North Carolina Flood Resiliency Blueprint Technical Advisory Group Meeting #5

Hazard Identification TAG

November 2, 2023

10:00am – 12:00pm

NORTH CAROLINA
Department of Environmental Quality

Meeting Agenda

- Introductions (10 min)
- Project Recap/Background (5 min)
- Review of Recent Meetings (10 min)
- Notable Adjustments (5 min)
- Progress Since Last Meeting – Recommendations (60 min)
- Discussion on Upcoming Workshops (20 min)
- Next Steps (10 min)

Introductions

TAG Members

Hazard TAG Members

Tom Langan- TAG CHAIR	NC Department of Public Safety/Floodplain Mapping Program
Adam Gold	Environmental Defense Fund
Danica Schaffer-Smith	The Nature Conservancy
Doug Marcy	NOAA
Gian Tavares	American Flood Coalition
John C Weaver	USGS South Atlantic Water Science Center
Kathryn Gaasch	NC Inclusive Disaster Recovery Network/ MDC Rural Forward
Klaus Albertin	NC DEQ/ Division of Water Resources
Kurt Golembesky	NC Department of Transportation/ Hydraulics Unit
Mackenzie Todd	NC DEQ/ Division of Coastal Management
Rick Luettich	University of North Carolina-Chapel Hill Institute of Marine Science
Wesley Brown	USACE

Project Recap/Background

Project Purpose, Goals and Phases Summary

Purpose of Blueprint

Three main goals of Blueprint deal with mitigating and increasing resilience against inland flooding in North Carolina:

1

Reduce likelihood and extent
Likelihood refers to the probability or frequency of the hazard occurrence. Extent refers to potential injury or damages that may result of a given intensity in a given area.

2

Reduce vulnerability and impact
Vulnerability is the inability to resist a hazard or respond to when a disaster has occurred. Impact deals with property damage and loss of life.

3

Increase community ability to maintain and quickly resume pre-storm activities
Continuity of operations or an expedited recovery allow for essential functions to be performed.

Project Goals

The flood resiliency blueprint will accomplish several key goals, including:

Develop community and basin-specific risk management processes to identify and address flooding for NC communities

Develop an online decision support tool to guide state, county, municipal jurisdictions to identify and select flood mitigation strategies responsibly, systematically, equitably, and transparently.

Establish a repeatable, statewide methodology for prioritizing, and selecting flood mitigation strategies for future implementation.

Statutory Authority (1/3)

S.L. 2021-180 Sec 5.9(c) Requirements

- Contract with an organization to **develop a statewide Flood Resiliency Blueprint** for major watersheds impacted by flooding, including, among others, the Cape Fear River and the Neuse River Basins
- Shall form the **backbone of a State flood planning process** that **increases community resiliency to flooding**
- Shall be a resource for riverine and stream management to reduce flooding
- Should support the establishment and furtherance of local government stormwater maintenance programs

Statutory Authority (2/3)

- Shall identify the major watersheds affected by flooding and direct these funds toward the activities which are central to the creation of an actionable Blueprint, namely:
  - Flood risk assessments
  - Identification of data gaps
  - Recommendations to reduce flood risk for each target basin
- Shall ensure the Blueprint incorporates local knowledge, community goals, projects of future flood risk, best available science and hydrologic science to create a decision tool for flood mitigation investments and strategies from local watersheds up to whole river basins
- **Lead to a prioritized set of projects and funding strategies** that can be implemented by state agencies, local government, and regional resource managers

Statutory Authority (3/3)

