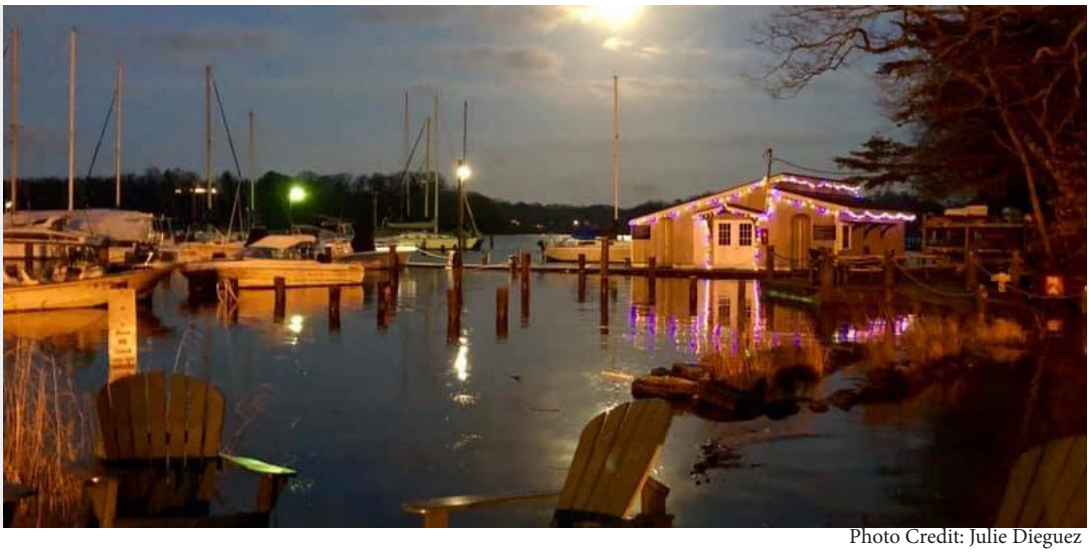


Photo Credit: Julie Dieguez

Nuisance Flood Plan Development Guidance

CHANGING
Maryland
FOR THE BETTER

October 2019

Nuisance Flood Plan Development Guidance

Introduction

There is recognition by Maryland lawmakers, local and state governments, and citizens that tidally-driven nuisance flood events are happening with more frequency. While nuisance flooding may not pose a serious threat or result in major damage, it interrupts and causes impacts to daily routines and can negatively impact commerce. Pursuant to Maryland House Bill 1427 (2019), §3-1018(b) and (c), on or before Oct. 1, 2020, a local jurisdiction that experiences nuisance flooding (NF) shall develop a plan to address nuisance flooding. In addition, a local jurisdiction shall update the plan every five years; publish the plan on the local jurisdiction's website; and shall submit a copy of the plan to the Maryland Department of Planning (Planning). This legislation is an update to Senate Bill 1006 and House Bill 1350 (2018). The definition of nuisance flooding in accordance with §3-1001 of the Natural Resource Article of the Maryland Annotated Code is "high tide flooding that causes a public inconvenience."

This document is meant to provide guidance on potential ways that a jurisdiction can meet the nuisance flood plan (NFP) requirement referenced above. While each jurisdiction may develop an individual plan, we suggest the smaller jurisdictions (municipalities) work with their respective county to develop joint plans where appropriate. This guidance was developed by a multi-partner workgroup facilitated by the Maryland Department of Natural Resources, and consisted of representatives from local governments, state agencies, and non-governmental organizations. The specific workgroup members can be found on Page 7. There is no prescriptive or "right" way to meet the NFP requirement, and given the diversity of local jurisdictions, the guidance is meant to be flexible and bring forward considerations and questions. The guidance is not mandatory, but it is recommended as a tool to figure out a path forward.

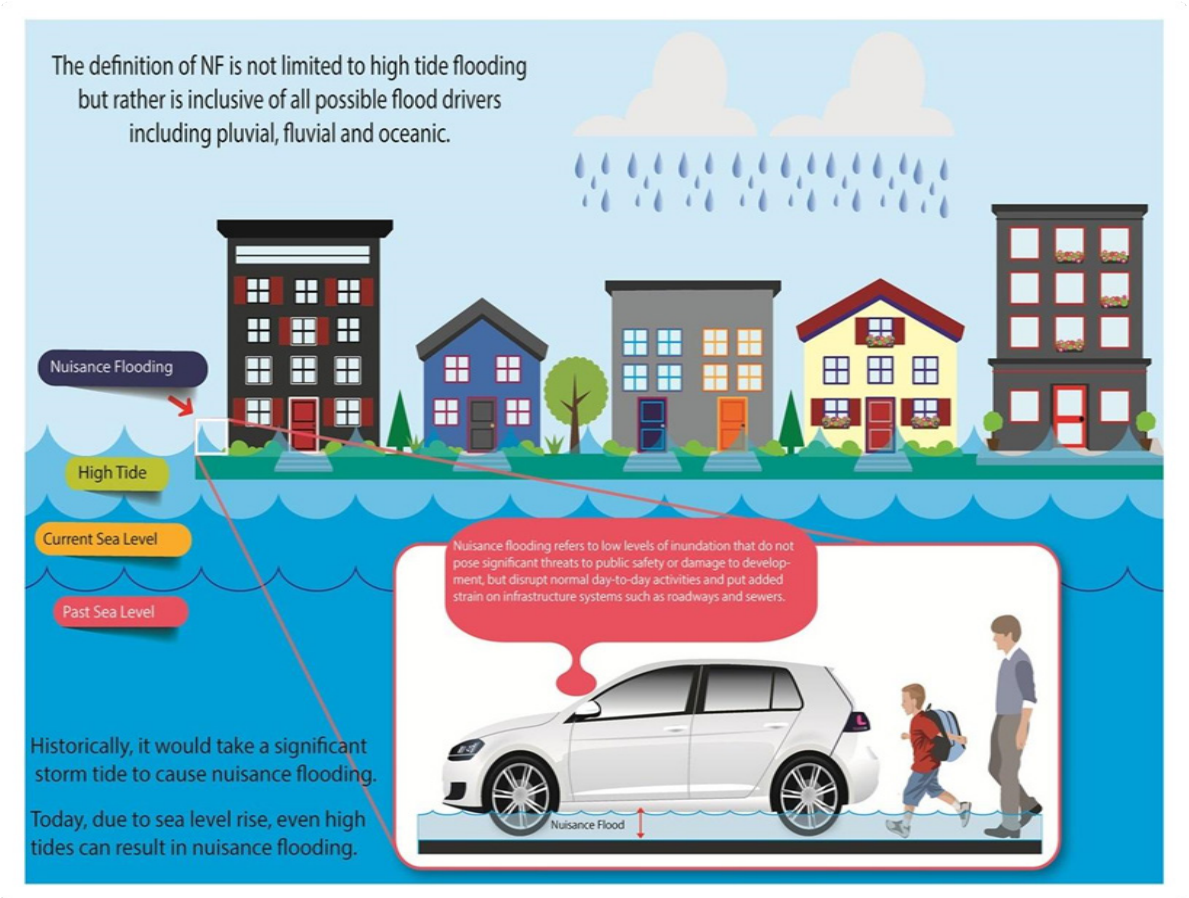
While each jurisdiction may meet the requirement in a different way, the workgroup recommends that each plan include three critical components:

