



Memo to: John Gray, Betty Boros, NJDEP
From: Chris Sturm, David Kutner, New Jersey Future
CC: Michele Siekerka, Chuck Richman, Sean Thompson, Peter Kasabach
Subject: Projects associated with unmet needs from the first round of CDBG-DR funds
Date: December 27, 2013

Thank you for the opportunity to share our recommendations relative to environmental and infrastructure projects associated with unmet needs from Superstorm Sandy. As you know, New Jersey Future is working on several fronts to determine the extent of need and assist people, properties and communities to improve their capacity to withstand future storms. This work includes: our Local Recovery Planning Manager Program, which has embedded planners to provide direct, long-term assistance to seven Sandy-impacted municipalities; interviews in communities with combined sewer systems and inadequate water infrastructure; and research on state-level strategies to increase resiliency.

As we discussed, our work shows several significant opportunities for New Jersey to learn from Superstorm Sandy and use the massive infusion of federal funds that has been directed toward recovery to prevent similar devastation in the future. For example:

- At the state level, there is limited information on Sandy impacts. We know there was \$2.6B in water infrastructure damage, but exactly what was damaged and where did that damage occur? How many and which of those facilities are slated to receive funds for repair and mitigation?
- New Jersey Future's Local Recovery Planning Managers report that the municipalities in which they work have yet to undertake a systematic assessment of the risks these communities face from storms next year or in 100 years. Most towns lack the necessary staff capacity even to manage consultants and existing planning grant programs do not offer guidance in how such assessments should be performed.
- Some hard hit areas, such as municipalities in Cumberland County, face growing risks from rising sea levels and rapid loss of protective marshlands, but cannot access planning grants to help them identify areas where growth and investment make sense long term.

Based on this experience, we offer the following recommendations related to future allocations of CDBG-DR funds:

1. Share What Happened: Publish Data on Sandy Impacts and an Assessment of Unmet Needs

State and federal agencies have extensive data on impacts from Sandy and other disasters that they should make available to the public to inform assessments of potential future vulnerability. To assess "unmet needs" these agencies must compare the impacts to state and federal spending on repairs and mitigation. This information should be made available statewide. For example:

- a. *Data on properties that have experienced repetitive loss, severe repetitive loss, and flood insurance claims:* This data should be provided at the parcel level where possible, but can be

aggregated to the block or block-group level where needed to address privacy issues. The information should be available to inform decisions at all levels of government regarding hazard mitigation, land use, capital improvements and buy out programs. As one example, please see New Jersey Future's recommendations on the state buyout program from March 2013, **attached**.

- b. *Data on damage to water infrastructure, by type and location:* Commissioner Martin has reported that DEP research found \$2.6B worth of damage to water infrastructure from Hurricane Sandy. The supporting information on which systems sustained damage, in what amount, and where should be made publicly available to help prioritize funding decisions and better focus available resources.
- c. *Data on federal and state spending on post-Sandy repairs and mitigation, by project type and location:* This data should be compared to damage assessments to demonstrate the magnitude and location of the unmet need.

2. Expand the DCA Post-Sandy Planning Grant Program by \$12 million to Enable Local Governments to Assess Risks and Vulnerabilities and Reduce Flood Insurance Costs

The DCA Post-Sandy Planning Grant Program provides an excellent platform on which to provide additional, targeted assistance to municipalities.

- a. Expand the scope of the required Strategic Recovery Planning Report (SRPR) to include a forward-looking risk assessment relating to storm surge and sea-level rise. The state must prepare a comprehensive, forward-looking risk assessment in response to the recent HUD Notice relating to the second allocation of CDBG-DR funds. The state should also encourage local governments to adopt their own local risk assessment in order to provide a common platform for infrastructure plans, land use plans, capital investments, hazard mitigation plans, etc. Risk assessments should be based on planning horizons that match the lifespan of infrastructure investments: 2030, 2050 and 2100. Based on this assessment, the State should call for an evaluation of vulnerability of a local government's built environment, critical infrastructure, natural resources and vulnerable populations. Given its potential to influence long-range planning, economic development and public investment, participating municipalities should be asked to appoint a steering committee and engage the community's residents to guide the development of the risk assessment and share its results. A suggested SRPR scope, which outlines the suggested contents of a vulnerability assessment, is **attached**.