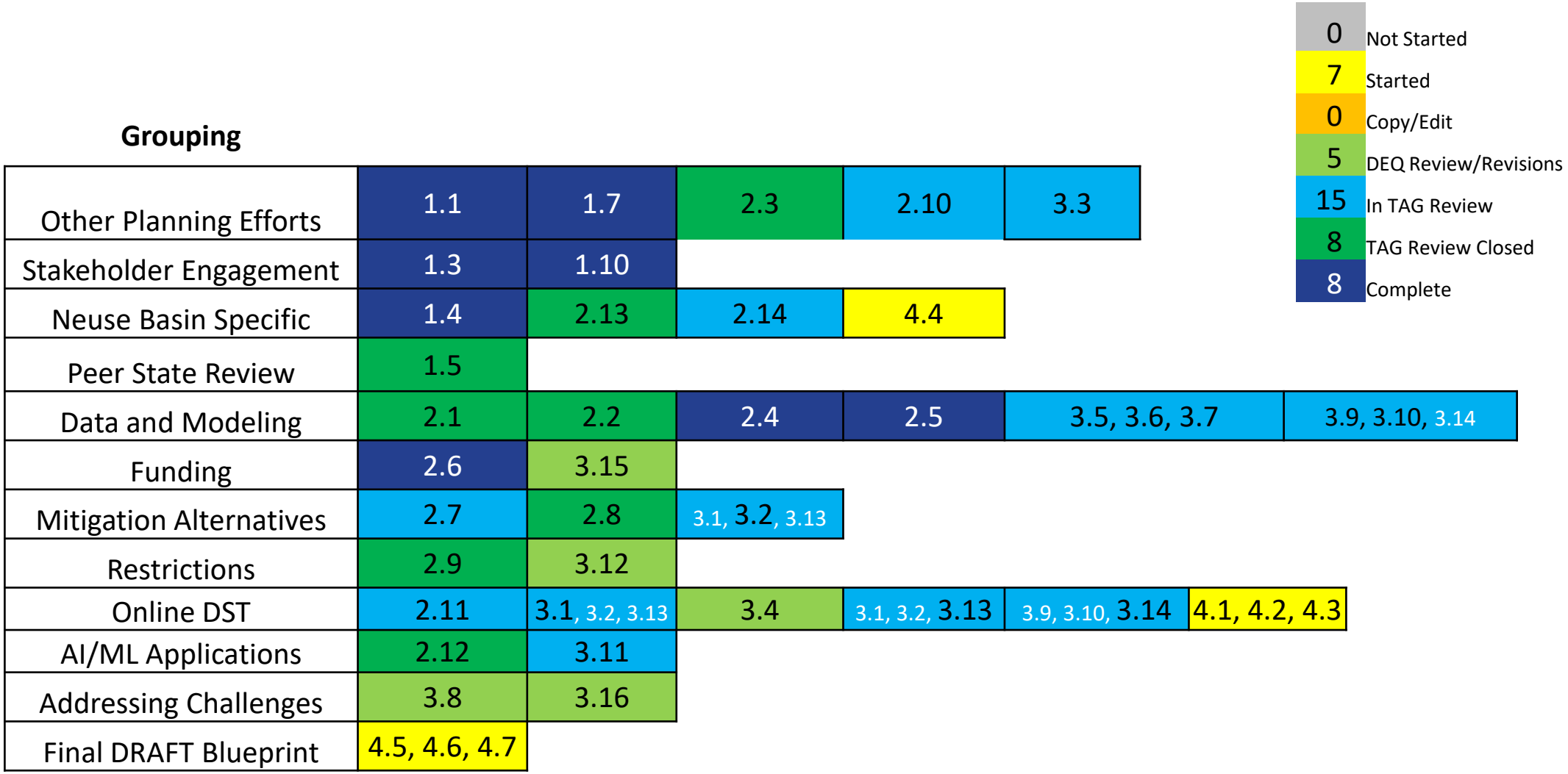
- DMS and the organization selected are encouraged to **examine examples from other states** such as the Louisiana Coastal Master Plan or the flood resiliency planning processes in South Carolina and Virginia.
- The organization shall send all necessary information to DMS on the implementation of the Blueprint upon request by DMS.
- The organization shall submit an initial **draft of the Blueprint to DMS no later than December 3, 2023.**
- DMS shall report by July 1, 2022 and annually thereafter to the Joint Legislature Commission on Governmental Operations and the Fiscal Research Division on the implementation of this subsection.

Phase Overview

The Blueprint project is split into phases, the first of which began in December 2022.

Phase One	Phase Two	Phase Three
1. Covers the development of a draft Blueprint 2. Mockup of the online decision support tool 3. Stakeholder outreach and internal meetings 4. Neuse River Action Strategy (pilot)	1. Complete development of online decision support tool (to run concurrently with Phase One) 2. Now under contract as of 11/1/23	1. See the application of the online support tool in river basins statewide 2. Include action strategies for certain targeted basins 3. Test and validate the online support tool
2022-2023	**2023-2024**	**2024**

Blueprint Subtask Flow Paths



TAG Reviewers

Task	Document	Primary Reviewer	Secondary Reviewer
2.7	Existing flood resiliency strategy inventory	Resilience/Mitigation/Reduction	
2.10	Identification of existing recommendations	Resilience/Mitigation/Reduction	Governance
2.11	Identification of existing flood mitigation decision tools	Tool Development/Acceptance	
2.12	Identification of AI/ML tools for Blueprint	Vulnerability/Risk/Impact	Tool Development/Acceptance
2.14	Neuse Action Strategy - Analysis of under-served floodprone communities	Neuse River Advisory Board	
3.1, 3.2, 3.13	• Risk decision-making tools recommendations • Tool and flooding issue linkage recommendations • Administering the decision-making tool recommendations	• Tool Development/Acceptance • Governance	
3.5, 3.6, 3.7	• Open-source H&H modeling approach recommendations • Decision tool storm frequency recommendations • Climate forecast model recommendations	• Hazard Identification • Vulnerability/Risk/Impact	
3.9, 3.10, 3.14	• Standardizing statewide dataset and model implementation recommendations • Immediate statewide effort recommendations • Blueprint maintenance recommendations	• Hazard Identification • Resilience/Mitigation/Reduction • Tool Development/Acceptance	Partnership/Funding
3.11	AI/ML utilization recommendations	Vulnerability/Risk/Impact	Tool Development/Acceptance
Task	**Upcoming Document**	**Primary Reviewer**	**Secondary Reviewer**
3.3	Other flood resiliency effort integration recommendations	Resilience/Mitigation/Reduction	Partnership/Funding
3.4	Other entity value incorporation recommendations	Governance	Partnership/Funding
3.8, 3.16	• Addressing challenges from Task 1 and 2 (technology, programs, strategies) • Lessons learned documentation	Vulnerability/Risk/Impact	Tool Development/Acceptance
4.1, 4.2, 4.3	• Documentation of requirements • Storyboards • Wireframes and mockups	Tool Development/Acceptance	ALL
4.4	Draft Neuse Basin Flood Resiliency Action Strategy	Neuse River Advisory Board	
4.5	Draft North Carolina Flood Resiliency Blueprint	Resilience/Mitigation/Reduction	Tool Development/Acceptance