- Inventory of known flood hazard areas where tidal nuisance flooding occurs
- Identification of flood thresholds/water levels/conditions that lead to tidal nuisance flooding
- A mechanism to document tidal nuisance flood events and response activities from 2020–2025

These three components will enable a jurisdiction to understand the extent of nuisance flooding, create a baseline inventory in 2019/2020 of conditions contributing to nuisance flooding and, over the next five years, document the number and location of nuisance flood events. Documentation and tracking is important to catalog the number of occurrences and severity over time to catalyze response and risk reduction actions.

What is Nuisance Flooding and how is it related to Sea Level Rise?

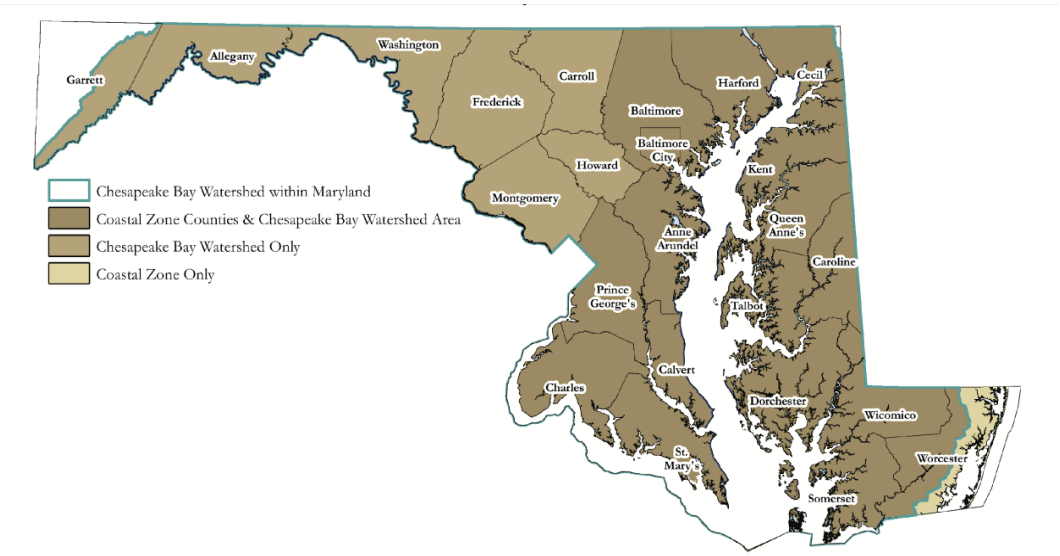
Communities throughout the State of Maryland face increasing disturbances from episodic nuisance flooding. The impacts of nuisance flooding disrupt daily activities for up to several hours and then abate. Roads may be temporarily closed due to high water, engineered and natural drainage systems may be overwhelmed, and fields and yards may be inundated for a period of time. In addition, precipitation may combine with tidal or wind-driven nuisance flooding, and further exacerbate the impacts and impair storm-water management infrastructure. This guidance addresses the result and impacts of tidal-driven nuisance flooding and compounding interactions with rainfall events. Nuisance flooding is defined in §3-1001 of the Natural Resource Article of the Maryland Annotated Code as "high-tide flooding that causes public inconvenience." This is similar to how the National Oceanic and Atmospheric Administration (NOAA) defines nuisance flooding or high tide flooding: "flooding that leads to public inconveniences such as road closures." Nuisance flooding is frequently referred to as "sunny day" or high tide flooding. As such, it is typically unrelated to particular storm events, though it may be exacerbated by long-duration wind events or passing storm systems and the astrological position of the sun and the moon. Over time, however, as a changing climate drives sea levels higher and precipitation events to greater severity, these repeated "nuisance" impacts will become significant stressors on infrastructure, emergency services, public health, and community fabric as they become more chronic in nature. The graphic below (Figure 1) depicts nuisance flooding and is for illustration purposes only.



While the §3-1018 of the Natural Resource Article only requires jurisdictions to make a plan for tidal flood events, Figure 1 depicts all the factors that can contribute to a nuisance flood event surface or stormwater (pluvial), riverine (fluvial), and tidal (oceanic).

Nuisance Flooding Plan Considerations & Components

It is recommended that all jurisdictions, including municipalities, within Maryland's Coastal Zone develop an NFP even if they do not meet the requirements of the legislation.



Municipalities in the Coastal Zone should consider if they will be able to meet the requirement on their own or if they should work with their affiliated county to fulfill the requirement similar to Hazard Mitigation Plans. While the process of developing a NFP may seem challenging, communities are already responding to nuisance flood events, and this guidance is meant to highlight existing processes and help a community navigate how they will meet the requirement and plan to address future events.

The workgroup recommends that each plan include three critical components that will contribute to establishing flooding baselines:

- Inventory of known flood hazard areas where tidal nuisance flooding occurs
- Identification of flood thresholds/water levels/conditions that lead to tidal nuisance flooding
- A mechanism to document tidal nuisance flood events and response activities from 2020-2025

The plan should be adaptive and flexible and should pull together knowledge from various sectors and programs that may already be addressing flood impacts from planning to emergency management to public works. There is no one way for a community to meet the requirement and there may be existing planning documents or processes that fulfill the requirement.

This guidance:

- Examines existing processes that may already meet the requirement such as hazard mitigation, comprehensive or green infrastructure plans;
- Provides information for how to access a stand-alone template;
- Explores how updates to a community's Critical Area program could reduce flood impacts.

There is technical and financial assistance available to communities to meet this requirement through the Maryland Department of Natural Resources. For more information, please contact Sasha Land at sasha.land@maryland.gov or (410) 260-8718.

