

Kent County Climate Change & Sea Level Rise Vulnerability Study

2016 MAFSM Conference

October 20, 2016

Brian Ambrette



Partners

- ▶ Kent County Department of Planning, Housing, and Zoning
- ▶ Kent County Office of Emergency Services
- ▶ Maryland Department of Natural Resources
- ▶ Eastern Shore Land Conservancy, Coastal Resilience Program
- ▶ Maryland Sea Grant Extension
- ▶ North Carolina Sea Grant
- ▶ South Carolina Sea Grant Consortium
- ▶ Carolinas Integrated Sciences & Assessments



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Project Goals

Goal 1 – **Identify** the natural hazards that will be exacerbated by climate change and sea level rise and **understand** how those impacts will affect the residents, economy, and natural resources of Kent County.

Goal 2 – **Engage stakeholders** in dialogue about natural hazards, the effects of climate change, and potential actions for mitigation or adaptation.

Goal 3 – **Communicate** the study's findings and recommendations to the public.

Goal 4 – **Train a team** in Maryland on the "VCAPS" method for assessing vulnerabilities.

Timeline

<u>Oct/Nov 2015</u>	Grant awarded, project kickoff, training
<u>January 2016</u>	Two dozen interviews
<u>February</u>	“VCAPS” workshops
<u>Spring/Summer</u>	Report & recommendation drafts
<u>August</u>	Public information session
<u>September</u>	Final report to Commissioners

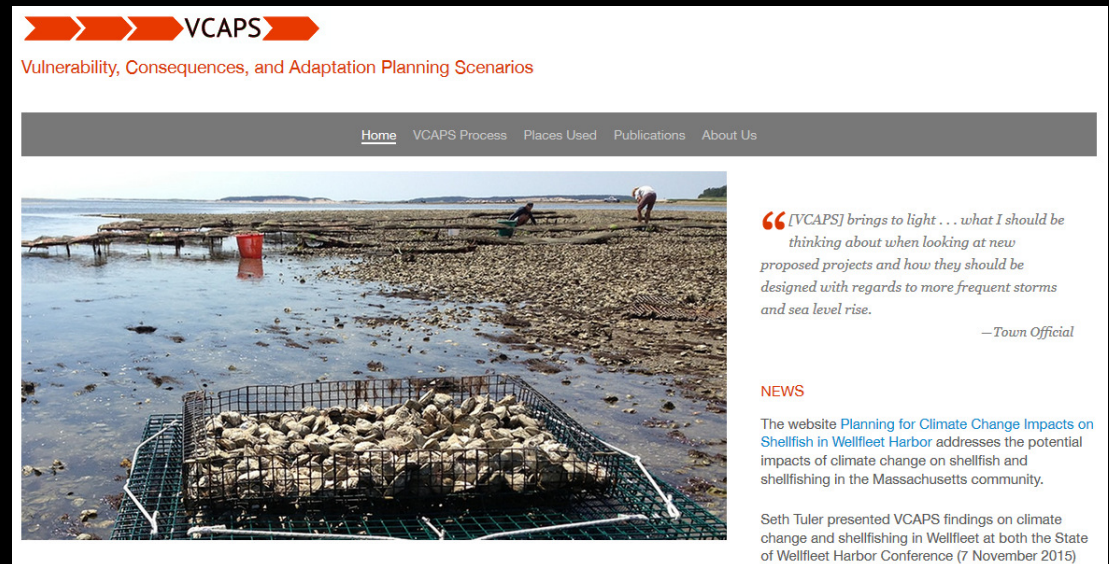


The VCAPS Process

Vulnerability, Consequences, and Adaptation Planning Scenarios

Benefits

- ▶ A participatory process
- ▶ Uncovers data needs, responsibility gaps, and planning requirements
- ▶ Strengthens collaboration across departments
- ▶ Improves public awareness and participation



