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# **Planning for Coastal Resiliency in the Northern Chesapeake Bay**

*Prepared for*

Harford County and APG-CSSC Joint Land Use Study Committee  
Office of Community & Economic Development  
2021 Pulaski Highway, Suite D  
Havre de Grace, Maryland 21078

*Prepared by*

EA Engineering, Science, and Technology Inc., PBC  
1311 Continental Drive, Suite K  
Abingdon, Maryland 21009

February 2019  
Version: FINAL  
EA Project No. 6334301

*“This study was prepared under contract with the Chesapeake Science and Security Corridor (part of the Harford County Office of Community & Economic Development), with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the collaboration and findings of the consultant, key JLUS partners involved in the development of this study, and does not necessarily reflect the views of the Office of Economic Adjustment.”*

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## LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
APG	Aberdeen Proving Ground
BMP	Best Management Practices
CSSC	Chesapeake Science and Security Corridor
CWTS	Constructed wetland treatment systems
DEM	Digital Elevation Model
DMCF	Dredged material containment facility
DNR	Department of Natural Resources
EPA	U.S. Environmental Protection Agency
ft	Foot (feet)
GIS	Geographic information system
GPS	Global positioning system
JLUS	Joint Land Use Study
LiDAR	Light detection and ranging
LSRWA	Lower Susquehanna River Watershed Assessment
MDE	Department of the Environment
MDOT	Maryland Department of Transportation
MFS	Major flood stage
MHHW	Mean higher high water
MLLW	Mean lower low water
mm/year	Millimeter(s) per year
MPA	Maryland Port Administration
NAVD88	North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
QA	Quality assurance
QC	Quality control
RDTE	Research, Development, Test, and Evaluation
SAV	Submerged aquatic vegetation
SDSFIE	Spatial Data Standards for Facilities, Infrastructure, and Environment
SLR	Sea level rise

SSPRA	Sensitive species project review area
TLP	Thin layer placement
TMDL	Total maximum daily load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
WGS	World Geodetic System
WWTP	Wastewater Treatment Plant

## GLOSSARY

***Accommodate (Resilience strategy)***—General strategy to alter or adapt existing structures, infrastructure or natural areas. Also includes development of new infrastructure that decreases the risks and increases the resiliency of developed areas to sea level alterations and storm surge

***Barrier island***—island in proximity to mainland that serves to decrease erosion of the mainland

***Beaches***—shore of a body of water

***Breakwaters***—detached or nearshore structures built parallel to the shore and seaward of the shoreline in shallow water

***Constructed wetland treatment systems***—wetlands designed to promote biogeochemical processes to transfer and transform contaminants

***Critical vulnerabilities***—areas and infrastructure that are predicted to be impacted from one of the sea level rise scenarios

***Dune***—hill made of sand or other loose sediment that is parallel to the shoreline and inland from the beach

***Floodproofing and impact reduction***—alterations to structures to make them better able to withstand flooding or submersion

***Flooded***—term used to describe areas and infrastructure that are temporarily impacted by water levels due to major flood stage

***Groins***—narrow structures, usually positioned perpendicular to the shoreline, that function to stabilize an area against erosion due to a net longshore loss of material

***High Scenario***—2050 and 2100 predictions using the increase in sea levels from the upper 1% probability for relative sea level rise from Boesch et al. (2018)

***Impacted***—general term for areas and infrastructure that are flooded due to sea level rise and major flood stage

***Land restoration***—constructing made-land in the footprint of historical coastal or island areas lost to erosion over time

***Levees***—onshore barriers with the principal function of protecting lower elevation areas against flooding

***Major Flood Stage (MFS)***—flooding from storm events. Identified from 2019 major flood stage for each county

***Managed Retreat (Resilience strategy)***—relocation of existing structures and infrastructure or natural features; limits the construction of new infrastructure within a specific area anticipated to be impacted by sea level rise or storm surge in the future

***Mid Scenario***—2050 and 2100 predictions using the increase in sea levels from the central estimate for relative sea level rise from Boesch et al. (2018)

***Nature-based resilience measure***—Engineered structures that have the same physical, biological, geological and chemical processes as those that occur in nature

***Non-structural resilience measures***—includes strategies to decrease risks from sea level rise and storm events that excludes construction of new structures

***Nuisance flooding***—impacts to low lying infrastructure, such as roads, caused by extra high tides without impact from weather

***Oyster reefs***—dense oyster colonies

***Performance factors***—design criteria that are site specific and need to be considered for the successful performance of the selected resilience measure

***Predicted Elevation***—height calculated from the summation of combinations of mean higher high water, sea level rise and major flood stage

***Protect Area***—Aberdeen Proving Ground (Aberdeen Area; Edgewood Area Churchville Test Area; Spesutie Island; Graces Quarters; Carroll Island; range areas including portions of the Chesapeake Bay, Bush and Gunpowder Rivers) and the surrounding counties of Harford (City of Aberdeen and City of Havre de Grace [(Havre de Grace)], Cecil, and Kent

***Protect (Resilience strategy)***—General strategy to defend an area from impacts from sea level rise and storm events

***Relative Sea Level Rise (SLR)***—Increase in water levels within the study area (i.e., Aberdeen Proving Ground, Harford County, Cecil County and Kent County) from climate change

***Relocation***—movement of populations and infrastructure from areas that are impacted by sea level rise and storm surge

***Resilience measures***—Specific subcategories of resiliency strategies of managed retreat, accommodate and protect

***Resilience strategy***—Overarching strategy of managed retreat, accommodate and protect

***Revetment***—onshore structures commonly made of armor-rock that protect shorelines from erosion

***Salt marsh***—wetlands that are flooded by salt water

***Sea level scenarios***—increases in water level from combinations of relative sea level rise and major flood stage

***Seagrass beds***—dense populations of submerged aquatic vegetation that grow in shallow beds

***Seawalls***—structures built onshore parallel to the shoreline with the objective of reducing overtopping and flooding of land and infrastructure behind due to storm surge and waves

***Sediment management strategies***—decisions surrounding the disposition of dredged material or sediment in an area

***Storm surge barriers***—flood gates that can be closed to mitigate risks from storm surges

***Structural resilience measures***—physical structures that are engineered such as levees, storm surge barriers, seawalls

***Threshold***—a parameter or parameters that are measured to indicate if/when the next step of a management plan needs to be initiated

***Water level increase***—indicates the general positive change in water levels and is a function of sea level rise and major flood stage