The State should require those grant recipients who may have already completed an SRPR to perform a vulnerability assessment as a condition of receiving any additional DCA Post Sandy Planning Grants. To reduce costs, data from the state's forthcoming risk assessment from Rutgers University should be provided to all communities. (*Estimated additional cost per municipality: \$10,000. Estimated total cost for eligible municipalities and counties: \$900,000.*)

- b. Create a new grant category - participation in the FEMA Community Rating System (CRS) program. Municipal participation in FEMA's CRS program leads to lower flood insurance premiums for a municipality as well as its residents, since the community becomes less exposed to flood risk. According to data provided on the National Flood Insurance Program's web site, as of May 1, 2013, 65 of New Jersey municipalities participate in the System at some level. With assistance, these participating communities could achieve additional insurance premium reductions. Furthermore, all risk-prone communities throughout the State should be participating in the program. This proposed grant should encourage communities to perform a "Getting to Resiliency" assessment to establish a baseline for Community Rating System program participation. Eligible grant activities should also include completing a CRS Program application, conducting assessments for program credit and developing an action plan for improving a community's credit score. *(Estimated cost per municipality: \$30,000. Estimated total cost for all 130 Sandy-affected communities: \$4 million.)*
 - c. Expand the list of municipalities eligible to receive Planning Assistance Grants to include Cumberland County municipalities that have been damaged by Sandy and other storms and face significant future risks, including: Lawrence, Maurice River, Commercial, Downe and Greenwich Townships. Risk assessments can help these communities identify safe areas for investment. Additional planning grants can help them identify methods to enhance resilience in areas of high vulnerability and channel future growth toward low-risk areas. *(Estimated total cost: \$1.5 million.)*
 - d. Provide funds for municipalities not currently participating in the program, and additional funds for municipalities already in the program, to prepare Strategic Recovery and Planning Reports and complete secondary eligible planning efforts. Much of the initial \$5 million CDBG-DR planning grant funds have been committed to fewer than half of the municipalities that are eligible for the program, which is a significantly smaller number than the total number of towns that sustained damage from Superstorm Sandy. Additional funding will start to meet the pronounced needs of these towns to plan for a smarter recovery and a more resilient future. *(Estimated total cost: at least \$5 million.)*
3. **Help Cities Reduce Flooding and Lay Groundwork for CSO Long Term Control Plans**
- Many urban areas experienced post-Sandy flooding conditions that will be made worse by sea level rise. Dysfunctional water, wastewater and stormwater infrastructure exacerbate these issues, as does extensive impervious surfaces. For example, FEMA estimates that up to 25% of economic losses from flooding are the result of poor urban drainage that can be addressed through stormwater management that employs Green Infrastructure.¹ The [NJ Clean Water Council](#) has identified asset management as critical to systematically managing and upgrading water infrastructure. DEP is issuing new Long Term Control Plans that require both asset management and consideration of green infrastructure strategies. Yet most NJ cities and the utilities that serve them lack the resources to address these issues. We recommend that, in addition to providing funds for

¹ FEMA, *Reducing Damage From Localized Flooding: A Guide for Communities*.

capital improvements, the NJDEP and/or the NJEIT offer grant funds to municipalities with Combined Sewer Systems in Sandy-affected counties to expand their capacity to upgrade their water infrastructure in the following ways to enhance resilience:

- i. Prepare customized municipal strategic green infrastructure plans that analyze the most effective green infrastructure strategies by sewer-shed based on local conditions, identify the most cost-effective approaches by sewer-shed, recommend strategic investments, and propose an implementation strategy.
- ii. Fund asset management plans, starting with an inventory of water, wastewater and stormwater infrastructure and its condition.
- iii. Expand local government capacity to address these issues, through technical assistance from dedicated staff.

New Jersey Future would be happy to help develop cost estimates for these recommendations.

