Mystic Island Voluntary Buyout Health Impact Assessment

Assessing Health Outcomes of Post-Sandy Decision-Making

May 2016

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Planning Healthy Communities Initiative

NEW JERSEY FUTURE

Mystic Island Voluntary Buyout
Health Impact Assessment

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About the Planning Healthy Communities Initiative

The ***Planning Health Communities Initiative*** (PHCI) is a partnership dedicated to promoting the integration of public health impacts into planning and decision-making. PHCI is an initiative of the Rutgers University Edward J. Bloustein School of Planning and Public Policy in collaboration with Rutgers Biomedical and Health Sciences. The goal of the PHCI is to build partnerships that enhance opportunities and implement tools that integrate health state, regional and local decisions, so that these decisions result in healthier communities and citizens.

About The Health Impact Project

The Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts, is a national initiative designed to promote the use of health impact assessments (HIAs) as a decision-making tool for policymakers.

Disclaimer

The authors of the report are solely responsible for the accuracy of the data, statements and interpretations contained in this document. The views expressed are those of the authors and do not necessarily reflect the views of the Health Impact Project, The Pew Charitable Trusts and the Robert Wood Johnson Foundation.

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Executive Summary

A Health Impact Assessment (HIA) provides decision-makers with an opportunity to understand the impacts of decisions on affected communities, and to consider recommendations for how the proposed activities and changes can best support public health, health equity, and environmental justice. Health Impact Assessment follows a six-step method (screening, scoping, assessment, recommendations, reporting, monitoring/evaluation) that results in a set of grounded recommendations intended to maximize positive health aspects and minimize negative impacts to health. This HIA considers the health impacts of a hypothetical buyout program scenario in Little Egg Harbor Township (LEHT), New Jersey for residents of Mystic Island, a community within the township that suffered significant damage from Hurricane Sandy in 2012. The decision point for this HIA is whether Little Egg Harbor Township should support homeowners in the Mystic Island neighborhood who wish to apply for voluntary buyouts.

Intended primarily to remove people from harm's way in flood-prone areas, a buyout is a purchase of private property using government funds, with the condition that the structures on the property are demolished and land is returned to open space. Although there is no active consideration of supporting residents' applications for buyouts at the time of this study in LEHT, it is a strategy for mitigating flood and climate change impacts that could hypothetically be considered in LEHT or other coastal towns. A buyout of flood-prone properties could result in a number of significant impacts to public health. These impacts could be positive or negative but are important to identify, measure, and consider in the overall assessment of the effect of buyouts on the community.

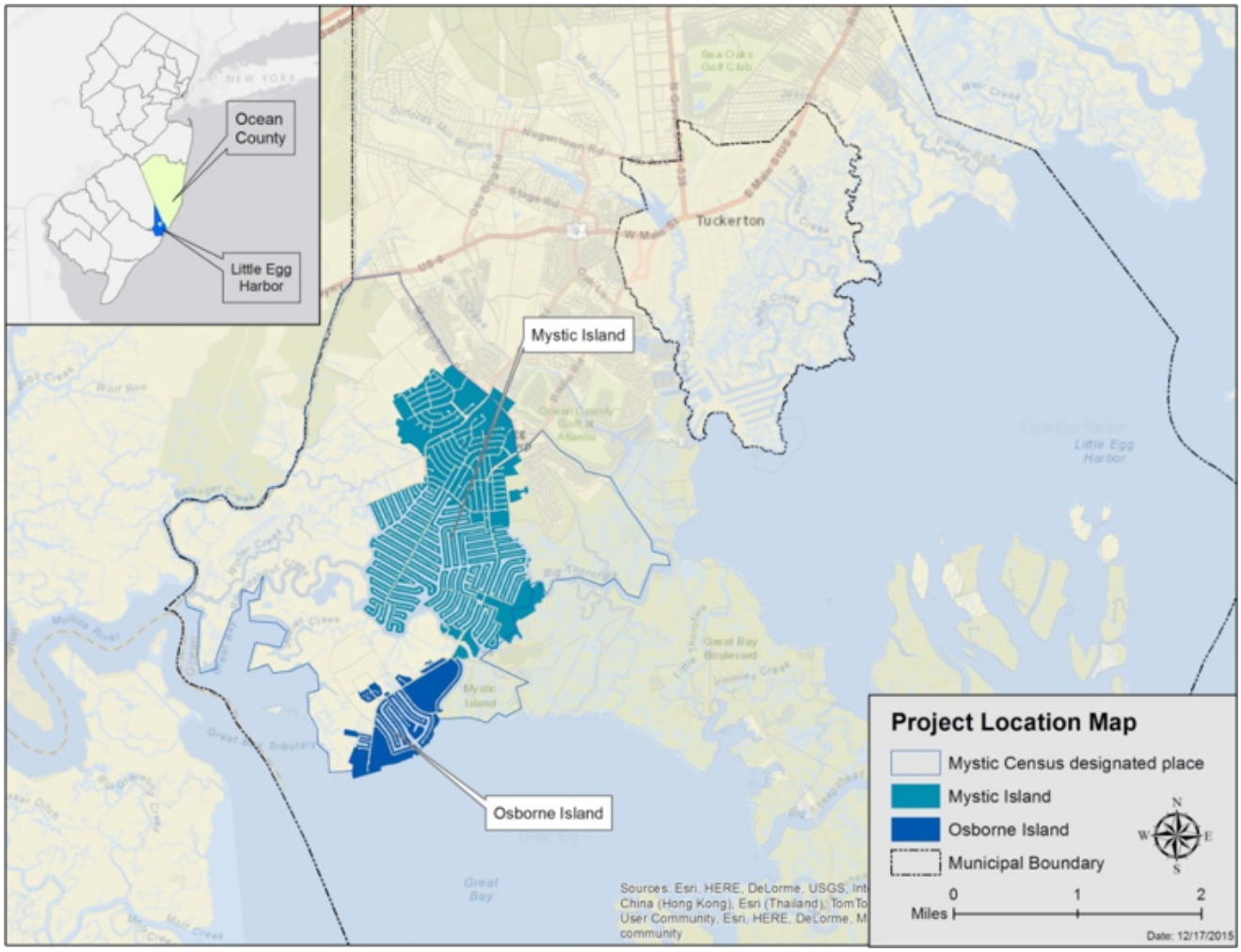
This HIA provides a helpful lens through which to evaluate the full range of impacts of buyouts on human health and social vulnerabilities of a lower-income population with limited capability to afford structural elevation, and on the community's fiscal health. The outcomes of the HIA are also intended to benefit decision-makers and residents of similar coastal communities in New Jersey and the U.S. that are plagued by chronic flooding and hurricanes.

Mystic Island is an unincorporated, mostly residential community of about two square miles located within Little Egg Harbor Township, Ocean County, New Jersey (see Figure 1).

Mystic Island's geographic and topographic characteristics make it highly vulnerable to repetitive flooding. The entire community is located within the 100-year floodplain, and Mystic Island has the highest concentration of repetitive loss properties in the Township. Projections for both inundation from Sea Level Rise (SLR) and increasingly severe and frequent coastal storms as a result of climate change predict continued and worsening weather-related impacts on the community. Hurricane Sandy flooded much of Little Egg Harbor Township with almost seven feet of water, damaging more than 4,000 homes, or approximately 10,000 residents. Nearly 1,000 of these homes suffered substantial damage, (i.e. the total costs of restoring the structure was at least half of the market value). Many of the damaged homes were in Mystic Island.

Still in the post-disaster recovery phase from Hurricane Sandy, communities like Little Egg Harbor Township are looking for ways to mitigate the potentially severe impacts that could occur from a similar, or worse, future storm. Any actions tak-

Figure 1: Location Map



en to improve resiliency to future storms is also likely to help to reduce sea-level rise impacts. A buyout program, such as the state's "Blue Acres" program, focuses on purchasing properties that have been damaged by flooding (or may be prone to damage by storms and storm-related flooding) and are eligible for acquisition. Flood-prone structures that are purchased with public funds are then demolished and the remaining land is converted into municipal-owned open space.

According to program criteria and in consultation with township officials and other stakeholders (as described in the stakeholder section below), the research team developed two alternative buyout scenarios that:

1. Could be potentially realized using current Blue Acres resources; and

2. Would achieve the maximum benefit in terms of flood risk reduction.

The first scenario is a buyout of approximately 100 contiguous parcels. This was considered the minimum number of properties that, when purchased and cleared, could result in enough open space to increase resiliency. The second scenario is a buyout of 500 parcels. This is likely the maximum number of properties that could be purchased with remaining buyout resources. Both of the scenarios propose purchasing a cluster of homes because this would achieve maximum environmental benefits. In the course of the HIA, the "decision not to decide" about opting into

Figure 2: Buyout Scenario 1

Figure 3: Buyout Scenario 2

the buyout program, the "no-action" alternative, was also evaluated.

To completely and accurately assess the health impacts of the buyout scenarios, it is necessary to develop a practical plan for how the land will be used (for what purposes, who will benefit and in what ways) and how it will be maintained (costs and responsibilities for upkeep, implications for community fiscal and public health). Feedback from the community indicates a preference for assuring that the land is well-maintained and provides some community benefits. For the purposes of the HIA, the research team envisions the repurposed space as a wetland/marsh with multiple uses and benefits.

The overarching research question guiding the HIA is:

What are the physical and mental health outcomes associated with the implementation of voluntary buyout scenarios for Mystic Island?

Five sub-questions relate to health determinants that may be affected as a consequence of the buyout decision:

» How will the buyout program affect future risks and health outcomes associated with **flooding damage** (routine and storm-related)?
» How will the buyout program affect health outcomes associated with **household finances**?
» How will the buyout program affect health outcomes related to the **municipal budget**?
» How will the new **open space** created by the buyout affect health?
» How will the buyout program affect health outcomes associated with **social cohesion**?

For each research question/health determinant, the research team conducted an assessment to determine its potential health impacts with respect to a buyout program. The impact analysis is based in part on scientific or published evidence, and also on critical thinking and reasoned assessment based on experience and opinions of experts, interpretation of stakeholder input collected via discussion forums, interviews and a resident survey, and accepted principles of public health. The analysis includes, where relevant, consideration of any disproportionate impacts or inequities in the distribution of benefits and burdens among various population subgroups.

For the projection of anticipated effects, we conducted a literature review, examining research relating our determinants to health outcomes, expert opinions, survey data and other quantitative cost-benefit modeling or mapping, and characterized anticipated health effects accord-

ing to their direction, likelihood, magnitude and distribution in the population. Understanding the potential local concerns about the buyout proposition and strong emphasis on protecting the local economy, we clearly identified all assumptions and limitations of the data used to support the assessment.

The study found that living in an area that is prone to regular flooding and vulnerable to severe storm flooding causes anxiety and stresses related to lifestyle disruption and costs of damage repair, and can also exacerbate respiratory conditions due to mold growth and dispersion. When severe storm events occur in these areas, it causes health impacts both immediately during and after the storm (injury, exposure to debris and hazards) and more severely for a long time after the disaster (stress and related exacerbation of physical and behavioral conditions). Flooding can be more disrupting for the elderly or disabled who have limited ability to find alternative routes, navigate flooded roadways, and may be more susceptible to health hazards. The HIA provided substantial evidence of the mental health aspects of household financial difficulties associated with storm recovery, but also of the potential for a buyout program to create new opportunities for improved mental and physical health and strengthened social networks. Lower income individuals and households are most severely affected by the anxieties of living with coastal flooding vulnerabilities and are most likely to benefit positively from efforts to improve resiliency.

Specific findings included:

Nuisance Flooding

» Buyout of chronically flooded properties will eliminate health impacts for those whose homes are purchased and leave Mystic Island.
» Clustered buyout of chronically flooded properties should reduce the severity of routine flooding for residents who remain in Mystic Island, thus reducing frequency and severity of nuisance flood caused health outcomes such as elevated stress, feelings of isolation, exposures to toxics, debris and mold.

Severe Flooding

» Clustered buyout of chronically storm-damaged properties will eliminate health impacts from future storms for those who are bought out and move to areas that are not at risk to coastal storms or severe flooding.
» Clustered buyout of chronically storm-damaged properties could reduce severity of future storm damage and flooding by providing a buffer for storm surge and wave action for remaining residents of Mystic, thus reducing frequency and severity of storm-related mental and physical health outcomes such as elevated stress, feelings of isolation, exposures to debris and mold.

Household Finances

» For the people who accept buyout, household finances should improve if a fair purchase price is offered that addresses current debt and provides ability to find and purchase adequate property in a less vulnerable area.
» For Little Egg Harbor residents, buyouts should have a negligible impact on household finances.
» Buyouts should reduce future needs of residents to access and use recovery programs.

Municipal Finances

» Buyout scenarios would result in a minor to moderate loss of tax revenue to the municipal budget, combined with cost savings that will likely not be fully realized.
» While the 100-unit buyout has limited effect, under the 500-unit buyout scenario, the Little Egg Harbor school district would be affected, and costs might have to be cut, including laying off some teachers or administrative personnel.

» Economic benefits could be achieved through the buyout scenario, including reduced costs of recovery from future flooding and storms, and potential revenue generated from new eco-tourism, but these benefits were not quantified in this study and require a more detailed analysis.

Open Space

» Open space with opportunity for recreation provides very positive health impacts for physical fitness and reduction of disease.
» There are strong positive mental health impacts associated with proximity of well-maintained open space.
» Eco-tourism opportunities can help to support local businesses and improve property values.
» Local open space with recreation opportunities disproportionately benefits lower income people who have limited access to private clubs.

Social Cohesion

» Removing abandoned homes through buyout will remove a source of distress and potential health hazards, improving quality of life for remaining residents.
» Loss of homes and populations could hurt some local programs and be missed by residents, causing feelings of isolation and sadness, particularly among lower income and younger individuals.
» The new recreational open space created by the bought out properties should provide opportunities for social interaction that improve community quality of life and mental health of residents.

The hypothetical voluntary buyout program presented in the HIA is one way to build resilience and remove potentially thousands of people from harm's way. In reality, it will be necessary to provide a range of options to keep communities living safely and sustainably along the mid-Atlantic coast. Coastal communities will need to take actions to reduce health hazards from both routine and storm flooding, and the impacts of a changing climate. The analysis and recommendations provided in this HIA will help to inform decisions related to other resiliency options. The outcomes of the HIA will benefit similar decision-making in other communities in New Jersey and the U.S. that are plagued by chronic flooding.

The recommendations from this HIA are aimed primarily at informing decisions made about support for buyout programs by the local governing body, but also address county, state and federal agencies involved in disaster recovery. They will also help with understanding the health implications of other resilience strategies and of the "do nothing" strategy. The HIA raises many questions that could be fruitful topics for additional studies to inform decision-makers as they tackle difficult issues related to planning for mitigation and resilience in anticipation of weather disasters and climate-change realities for decades to come.

A summary of recommendations from all six parts of the analysis is outlined below. The summary table in the full report includes suggested actors and timeline associated with each recommendation.

Recommendations
Nuisance Flooding:
LEHT should support resident applications for voluntary buyouts, particularly those residents who live in the most flood-prone areas of Mystic Island.
NJ State Blue Acres should approve buyout applications for properties that are clustered geographically to achieve the greatest nuisance flood reduction benefits.
A state or federal agency or foundation should commission a study to investigate the effect of increased open space on the reduction of nuisance flooding, including the configuration and amounts of restored wetland that would be required to achieve measurable benefits.
Severe Flooding:
Recommendations for Mystic Island Buyout Scenario
Buyouts should be clustered in a geographic area that results in greatest potential to reduce storm-related impacts. (i.e., most vulnerable to storm impacts and fewest elevated homes)
Social services, particularly access to mental health services, should be improved as a complement to a buyout program and targeted to lower income, less educated populations.
Along with a buyout initiative, a managed plan should be developed to protect the shoreline from sea level rise and increased vulnerability to storm surge.
Consider elevating Radio Road and installing other structural barriers to further protect Mystic Island from sea-level rise and storm surge.
Recommendations for Disaster Recovery Planning
FEMA should consider placing a priority on personnel continuity and greater internal coordination, to the greatest extent possible, and enhancing staff training to address the needs of affected communities with effectiveness, consistency and efficiency.
State recovery agencies should encourage faster response from insurance companies through incentives for fast and efficient turnaround on claims.
Local governments considering implementing resilience measures should propose them to residents in concert with community education about vulnerabilities so that residents understand the benefits of the measures.
Municipalities in areas vulnerable to coastal flooding should identify and work closely with local social service agencies and religious organizations to provide a stable, coordinated network of support for residents in the event of emergencies.
Federal, state and local agencies engaged in response and recovery efforts should be trained to both prevent, to the extent possible, and recognize the long-term mental health effects following a storm event through ongoing mental health surveillance, appropriate intervention, and adaptation strategies.
Programs to train local service providers in administrative/managerial requirements as well as response techniques should be sponsored by either the State OEM and/or FEMA. Such programs should be provided on a periodic basis so that local officials are trained in planning, management and implementation of response and recovery
Disaster managers at all levels should continue to work together as closely as possible with a goal to operate efficiently and rapidly to return affected populations to normalcy as quickly as possible.
Household Finances:
Recommendations for Mystic Island Buyout Scenariov
Buyout programs should be funded and readily activated and offered to residents quickly after storm-related disasters occur.
Prices offered for residential properties in a buyout program should reflect pre-storm value, but also consider additional costs borne by residents in the storm recovery phase.

Recommendations
Buyout programs should consider eligibility for people who have already used federal recovery programs such as RREM, and consider alternatives such as offering funds to residents to move their elevated homes if they are in a targeted buyout cluster.
Recommendations for Disaster Recovery Planning
Financial counseling services should be developed as part of disaster case management that will help storm victims access available programs and provide them advice about how to manage their financial assets appropriately.
Educational materials about program policies, administrative procedures, and application requirements of response and recovery programs should be prepared and provided well in advance of a disaster, so that people are well-informed about what to do and where to go for assistance immediately after a disaster event.
State or federal agencies or other funders should consider conducting a study of coastal New Jersey's regional economy, including the financial health of households and impacts of various resilience strategies on economic health.
Municipal Finances:
If buyouts are pursued, the township should consider creative approaches to cover cost of bulkhead, restoration and maintenance of passive recreation.
If the township must reduce costs to make up for lost tax revenue, it should prioritize service cuts that have minimal impact on population health, particularly on low-income and elderly populations.
If permissible by the buyout program rules, consider transferring open marshlands to the Natural Lands Trust, which can legally preclude access as an approach to limit municipal obligations.
Incentives should be offered to encourage residents of purchased property to remain in the township.
Recovery agencies or other funders should commission a study on the "do-nothing" scenario for coastal communities, and compare it with the fiscal impacts, costs and benefits of various resilience strategies.
Consider additional studies to provide a detailed understanding of the variables related to the cost of maintaining new open space under different management scenarios and evaluate the incremental property value and health impacts to the community of each option.
Open Space:
Develop and maintain new open space to create the maximum buffer against storms and as a functioning wetland.
Seek funding to support new open space development from funds available for habitat preservation and endangered species preservation.
If feasible, consider reserving some space on or surrounding new open space for development of passive recreation (bird blinds, kayak access) and possible trails with fitness equipment.
Buy-out programs should consider including visioning sessions so that residents and officials can consider impacts and options related to the buyouts, and as an opportunity to engage citizens in thinking about the future of their communities as well as opportunities to improve health and local economies.
Social Cohesion:
Consider uses for the new open space that will provide gathering places for community-building and public events.
Maintain the new open space so that it is attractive and deters crime.
Consider fostering new social networking opportunities for Mystic Island residents such as walking clubs, civic organizations and hobby-based clubs.
The state or another interested funder could support research to proactively plan how to use buyout land to maximize health benefits. A community toolbox for using health as a metric for envisioning new uses for open could help to make buyouts a more attractive alternative.

Introduction

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Purpose and Organization of Report

A Health Impact Assessment (HIA) provides decision-makers with an opportunity to understand the impacts of decisions on affected communities, and to consider recommendations for how the proposed activities and changes can best support public health, health equity, and environmental justice. This HIA considers the health impacts of a decision for Little Egg Harbor Township (LEHT), New Jersey to support a voluntary buyout program for residents of Mystic Island, a community within the township that suffered significant damage from Hurricane Sandy in 2012.

Intended primarily to remove people from harm's way in flood-prone areas, a buyout is a purchase of private property using government funds, with the condition that the structures on the property are demolished and land is returned to open space. Although there is no active consideration of supporting residents' applications for buyouts at the time of this study in LEHT, it is a strategy for mitigating flood and climate change impacts that could hypothetically be considered in LEHT or other coastal towns. A buyout of flood-prone properties could result in a number of significant impacts to public health. These impacts could be positive or negative but are important to identify, measure, and consider in the overall assessment of the effect of buyouts on the community.

After an introduction describing the post-disaster context and Mystic Island voluntary buyout program scenario, this report describes the phases of the Health Impact Assessment (HIA) study, first summarizing the key steps, activities and results associated with the screening and scoping processes, including the value of the HIA to the decision context, research questions, health determinants, pathways and project methods. Then the baseline assessment section presents a profile of current demographics and health of affected populations. This is followed by the projections and recommendations section that provides evidence to support predicted impacts associated with implementation of the buyout program in each health determinant area and recommendations to maximize positive health outcomes. Finally, an evaluation section describes evaluation steps and suggests a monitoring plan and topics for further research.

Project Team

The Planning Healthy Communities Initiative (PHCI) at Rutgers University carried out this Health Impact Assessment (HIA) study, supported by a grant from the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts. Project consultant New Jersey Future served as the lead coordinator for stakeholder engagement and communication. A project Steering Committee, described below, included representatives from government, private and non-profit organizations from Little Egg Harbor Township and Ocean County.

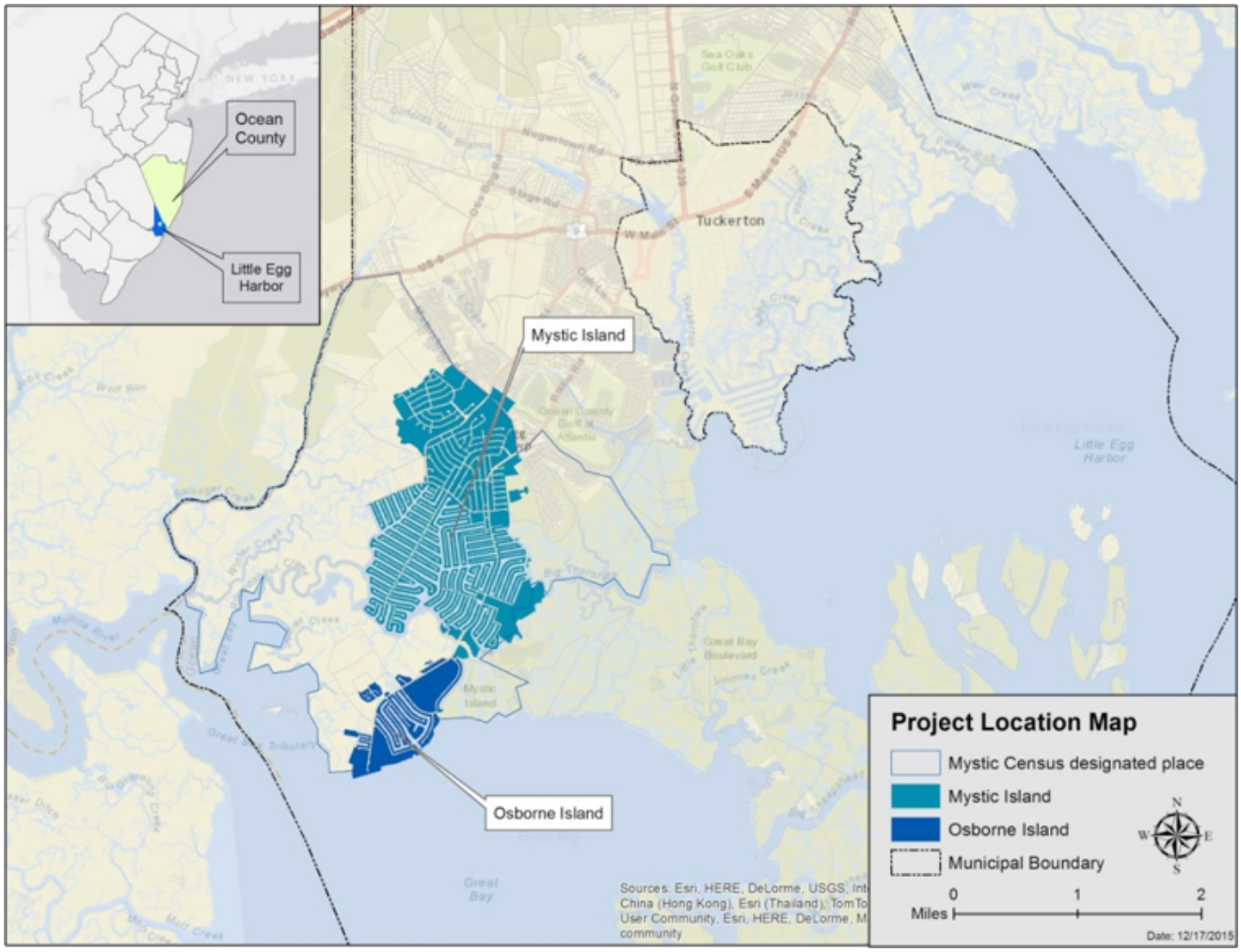
Background on Post-Disaster Context in Mystic Island

Mystic Island History & Vulnerabilities

Mystic Island is an unincorporated, mostly residential community within Little Egg Harbor Township, Ocean County, New Jersey (see Figure 4). Bordering the marshes that line Great Bay and Barnegat Bay and Atlantic Ocean to the east, Mystic Island was created in the 1960's with the joining together of several islands, resulting in buildable space surrounded by lagoons so that many houses have water and bay access in their backyards. Originally, Mystic Island was a vacation destination for New Yorkers, Philadelphians and people from other parts of New Jersey. By the end of the 20th century, the majority of the population was living in the community permanently as the homes in the neighborhood were converted for year-round use. More and more people wanted to live in the area full-time because it was affordable and close to Atlantic City jobs.

Although there is no data to quantify how many, the research team heard that many Mystic Island families live in homes that have been passed from family member to family member for as many as three generations. It is a moderate income community, and the economic downturn of the late 2000's, decline of Atlantic City jobs and diminished fishing in the Barnegat Bay have

Figure 4: Location Map



stressed the local economy. Some larger and more expensive homes have been constructed in the past two decades, however, including many on Osborn Island, which is located even closer to the waterfront but included in the Mystic Island Census Designated Place (CDP).[1]

Mystic Island's geographic and topographic characteristics make it highly vulnerable to repetitive flooding. The entire community is located within the 100-year floodplain, and Mystic Island has the highest concentration of repetitive loss properties[2] in the Township. Projections for both inundation from Sea Level Rise (SLR) and increasingly severe and frequent coastal storms as a result of climate change predict continued and worsening weather-related impacts on the community.

According to the township's *Floodplain Management Plan*,[3] during a Category 1 storm event, storm surge will inundate most of the marsh areas on the coast of the Township with up to six feet of storm surge, while Mystic Island could experience storm surge up to 3 feet in depth. During a Category 2 storm event, storm surge will further inundate the Township, with surge levels reaching above 9 feet in many of the Bayfront marsh areas. The storm surges would also be increased by sea level rise. With even a one foot increase in sea level rise, much of the marshland along the Bayfront would be affected, and a small area in the southern portion of the Township would revert to open water.[4]

By 2050, as sea levels rise and marshes retreat, a considerable portion of the protective marsh areas that currently buffer vast extents of Little Egg Harbor Township's coastal areas will be inundated and will not provide protection for more inland developed areas such as Mystic Island. The 2015 Vulnerability and Exposure Analysis prepared for the Township by New Jersey Future reports anticipated sea level rise of 1.48 feet by 2050, which would result in approximately 700 residential lots within the flood hazard area becoming permanently inundated. A 1-percent annual flood in 2050, coupled with anticipated sea level rise, would result in the inundation of approximately 4,000 residential lots, including all of Mystic and Osborn Islands. (See Figure 5).

For this property buyout analysis, Mystic Island was selected as the target area of the Township due to these particular vulnerabilities to tidal and storm related flooding. This was also the area of the Township hit hardest by Hurricane Sandy in 2012. Flooding and storm damage affects the health of the community in many ways, from physical injury to mold exposures to mental health effects created by the stress and anxiety of repairing home damage and fear of an uncertain future. According to a recent multi-university population study, Sandy continues to adversely affect lives even more than two years after the storm, in the form of "unfinished repairs, disputed claims, and recurrent mold," as well as "mental health distress, post-traumatic stress disorder (PTSD), and depression." [5]

1. A census-designated place (CDP) is a concentration of population identified by the United States Census Bureau for statistical purposes. CDPs are delineated for each decennial census as the statistical counterparts of incorporated places, such as cities, towns, and villages. CDPs are populated areas that lack separate municipal government, but which otherwise physically resemble incorporated places. Criteria established for the 2010 Census require that a CDP name "be one that is recognized and used in daily communication by the residents of the community" (not "a name developed solely for planning or other purposes") and recommend that a CDP's boundaries be mapped based on the geographic extent associated with residents' use of the place name.

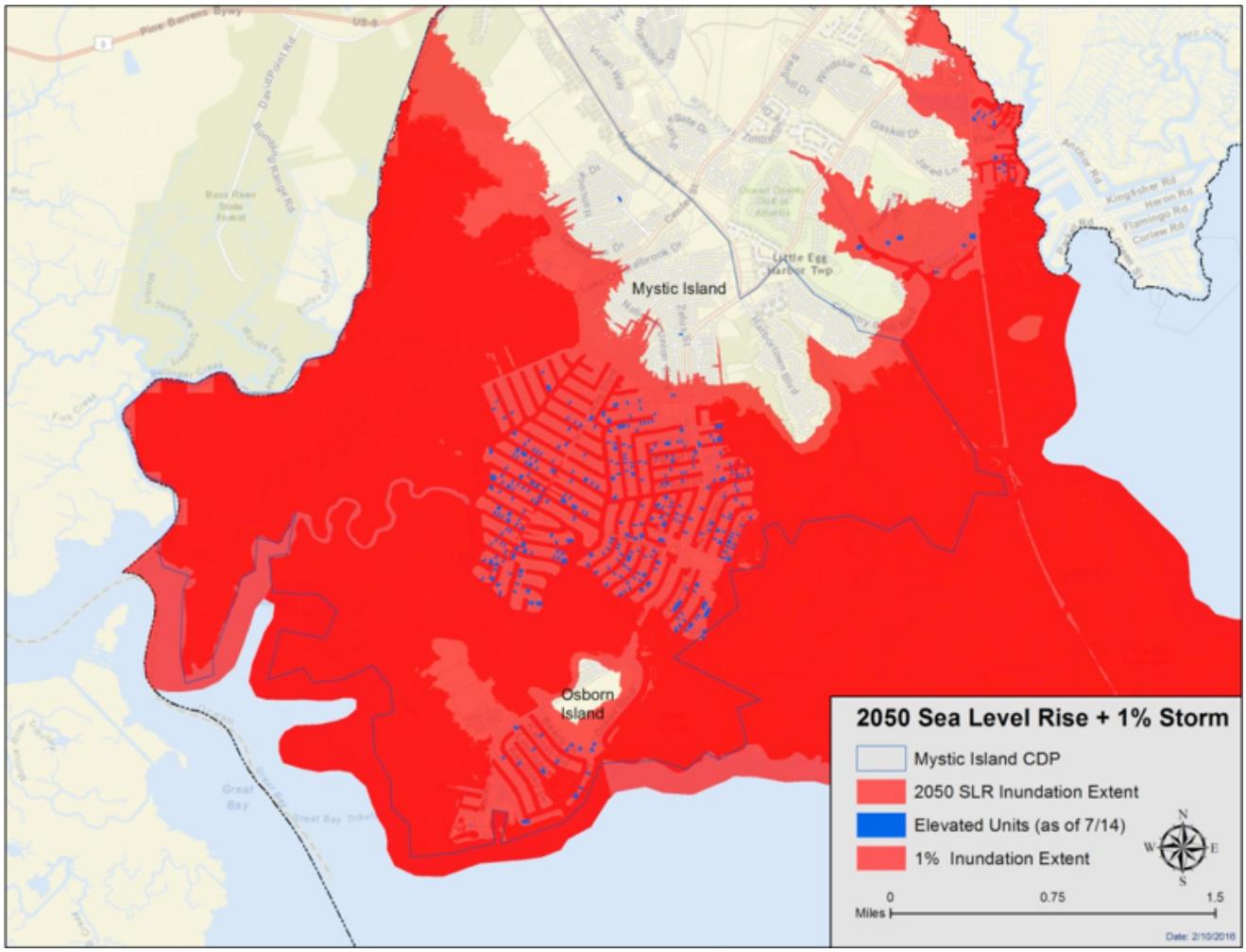
2. Repetitive loss properties are those buildings for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978.