Review of Recent Meetings

1. TAG Meeting #4 in July 2023
2. Neuse Workshop Meeting in September 2023
3. FEMA FFRMS Presentation in September 2023
4. NC State (Dr. Barbara Doll) Presentation in September 2023
5. Neuse Modeling Presentation and Discussion in October 2023

Tag Meeting #4
July 24th 2023 at DEQ Green Square

Purpose: To discuss deliverables and comments about subtasks assigned to TAG members for review, familiarize themselves with materials and whereabouts, and discuss specific topics pertaining to individual TAG needs.

Major Findings:

1. Statewide standard modeling suggested particularly for communities with limited capacity
2. Socio-economic aspects need to be included when determining tolerance/capacity
3. Clarity needed to decipher the tool itself from governance

Neuse Workshop Meeting
September 13, 2023 (virtual)

Purpose: To review the Draft Neuse Workshop Strategy Approach and summarize comments received thus far. Additional feedback from stakeholders were welcomed during this meeting.

Major Findings:

- Send materials out in a timely fashion
- Additional consideration for smaller communities is necessary
- Two online platforms were offered for use: publicinput.com and Metro Use
- Facilitate cooperation amongst entities (COGs, communities, counties, etc.) as it does not always exist
- Local leaders should be identified by the community, not just by agencies
- Show the potential impact(s) of Blueprint on the community to gain support

FEMA FFRMS Presentation

September 18, 2023 (virtual)

Purpose: FEMA offered to share work being completed for the Federal Flood Risk Management System with Advisory Groups and Blueprint Partners. This was provided by FEMA Region 4 in coordination with the Blueprint.

Major Findings:

- Established to encourage federal agencies to consider/manage current and future flood risk
- Standard was revoked then reinstated through EO 14030
- Requires agencies to prepare for and protect federally funded buildings and projects from flood risk
- Offers 3 approaches (CISA, FVA, 500-year floodplain)

Dr. Barbara Doll Presentation on Recent Research

September 21, 2023

Purpose: NC Sea Grant and NC State University conducted extensive research and analysis on flooding in Eastern North Carolina in the *Evaluation of Natural Infrastructure for Flood Mitigation and Water Quality Benefits.* The presentation reviews natural infrastructure (NI) measures and applications/examples that could be extrapolated for the Neuse Basin.

Major Findings:

- Combined (structural and natural) measures are necessary to mitigate flooding
- Floodplains flood – remove structures from flood prone areas
- Prevent new structures from being built in the floodplain (regulatory)
- Raise roads, enlarge bridges, and improve infrastructure to be more resilient
- Expand natural infrastructure

Neuse Modeling Presentation and Discussion

October 6, 2023, at DEQ Green Square (virtual option)

Purpose: This meeting was held to cover the intent and vision of Blueprint and to gain input on two different modeling approaches to exhibit the pros and cons of each.

Option 1 – The continuation of 2D rain on grid modeling that NCEM is currently performing statewide.

- More flooding sources and modeled frequencies
- Could serve as foundation for a second "Tier" of modeling that focuses on mitigation alternative analysis
- Consensus for Option 1 as recommended approach

Option 2 - A probabilistic approach to modeling including using numerous flood frequencies and durations and cloud computing to perform statistical analysis of results.

- Data and time processing intensive but should be considered as an option
- Data/models be developed to allow for efficient upgrade to a probabilistic approach if funding made available

Notable Adjustments

Neuse Workshops

Notable Adjustments

Neuse Workshops: Postponement

It has been decided to postpone Neuse Workshops until **early 2024** based on feedback received over the past several months and on the Neuse Workshop Strategy Approach document. The scope language is as follows:

> *Conduct at least four stakeholder workshops within the pilot river basin (Neuse) to address regional collaboration and decision making. Workshop must include Council of Governments, municipal and county leaders, private interest, non-governmental entities, and representatives of under-resourced and underserved populations including populations protected by Title VI of the Civil Rights Act.*

Notable Adjustments

Neuse Workshops: Content/Format

The Preliminary Draft Neuse Workshop Strategy / Approach document stated that the primary purpose of the workshops are to:

1. Provide an overview and answer any questions about the NC Flood Resiliency Blueprint and
2. Solicit input on the Neuse Basin Flood Resiliency Action Strategy

Since the Preliminary Draft Neuse Action Strategy will now be completed prior to the workshops, the structure, content, and engagement mechanisms previously suggested are subject to change.

A refined strategy capturing the additional outreach input will be developed in 2024, in addition to new modeling and project identification efforts.