4. **Dedicate \$5 million for a comprehensive, long-term framework for state, federal and local constructed protections along the shore.**

New Jersey needs a comprehensive update of the 1981 Shore Protection Master Plan to provide a blueprint for beach protection, flood protection and property acquisitions, similar to the 1981 Shore Protection Master Plan, but with greater detail. This updated blueprint should be based on scientific analysis of storm- and flood-related hazards and alternative protection measures, and it should include cost-benefit analyses. *(Estimated Cost: \$5 million.)*

Thank you for your consideration of these recommendations. Feel free to contact either [Chris Sturm](#) or [David Kutner](#) with any questions or for further discussion.

Recommendations for a Strategic Recovery & Acquisition Program for High-Hazard Areas in New Jersey

Purpose:

- To facilitate the movement of people and property out of vulnerable, hazardous locations subject to repeated damage from storms, shoreline erosion, flooding and storm surge.
- To enable the recovery of hazardous areas to natural conditions where they can help buffer and/or reduce the impacts of future storms, through permanent preservation and the restoration of natural features such as dunes, wetlands and living shorelines.
- To provide owners of damaged and/or vulnerable properties with an option that can prevent future headaches and costs associated with rebuilding.
- To increase safety for the public and properties in locations *adjacent* to hazardous areas and to improve the attractiveness of those areas for private investment and tourism.
- To reduce the many costs of recovery including the burdens on the municipality, insurance claim payouts, taxpayer liability and the need for expensive, temporary protective works and to be able to provide protective systems in a more, effective and less costly manner.

Proposed Program Focus

- Rely upon willing sellers.
- Limit program to: 1) high-hazard areas: FEMA “V” Zones, Erosion Hazard Areas, Overwash Areas and areas that experienced substantial damage from Superstorm Sandy; and 2) undeveloped lands that can buffer private developed property from the hazards of future storms.
- Design program to achieve complete relocation out of targeted high-hazard areas in the long-term, recognizing that progress will necessarily be incremental in many cases, especially given the reliance on willing sellers. Acknowledge that some areas will have a “checkerboard” pattern in the interim period.

Proposed Three-Part Program Structure

Dedicate \$250 million from the HMGP 404 program today, and seek additional funding from the supplemental federal appropriation. Structure the program to mirror the successful and well-understood NJ Green Acres program and allow for leveraging with additional public and private funds. Provide for more strategic targeting of acquisition areas through reliance upon target “Recovery and Acquisition areas” within which property owners are eligible to apply for buyout on a willing seller basis. Include bonus provisions in all three programs.

- **Part A – Municipal Program** –Invite municipalities to apply for designation of a Recovery and Acquisition (R & A) area or areas, subject to state review, provided they: 1) agree to designate R & A areas in their municipal master plan, zoning ordinance and capital improvement plan; and 2) notify all affected property owners. Encourage or require contiguous zones covering at least ten

homes. Allow, but do not require, municipalities and counties to provide matching funds. Limit eligible areas in the CAFRA region to the CAFRA area between the mean high water line of any tidal waters, or the landward limit of a beach or dune, whichever is most landward, and a point 150 feet landward of the mean high water line of any tidal waters or the landward limit of a beach or dune, whichever is most landward.

- **Part B – State Program** – Call on DEP to identify state priority R & A areas with a strong likelihood of repetitive damage based on the presence of conditions such as the following: historic flood insurance claims and damage assessments (from the National Flood Insurance Program), erosion rates, lack of available land for adequate dunes and beaches, proximity to a historic breach, inlet or overwash area, and adjacency to wetlands and natural areas. (See examples of such areas below.) Direct DEP to purchase properties in state priority R & A areas. Such a program provides a buyout option to severely impacted property owners in municipalities that have not designated their own R & A area. Require state identification of preliminary R & A areas within three months. Fund the DEP to develop a comprehensive blueprint for shore and flood protection, including updated Recovery and Acquisition areas, within 12 months, as described below.
- **Part C- Nonprofit Program** – Invite nonprofit organizations to apply for matching grants (with a 25% private match) to purchase properties in state or municipally designated R & A areas.

