WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

U.S. ARMY CORPS OF ENGINEERS

Technical Presentation

Public Meeting:

Submit a comment card at the In-Person public meeting

E-Mail:

WilmingtonHarbor403@usace.army.mil

Please submit emailed comments by July 22, 2024

Scan the QR Code to access the Project Comment Tool

Online:

Online comments may be made through the Public Comment Tool

The Public Comment Tool can be found on the project website:

https://wilmington-harbor-usace-saw.hub.arcgis.com/

Mail:

US Army Corps of Engineers
Wilmington District
ATTN: Wilmington Harbor 403
69 Darlington Avenue
Wilmington, NC 28403

Please submit mailed comments by July 22, 2024

Public Comments Requested by July 22, 2024

MEETING OBJECTIVES

USACE WILL PROVIDE INFORMATION ABOUT:

- Technical project information, so the Public can engage in an informed manner
- How/when to engage during this Scoping Phase
- What information or feedback is most useful at this phase in the process in the development of the EIS

USACE is requesting:

- Comment on potential alternatives and impacts
- Identification of any relevant information, studies, or analyses

PUBLIC ENGAGEMENT TIMELINE

VIRTUAL PUBLIC MEETINGS.

DATE	MEETING CONTENT	LOCATION	MEETING TIME
June 4, 2024	**Session 1.** Plan Formulation, NEPA, Cultural Resources, Social Effects, & Economics	Webex	1:00-3:00 pm
June 5, 2024	**Session 2.** Ecological Resources *(Wetlands, Protected Species, Habitat)*	Webex	1:00-3:00 pm
June 6, 2024	**Session 3.** Physical Resources *(Design, Geotech, GW, Geospatial, Hydrology, SLC, & WQ)*	Webex	1:00-3:00 pm
June 7, 2024	**Session 4.** Beneficial Use of Dredged Materials	Webex	1:00-3:00 pm

IN-PERSON PUBLIC OPEN HOUSE MEETING.

DATE	LOCATION	MEETING TIME
June 13, 2024	Sunset Park Elementary School, 613 Alabama Avenue, Wilmington, NC 28401	3:00-7:00 pm

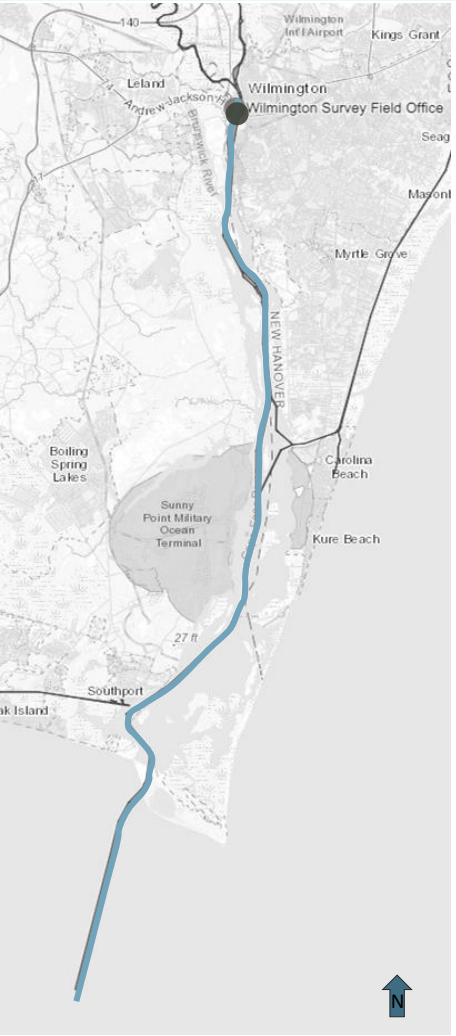
VIRTUAL PUBLIC MEETINGS.

DATE	MEETING CONTENT	LOCATION	MEETING TIME
June 24, 2024	**Session 1.** Plan Formulation, NEPA, Cultural Resources, Social Effects, & Economics	Webex	1:00-3:00 pm
June 26, 2024	**Session 2.** Ecological Resources *(Wetlands, Protected Species, Habitat)*	Webex	1:00-3:00 pm
June 27, 2024	**Session 3.** Physical Resources *(Design, Geotech, GW, Geospatial, Hydrology, SLC, & WQ)*	Webex	1:00-3:00 pm
June 28, 2024	**Session 4.** Beneficial Use of Dredged Materials	Webex	1:00-3:00 pm

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION



FEB 2020 - North Carolina State Ports Authority (NCSPA) Section 203 Feasibility Study

✓ Tentatively Selected Plan recommended deepening to 47 feet

✓ Submitted to the ASA(CW) in February 2020 for Review

MAY 2020 – Assistant Secretary of the Army (Civil Works) ASA (CW) Review Assessment

✓ Transmitted to Congress with unresolved comments including:

- Reframe assumptions and screening of alternatives
- Perform economic analysis using USACE methodology at multiple depths
- Conduct National Environmental Policy Act (NEPA) analysis including supporting engineering modeling and appropriate sea level rise
- Finalize a mitigation plan and a real estate plan
- Conduct Independent External Peer Review (IEPR)

DEC 2020 – Water Resources Development Act (WRDA 2020)

✓ Congress authorized the navigation project, at a total cost of $834,093,000 through Section 403 of Water Resources Development Act (WRDA) 2020. WRDA 2020 included a requirement that a final assessment address the concerns, recommendations, and conditions identified by the ASA (CW).

OCT 2023 – Section 403 Letter Report and Environmental Impact Statement

❑ The Wilmington District was tasked with producing a Letter Report and Environmental Impact Statement to address issues from the Review Assessment through a cost-share agreement with the NCSPA

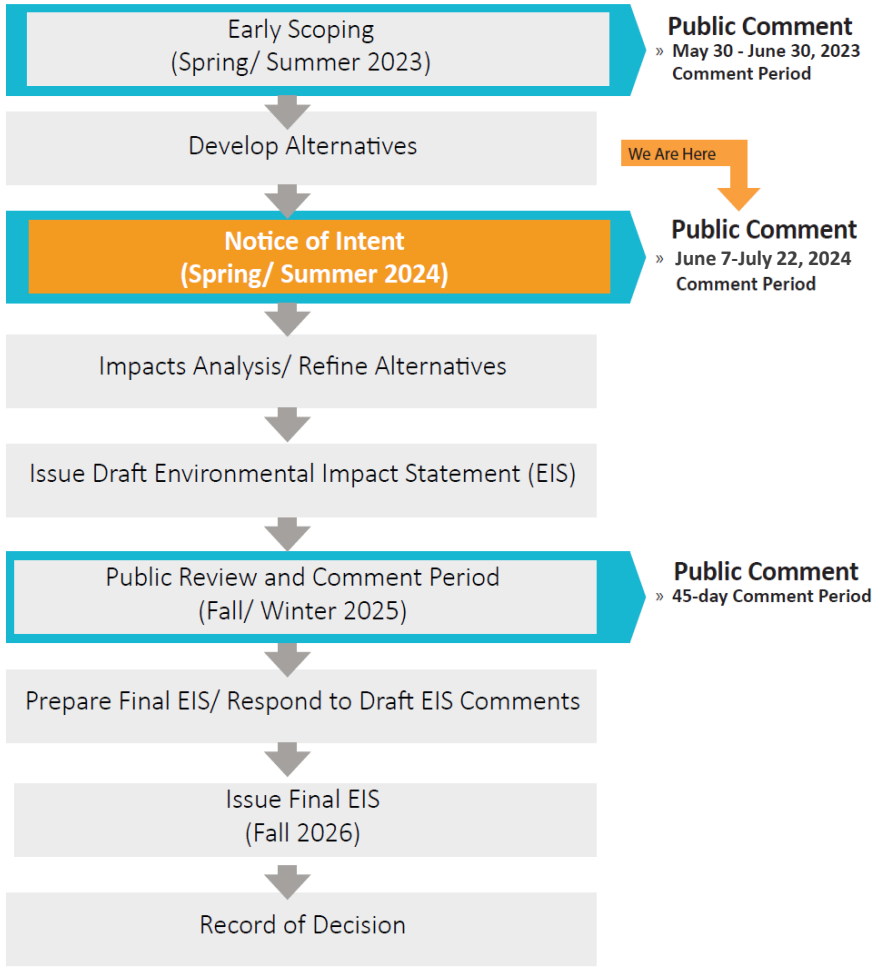
NEPA PROCESS

PURPOSE AND NEED:

- Describes the what and why for the proposed action
- Informs the development of alternatives

WILMINGTON HARBOR 403 PURPOSE AND NEED

- **PURPOSE.** Contribute to national economic development (NED) by addressing transportation inefficiencies for the forecasted vessel fleet, consistent with protecting the Nation's environment.
- **NEED.** Address the constraints that contribute to inefficiencies in the existing navigation system's ability to safely serve forecasted vessel fleet and cargo types and volumes.



DESCRIPTION OF ALTERNATIVES

BACKGROUND. The action alternatives will be compared to the No Action alternative to form the basis for engineering, environmental and economic analysis, and decision-making for the Wilmington Harbor Section 403 effort.

NO ACTION ALTERNATIVE
42’

- Depth -42’ MLLW
- Side Slopes: 3:1 (horizontal to vertical)

ACTION ALTERNATIVE 1
47’

- Depth increased from -42’ to -47’ MLLW with 2’ stepdown at Battery Island
- Side Slopes.
  - 3:1 (horizontal to vertical) from Anchorage Basin to Lower Swash
  - 5:1 from Battery Island to Baldhead Reach 4
- 2’ allowable overdepth authorized
- Where hard-rock present, 1’ additional over-depth
- 9.1 mi channel extension from BH Reach 3
- Widen areas identified in the 203 Report (Table 1)

ACTION ALTERNATIVE 2
46’

- Depth increased from -42’ to -46’ MLLW with 2’ stepdown at Battery Island
- Side Slopes.
  - 3:1 (horizontal to vertical) from Anchorage Basin to Lower Swash
  - 5:1 from Battery Island to Baldhead Reach 4
- 2’ allowable overdepth authorized
- Where hard-rock present, 1’ additional over-depth
- 9.1 mi channel extension from BH Reach 3
- Widen areas identified in the 203 Report (Table 1)

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

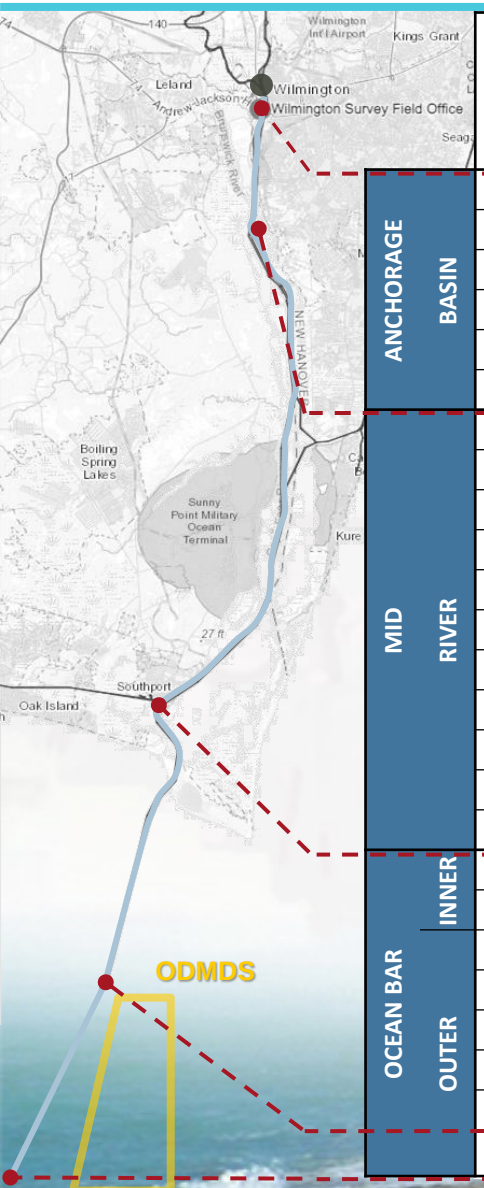


TABLE 1.

WIDTH: Standardizing the width of the channel; Wideners proposed

REACH			Exist. Channel Width (ft)	Proposed Channel Width (ft)	DEPTH - MEAN LOWER LOW WATER (MLLW) Future Without Project (ft)	Preliminary 2nd Action Alt. 46 FT ALT (ft)	Conditionally Authorized 47 FT ALT (ft)
ANCHORAGE BASIN		Anchorage Basin - 0+00 to 8+00	448-548	625 - 1509	38	46	47
		Anchorage Basin - 8+00 to 84+85	547-1200	625 - 1509	42		
		Between Channel	500-545	625			
		Fourth East Jetty	455-550	550			
		Upper Brunswick	400-775	500			
		Lower Brunswick	400-775	500			
MID RIVER		Upper Big Island	540-700	660	42	46	47
		Lower Big Island	507-695	500			
		Keg Island	400-695	500			
		Upper Lilliput	400-610	500			
		Lower Lilliput	600	600			
		Upper Midnight	600	600			
		Lower Midnight	600	600			
		Reaves Point	400-600	500			
		Horseshoe Shoal	400-607	500			
		Snows Marsh	400-607	500			
		Lower Swash	400-820	800 - 500			
OCEAN BAR	INNER	Battery Island	500-820	800 - 1300	44	48	49
		Southport	500	800			
	OUTER	Baldhead - Caswell	500-646	800			
		Smith Island Channel	650-895	900			
		Baldhead Shoal - Reach 1	775-900	750			
		Baldhead Shoal - Reach 2	900	900			
		Baldhead Shoal - Reach 3	500	600 - 900			
		Offshore Extension (New Reach 4)	NA	600			