Progress (July-Present)

Deliverables Completed/Upcoming, Task 3 Recommendations

Progress (July-Present)
Deliverables Approved and In Review

Approved

1.1 Literature Review (Secondary)

1.3 Stakeholder Engagement Plan (all TAGs)

2.1 Inventory Types and Sources of Flooding

1.10 Blueprint Recommendations Process (all TAGs)

2.4 H&H Modeling Gap Analysis

2.5 Future Flood Hazard Gap Analysis

In Review

3.5+3.6+3.7 Recommendations for Open-Source H&H Modeling, Storm Frequencies, and Climate Forecast Models Support Tools

3.9+3.10+3.14 Recommendations for Standardizing Statewide Datasets and Model Implementation

Progress (July-Present)
Upcoming Deliverables

To Be Completed

4.5 Draft North Carolina Flood Resiliency Blueprint

Scope Language

Subtask	Name / Description
4.5	Draft North Carolina Flood Resiliency Blueprint, a procedural document that serves as a manual for conducting flood resiliency planning at the river basin level. This document draws on information and lessons learned from the pilot basin and considers stakeholder input and data; however, it is intended to be a high- level comprehensive document that establishes how flood resiliency plans will be developed moving forward. This document shall include a decision framework that will lead future implementers through the planning process by identifying decision points, actions, and possible outcomes for each stage of the planning process. A phased approach including tasks and deliverables that streamline the overall stakeholder, analysis, and modeling processes will be defined to facilitate the development of future scopes of work. The document shall make recommendations including policy and governance strategies that could be incorporated at the state, regional, and community levels to coordinate efforts, affect change and improve the overall flood resiliency planning process.

Progress (July-Present)
Input on Recommendations (continued):

3.5 Open-Source H&H Modeling Approach Recommendations:

- Utilize 2D HEC-RAS models to evaluate basin-wide effects of implementing potential mitigation strategies at different recurrence intervals within targeted basins.
- Leverage RAS Mapper terrain modifications to efficiently model mitigation alternatives including structural and nature-based alternatives (channel modifications/improvements, diversions/re-alignment, detention/retention basins, wetland restoration).
- Utilize RAS Mapper within HEC-RAS for initial floodplain mapping generation and development of raster products including water surface elevation rasters that allow for building level risk assessments needed to inform benefit-cost analyses for potential mitigation strategies.

Progress (July-Present)
Input on Recommendations:

3.5 Open-Source H&H Modeling Approach Recommendations:

- Utilize 2D H&H modeling methods using the open-source HEC-RAS model (and associated RAS Mapper GIS) and the rain-on-grid approach that integrates hydrology and hydraulics in the same model platform as the basis for the Blueprint modeling efforts.
- Leverage available HEC-RAS model geometry developed from the field survey of channels and hydraulic structures that is available in the NCFMP FLOOD database to implement targeted and scalable improvements to base-level 2D modeling.
- Reanalyze the available advisory 2D modeling from NCFMP to allow mainstream flow to propagate downstream and provide valid flood impact results for the mainstream within the model.

Progress (July-Present)
Input on Recommendations (continued):

3.5 Open-Source H&H Modeling Approach Recommendations:

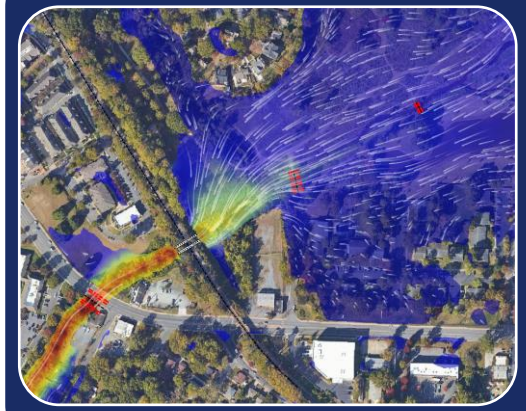
- Utilize spatial-varied precipitation data within HEC-RAS to calibrate 2D rain-on-grid models to known events to improve model accuracy and to model future events derived from climate models.
- Leverage stakeholder relationships with USACE, USGS and UNC (RENCI center) for coastal modeling needs using ADCIRC or similar.
- Use ADCIRC coastal modeling results (or similar) as boundary conditions for upland riverine 2D models to provide combined flood hazard awareness of fluvial, pluvial, and coastal flooding.
- Leverage stakeholder relationships with USGS for Groundwater modeling using MODFLOW or similar.

Modeling Scale and Usability

2 Tier Modeling Approach

Large-Scale Basin Modeling

- Cost Effective for Hazard Identification / Mapping
- Basin Wide Risk/Loss Estimation
- Communicating Flood Risk
- Good for Mitigation Alternatives: ***(Elevation, Acquisition, Flood Proofing, Detention, Wetland Enhancement, Water Farming, Natural Infrastructure, etc)***



Project/Site Specific 2D Modeling

- Developed by enhancing Basin Scale 2D Modeling
- Smaller Model Footprint
- Refined with Enhanced Data and Alternative
- Good for Mitigation Alternatives: ***(Grey Infrastructure, Culvert /Bridge Replacement, Levees, Channel Improvement, Regional Facilities, etc.***

Recommendations Discussion on Subtask 3.5

Identified as Secondary Contributor

Progress (July-Present)
Input on Recommendations (continued):

3.6 Decision Tool Storm Frequency Option Recommendations:

- Maintain consistency with the wide range of storm frequencies currently being modeled for the Advisory 2D mapping effort undertaken by the NCFMP. This will include the 20, 10, 4, 2, 1, 0.5, 0.2, and 0.1 (5-, 10-, 25-, 50-, 100-, 200-, 500-, and 1,000-yr) events as well as the 1%+/- (the statistical upper and lower bounds of the 1% event) and three "future" conditions events by increasing the 1% rainfall by 10, 20, and 30%.
- Implement the FVA approach recommended by FEMA through the FFRMS standard to easily develop two additional flood events by adding 2-feet and 3-feet to the 1% annual chance flood elevations developed from the results of HEC-RAS 2D modeling.