3. Adopted by the Township on 2-12-15 prepared by the Township's Floodplain Management Committee and the Township Engineer

4. NJ Future. Vulnerability and Exposure Assessment Report. 2015.

5. Sandy Child and Family Health Study (SCFHS-Place). (2015). "The Hurricane Sandy Place Report: Evacuation Decisions, Housing Issues and Sense of Community." D. Abramson, D. V. Alst, A. Merdjanoff, et al. Rutgers University School of Social Work, New York University College of Global Public Health, Columbia University National Center for Disaster Preparedness, Colorado State

Figure 5: 2050 Sea Level Rise + 1% Storm



Hurricane Sandy and Aftermath

On October 29, 2012, Hurricane Sandy, the second largest Atlantic storm on record, hit the New Jersey coastline and disrupted many thousands of lives.[6] A combination of storm surge, high winds and wave action knocked homes off foundations, destroyed shoreline structures and carried massive amounts of debris, as water and sand rose to eight feet above ground level in some places.[7] With Monmouth, Ocean and Middlesex Counties taking the brunt, total damages to New Jersey's infrastructure, business and housing sectors were estimated at over $10 billion.[8] Most of the damage to residential properties resulted from flooding; particularly in older homes that were not elevated.[9] Sandy caused major or severe damage (at least one foot of flooding and more than $8,000 in physical damage) to more than 55,000 homes in New Jersey.

Hurricane Sandy flooded much of Little Egg Harbor Township with almost seven feet of water, damaging more than 4,000 homes, or approxi-

University Center for Disaster and Risk Analysis, Briefing Report 2015_1.

6. Sandy was classified as a post tropical storm when it made landfall in New Jersey, but is commonly referred to as a Hurricane, as it is throughout this report.

7. http://www.nhc.noaa.gov/data/tcr/AL182012_Sandy.pdf

8. Blake et al, 2013; Rutgers SPA, 2013; NJ DCA, 2013

9. NJ Department Of Community Affairs. Community Block Grant Disaster Recovery Action Plan. 2013.

mately 10,000 residents.[10] Nearly 1,000 of these homes suffered substantial damage, (i.e. the total costs of restoring the structure was at least half of the market value). Many of the damaged homes were in Mystic Island. Stakeholders involved in this study reported that although the community has dealt with many moderate to severe storms (Nor'easters) in the past, Sandy was "different" in the degree of severity of the storm surge and winds, which mixed floating debris and toxic substances into the flood waters.

Following Sandy, the process of elevating homes that had begun prior to the storm became expedited and encouraged. Elevated homes reduce vulnerabilities, but can also present barriers to elderly and disabled people. Homeowners may also fear that raised houses could be toppled due to damage or destruction from high winds or floating storm debris.

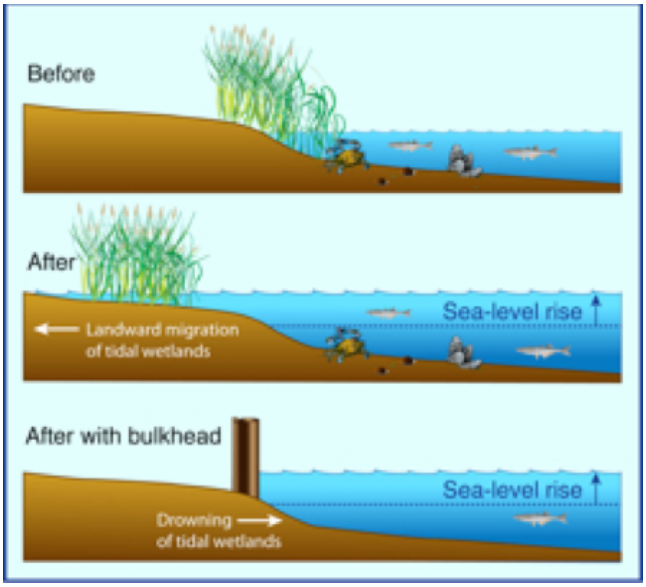
Coastal communities all across the country are considering options to reduce vulnerability and increase resiliency to impacts of climate change. Some residents of Little Egg Harbor have expressed interest in taking advantage of the option of a government buyout of residential properties, intended to reduce the risks of future flooding; however, local officials have reservations due to the possible loss of tax revenue and the effect this loss could have on the local economy. Clearly, the decision to support a buyout program could impact the health of the community in varied ways.

Blue Acres and Rationale for Buyouts as a Resilience Strategy

Still in the post-disaster recovery phase from Hurricane Sandy, communities like Little Egg Harbor Township are looking for ways to mitigate the potentially severe impacts that could occur from a similar, or worse, future storm. Any actions taken to improve resiliency to future storms is also likely to help to reduce sea-level rise impacts. From a geomorphological standpoint, coastal wetlands in New Jersey are deteriorating in quality with less vegetated surface, and edges eroded from wave energy and lack of new sediment,[11,12] So at the same time that sea levels are rising and storms are getting worse, existing wetlands, marshes and grass flats are not providing the protection they once offered to properties located at the edge of wetlands by absorbing and buffering against incoming water and wave energy. (See Figures 3 and 4).

Little Egg Harbor Township's Floodplain Management Plan identifies "Property Protection" as a set of measures that may mitigate impacts to the community from the increased risk of catastrophic flooding due to the combined effects of sea level rise, coastal erosion and climate change. One of these Property Protection measures is property acquisition or "buyouts" of land to add

Figure 6: Effect of Sea Level Rise on Wetlands[13]



Source: David Malmquist, 2009,Virginia Institute of Marine Scientists

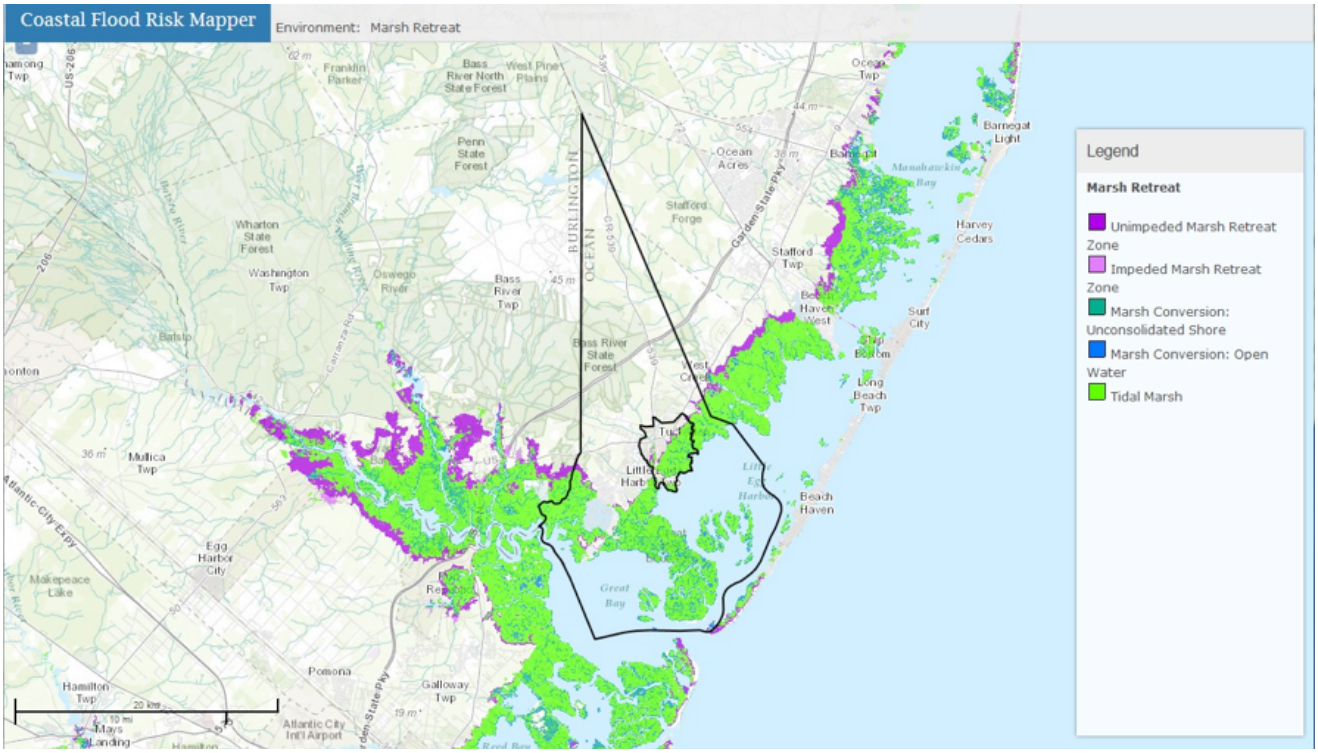
10. According to 2010 Census data the average household size in Little Egg Harbor Township is 2.46.

11. Tsudy, Norb. (2015). Personal Interview.

12. Gedan, K.B., M.L. Kirwan, E. Wolanski, E.B. Barbier, and B.R. Silliman. (2011.) "The Present and Future Rule of Coastal Wetland Vegetation in Protecting Shorelines: Answering Recent Challenges to the Paradigm." Climatic Change 106(1):7–29.

13. http://www.vims.edu/newsandevents/topstories/archives/2009/wetland_threat.php

Figure 7: Marsh Retreat



to the protected open space inventory in the floodplain. Increased open space at the shoreline provides increased buffer and protection to the rest of the community. When the government buys and demolishes residential properties in the floodplain that are subject to repetitive losses from floods, these property buyouts serve a dual purpose of adding to the protective open space buffer and moving families out of harm's way. Purchase and demolition of clusters of homes or whole neighborhoods that are then demolished and returned to a natural state is preferred so that the benefits of the increased floodplain buffer are maximized. If bulkheads or soft resilience measures are installed, as part of the management of the open space, they would further reduce some of the incoming wave action and energy.

The buyout program in place for New Jersey coastal towns is referred to as "Blue Acres." An offshoot of the state's Green Acres program, Blue Acres was started in 1995 and is administered by the New Jersey Department of Environmental Protection (NJDEP). The program focuses on purchasing properties that have been damaged by flooding (or may be prone to damage by storms and storm-related flooding) and are eligible for acquisition. Flood-prone structures that are purchased with public funds are then demolished and the remaining land is converted into municipal-owned open space.

State funding supports Blue Acres buyouts, but this program now also administers New Jersey's allocation of federal Community Development Block Grant-Disaster Recovery (CDBG-DR) funds, totaling $300 million that were allocated in response to Sandy. With these funds, the Blue Acres program can purchase homes in flood-prone areas at pre-storm value.

CDBG-DR money is intended to purchase:

- 1,000 (approximately) properties in tidal areas affected by Sandy in New Jersey.
- 300 properties in other towns that have flooded repeatedly, but were not affected by Sandy.

Additional funding is available to support buy-

outs with FEMA's Hazard Mitigation Grant Funding (up to $100 million) administered through New Jersey Office of Emergency Management, and from the Community Development Block Grant (CDBG) program, administered by the New Jersey Department of Community Affairs. The NJDEP Blue Acres program focuses on purchasing clusters of homes in order to maximize hazard mitigation impacts. The program is voluntary and the Blue Acres Program offers buyouts only where the following conditions are met:

- Severe flood damage from Hurricane Sandy, or repeated flood damage from previous storms has occurred;
- Willing sellers are available;
- Local government has expressed program support;
- Clusters of flood-prone homes, or whole neighborhoods can be purchased;
- The proposed buyouts are cost-effective according to FEMA guidelines;[14]
- Significant environmental impact and/or improvement to public health, safety, and welfare can be achieved.

After a cluster of homes has been identified and the state and local government have agreed to support a buyout, individuals are not required to participate. If a homeowner voluntarily submits an application, the Blue Acres Program negotiates a price (normally pre-storm value[15]), or works with the homeowner's bank or mortgage lender if a short sale is required. Additionally, the seller is not required to pay a real estate transfer tax nor do they pay commission to a realtor. Applications are reviewed on a rolling basis. (See Figure 8).

14. Benefit Cost Analysis is the method by which the future benefits of a mitigation project are estimated and compared to its cost. The end result is a benefit-cost ratio (BCR), which is derived from a project's total net benefits divided by its total project cost. A project is considered to be cost effective when the BCR is 1.0 or greater, indicating the benefits of a prospective hazard mitigation project are sufficient to justify the costs. See http://www.fema.gov/benefit-cost-analysis

15. Pre-storm value is determined by an independent appraiser who determines the pre-storm Fair Market Value of substantially damaged properties.

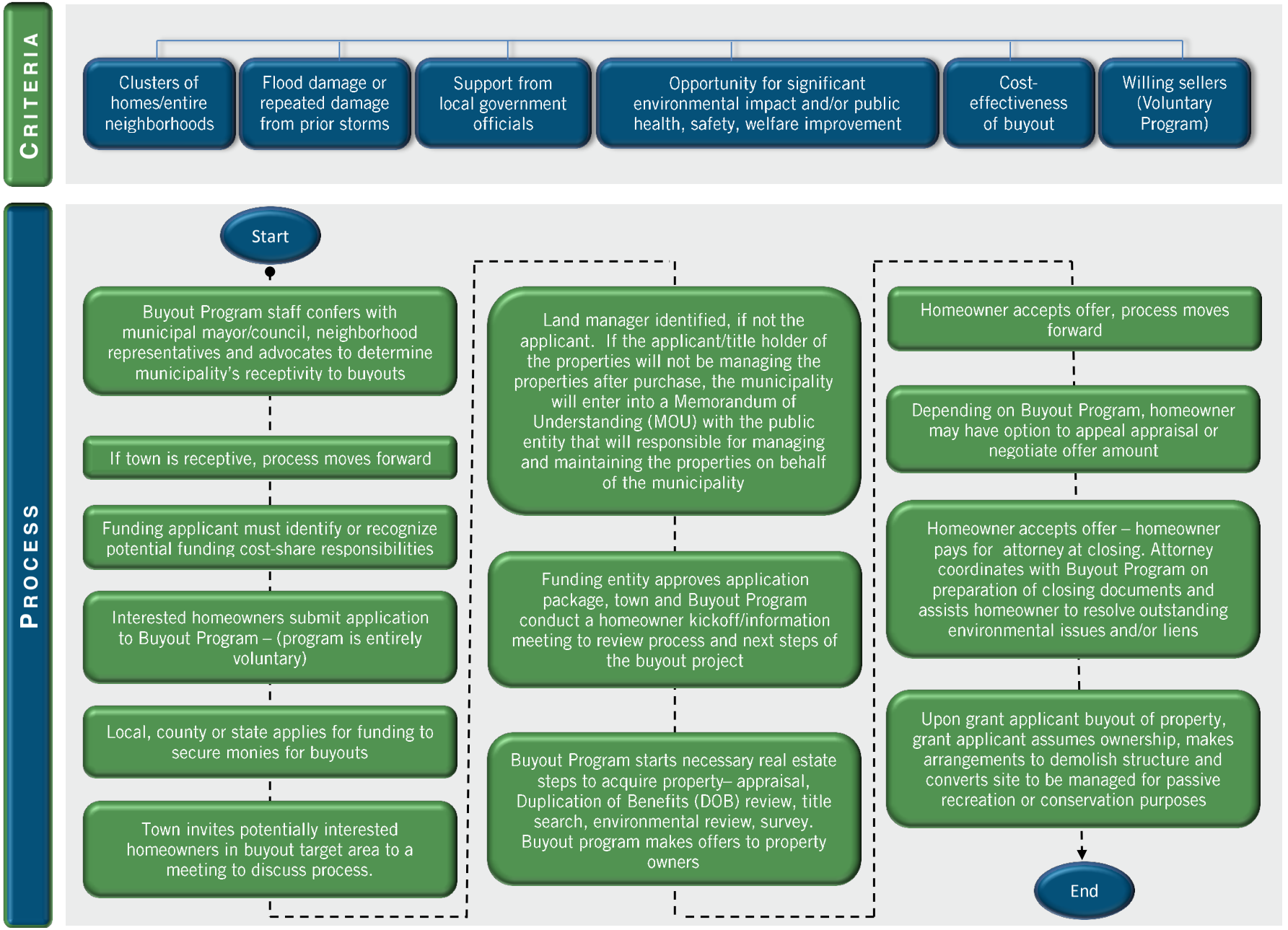
Mystic Island Hypothetical Buyout Alternatives

It is important to emphasize that currently, Little Egg Harbor Township has no specific geographic area or target number of properties under consideration, so the scenarios evaluated in this HIA are entirely hypothetical. In order to conduct an assessment of projected health effects of buyouts, these scenarios propose the number of properties that would be purchased and their approximate location and configuration. They have been vetted with township officials and other local stakeholders and will continue to be refined after the completion of this study if consideration of buyouts moves forward.

The buyout scenarios for this assessment were developed to meet the following criteria:

- The buyout would result in reducing future flood damage by focusing in areas where repetitive flooding is likely to occur, defined as areas flooded in recent severe storms, and areas that are most vulnerable to more routine flooding due to sea level rise;
- The buyouts would meet Blue Acres program guidelines;
- Target properties could be configured in clusters of entire blocks or groups of blocks, rather than in individual and scattered patterns;
- The buyout would provide the opportunity to construct hard and soft flood mitigation measures (i.e. bulkheads, living shorelines, etc.) to reduce potential flood hazard damage in areas of the Mystic Island neighborhood that will not be purchased;
- Buyouts would improve resilience, mitigate flooding, and provide significant environmental benefits.
- Buyouts would result in new open space that could provide other amenities and benefits to the community, such as passive recreation, waterfront access, etc.;

Figure 8: Buyout Program Process



According to these criteria and in consultation with township officials and other stakeholders (as described in the stakeholder section below), the research team developed two alternative buyout scenarios that:

1. Could be potentially realized using current Blue Acres resources; and
2. Would achieve the maximum benefit in terms of flood risk reduction.

The first scenario (Figure 9) is a buyout of approximately 100 contiguous parcels. This was considered the minimum number of properties that, when purchased and cleared, could result in enough open space to increase resiliency. The second scenario is a buyout of 500 parcels. This is likely the maximum number of properties that could be purchased with remaining buyout resources. Both of the scenarios propose purchasing a cluster of homes because this would achieve maximum environmental benefits. In the course of the HIA, the "decision not to decide" about opting into the buyout program, the "no-action" alternative, has also been evaluated. A more detailed description of the buyout scenarios follows.

Alternative #1:
approx. 100 properties
(Target area - along E. Boat, E. Brig
and E. Dory) = approx. 11.6 acres

According to a township official, the area of Mystic Island along East Boat, East Dory and East Brig Drives, encompassing about 100 properties, has been most repeatedly damaged by flooding caused by storm events and by tides. Figure 9 shows the location of this area which directly abuts the eastern waterfront of Mystic Island.

Alternative #2:
approx. 500 properties
(Target area - all property east of Radio
Rd. in Mystic Island) = approx. 61.4 acres

This alternative includes the area targeted in the buyout scenario #1, and adds parcels along the entire eastern waterfront of Mystic Island (Figure 10). This area is often the first to become flooded by both tidal action and storm surges, as water surges in from the bay and backs up into the creek (Big Creek) that winds along the eastern edge of the neighborhood facing the bay. This area would encompass about 61 acres of land and all of the blocks east of Radio Road, which is the major north-south road connecting Mystic Island and Osborn Island to the south. This scenario would not only take these homes out of harm's way, but also allow for elevation of Radio Road, or some other hardened infrastructure, to be constructed along the eastern edge of the road to further protect the remaining inland properties. It also affords a fairly large area to be used as open space or passive recreation.

Figure 9: Buyout Scenario 1

Figure 10: Buyout Scenario 2

Table 1:
Question: If you own your residence and were to receive fair compensation for your home, how interested would you be in selling as part of a buyout program? (n = 85)

Location	Very Interested (%)	Somewhat Interested (%)	Not Interested (%)	Don't own home (%)	Not sure (%)**
Mystic Island	39.6	39.6	17.0	2.4	2.4
Osborn Island	21.4	28.6	42.9	7.1	0
Other Little Egg Harbor or Tuckerton	33.3	16.7	50	0	0

Resident Interest in Buyouts

The resident survey conducted for this HIA (described below) revealed significant interest in considering a buyout alternative on the part of Mystic Island residents. Almost 80 % of Mystic Island respondents who own their homes indicated that they were either "very" or "somewhat" interested in selling if they received fair compensation. About half of residents from Osborn and from other parts of Little Egg Harbor Township or Tuckerton Borough said that they were interested (See Table 1).

It is important to note that a buyout initiative would not necessarily result in all participants leaving the township. In fact, 18 % of survey respondents said that they would be likely to leave the flood-prone area, but stay in Little Egg Harbor Township or Tuckerton. (See Table 2) Another 30 % were undecided about where they would move, and it is likely that at least some of these residents might opt to remain elsewhere in the township also. It is important to keep this in mind when interpreting the impact on local tax revenues. To the extent that people in homes that have been bought out were to move to new housing somewhere in Little Egg Harbor, the Township would experience no or negligible net tax loss.

Feedback from local residents obtained through the HIA survey and from informal interviews indicated that the main factor in the decision to accept a buyout is the price offered for the home. It needs to be a fair price, many said at market value or above, to compensate them for money already spent repairing damages. These issues are discussed in more detail below in the "Household Finance" section.

Table 2:
If you own your residence and were to receive fair compensation for your home, would you likely relocate: (n = 82)

Answer	%
to another part of Little Egg Harbor or Tuckerton	18%
outside of Little Egg Harbor or Tuckerton, but in Ocean County	9%
to another part of New Jersey	13%
outside the state of New Jersey	30%
Don't know / Not sure	29%
total	100%

Post-Buyout Open Space Vision

According to the Blue Acres program, land that remains after a home is purchased must be preserved as open space and no permanent structures may be reconstructed on the site. The goal is that newly preserved open space will serve as a buffer to future flooding or storms. The new wetland area is important not only as a flood-

ing buffer but as it functions to filter chemicals and pollutants and provide a habitat for fish and wildlife.[16] The area acquired from demolition of 100-500 homes, each occupying approximately 1/8 acre lots, plus the streets that serve the lots (approximately 12 to 62 acres), has the potential to become a community asset, and its use and condition will likely influence health for years to come.

To completely and accurately assess the health impacts of the buyout scenarios, it is necessary to develop a practical plan for how the land will be used (for what purposes, who will benefit and in what ways) and how it will be maintained (costs and responsibilities for upkeep, implications for community fiscal and public health). Feedback from the community (see Open Space section below) indicates a preference for assuring that the land is well-maintained and provides some community benefits. For the purposes of the HIA, the research team envisions the repurposed space as a wetland/marsh with multiple uses and benefits, developed with wetlands and habitat preservation or endangered species funds from state or federal sources. New Jersey has several loan and grant programs to assist communities in creating wetlands.[17]

The newly created wetlands would not have high ongoing costs, since functioning wetlands are self-regulating. After an initial cost of approximately $300,000 per 10 acres,[18] to plant vegetation, only periodic inspections for damage and sediment accumulation are necessary. These factors are described in greater detail in the Municipal Fiscal Impact section of this HIA.

Under the proposed post buyout concept, public access with passive recreation (boardwalks, gravel paths, benches, etc.) or even a marina could be options. According to the Blue Acres program staff, a floating public dock could be allowed as long as it is not constructed as a permanent structure. Floating docks can also be used in combination with wetlands, providing access to canoe/kayak entry areas, bird blinds or walking trails. It was beyond the scope of this HIA to develop a full concept plan and cost estimates for development and use options for the open space. Many specific factors such as the condition of current bulkheads, ability to install additional green infrastructure, and configuration of the open space, will influence the potential design and cost of any newly constructed wetlands or passive recreation features. It is important to again note that final decisions about management and use of the bought out land remains with the local community.

16. Dutzik, Ton and Doug O'Malley. "The Shore at Risk." The Frontier Group.

17. For example, Hurricane Sandy Coastal Resiliency Competitive Grants Program, Water Quality Management Planning Pass-Through Grant, Endangered Species - Conserve Wildlife Matching Grant, Flood Hazard Risk Reduction and Resiliency Grant Program, Shore Protection Grants and Loans, Municipal Public Access Planning Grant Program

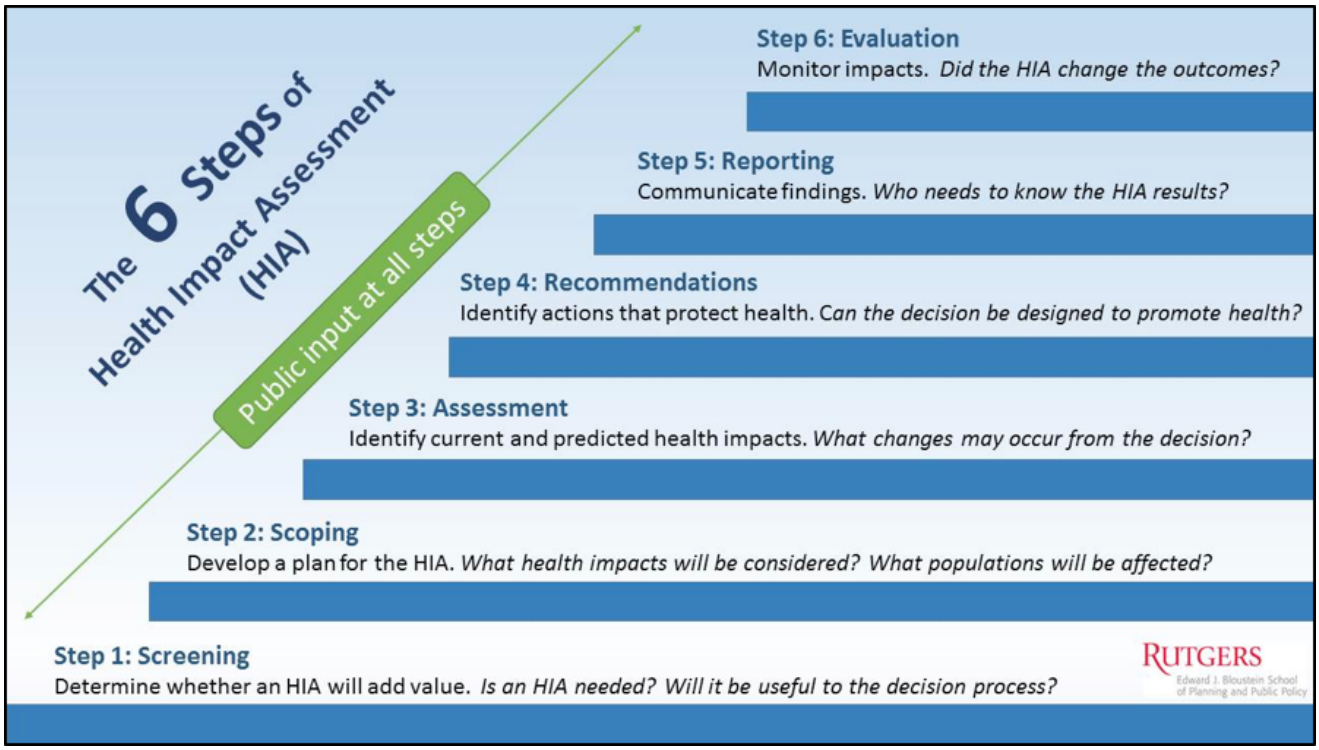
18. U.S. EPA. Stormwater Wetlands.

The Health Impact Assessment Process

By combining scientific data; health expertise; and public input, Health Impact Assessments (HIAs) identify and assess the potential positive and negative health effects of decisions related to policies, programs or projects. HIAs consider a range of social, environmental and economic influences on health and place an emphasis on identifying groups who might be particularly vulnerable or disproportionately impacted. Health Impact Assessment follows a six-step method (screening, scoping, assessment, recommendations, reporting, monitoring/evaluation) that results in a set of grounded recommendations intended to maximize positive health aspects and minimize negative impacts to health.

This HIA provides a helpful lens through which to evaluate the full range of impacts of buyouts on human health and social vulnerabilities of a lower-income population, and on the community's fiscal health. The outcomes of the HIA are also intended to benefit decision-makers and residents of similar coastal communities in New Jersey and the U.S. that are plagued by chronic flooding and hurricanes.

Figure 11: Health Impact Assessment Process



Screening & Scoping

II

Screening

The objective of the screening step is to determine whether a HIA is appropriate, likely to be useful, and feasible. Common questions asked during this step may include: What project or decision will the HIA address or inform? How important to health is the project or decision? Will the HIA provide new and important information to inform decision-makers? Is a HIA feasible given available resources?

Identification of Decision and Decision-makers

The decision point for this HIA is whether Little Egg Harbor Township should support homeowners in the Mystic Island neighborhood who wish to apply for voluntary buyouts. Little Egg Harbor Township Council is the decision maker. Key stakeholders are the residents of Mystic Island, the NJDEP Blue Acres Program and Ocean County.

Buyout programs can be a powerful local-level strategy to reduce vulnerability for communities throughout the country that are likely to be affected by the impacts of rising sea levels. These programs are often controversial, and an HIA helps to inform decision-making by allowing for consideration of economic, social and health impacts. To date, the principal concerns with respect to comprehensive buyout programs relate to economic impacts (fair value for homes, loss of property taxes to the local jurisdiction, etc.); the HIA offers community officials critical information to enable them to take both human and community economic health into account.

Research team members and the project funder engaged in consultation over the period of several months in early 2014 to determine that this decision context, though hypothetical in nature, presented an appropriate opportunity to conduct an HIA. *(See the Screening Checklist in Appendix A for a detailed list of the questions evaluated in the decision to determine the value of the HIA and to move forward with conducting the HIA study.)*

Available Resources

Program staff and consultants associated with the Health Impact Project, including technical support from the Georgia Health Policy Center, provided significant mentoring and support throughout the project. Other efforts provided complementary research and support for this study. As mentioned above, this project leveraged New Jersey Future's existing funding to support a local recovery planning manager in Little Egg Harbor Township. As this HIA was in process, the recovery program drafted a vulnerability assessment for the township that served as a companion to a Strategic Recovery Planning Report (SRPR) that was prepared by the Township's consulting engineer. These documents provided necessary background about future vulnerabilities to evaluate possible strategies. The vulnerability assessment provides an overview of the community's potential exposure to future storms and sea-level rise and the SRPR provides a prioritized list of projects and strategies that are intended to help the Township become more resistant to future storms and flooding. The HIA complements SRPR's list of strategies with its assessment of buyout options.

Likewise Rutgers, with support from the New Jersey Recovery Fund, provided New Jersey Future .with extensive analytical support in gathering geospatial data to support the Township's vulnerability analysis and ongoing recovery efforts.

Scoping

The scoping step establishes the foundation for designing and conducting the Health Impact Assessment. During this step, the HIA team identified: research questions; key health issues; determinants and pathways that should be considered; impacts to affected geography and population(s) that should be evaluated; and methods to be used to undertake the assessment. During the scoping phase, input was gathered from experts in a range of fields from coastal geomorphology to disaster response to local health and real estate professionals, as well as public stakeholders, and a plan was developed for their engagement throughout the HIA process.

Goals of the HIA

The goals of the HIA are to:

- » inform Little Egg Harbor Township municipal officials about the possible health implications of their decision about whether to support a voluntary buyout strategy;
- » determine and carry out methods to assess baseline conditions and projected health impacts;
- » develop recommendations intended to maximize health benefits and mitigate negative health impacts, on human health as well as community fiscal health, of a voluntary buyout program
- » focus on assuring an equitable distribution of benefits and burdens;
- » produce reports and presentations of different types for different audiences affected by or interested in the health implications of the buyout decision;
- » evaluate the process and impact of the HIA and suggest indicators for future monitoring of health impacts related to buyouts;
- » engage stakeholders who will be potentially impacted by the buyout program throughout the entire HIA process; and
- » define additional research questions for further study related to health determinants influenced by a voluntary buyout program.