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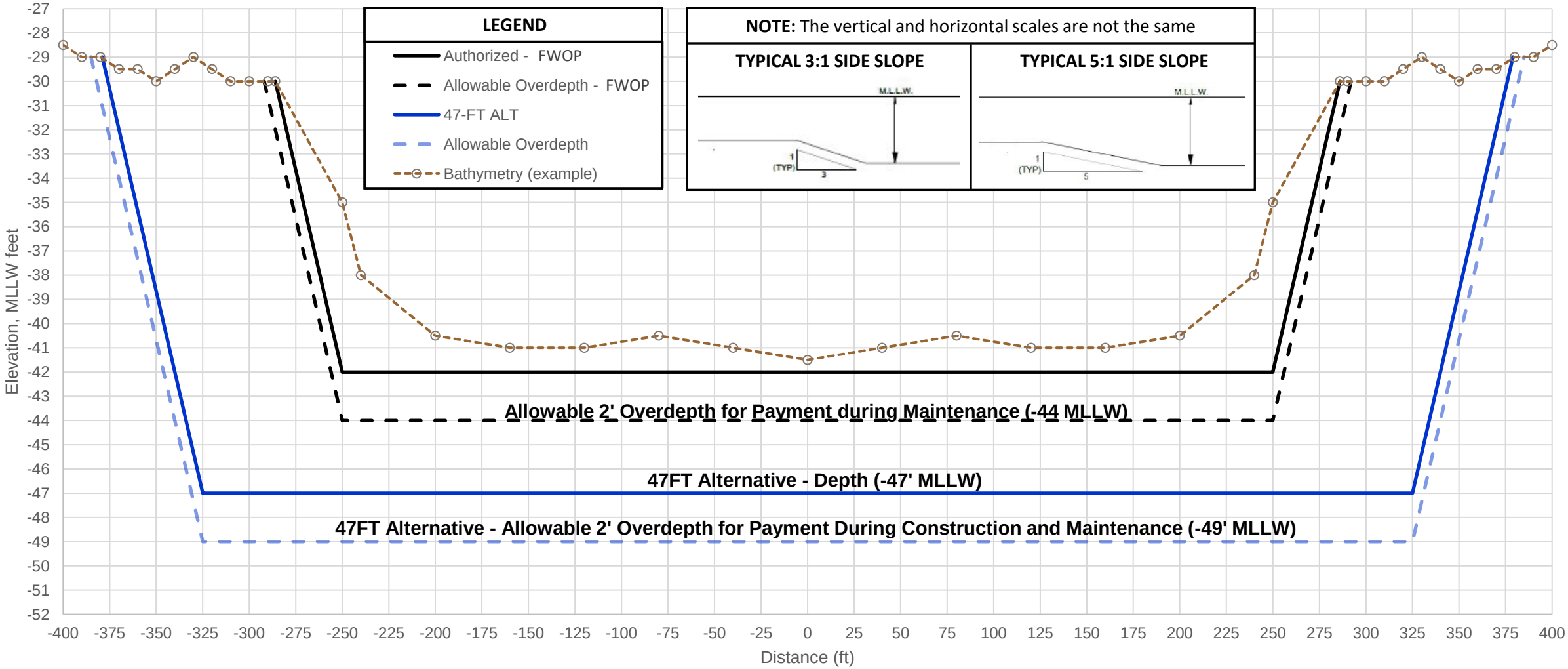
LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

NON-ROCK CROSS-SECTION (FWOP & 47' ALT)



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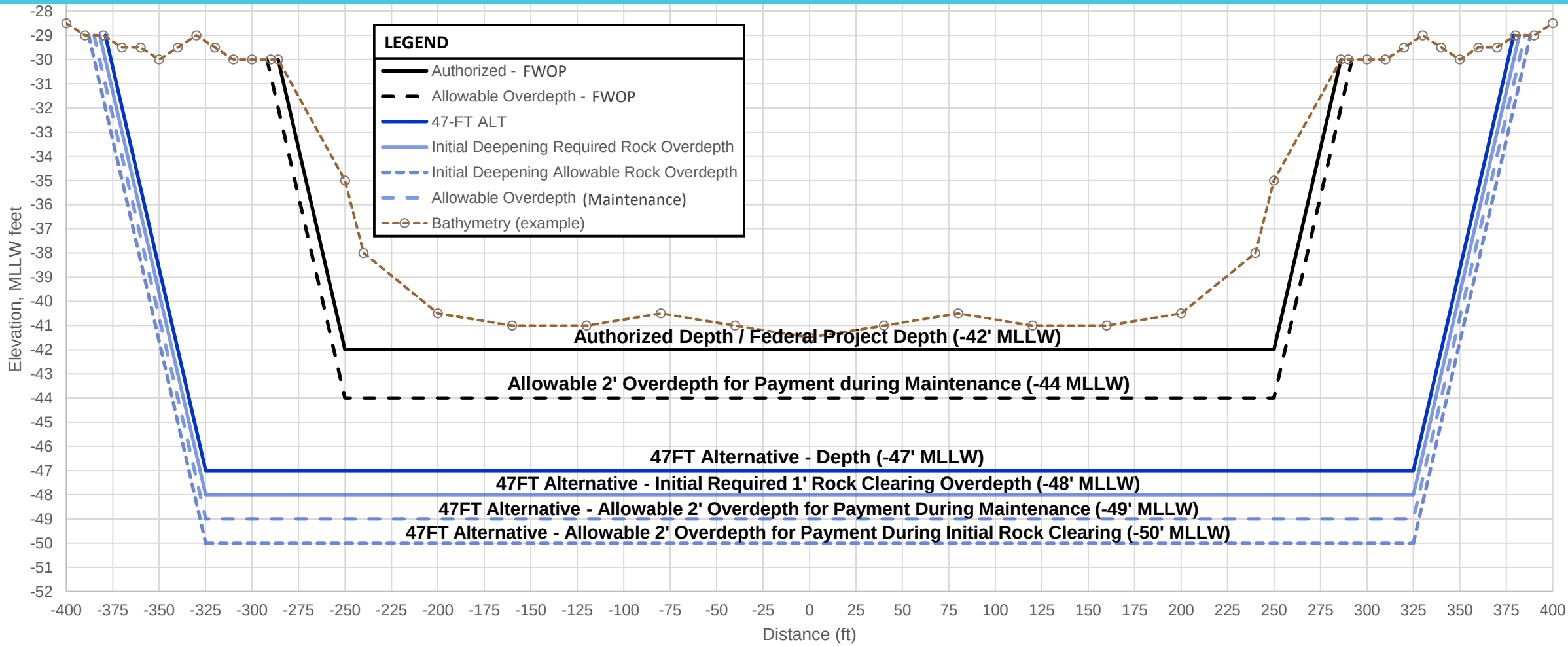
LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

ROCK CROSS-SECTION (FWOP & 47' ALT)



U.S. ARMY

SESSION 1

Plan Formulation, NEPA, Cultural Resources, Social Effects, & Economics

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

PLAN FORMULATION

OBJECTIVES.

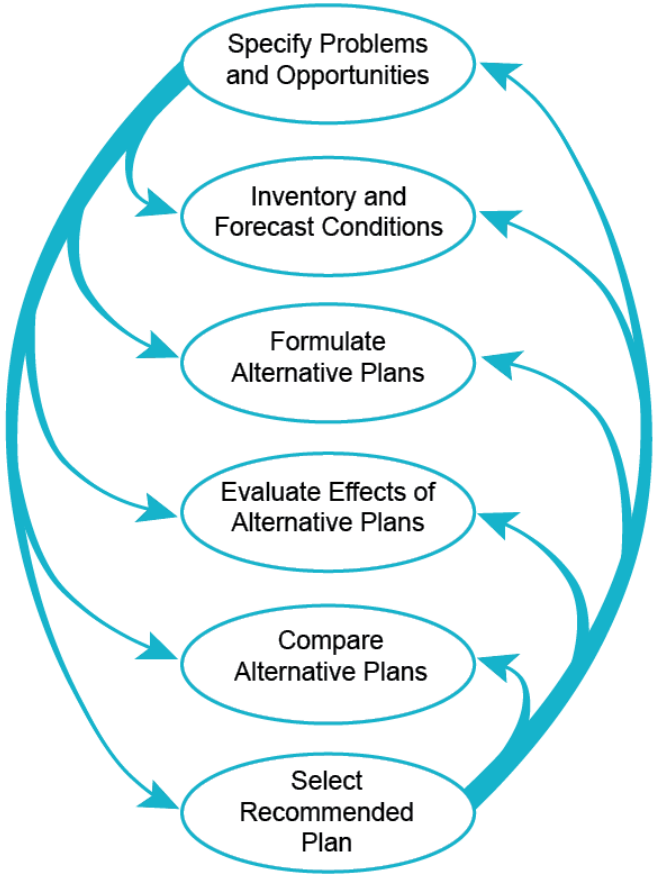
Contribute to national economic development:

- Reducing origin to destination transportation costs at the Port of Wilmington
- Reducing waterborne transportation costs of the Wilmington Harbor Federal Navigation Project by accommodating the transit of larger and more efficient vessels

SCREENING ALTERNATIVES.

Action alternatives will be compared to and contrasted with each other and the "no action alternative"

- Effectiveness
- Efficiency
- Completeness
- Acceptability



SELECTING ALTERNATIVES.

This analysis will examine and balance benefits and adverse impacts across a broad range of considerations:

- Construction, Operations and Maintenance costs
- Transportation cost savings
- Environmental impacts and mitigation
- Social impacts
- Cultural and historical resource impacts

FINAL DECISION.

USACE will submit the final Letter Report with a recommendation and an EIS to the Assistant Secretary of the Army (Civil Works) ASA(CW) to make a final decision.

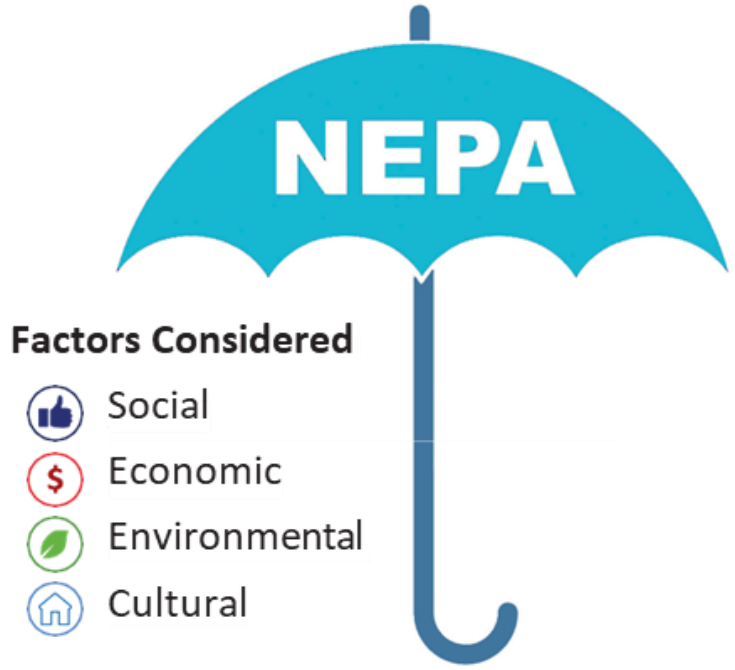
NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

The **NEPA process** has two major purposes:

- ensuring that agencies consider the environmental impacts of their proposed actions; and
- informing the public about potential agency actions and considering public feedback in their decision-making processes

IMPROVES federal decision making through *meaningful public engagement*

Compliance with other environmental laws will be integrated into the NEPA process, such as Clean Water Act, Endangered Species Act, Coastal Zone Management Act, and National Historic Preservation Act.



NEPA SCOPING

SCOPING INVOLVES:

- Identifying significant issues
- Eliminating non-significant issues from further study
- Determining the range of actions, alternatives, and impacts to be considered in the decision-making process
- Requesting comment on preliminary action alternatives

COMMENTS RECEIVED WILL INFORM:

- Development/refinement of alternatives
- Analysis/evaluation of impacts

PLEASE PROVIDE COMMENT ON:

- Concerns related to the project
- Suggestions for alternatives
- Resources that should be considered
- Identify studies/information and analysis useful for evaluation of impacts

ENVIRONMENTAL IMPACT STATEMENT

THE PURPOSE OF AN EIS IS TO:

- Ensure federal agencies consider the environmental impacts of their actions in decision making.
- Provide full and fair discussion of significant environmental impacts
- Inform decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment

AN EIS:

- Focuses on significant environmental issues and alternatives
- Provides evidence that all the necessary environmental analyses have been conducted.

ENVIRONMENTAL IMPACT STATEMENT

WHAT INFORMATION IS INCLUDED IN AN EIS?

- Purpose and Need, the what and why
- Alternatives, including the proposed action
  - Detailed description of the alternatives, including no action
  - Includes appropriate mitigation measures
- Affected Environment
  - Concise description of the environment that may be affected
  - Includes description of environmental trends
- Environmental Consequences
  - Scientific and analytical basis for the comparison of impacts to significant resources
  - Impacts of the action alternatives are compared to the no action alternative/future without project condition
- Summary of submitted alternatives, information, and analyses
- List of Preparers
- Technical Appendices
  - Compliance with other environmental laws
  - Engineering Modeling
  - Economic Analysis
  - Mitigation Plan

CULTURAL RESOURCES

ANALYSIS OF EFFECTS

- Area of Potential Effects (APE) - determined through an analysis of direct and indirect impacts.
- Hydrological models to include shoreline wake analysis and flood analysis will inform the extent of the area of potential effects Consultation with NC State Historic Preservation Office (SHPO), tribes, and other stakeholders will help inform potential effects to historic properties and other culturally significant resources
- Archaeological surveys were conducted in portions of the study area, most recently in 2018 (river channel); additional surveys may be required

HISTORIC PROPERTIES

- Historic properties preliminarily identified within the study area include but are not limited to:
  - Fort Fisher (Battery Buchanan) (National Historic Landmark)
  - USS North Carolina (National Historic Landmark)
  - Bald Head Island Lighthouse (National Register)
  - Brunswick Town Historic District (National Register)
  - Southport Historic District (National Register)
  - Wilmington Historic District (National Register)

SOCIAL EFFECTS

WE EVALUATE SOCIAL EFFECTS SUCH AS:

- Cultural impacts such as community cohesion
- Environmental Justice/disproportionate effects
- Increased or decreased options or choices
  - Recreation
  - Education
  - Civic/Government Participation

ENVIRONMENTAL JUSTICE

ENVIRONMENTAL JUSTICE. Ensures the adverse impacts are not disproportionately distributed to disadvantaged communities and that benefits are distributed fairly

- EJ Communities highlighted in the adjacent map were identified from the Census data (add detail)
- Identified communities in rural, suburban, and urban areas within Brunswick and New Hanover Counties
  - Community Impact Area based on potential impacts and benefits of the project
  - Potential Mitigation for adverse impacts

ECONOMIC ANALYSIS

- National Economic Development (NED) Benefits in Deep Draft Navigation
- Economic Assumptions
- Commodity Forecasting
- Fleet Forecasting
- Regional Economic Development

NED BENEFITS IN DEEP DRAFT NAVIGATION

NATIONAL ECONOMIC DEVELOPMENT (NED)

- Elimination or Reductions in Transportation Cost(s)
- Employment of larger vessels
- More efficient use of vessels
- Lower tug assistance or handlings cost(s)
- Reductions in transit time (waterborne or landside, etc.)
- Use of alternative mode (land vs. water, etc.)

