ATTACHMENT A

BRISTOL COUNTY ROUTE 114 RESILIENCE PLAN
SCOPE OF WORK

PROJECT PURPOSE

Rhode Island State Route 114 is a key north-south regional connector in the state's East Bay transportation network. For the communities of Bristol, Warren and Barrington, Route 114 is their "Main Street" central to their commercial, educational and housing systems. In each Town's planning and emergency management documents, Route 114 is recognized as their critical evacuation route. State Climate Planning documents and each of the local communities' Municipal Resilience Plans and Hazard Mitigation Plans acknowledge that the functionality and long-term existence of Route 114 is threatened by climate change impacts.

This critical infrastructure runs through several low-lying areas along the shoreline that are already susceptible to flooding. During the pre-Christmas 2022 floods, several segments of this road were under water during high tide. These conditions will only continue to worsen in the future with increasing sea level rise. STORMTOOLS provides compelling data of the severity of potential future flooding along this corridor.

Even temporary loss of this state-owned collector road would result in dramatic community impacts. These potential impacts could range from disconnected neighborhoods for emergency services, to loss of economic production, to loss of neighborhoods and infrastructure. The potential vulnerabilities, risks to this critical infrastructure, and a plan to control those risks need to be better understood such that communities can start positioning resources to transition to a more resilient community.

PROJECT GOALS AND OBJECTIVES

This project is much more than just making the Route 114 more resilient to future flooding, it is an opportunity to both improve resilience in the neighborhoods surrounding this transportation corridor as well as create value beyond resilience. Given the scale of federal and state funding opportunities that are now available and are likely to grow, this project is an opportunity to make improvements that will support each community's long-term goals.

Our goal is to engage local and state stakeholders and the public, to develop a purposeful plan that positions these communities to maximize the value of the future investments that will be required to make this transportation corridor resilient to future flooding. This includes prioritizing actions that balance flood risk and cost as well as maximize the opportunity to create additional benefits for a community.

SCOPE OF SERVICES

Task 1: Project Initiation

The Consultant shall coordinate with Statewide Planning staff to schedule and facilitate a kickoff meeting, led by the Consultant, to establish a work program for the Route 114 Resilience Plan project, clarify roles, and to refine the project schedule and scope. The emphasis of this meeting will be on the Consultant's planned management, administrative, and technical approach. The kickoff meeting will provide the consultant with a forum to introduce the consultant project manager and proposed project team members and solicit input from Statewide Planning and the Towns on the individual elements of the project approach.

The Consultant shall present their project approach regarding scope and schedule and propose a detailed flow of data and analysis between Statewide Planning staff and the Consultant, including responsibilities for data collection, mapping, and analysis. The consultant will use this meeting to also better understand project needs and deliverable requirements which will include the following:

- Understand each community's vision and short- and long-term plans for the Route 114 corridor. This will start by reviewing relevant materials and planning documents as outlined in the RFP and begin an ongoing conversation on what could be possible for each community to create as part of this project.
- Use StormTools to define potential Areas of Vulnerability (AOVs) that will be the focus of this project. We will confirm these during the meeting.
- Begin the conversation on how risk, vulnerability and exposure will be evaluated. This will be important to build consensus among stakeholders on the framework that will be used to identify and prioritize actions as well build stakeholder's awareness to better understand the dynamics of changing risk.
- Begin the discussion on format and presentation of project deliverables. We believe that the quality and presentation of quality of deliverables is essential to people understanding and accepting the plan and ultimately implementing the plan.
- Confirm the community engagement program and tailoring as appropriate for each community. This is described further in the next task.

Task 1 Deliverables:

- Project Initiation Meeting notes summarizing major points made during the meeting and decisions.
- Summary of StormTools mapped Areas of Vulnerability that will be the focus of this study.
- Example of vulnerability assessment matrix.
- Example deliverable formats.
- Finalized work plan with timeline, benchmarks, and deliverables.
- Schedule of Project Management Team meeting dates, to be held bi-weekly, or more frequently, as necessary.