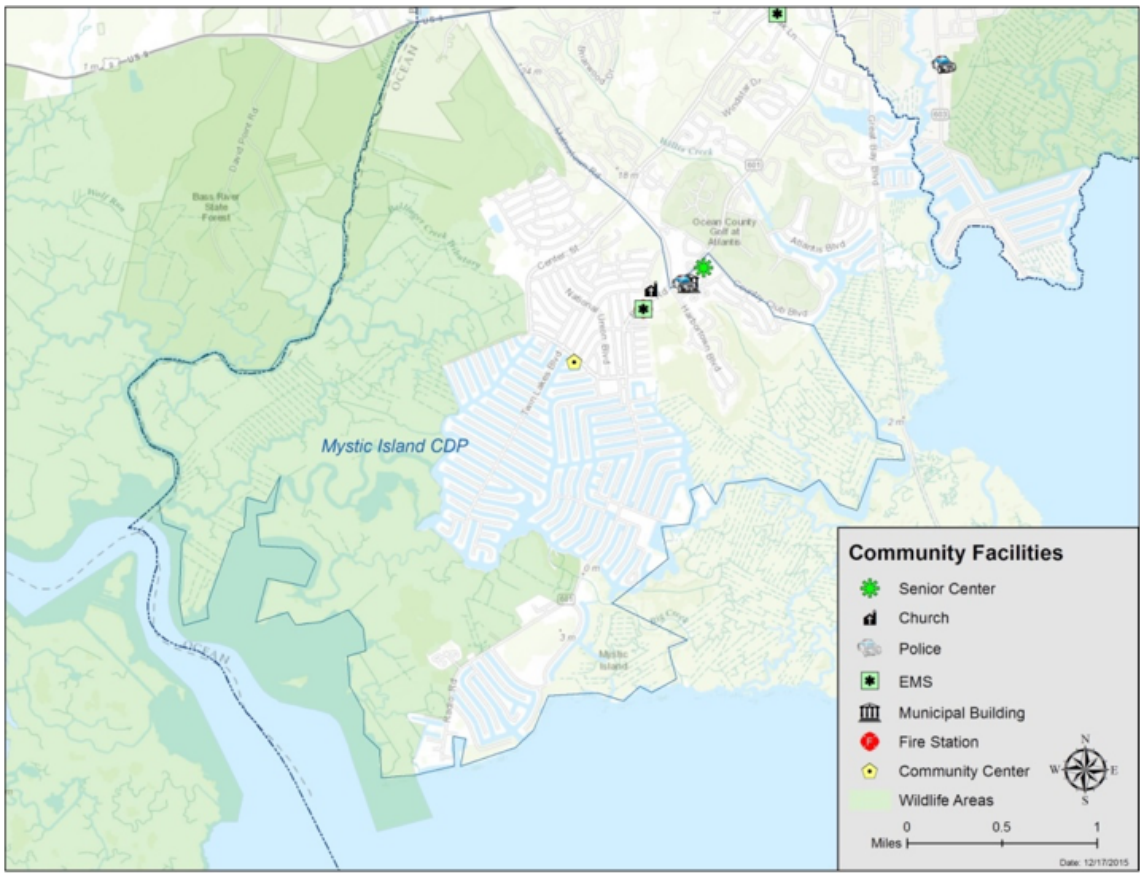
Study Geographic Boundaries

As described in preceding sections of this report, the voluntary buyout program is proposed for the Mystic Island area of Little Egg Harbor Township. The township is located in the southwestern corner of Ocean County (see Figure 4 on page 2). The Mystic Island neighborhood, which includes Osborn Island, encompasses an area of approximately 1.8 square miles. Both Mystic and Osborn Islands are within the Mystic Island Census Designated Place (CDP), which encompasses an area of approximately 7.7 square miles. Because the decision concerning Mystic Island will also affect the overall Township, especially in terms of possible economic and fiscal implications, the geographic boundaries and total population of Little Egg Harbor Township is considered an affected geography in this analysis.

Description and Assets

Mystic Island is largely residential (90%). A majority of the neighborhood is built with lagoons between the streets, so that houses have direct water and bay access. There is a community center, a senior center, church, nursing home, fire station and police station within the Mystic Island CDP boundary. The 2012 County Business Patterns report shows no recreation and fitness facilities or pharmacies. The report also shows

Figure 12: Mystic Island Assets and Facilities



no supermarkets in Mystic Island and only three in Little Egg Harbor. (See Figure 12).

While there are no parks within the boundaries of Mystic Island, there is designated open space immediately east and the southwest of the neighborhood. This area, as well as several other large tracts of preserved open space in the region, are mostly encompassed within the 72,200 acre Edwin B. Forsythe National Wildlife Refuge.

Temporal Boundaries

This HIA is concerned with short as well as long-term health impacts that may not be realized for decades.

Short-term – immediate and up to 15 years (2030)

Longer-term – from 15 to 35 years (2050)

The determination of the short and long-term horizons is tied to the recent vulnerability and exposure analysis. The 2050 time frame was selected because it is roughly equivalent to a 30-year conventional mortgage period to which most homeowners can relate. In addition, the vulnerability analysis is based on sea-level rise projections developed by Miller and Kopp.[1] These projections, which use 2030 and 2050 projection horizons, are widely used in several current sea level rise assessment models.[2]

Potentially Vulnerable Sub-populations

Vulnerable subpopulations that may either receive unequal access to benefits or may dispa-

1. Miller, K.G., R.E. Kopp, B.P. Horton, J.V. Browning, A. C. Kemp. (2013). "A Geological Perspective On Sea-Level Rise and Its Impacts Along the U.S. Mid-Atlantic Coast", AGU Publications, Department of Earth and Planetary Sciences, Rutgers University.

2. For example: Getting to Resilience, NJ Adapt, Climate Central

rately suffer negative outcomes could include those of lower income, elderly, disabled and youth. The baseline assessment identifies these subpopulations within Mystic Island, and the projection assessment focuses on understanding impacts these populations may experience.

A buyout initiative raises important equity considerations. Many of the homeowners on Mystic Island have incomes that are lower than other parts of the Township. As a consequence they may have fewer options or resources to offset the negative impacts of potential flooding, and are likely to have poorer health and access to health care. The decision about buyout alternatives will impact these populations to a greater degree than more affluent residents with more mobility and resources.

Research Questions

The overarching research question guiding the HIA is:

What are the physical and mental health outcomes associated with the implementation of voluntary buyout scenarios for Mystic Island?

Five sub-questions relate to health determinants that may be affected as a consequence of the buyout decision – future flood damage risk, household finances, municipal budget and fiscal impacts, new open space, and impacts on social fabric and cohesion. These sub-areas for study were selected and vetted at a project kickoff meeting, where attendees brainstormed about potential pathways between these conditions and health outcomes.

Sub-questions:

- How will the buyout program affect future risks and health outcomes associated with **flooding damage** (routine and storm-related)?
- How will the buyout program affect health outcomes associated with **household finances**?
- How will the buyout program affect health outcomes related to the **municipal budget**?
- How will the new **open space** created by the buyout affect health?
- How will the buyout program affect health outcomes associated with **social cohesion**?

The table below lists possible health impacts expected to be associated with each research question based on initial scans of literature and consultation with locals in the scoping phase, indicators that can be used to measure them, and sources of data consulted to collect information relevant to the research question. Indicators were selected because they are either data that are readily available through existing secondary sources, or information that could be collected at either an exact or approximate level through new primary data collection (interviews and surveys).

It is important to note that certain health determinants were not chosen for assessment, either because there was little or no stakeholder interest or concern expressed during the scoping process, or because the research team had little or no basis for evaluating the impacts of the determinant. For example, the impact of possible changes in motor vehicle use (and hence impacts on individual transportation costs or on local air pollution) was not explored, largely because it did not occur as an issue from early discussions with stakeholders in scoping, and also because the impact on air pollution or personal costs is likely to be very small. For the same reasons, the impact of the buyout program on access to healthy food was not examined. However, this is an aspect worth examining in more detail in future study. The team also did not explore the future health impacts for households who would accept the buyout and leave Mystic Island, except that the move would take them out of harm's way. Suggestions for future study of additional health determinants not addressed in this HIA are listed in the monitoring section of the report.

Table 3: Research Questions, Indicators and Data Sources

Research Questions	Possibly Related Effects and Health Outcomes	Indicators	Data Sources
How will the buyout program affect future risks and health outcomes associated with flooding damage (routine and storm-related)?	- Chronic stress - Acute stress - Anxiety and fear - Respiratory irritation (from mold) - Flood-related injury or death	- Poor Mental Health days - Self-reported stress and fears - Asthma rates - Reported injuries - Board of Health Complaints	**Baseline**: Local health depts., DEP, local hospitals and doctors, EMS **Projection**: Literature Review, EMS, Experts, DEP, SLR Inundation maps
How will the buyout program affect health outcomes associated with household finances?	- Stress and anxiety Depression - Hypertension - Heart disease - Addictions - Domestic violence	- HH Income - Property Values - Tax levels - Household Wealth - Poor Mental Health Days - Poor Physical Health Days - Morbidity measures - Self-reported stress	**Baseline**: US Census, County Health Rankings, BRFSS, Community Health Assessments (if available), Local health depts. Mental health hotline, Local Realtors and Tax Assessors **Projection**: Resident Survey, Stakeholder input, Literature Review, Experts, Local Realtors and Tax Assessors, Property value projection analysis
How will the buyout program affect health outcomes related to the municipal budget?	- Stress and anxiety - Depression - Hypertension - Heart disease - Addictions - Domestic violence	- Property Values - Tax levels - Levels of Service - Poor Mental Health Days - Poor Physical Health Days - Morbidity measures - Self-reported stress	**Baseline**: Community Health Assessment (if available), County Health Rankings, BRFSS, Mental health hotline, Local health depts., Local Realtors and Tax Assessors **Projection**: Literature Review, Experts, Local Realtors and Tax Assessors, Fiscal Impact Analysis
How will the new open space created by the buyout affect health?	- Respiratory irritation - Obesity-related diseases - Stress - Injury	- Physical Activity - Poor Mental Health Days - Poor Physical Health Days - Obesity-related disease rates - Asthma and allergy rates - Animal bites - Traffic injury data - Air pollution - Noise Pollution	**Baseline**: County Health Rankings, BRFSS, Local crime reports, Local Heath depts.., Local police, Resident Survey, Stakeholder input, DOT **Projection**: Literature Review, Resident Survey, Stakeholder input, DOT, Cost/Benefit analysis
How will the buyout program affect health outcomes associated with social cohesion?	- Stress - Depression - Addictions - Violence	- Self-reported rating of social cohesion - Success of social events and organizations	**Baseline**: Resident Survey, Stakeholder input, BRFSS, County Health Patterns **Projection**: Literature Review, Resident Survey, Experts

Health Determinants and Pathways

Health determinants are personal, social, economic, and environmental factors that are influenced by societal decisions and ultimately affect the health of individuals or populations. Health determinants are linked through research to health outcomes, such as life-expectancy, disease and injury. Considering the health effects of decisions requires employing a holistic definition of health and consideration of a broad set of health determinants, intermediate and final health outcomes and the pathways that connect them.

Causal models, or pathway diagrams, are used in HIAs to define cause and effect relationships that potentially exist between health determinants and health outcomes. Pathway diagrams help organize existing knowledge and research, guide analyses, and communicate information in a clear and systematic manner. A pathway diagram guides research questions and gives insight into the intermediate effects that lead to the plausible health results. Figure 13 shows a conceptual pathway diagram template.

Figure 14 on the following page depicts a health pathway diagram showing the impact of the buyout decision on the selected health determinants, the intermediate impacts, and final health outcomes associated with them.

Figure 13: Health Pathway Example

Methods

In this section, the methods that were used to define baseline conditions and projected impacts of a buyout program in Mystic Island are described.

Literature Review

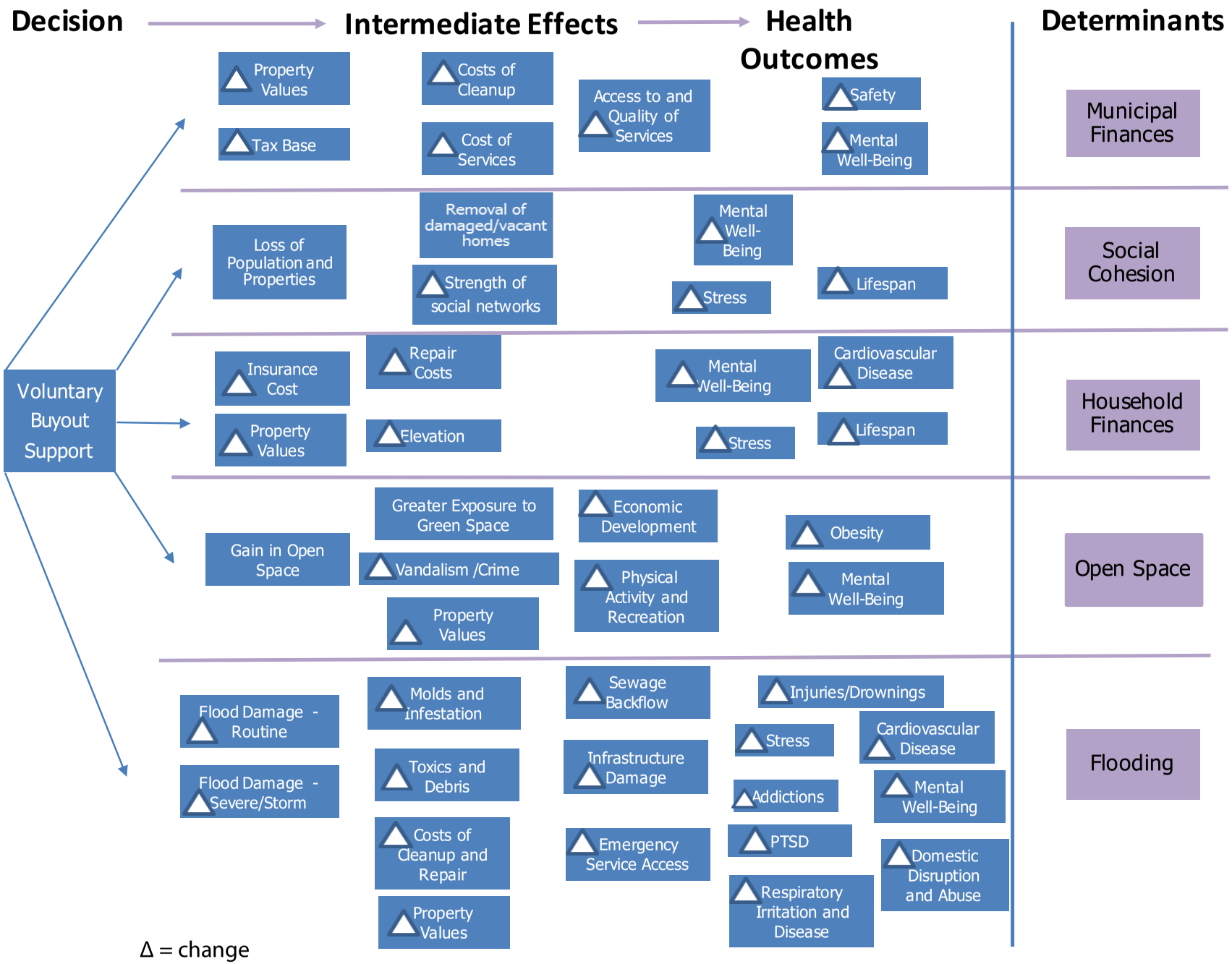
Literature review is critical to make the connection between the indicators and the broader questions about health determinants and projected outcomes. To predict health impacts, the team reviewed empirical research from scholarly journals to find evidence of connections between various proximate and intermediate effects and final health outcomes that may result from a buyout. In evaluating the literature, the team assessed the strength of evidence, methodologies and similarity of sample populations to our study population. In applying findings from literature to the research questions of this study, more weight was given to peer-reviewed studies where the scientific merit has been judged by experts in the field.

Secondary/Existing Data Collection

US Census data was the primary source used to conduct the baseline demographic and socioeconomic analysis. The team also collected parcel data, property value, taxation and local budget information from both NJ state MOD-IV (property tax database) and from Little Egg Harbor municipal offices and local realtors. For health data, the research team conducted a broad search for national data, including the CDC's Behavioral Risk Factor Surveillance System (BRFSS)[3] which collects data on health-related risk behaviors, chronic health conditions, and use of preventive services; and County Health Rankings and

3. http://www.cdc.gov/brfss/

Figure 14: Health Pathway Diagram



Roadmaps,[4] which weighs and summarizes over twenty sources of public health data from national sources. In addition, members of the team contacted the Little Egg Harbor Board of Health and Ocean County Health Department to obtain information pertaining to recent local health studies or data collection efforts.

Fiscal Impact Analysis

In consultation with experts in municipal finance and fiscal impact, the team conducted a fiscal impact analysis that evaluates the impact of the buyout program on the municipal and local school district budgets. A full report is found in the appendix and summarized in the Municipal Fiscal Impacts section below.

Roundtable

The team conducted a roundtable discussion on March 23, 2015 that included health and safety officials and experts, as well as representatives from important subpopulations of the Township to respond to questions about safety, security, physical activity and social/mental health aspects related to a potential voluntary buyout program. Discussion protocol and notes are found in Appendix E.

Roundtable

Expert/Informant Interviews

Frequent contact with members of the HIA steering committee (described below) served the function of providing expert and key informant input throughout the HIA information-gathering process. In addition to these exchanges, the team also conducted interviews with residents and with health stakeholders including the County Health Department, a scientific expert in coastal flooding and geomorphology, and local nonprofits with health and social service missions. List of interviewees is in Appendix F.

Survey

The HIA team conducted a Community Health and Resilience Survey between April and July of 2015, targeted to LEH and specifically to Mystic Island residents. Most respondents completed the survey through an online format, but some filled out paper copies. The survey link was distributed through the LEH township website, and directly via e-mail to mailing lists associated with local nonprofit groups. Members of the steering committee promoted the survey via local contacts and through word-of-mouth. The survey enabled the project team to collect new primary data on resident experiences and impacts from past flooding, health and safety concerns, and preferences related to buyout scenarios. A set of health questions was assembled and responses were collected in a format that will be comparable with other HIAs and from questions from the Behavioral Risk Factors Surveillance System (BRFSS), assuring comparability with national and state statistics. Answers to the questions helped to provide some baseline health information, but primarily helped to support impact projections and recommendations. The research team secured approval from the Rutgers Institutional Review Board for the Protection of Human Subjects (IRB) for the survey protocol. A copy of the survey protocol is found in Appendix G.

4. http://www.countyhealthrankings.org/

Survey Respondent Characteristics

A total of 120 people completed the survey, with almost half living in the Mystic Island lagooned area (34% bordering a marsh or wetland area), and about 75% of all respondents from the Mystic and Osborn Island neighborhoods. The other 25% were from other parts of Little Egg Harbor or Tuckerton (6%).

There were slightly more females (54%) than males answering the survey, and three quarters of respondents had no children at home. Almost 70% of respondents were 50 years of age or older, with the largest percentage (42%) between 51 and 65 years of age. (See Table 5). Those older than 65 were 27% of the sample. The sample was slightly older than the age profile for the entire CDP, in which 22% are older than 65 years of age. Reflecting the racial composition of the area almost exactly, though, the respondents were almost all white (98%). The respondent sample was significantly more educated than the Mystic Island CDP, with a vast majority (87%) having at least some college education, and 44% of the respondents college graduates, compared with only 10 percent having college degrees in the CDP as a whole.

In terms of income, about 25% of respondents reported household incomes below $50,000, with 25% between $50,000 and $75,000 and another 25% over $100,000. This distribution was consistent across residents from all parts of the township. Almost 60% were employed, with 27% retired and the rest either unemployed, unable to work, homemakers or students.

Most of the respondents own their homes in LEH and use them as their primary residence (84%), with 7% of respondents owning a seasonal home in LEH. Renters comprised only 2% of the survey respondents. About 25% of respondents have lived in their homes for over 20 years.

Almost half of respondents live in houses con-

Table 4:
Residence of Survey Respondents (n = 109)

Residence	%
Mystic Island - lagooned	47%
Mystic Island - upland (not lagooned)	12%
Osborn Island	15%
Other part of Little Egg Harbor	20%
Tuckerton	6%
total	100%

Table 5:
Age of Survey Respondents (n = 89)

Answer		%
18-35		10%
36-50		21%
51-65		42%
66-75		24%
Over 75		3%
total		100%

Table 6:
Question: If (your home is) on slab or block, do you have plans to elevate? (n = 73)

Answer	%
Yes, in the coming year	22%
Yes, in 1-2 years	1%
Not sure	12%
No	52%
Other:_____	12%
total	100%

Table 7:
Stakeholder Engagement in HIA Process

Stage of HIA	Stakeholder Engagement
Screening	- Project lead partners, Pew Health Impact Project, consultation with local officials in LEH
Scoping	- Kickoff event – Invited local officials and community members identify priority health issues and concerns.
Assessment	- Resident Survey - Health/Safety Roundtable Discussion - Quantitative Analyses - Key Informant and Expert Interviews
Recommendations	- Final Public Meeting/Open House - Review of recommendations by other agencies, as needed
Reporting	- Stakeholders review report - Stakeholders help to communicate HIA findings to media and on websites.
Evaluation/Monitoring	- Stakeholders implement recommendations and monitor decision outcomes and long-term health impacts.

structed on slab, while about 30% have elevated their homes onto pilings. A large majority (83%) of those homeowners who elevated their homes on pilings did so after Sandy. Of those currently on slab, almost a quarter plan to elevate in the next two years.

In relation to Hurricane Sandy, 91% of survey respondents were living in Little Egg Harbor Township during the hurricane, and two thirds of them evacuated. About half evacuated for less than one week. However, about 30% could not return for more than one year, and 14% still had not returned to their homes as of the summer of 2015.

Stakeholder Engagement

A variety of methods and formats for stakeholder engagement resulted in the collection of a rich set of local input to inform the assessment of local conditions and to support assessment of impacts and recommendations. (See Stakeholder Engagement Plan in Appendix C and Table 7)

Steering Committee

An HIA steering committee comprising approximately 15 members representing Little Egg Harbor Township, local business, Mystic Island residents, NJDEP Blue Acres, EPA, and local and county social service and health organizations was assembled. The committee met periodically throughout the project, providing review of interim products and analyses. In addition, individual members were consulted on an as-needed basis for local data or contacts.

Public Meetings

At a kickoff meeting with key local stakeholders and Blue Acres program staff held in Fall of 2014, the project team was introduced, HIA concepts were presented, and participants selected health determinants and broke into teams to brainstorm health pathways for those determinants. This input formed the foundation of the project and helped to shape the scope and bounds of the analysis.

Kickoff Meeting

Data Gaps and Constraints

The literature cited in this report includes only a subset of the literature available on each topic, so it is possible that some sentinel studies were missed and are absent due to time limitations. Furthermore, some quantitative baseline data that the HIA team sought for each indicator either did not exist at all, or was unavailable at a level lower than the state or region and therefore was inapplicable to the study area. Further, the team did not create statistical quantitative models to predict the degree of change. Projections are based largely on qualitative assessment of the range of data collected and judgment of the research team, with stakeholder review.

Also, it is important to note that the health benefits and risks identified in this assessment may not materialize if the voluntary buyout does not occur, or does not occur in the same volume as predicted in the scenarios. Actual implementation of the program will depend on a variety of factors including availability of funding; priorities and preferences of property owners and local decision-makers; and physical constraints.

Kickoff Meeting

Baseline Assessment

III

The research team prepared three profiles. Profile one describes demographic and socio-economic characteristics of the Mystic Island and Little Egg Harbor Township population. Profile two describes housing characteristics. The third profile captures available health statistics, including self-reported health characteristics of the non-representative survey sample. Data for Ocean County and/or the State of New Jersey is displayed for comparison purposes, where relevant (and in some cases, County data is the finest scale available). As part of the analysis, the research team sought to identify and document any health disparities/inequalities that exist among population subgroups and/or places.

Demographic & Socioeconomic Profile

A demographic and socioeconomic profile of an affected population is an important element for understanding how the impacts of a decision may affect different subpopulations in different ways. For example, certain subpopulations such as low-income or elderly, may have characteristics or vulnerabilities, such as limited resources, that create disparate impacts. Table 8 summarizes the major demographic statistics of Little Egg Harbor Township, as found in the US Census. The data for Mystic Island was collected at the Census Designated Place level, which includes both Mystic and Osborn Island.

According to data from the 2012 American Community Survey, Little Egg Harbor Township had a total population count of 19,992, with 8,164 (42%) living in Mystic Island. For the past three decades, the Township has been growing at a fast pace - faster than the county and the State - increasing in population by about 25% between 2000 and 2010. However, in 2012, the American Community Survey reflected a decline in population, marking the end of the Township's steady growth trend. Notably, for the Mystic Island neighborhood, population declined from 2000 to 2010 by 2.31%, revealing a depopulation trend occurring here even before Hurricane Sandy. However, it is important to consider that Mystic has a larger seasonal population that is not accounted for in the census or the America Community Survey.

Racially, Little Egg Harbor is not diverse. Over 96% of the township's population identified as white, with only 2% of its population reported to be black or African -American and 1.4% Asian. Nearly 6 % of the residents of the Township are of Hispanic origin. This distribution is nearly equal in Mystic Island; except that the proportion of Hispanic population in Mystic is 50 percent higher (9%) that of Little Egg Harbor as a whole (6%).

Vulnerable Subpopulations

Those populations most vulnerable to impacts associated with buyouts are likely to be the elderly, those on fixed incomes, those with large mortgages and of lower income. With a median age about three years higher than Ocean County, the Mystic Island community is slightly older than surrounding areas. Median household income of Mystic Island is slightly lower ($52,000) than Little Egg Harbor Township as a

Table 8: Selected Demographics for Mystic Island, Little Egg Harbor Township, Ocean County and New Jersey (US Census, 2012)

	Mystic Island	Little Egg Harbor	Ocean County	New Jersey
Population (2012, ACS)	8,164	19,992	575,961	8,793,888
Population Change (2000-2010)	-2.3%	25.8%	-.1%	0%
Median Age	45.7	45.3	42.7	38.9
White (%)	97.9%	96.5%	92.9%	71.5%
Hispanic or Latino (of any race)	9%	5.8%	8.2%	17.7%
Household Income (Median)	$52,000	$58,000	$60,000	$73,000
% Pop. Below Poverty	10.8%	9%	11%	10.8%
Educational Attainment, 18+ years, (HS degree or less)	44%	38%	34%	41%

whole ($58,000), and quite a bit lower relative to Ocean County ($60,000) and the state as a whole ($73,000).

Mystic Island residents are slightly less educated when compared to the overall township, county and state population. Approximately 44% of the adult population in Mystic Island has only a high school degree (about 6% higher than in all of Little Egg Harbor and 10% higher than Ocean County) and only 10% hold a bachelor's degree (lower than all of Little Egg Harbor and Ocean County).

Housing Profile

A housing profile describes the types and condition of residential properties in the affected area. Because housing has significant impacts on health in many ways, from physical safety to indoor air quality to stresses associated with home ownership, it is an important piece of the baseline analysis in an HIA where the decision will affect housing decisions in the community.

As noted previously, Little Egg Harbor is primarily a residential community. The 2013 MOD-IV data[1] for the township shows that residential properties, not including apartment buildings, made up 79% of the total properties within the municipality. Mystic Island has a higher concentration of residential properties than the township as a whole, around 89%, and these properties comprise 93% of the total assessed property value of the neighborhood. Mystic Island is estimated to have 5,881 properties or 45% of the total amount of properties within Little Egg Harbor,

1. Mod-IV provides tax information for all parcels in New Jersey including assessed value of land and assessed value of improvements (buildings). New Jersey Division of Taxation through the Local Property Tax/Technical Support Section and the New Jersey State Treasury Office of Information Technology, creates and maintains this data.

Table 9: Property Classifications for Mystic Island and Little Egg Harbor Township

Property Type	Mystic Island	% of Total Properties	Little Egg Harbor	% of Total Properties	% of Little Egg Harbor Properties in Mystic
Vacant Land	240	4%	1416	11%	17%
Residential (four families or less)	5227	89%	10193	79%	51%
Farm	0	0%	17	0%	0%
Commercial	54	1%	167	1%	32%
Industrial	0	0%	1	0%	0%
Apartment	0	0%	2	0%	0%
Public Property (Including Schools)	124	2%	920	7%	13%
Church and Charitable Property	7	0%	22	0%	32%
Other Exempt properties not included in the above classifications	30	1%	190	1%	16%
No Data	199	3%	0	0%	
Total	5881	100%	12928	100%	45%

*Source: MOD-IV

and contains 51% of the residential properties in the Township (excluding apartments). Table 9 summarizes this data and provides comparisons for agricultural, commercial, industrial and tax exempt land uses.

Homes in Mystic Island are mostly modest single family one-story bungalows. Single family detached housing makes up 83% of all housing units in Little Egg Harbor and 91% of housing units in Mystic Island. This is a much higher proportion than in Ocean County, where approximately 76% of housing stock is single family detached units.

Mystic Island has a higher proportion of units classified as vacant (34.6%) than Little Egg Harbor Township as a whole (22%). Both estimates are much higher than the Ocean County estimate of 19.8%. This may be in some part due to the ACS definition of vacant housing unit, which

Single family homes along lagoons

Table 10: Occupancy Status for Mystic Island, Little Egg Harbor Township and Ocean County

	Mystic Island		Little Egg Harbor		Ocean County	
Housing Occupancy	**Estimate**	**Percent**	**Estimate**	**Percent**	**Estimate**	**Percent**
Total Housing Units	5,292		10,517		278,113	
Occupied housing units	3,459	65.4%	8,205	78.0%	222,970	80.2%
Total Vacant housing units	1,833	100%	2,312	100.0%	55,143	100.0%
For rent	0	0%	54	0.5%	2,402	0.9%
For sale only	155	2.9%	227	2.2%	4,463	1.6%
For seasonal, recreational, or occasional use	1,517	28.7%	1,748	16.6%	40,017	14.4%
Other vacant	161	3.0%	283	2.7%	7,338	2.6%

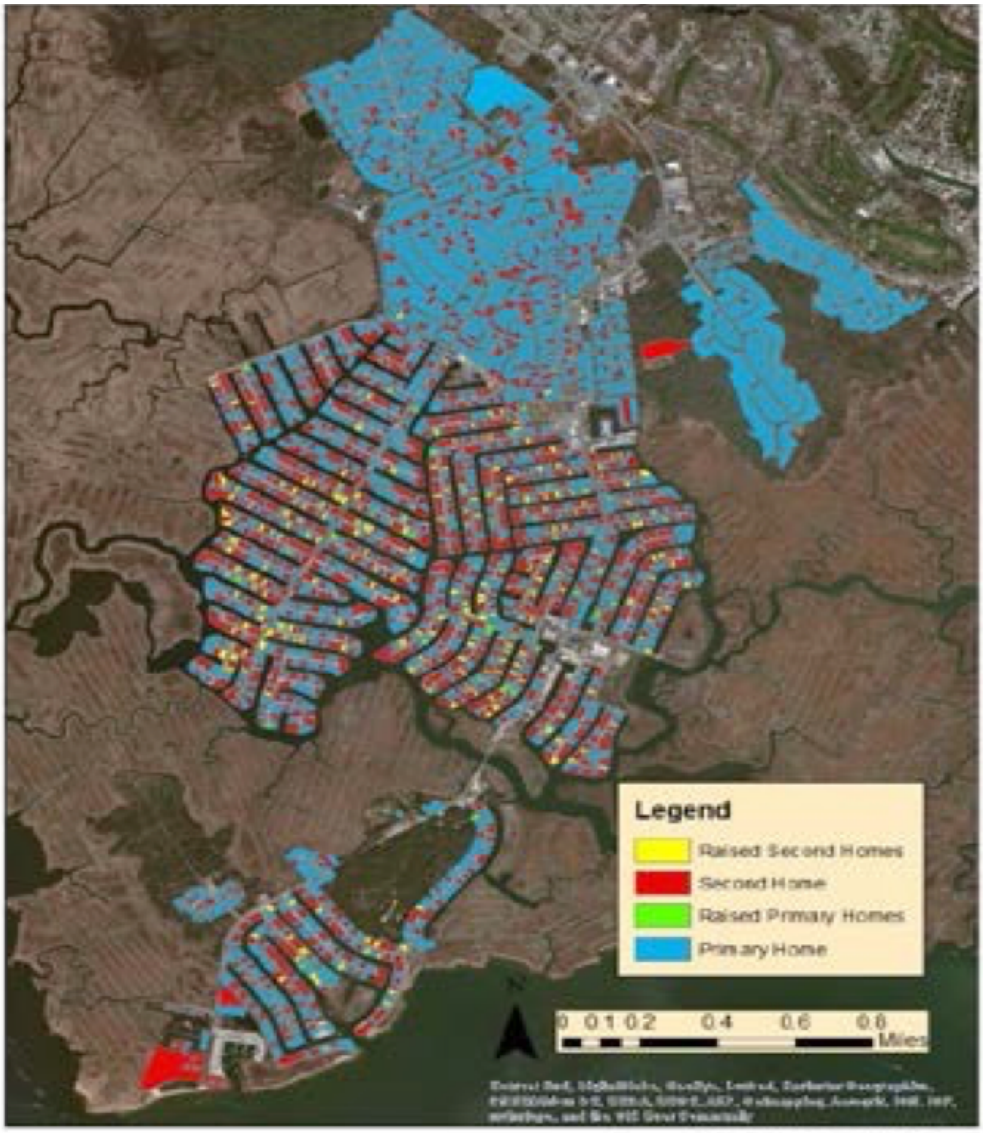
includes homes that are occupied for less than two months per year. This means that seasonal units are included in this number. Little Egg Harbor and Mystic Island have a larger percentage of seasonal homes than the county. As Table 10 shows, 14.4% of Ocean County's housing stock is classified as seasonal, whereas as Little Egg Harbor and Mystic Island 16.6% and 28.7% respectively is designated as seasonal.