ECONOMIC ASSUMPTIONS

- **The action alternatives will not increase the volume of cargo differently than the without project scenario**; the same amount of cargo will be moved more efficiently (NED Benefits).
- **Wilmington Harbor Design Vessel:** Post-Panamax Generation III
  - 1,200 to 1,220 feet length over all (LOA)
  - 44 1,200-foot LOA calls in 2021
  - 168 feet beam (Max. for expanded Panama Canal locks)
  - 51 feet draft
  - Nominal 20' Equivalent (TEU) intake of ~ 10,000 to 15,000 TEUs
- **Ability to move the same amount of cargo using larger ships = fewer trips**
  - fewer vessel trips = lower transportation costs (benefits)
- **Due to the current channel's configuration, light loading practices continue as the least-cost alternative to intermodal shifts in cargo**
  - Overall vessel fleet composition will remain much the same as it is today
  - Bulker and Chemical Tanker fleet mix will not incorporate new, larger classes, but shift towards larger end of existing fleet, and remain draft constrained
  - Asian container shippers will not fully utilize the available fleet of Post-Panamax Generation III vessels and retain smaller vessels
  - A smaller share of the South/Central American container cargo is shifted to the light-loaded, Post-Panamax Generation I fleet, resulting in smaller vessels continuing to call on Wilmington

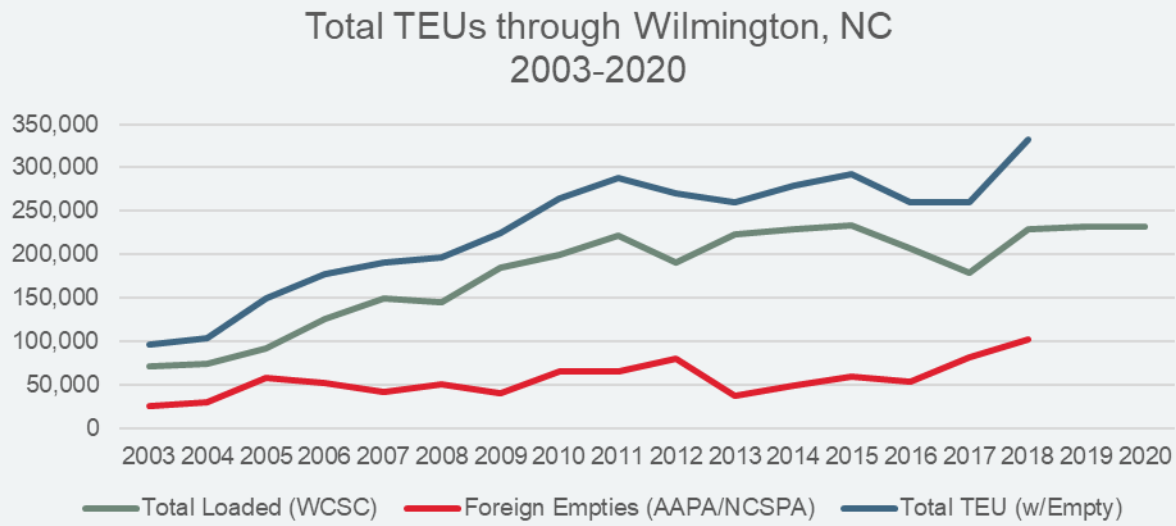
COMMODITY FORECASTING

Historical data informs, not forecasts

Future without Project (FWOP) = Future with Forecast (FWP) forecast

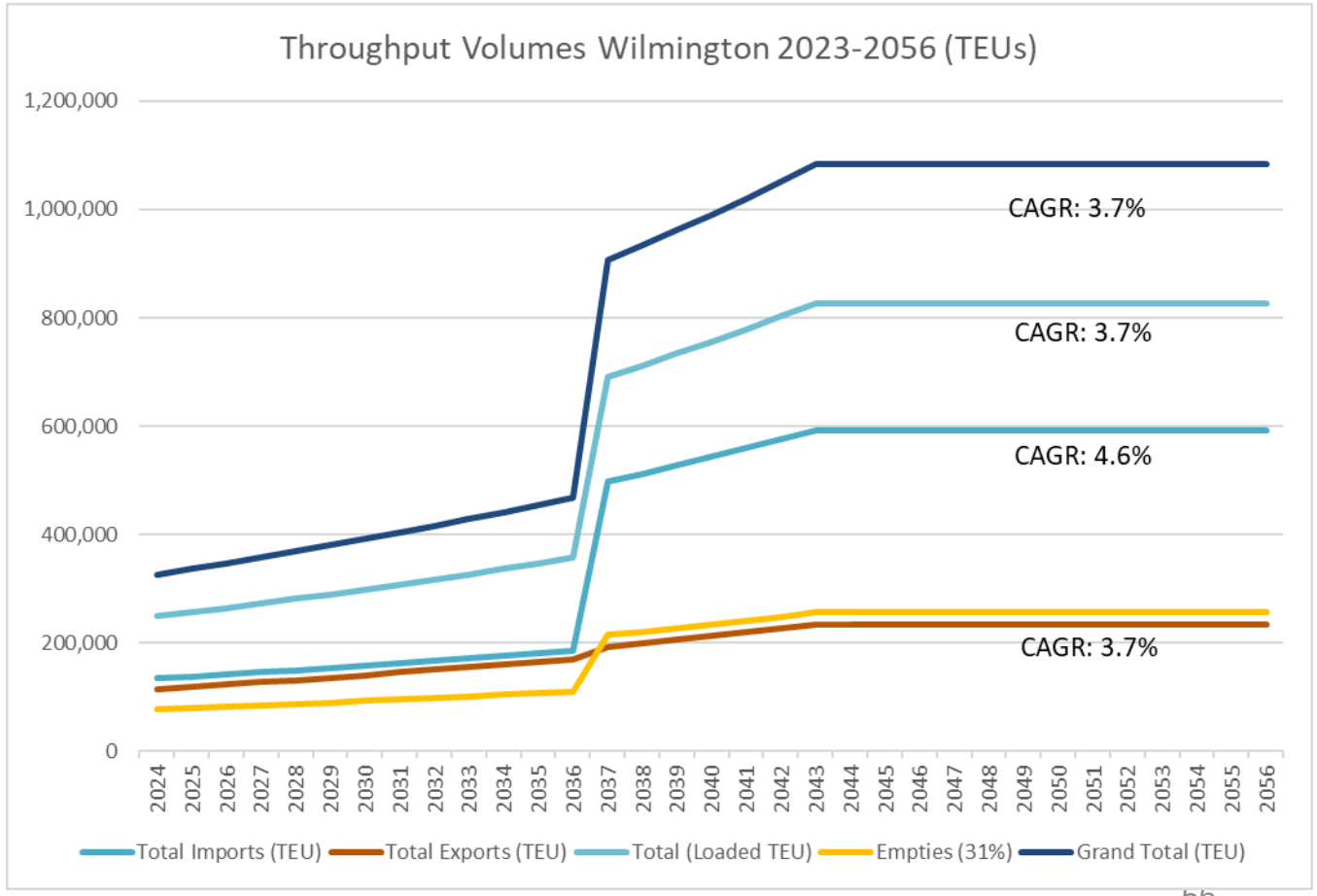
Not all commodities get forecasted

- Informs future conditions.
  - Shows that cargo volumes grow over time
  - Growth is independent of channel depth (42-foot project completed in 2012 & Twenty-foot equivalent unit (TEU) volume had already surpassed 275,000 TEUs at the time the last deepening was completed
- Steady growth mirrors economic growth of the NC region over that same time
- Dynamic cargo volume growth over time is the trend, even without a project



FORECAST APPLIED TO ALL ALTERNATIVES

- Total cargo throughput is expected to continue to increase in the future
- Total cargo throughput is anticipated to be the same with or without a project. The same volume of cargo will be moved more efficiently = NED Benefits
- The port will see an increase in vessel traffic to accommodate this increase in volume



REGIONAL ECONOMIC DEVELOPMENT

- Regional Economic Development measures changes in the distribution of regional economic activity that result from each alternative plan.

- Evaluations of regional effects are carried out using nationally consistent projections of:
  - Income
  - Employment
  - Output
  - Population

- Changes are due to effects of project construction and maintenance activities (Temporary).

- Typically, three categories of impacts:
  - Direct Effects (e.g. dredging industry)
  - Indirect Effects (e.g. spending by construction workers)
  - Induced Effects (e.g. spending changes by hotel and restaurant workers)

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Thank you for attending!

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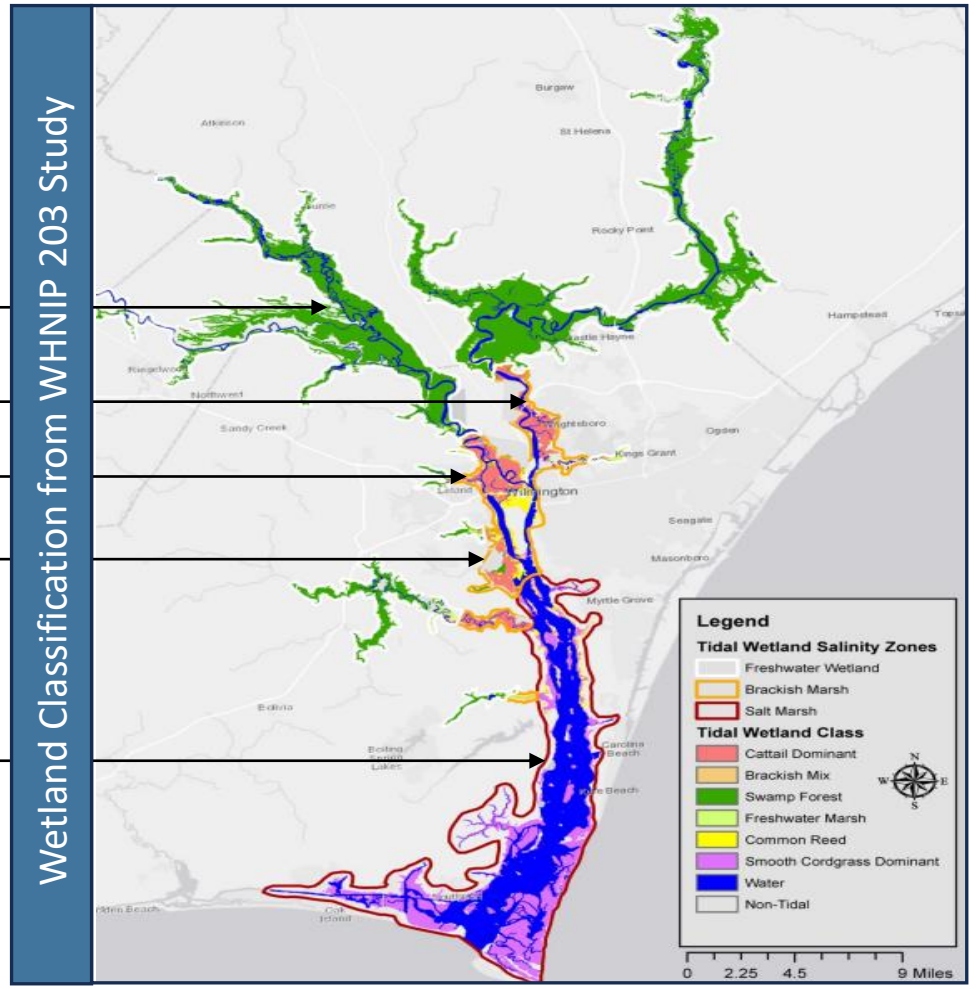
SESSION 2

Ecological Resources

WETLAND TYPES – SALINITY ZONES

SALINITY ZONES in the study area are based on landscape position along salinity gradients

- Northeast Cape Fear River **wetlands transition** from **brackish marsh to freshwater marsh/swamp forest** like Cape Fear River mainstem
- **I-140 Bridge marks transition** from brackish marsh to tidal freshwater marsh and swamp forest
- **Freshwater marsh** north of mouth of Northeast Cape Fear River begin to occur and are predominant at upper end of brackish reach
- Oligohaline (very low salinity: 0.5-5.0 ppt) **brackish marshes** exist along approximately 10 miles of river north of Barnards Creek
- **Single-species stands of salt marsh** dominate polyhaline (brackish: 18.0-30.0 ppt) & lower mesohaline (low salinity: 5.0-18.0 ppt) reaches of the Cape Fear River



WETLAND HABITATS

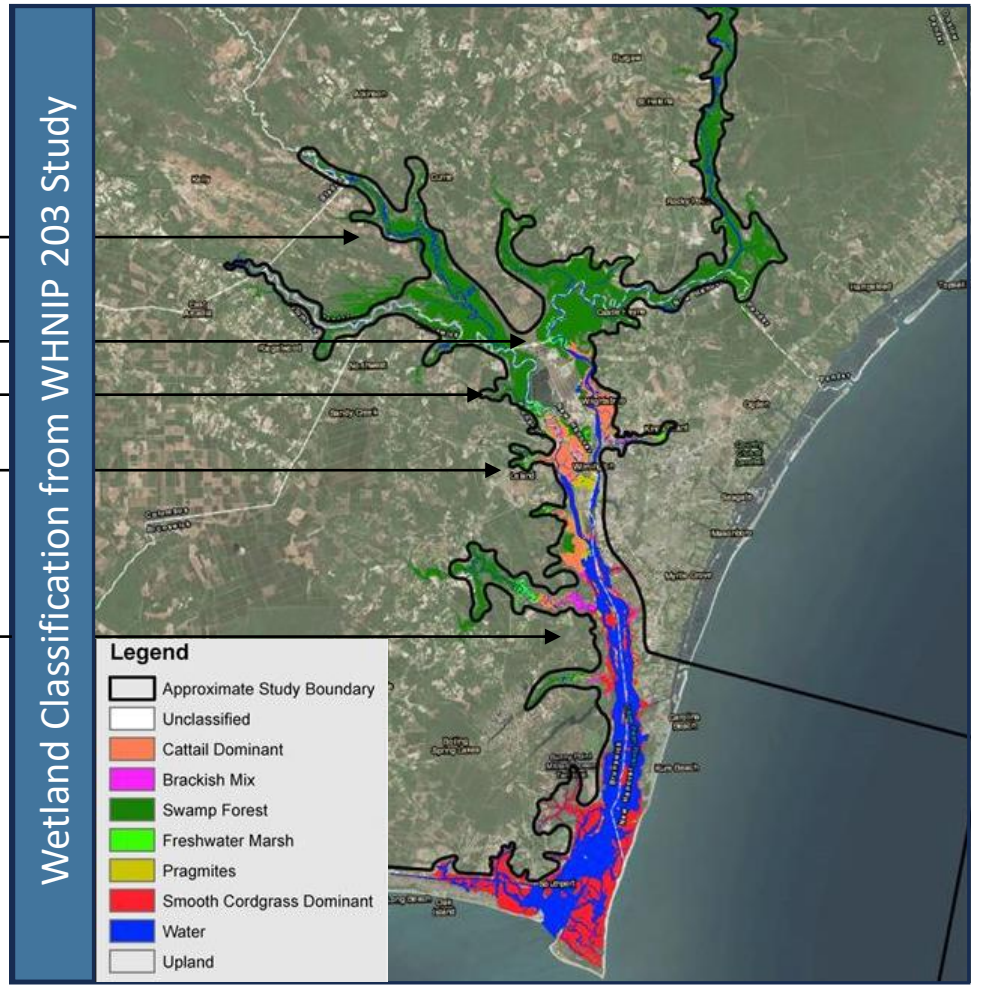
NORTHEAST CAPE FEAR RIVER WETLANDS.
Species include wild rice, arrowhead, pickerelweed, arrow arum, transitioning to sawgrass, three-square, sedges, salt marsh aster; tidal swamp forest includes bald cypress, water and swamp tupelo

I-140 BRIDGE.
Marsh species include those noted above, as well as, sawgrass, three-square, sedges, salt marsh aster; tidal swamp forest includes bald cypress, water and swamp tupelo

TIDAL FRESHWATER MARSH. (North of Northeast Cape Fear River)
Species include cattail, wild rice, arrowhead, pickerelweed, arrow arum

TIDAL BRACKISH MARSH. (above Barnards Creek)
Dominated by cattail w/ fringing smooth cordgrass along channel

TIDAL SALT MARSH. (~21 miles up to Barnards Creek)
Dominated by smooth cordgrass w/ narrow to no high marsh (black needlerush/saltmeadow cordgrass); common reed dominates high portions of marsh above tide line



POTENTIAL WETLAND IMPACTS

CONVERSION OF WETLAND TYPES due to the project may occur (i.e. marsh to open water, freshwater to brackish, brackish to saline, etc.)