Nuisance Flooding Plan Development Process

Step 1: Determine which Department will Complete the Nuisance Flood Plan and/or Set up and Lead a Nuisance Flooding Plan Workgroup

Successful adaptation and long-term risk reduction to nuisance flooding hinges on a jurisdiction's involvement of local leaders and decision makers to respond to the impacts. To ensure the plan accurately addresses the concerns of the community, identify a lead agency, and consider including the following groups or individuals – as well as other subject matter experts – for a nuisance flood planning workgroup. Your jurisdiction may have a pre-existing workgroup such as a hazard mitigation planning committee which can serve as a nuisance flooding planning committee. Potential representatives could include:

- Planning and Zoning
- Geographic Information Systems (GIS)
- Public Works
- Elected Officials
- Emergency Management
- County & Municipal Representatives
- Transportation
- Community Stakeholders
- Chamber of Commerce
- Water-Dependent Industry
- First Responders

Step 2: Assess Risk & Impacts

It is important to take inventory of locations that flood regularly during tidal events, including properties and infrastructure that are impacted. The inventory could include maps, tables, and photographs. In addition to taking inventory, consider how you will track impacts to those locations, and your jurisdiction's response over the next five years (2020-2025). To predict and prepare for nuisance flooding your jurisdiction will need to identify a tidal nuisance flood threshold (e.g., high tides projected to be 2' above normal, road closures greater than one hour, etc.) or a set of conditions that lead to documentation of a nuisance flood event (e.g., wastewater treatment overflows, failing septic tanks, etc.). Another consideration will be the frequency of occurrence at each identified location where nuisance flooding occurs (e.g., once a week, twice a month, four times a year, etc.). Your jurisdiction may wish to use the following tools, along with local knowledge and observations to inventory areas of risk of nuisance flooding and identify a flood threshold.

Tools to Determine 'What's at Risk?'

The **Risk Applications** (Maryland Department of Transportation (MDOT) Climate Change Vulnerability Viewer or NOAA Coastal Flood Exposure Mapper) can be used to identify and/or verify nuisance flooding areas and determine the tidal nuisance flood threshold. The MDOT application Mean Sea Level layer identifies four water depths on the roadway (>0.1' to <=0.5', >0.5' to <= 1', >1' to<=2', >2'). The Depth Grid layers depict flooding at 0.7' intervals in 2015 (0.00' to 0.70', 0.70' to 1.40', 1.4 to 2.10', 2.10' to 2.80' and 2.80' to 3.30') and are then adjusted to include projected sea level rise for 2050 and 2100.

1. The **MDOT Climate Change Vulnerability Viewer** can be used to determine which roadways will be flooded based on a specific likelihood of a storm event and indicates the depth of flooding associated with that event. Two types of data layers are provided: a) flooding depth on a roadway (Roadway Inundation) and b) depth of flooding over the land area (Flood Depth Grids). To access the website: arcg.is/ymbaW

    a. Open the website and in the top ribbon click on icon **Jurisdiction Bookmarks**. Select your jurisdiction.

    b. Click on the icon which is **Roadway Inundation**. Select the *2015 Mean Sea Level – 10% Annual Chance (10YR Storm)* layer. This layer depicts the lowest level of flooding to roadways that is likely occurring during a minor event. When available the 1YRr chance storm layer will more accurately show nuisance flooding. Click on any of the segments shown on the map to get a popup box showing the attribute values of that road segment and its predicted flooding. You can also use the Search function at the top of the list of data (magnifying glass), and enter *2015*, *2050*, or *2100* to filter the list of data options based on year. This will minimize the amount of results making it easier to locate your specific dataset of interest.

    c. Next, click on the icon which is **Flood Depth Grids**. Select the *2015 Mean Sea Level – Depth Grid 10% Annual Chance (10YR Storm)*. This layer depicts the likely flooding of the land area and the depth of flooding above Mean Sea Level. You can click any location where predicted flooding is shown on the map, and a pop-up box will show the predicted height of water depth at that location. You can also use the Search function at the top of the list of data (magnifying glass), and enter *2015*, *2050*, or *2100* to filter the list of data options based on year. This will minimize the amount of results making it easier to locate your specific dataset of interest.

    d. This information can be used to identify the tidal nuisance flood threshold – e.g. 3.3' above 2015 Mean Sea Level, or 10% Annual Chance of Flooding above 2015 Mean Sea Level, or 2'+ depth of water on the roadway.

    e. A variety of other related data is available by clicking on the icon which is **Related Data.** Users can access Federal Emergency Management Agency (FEMA) Hurricane Evacuation Routes, FEMA Effective Floodplains, MDOT SHA Emergency 667 Events, MDOT State Highway Administration (SHA) Maintained Roads, & County Boundaries. Other topography and elevation data is included under this tab as well showcasing Slopes & Terrain (Hillshade). Another key feature of the application is that users can click anywhere on the map within the State of Maryland and get a popup box returning the approximate Elevation above mean sea level in feet. The Data Layers are available for download atesrgc.org/mapServices. For questions, please contact Elizabeth Habic with MDOT SHA.

2. The **NOAA Coastal Flood Exposure Mapper** can be used to identify areas likely to flood during extreme high tides. The flood thresholds for this map are based on national flood thresholds from *NOAA Technical Report NOS CO-OPS 086: Patterns and Projections of High Tide Flooding along the U.S. Coastline Using a Common Impact Threshold*. In the report, NOAA recognizes **high tide flooding** as sunny day, nuisance and recurrent tidal flooding. To access the website, please visit: coast.noaa.gov/floodexposure/#/splash

This viewer can from a landscape perspective show low-lying areas vulnerable to nuisance flooding. You can use this as a first step to identify trouble spots and then fill in with more specific community information. We advise going to the flood hazards map and then turning off the Coastal Flood Hazard Composite Layer and turning on the High Tide Flooding layer. For additional guidance on using the NOAA Coastal Flood Exposure Mapper, please see the following tutorial: coast.noaa.gov/ufem/

Tools to Forecast and Predict Nuisance Flood Events

1. National Weather Service Advanced Hydrologic Prediction Service (Coastal & Riverine Water levels): water.weather.gov/ahps/rfc/rfc.php

   Click on the Regional map for the mid-Atlantic to show the flood status of riverine and coastal locations. Selecting a specific location will provide conditions for that gauge. The conditions are current and predicted. A user brochure of what data is available can be found: nws.noaa.gov/os/water/ahps/resources/Guide_to_Hydrologic_Information_Brochure.pdf

2. NOAA Inundation Dashboard: tidesandcurrents.noaa.gov/inundationdb/ The dashboard provides real-time and historical inundation information at select National Ocean Service tide stations. For a full list of features, click on the link and then click the 'About?' link at the top of the map.

3. Chesapeake Bay Operational Forecast System: This generates water level, current, temperature, and salinity nowcast and forecast guidance four times per day. tidesandcurrents.noaa.gov/ofs/cbofs/cbofs.html

Step 3: Review Existing Plans/Programs & Evaluate How Your Jurisdiction Will Meet the Requirement

There are existing plans and processes in your jurisdiction that may meet the NFP requirement or could be used to meet the requirements in the next update of that plan. Each jurisdiction is responsible for documenting how this will be addressed. If you decide to use a current plan or program, a 1- to 2-page explanation of what is contained in that existing plan, how that plan meets the requirements of the law, and where those plans are publicly available should be submitted to the Maryland Department of Planning.