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Recommendations Discussion on Subtask 3.6

Decision Tool Storm Frequency Option Recommendations

Progress (July-Present)
Input on Recommendations (continued):

3.7 Climate Forecast Model Selection Recommendations:

- Utilize the MACA CMIP5 RCP8.5 statistically downscaled climate projection to develop future climate conditions. Perform comparisons of the downscaled rainfall to the pre-defined future condition profiles outlined above (1% +10-, 20-, and 30%) to determine if additional H&H modeling profiles are needed to analyze future conditions flooding more fully.
- Climate modeling is constantly changing and evolving with new data and technology. The Blueprint must allow for refreshes/updates as new data (such as additional variables for downscaled CMIP6 projections which are not available yet) become available.
- When evaluating smaller drainage areas where downscaled precipitation will not provide an adequate level of detail, implement the use of Atlas 15 once it is available. Include SLR estimates based on NOAA's 2022 Technical Report when setting downstream boundary conditions for H&H models in coastal environments.

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Recommendations Discussion on Subtask 3.7

Climate Forecast Model Selection Recommendations

Progress (July-Present)

Input on Recommendations (continued): Dataset 1: Topographic Data

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- North Carolina should continue to provide annual updates to the LiDAR datasets by Phase. This will ensure that no areas of the state have topographic datasets that are more than five years old.
- North Carolina should continue to enhance the LiDAR / remote sensing products to include classified building outlines, roadways, and bridges. This will allow for semi-automated extraction of building polygons, and 3D road elevation datasets for risk assessment and disaster response.
- North Carolina should continue to distribute these topographic datasets publicly via the Spatial Data Download tool. This tool and website should be maintained and updated to allow additional functionality and enhancements.

Progress (July-Present)

Input on Recommendations (continued): Dataset 1: Topographic Data

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- Remote sensed LiDAR data should be leveraged to develop or enhance land use/ land cover datasets, as well as impervious coverage datasets statewide. These datasets should be maintained on a frequency synchronized with the LiDAR phases.
- North Carolina should consider using technology such as change detection algorithms to detect newly constructed buildings that may be in either a Regulatory (FEMA) floodplain, Advisory (NC Floodplain Mapping Program), or additional modeling program developed by future phases of the Blueprint. These newly constructed buildings should be included in additional community outreach and mitigation alternatives where practical.

Recommendations Discussion on Subtasks

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

Dataset 1: Topographic Data

Progress (July-Present)

Input on Recommendations (continued): Dataset 2: Building Data

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- North Carolina should perform a complete update of the statewide building footprint database developed initially by NCEM in 2010-2013. This update should be initiated in 2024 in close coordination with NCEM and NC CGIA.
- Available Quality Level 1 LiDAR containing a “buildings” class in the classified LiDAR point cloud should be leveraged to every extent possible to reduce the development costs.
- First Floor Elevations were collected for approximately 135,000 buildings within the special flood hazard areas in North Carolina between 2011-2013. This data should be updated where new buildings have been constructed in the floodplains or have had significant modifications.

Progress (July-Present)

Input on Recommendations (continued): Dataset 2: Building Data

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations

3.10: Immediate statewide effort recommendations

3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- North Carolina should update and enhance the building footprint dataset to include the following minimum attributes for each building contained in proximity to a Special Flood Hazard Area or NC Advisory flood hazard areas:
  - First Floor Elevation Measurements
  - Lowest Adjacent Grade (LAG) elevation from LiDAR
  - Highest Adjacent Grade (LAG) elevation from LiDAR
  - Occupancy Type
  - Building Type
  - Number of Stories
  - Foundation Type

Progress (July-Present)

Input on Recommendations (continued): Dataset 2: Building Data

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations

3.10: Immediate statewide effort recommendations

3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- Building footprint data should be updated annually in synch with the LiDAR collection, using classification techniques to extract added, removed, or significantly modified buildings using change detection algorithms. These LiDAR derived buildings should be part of the LiDAR scope of services and deliverables annually.
- Blueprint decision support tools should leverage this data through web services in order to avoid data duplication while sharing this data with other web-based applications (Flood Risk Information System, FIMAN, SERA, Flood.NC.Gov and others).
- Footprint data should be publicly available via the State's Spatial Data Download portal hosted by NCEM.

Recommendations Discussion on Subtasks

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

Dataset 2: Building Data

Progress (July-Present)

Input on Recommendations (continued):

Dataset 3: Critical Infrastructure/Key Resources

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations

3.10: Immediate statewide effort recommendations

3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- North Carolina should conduct a detailed gap analysis of existing Critical Infrastructure and Key Resources datasets available at the statewide and countywide scale. The results of this gap analysis will be a recommendation for dataset enhancements.
- The Blueprint team should work in conjunction with NCEM to develop a statewide database schema for Critical Infrastructure and Key Resources.
- North Carolina should develop the geospatial data layer for Critical Infrastructure and Key Resources statewide.