DIRECT LOSS OF WETLANDS may occur from changes to hydrology and shoreline erosion

HYDROLOGIC AND SALINITY MODELS are being developed to assess project impacts on wetlands

CORPS WILL ASSESS the wetland functional loss related to the proposed action, and identify any necessary Compensatory Mitigation

UNIFORM MITIGATION ASSESSMENT METHOD

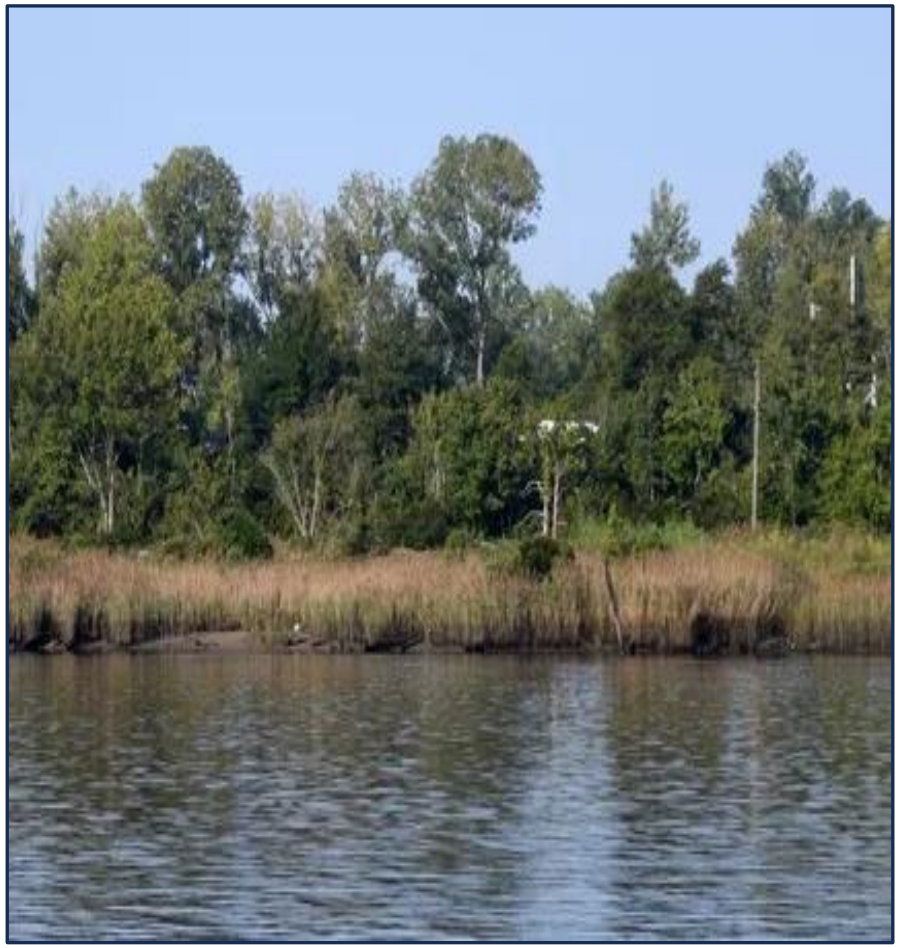
OVERVIEW

- Comprehensively assess affected areas:
  - Wetlands
  - Benthic habitat (SAV, hard bottom, shellfish)
  - Open water
- Rapid assessment approach
- Versatile/adaptable application
  - Assesses functional losses of wetland impacts & proposed mitigation
  - Detailed assessments using reference sites/wetlands
- Used to identify and assess appropriate mitigation for functional losses

UNIFORM MITIGATION ASSESSMENT METHOD

CAPABILITIES

- UMAM captures all relevant details of a wetland assessment area
- The function scores are overall scores of the assessment area
- Location and Landscape Support function includes listed species and general wildlife
- Water Environment function captures impacts due to increased salinity (i.e., hydrologic stress, vegetation changes, etc.)
- Assessment areas can be combined if reasonably similar and like the reference site
- Used to identify potential compensatory mitigation



ENDANGERED SPECIES/PROTECTED SPECIES

ENDANGERED SPECIES ACT (ESA) OVERVIEW

- Potential Effects to Species
- Protection of Critical Habitat

INTEGRATION OF ESA SECTION 7 CONSULTATION WITH NEPA:

- Biological Assessments (BA) will be prepared in coordination with National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS)
- BAs will be included as appendices to the draft EIS (DEIS)

POTENTIAL ROUTES TO EFFECT:

- Vessel strikes
- Hopper dredge entrainment
- Confined blasting
- Water quality impacts to habitat
- Substrate changes
- Obstacles to migration

CORPS WILL ALSO COORDINATE CONCURRENT WITH PREPARATION OF THE DEIS:

- Migratory Bird Treaty Act
- Magnuson-Stevens Fishery Conservation Management Act, Essential Fish Habitat
- Marine Mammal Protection Act
- Fish and Wildlife Coordination Act

	ESA SPECIES	STATUS	CRITICAL HABITAT
NMFS	Giant Manta Ray	Threatened	No
	Atlantic Sturgeon	Endangered	Yes
	Shortnose Sturgeon	Endangered	No
	Fin Whale	Endangered	No
	North Atlantic Right Whale	Endangered	Yes
	Sei Whale	Endangered	No
BOTH	Green Sea Turtle	Endangered	Proposed
	Hawksbill Sea Turtle	Endangered	No
	Kemp's Ridley Sea Turtle	Endangered	No
	Loggerhead Sea Turtle	Threatened	Yes
	Leatherback Sea Turtle	Endangered	No
USFWS	Piping plover (shorebird)	Threatened	No
	Rufa Red knot (shorebird)	Threatened	Proposed
	Roseate tern (water-dependent bird)	Endangered	No
	Eastern black rail (water-dependent bird)	Threatened	No
	West Indian manatee	Threatened	No
	Magnificent ramshorn (freshwater snail)	Endangered	Yes
	Atlantic pigtoe (freshwater mussel)	Endangered	No

AQUATIC HABITAT – DIRECT IMPACTS

DIRECT IMPACTS TO BENTHIC (river bottom) HABITAT.

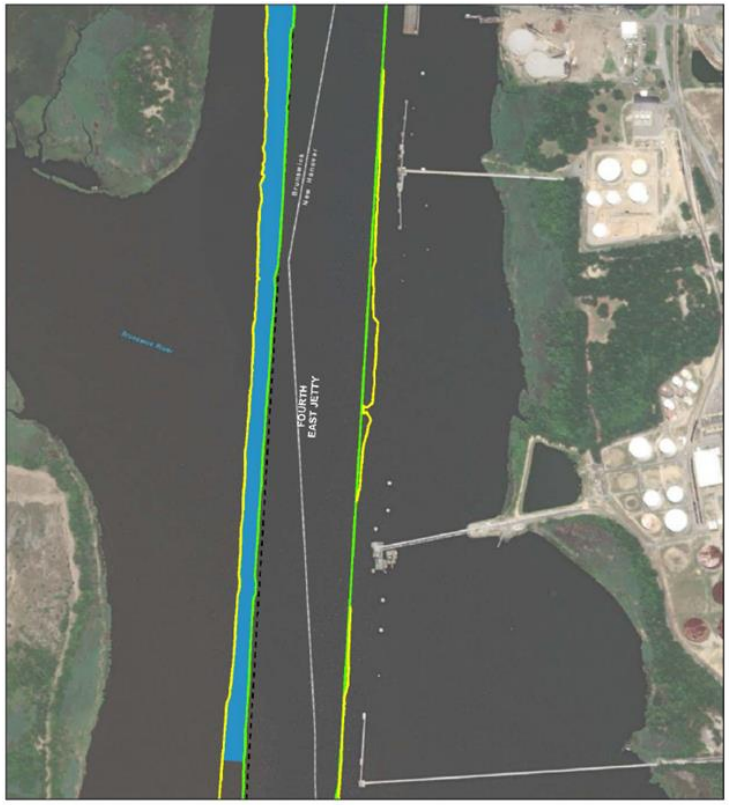
Estuarine soft bottom habitat may be directly impacted (deepened) by channel modifications

Potentially impacted areas will be identified via a GIS analysis of bathymetric (depth) data and project design. Functional loss of habitat due to increased depth in and around the channel will be evaluated in coordination with state and federal agency biologists.

Potential resources impacted include:

- Primary Nursery Areas
- Macroinvertebrate communities
  - Abundance and diversity
- Foraging habitat for nursery species
- Primary producer productivity
- Shallow habitat refuge from large predatory species

Example Identification Analysis from WHNIP 203 Study



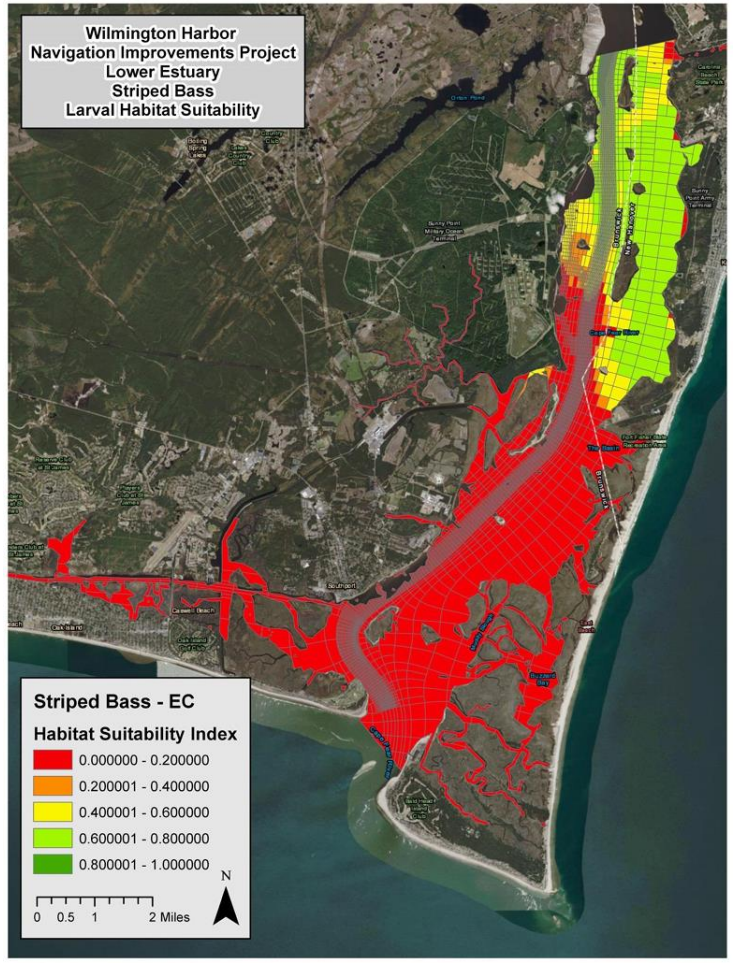
AQUATIC HABITAT – INDIRECT IMPACTS

HABITAT SUITABILITY INDEX (HSI) MODELS.