Proposed Program Provisions

- Payment level:
 - Base price based on pre-storm value as an incentive for property owners
- Priority ranking for:
 - Properties in V-zone and Coastal High Hazard Areas, as defined in DEP Coastal Zone Management Rules, at N.J.A.C. 7:7E-3.18
 - Overwash Areas, as defined in DEP Coastal Zone Management Rules, at N.J.A.C. 7:7E-3.17
 - Erosion Hazard Areas, , as defined in DEP Coastal Zone Management Rules, at N.J.A.C. 7:7E-3.19
 - Properties needed to allow for adequately-sized dunes and beaches.
 - Properties adjacent to preserved land
 - Repetitive loss properties as defined by the NFIP
- Bonus Provisions where:
 - Ten or more adjacent property owners indicate willingness to sell – 10% bonus
 - Entire target area indicates willingness to sell – 15% bonus
 - Municipality makes target R & A area ineligible for public rebuilding/elevation funds – additional 5% bonus
 - Property can be used for natural resource restoration with protective value such as dune construction or living shoreline – 10% bonus
- Provisions for federal reimbursement for demolition of properties

- Ownership: Properties would be state-owned initially (except in case of nonprofit program), then conveyed to the municipality or conservation group.
- Property deed restricted for conservation and recreation purposes.

Recommended Additional Program Components

- Create program to assist homeowners and renters with identifying new places to live and with relocation costs. (We are told that North Carolina had a successful program with such provisions that might offer helpful lessons.)
- Dedicate \$2 million for planning grants for municipalities with land in an R & A area to update zoning and other ordinances and to allow density transfer programs such as cluster, noncontiguous cluster and Transfer of Development Rights. (Note that municipalities can create a joint TDR program where development rights are transferred from one municipality that lacks capacity for growth into another municipality willing to accept it.)
- Provide municipalities with access to a fiscal impact analysis from the Office of Planning Advocacy in conjunction with the DCA Division of Local Government Services.
- Provide municipalities with priority access to the proposed EDA Neighborhood and Community Revitalization Program to obtain funds for infrastructure rebuilding in safe locations.
- Dedicate \$5 million for the creation of a comprehensive blueprint for beach protection, flood protection and acquisitions, similar to the 1981 Shore Protection Master Plan, but with greater detail. The blueprint would be based on scientific analysis of storm- and flood-related hazards and alternative protection measures, and include cost-benefit analyses.

Examples of Areas Appropriate for State Designation for Recovery and Acquisition

Superstorm Sandy demonstrated that certain areas in New Jersey have a strong likelihood of recurring, repetitive damage from storms and flooding. Individual property owners, their neighbors, and the taxpayers of New Jersey all benefit from relocating people and property away from these areas, regardless of whether the municipality is ready or able to apply for acquisition funding. Outstanding examples of highly hazardous, vulnerable locations include the following:

- Whale Beach, Upper Township, Cape May County. This area is eroding rapidly, as reflected in its identification as a Critical Erosion Area I in the NJ Shore Protection Master Plan, with high-energy waves, overwash and flooding¹. The entire island is in a V-zone and has a track record of damage.
- Union Beach, Monmouth County. Portions of Union Beach were severely damaged, especially locations surrounded by wetlands and streams.
- Ortley Beach, Toms River, Ocean County. The homes between Route 35 and the ocean are so close to the ocean that there is inadequate land to sustain beaches and dunes. (See the attached map showing damage post-Sandy.) A goal of reclaiming two to three rows of homes would allow for successful protective beaches and dunes to be reestablished. There are

¹ Coastal Storm Hazard Mitigation Strategies for Strathmere and Whale Beach, June 1986, Frank Banisch and Peter Pizor.

opportunities for development and redevelopment nearby, including a large vacant parcel formerly used by the Ocean County Utility at the corner of Fielder and Washington.

- Mantoloking, Ocean County. The breach in Mantoloking, though repaired, is highly vulnerable to future damage, especially the homes near the bridge (which is an evacuation route.)