Using the MOD-IV data, property addresses in Mystic Island were compared to owner's listed addresses as a method to identify "second" homes. Second home status was assumed for any property where the property and owner address did not match. This approach cannot detect properties that are owned by someone else, but rented to full time residents, or other possible arrangements. So it is possible that the true number of seasonal homes is lower than the estimation. Using the procedure, however, it was determined that 1,946, or 37% of the properties in Mystic Island could be secondary homes. As anticipated, these numbers are higher than the ACS estimates.

A map showing all the raised properties in Mystic Island as of 2014 was prepared based on new single family development logs for 2013-2014 and a list of elevated or raised properties provided by the township. A total of 358 houses were raised in Mystic Island. A total of 244 of those properties are possible secondary homes. The following map (Figure 15) shows the locations of these properties. The map reveals that while secondary and raised properties are evenly dispersed throughout Mystic Island, there are much smaller concentrations north of the lagooned area.

The median home values, collected through the American Community Survey 5 Year estimates, are declining, and the Mystic Island area experienced that largest rate of decline, when compared to its township and county, of approximately $11,960 per year. A simple linear trend line (Figure 16) was applied to all these values to determine the rates of change. Median home values show a declining trend in all four geographies.

Figure 15: Secondary and Raised Homes in Mystic Island



Source: 2013 NJ MODIV and NJGIN Parcel Data

Figure 16: Median Value of Residential Properties

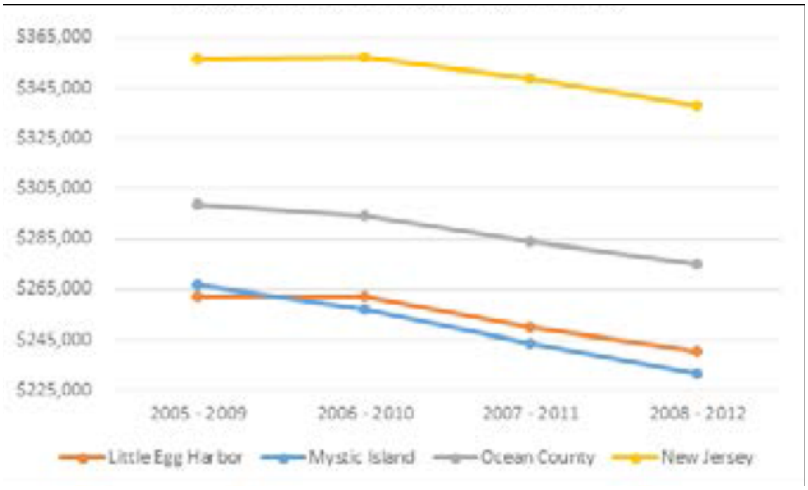


Table 11: Median Property Values and Total Assessed Value in Little Egg Harbor 2011 – 2013

Year	Median Total Assessment (Land & Building)	Median Land Assessment	Median Building Assessment	Total Assessed Value
2011	$239,900	$114,100	$118,100	$2,608,549,689
2012	$237,100	$112,300	$117,800	$2,574,026,589
2013	$234,700	$109,900	$117,100	$2,514,745,239
2014	$226,600	$107,500	$114,200	$2,425,814,439
Rate	-4,230	-2,220	-1,240	-60,000,000
% Change	-6%	-6%	-3%	-7%

Health Profile

The research team collected baseline health information to understand the current state and recent trends of physical and mental health conditions in the Mystic Island and Little Egg Harbor communities. A complete profile would examine chronic disease conditions, physical activity and fitness levels and mental health, as well as data on some health determinants such as neighborhood safety and household environments. For the purposes of the HIA, a focused effort was targeted to those health data most directly related to the five research questions, as identified in the "indicator" column in Table 3 on page 17.

It is important to note that there is a lack of locally-based health data or studies specific to Little Egg Harbor and Mystic Island. On some health determinants, like household environment (mold, pests, etc.), there is no locally available data. For some of these health conditions and factors that influence health, qualitative data were obtained from interviews and the resident survey, or non-validated observations from local officials.

Disease, Fitness and Behavioral Health Conditions

The research team could not access any data on chronic disease that was at a finer grain than county-level that would be more relevant to understanding the Mystic Island community. For Ocean County, data from the BRFSS show rates consistent with the state of New Jersey on most chronic disease categories (Table 12). Heart disease is about 50% more prevalent in Ocean County than in the state as a whole, however. Based on recent health data for Ocean County, adult obesity is slightly higher than in the state of New Jersey and access to exercise is about 5% lower in Ocean County than the state as a whole. Poor mental health (days of reported poor mental health) based on BRFSS (2006-2012) are higher in Ocean County than in the state, and there are relatively fewer mental health providers. The research team could find little data for mental health conditions, such as the number of people reporting high levels of stress or anxiety.

Table 12: Ocean County and New Jersey Health Statistics, 2015

Health Statistic	Ocean County	NJ
Poor Mental Health Days[1]	3.5	3.3
Mental Health Providers[2]	826:1	623:1
Heart Disease	6.0%	4.1%
Adult Obesity[3]	27%	24%
Access to Exercise Opportunities[4]	91%	96%
Smoking Rates	17.3%	16.5%
Limited Access to Healthy Foods[5]	10%	4%

Source: Behavioral Risk Factor Surveillance System 2006-2012

1. Average number of mentally unhealthy days reported in last 30 days
2. Ratio of population to mental health providers
3. Percentage of adults who report a BMI of 30 or more
4. Percentage of population with adequate access to locations for physical activity
5. Percentage of population what are low income and do not live close to a grocery store

According to the Substance Abuse Overview from 2010[2], Ocean County had the third highest rate of alcohol and drug treatment admissions in the state. Heroin was the primary drug with the highest percentage of admissions, identified in 49% of all admissions by Ocean County residents, followed by primary alcohol admissions at 31%.

In November 2014, Ocean County Health Department released a 2014-2018 Community Health Improvement Plan report[3] that builds on a Community Health Needs Assessment Data Report completed in July of 2013.[4] The reports contain little data specific to Little Egg Harbor Township. As part of its assessment process, the County distributed a Community Health Survey to residents, and a total of 930 surveys were completed. The survey was conducted in summer of 2012, prior to Hurricane Sandy. Residents were asked for the three most important issues affecting the overall health of their community. Substance abuse was identified as the top concern, followed by nutrition/obesity, cancers and stress.

Other Health and Healthcare Considerations

Households with lower socioeconomic status are prone to increased health risks and are also less likely to get treatment.[5] People of lower socioeconomic status are less likely to get regular medical check-ups and are less likely to be able to afford costly medicines or treatments when compared to those of higher socioeconomic status. This relationship between health and socioeconomics is a result of the differences in education levels and financial health that correlate with socioeconomic status.[6]

The 2014 - 2018 Ocean County Community Health Improvement Plan includes a summary of meetings with Ocean County residents to talk about the health effects of Hurricane Sandy. They found that the storm compounded the following existing health issues in the county. The following findings are relevant to this HIA:

» Mystic Island residents are more closely tied to Atlantic County resources and sometimes feel neglected or detached because Little Egg

2. http://www.nj.gov/humanservices/dmhas/publications/statistical/Substance%20Abuse%20Overview/2009/Ocean.pdf

3. Ocean County, NJ. Ocean County Community Health Improvement Plan. October 2014.

4. Ocean County, NJ. Ocean County Community Health Needs Assessment Data Book, 2013.

5. Adler, N.E., and K Newman. (2002). Socioeconomic Disparities and Health: Pathways and Policies, Health Aff, 21(2): 60-76

6. Kuper, H. and M. Marmot. (2003). "Job Strain, Job Demands, Decision Latitude and Risk of Coronary Heart Disease within the Whitehall Study II," Journal of Epidemiological Community Health, 57:147-153.

Harbor Township and Tuckerton Borough are located 35 miles away from the County Health Department office;

- The Ocean County Southern Services Center is located in Manahawkin, but is still fairly far away (10 miles) from Little Egg and Tuckerton. Residents can go the Meridian Health Services for non-routine medical care but not many people are aware of the services;
- The area is suffering from unemployment and people affected by Atlantic City casino closings;
- There is no effective mass transit serving Ocean County. The only available train access is in the far north eastern portion of the County in Bay Head, about 45 miles from Little Egg Harbor Township;
- The issues the community is wrestling with are not just health-related but also involve social services, drug treatment, food access, and nutrition;
- Faith-based organizations and food banks are very active in the Tuckerton and Little Egg Harbor area and link with Long Term Recovery Groups.

Self-Reported Health of Survey Respondents

The Mystic Island Survey contained a number of questions about personal health. It is important to note that these results cannot be interpreted to be representative of the population of the community because the sample was drawn from convenience and not randomly. While the survey sample matches the population characteristics fairly closely, no survey respondents were under the age of 18. Also, there is no way to know whether the survey respondents tended to be in relatively poorer or better health than the population as a whole. Nonetheless, information about the health of the respondents can be gleaned from their self-reported answers.

About 60% of respondents reported their overall health as "very good" or better, with another 30 % rating their health as "good." Almost 19% of respondents said that they had "serious difficulty walking or climbing stairs," and 23% of the Mystic Island respondents identified this limitation.

Table 13: Question: Have you EVER been told by a doctor or other health professional that you had: (n = 84)

Response	All Survey Respondents	Mystic Island Only	Ocean County*
Asthma	12.1%	15.4%	11.8%
Depressive Disorder	28.6%	32.1%	___
Cancer other than skin	14.3%	18.9%	___

*BRFSS (2006-2012)

Little Egg Harbor Township residents reported that health professionals have told them that they have higher rates of asthma than the county, and high rates of depression and cancer (no comparable figure for the county). When evaluating responses only from Mystic Island residents, the rates of asthma, depression and cancer are even higher. The survey did not ask whether or not these diagnoses came after Sandy.

The survey asked respondents to answer a series of questions about their level of access to factors that influence a healthy lifestyle. Interestingly and contrary to expectations, people 50 and under reported less access than those over 50 to some of the factors. Regarding access to healthy foods, 63% of people 50 and under said that they had adequate access, whereas 83% of those over 50 said that they had adequate access. Within the 36-50 age-group, 22% of the respondents disagreed with a statement that they had adequate access to healthcare, higher than the 51-65, 66-75 or over 75 groups. Finally, younger- aged respondents reported that they had poorer access to recreational facilities. Only

Table 14: Question: Please rate your level of agreement with the following statements about the current state (in 2015) of your neighborhood in Little Egg Harbor: (n=96)

Question	Strongly Agree	Agree	Not sure/ No opinion	Disagree	Strongly Disagree
I have adequate access to healthy foods/groceries.	33.7%	43.2%	6.3%	10.5%	6.3%
I have adequate access to healthcare.	34.4%	49.0%	3.1%	10.4%	3.1%
I have adequate access to recreational facilities.	20.8%	40.6%	8.3%	21.9%	8.3%

44% of respondents 18 to 35 years of age agreed that they had adequate access to recreational facilities, the lowest reported level of access. By contrast, two thirds (67%) of respondents 51 to 65 years of age reported that they had good access to recreation facilities.

It is unclear why younger people would report poorer access to food, healthcare and recreation when they would presumably be more likely to be mobile, active and have access to transportation. We could speculate that perhaps those in the older age groups are not as much in need of healthy food and recreation and are more satisfied with local offerings, and if they need healthcare, they are more satisfied with more local providers with whom they may have established relationships.

Impact Projections and Recommendations

IV

For each research question/health determinant, the research team conducted an assessment to determine its potential health impacts with respect to a buyout program. The impact analysis is based in part on scientific or published evidence, and also on critical thinking and reasoned assessment based on experience and opinions of experts, interpretation of stakeholder concerns, and accepted principles of public health. The analysis includes, where relevant, consideration of any disproportionate impacts or inequities in the distribution of benefits and burdens among various population subgroups.

For the projection of anticipated effects, we conducted a literature review, examining research relating our determinants to health outcomes. In evaluating the literature, we assessed the strength of evidence, corroboration, methodologies and similarity of sample populations to our study population. The projection assessment synthesizes the literature review, expert opinions, survey data and other quantitative cost-benefit modeling or mapping, as deemed necessary or possible during the scoping phase, and characterizes anticipated health effects according to their direction, likelihood, magnitude and distribution in the population. Understanding the potential local concerns about the buyout proposition and strong emphasis on protecting the local economy, we clearly identified all assumptions and limitations of the data used to support the assessment.

For each of the five major health determinants in the study, the analysis includes a summary of its connections to health outcomes, a summary of the community impacts specific to Mystic Island based on local input, a discussion of vulnerable populations, and a set of impact projections and related recommendations to maximize positive health outcomes and mitigate negative outcomes.

Flooding

As a waterfront, lagooned community built at sea level on marshland, residents of Mystic Island have been used to both routine and storm-related flooding for decades. Coastal areas of New Jersey are subject to two primary types of flooding. First, routine or "nuisance" flooding occurs from increasingly frequent flooding of streets after rainstorms due to loss and degraded quality of wetland buffers and poor stormwater drainage, coupled with rising sea levels. For homes near the waterfront, flooding from ocean waves is occurring even during high tides. Second, severe coastal storms and hurricanes can cause massive storm-related flooding that results from a combination of already high sea levels and storm surge. At these times, high winds often add intensity by weakening structures, knocking down power lines and damaging infrastructure and property.

This section looks at how a voluntary buyout program could affect future impacts from both types of flooding in Mystic Island and their associated health outcomes. If homes are removed and more land is returned to open space that can buffer other properties, the impact of buy-

outs should be to reduce the severity of both routine and severe flooding and therefore reduce health outcomes are associated with both types of flooding.

Routine Flooding

Connection to Health Outcomes

Standing water poses many health risks including exposure to contaminants/pathogens in the flood waters.[1] Although there is some evidence that chemicals mobilized from storage or already in the environment (e.g. pesticides) may contaminate floodwaters and homes, there is little evidence that the contamination directly causes health effects.[2] Repeated flooding that enters garages or saturates carpets in homes can lead to mold growth. People with asthma, allergies or other respiratory conditions may be more sensitive to mold. People with weakened immune systems or with chronic lung diseases can develop mold infections in their lungs. A meta-analyses looking at 33 studies determined that "dampness and mold are associated with approximately 30–50% increases in a variety of respiratory and asthma-related health outcomes."[3] Standing water also encourages mosquito growth, and mosquito vectored diseases include protozoan diseases and viruses.[4, 5]

Routine flooding can affect health in other less direct ways. Property values near the shore have been threatened by tidal flooding, as the cost of repairing damages grows higher and higher.[6,7] Flood insurance fees are climbing and diminishing the desirability and affordability of the homes in these communities.[8] In most beachfront communities, the infrastructure was built without consideration of impacts of sea level rise.[9,10] Some shore towns may need to raise their roads, possibly at large expense to the government and residents. Tidal flooding can also cause damage to unprotected sewage treatment facilities, pumping stations, and pipes. (UCSUSA).

Further, when roads are flooded and impassable, the loss of transportation service can cause service impacts and social disruptions, as people have difficulty getting to appointments, to the grocery store and to schools and jobs.[11] The increased time spent on roads due to road closures or re-routing leads to less time that residents are able to devote to other things and to increased stress.

Community Impacts and Stakeholder Input

There are some locations in Mystic Island that flood twice a month at high tide during new and full moons. There are also areas that routinely flood during even minor rainstorms. Flooding is more likely within the north end of Mystic Island

1. CDC. Flood Waters Or Standing Waters: Health Risks, 2015

2. Fisk, W. J., Lei-Gomez, Q. and Mendell, M. J (2007). "Meta-analyses of the associations of respiratory health effects with dampness and mold in homes: Singapore," Indoor Air, Vol. 17

3. CDC. Mold After a Disaster, April 22, 2015. At: http://emergency.cdc.gov/disasters/mold/index.asp

4. CDC. Flood Waters

5. Ahern, M., R. S. Kovats, P. Wilkinson, R. Few and F. Matthies (2005). "Global Health Impacts of Floods: Epidemiologic Evidence." Epidemiologic Reviews, 27(1): 36-46

6. Kaufman, L. (2010). "Front-line city in Virginia tackles rise in sea." New York Times, November 25.

7. Koch, W. (2013). "Rising sea levels torment Norfolk, Va., and coastal U.S." USA Today, December 18.

8. Stiles, S., and S. Hulst. (2013). "Homeowners insurance changes in coastal Virginia: Causes and consequences for shoreline communities." Norfolk, VA: Wetlands Watch Inc.

9. Biging, G., J. Radke and J.H. Lee. (2012). "Impacts of Predicted Sea-Level Rise and Extreme Storm Events on the Transportation Infrastructure in the San Francisco Bay Region," Publication number: CEC-500-2012-040, California Energy Commission.

10. Burkett, V. and M. Davidson. (2012). "Coastal Impacts, Adaptation and Vulnerabilities: A Technical Input to the 2013 National Climate Assessment," Washington DC: Island Press.

11. Hoggart, S. P. G., M.E. Hanley, D. J. Parker, D.J. Simmonds, et al. (2014). "The consequences of doing nothing: The effects of seawater flooding on coastal zones," Coastal Engineering, 87:169-182.

Table 15:
Question: About how often does NUISANCE flooding occur in your neighborhood (%)? (n = 59)

	More than once a month	About once a month	About 5-10 times per year	Between 2- 5 times per year	About once a year	Less than once a year	Total
Mystic Island Residents	10.2	10.2	11.9	16.9	6.8	37.3	100

because the elevation is slightly lower there.

Input from participants at the roundtable meeting, steering committee members and other residents reflected a consensus view that there would always be people who want to live by the water and that those people would be willing to accept the condition of frequent small-scale flooding. It is part of the territory if you're "willing to live on an island." Since people have been accustomed to occasional flooding, there was also some feeling that if the increase in flood levels is gradual, people would continue to become accustomed to it. As of the writing of this report, residents in certain blocks are reporting that they need to move cars from floodways during tidal flooding events, but since they know the tide schedule, they don't feel burdened by it.

However, there is a competing view that people may now view chronic flooding differently in a post-Sandy context, such that even minor flooding is now a more traumatic experience. Especially for older people, constant flooding can get tiresome, and some wonder if there could be a "tipping point" at which residents would leave due to repeated minor flooding. Some people are concerned about long-range effects on the community with the increasingly frequent flooding and its potential effect on property values. Table 15 shows that in our survey sample, about 20 % of households in Mystic Island experience nuisance flooding once a month or more, with more than half of households reporting flooding at least twice a year.

The research team heard fears about flood waters damaging cars, roads, and foundations of houses. There are also fears that flooded streets could affect residents' ability to leave their homes or access by emergency vehicles. Several survey respondents commented that storm sewers back up and should be replaced, and streets should be repaired or elevated. Other concerns about nuisance flooding mentioned by stakeholders are stagnant water in front of houses, saturated ground that is hard to walk over, debris in roadways, mold growing in abandoned properties, and lagoon water contamination from storm runoff.

As shown in Table 16 below, the survey respondents from all of Little Egg Harbor Township and Tuckerton rated the flooding impact on property value as the most severe effect, followed closely by storm sewer backups, water contamination, flooded streets and elevated stress levels. Looking exclusively at Mystic Island responses (in red), a much higher percentage of respondents rated storm sewer backups as having both severe and

Routine flooding on Mystic Island streets

Photo credit: Charles Newmeyer

Table 16:
Question: During nuisance flooding, which of the following do you normally experience, and how severe is the impact? (n = 87)

Question	Severe Impact	Moderate Impact	Very little or No impact	Not sure/ No opinion	Mean
Flooded streets affecting my ability to drive	16.1%	42.5%	32.2%	9.2%	2.34
Storm sewer backups	18.6%	26.7%	45.4%	9.3%	2.45
Mystic Island only	**25%**	**32%**			
Impact on my property value	18.9%	27.1%	44.7%	9.4%	2.45
Floating debris	14.1%	24.7%	54.1%	7.1%	2.54
Elevated stress levels in myself or my family	15.1%	22.1%	54.7%	8.1%	2.56
Mystic Island only	**20%**				
Loss of electricity	14.1%	21.2%	55.3%	9.4%	2.60
Toxics – Water Contamination	16.3%	12.8%	59.3%	11.6%	2.66
Effect on local businesses	11.8%/15	24.7%	48.2%	15.3%	2.67
Limited access of emergency vehicles	8.1%	19.8%	60.5%	11.6%	2.76
Mold growth in home	7.0%	15.1%	65.1%	12.8%	2.84
Feelings of isolation	**4.7%**	10.5%	69.8%	15.1%	2.95
Damage to my residence	3.5%	7.0%	77.9%	11.6%	2.98
Flooding-related Injuries	2.3%	1.2%	81.4%	15.1%	3.09

Table 17:
Question: Impact of Buyout on Flooding (n = 83)

	Strongly Agree	Agree	Not Sure/ No Opinion	Disagree	Strongly Disagree
I think a loss of homes might reduce future flooding impacts.	12.05%	12.05%	36.14%	21.69%	18.07%
I think a loss of homes might increase future flooding impacts.	10.98%	13.41%	36.59%	25.61%	13.41%

moderate impacts, and a higher percentage of Mystic resident respondents rated elevated stress as a severe impact. Of those who rated "feelings of isolation" as a severe impact, all resided in the lagooned portion of Mystic Island.

It is interesting to note that residents are very uncertain about how a buyout and demolition of homes would affect flooding impacts, with 24 % of survey respondents believing that a loss of home structures might reduce future flooding and an equal 24 % believing that a loss of homes might increase flooding impacts (See Table 17).

Vulnerable Populations

Even though Mystic Island is very homogeneous from a racial and ethnic standpoint, there are still disparities based on income, age and disability. Nuisance flooding affects all populations who live in a flooded area, but would be most likely to negatively impact people of lower income for several reasons. They might have fewer safe options for travel, and are also more likely to be wage earners with service or hourly jobs that require them to be physically on site in order to earn their wages, requiring travel through flooded streets. People with less disposable income are less likely to afford repairs and mold remediation than those with more disposable income, putting them more at risk for home-based health hazards resulting from flooding.

Elderly and disabled are another vulnerable population, because they may lack not only the financial but the physical capability to withstand flooding or evacuate to higher ground. The degree to which these populations are impacted, though is often related to their wealth and financial standing.[12]

Impact Projections

» Buyout of chronically flooded properties will eliminate health impacts for those whose homes are purchased and leave Mystic Island.
» Clustered buyout of chronically flooded properties should reduce the severity of routine flooding for residents who remain in Mystic Island, thus reducing frequency and severity of nuisance flood caused health outcomes such as elevated stress, feelings of isolation, exposures to toxics, debris and mold.

Related Recommendations

» LEHT should encourage residents in the most flood-prone areas of Mystic Island to apply for voluntary buyouts.
» NJ State Blue Acres should approve buyout applications for properties that are clustered geographically to achieve the greatest nuisance flood reduction benefits.
» A state or federal agency or foundation should commission a study to investigate the effect of increased open space on the reduction of nuisance flooding, including the configuration and amounts of restored wetland that would be required to achieve measurable benefits.

Severe/Storm Flooding

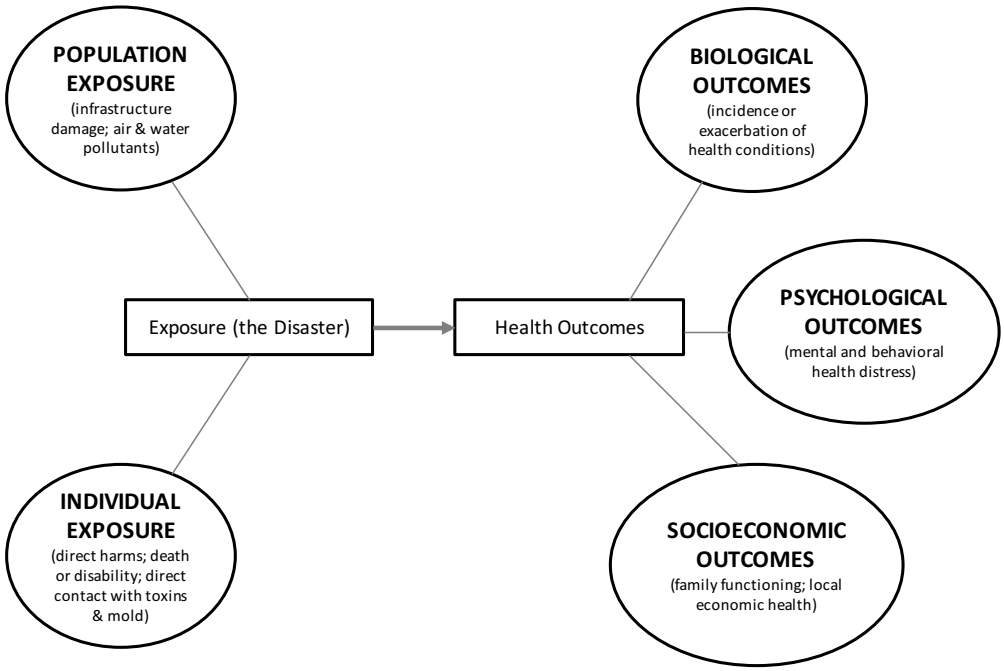
This section addresses impacts associated with a severe storm – the type of storm that would normally be accompanied by high winds and storm surge in addition to rain. Because Hurricane Sandy was the most severe storm suffered along the New Jersey coast in decades and is fresh in people's minds, much of the content of this section will refer specifically to this storm. The same impacts could occur from future storms, though, so it is important to think about severe storm impacts more generally and to reference findings from studies of other storms.

Connection to Health Outcomes

The health impacts of acute or severe storms

12. Jonkman, S.N., B. Maaskant, E. Boyd, and M. L. Levitan. (2009). "Loss of life caused by the flooding of New Orleans after Hurricane Katrina: analysis of the relationship between flood characteristics and mortality," Risk Analysis, 29(5):676–698.

Figure 17: Disaster Exposure and Outcome Model



with flooding have been extensively documented. Health impacts in affected communities occur during and in the immediate aftermath of a severe storm (death and injury) and during the intermediate and longer-range recovery period after a storm (a range of illnesses and mental health conditions).[13] Figure 17 depicts how population and individual exposure to a major storm disaster leads to health outcomes that are biological, psychological and social in nature.

According to the Sandy Child and Family Health Study Person Report (SCFHS-P), a major representative population study of 1 million New Jersey residents living in Sandy's path conducted by researchers from four universities, rather than a single acute exposure, there is often an "exposure continuum" in large-scale disaster settings. The study found that the health impacts of a disaster occur throughout a long timespan, from traumas in the immediate exposure, to toxic exposures that may remain present in the water or soil, to the "fraught emotional landscape of an uncertain environment" that can remain for years into recovery and can create significant psychological impacts.[14]

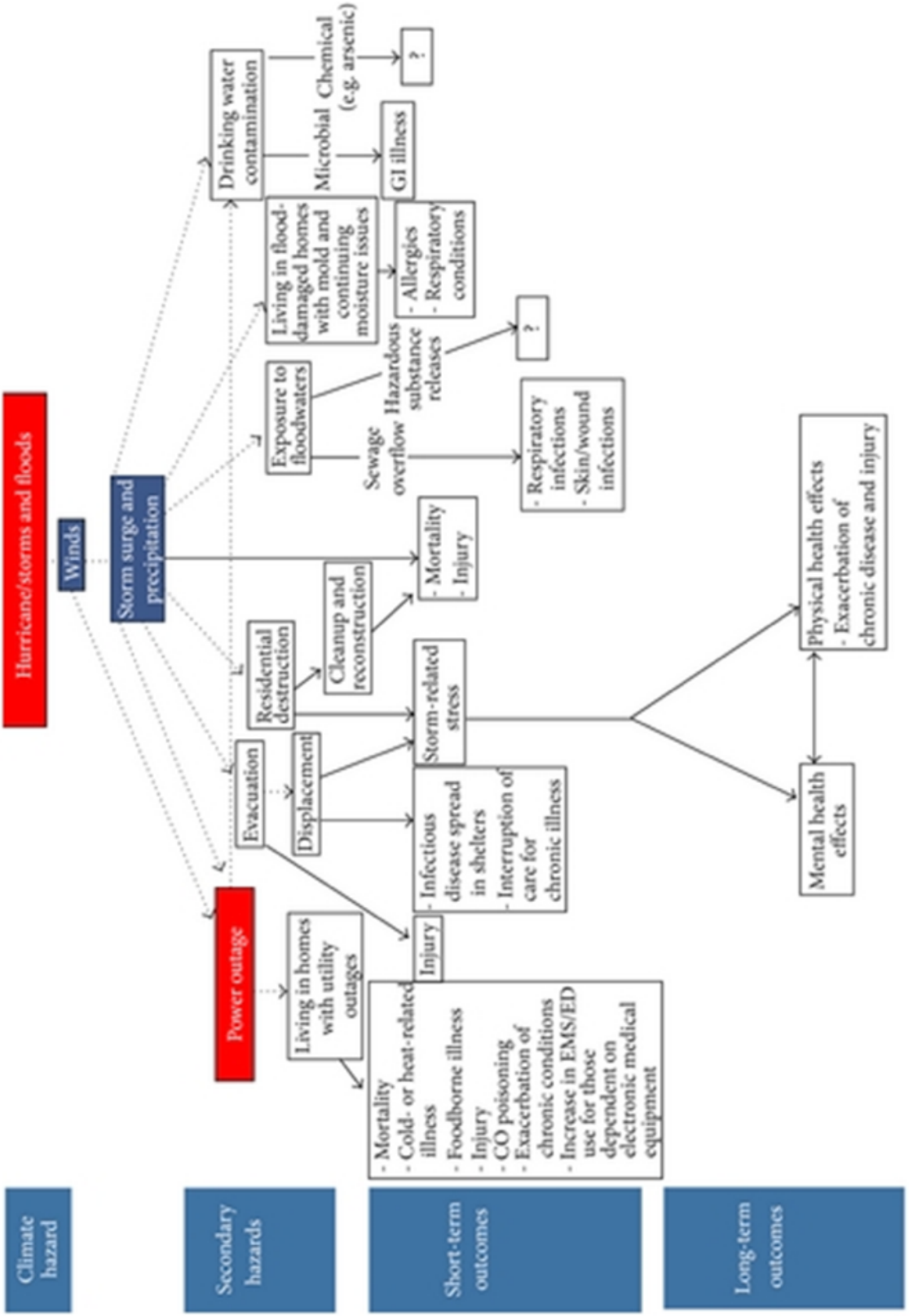
Lane (2013), in a review of impacts of coastal storms on health, notes that health outcomes can occur through multiple pathways (see Figure 18) including: (1) hazards from exposure to storm impact; (2) evacuation; (3) post-storm hazards from utility outages and sheltering in place in inadequate housing; (4) exposure to secondary hazards including contaminated drinking water, contact with contaminated floodwaters, and mold and moisture in housing; (5) population displacement and disruption of services; (6) mental health effects from traumatic or stressful experiences during and after the storms; and (7) health and safety risks from clean-up and recovery activities.