Identifies potential indirect impacts to fish and fish habitat associated with each alternative

- Indicator species selected:
  - Atlantic sturgeon
  - Blueback herring
  - Striped Bass
  - Southern flounder
  - Previous studies: redfish, white shrimp
  - Eastern oyster
  - American shad
  - Spot
- Example Model Inputs
  - Hydrodynamic model outputs: Temperature, dissolved oxygen, salinity
  - GIS datasets: Wetland presence, substrate, depth
  - Other data: zooplankton concentration, freshwater flows
- Different species models analyze different portions of the water column
- Conditions with and without the project can be compared to assess changes in habitat quality due to the project

Example HSI Analysis from WHNIP 203 Study



AQUATIC HABITAT – INVASIVE SPECIES RISK

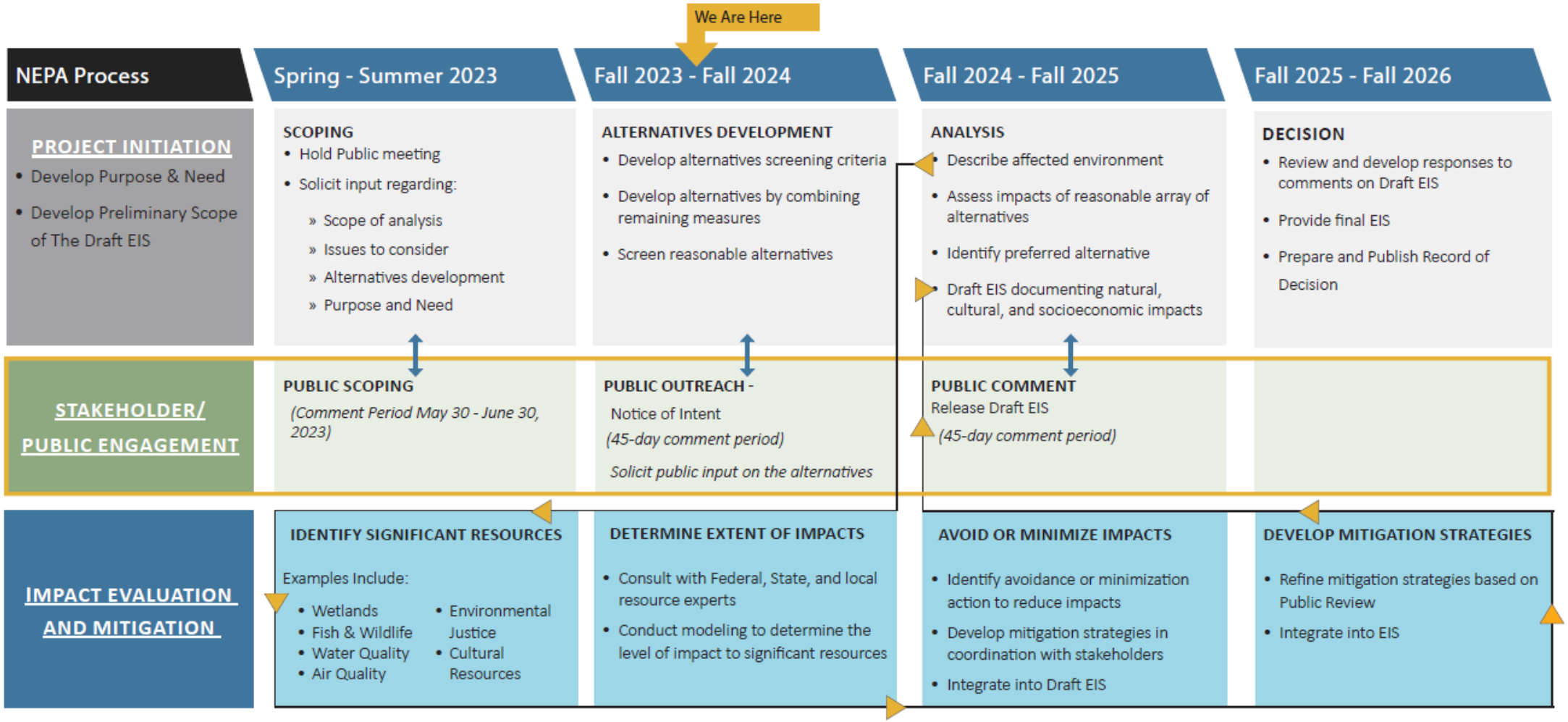
INVASIVE SPECIES RISK.

- Will be assessed using:
  - Shipping frequency
  - Shipping connectivity
  - Hull sizes
  - Ballast quantities
- Driven by economic forecasting
- Will be compared across alternatives

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

NEPA PROCESS & MITIGATION PLANNING



MITIGATION PLANNING PROCESS

Corps has responsibility under section 906 of the Water Resources Development Act (WRDA) of 1986, to mitigate for damages to ecological resources, including terrestrial and aquatic resources, and fish and wildlife losses that result from a water resources development projects

CORPS POLICY

- Mitigate for functional impacts/loss
- Habitat-based evaluation methodologies must meet Corps model certification and approval requirements
- Mitigation plans must include an incremental cost analysis.
- Compensatory to the effect
- Monitoring is required for all mitigation measures

Identify Significant Resources	Identify significant ecological resources that may be impacted by the proposed project
Evaluate Impacts	Assess the degree of the impact to affected resource and identify significant unavoidable effects.
Determine Mitigation Objectives	Determine mitigation objectives for the affected resources, objectives reflect the significant unavoidable effects
Identify Mitigation Strategies and Measures	Assess mitigation measures and strategies necessary to achieve the objectives and compensate for unavoidable habitat impacts
Formulate Mitigation Plan Alternatives	Screen mitigation measures and combine into mitigation plan atlernatives
Analyze Cost Effectiveness of Mitigation Alternatives	Conduct incremental cost analysis and cost effectiveness of mitigation plan alternatives.
Recommended Compensatory Mitigation Plan	Plan selection based on the mitigation alternative that provides full mitigation of losses and meets the mitigation objectives. Corps also evaluates tradeoffs and other selection factors. No other plan meets the mitigation objectives at a lower cost.
Monitoring and Adaptive Management Plan	Identify monitoring elements to increase knowledge of affected resources and evaluate the success of mitigation efforts to inform adaptative management

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SESSION 3

Physical Resources

GEOTECHNICAL INFORMATION

INTENT.

- Share the information we have to make our assumptions and decisions
  - Data being used and the products being developing from that data
  - Process/ Way Ahead
- Provide an overview of the history of the data collected
- Explain how geotechnical data is used to create dredged material types maps and Top of Rock Surface
- Potential for Blasting & the process for developing the Conceptual Blast Mitigation Plan

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

GEOTECHNICAL DATA COLLECTION

GEOTECHNICAL SAMPLING (1964-2023)

- **Purpose** – Collect samples to physically characterize dredged materials.
- 1,544 – Wash Probes, SPTs/Rock Borings, Vibracores
- **Wash Probe** - Uses high-pressure water in a casing to dislodge and bring up soil samples from the subsurface.
- **SPTs -** Uses a split-barrel sampler in a casing which is driven this into the ground using a drop hammer.
- **Rock Borings** – Involves drilling in solid rock using a rotary drill bit designed to break through hard rock formations.
- **Vibracores** – Uses a tube that is vibrated into the sediment.

REACH	WASH PROBES	SPTS/ROCK BORINGS	VIBRACORES
Anchorage Basin	248	76	6
Between Channel	14	5	4
Fourth East Jetty	50	23	3
Upper Brunswick	13	7	1
Lower Brunswick	10	17	1
Upper Big Island	8	50	1
Lower Big Island	5	15	1
Keg Island	9	13	10
Upper Lilliput	12	17	14
Lower Lilliput	10	27	1
Upper Midnight	4	18	3
Lower Midnight	3	11	1
Reaves Point	7	3	6
Horseshoe Shoal	0	3	11
Snows Marsh	22	8	11
Lower Swash	45	6	28
Battery Island	2	1	27
Southport	4	0	23
Baldhead Caswell	1	0	14
Smith Island	8	1	29
Baldhead Range 1	10	0	41
Baldhead Range 2	13	3	34
Baldhead Range 3	310	21	143
Baldhead Range 4	23	0	0
Total	831	325	413

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

GEOTECHNICAL & GEOPHYSICAL TIMELINE

Wilmington Harbor Deepening – 1964 -30 MLLW

- Borings – 25
- Wash Probes – 0
- Vibracores – 0
- Geotechnical data from 1964

Wilmington Harbor Deepening – 1993 -40 ft MLLW

- Borings – 193
- Wash Probes – 402
- Vibracores – 0
- Geotechnical data collected from 1987, 1989, 1990, 1991, 1992, 1993, 1994

Wilmington Harbor Deepening - 2000 -42/44 MLLW

- Borings – 259
- Wash Probes – 704
- Vibracores – 469
- Seismic Reflection Survey – 1994 and 1997
- Geotechnical data collected in 1998, 1999, 2000, 2002, and 2005

Wilmington Harbor Improvement Project - 2015

- Borings – 0
- Wash Probes – 318
- Vibracores – 95
- Geotechnical data collected in 2006, 2008, 2010, 2012, 2013, and 2015

Wilmington Harbor 203 - 2019

- Borings – 0
- Wash Probes – 0
- Vibracores – 0
- Seismic Reflection Survey - 2017

Wilmington Harbor 403- Present

- Borings – 0
- Wash Probes – 0
- Vibracores – 85
- Geotechnical data collected in 2023

WILMINGTON HARBOR GEOTECHNICAL AND GEOPHYSICAL DATA TIMELINE

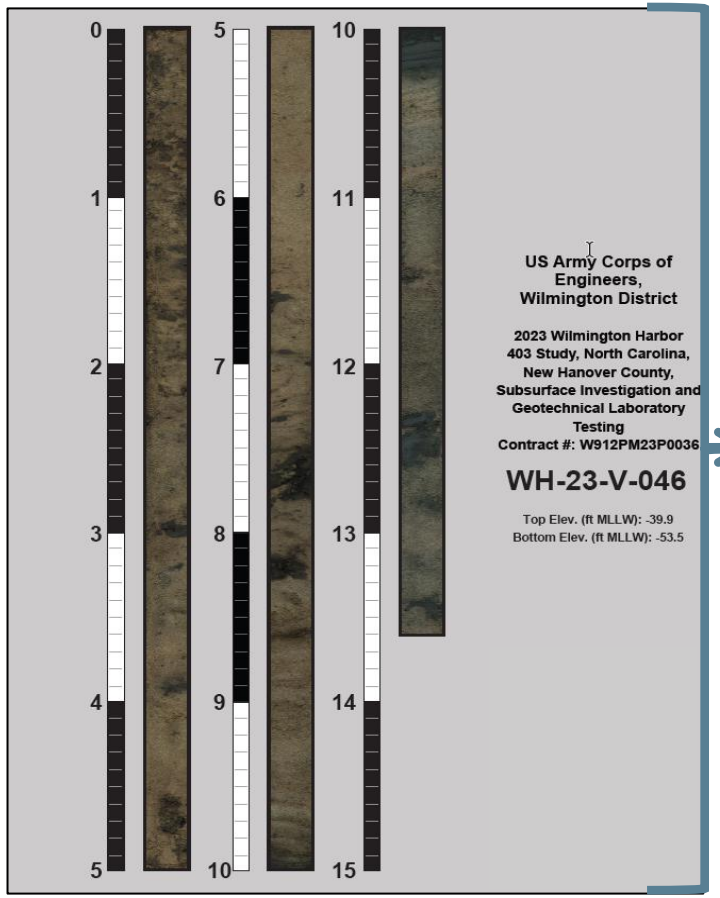
WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

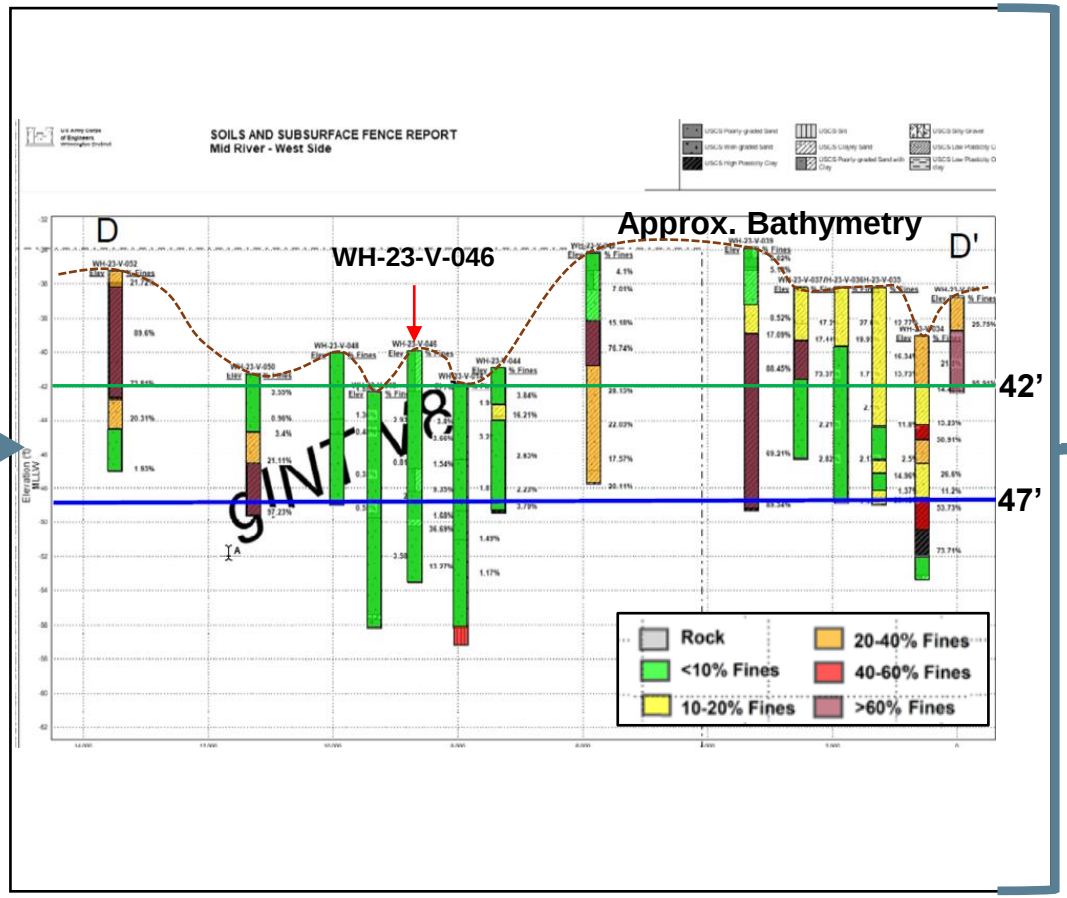
GEOTECHNICAL DATA PROCESS

DATA COLLECTION, ANALYSIS, & DEVELOPMENT OF DREDGED MATERIAL TYPE MAPPING.

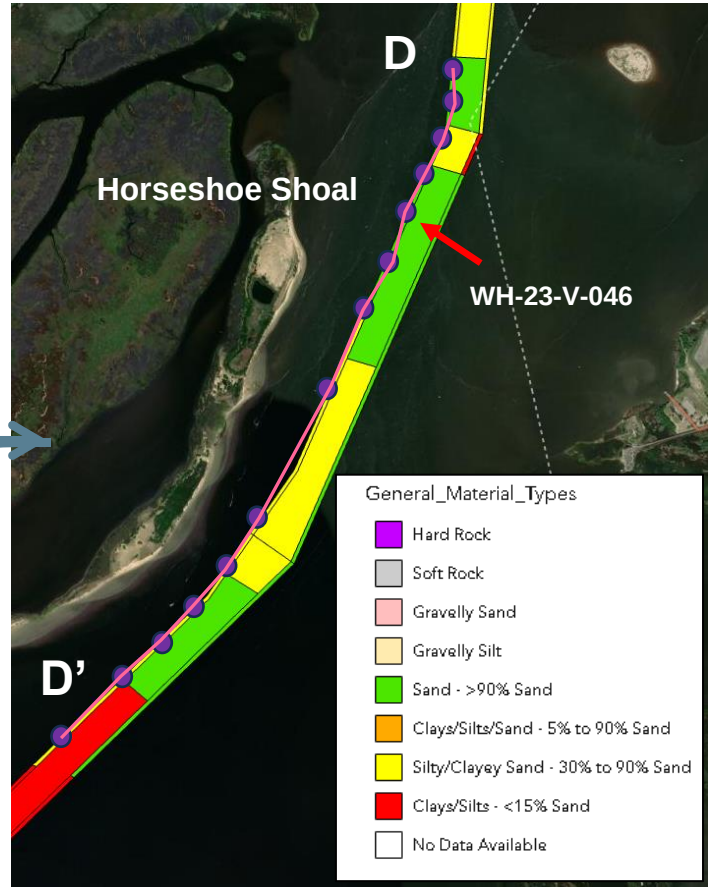
Vibracore Sample in Horseshoe Shoal Reach



Profile of Horseshoe Shoal Reach Depicts Subsurface Material Types



Dredged Material Types Generalized and Mapped



GEOTECHNICAL COMPOSITION

RESULTS OF THE INVESTIGATION.