The screenshot shows the VCAPS website interface. At the top, there is a logo with three orange chevrons pointing right, followed by the text "VCAPS" in a bold, sans-serif font. Below the logo, the full name "Vulnerability, Consequences, and Adaptation Planning Scenarios" is written in a smaller font. A navigation bar contains links for "Home", "VCAPS Process", "Places Used", "Publications", and "About Us". The main content area features a photograph of a coastal area with a shellfish trap in the foreground and a person in the background. To the right of the photo is a quote: "VCAPS brings to light . . . what I should be thinking about when looking at new proposed projects and how they should be designed with regards to more frequent storms and sea level rise." attributed to a "Town Official". Below the quote is a "NEWS" section with a link to "Planning for Climate Change Impacts on Shellfish in Wellfleet Harbor" and a brief description of the website's content. At the bottom of the screenshot, the website URL "www.vcapsforplanning.org" is displayed.

www.vcapsforplanning.org



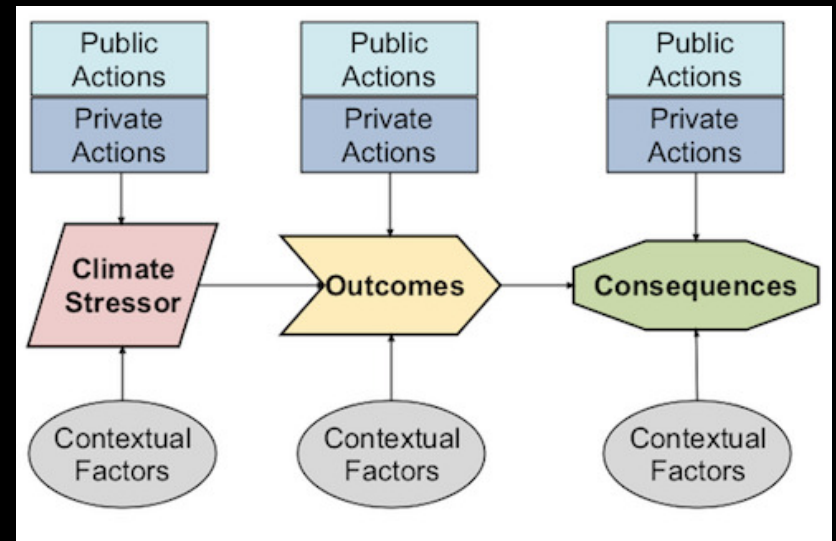
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The VCAPS Workshops

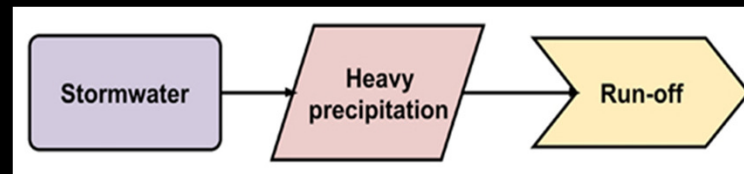
How it works

- ▶ A facilitated conversation
- ▶ Aided by real-time “conversation mapping”
- ▶ Produces cause-and-effect linkages between natural hazards and community impacts
- ▶ Integrates science with local context and experiences