Recommendations Discussion on Subtasks

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

Dataset 3: Critical Infrastructure/Key Resources

Progress (July-Present)

Input on Recommendations (continued):

Dataset 4: Statewide "Risk" Scores for Building/Transportation Assets

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations

3.10: Immediate statewide effort recommendations

3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- Building Flood Risk Scores
  - NC Flood Resiliency Blueprint recommends similar flood risk score be established for every building within the pilot Neuse River Basin, and eventually all river basins statewide.
  - It is recommended that the statewide flood risk scores include a subset of components used in Mecklenburg County example as statewide collection of several of the dataset components required would be cost prohibitive.

Recommendations Discussion on Subtasks

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

Dataset 4: Statewide "Risk" Scores for Building/Transportation Assets

Progress (July-Present)

Input on Recommendations (continued):

Dataset 4: Statewide "Risk" Scores for Building/Transportation Assets

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- Transportation Flood Risk Scores
  - Transportation assets could be scored based on roadway classification, flood probability, and depth.
  - The Transportation Flood Risk Scores could be applied to at-risk segments of the road.
  - Flood mitigation alternatives can be evaluated based on any benefits from reduction in flooding along at-risk transportation corridors.
  - Scores can be cumulated or aggregated like the building level flood risk scores for baseline conditions and flood resilience program tracking.

Progress (July-Present)

Input on Recommendations (continued):

Dataset 5: Statewide Transportation Hydraulic Crossing Dataset

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations

3.10: Immediate statewide effort recommendations

3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

- Consider developing a pilot program to enhance the existing NCDOT hydraulic structure inventory for the Neuse River Basin. This dataset would be enhanced with data from best available sources and/or field collected data as needed.
- The pilot data will be developed into a standardized geospatial dataset that will aid in the refinement of 2D hydraulic modeling.
- After the completion of the Pilot collection for the Neuse River Basin, a sensitivity analysis should be performed on 2D modeling containing the enhanced structures and 2D modeling using traditional methods. The results of this pilot sensitivity analysis will dictate if there is benefit to statewide implementation.

Recommendations Discussion on Subtasks

3.9: Standardizing Statewide Datasets and Model Implementation Recommendations
3.10: Immediate statewide effort recommendations
3.14: Recommendations on strategies to maintain the Blueprint including update frequencies and strategies.

Dataset 5: Statewide Transportation Hydraulic Crossing Dataset

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Neuse Workshops

Workshop Feedback, Engagement Examples

Neuse Workshops
Comments Reviewed and Categorized

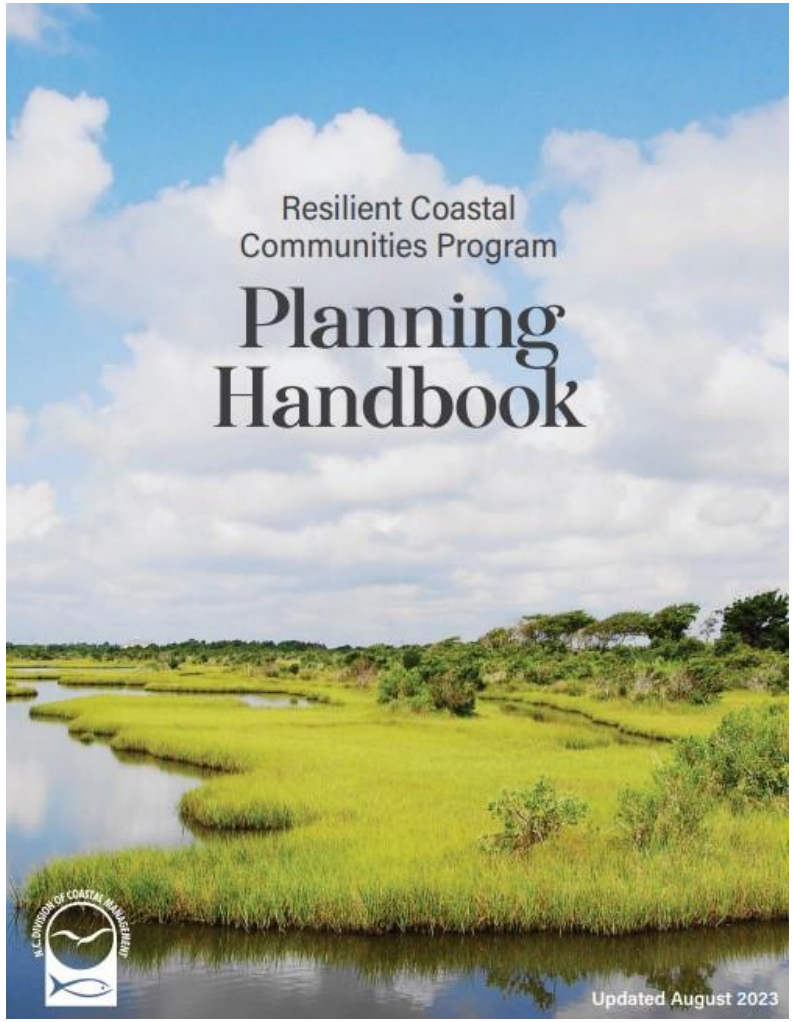
Neuse Advisory Group and other TAG members were asked to provide feedback on the Draft Neuse Workshop Strategy Approach. A total of 63 comments were collected, reviewed and categorized.