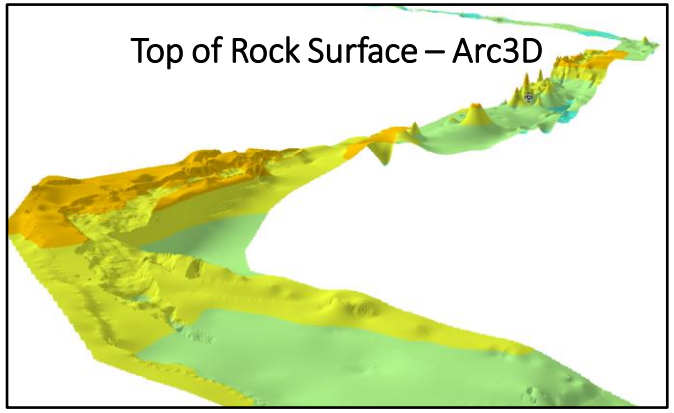
- Calculation of quantities for each reach broken out by dredged material type
- Evaluation of appropriate placement locations (i.e. beach placement, habitat restoration, or shoreline protection)
- Development of specific material extents within each specific reach
- Identify data gaps for future investigations

TOP OF ROCK SURFACE

DIFFERENTIATE CONSOLIDATED
(i.e. limestone, siltstone, cemented quartz sand)

VERSUS UNCONSOLIDATED SEDIMENTS
(i.e. gravel, sand, clay and silt)

- Assessment of hard rock and soft areas by evaluating previous strength and rock data



Rock Hardness Table – Identifies Dredging Method(s) (Hatheway, 1997)

ROCK HARDNESS	IDENTIFICATION CRITERIA	UNCONFINED COMPRESSIVE STRENGTH (PSI)	EXCAVATION PROPERTIES
Very Soft Rock	Material crumbles under firm blows with sharp end of geologic pick; can be peeled with a knife; too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure. Standard Penetration Test (SPT) will refuse.	250-440	Easy ripping
Soft Rock	Can be just scraped with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer.	440-1,500	Hard ripping
Hard Rock	Cannot be scraped with a knife; hand specimen can be broken by pick with a single firm blow; rock rings under hammer.	1,500-2,900	Very hard ripping
Very Hard Rock	Hand specimen breaks with pick after more than one blow; rock rings under hammer	2,900-10,000	Extremely hard ripping or blasting
Extremely Hard Rock	Specimen requires many blows with geological pic to break through intact material; rock rings under hammer	>10,000	Blasting

CONCEPTUAL BLAST PLAN

CONCEPTUAL BLAST PLAN.

- Blasting is a pre-treatment of “hard” rock to allow it to be removed.
- Reaches in which “hard” rock is present.
  - Previous reaches that were blasted for past deepening efforts.
  - Geotechnical data.
- Confined Underwater Blasting
- Controlled detonation method
- Stemming materials placed above explosives in borehole

Unconfined vs. Confined Blast.

The white water on top is the release of air within the fractured rock during an actual blasting event.

Unconfined Blast of 7 lbs

Confined Blast of 3,000 lbs

Miami Harbor Deepening, 2005 (Jordan-Sellers, 2012)

CONCEPTUAL BLAST MITIGATION PLAN

PURPOSE.

- Facilitate coordination under Marine Mammal Protection Act, Endangered Species Act, and Magnuson-Stevens Fisheries Conservation and Management Act.
- Facilitate coordination under Section 106 (Cultural & Historical Resources Protection)
- Develop guidance for coordination and required information for full development of the blast mitigation plan during the design and construction phase

OBJECTIVES.

- Evaluate potential effects to ecological, cultural, and historical resources related to blasting
- Provide mitigation recommendations, including physical and non-physical measures to minimize impacts based on biological considerations, as well as any other avoidance or minimization measures

SEDIMENT QUALITY TESTING

WHEN WILL SEDIMENT BE TESTED?

- Before dredging, during the Pre-Construction Engineering and Design (PED) phase

WHAT TYPE OF TESTS WILL TAKE PLACE?

Engineering. To determine the visual classification (USCS symbol) and grain sizes of unconsolidated sediments we will perform the following three tests:

- ASTM D6913, Particle-Size Distribution of Soils Using Sieve Analysis
- ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes
- Visual, volumetric percentage of shell and rock fragment determination.
- Additional tests as needed for consolidated sediments

Environmental. Testing requirements for compliance with Clean Water Act and other environmental laws will be coordinated with state and federal agencies, such as the North Carolina Department of Environmental Quality and U.S. Environmental Protection Agency.

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LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

GEOSPATIAL ANALYSIS

PUBLIC OUTREACH

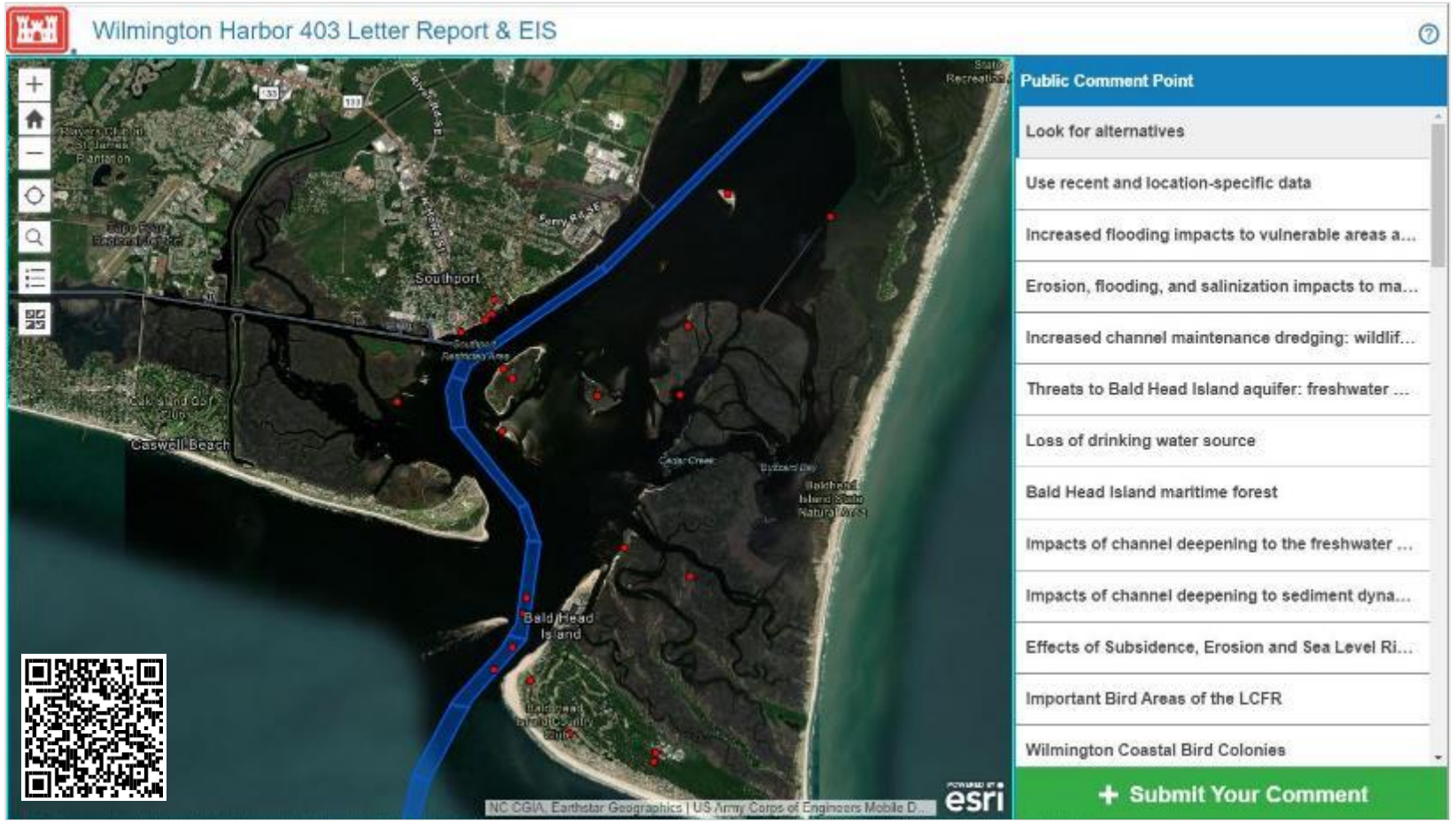
- ArcGIS Online Hub Site
- Public Comment Tool →

ENGINEERING SUPPORT

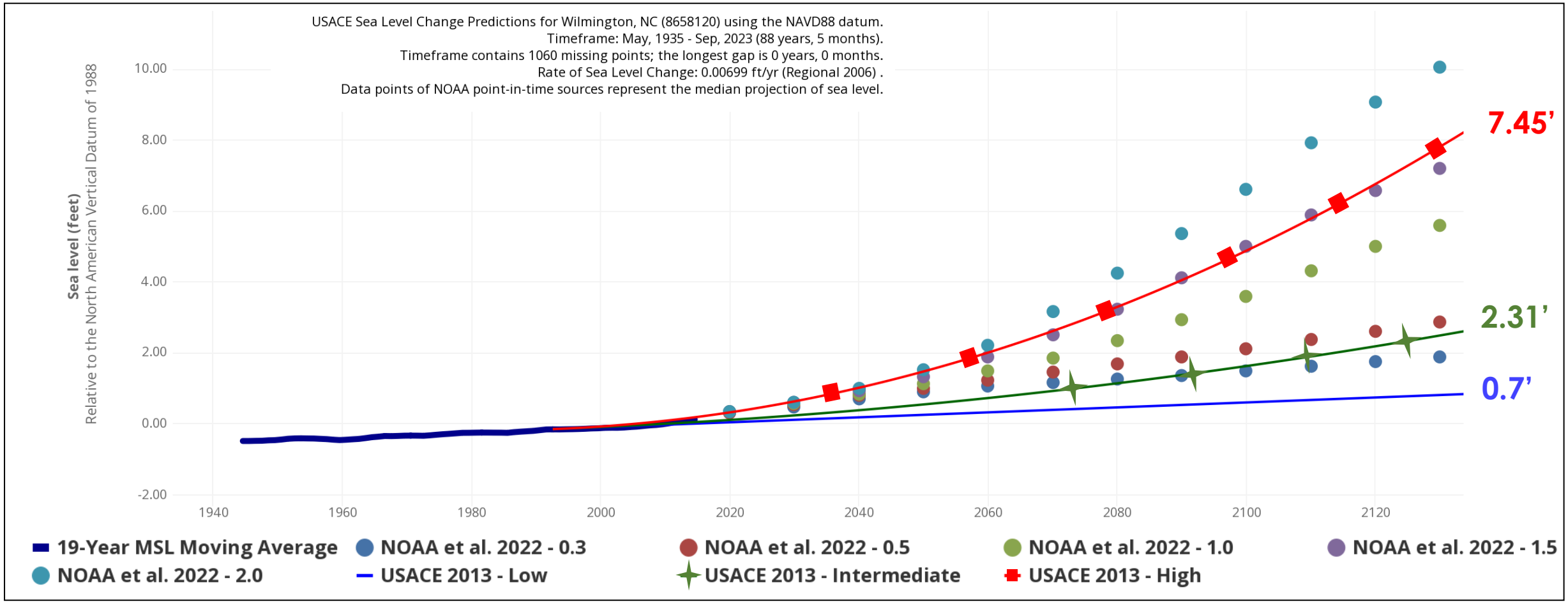
- Top of Rock Surface Model
- Dredge Material Quantities

ENVIRONMENTAL SUPPORT

- Habitat Suitability Index Modelling
- Wetlands Impacts
- Aquatic Resources Impacts
- Beneficial Use of Dredge Material Site Identification



SEA LEVEL CHANGE PROJECTIONS



COASTAL MODEL OVERVIEW

DELFT3D

Description:

- Integrated, open-source software suite for computing physics of coastal, estuarine, and riverine areas
- Multidimensional (2D/3D) curvilinear grid

Components:

- Hydrodynamics (flows)
- Sediment transport & morphology
- Wave transformation
- Water quality

Applications:

- Tide and wind-driven flows (storm surge)
- River flows, salt intrusion
- Sediment transport and morphology

GENCADE:

- 1D shoreline evolution model
- Computes change in shoreline and transport due to waves and currents

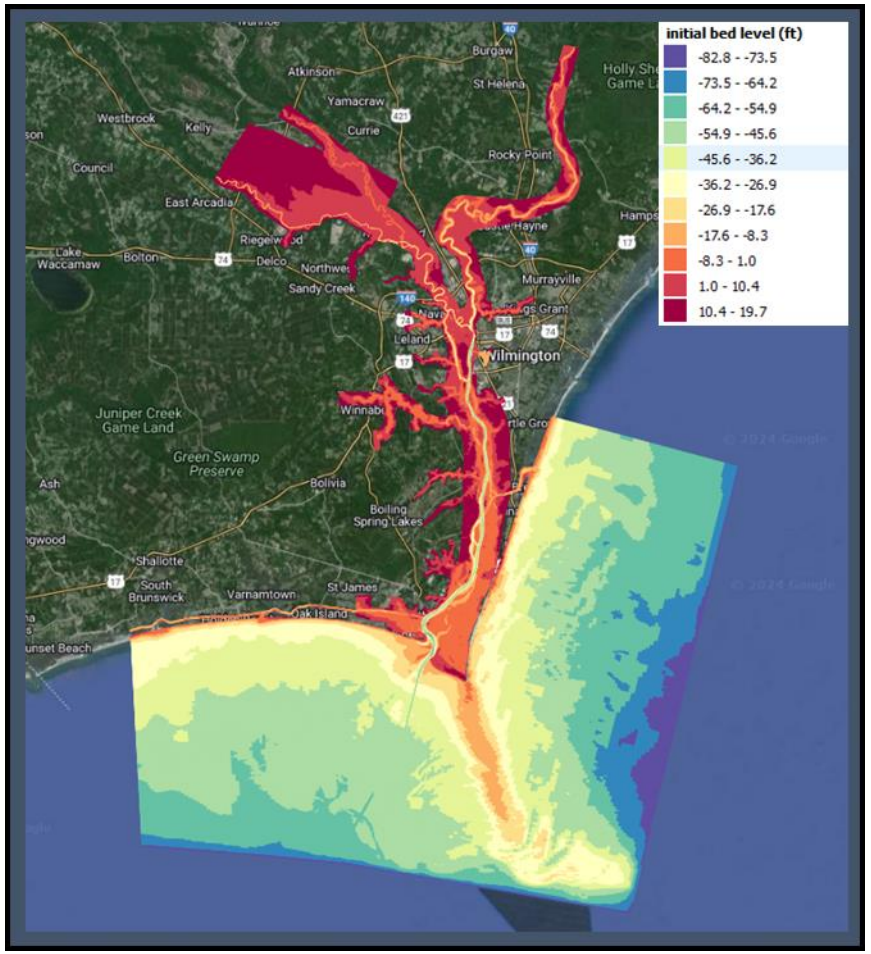
XBEACH:

- 2D vessel wake model
- Computes changes in sediment transport due to vessel passage, waves, and currents.