Causal diagramming



Causal Diagramming



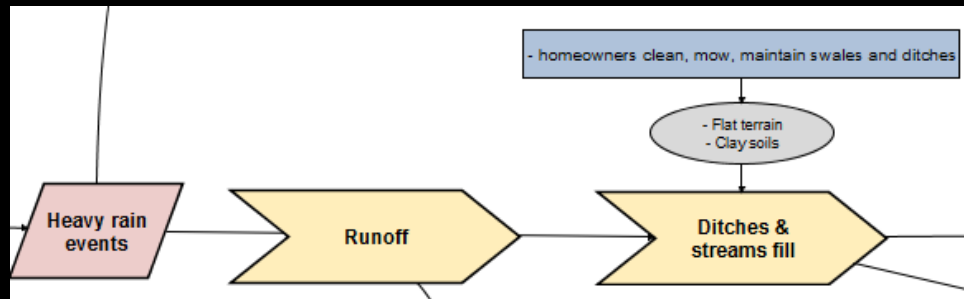
Management
concern

Natural/
climate
stressor

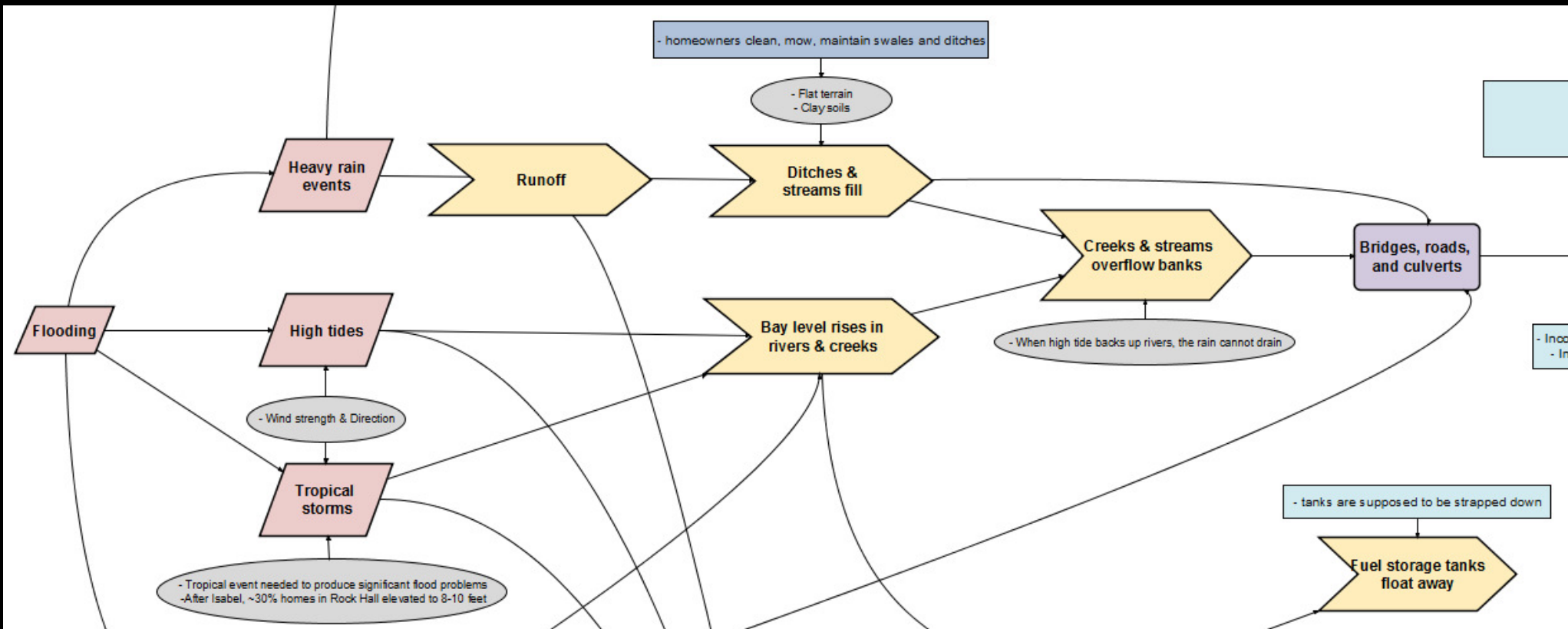
Outcomes
& impacts

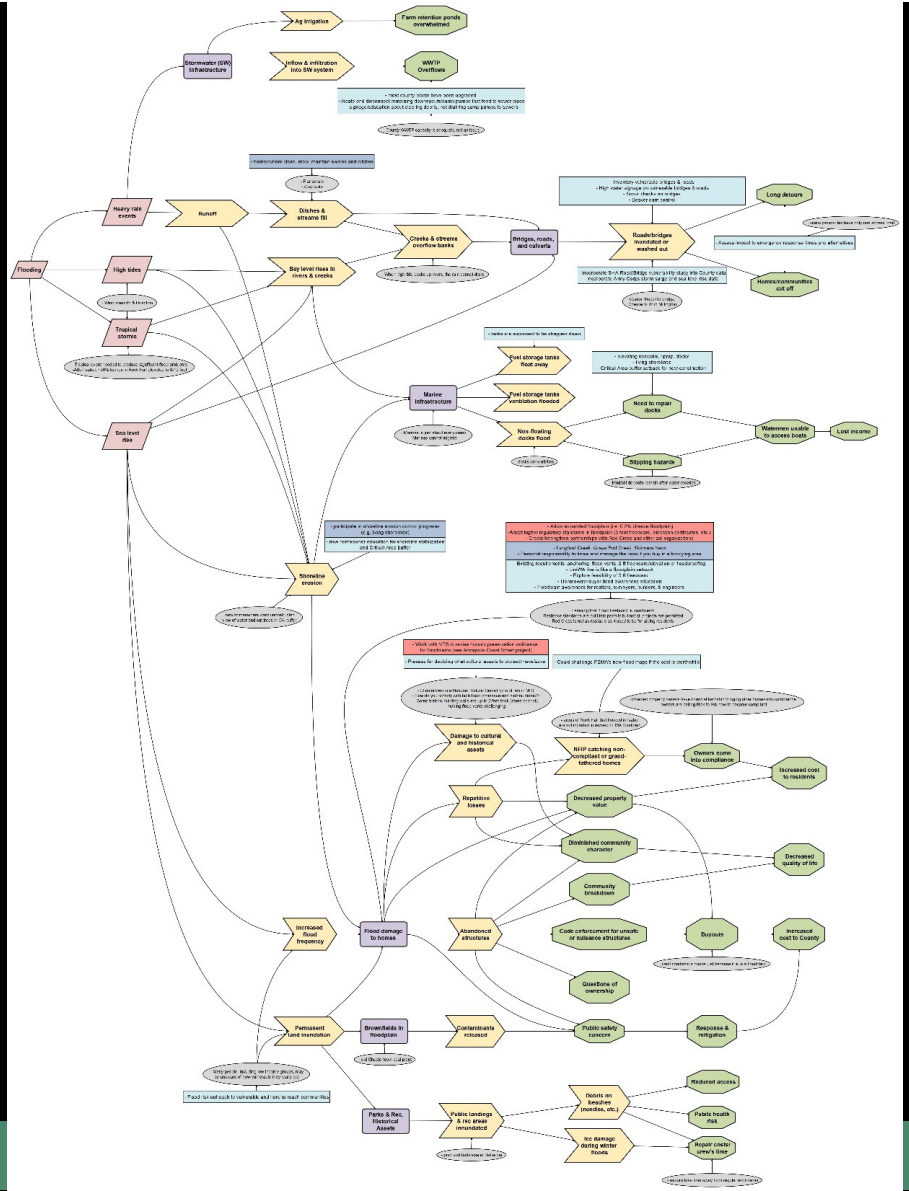


The VCAPS Process



The VCAPS Process





Recommendations

- ▶ Cooperation & Collaboration
 - ▶ Community Resilience
 - ▶ Education, Information, and Outreach
 - ▶ Emergency Management
 - ▶ Infrastructure & Maintenance
 - ▶ Planning & Decision-making
 - ▶ Land Use & Land Management
 - ▶ Research & Data
- ▶ 8 categories
 - ▶ 21 recommendations
 - ▶ 48 actions recommended by stakeholders
 - ▶ 17 additional actions