Following is a description of health effects of

13. French J., R. Ing, S. Von Allmen, and R. Wood. (1983). "Mortality from flash floods: a review of National Weather Service reports, 1969–81," Public Health Reports, 98(6):584–588.

14. Sandy Child and Family Health Study (SCFHS-Person). (2015). "The Hurricane Sandy Person Report: Disaster Exposure, Health Impacts, Economic Burden, and Social Well-Being."

Figure 18: Health Effects of Hurricanes



Source: Lane (2013)

severe flooding (both short and longer-term) in several key areas of impact: mental and behavioral health, mortality and physical injury, evacuation, mold, hazard/toxic exposure, and other effects that are not captured in these broad areas.

Mental and Behavioral Health

Living through a severe storm that causes property damage or injury is a traumatic experience. There are clear links in the literature between suffering storm-related trauma and numerous mental health impacts. Some of the mental health disorders most commonly found in people affected by floods are post-traumatic stress disorder (PTSD), depression and anxiety. Studies have found that the incidence of stress and anxiety symptoms as mental health factors was significantly increased in flood-damaged homes within one week after flooding, and that stress related to PTSD can continue to be statistically significant for six months after flooding.[15] Ohl and Tapsell (2000) report on a longitudinal study which found that 15-20% of people affected by a natural disaster have symptoms of PTSD.[16]

The SCFHS-Person study found that among those 100,000 New Jersey residents whose homes suffered significant damage, 27% are experiencing moderate or severe mental health distress and 14% report the signs and symptoms of PTSD even two and a half years after the storm.[17] In addition, the companion Place Study research showed an increase in domestic violence, and increased rates of drinking (8%) and smoking (30%) since Sandy occurred across all household and individual characteristics.[18]

Mental Health Impacts of Severe Storms

Shorter-term:
- Trauma
- Anxiety

Longer-term:
- Stress
- PTSD
- Increased Domestic Violence
- Increased Smoking/Drinking
- Exacerbation of physical health conditions
- Fear of future floods

Living with any kind of stress for long periods of time has serious adverse health consequences. These health effects can include "impaired immunity, atherosclerosis, obesity, bone demineralization, and atrophy of nerve cells in the brain."[19] Severe storms create long-term mental and behavioral health effects not only because the memories of the storm trauma remain present and sharp, but also because the process of repair and recovery can take years and can lead to uncertainties and stresses about lost property values, diminished finances, and sometimes decisions about relocation.

The duration of mental health problems may depend on the nature of exposure to the storm and on ongoing stressors related to the storm. One study of mental health conditions after Hurricane Ike, which occurred in September 2008, showed that prevalence of storm-related PTSD decreased within 18 months.[20] However, elevated levels of PTSD and psychological distress

15. Hasegawa, K., H. Yoshino, U. Yanagi, K. Azuma, et al. (2015). "Indoor environmental problems and health status in water-damaged homes due to tsunami disaster in Japan," Building and Environment, 93(1):24-34

16. Ohl C.A. & TapsellS.M. (2000). "Flooding and Human Health." BMJ. 321:1167-8.

17. SCFSH-Person, 2015

18. Sandy Child and Family Health Study (SCFSH-Place). (2015). "The Hurricane Sandy Place Report: Evacuation Decisions, Housing Issues and Sense of Community."

19. Mcewen, B. (2004) "Protection and Damage from Acute and Chronic Stress: Allostasis and Allostatic Overload and Relevance to the Pathophysiology of Psychiatric Disorders," Ann. N.Y. Acad. Sci. 1032: 1–7.

20. Pietrzak, R.H., M. Tracy, S. Galea et al. (2012). "Resilience in the face of disaster: prevalence and longitudinal course of mental disorders following Hurricane Ike," PLoS ONE, 7(6): Article ID e38964.

among vulnerable populations have also been observed up to five years after a hurricane.[21] Following Hurricane Katrina, researchers have suggested that slow government responses may have exacerbated mental health problems and argued that an efficient emergency response can also help to minimize the mental health impacts of natural disasters.[22]

Tapsell et al (2002) found that social effects of flooding can include the impact of the loss and damage to possessions and property, disruption and deterioration in the quality of individual, family and community life, time off work and the financial consequences, and fears of future flooding and security.[23] Researchers have stated that "the most striking result was the scale of psychological stress experienced by flooded adults…….and independent of reported physical illness"[24] and "the long term effects of flooding on psychological health may perhaps be more important than illness or injury."[25]

A study of health impacts associated with floods in Carlisle, England in 2005 revealed that experiencing the floods exacerbated existing ailments, and that mental health issues were more common and more serious. The Carlisle study found effects from not only the primary occurrence of the flood, but also longer-term anxieties that continued to be experienced for years after the event due to issues with contractors and insur-

21. Paxson, C., E. Fussell, J. Rhodes, and M. Waters. (2008). "Five years later: recovery from post-traumatic stress and psychological distress among low-income mothers affected by Hurricane Katrina," Social Science and Medicine, 74(2):150–157.

22. Galea, S., C. R. Brewin, M. Gruber et al. (2007). "Exposure to hurricane-related stressors and mental illness after Hurricane Katrina," Archives of General Psychiatry, 64(12):1427–1434.

23. Tapsell S.M., Penning-Rowsell E.C.,Tunstall S.M. & Wilson T.L. (2002). "Vulnerability To Flooding; Health and Social Dimensions." Phil.Trans.R.Soc.Lond. 360:1511- 25.

24. Reacher M., Mckenzie K., Lane C. et al (2004). "Health Impacts of Flooding In Lewes: A Comparison of Reported Gastrointestinal and Other Illness and Mental Health in Flooded and Non-Flooded Households." Communicable Disease and Public Health 7(1):1-8.

25. Ohl C.A. & TapsellS.M. (2000).

Thumbnail sketch:

A conversation with Liz McDevitt, Case Manager, A Future With Hope

Liz has observed that because their social and family lives were disrupted, many people display symptoms of depression – withdrawing from things they would typically do because of the condition of their homes – leading to further strains on their families. The inability to manage mental perspective has been increasing gradually and the need to access mental health assistance has become huge. However, at the same time that mental health issues become increasingly manifest, program funding is dropping off. Many grants had to be spent within an entirely unrealistic one-year period. Liz stressed that disaster recovery is a long process and funders need to understand that it can take at least five years before disaster victims will start to realize any measure of progress.

Liz indicated that most vulnerable populations – elderly, disabled and lower income families possess limited ability to learn about assistance programs. Survivors have been self-reporting increased incidence of high blood pressure, weight gain, and heart attacks, likely due to elevated stress related to Sandy. But she said that people who live along the coast want to live there regardless of whether it makes sense, so buyouts may not work. Many people want to rebuild at the shore even when they are not able to elevate, even though they will not receive FEMA assistance in the event of a future storm if they don't elevate.

Table 18: Proportion of Deaths by Cause during Three Major Hurricanes

Hurricane	Drowning	Trauma	Heart Disease	Vehicular Crash	Other	Total Deaths	% over 65
Katrina	40%	25%	11%	N/A	24%	971	63%
Floyd	69%	2%	8%	13%	8%	52	N/A
Sandy	34%	24%	N/A	5%	37%	114	43%

Sources: http://new.dhh.louisiana.gov/assets/docs/katrina/deceasedreports/KatrinaDeaths_082008.pdf; http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6220a1.htm#tab; Lane K, Charles-Guzman K, Wheeler K, Abid Z, Graber N, Matte T. Health effects of coastal storms and flooding in urban areas: a review and vulnerability assessment. Journal Of Environmental And Public Health [serial online]. 2013;2013:913064. Available from: MEDLINE, Ipswich, MA. Accessed November 4, 2014.

ance companies. Fear of future floods was also present, causing additional stress. There may also be stress-related exacerbation of chronic physical and mental health problems related to isolation.[26]

More than a year after Hurricane Katrina, anxiety and mood disorders in the New Orleans metro area were substantially elevated, and mental health conditions were broadly distributed in the population.[27] Serious mental illness was typically accompanied by PTSD, and important predictors of mental health problems were storm-related physical illness or injury, physical adversity, and property loss. In addition, two years after Katrina, the prevalence of self-reported psychological and physical intimate partner violence increased among Mississippi residents affected by the hurricane.[28]

It is important to note that most studies on mental health conditions were cross-sectional and performed only after storms had occurred. Therefore, pre-storm mental health status could not always be ascertained, limiting conclusions about the cause-effect relationship between storms and subsequent mental health outcomes.

Mortality, Injury and Illness

Another clear impact of severe storms on public health is the risk of injury during and immediately after the storm, and of death due to the storm occurrence or as a direct result of injuries or health conditions created by the storm. As seen in Table 18, hurricane related mortality is most often caused by drowning, trauma, and heart disease . Drowning occurs mainly in the victims' homes, but also occurs when a victim tries to swim to safety. Strong doubt that the storm will be as damaging as predicted, fear of looters, and disability are among the reasons that residents do not evacuate in a timely fashion. The risk of death is influenced by age, disability status and socioeconomic standing.[29]

Mortality from other accidental and natural causes may also increase during the power outages that often occur during and after severe storms. A study of the August 14-15, 2003, Northeast blackout that affected NYC found increased mortality from both accidental and natural causes that resulted in approximately 90 excess deaths

26. Carroll, B., H. Morbey, R. Balogh, G. Araoz. (2005). "Living in Fear: Health and Social Impacts of the Floods in Carlisle." St. Martins College, Carlisle : Centre for Health Research and Practice Development.

27. Galea et al (2007).

28. Schumacher, J.A., S. F. Coffey, F. H. Norris, M. Tracy, K. Clements, and S. Galea. (2010). "Intimate partner violence and Hurricane Katrina: predictors and associated mental health outcomes," Violence and Victims, 25(5): 588–603.

29. Carroll, B. et al (2005).

during the period (an increase of 28%).[30]

A total of 114 deaths were caused by Sandy, 34 of those in New Jersey. A majority (60%) of the deaths occurred on the first two days following the storm, caused either by drowning or trauma. The majority of the indirectly related mortalities were caused by carbon monoxide poisoning. Emergency room visits due to carbon monoxide inhalation, other respiratory injuries, skin infections and gastroenteritis have also been seen to increase after a hurricane.[31]

Another health impact of acute flooding is injury and illness. Injuries that occur during and immediately after a storm could include blunt trauma, wounds, lacerations, sprains and electrocution. When a household decides not to evacuate in the wake of a disaster, they expose themselves to risks such as loss of power and telecommunications, lack of mobility due to flooded roads, and shortage of available food and clean water. People using stoves for heat or candles for light expose themselves to fire risk as well as risk of falls from inadequate lighting in dwellings, hallways, and stairwells.[32] [SCAFH 47, 25]. Inability to access food and fresh water, particularly for people living in high-rise apartments where water delivery is dependent on electric pumps, could lead to infectious disease risk because of inability to properly wash hands or food, bathe, or flush toilets.

Evacuation

The immediate risks of acute flooding sometimes require residents of a community to evacuate their homes and move to higher ground. A complex web of decision factors and resulting actions play a part in whether or not a household decides a natural disaster poses enough risk to warrant evacuating their home.[33]

When short-term evacuation turns into long-term displacement, it can lead to a host of adverse effects.[34] Studies showed that health effects of displacement of populations following Hurricane Katrina were often related to infectious disease from living in congregate shelters, disruption of access to health care for chronic conditions like hypertension and renal disease, or some combination of both.[35,36] For those who have experienced displacement, short- and long-term mental health effects are the most commonly cited storms-related health outcomes in the literature. Following Katrina, evacuees at the Red Cross Shelter in Austin, TX, USA, were at increased risk of short-term acute stress disorder, while populations who were displaced or who experienced or witnessed traumatic events had an increased risk of long-term mental health effects.[37] Vulnerable populations were identified as women, African-Americans, and those with prior psychiatric history, poor physical health, and weak social networks.[38] Katrina evacuees liv-

30. Anderson, G.B. and M. L. Bell. (2012). "Lights out: impact of the August 2003 power outage on mortality in New York, NY," Epidemiology 23(2):189–193.

31. CDC Mortality and Morbidity Weekly Report. (2006). Surveillance for illness and injury after Hurricane Katrina – three counties, Mississippi, March 10, 55(9):231-234.

32. Broder, J., A. Mehrotra, and J. Tintinalli. (2005). "Injuries from the 2002 North Carolina ice storm, and strategies for prevention," Injury 36(1):21–26.

33. Dash, N. and H. Gladwin. (2007). "Evacuation Decision Making and Behavioral Responses: Individual and Household" Nat Haz Rev 8(3):69-77.

34. Fullilove, M.T. (1996). "Psychiatric implications of displacement. Contributions from the psychology of place," American Journal of Psychiatry 153(12):1516-23.

35. Murray, K.O., C. Kilborn, M. Desvignes-Kendrick et al. (2009). "Emerging disease syndromic surveillance for Hurricane Katrina evacuees seeking shelter in houston's astrodome and reliant park complex," Public Health Reports 124(3):364–371.

36. Arrieta, M.I. R. D. Foreman, E. D. Crook, and M. L. Icenogle. (2009). "Providing continuity of care for chronic diseases in the aftermath of Katrina: from field experience to policy recommendations,"Disaster Medicine and Public Health Preparedness 3(3):174–182.

37. LaJoie, A.S., G. Sprang, and W. P. McKinney. (2010). "Long-term effects of Hurricane Katrina on the psychological well-being of evacuees," Disasters 34(4):1031–1044.

38. Kim, S.C., R. Plumb, Q. N. Gredig, L. Rankin, and B. Taylor. (2008). "Medium-term post-Katrina health sequelae among New Orleans residents: predictors of poor mental and physical health," Journal of Clinical Nursing 17(17):2335–2342.

ing in Houston were also found to be at risk for increased substance use.[39]

Mold

Although studies are inconclusive, many researchers agree that mold can aggravate existing respiratory and allergy symptoms. It has also been associated with mental health distress. Although increased concentrations of mold were detected after Hurricane Katrina, the impact of the mold on health has not been well characterized, possibly because of under-reporting or under-detection of health problems, or by population displacement that reduced exposure.[40] The SCFHS-Person study (2015) found that adults who were exposed to mold were 2.5 times as likely as those not exposed to be diagnosed with asthma after the storm, and were twice as likely to report mental health distress. Following Hurricane Sandy, weather conditions created a situation allowing mold to breed and thrive , as a cold spell caused residents to close up their still-damp homes.

Abandoned and boarded homes may be mold-laden

After the giant tsunami disaster in Japan in March 2011, a survey determined that exposure to dampness and mold was positively associated with adverse health effects. The study related that "the incidence of respiratory symptoms, nasal symptoms, headache/dizziness was significantly increased in flood-damaged homes within one week after flooding. Headache/dizziness continued to be significantly increased until one month after flooding."[41]

Exposure to Hazards & Contamination

Flood waters can create new exposures to hazards through a number of pathways, resulting in numerous health threats. Containers of hazardous chemicals floating free from their normal storage places in garages or sheds, can land on lawns or porches, leak and create skin, inhalation or ingestion exposures. Specific chemicals of concern include volatile organic compounds (VOC) such as benzene, toluene, ethylbenzene, and xylene. Research suggests that flooding increases the amount of contamination in surface water.[42] Skin infections such as tetanus, gangrene and fungus have been linked to prolonged exposure to contaminated flood waters. An increased rate of gastrointestinal illness has been linked to flood water exposure as well as drinking tap water during and immediately following a flood, and has been seen to effect a disproportionate number of children.[43]

However, following Sandy, initial testing of two Superfund sites indicated that contact with contaminated water from these areas was not a major health threat.[44] Flood waters have deposited

39. Cepeda, A., A. Valdez, C. Kaplan, and L. E. Hill. (2010). "Patterns of substance use among Hurricane Katrina evacuees in Houston, Texas," Disasters 34(2):426–446.

40. Barbeau, D.N., L. F. Grimsley, L. E. White, J. M. El-Dahr, and M. Lichtveld. (2010). "Mold exposure and health effects following Hurricanes Katrina and Rita," Annual Review of Public Health 31:165–178.

41. Hasegawa et al, (2015).

42. Chambers, P. A., et al. (1997). "Impacts of municipal wastewater effluents on Canadian waters: A review," Water Quality Research Journal of Canada 32(4):659-713.

43. United States Environmental Protection Agency. (2004). Report to Congress: Impacts and Control of CSOs and SSOs. Washington D.C.

44. U.S. EPA. (2012) Hurricane Sandy Sampling Results, available at: http://www.epa.gov/region2/superfund/npl/gowanus/sandysampling.pdf

lead and arsenic in the soil, although the contamination is significantly reduced by 18 months post-flood.[45] Exposure to these toxins impact the nervous system and can lead to reduced attention span, decreased IQ, seizures and coma.[46]

Effects of Power Outages and Infrastructure Damage

Local or widespread power outages could result from flood or wind damage to electrical infrastructure. Following widespread power outages, carbon monoxide (CO) poisoning is a major health hazard. Deaths and illness can occur when portable generators, cooking appliances, and other fuel burning equipment are used indoors or improperly.[47,48]

People living in residential buildings without electricity for long periods of time may be more vulnerable to foodborne disease because they cannot refrigerate food. After a 2003 summer power outage in New York City, researchers observed increases in diarrheal illness caused by the consumption of spoiled foods.[49] It is also possible that proliferation of pests, including rodents and roaches, because of difficulty with cleaning and removing trash may exacerbate allergies, asthma, and other respiratory conditions.

Thumbnail sketch:

A conversation with Julie Weiner-Swarez, Mystic Island resident

Julie has lived in the Mystic Island neighborhood for over 11 years. One of Julie's neighbors simply walked away from their home after the storm, another sold their residence, and renters are now living in homes that had been owner-occupied. According to Julie, two of her neighbors died, due at least in part, to the stresses they experienced after the storm. They had nowhere else to go and lived for a long time in a moldy home, aggravating the wife's pre-existing lung condition. She died and then her husband died shortly thereafter. Julie explained that many second homes remain vacant because people do not have the money to make repairs. Many homes are untouched, moldy, and animal-infested.

Julie now feels stress building whenever storm events are forecasted. She used to love experiencing storms. Now she's fearful. . "Full moons terrify me," she says. She would have jumped at the chance to accept a buyout option if it had been available immediately after the storm. She'd even take it now if it could cover the cost of the home.

The SCFHS-Person study reports that even after the electric grid had been largely restored, many residential buildings in Sandy-inundated areas of New York City still lacked electric power, heat, or running water - often because of salt water flood damage to buildings electrical and heating systems. Exposure to hot or cold temperatures from lack of climate control could result in heat- or cold-related illness, including heat stroke or hypothermia, as well as exacerbation of respira-

45. Abel M., S. Presley, R. Zartman et al. (2010). "Spatial distribution of lead concentrations in urban surface soils of New Orleans, Lousiana USA," Environmental Geochemistry and Health 32(5): 379-389.

46. Vivier, P. M. Hauptman, S. Weitzen, S. Bell, D. Quilliam, J. Logan. (2011). "The important health impact of where a child lives: neighborhood characteristics and the burden of lead poisoning," Maternal and Child Health Journal 15(8):1195-1202.

47. Kile, J.C., S. Skowronski, M. D. Miller et al. (2005). "Impact of 2003 power outages on public health and emergency response," Prehospital and Disaster Medicine 20(2):93–97.

48. Cukor J. and M. Restuccia. (2007). "Carbon monoxide poisoning during natural disasters: the Hurricane Rita experience," Journal of Emergency Medicine 33(3):261–264.

49. Marx, M.A., C. V. Rodriguez, J. Greenko et al. (2006). "Diarrheal illness detected through syndromic surveillance after a massive power outage: New York City, August 2003," The American Journal of Public Health 96(3):547–553.

tory, cardiovascular, and other chronic diseases.[50]

Other Effects from Storms and Storm Damage

Exposure to disasters can cause various other impacts to human health in addition to those highlighted above. There is also a growing literature on long-term effects – including the development of chronic illnesses much later in life – that may be traced back to a disaster exposure and its stressors.[51,52] Researchers observed a three-fold increase in the incidence of acute myocardial infarction among Tulane Health Sciences Center hospital patients two years after Hurricane Katrina related to emotional stress.[53]

Also, injuries or even death can result in occupations related to post-storm clean-up, reconstruction and utilities restoration. Residents could also suffer non-fatal injuries incurred while removing debris or during minor and major home repairs (for instance, removing wet building materials or wet wall insulation). Indoor dust created during cleaning, exposure to mold, fumes from temporary heating sources, and the use of strong cleaning products can also irritate the eyes, throat, and lungs. Although not documented, during recovery, air quality may be negatively affected by dust from the home clean-up, debris movement, emissions from truck traffic, and the use of outdoor temporary boilers and emergency generators.

As mentioned above, the delivery of and access to health care and other basic services—as well as efforts to respond in storm- or flood-damaged areas—could be impeded if workers and volunteers have difficulty traveling to and within the areas. Large-scale displacement of populations could increase demands on the transportation infrastructure.[54]

Community Impacts and Stakeholder Input

Data from our community survey, Steering Committee discussions, interviews and our focus group all clearly reveal that our strongest impact related to the decision to pursue buyouts relates to mental and behavioral health. That is, the impact that buyouts could have to both remove people from harm's way and mitigate the impact of severe storm-related floods for those who remain in the community will affect mental health more than any other health condition, and in a positive direction, because the impacts of being affected by hurricane strength storms and flooding are so severe. The most recent severe storm, Sandy, has produced after-effects resulting in high anxiety, depression and substance abuse, with the primary causes traced to PTSD type symptoms of experiencing the storm, displacement, the financial and property losses, and the uncertainty of the future that creates a feeling of despair.

The pattern of mental health impacts is broad in terms of type and time span. Although it doesn't happen in an exactly linear fashion, generally the residents experienced anxiety leading to stress and then sometimes depression, which manifests after some time in abuse of drugs, tobacco or alcohol and various family disruptions such as divorce. The stressors creating these conditions

50. O'Neill, M.S. and K. L. Ebi. (2009). "Temperature extremes and health: impacts of climate variability and change in the United States," Journal of Occupational and Environmental Medicine 51(1):13–25.

51. Shonkoff, J. P., et al. (2012). "The Lifelong Effects of Early Childhood Adversity and Toxic Stress." Pediatrics 129(1): e232-e246.

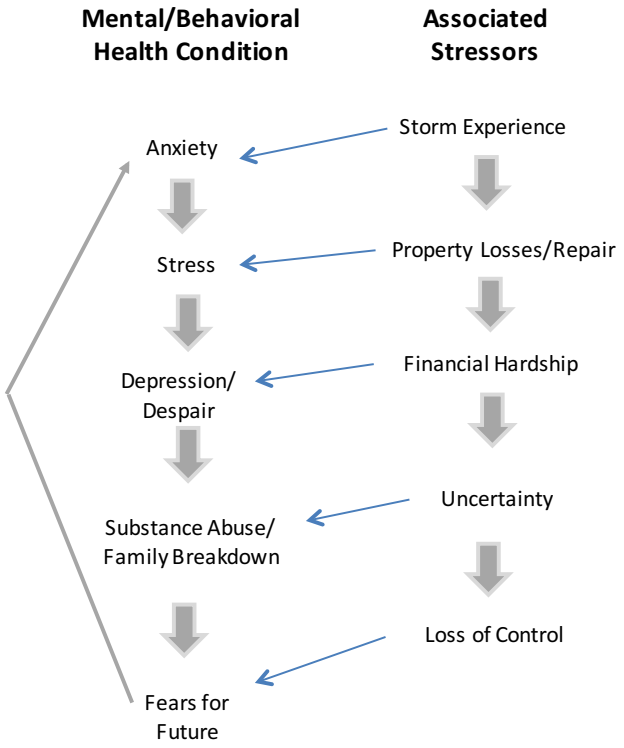
52. Weissbecker, I., S. E. Sephton, M. B. Martin and D. M. Simpson (2008). "Psychological and Physiological Correlates of Stress in Children Exposed to Disaster: Current Research and Recommendations for Intervention." Children, Youth and Environments 18(1): 30-70.

53. Gautam, S., J. Menachem, S. K. Srivastav, P. Delafontaine, and A. Irimpen. (2009). "Effect of Hurricane Katrina on the incidence of acute coronary syndrome at a primary angioplasty center in New Orleans," Disaster Medicine and Public Health Preparedness 3(3):144–150.

54. Fayard G.M. (2009). "Fatal work injuries involving natural disasters, 1992–2006," Disaster Medicine and Public Health Preparedness 3(4):201–209.

start with the experience of the storm, and flow through the resultant property damage, financial hardships created by the repair or rebuilding, and the growing uncertainty about the future and feelings of a loss of control over the many outside factors and forces influencing the ability to maintain a stable household. (See below).

Figure 19: Secondary and Raised Homes in Mystic Island



In the meetings conducted by the Ocean County Health Department to talk with residents and providers about the health effects of Hurricane Sandy, a wide range of health impacts were described including most of those described above. A major finding was that the storm compounded existing underlying chronic health issues. It also created some new impacts associated with exposures to mold and to poor nutrition caused by "stress eating" and eating convenience foods due to loss of routine or inadequate access to healthy food and cooking capacity.[55] When people are stressed, they found, they often do not seek routine preventative care and become less healthy, and if they have lost access to care due to job loss or relocation of a local provider, they may seek care at emergency rooms, taxing the healthcare system. In addition, the Ocean County discussion group meeting participants mentioned economic impacts from the major storm damage including loss of jobs and local revenues because of physical damage to businesses or business closures due to the economic downturn (partly due to the storm and partly due to regional trends and job losses in Atlantic City).

Interviews with agencies providing social services to Little Egg Harbor township residents echo the same strong observations about the prominence of mental health issues related to experiences from Hurricane Sandy. Especially apparent is the continuation and even growth of the impacts with the passage of time. One interviewee told us that the mental health issues are getting more pronounced through time, and some people are making bad decisions because the stress of the recovery has affected their mental stability. People feel that they are unable to control their own destiny, leading some to despair and some to focus so much on returning to pre-storm conditions that they perhaps do not rationally consider all alternatives. But at the same time, some people fear that when all of the recovery programs expire, they will be left to fend for themselves without support, fueling feelings of isolation.

Residents reported a great deal of frustration with government officials who administered recovery programs Although other agencies were involved, FEMA was mentioned most often as an organization that lacked institutional stability and competence with regard to assisting affected residents. Because personnel changed often, residents sometimes received inconsistent or contradictory responses to requests and applications. The length of time to wait for answers about claims and funding, confusing requirements, and lack of stability in the staff contributed to feelings of hopelessness.

55. Ocean County, NJ. Ocean County Community Health Needs Assessment Data Book, 2013.

More than two years after Sandy, some people who have still not returned to their homes in Mystic Island and some were just returning, have experienced a "bump-up" in anxiety due to "survivor's guilt" or a feeling of withdrawal and isolation because of difficulty accepting a changed community. Residents told researchers that "many psychological issues are coming to the surface" only two years after the storm, as a process similar to the Kubler-Ross stages of grief takes place. The initial denial and anger is giving way to bargaining, depression and finally acceptance. (See Table 19).

The most consistent comments on the resident survey regarding flooding impacts were increased stress from financial difficulties and frustrations with recovery programs, abandoned homes affecting neighborhood quality of life, and mold growth. Responses such as "stress affecting mental health and marital relationship," "our whole family now suffers from depression," and "constantly smell mold in neighborhood" are representative of the comments from dozens of survey respondents.

Survey respondents were asked to rate the severity of various impacts associated with storm events generally, and then specifically with Sandy. With Sandy, respondents were asked to rate the severity of impacts at three points in time: immediately, six months after the storm, and two years after the storm. The following table isolates responses from residents of the lagooned area of Mystic Island, when there was a marked difference in their survey answers. (See Table 20).

In almost every category of impact, the severity was rated much higher for the immediate aftermath of Sandy than for storms in general. For several of the impacts (e.g., property value, stress, ability to fix home, effect on businesses), a higher percentage of people rated them more severe even two years after the hurricane than during the immediate aftermath of a typical storm. The single impact rated as most severe for storms generally and also for Sandy was the effect on property value. Stress and ability to fix homes came in a close second and third. Almost two thirds of the survey respondents (65%) reported either moderate or severe levels of stress even two years after Sandy.

It is also interesting to note that a higher proportion of respondents from the Mystic lagooned area of Little Egg Harbor Township reported severe impacts in several categories than from the township as a whole. Over 90% of Mystic

Table 19: Stages of Grief and Post-Sandy Correlates

Stages of Grief	Post-Sandy Correlate	Health Effects	
Denial	Initial Shock: What happened? Can it be real?	Shock Disbelief	***Passage of Time***
Anger	Frustration: How and why could this happen? It's not fair. Why is no one helping?	Anxiety Poor eating habits	
Bargaining	Assessment of Alternatives: How can I get my life back? What might I have to give up?	Neglect of health	
Depression	Despair/Loss of Hope: Why continue down this path? What is my future?	PTSD Depression	
Acceptance	Stability/Normalcy: Embracing of new reality, Commitment to new future	Healthy mental state Healthy habits Family stability	

Table 20: Question: During and in the immediate months after STORM events, which of the following do you normally experience, and how severe is the impact?

Question	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion
Impact on my property value	**31.0%**	**25.0%**	**39.3%**	**4.8%**
Sandy – Immediately After	70.1%	14.3%		
Sandy – 2 years After	58.8%	23.4%		
Elevated stress levels	**30.6%**	**25.9%**	**37.7%**	**5.9%**
Sandy - Immediately After	53.9%	24.3%		
Mystic lagooned	78.4%			
Sandy – 2 years After	36.4%	28.6%		
Mystic lagooned	59.5%			
Concern about my ability to fix my home	**25.6%**	**17.4%**	**51.2%**	**5.8%**
Sandy - Immediately After	57.7%	12.8%		
Mystic lagooned	86.5%			
Sandy – 2 years After	35.1	22.1		
Cleanup of trash and debris	**25.6%**	**36.1%**	**34.9%**	**3.5%**
Sandy - Immediately After	51.3%	28.2%		
Floating debris	**25.6%**	**31.4%**	**39.5%**	**3.5%**
Effect on local businesses	**24.7%**	**23.5%**	**41.2%**	**10.6%**
Sandy - Immediately After	48.1%	27.2%		
Sandy – 2 years After	27.6%	40.8%		
Toxics - Water Contamination	**23.5%**	**18.8%**	**51.8%**	**5.9%**
More sleeplessness	**21.2%**	**21.2%**	**50.6%**	**7.1%**
Sandy - Immediately After	32.5%	24.7%		
Sandy – 2 years After	22.4%	29.0%		
Flooded streets affecting my ability to drive	**20.9%**	**38.4%**	**36.1%**	**4.7%**
Storm Sewer backups	**20.9%**	**31.4%**	**41.9%**	**5.8%**
Increased crime in neighborhood	**18.6%**	**27.9%**	**41.9%**	**11.7%**
Loss of electricity	**18.3%**	**40.2%**	**39.0%**	**2.4%**
Limited access of emergency vehicles	**17.4%**	**24.4%**	**52.3%**	**5.8%**
Mold growth in home	**17.2%**	**20.7%**	**54.0%**	**8.1%**
Sandy - Immediately After	42.3%	18.0%		

Question	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion
Mystic lagooned	64.9%			
Sandy – 2 years After	17.1%	25.0%		
Mystic lagooned	27.0%			
Feelings of Isolation	**15.3%**	**18.8%**	**58.8%**	**7.2%**
Sandy - Immediately After	24.4%	25.5%		
Mystic and Osborn	30.6%	27.4%		
Damage to my residence	**14.9%**	**18.4%**	**60.9%**	**5.8%**
Sandy - Immediately After	59.0%	19.2%		
Mystic and Osborn	67.7%			
Mystic lagooned	91.9%			
Poorer eating habits	**10.7%**	**19.1%**	**57.1%**	**13.1%**
Increased smoking	**5.9%**	**8.2%**	**62.4%**	**23.5%**
Increased drug use	**4.8%**	**1.2%**	**73.8%**	**20.2%**
Increased drinking alcohol	**4.7%**	**10.6%**	**65.9%**	**18.8%**
Storm-related Injuries	**4.6%**	**10.3%**	**77.0%**	**8.1%**

lagooned residents reported severe impacts related to property damage from Sandy, versus 59% of the sample as a whole. Notably, 65% of Mystic lagooned residents reported increased mold growth immediately after Sandy, compared with 42% after Sandy in the whole sample. Mystic Island lagooned residents indicated much more severe stress immediately following Sandy and 60% of Mystic lagooned residents still rated severe stress two years after the storm.