COASTAL MODEL OUTPUTS

DELFT 3D

- Compare changes to circulation, morphology
- Future without Project, Action Alternative 1 (47 ft Conditionally Authorized Depth), Action Alternative 2
- Temporal resolution 15 min (time series) to 1 hr (map output)
- Spatial resolution 5 m to 90 m, 16 vertical layers
- Varying inflow and SLC regimes, episodic (storm) events
- Tidal range impacts (tide datums, MHW, MLW, etc.)
- Hurricane velocities and storm surge
- Results in graphical form (2D maps, vertical profiles, time series)
- Results in tabulated form (tables and spreadsheets of parameters of interest)



HYDROLOGY - DEFINITIONS

STATISTICAL YEARS VS. MEASUREMENTS (1970 – 2022):

- Dry Year (25th Percentile)
- Typical Year (50th Percentile)
- Wet Year (75th Percentile)

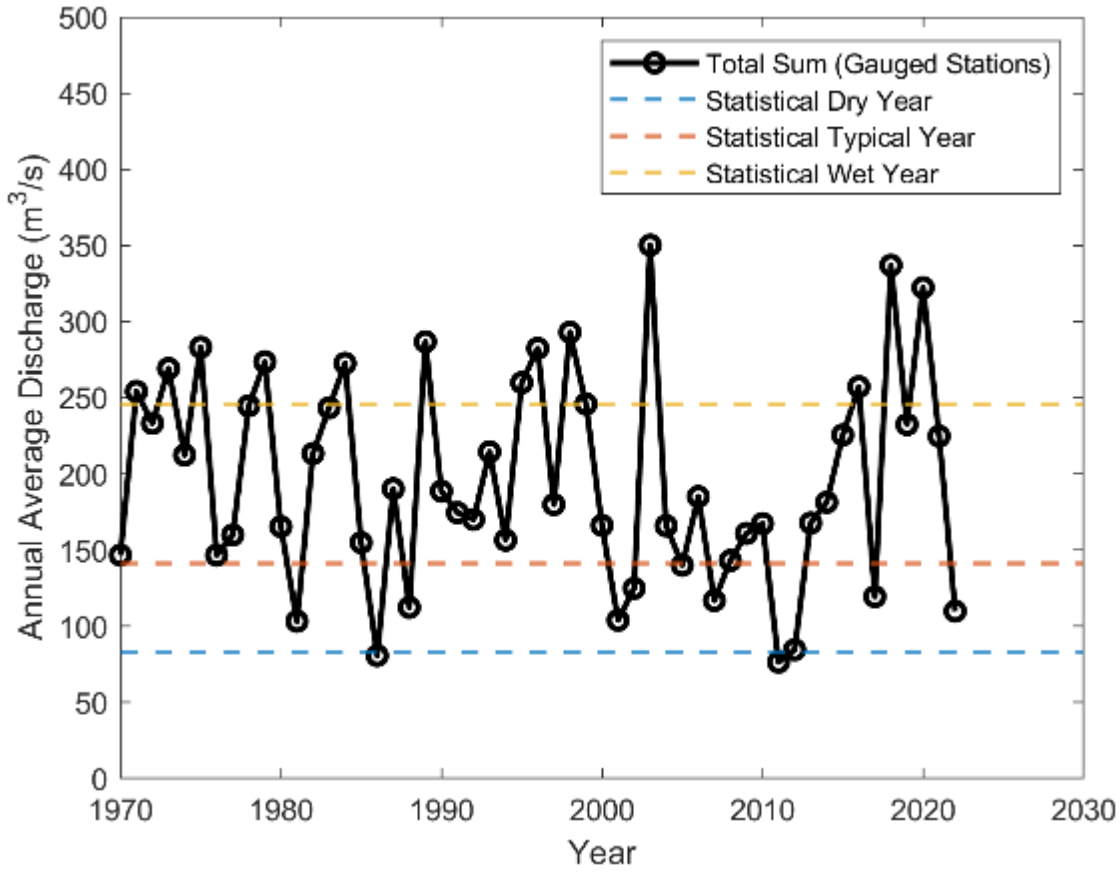
LOW, INTERMEDIATE, HIGH FLOW REGIMES WITHIN DRY, TYPICAL, AND WET HYDROLOGIC SCENARIOS

- Low – 25th percentile discharge
- Intermediate – 50th percentile discharge
- High – 75th percentile discharge

STORM RUNS

- Florence + low – Hurricane Florence storm surge hydrograph + low flow
- 100 yr + low – 100-yr storm surge hydrograph + low flow
- 500 yr + low – 500-yr storm surge hydrograph + low flow

HYDROLOGY



MODEL OUTPUTS - SEDIMENT TRANSPORT

Evaluate in-channel sediment movement

- Cumulative erosion and sedimentation (shoaling)
- Focus on anchorage basin sedimentation
- Include riverine suspended sediment supply
- Parameterize long-term conditions using varying hydrologic conditions and “morphological acceleration” factor in Delft3D

MODEL OUTPUTS – VESSEL WAKE (XBEACH)

XBeach model to evaluate vessel effects at shoreline areas

- Simulate expected future vessel impacts by parameterizing ship as moving wave source
- Phase-resolving wave model (individual wave crests and interactions)
- Compare future alternatives:
  - Wave conditions (height, period, direction)
  - Peak water levels
  - Bed shear stresses

WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

Model scenarios were selected to:

- Model average and "bookends" of conditions
- Average year, intermediate flows represents typical conditions
- Dry year, low flow scenarios and high year, wet flow scenarios provides the range of conditions, i.e. "bookends" type conversion

Running all four sea level rise scenarios:

- Provides temporal insight on conditions occurring between existing conditions and the forecasted conditions

Typical year, low flow scenarios will be run to identify wetland type conversion

Hydrodynamic, Sediment, and XBEACH | Required Hydrodynamic | X Proposed Water Quality Module Run (WQ, Habitat, Wetland Analysis)

Sea Level Change Projection	Hydrology	FLOW REGIME					
		Low (25%ile)	Int (50%ile)	High (75%ile)	Florence + low	100 yr + low	500 yr + low
No	Dry	X	X	X			
	Typical	X	X	X			
	Wet	X	X	X			
Low	Dry	X	X	X			
	Typical	X	X	X			
	Wet	X	X	X			
Intermediate	Dry	X	X	X			
	Typical	X	X	X			
	Wet	X	X	X			
High	Dry	X	X	X			
	Typical	X	X	X			
	Wet	X	X	X			

WATER QUALITY - MODEL OUTPUTS

- Compare changes to water quality parameters
- Future without Project, Action Alternative 1 (47 ft Conditionally Authorized Depth), Action Alternative 2
- **Temporal resolution daily to seasonal/annual**
- **Spatial resolution as high as 20 m, 10 vertical layers**
- **Salinity peaks and ranges (summer, winter, surface, bottom, etc.)**
- **Dissolved oxygen peaks and ranges**
- **Temperature**
- Results in graphical form (2D maps, vertical profiles, time series)
- Results in tabulated form (tables and spreadsheets of parameters of interest)

WATER QUALITY – CWA SEC 401 COMPLIANCE

CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION (WQC) COMPLIANCE.

- Section 401 of the CWA requires that any deposition of dredged or fill material into waters of the United States (WOTUS) comply with North Carolina water quality standards.
- A Section 401 WQC will be required for the project; issues to be addressed would include placement of dredged/fill material in WOTUS for beneficial use of dredged material, blasting, return water from an upland site, and potentially for changes to turbidity and dissolved oxygen.

TURBIDITY.

- Cloudiness or haziness of a fluid caused by large numbers of suspended individual particles.
- Turbidity would be generated by dredging associated with the project, as well as blasting and any placement of dredged material into WOTUS, although turbidity is expected to be temporary.

QUALITATIVE ASSESSMENT.

- Proposed channel deepening and widening in the project area may encounter rock and sediments.
- Sediments may range from fines (silts and clays) to sandy material (what you may see on a beach).
- Dredging and dredged material placement are expected to have only short-term impacts, meaning turbidity and associated environmental effects will be temporary.

GROUNDWATER

INTENT. Groundwater is an important resource and additional analysis is underway. A computer groundwater model will be used to predict impacts of the project.

MODEL DATA INPUTS.

- Topographic/Bathymetric Data; hydrogeologic layering
- Groundwater levels and salinity at monitoring wells (Delft 3D)
- Groundwater withdrawals
- Precipitation

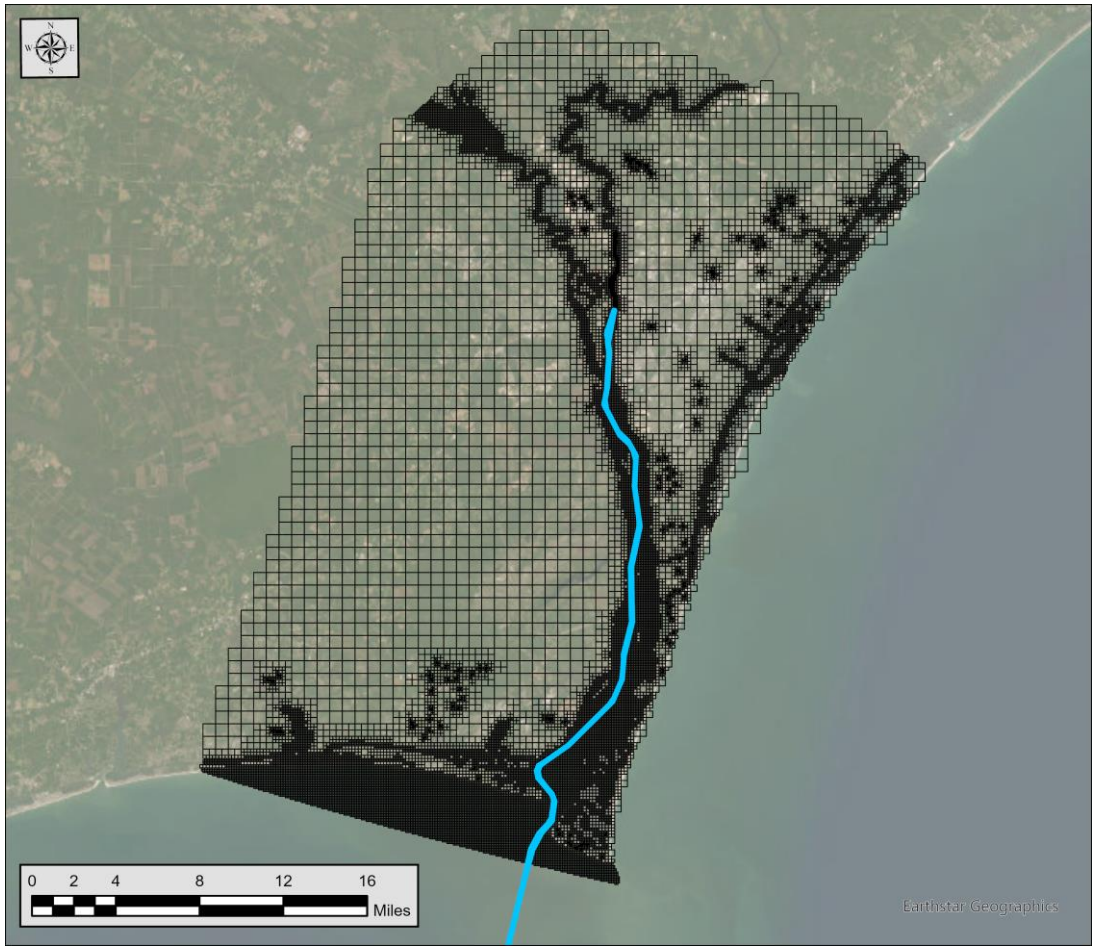
MODEL PREDICTIONS.

- Groundwater level changes due to project
- Groundwater flow direction changes due to project
- Saltwater intrusion into aquifers due to project

MODEL SCENARIOS.

- Using 3 sea level rise scenarios
- Using 2 future well withdrawal scenarios

Extent of the Groundwater Model and the grid mesh being used.



AIR QUALITY

GOAL. Understand impacts from air emissions and greenhouse gases (GHGs) from current operations and future conditions.

- Base operations – most recent year of data, 2023
- Future conditions – no changes, 46 ft channel depth, 47 ft channel depth

METHOD. Emissions from criteria pollutants, greenhouse gases, and hazardous air pollutants, as available, will be calculated as part of the analysis:

- Sources to be Included: Mobile sources – ocean-going vessels, harbor craft, cargo handling equipment, on-road vehicles, construction equipment, locomotives & Stationary sources from facilities located on port authority property.
- Geographical Domain: Marine boundary – transit area, maneuvering areas, hoteling area, anchorage zone; & Land-side boundary – intermodal terminals, staging areas, railyard, on-port roads
- Time Domain – 2023 base year emissions inventory and future emissions inventory based on forecasted future conditions.





U.S. ARMY

SESSION 4

Beneficial Use of Dredged Material

BENEFICIAL USE OF DREDGED MATERIALS - PLANNING

BENEFICIAL USE OF DREDGED MATERIAL VISION.

To the greatest extent practicable **maximize the beneficial use** of materials and **minimize removal from the system.**

INTENT.

Utilize lessons learned, Federal guidance/ directives and stakeholder involvement to match the available materials, location, and criteria for beneficial use opportunities.

OPPORTUNITIES.