Task 2: Public Participation

The Consultant shall develop and implement a Public Participation Plan to guide the process of engagement and outreach. This Plan shall include the following elements:

- The consultant will conduct bi-weekly phone calls or virtual conference calls with representatives of the Division of Statewide Planning and the Towns of Bristol, Barrington, and Warren (Project Management Team) that will serve as update meetings. A standing agenda will be created for the first call which will be used throughout the duration of the project; no additional materials will be prepared for these meetings. Conference calls are planned to be one hour long or less.
- Stakeholder workshops with Project Management Team and Town representatives. The goal of these workshops will be to work directly with the Consultant team to actively review findings and reach consensus on recommendations and findings before communicating them to the public.
    - The target audience for the Stakeholder workshops will be representatives of the Towns, Statewide Planning, RIDOT, RIPTA, and other state and local agency representatives.
    - The following stakeholder workshops will take place throughout the duration of the project.
        - Results of existing and future conditions analysis and confirming Areas of Vulnerability that will be the focus of this project (virtual).
        - Review Vulnerability Assessment for each AOV, finalize risk scores and reach consensus on prioritization of AOVs and critical infrastructure (virtual).
        - Review Alternatives Analysis for each AOV and reach consensus on general approach to improve flood resilience in each AOV. This workshop will also review the Alternative Routes Analysis.
        - Review proposed recommended plan and prioritized actions.

- Public Meetings. Six public workshops will take place throughout the duration of the project. These workshops will be held in person and may be recorded by the State and participating towns for their use in sharing the information with the public through digital and broadcast media. The public meetings for this phase of the project will be delivered at key points of the project process, and focus on the following topics:

- **Workshop 1:** Project Summary and Listening Session (near end of Task 3). This will include one workshop in Barrington and one workshop in Bristol/Warren (two meetings total).
    - Introduction to the project,
    - Project goals and approach,
    - Presentation of Existing Conditions and Future Conditions Analysis
    - How people can stay informed on the project.
    - Open format workshop to solicit feedback from participants on their observations, concerns and goals.

- **Workshop 2:** Review of Risk Assessment and Prioritization (near end of Task 4). This will include one workshop in Barrington and one workshop in Bristol/Warren (two meetings total).

    - Project summary
    - Review of Workshop 1 points and outcomes
    - Presentation of Vulnerability Analysis

- **Workshop 3:** Summary of Findings (during Task 6). This will include one workshop in Barrington and one workshop in Bristol/Warren (two meetings total).

- At least one of the six workshops will be held in the Town of Bristol.

The Consultant will provide the Project Management Team with recommended agendas for the workshops, presentations on the project, the proposed project approach, data, scenarios, and other information, soliciting input and identifying next steps, upon request in electronic format. Two members of the Consultant team will attend each workshop to make the presentation and assist the State and towns in facilitation.

The Consultant shall be responsible for preparing meeting materials, participating in and facilitating Stakeholder meetings and public meetings as identified above. The Project Management Team will be responsible for all logistical organization and implementation of the meetings and workshops in this task including securing meeting spaces and promoting/advertising meetings to the public. Meeting materials shall be submitted to the Project Manager at least one week prior to the meeting date.

Task 2 Deliverables:

- Public Involvement Plan
- Six (6) public workshops and written summaries of Workshops
- Two (2) in-person and two (2) virtual Stakeholder Meetings.
- Prepare presentation materials (PowerPoint Presentations, handouts, illustrations and maps, etc.).
- Written summary of bi-weekly update conference calls.

Task 3: Data Collection and Existing and Future Conditions Analysis

The purpose of this task is to collect and utilize existing sources of data in order to develop an understanding of existing and future conditions related to flood risk within the project area. This analysis will form the groundwork of the future work that will be completed as part of this study.

This task will also identify the Areas of Vulnerability along the Route 114 corridor that will be the focus of this study.

Task 3.1: Existing and Physical Conditions Analysis

The Consultant shall review existing plans, studies, programs, and datasets relevant to this project, including, but not limited to those listed below. This task does not include any field work or data collection and will rely solely on existing state and local electronic data.

Datasets to be Reviewed:

- Rhode Island STORMTOOLS
- SLAMM (Sea Level Affecting Marsh Migration) Maps
- RI Travel Demand Model data
- eSTIP viewer for town projects

In order to keep costs down, and to assist the consultant, we understand that the Towns and the Division of Statewide Planning will provide the following digital data for GIS mapping and existing conditions analysis:

- Public utility maps
- Building footprints base map
- Parks and open space base map
- AADT
- Functional Classification
- On-street parking
- Pavement quality
- Repaving schedule
- Trails, bike paths, and bike facilities
- Transit routes and transit stops
- Pavement width
- Historic pavement materials
- Intersection controls, including signals, stop and yield
- Zoning boundaries
- Parcel boundaries
- National Register of Historic Places properties
- Regional attractors
- Water bodies and access points to the water
- Universities and Institutions
- K–12 schools: public, private, and charter
- Senior housing and day facilities
- Railroad
- Neighborhood names and boundaries
- Existing and Future land uses
- Town-owned parcels
- Topographic contours