Table 21 shows that almost of a quarter of respondents from Mystic lagooned reported that someone in their household had sought mental health counseling to cope during the storm recovery period, while none of the respondents from Osborn or the rest of LEHT reported seeking professional help.

To understand one aspect of the psychological impact of the Sandy experience, we asked survey respondents how much they feared rising waters more now (two and a half years after the storm) than prior to the storm. Remarkably, more than one third of respondents reported fearing rising water "a great deal" more, with another more than one third fearing floods "somewhat" more.

An interpretation of this finding is that flooding now triggers a more traumatic psychological response. Residents told us that before Sandy, flooding was just a nuisance and tolerated, but

Table 21: Question: Have you or a family member sought counseling or other mental health services to help you cope with Sandy recovery (percent)? (n = 78)

Location	Yes (%)
Mystic - lagooned	24.3
Mystic – non-lagooned	18.2
Osborn	0
Tuckerton and rest of LEHT	0

Table 22: Question: Since Hurricane Sandy, how much MORE do you fear rising waters and flooding compared to before the storm occurred? (n = 78)

Answer	%
A great deal	35%
Somewhat	37%
Not much	18%
Not at all	10%
Total	100%

now it is associated with the trauma of Hurricane Sandy. A focus group participant described that before the storm, residents "didn't pay attention to weather forecasts," but now reports of possible storms cause concern. Normal flooding is "dealt with." But "Sandy was different" in its scale and range of impacts. However, focus group members also said that residents still see large impact flooding as a rare event.

Interestingly, younger age groups reported more fear of flooding than senior citizens and elderly, with about 56 percent of people aged 18-35 and over 40 percent of people aged 36-50 saying that they feared rising water a great deal more, about the twice the percentage of those over 66 years of age. (See Table 23).

Home Elevation

Another issue related to the impact of floods on health is a resident's decision about whether to elevate their house on pilings. A house elevated above predicted future storm surge and floodwater levels should theoretically protect residents from some of the major flood-related impacts, such as property damage, mold growth in homes, injury, and the need for property repair. According to New Jersey's Emergency Flood Elevation Rule, residents are required to elevate and/or meet new construction standards if their homes are located in a flood zone and were declared substantially damaged, or are new construction.

People living in elevated homes, even if in a flood-prone area, should be out of the way of flood waters. However, these structures are still subject to wind damage from storms, and infrastructure upon which a homeowner depends – roadways, water, sewer and electrical services – may still be flooded.

Our survey revealed that residents have concerns about the safety and practicality of raising their homes. Some mentioned fears of floating debris dislodging the pilings during storms and pipes under the house freezing. Even if the homes were completely safe from damage, accessing the house via a long set of stairs is problematic

Table 23: Question: Since Hurricane Sandy, how much MORE do you fear rising waters and flooding compared to before the storm (%)? (n = 77)

Age	A great deal	Somewhat	Not much	Not at all	Total
18-35	55.6	33.3	0	11.1	100
36-50	41.2	29.4	17.7	11.8	100
51-65	33.3	36.7	23.3	.7	100
66-75	22.2	50	16.7	11.1	100
75+	33.3	33.3	0	33.3	100
All	35.1	37.7	16.9	10.4	100

Home are being elevated

for some populations, particularly elderly and disabled, and elevators are subject to mechanical failure during storms. Further, the cost of elevation, even with government-sponsored programs to provide some reimbursement, can be too expensive for lower income families.

Vulnerable Populations

Severe storms can disproportionately affect the most vulnerable and susceptible households in both behavioral health disorders and in physical health issues. Although each storm and each community is different, groups generally most vulnerable to adverse storms-related outcomes include older adults, young children, women, those with pre-existing physical or mental health problems or substance use disorders, low-income households, disadvantaged racial/ethnic groups and those with weak social networks. The Ocean County study, for example, found that people with existing mental health problems suffered from magnified symptoms after Hurricane Sandy due to personal and financial stresses.[56]

Elderly and disabled residents can be more vulnerable to health impacts of storms and flooding because of physical limitations or lack of access to social support resources.[57] When elderly populations also have lower incomes, they may have even less resilience than younger populations. Literature shows that hurricane mortality is most likely to affect senior citizens, disabled, and poor communities.[58,59,60] Almost half of the people killed during and in the immediate aftermath of Hurricane Katrina were older than 75 years of age.[61] Seniors were disproportionately impacted by mortality from Hurricane Sandy, with the proportion of residents over 65 years of age who died as a result of the hurricane about three times higher than their proportion in the general population.[62]

During power outages, elderly populations can also be more severely impacted. The study of the 2003 power outage in the Northeast found that seniors aged 65–74 years were most vulnerable to increased rates of injury and mortality, likely due to difficulties created by non-functioning elevators, increased emergency call times for ambulances and closed stores and pharmacies.[63] Other risks for elderly residents of nursing facilities or living alone during power outages include the failure of medical equipment and exposure to hot or cold ambient temperatures, possibly compounded by a lack of supplies.[64]

56. Ocean County, NJ. Ocean County Community Health Needs Assessment Data Book, 2013.

57. Peek, L. "Age." (2014). In Social Vulnerability to Disasters, 2nd ed., edited by D. S. K. Thomas, B. D. Phillips, W. E. Lovekamp, and A. Fothergill, pp. 167-198. Boca Raton, FL: CRC Press.

58. Rygel L, D. O'Sullivan, and B. Yarnal. (2006)., "A Method For Constructing A Social Vulnerability Index: An Application To Hurricane Storm Surges In A Developed Country," Mitigation and Adaptation Strategies for Global Change 11(3): 741–764.

59. Noe, R, Schnall A., Stanley S, et al. (2013). "Disaster-related Injuries and Illnesses Treated by American Red Cross Disaster Health Services during Hurricanes Gustav and Ike, Southern Medical Journal, 106(2): 102-108.

60. Wang, D., B. Yarnal. (2012). "The vulnerability of the elderly to hurricane hazards in Sarasota, Florida," Natural Hazards 63(2): 349

61. Jonkman et al (2009).

62. New York Times. (2012). "Mapping Hurrican Sandy's Deadly Toll," Nov. 12.

63. Anderson and Bell (2012).

64. Dosa D.M., N. Grossman, T. Wetle, and V. Mor. (2007). "To evacuate or not to evacuate: lessons learned from Louisiana nursing home administrators following Hurricanes Katrina and Rita," Journal of the American Medical Directors Association 8(3):142–149.

In this HIA study, seniors and those serving seniors reported that often the elderly have a diminished sense of control over their options for recovery from storms. This loss of control creates stress, exacerbating conditions like high blood pressure and deteriorating cognitive ability. Financial resources are often limited because life savings may have been lost with the loss of home value, making home repair or elevation a strain or impossible. Loss of sentimental items can create sadness also. Some seniors who no longer have mortgages do not purchase flood insurance in order to save money, further reducing options. In addition, elderly or disabled populations are often unable or unwilling to access elevated homes because ramps are problematic, steps are too difficult, and elevators are not cost-effective and subject to breakdown and future flood damage. With limited ability to fix homes or to sell and move away, residents participating in our discussion forum and interviews observed that many elderly are staying in flood-damaged homes, potentially getting ill from moldy conditions, although there is no reliable data to confirm this observation.

The Ocean County Health study found that children could be more affected than other sectors of the population by poor nutrition caused by family upheaval and loss of routine in the aftermath of a flooding disaster.[65] In other studies, evacuated children were found to be more susceptible to illness and disease because of their naïve immune systems[66] and adolescent children who have experienced major storms were more likely to engage in drug use.[67] Input from our discussion forum indicated that although children are usually resilient, they can reflect the stress coming from parents' behaviors. In other words, if the parents are coping well in a post-disaster context, the children will follow suit, but if stressful issues are plaguing the household, children may need extra counseling to help them to cope. The SCFHS-Person study found that children living in homes with minor Sandy-related damage were over five times as likely to feel sad, depressed, nervous or afraid as were children in homes that were not damaged, and over eight times as likely to have difficulty sleeping.

Vulnerability of lower income residents takes several forms. It may be caused by not having sufficient money to pay for gas or a motel when considering evacuating, or not having enough financial assets to repair a home when insurance or other housing falls short.[68] As with the elderly, low-income residents are less likely to have had flood insurance, and are more likely to be unable to afford the cost of raising their house. As an example of disproportionate impacts felt by lower income residents, the SCFHS-Person study found that New Jer¬sey residents living in households earning less than $20,000 per year were over twice as likely to come into direct contact with mold, perhaps because of the nature of the housing construction. The study also found that PTSD rates fall as income rises, as does severe mental health distress. One of the messages often repeated by interviewees in this study was that lower income individuals, particularly those who are also less educated, often have more trouble navigating the complicated assistance programs, further adding to stress.

The tables below show that residents with household incomes below $50,000 from the survey sample were the most likely to be severely or moderately concerned about ability to fix their homes. Note that the severity is higher in all income groups from Hurricane Sandy (Table 25) than from storms in general (Table 24), but the disproportionately more severe impact still falls on those with incomes less than $50,000.

65. Ocean County, NJ. Ocean County Community Health Needs Assessment Data Book, 2013

66. Murray et al (2009).

67. Rohrbach L.A., R. Grana, E. Vernberg, S. Sussman, and S. Ping, "Impact of Hurricane Rita on adolescent substance use," Psychiatry 72(3):222–237, 2009.

68. Fothergill, A. and L. A. Peek (2004). "Poverty and disasters in the United States: A review of recent sociological findings." Natural Hazards 32(1): 89-110.

Table 24: Question: During and in the immediate months after STORM events, which of the following do you normally experience and how severe is the impact (%)? (Concern about my ability to fix my home) (n = 72)

HH Income	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion	Total
Less than $25,000	40	0	40	20	100
$25,000 - $50,000	35.7	28.6	35.7	0	100
$50,000-$75,000	11.8	35.3	41.2	11.8	100
$75,000 - $100,000	16.7	11.1	66.7	5.6	100
Over $100,000	33.3	5.6	55.6	5.6	100
All	25	18.1	50	6.9	100

Table 25: Now thinking about Hurricane Sandy in particular, which of the following did you and/or someone in your household experience in the immediate weeks following of the storm and up to six months later and how severe were the impacts (%)? (Concern about my ability to fix my home) (n = 77)

HH Income	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion	Total
Less than $25,000	66.7	16.7	16.7	0	100
$25,000 - $50,000	85.7	7.1	7.1	0	100
$50,000-$75,000	55.6	16.7	27.8	0	100
$75,000 - $100,000	40	20	40	0	100
Over $100,000	47.1	11.8	41.2	0	100
All	57.1	14.3	28.6	0	100

Interestingly, our survey showed that lower income households experienced greater feelings of isolation immediately following the storm (Table 26), but that the relative feelings of isolation were more evenly distributed and even greater for higher income households two years after Sandy (Table 27). Although not statistically significant and somewhat counter-intuitive, it is possible that this change could reflect the reality that sometimes poorer people have few options and capacity to handle decisions and actions in the wake of a disaster and feel neglected, but that as time goes on, the more wealthy in storm-ravaged areas begin to feel more isolated as the nature of the community changes and no longer provides the amenities to which they had grown accustomed.

It is noteworthy that the community survey showed younger people feeling more isolated two years after Sandy than older people (Table 28). Although difficult to confirm, it may be that younger people are thrown off their routines to a greater degree by the slow pace of recovery and loss of some amenities and economic opportunities than older people who were not as engaged in the local social scene or reliant on the local economy for their livelihoods.

The younger population (18-50) also reported

Table 26: Question: Now thinking about Hurricane Sandy in particular, which of the following did you and/or someone in your household experience in the immediate weeks following of the storm and up to six months later and how severe were the impacts (%)? (Feelings of Isolation) (n = 77)

HH Income	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion	Total
Less than $25,000	16.7	33.3	50	0	100
$25,000 - $50,000	28.6	42.9	28.6	0	100
$50,000-$75,000	38.9	22.2	38.9	0	100
$75,000 - $100,000	13.3	13.3	66.7	6.7	100
Over $100,000	17.7	11.8	70.5	0	100
All	24.3	22.9	51.4	1.4	100

Table 27:Which of the following have you experienced in the PAST TWO YEARS SINCE the immediate six months six months following Sandy, and how severe was the impact (%)? (Feelings of isolation) (n = 76)

HH Income	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion	Total
Less than $25,000	16.7	16.7	50	16.7	100
$25,000 - $50,000	0	42.9	57.1	0	100
$50,000-$75,000	33.3	22.2	44.4	0	100
$75,000 - $100,000	13.3	6.7	80	0	100
Over $100,000	12.5	18.6	62.5	6.3	100
All	15.9	21.7	59.4	2.9	100

Table 28:Which of the following have you experienced in the PAST TWO YEARS SINCE the immediate six months six months following Sandy, and how severe was the impact? (Feelings of isolation) (n = 76)

Age	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion	Total
18-35	22.2	0	55.6	22.2	100
36-50	29.4	11.8	58.8	0	100
51-65	13.8	37.9	48.3	0	100
66-75	5.6	11.1	83.3	0	100
75+	0	33.3	66.7	0	100
All	15.8	21.1	60.5	2.6	100

Table 29:Question: During and in the immediate months after STORM events, which of the following do you normally experience and how severe is the impact (%)? (Increased smoking) (n = 77)

Age	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion	Total
18-35	12.5	25	25	37.5	100
36-50	11.8	5.9	58.8	23.5	100
51-65	0	9.7	64.5	25.8	100
66-75	5.6	0	77.8	16.7	100
75+	0	0	66.7	33.3	100
All	5.2	7.8	62.3	24.7	100

higher proportions of increased smoking in the time following severe storm events than older populations (Table 29). And interestingly, people in higher income households also reported higher proportions of increased smoking after storms (Table 30), as well as more with severe impacts on nutrition (Table 31). Again, although these two populations (young adults and higher income) are not traditionally considered vulnerable, it could be that the changes brought on by storms are more pronounced in those normally accustomed to having ample resources and a higher quality of life – leading to some increased stress.

Impact Projections

» Clustered buyout of chronically storm-damaged properties will eliminate health impacts from future storms for those who are bought out and move to areas that are not at risk to coastal storms or severe flooding.
» Clustered buyout of chronically storm-damaged properties could reduce severity of future storm damage and flooding by providing a buffer for storm surge and wave action for remaining residents of Mystic, thus reducing frequency and severity of storm-related mental and physical health outcomes such as elevated stress, feelings of isolation, exposures to debris and mold.

Related Recommendations

Because a great deal of rich data was obtained in the course of this study regarding the Sandy recovery process, the recommendations extend beyond those related to buyouts to also include suggestions for conducting future disaster recovery planning in ways that address health considerations.

<u>For buyout:</u>

» Buyouts should be clustered in a geographic area that results in greatest potential to reduce storm-related impacts. (i.e., most vulnerable to storm impacts and fewest elevated homes)
» Social services, particularly access to mental health services, should be improved as a complement to a buyout program and targeted to lower income, less educated populations.
» Along with buyout initiative, a managed plan should be developed to protect the shoreline from sea level rise and increased vulnerability to storm surge.
» Consider elevating Radio Road and installing other structural barriers to further protect Mystic Island from sea-level rise and storm surge.

Table 30: Question: During and in the immediate months after STORM events, which of the following do you normally experience and how severe is the impact (%)? (Increased smoking) (n = 71)

HH Income	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion	Total
Less than $25,000	0	0	80	20	100
$25,000 - $50,000	0	0	92.9	7.1	100
$50,000-$75,000	0	18.8	75	6.3	100
$75,000 - $100,000	11.1	11.1	50	27.8	100
Over $100,000	11.1	5.6	50	33.3	100
All	5.6	8.4	66.2	19.7	100

Table 31: During and in the immediate months after STORM events, which of the following do you normally experience and how severe is the impact (%)? (Poorer eating habits) (n = 70)

HH Income	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion	Total
Less than $25,000	0	0	80	20	100
$25,000 - $50,000	0	14.3	78.6	7.1	100
$50,000-$75,000	0	33.3	66.7	0	100
$75,000 - $100,000	16.7	11.1	50	22.2	100
Over $100,000	16.7	33.3	38.9	11.1	100
All	8.6	21.4	58.6	11.4	100

For disaster recovery planning:

» FEMA should consider placing a priority on personnel continuity and greater internal coordination, to the greatest extent possible, and enhancing staff training to address the needs of affected communities with effectiveness, consistency and efficiency.
» State recovery agencies should encourage faster response from insurance companies through incentives for fast and efficient turnaround on claims.
» Local governments considering implementing resilience measures should propose them to residents in concert with community education about vulnerabilities so that residents understand the benefits of the measures.
» Municipalities in areas vulnerable to coastal flooding should identify and work closely with local social service agencies and religious organizations to provide a stable, coordinated network of support for residents in the event of emergencies.
» Federal, state and local agencies engaged in response and recovery efforts should be trained to both prevent, to the extent possible, and recognize the long-term mental health effects following a storm event through ongoing mental health surveillance, appropriate intervention, and adaptation strategies.

» Programs to train local service providers in administrative/managerial requirements as well as response techniques should be sponsored by either the State OEM and/or FEMA. Such programs should be provided on a periodic basis so that local officials are trained in planning, management and implementation of response and recovery.

» Disaster managers at all levels should continue to work together as closely as possible with a goal to operate efficiently and rapidly to return affected populations to normalcy as quickly as possible.

Household Finances

Connection to Health Outcomes

People living in flood-prone areas can incur household costs associated with repeated clean-up and repair from routine flooding, as well as occasional massive repair or restoration necessary after major flood damage. The SCFH Person study found that 16 percent of New Jersey residents expressed a need for financial help in paying rent, mortgage, or utilities, about half of whom also had expressed a need for practical repair services. Further, the value of their homes may deteriorate relative to homes in areas that are not as flood-prone, diminishing asset value and ability to sell homes.

It is well-documented that financial stresses and housing insecurity can lead household members to suffer from increased stress and negative health outcomes.[69,70] These can include depression, which in turn, may lead to drinking or other substance abuse as a coping mechanism.[71] Increased housing and living costs can cause an individual to feel a loss of control over their lives. Researchers have called this a situation of "low decision latitude," which increases stress which can lead to heart problems, high blood pressure, and trigger mental illnesses.[72] These stresses can cause tension between spouses, creating additional mental anguish.[73] In other words, the stress from household finances will create the same negative health outcomes as stress that stems from other sources. The SCAFH study indicated that the health effects associated with catastrophic damage to one's home are similar to those experienced by people living in deep poverty.

Resilience options that increase open space or parks can serve to counteract some of the negative household financial impacts and thus ease these negative health outcomes. Economists have demonstrated, for example, that proximity to a park increases housing values anywhere from $500 to $2000.[74,75] In addition, ocean views can increase property values between 8 to 60 percent depending on the quality of the view.[76]

69. Pollack,C.E., B.A. Griffin and J. Lynch. (2010). "Housing Affordability and Health among Homeowners and Renters," Am J Prev Med 39(6):515-21.

70. Katz, L.F., J.B. Liebman, and J.R. Kling. (2001). "Moving to Opportunity in Boston: Early Results of a Randomized Mobility Experiment," Quarterly Journal of Economics, 116 (2):607–54

71. Price, R. H., J.N. Choi, and A. D. Vinokur. (2002). "Links in the Chain of Adversity Following Job Loss: How Financial Strain And Loss Of Personal Control Lead To Depression, Impaired Functioning, and Poor Health." Journal of Occupational Health Psychology 7(4): 302.

72. Landsbergis, P.A., P.L Schnall, T.G. Pickering, K. Warren, J.E. Schwartz. (2003). "Lower socioeconomic status among men in relation to the association between job strain and blood pressure," Scandinavian Journal of Work, Environment, & Health, 29(3):206-215.

73. Price et al. (2002).

74. Benson, E., J. Hansen, A. Schwartz, G.T. Smersh et al. (1998). "Pricing residential amenities: The value of a view," The Journal of Real Estate Finance and Economics 16(1):55-73.

75. Land Trust Alliance Fact Sheet: The Economic and Tax Base Benefits of Land Conservation, 2008.

76. Pincetl, S., J. Wolch, J. Wilson and T. Longcore. (2003). "Toward

Thumbnail sketch:

A conversation with Julie Weiner-Swarez, Mystic Island resident

Julie has lived in the Mystic Island neighborhood for over 11 years. Her house was completely destroyed by Sandy and her family was forced to evacuate the area during the storm. They lost all their belongings and their boat, which had survived the storm, was stolen from their yard. The family stayed with Julie's parents for four months and then rented a home in Ortley Beach. They finally returned to their home two years after the storm. The house was elevated 17 ½ feet above sea level, but the cost of the repairs exceeded the family's income and they are rapidly reaching a point when they may have to give up the house. But since the mortgage exceeds the home's value, the family may have no choice but to declare bankruptcy, destroying their credit history.

Table 32: How often in the past 12 months would you say you were worried or stressed about having enough money to pay your rent/mortgage? (n=91)

Answer	%
Always	22%
Usually	11%
Sometimes	23%
Rarely	13%
Never	30%
Don't know / Not sure	1%
Total	100%

a sustainble Los Angeles: A 'Nature's Services' Approach, USC Center for Sustainable Cities Technical Report, February

Thus, over time, open space increases real estate values and improves weak real estate markets.[77] The consequence of rising property values, however, is that although it is good for long term resale and asset growth, in the shorter term, it could mean rising property taxes, which is an additional strain on people who are already financially strained to pay bills.

Community Impacts and Stakeholder Input

With the specter of Hurricane Sandy looming large in the minds of many residents and service providers, tales of the wide variety of financial hardships facing their households from this severe storm considerably influenced the local input to this study. Some data, however, including some survey questions, also captured information about household financial impacts of less severe but more frequent nuisance flooding and potential financial impacts of buyouts.

Regarding household financial impacts of the storm, interviews revealed that the government assistance programs have not covered as much of the cost to repair and rebuild as many residents had hoped, and the long waiting time before repairs were made has added to the financial loss. The Ocean County Community Health Improvement Plan (2015) indicated that the costs of recovery from Sandy have caused financial stresses, resulting in homelessness and considerable displacement. Recent closures of several Atlantic City casinos, where many people in Ocean County are employed, has contributed to this stress as unemployment rates have grown. Table 32 shows that at the time of the survey in the summer of 2015, two and a half years after Hurricane Sandy, more than 50 percent of respondents were at least "sometimes" worried about having enough money to pay rent or mortgage, with more than one fifth "always" worried.

77. Bolitzer, B., Netusil, N. (2000). The impact of open spaces on property values in Portland, Oregon. J. Environ. Manage. 59:185–193.

Resident Comments about Impact of Sandy on Household Finances:

"I've gone broke."

"I had to rent a house and also still pay my mortgage. (A)ll life's savings are gone as well as all life's belongings."

"It is taking so long to recover, I would hate to see it again."

"I would have jumped at a buyout option if it was available immediately after the storm. I would even take it now if it could cover the cost of the home."

Steering committee members described recent rules changes that have significantly increased insurance and bonding costs for builders. Committee members expect that these costs will eventually be passed on to homeowners, significantly increasing rebuilding costs. Increased requirements are creating doubt about rebuilding, which is imposing obstacles to proceeding. Many homeowners are worried that the financial burdens of flood insurance and storm repair, coupled with decreased marketability of their homes at a price necessary to cover their mortgage and repair costs, leaves them facing a very uncertain financial future.

The requirements of the primary funding program to help residents elevate their homes, called Rehabilitation, Reconstruction, Elevation and Mitigation (RREM), have overwhelmed people according to stakeholder input. They report that often grants available through the program are not sufficient to complete projects. Up to 500 households have applied for RREM grants in Little Egg Harbor, and about 350 homes have been rebuilt, as of mid-year 2015.[78]

People are also concerned that homes that remain empty and unkempt are contributing to reducing the value of the property in the community. They are afraid of a domino effect that would result in only poorer people with no options to leave or nowhere else to move remaining in or moving to the neighborhood, leading to more rental properties that are not well-maintained, and more drugs and crime that will continue to diminish the desirability of the community.

For residents who accept a buyout, these financial stresses should be markedly reduced, as they will recoup pre-storm home values, and avoid future repair expenses and frustrations. If a clustered, strategic buyout in Mystic Island reduces flooding frequency and severity for those remaining, property values should begin to increase and added financial burdens should decrease. Further, if the bought out land is returned to open space with passive recreation options (see Open Space section below), the proximity to this space should also increase values.[79] Since the open space recommended for this project would provide bay, or ocean view to a new set of properties at the "new edge" of the community, it is expected that property values for the remaining homes will increase.[80]

Community input on the impact of a Mystic Island buyout initiative on residents' household

78. Moore, K. (2014). "Little Egg Harbor recovery update,"app.com, May 24, available at: http://www.app.com/story/news/local/2014/05/24/little-egg/9532649/

79. Lutzenhiser, M. and N. Netusi. (2001). "The Effect of Open Space on a Home's Sale Price," Contemporary Economic Policy 19(3):291–298.

80. Trust for Public Land. (2008). Report: "How Much Value Does the City Of Philadelphia Receive from its Parks and Recreation System?"

Abandoned homes are scattered throughout neighborhood

economic states varied. As noted above, almost 80 percent of residents responding to the survey indicated that they would have either "somewhat" or a "great deal of" interest in considering a buyout of their home. Some locals indicated that it would be great to have the opportunity to sell, but almost everyone stressed that buyouts would not work unless "people get a good deal." Many feel that if they hold out until property values begin to rise and there is not another big storm, a private buyer might pay more than the government. A concern in Little Egg Harbor Township is that people are beginning to improve their homes, so market values may be higher now and the amount they would receive through a buyout may not be adequate compensation. This is a particular problem for those homeowners whose mortgage amounts substantially exceed their home value. Residents will have to be convinced that the price is a "fair assessment" of their homes' worth.

Others noted that the RREM program (home elevation) will have a large influence on whether homeowners will accept the buyout. If homeowners used Federal assistance through RREM to elevate structures, which was available almost immediately after the storm and well before buyout offers were made, they are not as likely to be eligible to apply for other federal Recovery grants or buyout funds.

Residents who remain in Mystic are concerned that if a large number of properties were purchased and the space were poorly maintained, the area could become trash-filled or drug-infested, further bringing down property values. These conditions also have clear detrimental public health impacts. Also, residents expressed skepticism about the gains in resilience that could be achieved with only partial buyout of parcels in Mystic Island. The concern was that the amount of property acquisition that would be needed to result in a significant increase in resilience would be cost-prohibitive.

A majority of residents who responded to the survey are not convinced that a buyout of homes, resulting in fewer homes and more open space in Mystic, would increase their property values. At the same time, most are concerned that the buyout might increase their taxes. To make up a $100,000 loss in tax revenues amounts to about a $10 increase in taxes per parcel in LEHT.

Table 33: (n = 83)

Question	Strongly Agree	Agree	Not Sure/ No Opinion	Disagree	Strongly Disagree
I am concerned that a loss of homes might increase my taxes.	60.2%	31.3%	6.0%	1.2%	1.2%
I think a loss of homes might increase my property value.	14.5%	15.7%	21.7%	26.5%	21.7%

Vulnerable Populations

People with lower household incomes and lower net assets are the most impacted by strains on household finances, and have the most to gain in economic, mental and physical health when household finances and asset values improve.[81] However, as mentioned above, rising property values due to home improvements can also result in higher taxes that can be an inordinate burden for those on fixed incomes, so it is a double-edged sword. Low-income residents of Little Egg Harbor Township are less able to afford the cost of raising their house. Because they have few options, these individuals sometimes do not report damage to their homes out of fear of eviction. Instead the residents continue living in unhealthy and unsafe homes, putting their own health and welfare at risk.

Many interview participants also pointed out that navigating the numerous assistance programs can be harder for lower income individuals, particularly those who are also less educated. Those with the least income reported the greatest and most complex housing needs, but were least likely to apply for assistance, according to the SCAFH-Person study (2015). This population has fewer resources to begin with, and is also less likely to access available outside resources, so they are more likely to spend all or most of their savings on the costs associated with recovery.

Thumbnail sketch:

A conversation with Bobbie Ridgely, Executive Director, A Future With Hope

A Future with Hope is a non-profit organization that was started in the immediate aftermath of Hurricane Sandy by the Greater NJ United Methodist Church in partnership with the United Methodist Committee on Relief. Although initially focusing on emergency relief, the organization's mission expanded into long term recovery, providing disaster case management and direct rebuilding assistance to help people return to their homes. In Bobbie's opinion, many residents have become singularly focused on returning to a pre-storm state, and any alternative - such as buyouts - is quickly ruled out. Also, people have become so accustomed to a recovery mindset that they are having trouble letting go once their homes are finally repaired and livable. The RREM program funding is often insufficient to complete rebuilding projects, contributing to a sense of frustration and loss. And the difficulty in navigating this program is compounded for lower income, less-educated homeowners.

81. Moskowitz, D., E. Vittinghoff, L. Schmidt. (2013). "Reconsidering the Effects of Poverty and Social Support on Health: A 5-Year Longitudinal Test of the Stress-Buffering Hypothesis." Journal of Urban Health 90(1):175-84.

Table 34: Question: How often in the past 12 months would you say you were worried or stressed about having enough money to pay your rent/mortgage? Would you say: (n = 82)

HH Income	Always	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion	Total
Less than $25,000	42.9	28.6	28.6	0	0	100
$25,000 - $50,000	29.4	17.7	17.7	11.8	23.5	100
$50,000-$75,000	31.6	5.3	26.3	15.8	21.1	100
$75,000 - $100,000	5.3	10.5	21.1	10.5	52.6	100
Over $100,000	15	10	30	15	25	100
All	22	12.2	24.4	12.2	28.1	100

Table 35: How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals? Would you say: (n = 83)

HH Income	Always	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion	Total
Less than $25,000	14.3	42.9	0	28.6	14.3	100
$25,000 - $50,000	5.9	23.5	17.7	23.5	29.4	100
$50,000-$75,000	21.1	5.3	21.1	10.5	42.1	100
$75,000 - $100,000	5.3	0	21.1	15.8	57.9	100
Over $100,000	0	0	14.3	19.1	66.7	100
All	8.4	9.6	16.9	18.1	47	100

Our survey revealed that over 70 percent of people in households earning $25,000 or less were "usually" or "always" concerned about having money to pay their rent, more than four times the proportion in the population making over $100,000. (See Table 34). It is difficult to ascertain, however, whether this population may have been equally as concerned about paying rent prior to Sandy, so we express caution in attributing it only to conditions of Sandy aftermath. A majority of the respondents (57%) with incomes under $25,000 also reported "usually" or "always" being worried about having enough money to buy nutritious food. Very few respondents in households making over $75,000 reported this worry and none making over $100,000. (See Table 35).

The SCAFH-Person study found, somewhat surprisingly, that although senior citizens are more likely to need help with storm cleanup and home elevation, as a subpopulation they were less likely to have had difficulty immediately following the storm in paying for housing costs, generators, and utilities. Our survey bears out this finding in some respects, as no respondents in the over 65 age category reported having worries about having enough money to buy meals, while nearly a third of people in the under 50 age group said that they have these worries. (See Table 36). Although we have little other supporting data, a plausible explanation for this result could be that more people over 65 are used to living on less money and may have savings to draw from to a greater degree than younger people. They

Table 36: How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals? Would you say: (%) (n = 89)

Age	Always	Usually	Sometimes	Rarely	Never	Total
18-35	22.2	11.1	22.2	22.2	22.2	100
36-50	21.1	21.1	26.3	21.1	10.5	100
51-65	2.7	8.1	18.9	18.9	51.4	100
66-75	0	0	4.76	23.8	71.4	100
75+	0	0	33.3	0	66.7	100
All	7.9	9	18	20.2	44.9	100

may also worry less in general about things like nutrition and health than younger counterparts.

