: 5.2 US Feet Target Width: 0.8 US Feet Mag Anomaly: no Avoidance Area: no **Description**: A 5- long linear feature that is resting flat on the bottom surface. No associated magnetic signature suggesting a non-ferrous object. (NFI)

7.0 Conclusions and Recommendations

The project site rests in within the vicinity of important historical sites and occurrences. Historical research shows that major events of national importance, including the Revolutionary War's Siege of Yorktown and the Civil War's Battle of Yorktown, warrant archaeological investigations. Historical documentation suggests the possibility that Revolutionary and/or Civil War actions may have been deposited at the mouth of Wormley Creek. Sunken vessels, plantation wharves, and trash middens may exist within the project area.

A comprehensive Phase I Underwater Archaeological remote sensing survey of the navigational channel and an alternative channel that connects Wormley Creek and the York River resulted in the identification of three magnetic anomalies and one sonar feature across the two channel alignments. Of these four targets, one location (M-1) generated a magnetic signature type that was considered suggestive of a submerged cultural resource.

Of the three magnetic anomalies identified, two had brief, very low intensity signature suggestive of single source objects, rather than potential submerged cultural resource material. The lone sonar target was a five-foot linear, non-ferrous feature that was not considered to be suggestive of a submerged cultural resource.

The largest magnetic anomaly (M1) had a diverse, multi-component signature that was spread out across an area 60 feet along the eastern-most survey lane. This magnetic anomaly was only detected on the survey lane along the eastern side of the channel - however it appears that the target signature may extend further east toward the shoreline beyond the limits of the present survey.

Signature characteristics of M-1 coupled with its location directly within a high probability location warrant the recommendation for additional archaeological investigations (or avoidance) to identify and evaluate the historic significance of the source material responsible for generating this anomaly. Target M-1 was located within the APE of the existing channel alignment.

However, no potentially significant remote sensing targets were located within the APE of the alternate channel alignment and no additional underwater archaeological investigations are recommended for that alignment.

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APPENDIX H:

Public Comments and Responses*

*This appendix will be updated after the 30-day comment period has closed.