There are successful examples in New Jersey of where acquisition and density transfer programs have protected people and property, including the following:

- Sea Isle City implemented a density transfer program after the 1962 storm whereby the mayor at the time, Dominic Raffa, traded storm damaged oceanfront properties for municipal properties located landward of Landis Ave as a means to move residents out of harm's way. When the DEP conducted damage assessment after the March 1984 northeaster disaster, the mayor identified oceanfront parcels that were swapped and was quite proud of what he had done more than 20 years earlier.
- Although it was a long time ago, the Borough of Longport abandoned 10 blocks at the southern end of town in the early 1900s based on continued erosion and storm damages, which were eventually washed into the sea.

Strategic Recovery Planning Report

SCOPE OF WORK

The Strategic Recovery Planning Report (SRPR) is intended to help guide municipal recovery efforts from the effects of Superstorm Sandy and reduce vulnerabilities to future storms in these municipalities.

- a. The Report will evaluate the impacts on affected community features and address the conditions created or exacerbated by the storm.
- b. The Report will articulate the planning goals, strategies, and priority actions that are most urgently needed to improve public safety, increase resistance to damage from future storms.
- c. The Report will contain detailed descriptions of each of the projects proposed; a statement of need that demonstrates how each project relates to the impacts of Superstorm Sandy; why the project is important to the economic and environmental health of the community; the major tasks associated with each project; the estimated cost of implementation; identification of potential or actual funding sources to pay for project implementation; and estimated implementation dates.

Task 1 Community Participation

- 1.1 Establish a steering committee of municipal leaders to guide the community outreach process and the preparation of the SRPR. The Steering Committee should include representation from County's Office of Emergency Management and Department of Planning.
- 1.2 Conduct periodic public workshop meetings, as outlined in the task descriptions below, to solicit input and familiarize the public with the findings, conclusions and recommendations of the SRPR
- 1.3 Develop a web-based community outreach strategy to solicit broad-based participation, through community-wide surveys, polls, etc., and disseminate information about the planning process and the findings, conclusions and recommendations of the SRPR
- 1.4 Steering Committee Meeting #1 - Conduct a Steering Committee kickoff meeting to present objectives of the plan and the project schedule

Deliverables: Project schedule, Steering Committee meeting minutes.

Task 2 Existing Conditions Analysis and Vulnerability Assessment

- 2.1 Using Flood Mapper, developed by the Jacques Cousteau National Estuarine Research Reserve, and the shared resources of the Coastal Vulnerability Index created by the NJ Department of Environmental Protection and the Coastal Vulnerability Assessment prepared by the Rutgers Climate Institute, create inundation scenarios mapping areas of critical current and future vulnerability to flooding, storm surge, and sea-level rise. This assessment shall be based on detailed mapping of the characteristics described in part 1 of the attached "Elements of a Vulnerability Assessment" summary. The assessment shall evaluate potential impacts of a range of hazards (coastal storm events/flood patterns, category 1-4 hurricanes, erosion, flooding, SLR, storm surge) for past events, existing conditions, and year 2030, 2050, 2100 planning horizons.
- 2.2 Based on the determination risk prone areas identified through the analysis performed in Task 2.1, conduct a detailed assessment of the vulnerability of the community's built environment, natural resources and vulnerable populations, as described in part 2 of the attached "Elements of a Vulnerability Assessment" summary. This vulnerability assessment shall include a detailed evaluation, using maps and narrative, of Superstorm Sandy's community impacts and of areas of repetitive loss and severe repetitive loss.

- 2.3 Evaluate the vulnerability and determine the probability of disruption in services of the community's critical infrastructure in accordance with the "Infrastructure Systems Rebuilding Principles" developed by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE), dated February 28, 2013 (attached). In addition to determining risk reduction strategies, this assessment is intended to meet eligibility requirements for CDBG-DR II funding.
- 2.4 Assist the community to perform a "Getting to Resiliency" assessment, which will help to determine risk reduction strategies and provide a base line for the municipality's participation in the National Flood Insurance Program Community Rating System.
- 2.5 Steering Committee Meeting #2 – Conduct meeting with Steering Committee to review findings, and maps from Task 2 existing conditions analysis and vulnerability assessment
- 2.6 Public Workshop #1 - Conduct a public workshop with government officials, local businesses and residents to identify the municipality's most pressing concerns and recommendations for rebuilding the community

Deliverables: A narrative existing conditions analysis and vulnerability assessment report and map series documenting the findings from Tasks 2.1 to 2.4; Steering Committee and public workshop meeting minutes.