Impact Projections

» For the people who accept buyout, household finances should improve if a fair purchase price is offered that addresses current debt and provides ability to find and purchase adequate property in a less vulnerable area.
» For Little Egg Harbor residents, buyouts should have a negligible impact on household finances.
» Buyouts should reduce future needs of residents to access and use recovery programs.

Related Recommendations

As with the recommendations related to the flooding impacts, we divide recommendations into those specifically related to buyout programs, and those that apply to disaster recovery planning generally.

For buyouts:

» Buyout programs should be funded and readily activated and offered to residents quickly after storm-related disasters occur.
» Prices offered for residential properties in a buyout program should reflect pre-storm value, but also consider additional costs borne by residents in the storm recovery phase.
» Buyout programs should consider eligibility for people who have already used federal recovery programs such as RREM, and consider alternatives such as offering funds to residents to move their elevated homes if they are in a targeted buyout cluster.
» Buyout programs should be integrated with stewardship and "visioning" sessions so that residents can consider what will replace the bought out properties, providing an opportunity to engage citizens in thinking about the future of their communities, as well as opportunities to improve health and local economies.

For disaster recovery planning:

» Financial counseling services should be developed as part of disaster case management that will help storm victims access available programs and provide them advice about how to manage their financial assets appropriately.
» Educational materials about program policies, administrative procedures and application requirements of response and recovery programs should be prepared and provided well in advance of a disaster, so that people are well-informed about what to do and where to

go for assistance immediately after a disaster event.

» State or federal agencies or other funders should consider conducting a study of the coastal New Jersey regional economy, including the financial health of households and impacts of various resilience strategies on economic health.

Municipal Finances

Connection to Health Outcomes

A buyout program will impact the local municipal budget and potentially its fiscal health in several ways. It removes residential properties from the local tax rolls, and if relocated residents do not move into new housing in the same jurisdiction, the tax revenues from those properties will not be recovered. At the same time, though, the costs of services no longer provided to those properties could present savings to the municipal budget, plus the possible boost of additional revenues from increased property values or local revenue from visitors to the new open space.[82] In this section, we first discuss the literature concerning the impact of buyouts on fiscal health. Then, though there is little literature on the impacts of fiscal health on public health, we describe potential connections and reasoning behind those connections in this section.

First, there are very few studies of the impacts of residential buyout programs on communities, but most of the literature that is available shows that buyouts have a strong, positive long-term effect on the fiscal health of a town. Evidence from completed buyout programs across the country show that these investments pay for themselves in avoided federal recovery costs from future floods, usually within about 10 years, sometimes as little as 2-5 years.[83] According to FEMA and a commissioned, independent study, for every $1 spent on hazard mitigation activities, the US economy saves $4 in societal losses, as well as an additional $3.65 in costs to the US Treasury on avoided federal disaster-recovery expenditures (e.g., flood mitigation costs) and lost tax revenues.[84] Buyouts also continue to provide savings through cost avoidance in perpetuity, since flood risk, response, and recovery costs are permanently avoided. Buyouts can provide additional public benefits, including physical buffering against future floods, public recreational space, and enhancement of wildlife habitat.

The fiscal impact to a municipality of participating in buyouts should ideally be compared with the alternative of doing nothing to increase resilience and reduce damages from future storms and nuisance and sea level rise flooding. In a report about the impact of Sandy on New Jersey towns and households, a researcher from Rutgers estimated that NJ municipalities suffered $1.7 billion in expenses due to the hurricane. Most of the costs incurred were due to damage to transportation and school infrastructure, community buildings, as well as public health and utility facilities. Municipal budgets paid for some of these costs, but funding also came from emergency appropriations, loans, or specialized trusts.[85]

82. Geoghegan J. (2002). "The Value of Open Spaces in Residential Land Use." Land Use Policy 19(1): 91–98.

83. FEMA. (2005). Fact Sheet: Mitigation's Value to Society: Building Stronger and Safer.

84. Multihazard Mitigation Council. (2005). "Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities, Volume 1 – Findings, Conclusions, and Recommendations."

85. Halpin, S. H. (2013). "The Impact of Superstorm Sandy on New Jersey Towns and Households." Rutgers University School of Public Affairs and Administration.

The "do-nothing" costs would be akin to the expenses municipalities encountered for recovery in the aftermath of Hurricane Sandy. For example, the Rutgers study found that costs related to storm response and recovery that affect municipal budgets can be the costs of debris removal (73% of municipalities used their own personnel or hired contractors), costs of shelter provision (about 40% of towns staffed shelters using local personnel), in addition to unrecovered costs of infrastructure repair and costs of emergency supplies and lost income. Another cost to consider is lost work days in the wake of storm events, and tax losses from residents who are in household financial peril and cannot afford to keep up with tax payments. Even to prepare for the increased amounts of "normal" flooding that will be occurring from sea level rise and more routine storms, coastal towns may need to consider costly mitigation strategies such as new stormwater systems and physically re-arranging development patterns. Fully capturing these estimated costs and quantifying potential benefits would be necessary to obtain a full understanding of buyout impacts.

We could find no studies that tied a municipality's fiscal health to impacts on the health of residents in any direct way. We can speculate that if a town is fiscally healthy, it is more able to provide efficient services that support the health of residents like trash and debris removal, public safety, maintenance of parks and infrastructure and health inspections, and even to promote health in more direct ways such as recreational programming, vaccination clinics, health fairs and educational campaigns. Likewise, if a town is facing budget cuts, some of these services and programs might need to be reduced or eliminated, which would have some impact on promotion or support of healthy lifestyles. The ultimate health outcomes would be almost everything from physical fitness-related impacts, to crime, to potential increases in some illnesses. If the morale of the town begins to suffer because municipal services are dwindling, then dissatisfaction and sadness can begin to create stresses and depression. Further study is needed to tie municipal fiscal health to impacts that are manifested in the community and to final public health outcomes.

Community Impacts and Stakeholder Input

Stakeholders' concerns about the possible tax impact of fewer residential properties in Little Egg Harbor centered on the possibility that the tax rates might increase for existing residents. This may or may not occur and even if it does, may or may not result in higher taxes on an individual household, depending on the results of property value reassessment. But few, if any, residents or other stakeholders outside of the municipal government provided any opinions about the effect of buyouts on the town budget, or about the effects of the municipal fiscal health on their own health.

Local officials remain concerned about the strain on the municipal budget from the potential loss of tax revenue and costs associated with maintaining the open space. An interview with a township official highlighted concerns about the continued provision of emergency access and police protection to the area, and other amenities (benches, trails) that might have to be built and maintained, and the costs of municipal responsibilities for bulkhead provision and maintenance. The buyout scenario we developed that envisioned the purchase of 500 properties would require installation of about a mile in total of bulkheads on the shoreline of the roadways identified in the scenario. Currently these bulkheads are maintained by the individual owners of these parcels. If purchased, however, these bulkheads would become the responsibility of the Township. New bulkheads have a 20 to 30 year life but if they are older and made of wood they would have to be replaced, at considerable cost to the municipality. An alternative could be to allow the area to revert to marshlands

but build up the bank to naturally stabilize the shoreline. The official noted that restoration to open marshland would have few costs. Currently, if faced with buyouts, the Township would likely raise taxes, because services currently cannot be reduced or eliminated in the short term. However, even under the scenario with the highest number of buyouts and the lowest recovered costs (500 properties and 25% cost savings – see discussion of FIA below), the Township would need to raise taxes by just over $50 per parcel on average to offset the calculated tax loss.

A school official interviewed in conjunction with this analysis commented that the projected loss of 27 K-12 students [under the 100-property scenario, based on average children per household] would not result in a budget reduction or reduced state-aid, although there might be some reductions in the smaller school aid programs. The school system has already reduced staff through attrition over the last two years, as enrollment in the District has declined from 1,752 two years ago to 1,623 last April. But if the district lost 135 K-12 students [under the 500-property scenario], it is likely that some educators would have to be laid off. As with the Township, the budget of the K-6 schools would face short-term pressures—revenues from property taxes would decrease by a greater amount than would costs since most of the school district's costs are essentially fixed. However, the state aid formula could result in more per student aid to compensate for the loss of student population, so the impacts could be significantly lessened.

The fiscal impact analysis (FIA) conducted for this report uses actual Township budget and tax assessment data to calculate the marginal net gain or loss to the Township's budget that would result from the removal of existing residences under the two scenarios (100 parcels and 500 parcels). (See the full FIA report in Appendix D.) The FIA calculates the average cost of township-provided services (such as sanitary sewer or police and fire protection) to residential structures, then balances that against the expected tax revenues. The current state of the art for this type of traditional fiscal impact analysis has limitations in the context of resilience. For example, this type of analysis does not consider any revenue that may be generated from restoration of the bought out area (e.g., eco-tourism opportunities with the related local economic value that comes along with that). Nor does this analysis consider avoided costs to the municipality and other non-bought-out-residents of reducing risk and vulnerability.

Commercial areas of Mystic Island could see a boost from eco-tourism

The FIA conducted for this assessment shows that there would be net loss to township and school district revenue under almost any scenario. The full theoretical amount of "savings" in the form of reduced costs to provide services would likely not be realized, especially in the 100 property scenario, because of the ongoing need to provide services and maintain the open space area and inability to immediately reduce costs on a marginal basis, resulting in slight to moderate losses to the municipal and school district budgets. In reality, any savings to the Township due to a decrease in services would accrue slowly, and would depend greatly on the number and location of the properties.

However, the loss of tax revenue is relatively small in comparison to the size of the municipal budget and the overall amount of taxes the

Table 37: Fiscal Impact Analysis: Summary of Results

500 Properties					
100% of Savings Realized		**50% of Savings Realized**		**25% of Savings Realized**	
Twp	K-6	Twp	K-6	Twp	K-6
$21,281 LOSS	$171,148 gain	$350,890 LOSS	$185,426 LOSS	$515,695 LOSS	$363,713 LOSS
$2.19 LOSS per LEH parcel	$17.64 gain per LEH parcel	$36.17 LOSS per LEH parcel	$19.12 LOSS per LEH parcel	$53.16 LOSS per LEH parcel	$37.50 LOSS per LEH parcel
100 Properties					
100% of Savings Realized		**50% of Savings Realized**		**25% of Savings Realized**	
Twp	K-6	Twp	K-6	Twp	K-6
$4,430 LOSS	$34,230 gain	$70,265 LOSS	$37,085 LOSS	$103,182 LOSS	$72,742 LOSS
$0.44 LOSS per LEH parcel	$3.39 gain per LEH parcel	$6.96 LOSS per LEH parcel	$3.67 LOSS per LEH parcel	$10.22 LOSS per LEH parcel	$7.20 LOSS per LEH parcel

Township collects. The tax revenue lost from the loss of 100 properties would represent less than 1 percent of the municipal budget. A loss of 500 properties would represent about 3 percent of the budget.

It is important to note that a calculation of tax revenues lost from bought out properties must be considered in conjunction with the comparison of no action being taken to reduce flooding impacts and improve resiliency. The municipality will continue to incur costs from storms and flooding in terms of the personnel time allocated to addressing abandoned properties, repairing damaged streets and sewer infrastructure and clearing storm debris. For instance, township officials noted that cleanup after a typical Nor'easter can cost from $1,000 - $1,500. Cleanup from Sandy totaled close to $7 million, but these costs were largely reimbursed by FEMA.

The alternative to property buyouts is the long-term maintenance and protection of these neighborhoods using property protection actions and structural projects to mitigate the combined effects of sea level rise, coastal erosion and climate change. Without implementation of such measures, the accumulated real costs to property owners whose homes are located in a vulnerable zone may ultimately erode property values in Mystic Island, thus negatively impacting the Township's tax base in a manner similar to property buyouts. Further, if property owners can no longer pay their taxes or decide to abandon their property prior to making necessary repairs due to flooding events, the Township could incur additional costs.

Vulnerable Populations

It is difficult to say which populations would be most affected by changes to municipal fiscal health because it would depend upon which services or programs would be reduced or increased as the budget rises or falls. In a prior round of cutbacks, Little Egg Harbor Township laid off police officers and clerks. Presumably, reductions in police personnel would affect the entire township equally, but if crime or public safety issues are concentrated in certain areas, those

areas would bear a disproportionate burden. On the other hand, budgets may become healthier if tax revenues eventually rise because the area becomes more desirable due to increased protections against storms. And the added open space could attract new tourists and amenities, which could boost the economy. Added storm protection could also serve to reduce costs related to cleanup of flood and storm damage. Under these circumstances expanded services could benefit these same populations.

Impact Projections

» Buyout scenarios would result in a minor to moderate loss of tax revenue to the municipal budget, combined with cost savings that will likely not be fully realized.
» While the 100-unit buyout has limited effect, under the 500-unit buyout scenario, the Little Egg Harbor school district would be affected, and costs might have to be cut, including laying off some teachers or administrative personnel.
» Economic benefits could be achieved through the buyout scenario, including reduced costs of recovery from future flooding and storms, and potential revenue generated from new eco-tourism, but these benefits were not quantified in this study and require a more detailed analysis.

Related Recommendations

» If buyouts are pursued, the township should consider creative approaches to cover cost of bulkhead, restoration, living shoreline installation, and maintenance of passive recreation.
» If the township must reduce costs to offset lost tax revenue, it should prioritize service cuts that have minimal impact on population health, particularly on low-income and elderly populations.
» If permissible by the buyout program rules, consider transferring open marshlands to the Natural Lands Trust, which can legally preclude access as an approach to limit municipal obligations.
» Incentives should be offered to encourage residents of purchased property to remain in the township.
» Recovery agencies or other funders should commission a study on the "do-nothing" scenario for coastal communities, and compare it with the fiscal impacts, costs and benefits of various resilience strategies.
» Consider additional studies to provide a detailed understanding of the variables related to the cost of maintaining new open space under different management scenarios and evaluate the incremental property value and health impacts to the community of each option.

Open Space

Connection to Health Outcomes

A great deal of research supports the positive association between the presence of open space in a community and many positive health outcomes in nearby residents. There are direct physical and mental health impacts, as well as more indirect economic impacts that can result in improved quality of life and mental health.

Physical Health

There is very strong literature connecting open space and recreation areas to a wide range of positive health effects. Living close to accessible recreation increases physical fitness and thus reduces diseases related to obesity. Specifically, regular physical activity helps reduce the risk of developing heart disease, stroke, diabetes, obesity, some forms of cancer, high blood pressure and high cholesterol and has been shown

to have a positive impact on pulmonary function.[86,87] Moderate evidence exists for physical activity's role in lowering risk of hip fracture, increasing bone density and lowering risk of future disability in adults.[88]

For children and adolescents, physical activity is strongly connected to improved cardiovascular endurance, muscular fitness and more favorable body composition.[89] Open space provides an outlet for physical activity to the extent that the areas have pathways, workout equipment, and playgrounds. Key neighborhood features related to physical activity include access to parks, recreational facilities and green space; tree canopy; walkability; and safety and crime. A review of studies showed that access to places for physical activity combined with outreach and education can produce a 48 percent increase in the frequency of physical activity.[90]

Access to public spaces for recreation is an important factor in the ability to exercise and this would be particularly important in densely populated neighborhoods with compact properties and little open space. Studies have found, for instance, that 30 percent of people who are physically active exercise in public parks and that people who live near trails are 50 percent more likely to meet physical activity guidelines.[91] Individuals are more likely to utilize parks if they are close to where they live, are safe, and are regularly maintained.[92]

Mental Health

The presence of scenic green or natural areas provides psychological benefits. The relative quiet and beauty of nature enhances positive mood and provides a refuge from everyday stressors. Studies have shown decreased symptoms of depression and anxiety, and an overall improvement in well-being from physical activity and from access to green spaces.[93,94,95]

Studies have found that the visual presence of natural vegetation and trees improves adult recovery from mental fatigue, leading to a reduction in socially unacceptable behavior and crime, and can improve problem solving and cognitive function.[96] Similar environments have been found to increase concentration and reduce behavior problems among children generally, and improve functioning in children with Attention Deficit and Hyperactivity Disorder (ADHD).[97]

86. Cohen, D., A. Sehgal, S. Williamson, D. Golinelli, N. Lurie and T. McKenzie. (2007). "Contribution of public parks to physical activity," American Journal of Public Health 97(3):509-514.

87. Blanck H, Goodman A, Merriam D, et al. (2012). "Let's go to the park today: The role of parks in obesity prevention and improving the public's health." Childhood Obesity,8(5):423-428.

88. Dunlop D, Song J, Hootman J, et al. (2016). "Sedentary Time in U.S. Older Adults Associated With Disability in Activities of Daily Living Independent of Physical Activity," Journal Of Physical Activity & Health, 12(1): 93-10.

89. Dowda, M., B.E. Ainsworth, C.L. Addy, R. Saunders, & W. Riner. (2001). "Environmental influences, physical activity, and weight status in 8-to 16-year-olds." Archives of Pediatrics and Adolescent Medicine 155(6):711.

90. Kahn, P.H.J., and S.R. Kellert (eds.), Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations, Cambridge, MA: MIT Press, 2002.

91. Brownson, R., E. Baker, R. Housemann, L. Brennan, S. Bacak S. (2001). "Environmental and Policy Determinants of Physical Activity in the United States," American Journal Of Public Health 91(12):1995-2003.

92. Jackson, R., & Kochtitzky, C. (2009). Creating A Healthy Environment: The Impact of the Built Environment on Public Health, Washington DC: Sprawl Watch Clearinghouse.

93. Maller, C., M. Townsend, A. Pryor, P. Brown, L. St. Leger. (2006). "Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations." Health Promotion International 21(1):45-54.

94. van den Berg, A., J. Maas, R. Verheij, & P. Groenewegen. (2010). "Green space as a buffer between stressful life events and health," Social Science & Medicine 70(8):1203-1210.

95. Groenewegen, P., van den Berg, A., Maas, J., Verheij, R., de Vries, S. (2012). "Is a Green Residential Environment Better for Health? If So, Why?" Annals Of The Association Of American Geographers 102(5):996-1003.

96. Ward T.C, Aspinall P. (2011). "Natural Environments and their Impact on Activity, Health, and Quality of Life.," Applied Psychology: Health & Well-Being 3(3):230.

97. Taylor, AF, Kuo FE, Sullivan WC. (2001). "Coping With ADD: The Surprising Connection to Green Play Settings." Environment and Behavior 33(1):54-77.

Marshland along eastern edge of Mystic Island could be developed for eco-tourism

Air and Water Pollution

Vegetation in greenspace improves air quality by removing CO2 from the atmosphere, and can help to minimize heat island effects through reduction of paved surfaces.[98] While this can improve respiratory conditions like asthma, it can also aggravate asthma and allergic reactions if the greenspace contains vegetation with allergens. Vegetated areas will expose users to potential hazards that can result in acute incidents (e.g., bites), diseases (Lyme diseases) or allergic reactions (e.g., poison ivy). However, if asthma is well-managed, there is no association between asthma symptoms and leisure-time physical activity in children.[99] Vegetation also means possible contact with plant or insect pests like poison ivy, ticks or mosquitoes. Bites or rashes can range from being nuisances to more serious conditions requiring hospitalization. Negative encounters with wildlife or stray pets that may live or wander near the trail can also be a concern to trail users. In this case, users risk encounters with an aggravated or rabid animal that could result in an acute incident.

Local Economy

As discussed above in the Household Finance section, research shows that properties close to park space increase in value.[100,101] A study by the Trust for Public Land found that homes within 500 feet of a park increased in value by 5 percent.[102] The National Homebuyer Survey found that 50% of homeowners would pay more to live near open space.[103] These property value effects increase total asset value for homeowners and also can bring more tax revenue to the local municipality. Increased property values and tax payments create the double-edged sword of gentrification, as some lower-income households may have difficulty paying more taxes, while at the same time, fewer homes are available to lower-income households to purchase.

Depending how the open space is developed, it could also generate revenue in the local community. Tourists may drive to use the park and then choose to eat or shop with local vendors, creating local jobs and increasing the attractiveness of the

98. Coutts, C. (2010). "Green infrastructure and Public Health in the Florida Communities Trust Public Land Acquisition Program," Planning Practice and Research 25(2): 203-222.

99. Kosti, R., Priftis, K., Panagiotakos, D., et al. (2012). "The Association between Leisure-Time Physical Activities and Asthma Symptoms among 10- to 12-Year-Old Children: The Effect of Living Environment in the PANACEA Study." Journal Of Asthma 49(4):342-348.

100. Anderson, S. and S. West. (2006). "Open Space, Residential Property Values, and Spatial Context." Regional Science and Urban Economics 36(6):773–789.

101. Nicholls, S. (2004). "Measuring the Impact of Parks on Property Values: New Research Shows That Green Spaces Increase the Value of Nearby Housing," Parks and Recreation, 24–32.

102. Trust for Public Land (2008).

103. Jackson and Kochtitzky (2009).

Table 38: (n = 83)

Question	Strongly Agree	Agree	Not Sure/ No Opinion	Disagree	Strongly Disagree
I think that more open space along the bayfront could be a positive asset for Mystic Island.	21.69%	27.71%	22.89%	13.25%	14.46%

Table 39: (n = 83)

Question	Would be likely to USE the space	Might use the space	Would likely NOT use the space	Mean
it had safety against crime (lighting, patrols, etc.)?	78.05%	17.07%	4.88%	1.27
it had safe access (road crossings)?	76.54%	18.52%	4.94%	1.28
there were parking?	74.39%	19.51%	6.10%	1.32
it had benches?	73.42%	21.52%	5.06%	1.32
it had a walking/biking path?	73.49%	16.87%	9.64%	1.36
it had water access?	69.14%	22.22%	8.64%	1.40
it had disability (ADA) access?	66.67%	25.64%	7.69%	1.41

community for economic activity.[104] More than 400,000 jobs statewide are linked to the tourism industry, including a growing number of jobs linked to "ecotourism," such as hunting, fishing and wildlife watching.[105] Using the repurposed space as a wetland with some access for boats and paths and blinds for wildlife watching has the potential to encourage tourism.

It is difficult to project how much it would cost the municipality to return the land back to functioning wetlands, and to install some passive recreational amenities. After initial vegetation is planted, an annual inspection should be conducted to repair any storm damage and every 5-7 years sediment should be removed from the forebay.[106] The initial cost constitutes the primary expenditure with some smaller annual expenditures required for damage repair and maintenance of any boardwalks, floating docks, signs or benches.

Community Impacts and Stakeholder Input

About half of the respondents to the survey agreed that more open space along the bayfront could be a positive asset for Mystic Island (Table 38).

A high percentage (90%) of survey respondents said they would use new open space in Mystic Island, with the most important factor being the safety of the space in terms of crime, and safe access to the area. Other important features would

104. Nordstrom, K.F., N. L. Jackson, N.C. Kraus, et al. (2011). "Enhancing geomorphic and biologic functions and values on backshores and dunes of developed shores: A review of opportunities and constraints, Environmental Conservation 38:288-302.

105. Dutzik, T. and D. O'Malley. (2010). "The Shore at Risk: The Threats Facing New Jersey's Coastal Treasures, and What it Will Take to Address Them." The Frontier Group, Environment New Jersey Research and Policy Center.

106. U.S. EPA. Stormwater Management Fact Sheet: Stormwater Wetland.

be parking, benches and walking/biking paths. (See Table 39). Other survey comments mentioned that the space should include something to do other than to just look at the water, and others elaborated that it should be child and pet friendly, and be well-maintained.

Other local perspectives from interviews and discussions were generally in agreement that passive or mildly active recreation in new open space in Mystic Island could benefit the area, with some noting the lack of a community park in either Mystic or Osborn Island. One commented that "we are surrounded by water, yet have not one bay beach or waterfront park." Although some residents expressed a preference for fishing piers, most felt that the area should be kept as "natural" as possible including rebuilding wetlands with protective grasses to prevent erosion, and possibly some type of seawall structure to provide extra protection against flooding. Most residents realized that only a cluster of lots together could provide the community benefits of new usable open space and flood protection. A survey comment read: "It would have to be created in a way that protects the remaining community's safety and value, and protects it from future rising tides and catastrophic storms."

Primary concerns about the new open space created from the buyout area are that it could attract crime and drug activity, that it would be unusable during "greenhead (fly) season," and that the cost in lost tax revenues and municipal upkeep of the property might result in increased local taxes. But others mentioned that there might be an opportunity to cut municipal costs by involving the community in the upkeep of the space.

Vulnerable Populations

For those who are of lower income, the presence of new open space helps to address common disparities in access to parks and trails for those

Lot for sale along eastern edge of Mystic Island

in poor neighborhoods.[107,108] The open space, if it contains paths for passive recreation, can help poorer residents, who cannot afford paid membership at a health club, with the opportunity to meet daily recommended levels of physical activity and recreation.[109,110] Further, those at most risk for obesity and related diseases include minority groups and low-income individuals.[111]

Children are another subpopulation that can benefit disproportionately from easy access to a safe place to walk, run, and bike and there is moderate scientific evidence that physical activity is connected to reduced anxiety and depression in children.[112] Exposure to greenspace has been shown specifically to assist the development of feelings of well-being in children, helping them to learn emotional and behavioral connections

107. Gordon-Larsen, P., M. Nelson, P. Page, B. Popkin. (2006). "Inequality in the built environment underlies key health disparities in physical activity and obesity," Pediatrics 117(2):417-424.

108. Moore, L. V., A.V.Roux, K.R. Evenson, A.P. McGinn, & S.J. Brines. (2008). "Availability of Recreational Resources in Minority and Low Socioeconomic Status Areas," American Journal of Preventive Medicine, 34(1):16–22.

109. Blanck et al. (2012).

110. Cohen et al. (2007).

111. CDC. (2012). Overweight and Obesity. Available at: http://www.cdc.gov/obesity/data/adult.html.

112. Epstein, L., Raja, S., Roemmich, J., et al. (2012). "The Built Environment Moderates Effects of Family-Based Childhood Obesity Treatment over 2 Years," Annals Of Behavioral Medicine 44(2):248-258.

to nearby natural and social environments.[113] Exposure has also been shown to reduce symptoms of Attention Deficit Hyperactive Disorder in children.[114]

For older adults, strong evidence indicates that being physically active is associated with higher levels of functional health, a lower risk of falling, and better cognitive function.[115,116]

Impact Projections

» Open space with opportunity for recreation provides very positive health impacts for physical fitness and reduction of disease.
» There are strong positive mental health impacts associated with proximity of well-maintained open space.
» Eco-tourism opportunities can help to support local businesses and improve property values.
» Local open space with recreation opportunities disproportionately benefits lower income people who have limited access to private clubs.

Related Recommendations

» Develop and maintain new open space to create the maximum buffer against storms and as a functioning wetland.
» Seek funding to support new open space development from funds available for habitat preservation and endangered species preservation.
» If feasible, consider reserving some space on or surrounding new open space for development of passive recreation (bird blinds, kayak access) and possible trails with fitness equipment.
» Buy-out programs should consider including visioning sessions so that residents and officials can consider impacts and options related to the buyouts, and as an opportunity to engage citizens in thinking about the future of their communities as well as opportunities to improve health and local economies.

113. Kahn and Kellert. (2002).

114. Taylor et al (2001).

115. Jackson and Kochtitzy (2009)

116. U.S. DHHS. (2008). Physical Activity Guidelines for Americans.

Social Cohesion

Connection to Health Outcomes

Traditionally, social cohesion refers to "a system of social bonds, relations, beliefs, and integration that connects different individuals to a large collective unit."[117] It is a measure of the degree of trust members of a society have in each other and in society itself; it is their willingness to cooperate, help one another out, volunteer, and do so with no coercion. There are several ways that a buyout of homes could affect social cohesion in a community. There is also extensive literature about the impacts of social cohesion on health. This section discusses both of these connections.

The buyout and demolition of abandoned homes could improve neighborhood conditions and community morale

117. Koonce, K.A. (2011). "Social cohesion as the goal: can social cohesion be directly pursued?" Peabody Journal of Education 86(2):144-154.

Thumbnail sketch:

A cconversation with Brunilda Price and Leslie Terjesen, Ocean County Health Department

Following Sandy, the Ocean County Health Department offered assistance through a Sandy Social Services Block Grant, providing lead testing, and personal protective gear for storm debris cleanup. Proper mold mediation guidelines and seminars were offered to all Ocean County residents. According to the Ocean County Community Health Needs Assessment, stakeholders and residents identified social and economic problems throughout the county that predated Sandy but were considerably magnified due to the storm. Chronic diseases were compounded and magnified as a result of the Hurricane. Many residents are experiencing a high level of stress due the complexities of rebuilding or elevating their homes. Other problems residents are facing include unemployment, homelessness, drug abuse, alcoholism, domestic violence and food insecurity. The County relied on faith and community-based organizations and food banks to help meet the social and emotional support needs.

Living through a disaster affects the whole community, causing both individual trauma and collective trauma. People's perceptions of their homes as secure environments change significantly after a flood. But often a community comes together and there is bonding both during and after the disaster, based on the shared negative experience and desire to return some stability to their lives. However, it can also lead to the breakdown of relationships. For some, the strain of dealing with the disaster creates a burden on their relationships with their partners, their families, and their friends. So in the case where social cohesion has been strengthened by living through a disaster, then the buyout and exodus of households from the community could create another shock that disrupts or weakens that cohesion. However, it could also help to foster a spirit of resilience in the community, as residents see efforts made to reduce future risks and remove problem properties.

There are houses still abandoned since Sandy that are located in the identified hypothetical buyout area, and these properties adversely affect neighborhood cohesion and character. A buyout would result in the demolition of these homes, which should have a positive effect on overall neighborhood quality, which in turn affects frame of mind and mental health.

If the open space is maintained as a passive recreation area that can serve as a gathering space, then social cohesion can be enhanced. When many members of a community are at the same place enjoying the same resource or activity, it can create a sense of social cohesion.[118] There is a strong literature to support that when safe, accessible recreation space is added, it spurs local business activity and social gathering.[119,120] In fact, research suggests that open spaces offer opportunities for peace, relaxation, and social activities that, for many, is the primary purpose for visiting the space, with physical activity as a secondary benefit.[121]

118. Ross, C., Leone, D. K., Marcus, M., Barringer, J., Dannenberg, A., Beck, L. (2012). "Health impact assessment of the Atlanta beltline," American Journal of Preventive Medicine 42(3):203-213.

119. Sherer, P. (2006). The Benefits of Parks: Why America Needs More City Parks and Open Space. Report for Trust for Public Land.

120. Sullivan, W.C., Kuo, F.E., DePooter, S.F. (2004). "The fruit of urban nature: Vital neighborhood spaces." Environ. Behav. 36:678–700.

121. Ward and Aspinall (2011).

Open space in Mystic could be turned into social gathering space for education and walks

Source: Texas Coastal Watershed Program, Edinburg Scenic Wetland

Parks can create a place for shared experience that increase social capital, and communities that are more closely knit have a stronger support system and thus may be able to handle stress in a healthier manner.[122] However, if open space is not well-maintained and is not used, it may have the opposite effect, furthering a sense of disconnection and hopelessness. Studies have found, though, that green space is usually associated with lower crime rates and more positive social behavior and with decreased feelings of loneliness and increased lifespan for individuals.[123,124]

High levels of stress and fear, as are found in a post-disaster community like Mystic Island, can also lower social cohesion, which in turn is associated with negative health effects ranging from chronic and infectious diseases[125] to higher mortality rates.[126,127] Berkman and Kawachi (2000) found that people who self-reported severe lack of social support were more than twice as likely to report fair or poor health than people who did not lack social support.[128] Numerous studies have shown that stress can be moderated through protective factors related to social support and the creation of social networks, social capital and social cohesion. Healthy People 2010 asserts that the social environment—including interactions with family, friends, coworkers, and others in the community—has a "profound effect on individual health."[129] Being part of a stable community can provide a buffer against stress through strong social connections and social cohesion built over time,[130] which is associated with lower levels of stress, and more positive health outcomes.