Flood Mitigation Plan: Does your jurisdiction have a flood mitigation plan? If so, does it include any of the three critical components listed on page 1? If so, how? If not, what information does it provide that could meet the NFP requirements?

Hazard Mitigation Plan (HMP): Due to similar hazard mitigation management issues, the HMP is a logical place where you might address nuisance flooding. Review your current hazard mitigation plan, and hazard profile for flooding. Does it include any of the three critical components listed on page 1? If so, how? If not, what information does it provide that could meet the NFP requirement?

For the 2021 update to the State Hazard Mitigation Plan, Maryland will evaluate how to incorporate nuisance flooding. This could then be used as a guide for updates to local HMPs should a jurisdiction opt to incorporate nuisance flood plans into their HMPs.

Should your community elect to meet the requirement through HMPs, key questions to consider might be: In the next required update to your hazard mitigation plan, how might you expand the flood hazard profile to include nuisance flood events and how could you incorporate mitigation/adaptation strategies that address nuisance flood impacts?

Critical Area Program: Existing components of a jurisdiction's local Critical Area program may support efforts to reduce nuisance flooding or enhance coastal resilience, and therefore may be appropriate to reference in the NFP. Local programs already include requirements related to stormwater management, planting shorelines, and use of fees-in-lieu. A local jurisdiction could reference nuisance flooding in these requirements or look at changes to these requirements to provide even greater benefits to address flood events. Suggested strategies include requiring enhanced stormwater management in certain development situations, using fees-in-lieu for mitigation projects that also address nuisance flooding, or adjusting planting strategies to focus on resilience.

Formal changes to a local Critical Area program by a jurisdiction require review and approval by the full Critical Area Commission (CAC). Commission staff will work with interested jurisdictions to suggest these and other potential amendments and can provide guidance throughout the entire amendment process. The Town of Oxford is one jurisdiction that has made relevant amendments to their program that address flood impacts. For more information, please contact Alexandra DeWeese at Alexandra.deweese@maryland.gov or (410) 260-3479.

Green Infrastructure Plan: Does your jurisdiction have a Green Infrastructure Plan? Are there elements of that plan that identify areas of nuisance flooding and use a green infrastructure approach to address tidal flood impacts? Does it include any of the three critical components listed on page 1? If so, how? If not, what information does it provide that could meet the NFP requirements?

Comprehensive Plan: Does your comprehensive plan address any of the three critical components listed on page 1? If so, identify where it is included. If not, this information could be included in one or more of the comprehensive plan elements – Development Regulations, Sensitive Areas, Transportation, Water Resources, Community Facilities, Goals & Objectives, Land Use, Municipal Growth and/or Fisheries. While the NFP components may not fit within one element, the NFP would likely be considered in many of the comprehensive plan elements.

Step 4: Develop the Plan

Use the documented risks and hazard areas to inform the plan and define tidal flood thresholds and document nuisance flood events and impacts (2020-2025). If your jurisdiction is utilizing an existing plan or bringing together elements of multiple plans to meet the requirement then this should be documented in a 1- to 2-page explanation. Your plan may want to focus on particularly vulnerable areas within your jurisdiction, identify potential financial impacts of nuisance flooding, and determine the need for or highlight actions to reduce impacts both short and long term. The Eastern Shore Land Conservancy has developed a template that a jurisdiction can utilize to either amend existing planning documents or as a standalone plan. For more information, please contact Jim Bass at jbass@eslc.org or (410) 690-4603. Kent County, with the assistance of the Eastern Shore Land Conservancy, created a nuisance flooding plan that is available in Appendix I, and can serve as an example of how one jurisdiction chose to meet the NFP requirement.

Step 5: Submit, Communicate and Implement the Plan

Communicate the contents of the plan and the intended next steps within your jurisdiction. Make sure that there are clear roles and responsibilities for how tidal nuisance flood events and adaptation actions will be documented over the next five years. Since the NFP requirements can be satisfied in a variety of ways, the public participation and formal adoption process will depend upon the type of planning document your jurisdiction creates. By statute, each jurisdiction will post the plan on their website and send a copy to Deborah Herr Cornwell (deborah.herrcornwell@maryland.gov) at the Maryland Department of Planning. Upon receipt, your jurisdiction will receive a letter of acknowledgement from Planning. The plan will then be shared with the Maryland Department of Natural Resources for review. Any local nuisance flood plans proposed as a comprehensive plan amendments or functional plans must be submitted to Planning for 60-day interagency review under State law (Section 3-203(c), Land Use Article.

Documentation of Tidal Nuisance Flood Events

The Maryland Department of Natural Resources is working with state and local partners to launch an efficient and effective tool to document nuisance flood events. This tool is meant to aid in flood documentation over the next five years (2020-2025) and will be available in 2020.

Nuisance Flood Plan Workgroup Members

Name	Organization	Title
Brian Ambrette	Eastern Shore Land Conservancy	Director of Strategic Initiatives
Jihane Ambroise	Maryland Emergency Management Agency	Hazard Mitigation Planner
Jim Bass	Eastern Shore Land Conservancy	Coastal Resilience Specialist
Michelle Canick	The Nature Conservancy	Conservation Project Manager
Alexandra DeWeese	Maryland Critical Area Commission	Planner
Virginia Gregg	Kent County Emergency Management	Emergency Planner
Elizabeth Habic	Maryland Department of Transportation – State Highway Administration	Climate Risk and Resiliency Program Manager
Deborah Herr Cornwell	Maryland Dept of Planning	Resource Conservation Planner
Josh Kurtz	The Nature Conservancy	Director of Policy Development
Stephanie Jones	Kent County Dept of Planning, Housing and Zoning	Environmental Planner
Sasha Land	Maryland Dept of Natural Resources	Coastal Planner
David Mandell	City of Annapolis, Emergency Management	Deputy Director
Kate McClure	Maryland Sea Grant Extension	Coastal Climate Specialist
Jaleesa Tate	Maryland Emergency Management Agency	State Hazard Mitigation Officer
Kevin Wagner	Maryland Dept of the Environment	NFIP-Community Assistance Program Manager

Appendix 1: Nuisance Flood Plan Example: Kent County, MD

Kent County Nuisance Flooding Plan

March, 2019

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*This report was prepared by Kent County Government, Departments of Planning & Zoning and Emergency Services, **using Federal funds under award number NA18NOS4190145 from NOAA**, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.*

I. Background

Maryland Senate Bill (SB) 1006 states that "on or before July 1, 2019, a local jurisdiction that experiences nuisance flooding shall develop a plan to address nuisance flooding." The legislation further specifies that the plan must be submitted to the Maryland Department of Planning, published on the local jurisdiction's website, and updated at least every five years.