Plans and Studies to be Reviewed:

- Preparing for Resilience: Barrington and Warren Mixed-Use Climate Response Demonstration Site
- 2021 Market to Metacom Economic Study
- A Future with Water: Sea Level Rise in Rhode Island (UPENN 2018 Graduate City & Regional Planning Studio deliverable)
- RIDSP Sea Level Rise Transportation Analysis
- URI Coastal Institute Climate Response Demonstration Sites (NOTE: Transportation workshop summary is included on Page 11)
- Envision Resilience Narragansett Bay Challenge
- Town of Barrington Comprehensive Plan
- Town of Bristol Comprehensive Plan
- Town of Warren Comprehensive Plan
- Town of Bristol Hazard Mitigation Plan
- Town of Warren Hazard & Flood Mitigation Plan
- Town of Barrington Hazard Mitigation and Flood Management Plan

The Consultant shall perform a desktop analysis using Geographic Information Systems (GIS) and other tools at their discretion to determine if any data gaps exist and to understand how to use existing data to perform Task 4: Vulnerability Analysis. The Consultant shall compile a GIS database of relevant data as referenced above that will serve as base mapping for this project. The Plans and Studies identified above will also be reviewed to assess how each plan intersects with the long-term goals for this project. Existing and adopted community and economic planning documents from the participating Towns will be incorporated into this database in order to better coordinate potential resilience adaptation actions that are ongoing or ingrained within regulations and capital plans.

Task 3.2: Existing and Future Conditions Flooding Assessment:

The project team will review existing climate projections and sea level rise scenarios for the State of Rhode Island, which includes a single 10-year and a single 100-year return period event for both current and a 2- foot sea level rise scenario from Rhode Island StormTools. Mapping will be prepared for each AOV to summarizes extent and depth of flooding.

Task 3.3 Review of Existing Conditions
This task will include the following:

- Site visits to a maximum of seven (7) potential Areas of Vulnerability that were identified in Task 3.2. The purpose of the site visit will be to visually confirm information shown on base mapping and built assets that may be vulnerable as well as resources that could be leveraged to reduce future risk.
- Review of existing natural resources near each of potential AOVs and a summary of the future risks to those resources as well as the potential to adapt those resources to improve resilience to the built environment. These will be summarized graphically based on a qualitative review.
- Interview Planners for each community to better understand each Community's short- and long-term vision for the Route 114 corridor as well as appetite for general resilience approaches such as nature-based designs, road raising, retreat and hardened infrastructure. Existing flooding issues and concerns will also be documented during the interviews.
- Meet with RIDOT to introduce appropriate staff members from that agency to what is planned for this project as well as better understand RIDOT's vision for future resilience in this corridor. This will include reviewing State transportation plans and data to understand upcoming RIDOT projects in the corridor as well as the condition of existing infrastructure.
- Identify actions currently being done by municipalities and RIDOT to address known or future flood impacts.

Task 3.4 Prepare Existing and Future Conditions Summary Memorandum
The Consultant shall summarize the findings of Task 3.1 through 3.3 in a concise technical memorandum. This will include identifying potential Areas of Vulnerability (AOV) along the Route 114 corridor that will be the focus of future tasks. The memorandum will utilize a highly graphical format with less narrative in order to maximize its accessibility to the public and community leaders. This memorandum will include:

- Location of recommended AOVs that will be assessed as part of this study.
- Critical infrastructure (i.e. government and emergency facilities) and resources that that will be exposed in each AOV within the Route 114 corridor and critical elevations associated with that infrastructure.
- Summary of general opportunities and limitations that will apply over the entire project area as well as specific to AOVs.
  Mapped flood extent and depth for each identified AOV as developed in Task 3.2.

Task 3 Deliverables:

- Existing and Future Conditions Summary Memorandum (delivered in PDF and Word formats).
- Compiled electronic GIS database that includes relevant information.

Task 4: Vulnerability Analysis

The Consultant shall identify and assess vulnerability of infrastructure such as roadways and utilities to current and future flooding focused on flood resilience. The vulnerability assessment will be focused on the AOVs identified as part of Task 3. As part of this task, the Consultant shall analyze the vulnerability of the following elements:

- Built environment (evacuation routes, buildings, roads, bridges, water, utilities, energy, etc.)
- Social environment (health, emergency response, vulnerable populations, etc.)
- Cultural environments (native American tribes, environmental justice areas, etc.)
- Natural environment (aquatic, marine, terrestrial ecosystems, etc.)