Voices from Kent County

- ▶ *“The 2 to 4 inch rainstorms are more common.”*
- ▶ *“It seems like all we have now is 100-year events.”*
- ▶ *“The 100-year event is much more frequent and unrelated to growth or development.”*
- ▶ *“The Chester River floods more frequently at high tide, particularly in the summer.”*
- ▶ *“Now every storm is a serious concern for life and property.”*
- ▶ *“It doesn't freeze like it used to. There's no more skating on the ponds.”*
- ▶ *“Summers are becoming like Florida.”*
- ▶ *“As a teen I remember being hired to work in dry fields during school vacation in March. Now we're not able to work in the fields until April because they stay wet longer.”*



Thank you

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Existing Plans

[Kent County Comprehensive Plan \(2006 and 2016 Update\)](#)

[Kent County Hazard Mitigation Plan \(2004, 2014, and 2016 Update\)](#)

[Floodplain Management Ordinance \(last updated June 2014\)](#)



2006 Kent County Comprehensive Plan

GOAL: LIMIT DEVELOPMENT IN AREAS WITH CONSTRAINTS IN ORDER TO MINIMIZE THE LOSS OF LIFE AND STRUCTURES AND IMPACTS TO THE ENVIRONMENT

Strategy: Maintain, enforce and if necessary, strengthen existing regulations for floodplains and buffers Kent County's existing regulations address building, filling and other disturbances within stream buffers, shoreline cliffs, and floodplains.

Strategy: Participate in the Community Rating System Program. The Federal Insurance Administration will grant flood insurance premium credits to property owners whose community participates in the Community Rating System (CRS). In order to qualify for the CRS program, a community must have floodplain programs which address four broad categories:

- * Public information*
- * Flood damage reduction*
- * Flood preparedness*
- * Mapping and regulation*



2006 Kent County Comprehensive Plan

GOAL: LIMIT DEVELOPMENT IN AREAS WITH CONSTRAINTS IN ORDER TO MINIMIZE THE LOSS OF LIFE AND STRUCTURES AND IMPACTS TO THE ENVIRONMENT

Strategy: Investigate the impacts of sea level rise and subsidence on floodplains and other low lying areas in the County Tide gauges for the Chesapeake Bay and the Mid-Atlantic coast show rates of sea-level rise twice that of the worldwide average. Scientists disagree on the cause of the recent increase in the rate of rise. There is little awareness, however, that the rapidly rising relative sea level within the bay is also having dramatic and wide-ranging effects. Islands once populated in colonial time and during the past century have disappeared due to submergence and related shore erosion.



2016 Comprehensive Plan Draft Update

GOAL: LIMIT DEVELOPMENT IN AREAS WITH CONSTRAINTS IN ORDER TO IMPROVE SAFETY AND REDUCE ENVIRONMENTAL AND PROPERTY DAMAGE

Strategy: Maintain, enforce and if necessary, strengthen existing regulations for floodplains and buffers.

Kent County's existing regulations address building, filling and other disturbances within stream buffers, shoreline cliffs, and floodplains for their flood reduction and habitat protection benefits. The County will keep its floodplain regulations current with standard practice and attain higher levels of protection as appropriate.



2016 Comprehensive Plan Draft Update

Strategy: Participate in the Community Rating System Program.

The Federal Insurance Administration will grant flood insurance premium reduction to property owners whose community participates in the Community Rating System (CRS) and achieves a higher standard for flood protection, preparedness, and mitigation. In order to qualify for the CRS program, a community must have floodplain programs which address four broad categories:

** Public information * Flood damage reduction*

** Flood preparedness * Mapping and regulation*



2016 Comprehensive Plan Draft Update

Strategy: Implement the results of the County's Climate Change and Sea Level Rise Vulnerability Analysis and the County's current Hazard Mitigation Plan. Investigate the impacts of sea level rise and subsidence on floodplains and other low lying areas in the County.

Corroborated by the County's study of impacts into its vulnerable resources, sea level rise mitigation practices are essential in protecting life, property, and habitat natural and man-made hazards may affect Kent County. To reduce future property damage and threats to human safety, the County has adopted and updated its Hazard Mitigation Plan.