I. Introduction

Flooding is one of the most common natural hazards experienced in Kent County. Depending on the circumstances, flooding may be widespread or isolated, developing slowly or quickly. It may take the form of coastal, overland, or flash flooding. Floods may originate from ice jams or from the failure of dams or levees. Nuisance flooding is a more specific and commonplace phenomenon which dictates a slighter response and threatens the community in less intrusive ways.

The National Oceanic and Atmospheric Administration (NOAA) defines nuisance flooding, or high tide flooding, as "flooding that leads to public inconveniences such as road closures. It is increasingly common as coastal sea levels rise." The language of SB 1006 refers to nuisance flooding as "high-tide flooding that causes public inconvenience." Nuisance flooding is typically unrelated to particular storm events, though it may be exacerbated by long-duration wind events or passing storm systems. As such, it is frequently referred to as "sunny day flooding."

Nuisance flooding is capable of disrupting daily activities through a variety of mechanisms, such as the closure of roads due to high water, the inundation of yards and parks, and the impairment of engineered and natural drainage systems. Currently, these disruptions typically occur for a period of several hours and then abate. However, as a changing climate drives sea levels higher and precipitation events to greater severity, these repeated "nuisance" impacts will become significant stressors on the infrastructure, emergency response, public health, and fabric of the community.

In Kent County, nuisance flooding occurs most predominately in locations near or adjacent to major bodies of water. Along the Chester River, nuisance flooding is common on residential and commercial properties. The Town of Chestertown has made major investments in flood mitigation at the municipal marina, park, and walkways along the riverbank. Elsewhere in the County, nuisance flooding is experienced as debris from farm fields washes into ditches and eventually settles on roadways as ditches overflow. Culverts in low-lying areas may have difficulty conveying water adequately, causing ponding on low-lying roadways throughout the County.

II. Preparing for Nuisance Flooding

Because nuisance flooding is a complex problem, strong partnerships between planning, public works, emergency management, and geographic information systems (GIS) are necessary for Kent County to properly prepare for the impacts of nuisance flooding. In particular, it is important that departments collaborate to inventory and map chronically inundated areas.

As part of the nuisance flood planning process for Kent County, a team of staff created a thorough inventory of known flood hazard areas, which can be found as Appendix I to this document. Departments involved in the nuisance flood planning and inventory process can be found in Appendix II.

In addition to mapping, accurate flood forecasting and warning is critical to the safety and preparedness of a community. Weather forecast data is received from the National Weather Service (NWS) forecasting office at Mt. Holly, New Jersey. Critical tide information is received from the NOAA tide gauge stationed at Tolchester Beach, as well as additional gauges elsewhere throughout the Chesapeake Bay. These gauges allow Kent County to be aware of and prepare for possible nuisance flooding impacts.

The Kent County Office of Emergency Services (OES) maintains a close relationship with NWS Mt. Holly, receiving notifications of special hazards and watches or warnings of severe weather before the community is impacted. The timeliness of these severe weather alerts is critical when the potential for public safety impacts exists, such as in flood situations. Additionally, it is the responsibility of the Kent County OES to disseminate public safety information via CodeRED, the County's mass notification system, and social media outlets. When nuisance flooding

is anticipated, it may be necessary for Kent County OES to initiate a message to flood hazard areas via CodeRED and social media outlets with details about flood severity, duration, or impacts such as road closures.

III. Responding to Nuisance Flooding

A. Emergency Response

Thresholds are maintained for Kent County which direct a set of actions based on a particular inundation level or frequency of flooding. These thresholds are meant to supplement actions directed by the Kent County Emergency Operations Plan.

Threshold	Response Level	Required Action
Forecast data from the NWS or NOAA tide gauge indicates likely nuisance flooding impacts	Level I – Public Warning	Make the public aware of nuisance flooding threat via mass notification emails, social media, etc.
Flood waters are present below nuisance levels and are rising	Level II – Monitor Inundation	Deploy DPW and SHA personnel to monitor flood levels as needed and place high water signs at impacted locations.
Flood waters are high enough to warrant temporary road closures	Level III – Flood Response	Place additional DPW and SHA personnel on standby; close roads and reroute traffic as flooding reaches hazardous levels

When flooding reaches such a severity that life safety, critical infrastructure, and key resources are threatened, "nuisance" flooding levels have been exceeded. Below are response concepts consistent with the Kent County Emergency Operations Plan which may become necessary as flood waters rise beyond nuisance levels.

- Response
    - Lifesaving activities
    - Incident containment
    - Public health concerns
    - Maintenance of transportation routes
    - Maintenance of critical facilities
    - Public warning mechanisms
    - Responder health & safety
    - Media & VIP management
    - Control & Coordination of operations
    - Provision of transport, shelter and documentation of displaced persons
    - Restoration of normality
- Recovery
    - Handover from life saving
    - Facilitate the restoration of systems to normality
    - Assess damage and return vital life support systems to minimum operating standards
    - Collate financial cost of the event
    - Legal implications, claim investigation
    - Debrief & compilation of final report

- Community & restoration of services

B. Documentation

Documenting the extent and impacts of nuisance flooding is critical to public safety and the long-term resilience of Kent County. This information will be documented and updated on a regular basis for emergency planning purposes. A review of flood documentation should provide Kent County a comprehensive view of trends in flooding over time. The following factors will be recorded by Kent County OES and DPW for tracking, and archived by County GIS staff. This includes instances of nuisance flooding addressed by SHA and communicated over the radio.

- Date, time, and location of nuisance flooding
- Impacts (e.g. "x amount of water on the roadway," "ditch overflow," "docks underwater," etc.)
- Agency notified and action taken

See Appendix 3 for a copy of the Kent County nuisance flooding documentation tool.

IV. Mitigating Nuisance Flooding Impacts

Both the Comprehensive Plan and the Hazard Mitigation Plan (HMP) for Kent County address measures by which the impacts of flooding can be mitigated, or lessened, by structural and nonstructural means. The purpose of the Nuisance Flooding Plan is to augment and support the information and recommended actions found in other planning documents. According to the County's 2014 HMP (p. 6-7):

> *The Comprehensive Plan addresses the County's accelerated erosion by high winds and high tides, overland flow, and shoreline cliff sluffing and identifies strategies to reduce erosion along Kent County's 268 miles of tidal shoreline. Both the Comprehensive Plan and the Hazard Mitigation Plan identify shoreline control/stabilization measures and both residential and agricultural best management practices as viable means of reducing accretion/erosion of Kent's highly erodible soils. Both plans also emphasize the maintenance, enforcement, and strengthening of floodplain regulations and participation in the Community Rating System. All county projects will be evaluated for consistency with both the Comprehensive Plan and the Hazard Mitigation Plan.*

The principles of floodplain management are fundamental to the proper mitigation of nuisance flooding in Kent County. Higher standards – such as freeboard, development restrictions in the floodplain, etc. – can be effective in mitigating the effects of both nuisance flooding and other major flooding events.