This vulnerability assessment will consist of developing a composite risk score for each AOV that will provide a comparative score of relative vulnerability between AOVs and assets in order to allow actions in each AOV to be prioritized. This scoring will not include individual assets within an AOV and instead will be focused on generalized assets (e.g. road infrastructure, critical facilities, buildings, residences).

Flood risk will be calculated as the product of probability and exposure:

- Probability of flooding will be derived from whether the asset is within the current and 2-foot sea level rise floodplains for the 10-year or the 100-year flood.
- Exposure is generally a function of the value of the assets and population at risk. Potential factors that could be considered include exposure of disadvantaged communities, neighborhoods that rely on access to a road segment for evacuation and emergencies, other critical public assets (e.g. pump stations, hospitals, fire/police), impact to local economy, impact to residential neighborhoods, etc.

The following paragraphs describe the specific tasks that will be completed for this analysis.

Task 4.1 Develop Framework for Scoring Vulnerability

While probability of flooding will be calculated as part of Task 3.2, a framework will be developed to calculate exposure of infrastructure assets. Given the number of potential variables in how exposure scores can be calculated and the impossibility of considering every potential factor, we propose a workshop approach with stakeholders to review potential criteria as well as their relative weights to compare them. This discussion will begin at the Project Initiation meeting and finalized in subsequent stakeholder meetings. This approach will provide a defendable explanation of how risk is calculated and how projects are prioritized consistently between the three towns and will allow people to readily understand how vulnerability for each road segment in an AOV is scored and prioritized. In order to keep this tool accessible to stakeholders and the public, this matrix will include no more than 6-8 criteria.

This task will also include developing a framework on how risk scores will be composited for each AOV in order to account for the scale of infrastructure assets at risk within an AOV as well as for changing probability of flooding over time because of climate change impacts. A composite risk score will be used to prioritize actions between AOVs.

Task 4.2 Complete Risk Assessment

Using the framework developed as part of Task 4.1 and the information developed as part of Task 3, the Consultant will populate the rating matrix as part of Task 4.1 for each AOV. Risk scores will be calculated for critical infrastructure elements. This risk assessment will be limited to generalized assets including built infrastructure and significant natural resources identified in Task 3 in each AOV.

This task will also include a sensitivity analysis of the draft risk assessment to assess whether any individual criteria may be excessively influencing the scores. This will consist of testing several critical scores and assessing how they impact the overall scores and whether that is reasonable.

As part of a workshop included in Task 2, these risk assessments will be reviewed with stakeholders. During the workshop, criteria weights and scores will be reviewed with stakeholders and the values confirmed or adjusted. The risk assessment scores will be finalized at the end of this workshop and will be the basis of prioritizing future actions.

Task 4.3 Assess Adaptive Capacity of Each AOV

A strategic assessment will be conducted for each of the identified AOVs to assess the potential ability for existing natural and built assets to reduce flood risk. This will be based on scale of flooding anticipated and our general observations and experience based on existing built and natural resources in each AOV. As a result, only a qualitative score of adaptive capacity will be assigned to each AOV (i.e. "high adaptive capacity", "moderate adaptive capacity", "low adaptive capacity").

This adaptive capacity score will be used to modify the risk assessment scores to prioritize future actions.

Task 4.4 Prepare Vulnerability Assessment Memorandum

The Consultant shall summarize the findings of Task 4.1 through 4.3 in a concise technical memorandum. The memorandum will utilize a highly graphical format with less narrative in order to maximize its accessibility to the public and community leaders. This memorandum will include:

- Framework used and documented to complete the vulnerability assessment.
- Summary of potential adaptive capacity for each AOV.
- Final risk assessment and scores.
- Recommended prioritization of AOVs and critical infrastructure within AOVs.

Task 4 Deliverable:

- Vulnerability Assessment Memorandum (delivered in PDF and Word formats).

Task 5: Alternative Routes Analysis

The Consultant shall build upon the vulnerability assessment conducted in Task 4 and determine the scenarios and specific locations where Route 114 may become impassable and assess where and how to divert traffic should it become necessary. The Consultant shall take both a short-term view and a long-term view, making recommendations for permanent alternative routes in cases where frequent disruptions are expected to occur.