Comment Category	Meaning
Not Started	Incomplete
In Progress	Underway/To Be Completed
Addressed	Addressed Within Existing Document
Requires Follow-Up	Raise/Defer to DEQ (larger scale)
Meeting/Review Flag	Raise/Defer to Planning Team/Stakeholder Specialist

**Majority of the comments fall within “Requires Follow-Up” or “Meeting/Review Flag” categorizations

Neuse Workshops

Engagement Examples – NC Resilient Coastal Communities Program



The program aims to facilitate a community-driven process and has created the RCCP Planning Handbook to guide contractors and local governments for completing Phases 1 and 2, both of which heavily involve community engagement.

Phase 1: Community Engagement and Risk/Vulnerability Assessment

Phase 2: Planning, Project Identification, and Prioritization

Neuse Workshops

Engagement Examples – Resilient Coastal Communities Program

Phase 1: Community Engagement and Risk/Vulnerability Assessment:

1. Develop a Community Action Team
2. Review Existing Plans and Efforts
3. Set Vision and Goals
4. Develop a Community Engagement Strategy**
5. Identify and Map Critical Assets, Natural Infrastructure, and Socially Vulnerable Populations

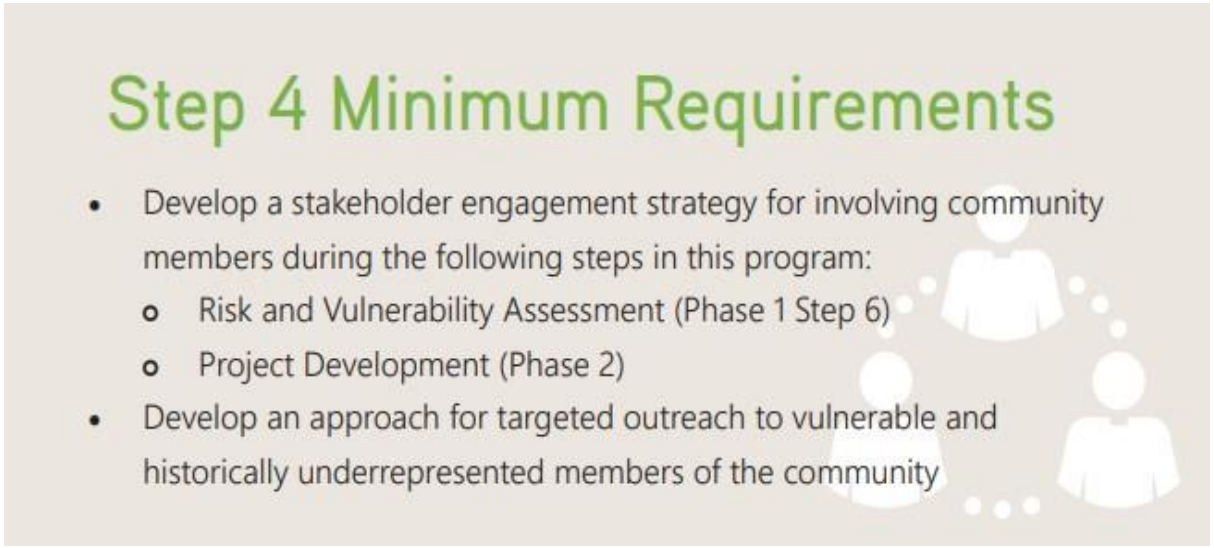
**Indicates high relevancy to Draft Neuse Workshop Strategy Approach

Neuse Workshops

Engagement Examples – Resilient Coastal Communities Program

Phase 1, Step 4: Develop a Community Engagement Strategy

- Provides diverse stakeholder categories and examples
- Highlights importance of inclusivity particularly vulnerable and historically underrepresented communities
- Lists engagement opportunities adopted from NOAA's *Common Stakeholder Participation Techniques* (method and description)