Task 3 Alternatives Assessment

- 3.1 Identify and evaluate a range of alternative strategies to address current and probable flood hazards storm surge and sea level rise scenarios. Develop options for flood mitigation, evaluating potential green infrastructure, gray infrastructure, and combined options, to include sea walls, living shorelines, dredging, bulkheading, flood storage capacity, and increased permeable surfaces. Evaluate options in terms of effectiveness, and cost. Model flood mitigation measures using 2030-, 2050- and 2100-year storm surge and sea level rise scenarios developed in Task 2. Provide cost estimates and permit requirements and recommended priorities for implementing suggested alternatives.
- 3.2 Steering Committee Meeting #3 – Conduct meeting with Steering Committee to review the alternatives assessment and recommended recovery strategies and establish project implementation priorities.

Deliverables: A narrative assessment of infrastructure vulnerability, an assessment of various response alternatives, preliminary implementation priorities. Steering Committee meeting minutes.

Task 4 Implementation Strategy

- 4.1 Based on public input obtained through Task 2.6 the risk assessment and engineering analysis, develop detailed recommendations for planning and flood mitigation measures
- 4.2 Recommend and prioritize municipal actions (short and long-range) to promote recovery from the effects of Sandy and reduce vulnerabilities to future storms. For each recommendation, identify major tasks, develop estimated implementation costs and delineate a timeframe for task completion and identify who should have chief responsibility to manage project implementation. This task will include the preparation of preliminary contextual, concept sketches of up to 4 priority recovery projects - to be selected in conjunction with the Townships - to help municipal officials and/or residents of the communities understand the visual and physical impacts of the project.

4.3 Steering Committee Meeting #4 – Conduct meeting with Steering Committee to review the implementation strategy

4.4 Public Workshop #2 - Conduct a public workshop with government officials, local business owners and residents to present the vulnerability and alternatives assessments, recommended implementation strategies and recommended project priority ranking.

Deliverables: Narrative and graphic implementation strategy; Steering Committee and public workshop meeting minutes.

Task 5 Integration with local regulations/county plan

5.1 Based on the results of the alternatives assessment and selected implementation strategies described above, examine the adequacy of the existing documents listed below and describe what changes are needed, if any, to support municipal planning needs and goals related to post-storm recovery and to mitigate future storm impacts.

- Community and/or county Master Plan, land use regulations, master plan elements, Capital Improvement Plans, Stormwater Management Plan and any associated official maps.
- Ocean County's Hazard Mitigation Plan.
- Approved but not constructed site plans, and approved but not completed subdivisions.
- Adopted redevelopment plans.
- Evacuation and emergency management plans.

5.2 Thorough review of existing plans and ordinances, develop recommendations for changes to allow for the implementation of recommended flood mitigation strategies. Such plans should include, but are not limited to Master Land Use Plan, zoning ordinance, building codes, stormwater management plan, capital improvement program

5.3 Present the community's proposed implementation strategies to representatives of the County's Office of Emergency Management and Department of Planning to ensure that the municipality's SRPR is consistent with the County Hazard Mitigation Plan and that the municipality's implementation strategies are included in the County's Plan.