Kent County's HMP identifies four areas in which focus is directed regarding mitigation activity. These four areas include:

- Ensure that existing structures are resistant to flood-related damage,
- Create awareness of floodplain hazards and protective measures,
- Protect critical facilities, and
- Prepare/update stormwater management plans for various areas in the County.

In addition to actions specified in the HMP, the NFP includes activities which Kent County will implement or consider implementing to mitigate the impacts of nuisance flooding. These activities support the four areas of focus found in the Hazard Mitigation Plan. They also support recommendations and actions from Kent

County's 2016 Climate Change and Sea Level Rise Adaptation Report and goals and strategies of the Kent County Comprehensive Plan.

- Structural
    - Enact floodplain ordinance or codes which mandate the use of freeboard beyond current requirements.
    - Improve stormwater management infrastructure to more effectively convey water from flood-prone areas.
    - Conduct regular maintenance of drainage and stormwater control systems.
    - Consider green infrastructure options rather than conventional stormwater solutions.
- Nonstructural
    - Public Information
        - Communicate the risk of nuisance flooding in non-emergency times to residents and businesses via mass mailings, social media, press releases, or automated phone calls.
        - Disseminate flood preparedness information to enable a safer and more aware public in the face of flooding.
        - Integrate nuisance flooding-related public messaging in Kent County's existing public information plan and materials.
    - Planning
        - Ensure Kent County's NFP is kept up to date and referenced in the Hazard Mitigation Plan and other pertinent locations.
        - Schedule meetings of the nuisance flooding planning committee on an as-needed basis to address flood-related issues and review plans.
        - Improve stormwater management planning and strengthen policies to reduce runoff.
    - Implementation
        - Educate and train County staff on responsibilities under the NFP.
        - Preserve floodplains as open spaces through the use of legal protection status.
        - Protect and restore natural coastal features (forests, marshes, dunes, underwater grasses, and oysters) that can reduce the impacts of flooding.

V. Projections for Future Impacts

The areas impacted by nuisance flooding will increase gradually in the coming years as changing climate elevates water levels and drives precipitation patterns to new extremes. This shift, however, is likely to accelerate gradually over time. New areas will also become impacted, leading to an increased number of businesses, residents, and critical infrastructure at risk. Public services will also be more frequently impaired as flooding increases.

Kent County will maintain a level of awareness of data made available by NOAA, the State of Maryland, the University of Maryland Center for Environmental Science, and other scientific institutions as it pertains to the community and local flood risks. These risks of increased nuisance flooding will be communicated appropriately to residents and decision makers and direct them to take appropriate action in the areas of emergency response and hazard mitigation. Elected officials and County staff will utilize venues such as County Commissioners' meetings and Planning Commission meetings to communication information on long-term flood risks. Future projections of sea level change and nuisance flooding should also be integrated into land use planning, floodplain management, comprehensive planning, and capital investment planning.

Appendix I – Nuisance Flooding Location Inventory

A. Locations Identified by County Roads Staff and NFP Workgroup Members

Location	Notes from County Roads and NFP workgroup members
Eastern Neck Road - ENI-NWR	regularly under water at significant tide - entrance bridge to Bogles Wharf Road
Bogles Wharf Road - ENI-NWR	regularly under water at significant tide - entire road can flood
Grays Inn Landing Road	whole length of road can flood. 3 homes along the water and a public landing will flood
Allen's Lane	Bay can come up the ditches (worse on Allen's Lane than Green Lane) - almost entire length of road can be impacted
Green Lane	Bay can come up the ditches - approximately 200' back from the Bay
Burris Road	where creek is close
Swan Creek Road	west of Burris Road - heavy rain
Humphrey's Point Road	where adjacent to water (2 houses can be cut off)
Skinners Neck Landing	
McKinleyville Road	(along Lawyer's Cove?) might need to be relocated due to sea level rise - residences, seafood business, and marina affected
Shipyard Lane Landing	
Cumberland Avenue	at stream crossing can flood, rest of the area has enough elevation to be safe
Fairlee Landing	pier underwater with storm tide
Buck Neck Landing	storm tide will flood section of Road along the water
Bessicks Corner Road	at Still Pond Creek Road - bridge and creek crossing flood at rain/tide combination
Still Pond Creek Landing	road is low and near the water
Still Pond Neck Road	from creek crossing behind neighborhood to Coast Guard Station
Still Pond Road	at unnamed creek above Urieville Lake
Bloomfield Road	
Turners Creek Landing	parking lot will flood
Station Road	at Urieville Creek crossing
Daves Hill Road	heavy rain + tide will back up creek
Duck Puddle Road	just south of Dave's Hill - floods on heavy rain
Gregg Neck Road	near private landing - tidal
Foxhole Landing	can flood on strong tide

Appendix I – Nuisance Flooding Location Inventory

Locations Identified by County Roads Staff and NFP Workgroup Members

Location	Notes from County Roads and NFP workgroup members
Eastern Neck Road - ENI-NWR	regularly under water at significant tide - entrance bridge to Bogles Wharf Road
Bogles Wharf Road - ENI-NWR	regularly under water at significant tide - entire road can flood
Grays Inn Landing Road	whole length of road can flood. 3 homes along the water and a public landing will flood
Allen's Lane	Bay can come up the ditches (worse on Allen's Lane than Green Lane) - almost entire length of road can be impacted
Green Lane	Bay can come up the ditches - approximately 200' back from the Bay
Burris Road	where creek is close
Swan Creek Road	west of Burris Road - heavy rain
Humphrey's Point Road	where adjacent to water (2 houses can be cut off)
Skinners Neck Landing	
McKinleyville Road	(along Lawyer's Cove?) might need to be relocated due to sea level rise - residences, seafood business, and marina affected
Shipyard Lane Landing	
Cumberland Avenue	at stream crossing can flood, rest of the area has enough elevation to be safe
Fairlee Landing	pier underwater with storm tide
Buck Neck Landing	storm tide will flood section of Road along the water
Bessicks Corner Road	at Still Pond Creek Road - bridge and creek crossing flood at rain/ tide combination
Still Pond Creek Landing	road is low and near the water
Still Pond Neck Road	from creek crossing behind neighborhood to Coast Guard Station
Still Pond Road	at unnamed creek above Urieville Lake
Bloomfield Road	
Turners Creek Landing	parking lot will flood
Station Road	at Urieville Creek crossing
Daves Hill Road	heavy rain + tide will back up creek
Duck Puddle Road	just south of Dave's Hill - floods on heavy rain
Gregg Neck Road	near private landing - tidal
Foxhole Landing	can flood on strong tide
MD 313 bridge in Millington	water at bottom of deck during storm tide
Sandfield	Millington neighborhood of West Street, Middle Street, and Race Streets has to evacuate for hurricanes. Sea level rise will make 12-15 homes in this neighborhood unlivable.