*The Hazard Mitigation Plan was originally adopted in 2004 and updated in 2014. It identifies and characterizes the County's potential natural and man-made hazards and provides appropriate actions to reduce their negative effects. **Continued...***



2016 Comprehensive Plan Draft Update

...continued

The Climate Change and Sea Level Adaptation Report met three intended purposes:

- ▶ *to augment the Kent County Hazard Mitigation Plan by understanding how existing hazards and risks may evolve and intensify in the future due to climate change;*
- ▶ *to inform the Kent County Comprehensive Plan and other planning processes by recommending strategies for mitigating risks, becoming resilient to extreme events, and adapting to changing conditions; and*
- ▶ *to stimulate conversations and improve collaboration across governmental departments and with community stakeholders*

The report provides recent data and provides preparedness and resilience actions.

Continued...



2016 Comprehensive Plan Draft Update

... continued

Tide gauges for the Chesapeake Bay and the Mid-Atlantic Coast show rates of sea-level rise twice that of the worldwide average. Evidence is mounting that the effects of climate change have begun and that sea level rise will accelerate. Awareness has generally grown and hazard mitigation strategies are contained in the County's Hazard Mitigation Plan to address these challenges.

Islands once populated in colonial times and during the past century have disappeared due to submergence and related shore erosion. The County will continue to coordinate with local partners to monitor and evaluate current science of climate change and sea level rise and adjust its hazard mitigation planning accordingly along with implementing the actions contained in its Hazard Mitigation Plan and its climate change response plan.



2014 Kent County Hazard Mitigation Plan

RISK ASSESSMENT

The following natural hazards have been documented in Kent County and have been assessed as risks for the purpose of this study. They have been ranked by the Hazard Mitigation Planning Committee in order of importance (number 1 being the most important hazard) based on their past occurrences, damages, claims, etc.

1. HURRICANES
2. RIVERINE AND COASTAL FLOODING
3. WINTER STORM/WINTER WEATHER
4. OTHER SEVERE STORMS
(THUNDERSTORMS, LIGHTNING, HAIL)
5. DROUGHT
6. SOIL MOVEMENT/STEEP SLOPES
7. WILDFIRE
8. EXTREME HEAT
9. TORNADOES
10. EARTHQUAKES



2014 Kent County Hazard Mitigation Plan



Each of the 10 hazards are outlined in three sections:

- ▶ Nature, History, and Profile
- ▶ Vulnerability based on current trends and available data and data limitations (facilities, construction, repetitive loss, loss estimations, so on)
- ▶ Mitigation strategies (responsible organizations, possible funding sources, and implementation timelines)