Deliverables: A narrative report detailing recommendations for modifying local regulations, codes and capital investment programs and formal recommendations submitted to the County to integrate local recovery strategies into the County Hazard Mitigation Plan

Task 6 Final Report

6.1 Synthesize town council, stakeholder and public comments obtained during the Community Participation Process described in Task 3 above, the staff's review comments and the products from Tasks 1 through 5 as a basis an illustrative and narrative draft SRPR. The draft report will include the following elements:

- An existing conditions analysis that summarizes community vulnerabilities and opportunities created or exacerbated by the storm and lists critical infrastructure and their vulnerability to disruption of services
- An alternatives analysis that identifies approaches to rebuilding that will be more resistant to damage from future storm events.
- An implementation strategy that recommends and prioritizes municipal actions (short and long range) to promote recovery from the effects of Sandy and reduce vulnerabilities to future storms. The strategy will also describe proposed projects specifically related to an application

for a NJ Department of Community Affairs' Post Sandy Planning Assistance Grant.

- Maps of areas of critical current and future vulnerability, including FEMA flood plain zones and elevation requirements.
- A detailed plan for integrating the SRPR into local plans and regulations and the County Hazard Mitigation Plan

6.2 Steering Committee Meeting #5 – Conduct meeting with Steering Committee to review the draft final SRPR

6.3 Public Workshop #5 - Conduct a workshop with government officials, local businesses and residents to present the draft final SRPR

6.4 Based on comments from the Steering Committee meeting and Public workshop, modify, compile, prepare and submit final SRPR to the Steering Committee, municipal elected officials and the New Jersey Department of Community Affairs, Office of Local Planning Services.

Deliverables: SRPR – 15 copies and one digital copy; Steering Committee and public workshop meeting minutes

Task 7 Project Manager

7.1 Prepare and submit, subject to community authorization, monthly progress reports documenting major findings, issues and the status of project tasks that have been completed. Progress reports will be submitted to the Project Steering Committee and the New Jersey Department of Community Affairs, Office of Local Planning Services.

Deliverables: Detailed monthly progress reports

ELEMENTS OF A VULNERABILITY ASSESSMENT¹

1. Flood Prone Determination Need to map exposure based on a range of potential hazards (coastal storm events/flood patterns, category 1-4 hurricanes, erosion, flooding, SLR, storm surge) and time frames (past events, existing conditions, 2030, 2050, 2100)
 - Slope: low lying coastal areas with very little slope (1% or less)
 - Flood Prone Areas: FEMA FIRM V-Zones/A-Zones, 100-year Floodplain, 500-year Flood Plain
 - Drainage: Well-drained to poorly-drained soils, SSURGO classifications
 - Erosion: susceptibility characteristics, historic shore lines
 - Geomorphology: shoreline types
 - Storm Surge: Inundation scenarios mapping needs to differentiate shallow flooding due to typical seasonal tidal activity (spring tides), storm surge and SLR at mean high water and mean higher high water

2. Vulnerability Analysis – community assets that are located within hazard-prone areas
 - Built environment, natural resources, social vulnerability (at block- or parcel-level), current land use patterns, zoning, master plan vision
 - repetitive loss/severe repetitive loss, extent of Sandy damage, insurance claims and payouts, ratables loss

Built-environment includes:

- Evacuation Routes, power and communications systems, emergency shelters, hospitals
- Roads, Bridges, railroads, public water, sanitary sewer systems, stormwater discharge structures
- Police and Fire
- Municipal buildings/public works facilities
- Parks and recreation facilities, Schools, Libraries, Museums, Landmarks, historic/cultural facilities, post offices, prisons
- Community Centers, Nursing Homes, houses of worship
- Business districts, shopping centers, manufacturing sites
- Point source pollution sites, landfills, gas stations, dry cleaners, brownfields sites, known contaminated sites
- Housing (type (SFD, multi-family, mobile homes, built prior to NFIP)
- Development density (housing units/sq mile)

Mapped natural resources include:

- Wetlands, forest lands
- Environmentally sensitive lands (beaches, bulkheads, dikes, marshes, open waters, coastal barrier resources)
- Conservation easements
- Blue acres/green acres lands

¹ Based on *Coastal Communities Vulnerability Assessment Mapping Protocols*, NJDEP Office of Coastal Management, 12/11

Social vulnerability includes:

- Population density
- Elderly, minority, lower income/poverty, disabled, youth, single-parent/single-mother hoh, homeless