Location	Notes from County Roads and NFP workgroup members
Shadding Reach Landing	on significant tide
Morgnec Road	east of MD 298 - flood on heavy rain
Mallard Road	where the pond meets the river and crosses road
Brices Mill Road	at Langford Road - two wooden bridges can flood with very high tides + rain
Quaker Neck Landing	and 1 house - tidal flooding
Cliffs City Road	houses west of landing will be cut off by sea level rise
Bessicks Corner Road	There is a plan in place to close the road if the pond dam ever fails
Cliffs City/Land's End Road/MD 289	sometimes floods during significant events
Handy Point Road	
Perkins Hill Road	occasionally floods
Lovers Lane (Chestertown)	occasionally where the pond is close to the road
Morgnec Road/MD 444	
Ricauds Branch Road	road just west of bridge can flood during significant events
Walnut Tree Road	low bridge - floods during significant events
Golts Road	
Quinn Road	
Kennedyville Road	
Olivet Hill Road	
Cromwell Clark Road	at stream - flooding issues during heavy rain - pipe replaced but it's a large drainage area
Blacks Station Road	where waterway meets the road
Turners Creek Road	at entrance to Sassafras NRMA
Worton Road	at intersection with Railroad tracks. Also floods along tracks behin the houses on Worton-Lynch Road
Augustine Herman Highway	where waterway goes under the road
John Hanson Road/MD 289	
MD 289	where pond drains along shoulder
Massey Crossroads	
Landing - end of High Street	
Remembrance Park/Horsey Lane	

Road segments identified by NFP workgroup members

Road Segment	Length (miles)
Allens Ln	0.57
Black Bottom Rd	2.50
Bogles Wharf Rd	0.70
Chesterville Bridge Rd	1.05
Grays Inn Landing Rd	0.06
Number Ten School Rd	1.52
Walnut Tree Rd	2.78
Golts "Crossroads"	
Black Bottom Rd	0.09
Bradford Johnson Rd	0.08
Golts Rd	0.07

Locations identified by SHA for NFP workgroup

Location	SHA Notes
MD 313	at Chester River Bridge - flooding issues during hurricane type storms
MD 289	end of state maintenance - flooding issues during heavy rain
MD 20	at Wesley Chapel - flooding issues during heavy rain
MD 298	at Buck Neck Road - flooding issues during heavy rain
MD 291	Edge Road - flooding issues during hurricane type storms
MD 291	east of Crane Street - flooding issues during hurricane type storms
MD 290	north of Chesterville - flooding issues during heavy rain
MD 299	at Sassafras River bridge - flooding issues during hurricane type storms
MD 289	at CRYCC pond - flooding issues during heavy rain

Road Locations identified in Kent County Hazard Mitigation Plan, 2014

Location	Route Number	Owner
Betterton to MD 298	292	SHA
Chesterville Bridge Road		Kent County
Chesterville Road to Black Station Road	444	SHA
Chesterville Road to Bolton Road	290	SHA
Cliffs City Road		Kent County
Cumberland Street		Kent County
Daves Hill Road		Kent County
Daves Hill Road to Galena	213	SHA
Edesville Road		Kent County
From Still Pond to Betterton	292	SHA

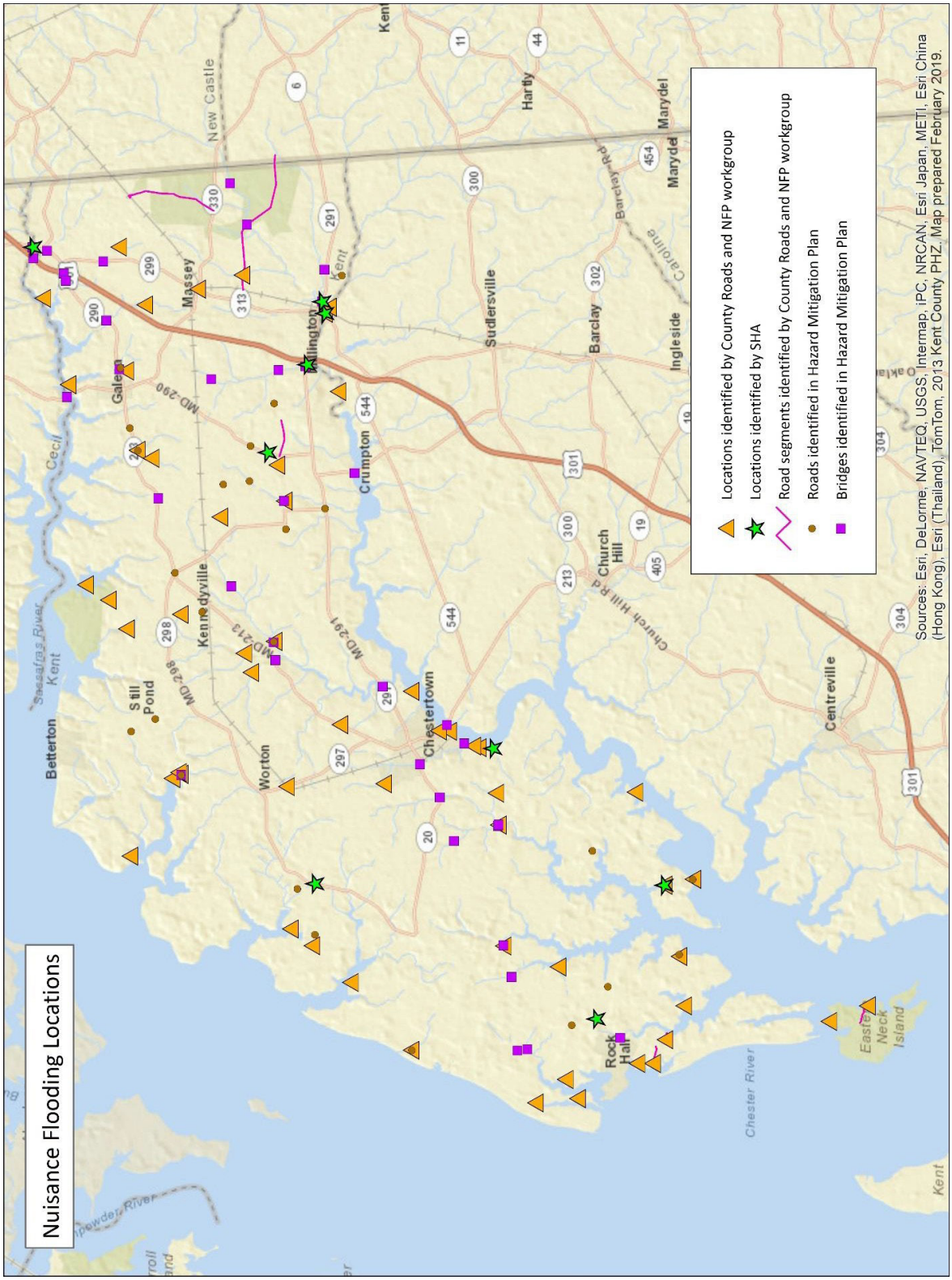
Location	Route Number	Owner
Handy Point Road		Kent County
Intersection of Rt 213 and Rt. 298	213	SHA
Kennedyville Road (Noth of Rt. 213)		Kent County
Locust Grove Road to Chesterville Road	444	SHA
Lovers Lane		Kent County
McKinleyville Road		Kent County
Morgnec Road (West of Rt. 298)		Kent County
Olivet Hill Road		Kent County
Peacock Corner Road		Kent County
Perkins Hill Road		Kent County
Sheldrake Drive		Kent County
Still Pond Creek Road		Kent County
Rt. 291 to Rt. 298 (Cherry Lane)	291	SHA
Walnut Point Road		Kent County