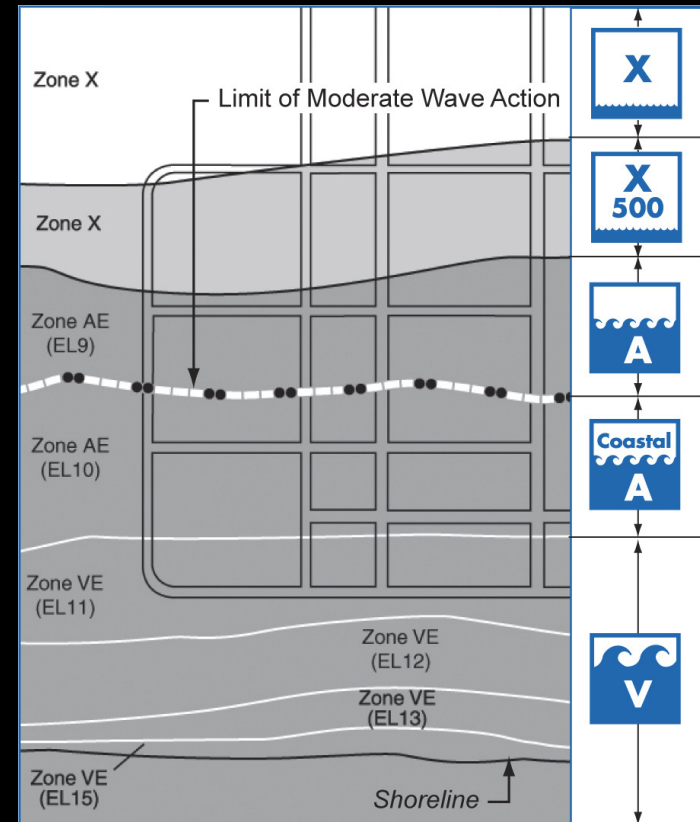
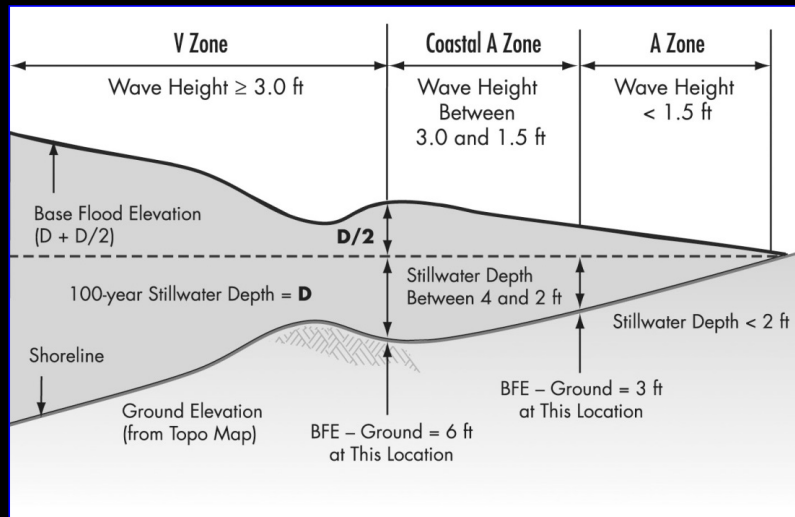
2014 Kent County Floodplain Ordinance

Establishes a flood protection elevation (FPE) of 2 feet above the base floodplain elevation (BFE). The protection elevation had been 1 foot in the past. Along tidally-influenced bodies of water, the addition of at least one or two feet of freeboard to the BFE accounts for uncertainty in the models and provides some allowance for potential sea level rise. An independent economic analysis funded by FEMA determined that small additional up-front costs of adding up to four feet of height to foundations that must already be elevated is off-set by both avoided future damage and lower flood insurance premiums (the “pay-back” period varies depending on amount of freeboard and the type of foundation).



2014 Kent County Floodplain Ordinance

Added a determination of the landward limit of waves 1.5 feet in height located behind the Coastal Hazard flood areas called the Limit of Moderate Wave Action (LiMWA). This line is delineated on the floodplain maps as follows:



2016 Climate Change Adaption Report Floodplain Recommendations

- ▶ Explore the feasibility of a 3-foot freeboard requirement for new construction and significant improvements in order to be consistent with federal guidance. In accordance with the inundation models, the County should consider a higher FPE standard.
- ▶ Require Limit of Wave Action setbacks for new construction in the floodplain.
- ▶ For all real property transactions, require an elevation certificate and disclosure of flood risk, Critical Area buffers, steep slopes, and wetlands.
- ▶ Determine whether the cost of challenging FEMA's new flood maps is worthwhile.
- ▶ Consider expanding the floodplain to include the 0.2% chance floodplain or a “coastal resilience overlay zone” for greater protection from sea level rise and an increased margin of safety against errors in FEMA flood risk maps.



Recommendations and Actions

- ▶ Cooperation & Collaboration
 - ▶ Community Resilience
 - ▶ Education, Information, and Outreach
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Kent County Government

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Thank you

Kent County Climate Change & Sea Level Rise Vulnerability Study

http://www.kentcounty.com/images/pdf/planning/Kent_Co_Climate_Change_Adaptation_Report_Sept_2016.pdf

Kent County Comprehensive Plan 2016 Update

<http://www.kentcounty.com/planning/comp-plan-update>

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