Using the information generated during vulnerability assessment, the team will prepare an assessment of the location-specific estimates of potential road closures taking place as a result of different flooding scenarios. These assessments will be based on the following factors:

- Short-term closures during storm events where temporary diversion of traffic is a feasible response and
- Long-term closures of existing roadways for sea level rise plus storm events impacts where physical adaptation of roadway segments as well as local and regional re-routing is required to ensure long-term functionality of the regional connections.

Based on these potential closures, we'll prepare recommendations for alternative routes based on the locations of roadway disconnections, existing vehicle volumes and the frequency at which disruptions are expected to occur. Our recommendations will be specific to the project area but also be informed by regional, national and international best practices for roadway and community adaptation.

Task 5.1 The Consultant will perform a literature review of recent existing studies focused on the study area that have analyzed transportation system vulnerabilities and alternate routes for hazard avoidance and evacuation. The Consultant will review available state and local data on road and bridge condition and state of repair. The Consultant will evaluate road infrastructure in critical locations surrounding the identified AOVs to identify capacity constraints based on the number of lanes provided, existing traffic volumes, and intersection control type.

Task 5.2 The Consultant will provide one map for each short-term closure alternative illustrating potential detour options surrounding each identified AOV. The Consultant will provide up to two long-term alternatives illustrated on a map showing alternative route options in the study area focused providing an alternative to the existing RI 114 corridor. The Consultant will identify locations along alternate routes where a capacity constraint or infrastructure condition deficiency exists that may jeopardize the viability of the alternate route.

The Consultant will utilize existing traffic count data where publicly available to make informed opinion on alternate routing. No new traffic count data will be collected. A traffic model is not included in this scope of work. The scope of work does not include a quantitative assessment of traffic impacts to existing roads or intersections due to traffic rerouting.

Task 5 Deliverable:

- Alternative Routes Analysis Memorandum in PDF and Word formats

Task 6: Identify Strategies to Improve Resilience

The Consultant shall identify and assess resilience strategies that address the vulnerabilities identified in Task 4. These strategies will include both infrastructure-based recommendations (alternate routes, roadway improvements, stormwater/culvert recommendations), as well as communications strategies that can be deployed during emergencies to influence motorist behavior.

The following paragraphs describe the specific tasks that will be completed for this analysis.

- For each AOV, identify two potential alternatives that would improve flood resilience. One alternative will be developed for the future 10-year storm event and one alternative will be developed for the future 100-year storm event. These alternatives will be developed to maximize the use of nature-based solutions. The intent of these alternatives is to book-end the range of possibilities for each AOV so that stakeholders can begin to understand the range of possibilities. These alternatives will be summarized graphically on a planimetric sketch for each AOV.
- Identify approximate scale of costs for each alternative. Given the lack of design at this stage, an opinion-of-cost will not be prepared, instead a range of potential costs will be assigned to each alternative (e.g. <$1 million, $1 to 5 million, $5 to 10 million, etc…).
- Qualitatively identify potential benefits for each alternative. Examples include enhancing natural resources, creating public access, and improving potential for redevelopment. These potential benefits will be summarized in a table.
- Identify potential barriers to implementation for each alternative. Examples include land acquisition requirements, permitting challenges, and impacts to property owners. Potential barriers to implementation will be summarized in a table.

Task 6 Deliverables:

- Planimetric sketch of each potential alternative and tabular summary of scale of costs, potential benefits and potential barriers to implementation.

Task 7: Develop a Resilience Plan for Route 114
The Consultant shall develop a Resilience Plan for Route 114, using the information and deliverables produced from Tasks 3-6. The Plan shall include recommended actions that the Towns of Barrington, Bristol, and Warren, and other State Agencies can use to improve resilience, including adaptation measure and alternative route proposals.

This final plan will be a graphical report with limited text to make the report more accessible to political leaders, agency decision makers and the public. In general, this report will consist of compiling and organizing the documentation developed as part of Tasks 3-6 into a single document.

In addition, this task will include the following:

- Prioritizing AOVs and major recommended actions within each AOV.
- Identifying recommended funding sources for major, near-term recommended actions.
- Potential implementation schedule for each AOV.

Task 7 Deliverable:

- Bristol County Route 114 Resilience Plan
  The Plan shall include the following:
  - Summary of Project
  - Summary of Public Engagement Process
  - List of Data Sources Used
  - Maps/Visuals Created
  - Summary of Strategies to Improve Resilience
  - Recommendations for how to Implement Actions
  - Recommendations for State Agencies, including RIDOT
  - Recommendations for sustainable project funding