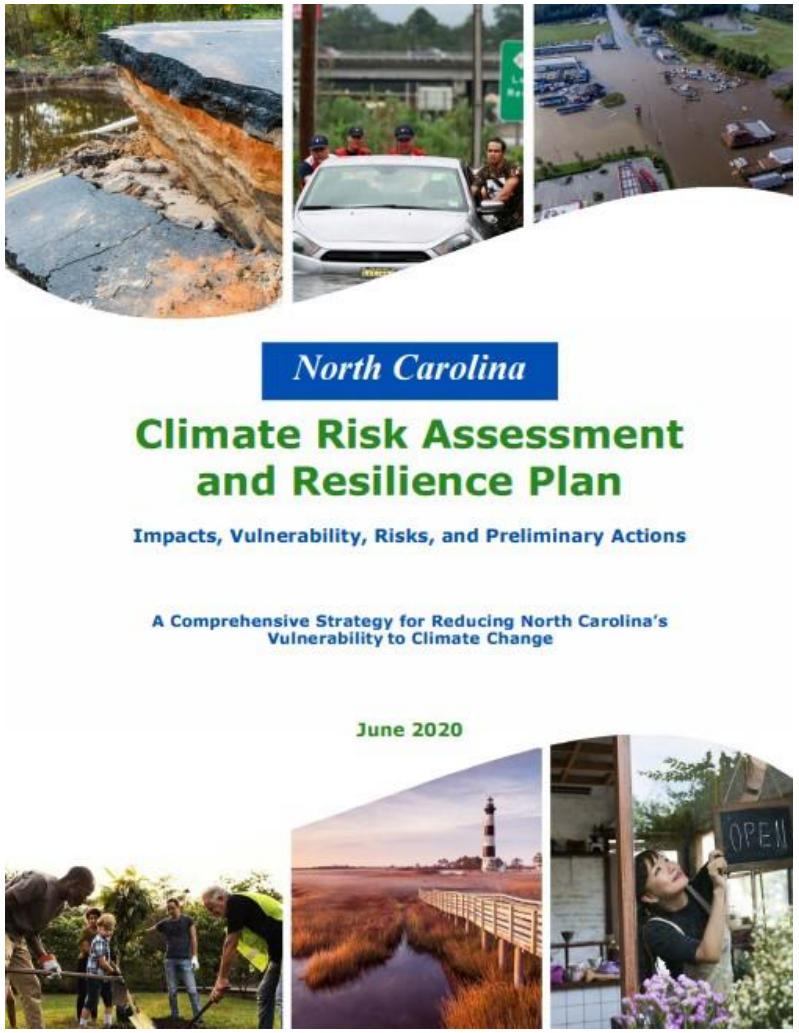
Additional Resources Linked:

https://www.communityresiliencebuilding.com/crbworkshopguide

https://coast.noaa.gov/data/digitalcoast/pdf/stakeholder-participation.pdf

Neuse Workshops

Engagement Examples – NC Climate Risk Assessment and Resilience Plan



This plan is the state's most comprehensive effort to date to address North Carolina's vulnerability to climate change. Included in the plan are workshop reports that were conducted in support of EO 80.

Section 9 of the order directs DEQ, with support of cabinet agencies and informed by stakeholder engagement, to prepare the 2020 Resilience Plan.

Neuse Workshops

Engagement Examples – NC Climate Risk Assessment and Resilience Plan

Mountain and Piedmont Regional Resiliency Workshop Report:

- Led by DEQ, workshops were planned, designed, and executed by a team of cabinet agencies, COGs, NGOs, and University partners
- Planning team was divided into two groups based on *geographic reach* and *influence* (Mountain and Piedmont)
- Over 200 stakeholders attended and over 300 provided input
- 2 workshops were held in the Mountain region; 3 in the Piedmont region
- Day-long workshops involved two educational Technical Sessions, a lunchtime presentation, and a 2-hour facilitated discussion

Neuse Workshops

Engagement Examples – NC Climate Risk Assessment and Resilience Plan

Mountain and Piedmont Regional Resiliency Workshop Report:

Technical Session 1	**How has the climate changed in the region and what is expected moving forward?** Lead climate experts provided an overview of historic, present, and projected regional climate patterns. Preliminary findings of the NC Climate Science Report were presented.
Technical Session 2	**How are climate hazards and impacts affecting the local community?** A panel of local government officials, state regional office staff, university partners, business owners, and NGO staff provided varied local perspectives on local hazards, impacts, and challenged. Approaches for managing short-and long-term environmental, economic, and societal changes associated with climate change hazards and impacts.
Lunchtime Presentation	**Regional resiliency solutions.** University partners tackled regional climate hazards and impacts and provided options for resiliency that can be implemented at the local level.
Facilitated Discussion	Participants were separated into six preassigned focus group areas based on professional roles and area of expertise: (1) Agriculture, Business, and Commerce, (2) Local Planning, (3) Public Health, (4) Environment and Natural Resources, (5) People and Community, and (6) Transportation.

Neuse Workshops

Brainstorming Engagement Style and Content

1. Who should be invited to the Neuse Workshops?
2. Should there be a focus on education vs. gathering feedback?
3. Are there particular entities that should be presenting/facilitating?
4. Where should these meetings take place for optimal turnout (geographically and/or venue-specific)?
5. How long should these workshops be? Specific times?
6. What engagement measures should be employed (i.e. Menti poll)
7. Should the Draft Action Strategy (or major findings) be shared at this time?

Open Discussion

Questions, Comments, Concerns

Next Steps / Pressing Questions

- Keep an eye out for upcoming deliverables:
    1. 4.1 Documentation of Requirements (all TAGs)
    2. 4.2 Storyboards (all TAGs)
    3. 4.3 Wireframes and Mockups (all TAGs)
    4. 4.4 Neuse Action Strategy
    5. 4.5 Draft North Carolina Flood Resiliency Blueprint (all TAGs)
- December 6th, 2023 – Full TAG/PAG meeting to present/discuss Preliminary Draft Blueprint Document
- December 19th, 2023 – Full TAG meeting to discuss Preliminary Draft Neuse Action Strategy