Cultural Resource Protection

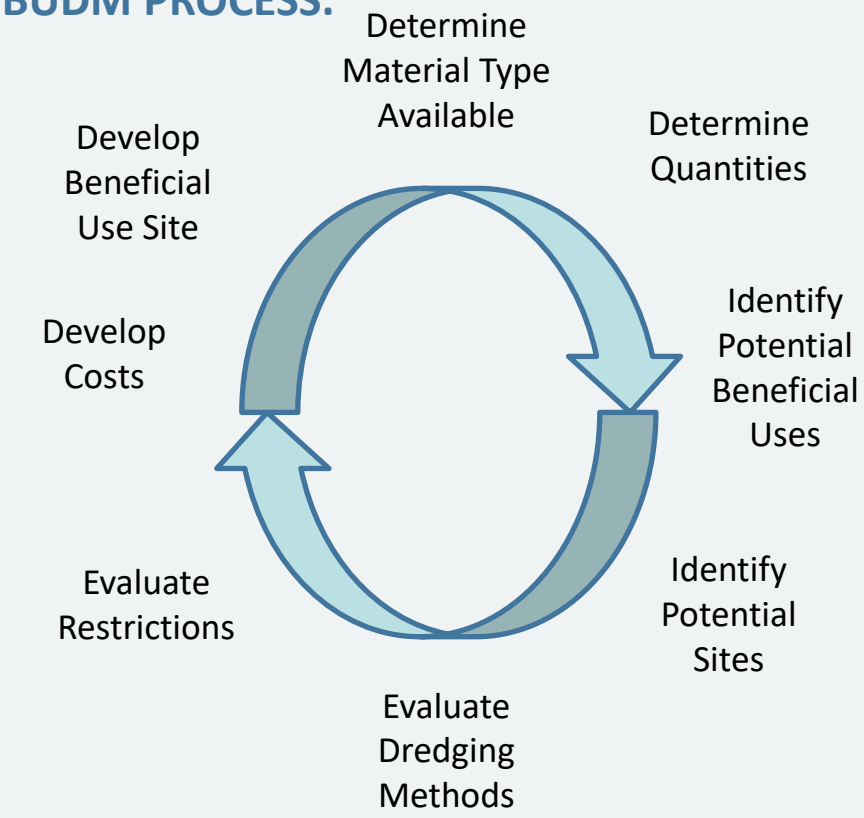
Shoreline Protection

Construction Materials

Wetlands Resiliency

Habitat Enhancement/Restoration

BUDM PROCESS.



BUDM OPPORTUNITIES: CULTURAL RESOURCES

CULTURAL RESOURCE PROTECTION.

Challenge: Shipwrecks and other archaeological artifacts may degrade, erode, or become strike-damaged if exposed to open water, compromising the physical integrity and cultural significance. In-situ preservation may include dredged materials.

Benefits: In-situ preservation may include dredged materials.

- Sandbag coverage (Coroneos, 2015)
- Reburial
- Site stabilization

Possible uses of dredged material:

Rock & Clays (stabilization)

Sand (sandbags and reburial)

https://www.diventures.com/blackbeards-ship-found-off-the-coast-of-north-carolina/

BUDM OPPORTUNITIES: SHORELINE PROTECTION

SHORELINE PROTECTION.

Challenge: Ship wake and storms may influence existing shoreline erosion through large wave action, wind, and rain.

Benefits: Increasing buffer zones and stabilizing embankments may reduce wave action and may significantly decrease shoreline damage from storms and large vessel wake.

Opportunities:

- Widen beaches
- Expand/ enhance natural areas (marshes, mudflats, islands, reefs, etc.)
- Add sediment (nearshore wave breaks, feeder berms, habitat creation/expansion, etc.)
- Add clay or rock revetments at water's edge to prevent softer soils from erosion

Possible uses of dredged material:

Rock (base of islands, material containment, shoreline lining, reefs)

Sand (beaches, bird islands, feeder berms)

Silts & **Not Quite Sand** (marshes, mudflats, feeder berms)

Clays (base of placement sites, breakwaters)

https://www.nccoast.org

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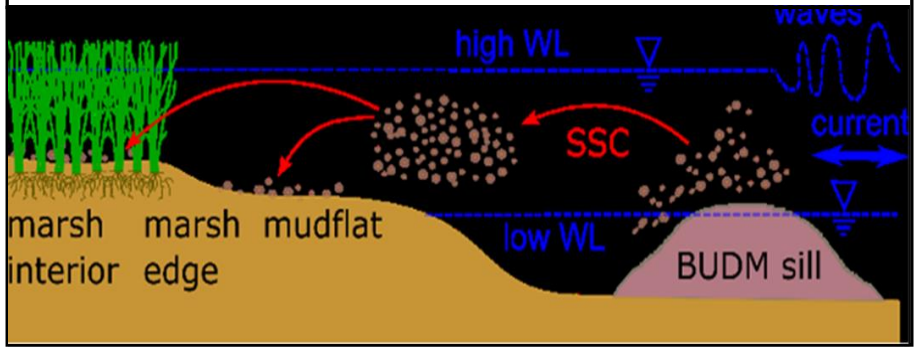


BUDM OPPORTUNITIES: WETLAND RESILIENCY

WETLAND RESILIENCY.

Challenges: Global climate change is contributing to sea level rise, drowning out low-lying habitat areas. Consequently, wetland area elevations may need to be raised for these habitats to survive into the coming decades.

Benefits: Adding sediment to these and surrounding low-lying areas may increase "elevation capital" to maintain and prepare the valuable ecosystems. This use would meet the conservation principles Resiliency, Representation, & Redundancy.

Opportunities:

- Thin- to thick-layer placement (depending on elevation)
- Restore & protect lost marsh habitats
- Create new areas for marshes to naturally develop
- Add buffer habitats such as mudflats

Possible uses of dredged material:

Rock (material containment, shoreline lining)

Silts & Not Quite Sand (marshes, mudflats, thick/thin-layer placement, feeder berms)

Clays (base of placement sites, feeder berms)

https://www.nccoast.org

BUDM OPPORTUNITIES: HABITAT RESTORATION

HABITAT ENHANCEMENT / RESTORATION.

Challenges: A variety of habitats associated with coastlines are depended upon by a diverse set of species, many of which are threatened or endangered.

Benefits: Restoring these habitats will help protect the shorelines during storms while serving other ecosystem functions (e.g., filter and increase water quality, serve as refugia, nesting and/or foraging grounds, sea life nurseries, reduce wave energy, expand species diversity, breakwaters, recreation, etc.).

Opportunities:

- Bird islands
- Oyster/artificial reefs
- Essential fish habitat (seagrass beds, shallows/mudflats, reefs, marshes, etc.)
- Marsh systems
- Intertidal mudflats
- Feeder berms (natural sediment dispersion)
- Upland habitat creation

Possible uses of dredged material:

Rock (base of islands, material containment, shoreline lining, reefs)

Sand (bird islands, feeder berms, deep scour holes)

Silts & Not Quite Sand (marshes, mudflats, feeder berms, seagrass beds, deep scour holes)

Clays (base of placement sites, feeder berms)

Shells (Oyster reefs, base of placement sites)

www.newsobserver.com

BUDM OPPORTUNITIES: CONSTRUCTION MATERIALS

CONSTRUCTION MATERIAL.

Challenges: Large quantities of sediments unsuitable for typical uses directly from the dredge (e.g., beach sand placement) are removed from the ecosystem and placed in upland containment sites or brought offshore.

Benefits: Dredged and dewatered sediment can be given away to be treated and used for a variety of building and construction materials and serve as the base of infrastructure.

Opportunities:

- Road construction
- Development fill/grading
- Foundations
- Landscaping
- Concrete, gravel, bricks, glass, etc.
- Park features (sandboxes, ponds, planting beds, etc.)
- Golf course shaping
- Borrow pit restoration
- Landfill capping
- Brownfield remediation
- Upland habitat/ Land creation
- Fertilizer
- Habitat restoration
- etc.

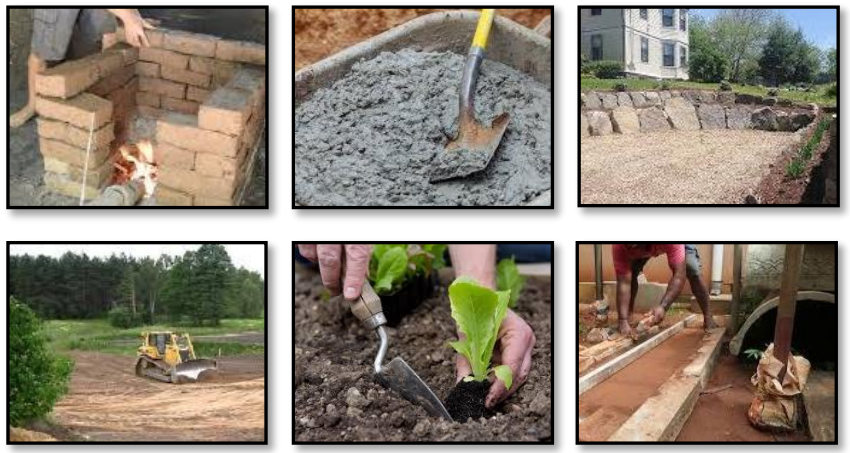
Possible sediment types for use:

Rock (upland features, driveways, fill)

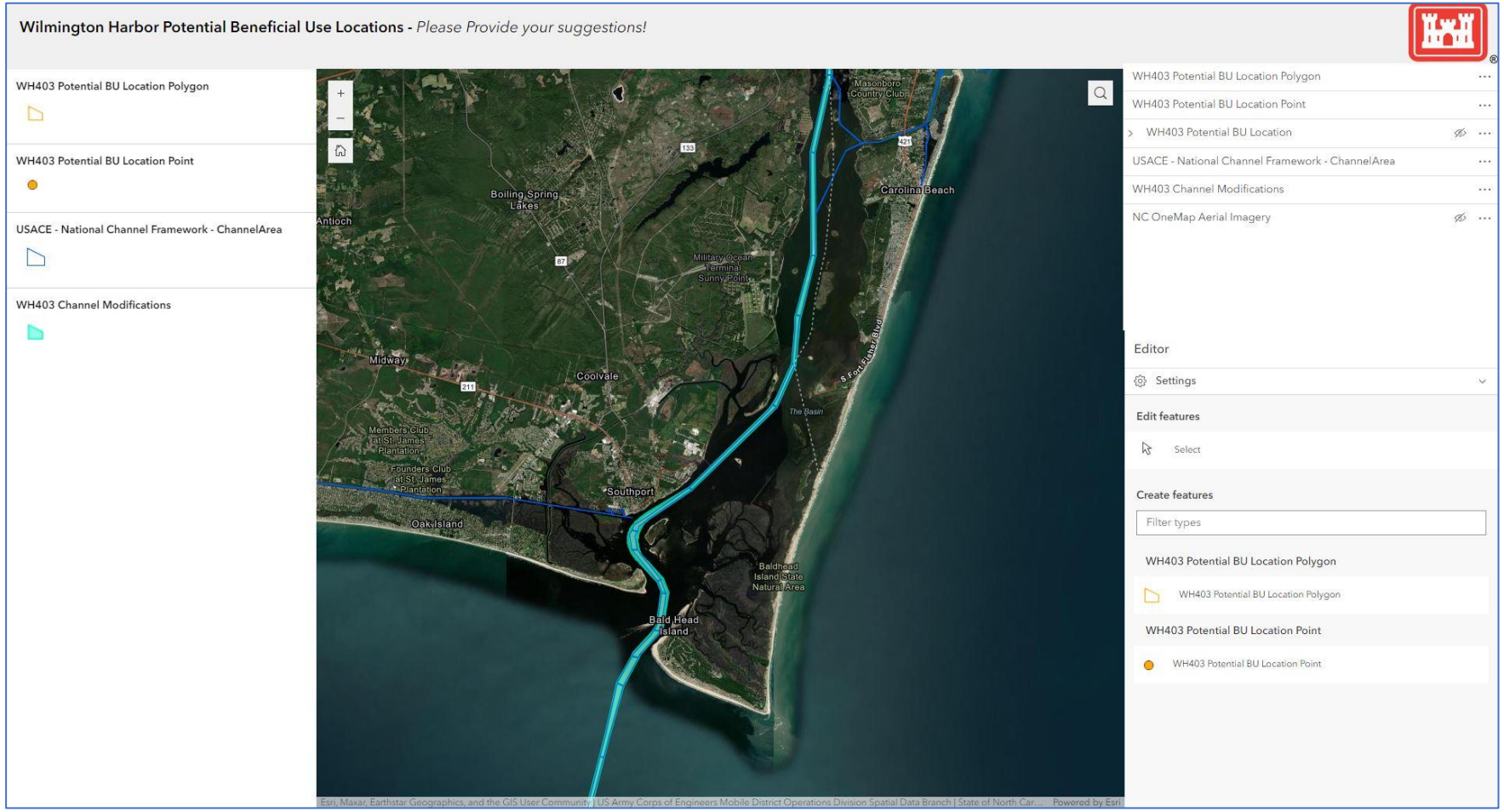
Sand (concrete, fill)

Silts & Not Quite Sand (fill, landscaping)

Clays (retention basins, upland features, bricks, concrete)



BENEFICIAL USE WORKSHOP TOOL



WILMINGTON HARBOR 403

LETTER REPORT & ENVIRONMENTAL IMPACT STATEMENT

Thank you for attending!

Scan the QR Code to access the Project Comment Tool

VIRTUAL PUBLIC MEETINGS.

DATE	MEETING CONTENT	MEETING TIME
June 4, 2024	**Session 1.** Plan Formulation, NEPA, Cultural Resources, Social Effects, & Economics	1:00-3:00 pm
June 5, 2024	**Session 2.** Ecological Resources *(Wetlands, Protected Species, Habitat)*	1:00-3:00 pm
June 6, 2024	**Session 3.** Physical Resources *(Design, Geotech, GW, Geospatial, Hydrology, SLC, & WQ)*	1:00-3:00 pm
June 7, 2024	**Session 4.** Beneficial Use of Dredged Materials	1:00-3:00 pm

IN-PERSON PUBLIC OPEN HOUSE MEETING.

DATE	LOCATION	MEETING TIME
June 13, 2024	Sunset Park Elementary School, 613 Alabama Avenue, Wilmington, NC 28401	3:00-7:00 pm

VIRTUAL PUBLIC MEETINGS.

DATE	MEETING CONTENT	MEETING TIME
June 24, 2024	**Session 1.** Plan Formulation, NEPA, Cultural Resources, Social Effects, & Economics	1:00-3:00 pm
June 26, 2024	**Session 2.** Ecological Resources *(Wetlands, Protected Species, Habitat)*	1:00-3:00 pm
June 27, 2024	**Session 3.** Physical Resources *(Design, Geotech, GW, Geospatial, Hydrology, SLC, & WQ)*	1:00-3:00 pm
June 28, 2024	**Session 4.** Beneficial Use of Dredged Materials	1:00-3:00 pm

Comment Period: June 7-July 22, 2024

E-Mail:

WilmingtonHarbor403@usace.army.mil

Mail:

US Army Corps of Engineers
Wilmington District
ATTN: Wilmington Harbor 403
69 Darlington Avenue
Wilmington, NC 28403

Online:

Online comments may be made through the Public Comment Tool

The Public Comment Tool can be found on the project website:

https://wilmington-harbor-us-ace-saw.hub.arcgis.com/