Bridge locations identified in Kent County Hazard Mitigation Plan, 2014

Route #	Road Name	Location	Waterway
US 301 NB/SB	Blue Star Memorial Highway	0.99 Miles south of Cecil County	MD 290
US 301 NB/SB	Blue Star Memorial Highway	On Cecil County Line	Sassafras River
MD 20	Rock Hall Road	1.20 Miles W of MD 21	Shipyard Creek
MD 20	Chestertown Road	0.77 Miles E of MD 446	Fannel Branch
MD 20	Chestertown Road	0.06 Miles E of MD 514	Radcliff Creek
MD 213	Augustine Herman Highway	0.09 Miles S of MD 537	Woodland Creek
MD 213	Augustine Herman Highway	1.01 Miles S of MD 292	Branch of Morgan Creek
MD 289	Quaker Neck Road	0.81 Miles S of MD 213	Radcliff Creek
MD 290	Galena Sassafras Road	0.23 Miles S of US 301	Jacobs Creek
MD 290	Galena Sassafras Road	1.91 Miles S of US 301	Sawmill Creek
MD 290	Galena Sassafras Road	0.60 Miles N of MD 213	Olivet Hill Branch
MD 291	River Road	0.19 Miles W of US 301	Mills Branch
MD 291	Cypress Road	0.24 Miles E of MD 313	Cypress Branch
MD 299	Galena Sassafras Road	On Cecil County Line	Sassafras River
MD 299	Galena Sassafras Road	0.46 Miles S of Cecil County	Branch of Sassafras River

Route #	Road Name	Location	Waterway
MD 299	Massey Road	1.27 Miles S of MD 290	Jacobs Creek
MD 445	Tolchester Road	2.60 Miles S of MD 21	Swan Creek
MD 445	Tolchester Road	2.90 Miles S of MD 21	Swan Creek
MD 446	Broad Neck Road	0.80 Miles S of MD 20	Mill Pond Creek
MD 674	E Sharp Street	0.25 Miles W of MD 20	Grays Inn Creek
MD 291	Morgnec Road	1.82 Miles E of MD 213 (Morgan Creek Bridge)	Morgan Creek
MD 213	Augustine Herman Highway	On Cecil County Line (Sassafras River Bridge)	Sassafras River
MD 290	Crumpton Road	On Queen Anne's County Line	Chester River
MD 213	Maple Avenue	On Queen Anne's County Line (Chester River Bridge)	Chester River
Co. Road 388	Langford Road	0.01 Miles W of Co. Road 83 (Brices Mill Road)	Mill Pond
Co. Road 388	Langford Road	0.01 Miles E of Co. Road 83 (Brices Mill Road)	East Fork Langford Creek
Co. Road 233	Ricauds Branch Road	0.01 Miles E of Co. Road 79 (Sandy Bottom Road)	West Fork Langford Creek
Co. Road 239	Still Pond Creek Road	0.01 Miles S of Co. Road 56 (Bessicks Corner Road)	Still Pond Creek
Co. Road 307	Morgnec Road	0.2 Miles E of MD 298	Unnamed Stream
Co. Road 226	Chesterville Bridge Road	0.4 Miles W of US 301	Mills Branch
Co. Road 26	Big Stone Road	0.4 Miles S of MD 330	Cypress Branch
Co. Road 275	Rileys Neck Road	0.05 Miles N of MD 291	Unnamed Stream
Co. Road 40	Perkins Hill Road	0.3 Miles E of MD 213	Morgan Creek
Co. Road 25	Walnut Tree Road	0.8 Miles NW of Co. Road 3227	Cypress Branch
Co. Road 315	Kennedyville Road	0.8 Miles SE of MD 213	Morgan Creek
Co. Road 15	Lambson Forest Road	1 Mile E of MD 290	Mills Branch

Nuisance Flooding Location Map



Appendix II – Nuisance Flooding Committee Members

A. Steering Committee

Name	Agency
Ginger Gregg	Kent County Office of Emergency Services
Jim Bass	Eastern Shore Land Conservancy
Jim Wright	Kent County Department of Public Works
Mike Moulds	Kent County Department of Public Works
Stephanie Jones	Kent County Planning, Housing and Zoning

Stakeholders Committee

Nane	Agency
Carla Gerber	Kent County Planning, Housing and Zoning
Dan Voshell	Kent County Department of Public Works
Jeffrey Squires	Maryland State Highways Administration
Joe Blizzard	Kent County Soil Conservation District
John Lancaster	Maryland State Highways Administration
Karen Miller	Kent County Soil Conservation District
Kate McClure	University of Maryland Sea Grant Extension
Kees DeMooy	Town of Chestertown
Marty Holden	Kent County Department of Public Works

Appendix III – Nuisance Flooding Documentation Tool

9-1-1 Nuisance Flood Log

Date	Time	Caller's Name	Caller's Phone	Dispatcher	Location Information	Impacts	Agency Notified	Agency Staff Notified (Name)	Action Taken (if Known)/ Notes

Larry Hogan
Governor
Boyd Rutherford
Lt. Governor