Community Impact and Stakeholder Input

More than half of the respondents from the lagooned areas of Mystic Island responded that they "strongly agreed" that they were concerned about how a loss of homes in Mystic Island would affect neighborhood social networks. (See Table 40).

122. Carroll, B., H. Morbey, R. Balogh, A. Gonzalo. (2009). "Flooded homes, broken bonds, the meaning of home: psychological processes and their impact on psychological health in a disaster," Health and Place 15:540-547.

123. Taylor et al (2001)

124. Kuo, F.E., and W. C. Sullivan. (2001). "Aggression and violence in the inner city effects of environment via Mental Fatigue," Environment and Behavior 33(4):543-571.

125. Kawachi, I., G.A. Colditz, et al. (1999). "Social capital and community effects on population and individual health," Annals of New York Academy of Sciences 896:120-130.

126. Lochner, K.A., Kawachi, I., Brennan, R.T., Buka, S.L. (2003). "Social capital and neighborhood mortality rates in Chicago," Soc Sci Med 56(8):1797–1805.

127. Carpiano, R.M. (2006). "Toward a neighborhood resource based theory of social capital for health: Can Bourdieu and sociology help?" Social Science & Medicine 62:165-175.

128. Berkman, L., Kawachi. I, editors. (2000). Social Epidemiology. New York: Oxford University Press.

129. U.S. DHHS. (2002). Healthy People 2010.

130. Cohen, S. and Wills, T.A. (1985). "Stress, Social Support, and the Buffering Hypothesis." Psychological Bulletin 98:310-357.

Table 40: (n = 82)

Question	Strongly Agree	Agree	Not Sure/ No Opinion	Disagree	Strongly Disagree
I am concerned about how a loss of homes in Mystic Island would affect neighborhood social networks.	37.8%	19.5%	26.8%	8.5%	7.3%
Mystic – lagooned	**52.4%**				

The SCFHS found that Hurricane Sandy forged closer relationships between neighbors through the shared experience of the storm and the volunteer efforts that residents engaged in to help others. Local input received through this HIA revealed that even though neighborhood social networks may have grown stronger as a result of Hurricane Sandy, social discontinuity associated with lingering unemployment from the economic downturn and continuing frustrations with the length of recovery time, remain. It is unclear how a buyout program would impact this existing social environment. Some community members indicated that people are not as "rooted" as they used to be. That is, connections with neighbors and community is not as important to people's lives and decision-making.

More people leaving the area would continue the trend of dropping church attendance which was noted by residents interviewed for this report. At the same time, fewer homes means less traffic in the main thoroughfares of the island, which can be more peaceful and stress-relieving. Also, as mentioned above, to the extent that some of the bought out would be homes that are currently abandoned, their removal would eliminate a a nuisance and health hazard for many residents who complain of odors, mold, darkness at night, and general distress from the appearance of the vacant homes.

Although many residents expressed concern about the quality of the neighborhood declining, there are still good reasons that make Mystic Island a desirable location, particularly for those who enjoy waterfront locations, backyard boat slips, and quiet way of life. Of top importance among survey respondents from all of Little Egg Harbor Township and Tuckerton about living in this area are affordability, being where you want to be, and location near the water. More than 85 percent of the Mystic Island residents who live on lagoons said that it was "very important" to have a

Many Mystic Island residents desire a location near the water

Table 41: Question: For you, how important are each of the following to you about living in Little Egg Harbor or Tuckerton: (n = 97)

Question	Very Important	Somewhat Important	Not at all important	Not Sure/ No Opinion
Affordability	**68.0%**	**28.9%**	**2.1%**	**1.0%**
It's where I want to be.	**60.8%**	**28.9%**	**7.2%**	**3.1%**
Mystic - lagooned	64.4%	31.3%		
Location near the water	**61.9%**	**19.6%**	**18.6%**	**0.00%**
Mystic - lagooned	85.4%			
Social connections	**41.7%**	**50.0%**	**6.3%**	**2.1%**
Mystic - lagooned	53.2%			
Amenities (parks, culture)	**40.2%**	**50.5%**	**9.3%**	**0.00%**
Family history	**21.7%**	**22.7%**	**45.4%**	**10.3%**

location near the water and more than 95 percent said "it's where I want to be." Interestingly, a higher percentage of Mystic Island lagooned residents said that social connections were very important than in the sample as a whole. (See Table 41)

The survey asked a series of questions about neighborhood perceptions currently, and the same questions for the period prior to Hurricane Sandy. The only one that was markedly different was that people indicated more concern about the safety of construction-related activities now (summer 2015) in contrast to before Sandy (prior to October 2012). While a strong majority of respondents said they know their next door neighbors well, and about two thirds said they socialize with neighbors, fewer than half said that social ties were strong.

Vulnerable Populations

Strong social cohesion would have the greatest positive impact on those with fewer individual resources because it provides a support system, as neighbors can lean on each other in times of need. Indeed, a cross-tabulation of the survey results showed that for those whose household income was under $50,000, social connections were twice as important as for those making under $50,000 per year. But the SCFHS found that even though social ties can improve the health of lower income people, stronger social support networks were reported by higher income people.

In terms of age, low social cohesion has been associated with lower self-rated health of teenagers and children, higher levels of depression, and increases in the presence of hyperactivity and emotional and conduct disorders.[131] It would seem intuitive that seniors would benefit from strong social cohesion, but they tend to be less worried about their neighborhood than younger residents and report a stronger sense of community.[132] A plausible explanation is that many seniors have established patterns of activity, are content with a more solitary lifestyle, and may have more limited involvement in the broader community (schools, sports, etc.) than younger people.

131. Abada, T., Hou, F., & Ram, B. (2007). "Racially mixed neighborhoods, perceived neighborhood social cohesion, and adolescent health in Canada." Social Science and Medicine 65(10):2004–2017.

132. SCFHS (2015).

Table 42: Question: Please rate your level of agreement with the following statements about the current state (in 2015) of your neighborhood in Little Egg Harbor: (n = 96)

Question	Strongly Agree	Agree	Not sure/ No opinion	Disagree	Strongly Disagree	Mean
I know my next-door neighbors well.	38.5%	42.7%	4.2%	10.4%	4.2%	1.99
I am concerned about safety of construction activities.	32.3%	33.3%	12.5%	17.7%	4.2%	2.28
PRIOR to Sandy	12.0%	11.8%				
I socialize with my neighbors.	20.8%	46.9%	10.4%	13.5%	8.3%	2.42
I am concerned about traffic safety.	24.0%	36.5%	13.5%	18.8%	7.3%	2.49
I know the other residents on my street well.	12.6%	49.5%	9.5%	25.3%	3.2%	2.57
There are strong social ties between people in my neighborhood.	14.6%	29.2%	27.1%	19.8%	9.4%	2.80
There is a crime problem in my neighborhood.	16.7%	22.9%	18.8%	30.2%	11.5%	2.97
There are often bad smells.	7.4%	13.7%	14.7%	49.5%	14.7%	3.51
There is often too much noise.	7.3%	7.3%	21.9%	51.0%	12.5%	3.54

Impact Projections

» Removing abandoned homes through buyout will remove a source of distress and potential health hazards, improving quality of life for remaining residents.

» Loss of homes and populations could hurt some local programs and be missed by residents, causing feelings of isolation and sadness, particularly among lower income and younger individuals.

» The new recreational open space created by the bought out properties should provide opportunities for social interaction that improve community quality of life and mental health of residents.

Related Recommendations

» Consider uses for the new open space that will provide gathering places for community-building and public events.

» Maintain the new open space so that it is attractive and deters crime.

» Consider fostering new social networking opportunities for Mystic Island residents such as walking clubs, civic organizations and hobby-based clubs.

» The state or another interested funder could support research to proactively plan how to use buyout land to maximize health benefits. A community toolbox for using health as a metric for envisioning new uses for open could help to make buyouts a more attractive alternative.

Summary of Findings and Recommendations

V

Summary of Findings

In this section, we first list all of the impact projections from the study and then discuss some implications and caveats associated with the findings.

Nuisance Flooding

» Buyout of chronically flooded properties will eliminate health impacts for those whose homes are purchased and leave Mystic Island.
» Clustered buyout of chronically flooded properties should reduce the severity of routine flooding for residents who remain in Mystic Island, thus reducing frequency and severity of nuisance flood caused health outcomes such as elevated stress, feelings of isolation, exposures to toxics, debris and mold.

Severe Flooding

» Clustered buyout of chronically storm-damaged properties will eliminate health impacts from future storms for those who are bought out and move to areas that are not at risk to coastal storms or severe flooding.
» Clustered buyout of chronically storm-damaged properties could reduce severity of future storm damage and flooding by providing a buffer for storm surge and wave action for remaining residents of Mystic, thus reducing frequency and severity of storm-related mental and physical health outcomes such as elevated stress, feelings of isolation, exposures to debris and mold.

Household Finances

» For the people who accept buyout, household finances should improve if a fair purchase price is offered that addresses current debt and provides ability to find and purchase adequate property in a less vulnerable area.
» For Little Egg Harbor residents, buyouts should have a negligible impact on household finances.
» Buyouts should reduce future needs of residents to access and use recovery programs.

Municipal Finances

» Buyout scenarios would result in a minor to moderate loss of tax revenue to the municipal budget, combined with cost savings that will likely not be fully realized.
» While the 100-unit buyout has limited effect, under the 500-unit buyout scenario, the Little Egg Harbor school district would be affected, and costs might have to be cut, including laying off some teachers or administrative personnel.
» Economic benefits could be achieved through the buyout scenario, including reduced costs of recovery from future flooding and storms, and potential revenue generated from new eco-tourism, but these benefits were not quantified in this study and require a more detailed analysis.

Open Space

» Open space with opportunity for recreation provides very positive health impacts for physical fitness and reduction of disease.
» There are strong positive mental health impacts associated with proximity of well-maintained open space.

» Eco-tourism opportunities can help to support local businesses and improve property values.
» Local open space with recreation opportunities disproportionately benefits lower income people who have limited access to private clubs.

Social Cohesion

» Removing abandoned homes through buyout will remove a source of distress and potential health hazards, improving quality of life for remaining residents.
» Loss of homes and populations could hurt some local programs and be missed by residents, causing feelings of isolation and sadness, particularly among lower income and younger individuals.
» The new recreational open space created by the bought out properties should provide opportunities for social interaction that improve community quality of life and mental health of residents

Table 43 lists the key health factors examined in the study, along with a summary of the projected impacts of a buyout program related to each factor. The table summarizes the direction of the expected health impacts, the degree of any expected impacts, the likelihood that the impacts will occur, and the distribution of those impacts to specific populations. For the flooding and household financial impacts, we split out the impacts onto two different populations - those who would accept a buyout and leave the community, and those who would remain in Mystic after a buyout of some of the most vulnerable properties.

Findings: Discussion and Implications

The study found that living in an area that is prone to regular flooding and vulnerable to severe storm flooding causes anxiety and stresses related to lifestyle disruption and costs of damage repair, and can also exacerbate respiratory conditions due to mold growth and dispersion. When severe storm events occur in these areas, it causes health impacts both immediately during and after the storm (injury, exposure to debris and hazards) and more severely for a long time after the disaster (stress and related exacerbation of physical and behavioral conditions). Flooding can be more disrupting for the elderly or disabled who have limited ability to find alternative routes, navigate flooded roadways, and may be more susceptible to health hazards. The HIA provided substantial evidence of the mental health aspects of household financial difficulties associated with storm recovery, but also of the potential for a buyout program to create new opportunities for improved mental and physical health and strengthened social networks. Lower income individuals and households are most severely affected by the anxieties of living with coastal flooding vulnerabilities and are most likely to benefit positively from efforts to improve resiliency.

The hypothetical voluntary buyout program presented in the HIA is one way to build resilience and remove potentially thousands of people from harm's way. In reality, it will be necessary to provide a range of options to keep communities living safely and sustainably along the mid-Atlantic coast. Coastal communities will need to take actions to reduce health hazards from both routine and storm flooding, and the impacts of a changing climate. Some of the analysis provided in this HIA will help to inform decisions related to other resiliency options. The outcomes of the HIA will benefit similar decision-making in other communities in New Jersey and the U.S. that are plagued by chronic flooding.

It should be emphasized that some of the residential units under consideration in this hypothetical scenario have already been elevated and renovated (using RREM and FEMA funding), so it may be problematic to purchase them. Although program rules do not make it impossible, the investments made in renovating and elevating homes may not be recoverable, making

Table 43: HIA Analysis – Summary of Findings: Health Impacts of a Voluntary Buyout Program

Health Determinant	Direction of Expected Health Impact	Degree of Impact	Likelihood	Population Impacted
Routine Flooding	Positive	High	Likely	Bought out residents
	Positive	High	Possible	Remaining residents
Severe/Storm Flooding	Positive	High	Likely	Bought out residents
	Positive	Low	Unclear	Remaining residents Elderly residents
Household Finances	Positive	Medium	Possible	Bought out residents
	Neutral	Medium	Possible	Remaining residents Lower-income and elderly residents
Municipal Fiscal Health	Unknown	Low	Unlikely	Remaining Residents
Open Space	Positive	Medium	Possible	Remaining residents Lower-income residents
Social Cohesion	Neutral	Low	Unclear	Remaining residents Lower-income residents

Direction of Impact	
Negative	Negative health impacts associated with this determinant
Neutral	Some positive and some negative impacts
Unknown	Unknown how health will be impacted
Positive	Positive health impacts associated with this determinant

Degree of Impact	
Low	Causes minor impacts
Medium	Causes some substantial impacts
High	Causes significant impacts

Likelihood	
Likely	Likely that impacts will occur
Possible	Possible that impacts will occur
Unlikely	Unlikely that impacts will occur
Unclear	Unclear whether impacts will occur

it an unattractive financial option. Furthermore, many current homeowners in Mystic Island enjoy direct boat access to the Atlantic Ocean that their properties provide and, as a result of the lack of other access points, may be un-interested in buyout and relocation.

Decisions and actions to reduce vulnerabilities and improve resiliency will need to be made at various levels. At the household level, it is important to note that the typical Mystic Island resident has probably not calculated into their plans the long-term effects of sea-level rise and storm impacts. It is not apparent that state and regional authorities have fully incorporated calculations of sea level rise and predicted future storm surges into their planning and policy decisions yet. It can be difficult for a township government to lead the way when nearby communities and higher levels of government are not acting in concert according to a coordinated and science-informed long-term plan.

Findings: Caveats and Limitations

A number of general caveats and limitations must be kept in mind to understand this HIA in the proper context. As one of the first HIAs conducted to evaluate post-disaster and disaster planning decisions, it lays the foundation for additional HIAs, as well as many other additional research studies, to provide a basis for a richer understanding and support for analysis of both baseline conditions and predicted impacts. Those are discussed throughout the report and summarized below. With literature that was somewhat limited by the relative novelty of buyout programs in the United States and climate change resiliency planning generally and by the timeframe and resources of this project, this HIA scratches the surface of a future where researchers and policy-makers work together to gather the best data and evidence to inform planning and policy decisions about how to keep populations healthy while building resilience to impacts of climate change.

Some limitations that are worth specifically noting are:

- The survey had a low number of responses in comparison with the target population and they were not collected with random sampling, so its findings cannot be considered representative of the population or statistically significant, but rather only descriptive of the respondent sample.
- The team was unable to quantify how much additional flood and storm protection would be created by a restoration of wetlands and new open space in the targeted buyout area and surrounding area.
- The team used the latest scientific projections to assume that sea level rise will continue and that major storms will continue to occur more frequently and with greater intensity, but was unable to bring those projections to a micro scale to analyze exactly how, where and when increased flooding and storm impacts might occur in Mystic Island.
- Many pieces of data were not available that would help to quantify specific impact projections, such as how many bought out Mystic Island residents would remain in the township, how much new development could occur in the township to absorb relocated Mystic residents, and how elevation of homes affects the overall health of residents living in them. Survey data and interviews helped to estimate some of these data.
- There was little to no health or environmental data available on either the municipal level or the neighborhood level.
- Because there are few community assets or active social organizations in Mystic Island and the study team was unable to contact some of the targeted stakeholders from social or service organizations, the ability to fully examine social cohesion within the community was limited.
- Some members of vulnerable groups were integrated into the process, while others were not as accessible to the team. For example, se-

nior citizens were represented by attendance at our Health/Safety roundtable and on the project steering committee. The team was less able to obtain input from representatives of the lower-income households in Mystic Island, the other key vulnerable population.

Summary of Recommendations

The recommendations from this HIA are aimed primarily at informing decisions made by the local governing body, but also address county, state and federal agencies involved in disaster recovery. At the local level, recommendations and findings from this study will inform Little Egg Harbor Township council about whether or not to proceed with support of a buyout program from the perspective of its impact on the health of the community. But they will also help with understanding the health implications of other resilience strategies and of the "do nothing" strategy. At the county, state or federal agency level, the recommendations will help program officials and decision-makers to adapt and implement disaster assistance and recovery programs in ways that are built on an understanding of mental and physical health impacts of disasters, and thus best promote and support the health of disaster victims.

A summary of recommendations from all six parts of the analysis is outlined below. The summary includes suggested actors and timeline associated with each recommendation.

Table 44: Summary of Recommendations

Recommendation	Actor(s)	Timeline*
Nuisance Flooding:		
LEHT should support resident applications for voluntary buyouts, particularly those residents who live in the most flood-prone areas of Mystic Island.	LEHT	Short-term
NJ State Blue Acres should approve buyout applications for properties that are clustered geographically to achieve the greatest nuisance flood reduction benefits.	NJ DEP	Short-term to Medium-term
A state or federal agency or foundation should commission a study to investigate the effect of increased open space on the reduction of nuisance flooding, including the configuration and amounts of restored wetland that would be required to achieve measurable benefits.	NJ DEP, FEMA, NOAA, USFWS, Private Foundations	Short-term
Severe Flooding:		
Recommendations for Mystic Island Buyout Scenario		
Buyouts should be clustered in a geographic area that results in greatest potential to reduce storm-related impacts. (i.e., most vulnerable to storm impacts and fewest elevated homes)	LEHT and NJDEP	Short-term
Social services, particularly access to mental health services, should be improved as a complement to a buyout program and targeted to lower income, less educated populations.	LEHT, social service agencies, Ocean County	Short and Medium-term
Along with a buyout initiative, a managed plan should be developed to protect the shoreline from sea level rise and increased vulnerability to storm surge.	LEHT, NJDEP	Medium-term
Consider elevating Radio Road and installing other structural barriers to further protect Mystic Island from sea-level rise and storm surge.	LEHT	Medium-term

Recommendation	Actor(s)	Timeline*
Recommendations for Disaster Recovery Planning		
FEMA should consider placing a priority on personnel continuity and greater internal coordination, to the greatest extent possible, and enhancing staff training to address the needs of affected communities with effectiveness, consistency and efficiency.	FEMA	Short-term
State recovery agencies should encourage faster response from insurance companies through incentives for fast and efficient turnaround on claims.	NJOEM, NJDEP, NJDHS (Human Services)	Short and Medium-term
Local governments considering implementing resilience measures should propose them to residents in concert with community education about vulnerabilities so that residents understand the benefits of the measures.	LEHT, NJDEP, Other coastal towns	Short, Medium and Long-term
Municipalities in areas vulnerable to coastal flooding should identify and work closely with local social service agencies and religious organizations to provide a stable, coordinated network of support for residents in the event of emergencies.	LEHT, NJOEM, social service agencies, Ocean County emergency	Short-term
Federal, state and local agencies engaged in response and recovery efforts should be trained to both prevent, to the extent possible, and recognize the long-term mental health effects following a storm event through ongoing mental health surveillance, appropriate intervention, and adaptation strategies.	NJDHS, NJOEM, NJDOH, Ocean County Health, Coastal towns	Short and Medium- term
Programs to train local service providers in administrative/managerial requirements as well as response techniques should be sponsored by either the State OEM and/or FEMA. Such programs should be provided on a periodic basis so that local officials are trained in planning, management and implementation of response and recovery	FEMA, NJOEM, US HUD, NJDHS, NJDEP, NJOEM, County and local emergency departments	Short-term/ongoing
Disaster managers at all levels should continue to work together as closely as possible with a goal to operate efficiently and rapidly to return affected populations to normalcy as quickly as possible.	FEMA, NJOEM, US HUD, NJDHS, NJDEP, NJOEM, County and local emergency departments	Short-term
Household Finances:		
Recommendations for Mystic Island Buyout Scenario		
Buyout programs should be funded and readily activated and offered to residents quickly after storm-related disasters occur.	NJDEP	Medium-term
Prices offered for residential properties in a buyout program should reflect pre-storm value, but also consider additional costs borne by residents in the storm recovery phase.	NJDEP	Short-term
Buyout programs should consider eligibility for people who have already used federal recovery programs such as RREM, and consider alternatives such as offering funds to residents to move their elevated homes if they are in a targeted buyout cluster.	NJDEP, FEMA, HUD	Short-term
Recommendations for Disaster Recovery Planning		
Financial counseling services should be developed as part of disaster case management that will help storm victims access available programs and provide them advice about how to manage their financial assets appropriately.	FEMA, US HUD, US DOH, NJDHS, NJDOH	Short-term
Educational materials about program policies, administrative procedures, and application requirements of response and recovery programs should be prepared and provided well in advance of a disaster, so that people are well-informed about what to do and where to go for assistance immediately after a disaster event.	FEMA, NJOEM, County Emergency Mgt.	Short-term
State or federal agencies or other funders should consider conducting a study of coastal New Jersey's regional economy, including the financial health of households and impacts of various resilience strategies on economic health.	NJDEP, NJOEM, Private Foundations and nonprofits,	Medium-term

Recommendation	Actor(s)	Timeline*
Municipal Finances:		
If buyouts are pursued, the township should consider creative approaches to cover cost of bulkhead, restoration, living shoreline installation, and maintenance of passive recreation.	LEHT	Short-term
If the township must reduce costs to make up for lost tax revenue, it should prioritize service cuts that have minimal impact on population health, particularly on low-income and elderly populations.	LEHT	Short and Medium-term
If permissible by the buyout program rules, consider transferring open marshlands to the Natural Lands Trust, which can legally preclude access as an approach to limit municipal obligations.	LEHT, Natural Lands Trust	Short or Medium-term
Incentives should be offered to encourage residents of purchased property to remain in the township.	LEHT	Short-term
Recovery agencies or other funders should commission a study on the "do-nothing" scenario for coastal communities, and compare it with the fiscal impacts, costs and benefits of various resilience strategies.	FEMA, NJDEP, NOAA, Private Foundations	Short and Medium-term
Consider additional studies to provide a detailed understanding of the variables related to the cost of maintaining new open space under different management scenarios and evaluate the incremental property value and health impacts to the community of each option.	NJDEP, NOAA, USFWS/DOI, Private Foundations	Medium-term
Open Space:		
Develop and maintain new open space to create the maximum buffer against storms and as a functioning wetland.	LEHT, NJDEP	Short-term
Seek funding to support new open space development from funds available for habitat preservation and endangered species preservation.	LEHT	Short-term
If feasible, consider reserving some space on or surrounding new open space for development of passive recreation (bird blinds, kayak access) and possible trails with fitness equipment.	LEHT	Short-term
Buyout programs should consider including visioning sessions so that residents and officials can consider impacts and options related to the buyouts, and as an opportunity to engage citizens in thinking about the future of their communities as well as opportunities to improve health and local economies.	NJDEP, FEMA	Medium- and Long-term
Social Cohesion:		
Consider uses for the new open space that will provide gathering places for community-building and public events.	LEHT	Short-term
Maintain the new open space so that it is attractive and deters crime.	LEHT, Local environmental organizations	Medium-term
Consider fostering new social networking opportunities for Mystic Island residents such as walking clubs, civic organizations and hobby-based clubs.	LEHT, Social Service agencies	Short-term
The state or another interested funder could support research to proactively plan how to use buyout land to maximize health benefits. A community toolbox for using health as a metric for envisioning new uses for open could help to make buyouts a more attractive alternative.	NJDEP, NJDOH, Private Foundations, NOAA	Medium-term

*Short-term = Within 2 years
Medium-term = 2-5 years
Long-term = More than 5 years

Evaluation and Monitoring Plan

VI

Evaluation

As of the writing of the final report, the evaluation step was not complete. The report describes here the plans for completing the evaluation in the months following issuance of the final report. The HIA evaluation consists of two parts. First, a process evaluation gauges the HIA's quality according to established standards and the original plan for the HIA, as developed in the scoping phase. This includes both self-evaluation and brief interviews with key project partners and clients for external perspective to assess how well the HIA process met their expectations.

A second type of evaluation is an impact evaluation that assesses the HIA's impact on decision-making. This will involve brief interviews with decision-makers and analysis of planning and implementation documents. The impact evaluation will determine the extent to which the HIA recommendations influenced the Township's decision as to whether or not to undertake a buyout program and, if implemented, how the recommendations shaped the strategies the Township follows. It will also look at how the HIA influenced other levels of government involved in disaster response, post-disaster recovery and resilience planning. At a period of several months after the HIA is published, the research team will contact decision-makers in Little Egg Harbor Township to assess the extent to which the HIA recommendations are being considered in the consideration of a buyout strategy or of other resilience strategies. After program officials associated with disaster recovery have reviewed the HIA, the team will also assess their receptiveness to considering report recommendations as they assess program modifications.

Monitoring Plan

The research team recommends a follow-up HIA monitoring plan to track decision outcomes and assess changes in health status and health determinants as decisions are implemented. The monitoring plan suggests goals for short- and long-term monitoring; recommends indicators that can be used to track progress; suggests which parties can/should be responsible for carrying out the monitoring plan; proposes a mechanism for reporting monitoring results to decision-makers, HIA stakeholders and the public (e.g., bi-annual health report); and identifies resources that may be available to carry out the monitoring plan.

Table 45 presents the basis for a monitoring plan to track changes in health outcomes over time. Official data sources could be scanned for changes in some of the indicators (obesity, social and behavioral indicators), while others such as use profiles and perceptions could be monitored through repeating a resident survey at periodic intervals.

Importantly, though, to effectively monitor health at the community level, local or county health agencies should engage in a data collection effort that can establish a baseline and then track changes to important health indicators at a local level. This could involve implementing a periodic survey as described above, and also efforts to gather summary data from providers, clinics and other health and environmental professionals about health conditions, while protecting individual privacy

Table 45: HIA Analysis – Monitoring Plan for Mystic Island Voluntary Buyout Program

Health Determinant/ Factor	Indicators	Responsible Party
FLOODING - ROUTINE	Number and type of flooding events Reported injuries Exposure to contamination and mold Respiratory illnesses Traffic incidents/Access Issues Mental health/stress Poor Mental Health Days	Ocean County Health Local Police Depts., public works and emerg. response Ocean County/NJTPA
FLOODING – SEVERE/STORM	Number and type of storm events Reported injuries Exposure to contamination and mold Respiratory illnesses Mental health/stress Poor Mental Health Days Addictions/Abuse	Local and regional Police Depts., public works and emerg. response Ocean County Health Local health officials Local hospitals and health service providers Ocean County/local planning dept.
HOUSEHOLD FINANCES	Mental health/stress Poor Mental Health Days Foreclosures – Bankruptcy filings Self-reported difficulty paying bills Property values	Local health depts. Local police dept. Local health dept. Local police dept., local planning dept.
MUNICIPAL FINANCES	Changes in tax revenues due to buyout properties Changes in level of service provided	Local government School district
OPEN SPACE	Revenue changes for businesses within .5 mile of open space Job growth for businesses within .5 mile of open space Changes in housing prices Changes in exercise habits Changes in physical fitness	Local economic development orgs., local planning depts.. chambers of commerce/Business Improvement Districts Local realtors and tax assessors Local/Ocean County Health
SOCIAL COHESION	Success/evaluation of social events Number of people attending social events/membership in civic orgs. Reported social connectivity and strength of social network	Local nonprofit service agencies, local health depts. Business Improvement Districts Social and Civic Organizations Faith-based groups

Topics for Future Research

The following is a list of topics for further research that were either suggested to the research team by stakeholders during the course of the project, or flowed directly from the analyses performed by the team. This is not an exhaustive list, but includes some of the topics which came up repeatedly as those that would be particularly informative to future HIAs or other health impact studies. There are likely many additional fruitful topics for study that would provide evidence or models that will help to inform decision-makers as they tackle difficult issues related to planning for mitigation and resilience in anticipation of weather disasters and climate-change realities for decades to come. Some of these studies could be performed by county or regional health-related or emergency management agencies, some could be carried out by universities or non-profits, and some could be led by state or federal agencies.

- **Effects of post-disaster recovery on vulnerable subpopulations:** Further studies could examine in detail the various environmental, social and economic Impacts on communities resulting from health determinants in various phases of disaster recovery on affected subpopulations. For example, how do psychological stresses impact elderly people in different ways than younger people, or how do financial stresses of home damage repairs affect low-income populations, or how do exposures resulting from flooding impact children or those with respiratory conditions?
- **Prioritization of buyout areas based on health and flood risk reduction:** Before the next major disaster occurs, the state could take the lead on studying where it is most logical to focus buyout programs geographically by assessing the relative benefits to the health of residents in target areas. This would be a multi-part and multi-modal study that could involve looking at areas vulnerable to coastal and inland flooding, and carrying out focus groups and expert interviews to understand local health factors, demographic analyses to determine socially and economically vulnerable populations, and geomorphological studies to determine where buyouts would provide the greatest benefits in flood hazard reduction.
- **Effect of increased open space on the reduction of nuisance flooding:** Further scientific studies are needed that quantify how the configuration, composition and amount of restored wetland achieves measurable flood-reduction benefits in coastal areas order to plan for the optimal locations for buyouts and use/development of open space.
- **Impact of buyouts on neighborhood quality of life factors:** Case studies and surveys that investigate the impact of buyout programs on the residents who remain in nearby neighborhoods after buyouts occur regarding quality of life and access issues, like for example, access to healthy food and effects of lost population on social groups and connections, would be helpful to better assess these impacts in future HIAs.
- **Health impacts for households who accept buyouts and re-locate:** A study of households who would choose to accept buyouts and leave floodprone areas could analyze how the decision to move affects their family life, social connections, and other health factors.
- **Effects of resiliency strategies on regional economy:** State or federal agencies or other funders should consider conducting a study of the health of the coastal New Jersey regional economy that includes the financial health of households and impacts of various resilience strategies on economic health.
- **Analysis of costs and benefits of managing coastal open space/wetlands for enhanced resiliency, health and economic benefit:** Additional studies could provide a detailed understanding of the variables related to the cost of maintaining new open space under different management scenarios and evaluate the incremental property value, health impacts and resiliency enhancements to the community of each option.
- **Comparison of resilience strategies vs. do-nothing:** Recovery agencies or other funders should commission a study on the "do-nothing" scenario for coastal communities, and compare it with the health impacts, fiscal impacts, costs and benefits of various resilience strategies.

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Appendices

Appendix A:
Screening Checklist

Screening Questions and Answers:

Is there a decision?	Is the decision likely to substantially affect health or health determinants?	Is the timeframe for the decision-making process appropriate?	Is there enough evidence and data for the analysis?	Is there potential to disproportionately affect vulnerable populations?	Does the current decision-making process fail to adequately address health?	Does the legal framework allow for health to be factored into the decision?	Are available staff and resources adequate to complete a successful HIA?
Yes. There are residents interested in buyouts, but the community needs to make a decision whether or not to support the effort.	Yes. This area, which was extensively damaged during Sandy, is at risk of inundation, homeowners have limited capability to afford elevation, potential health risks are significant	Yes. The community needs to devise comprehensive restoration strategies and is gearing up to conduct a detailed vulnerability assessment.	In part. NJF partners have sufficient data to perform risk assessment but additional data will need to be collected on fiscal impacts, etc.	Yes. Many of the homeowners on Mystic Isle are lower income	Yes. Presently there is no mechanism in local land use regulations to consider health impacts of any decision	Yes	Yes. NJF and its partners will conduct the risk assessment and the HIA

Is there major public controversy about the decision?	Is an HIA likely to produce new findings or recommendations?	Is there a risk for major catastrophic health consequences?
Yes. This is a potentially controversial strategy. Currently the town does not support buyout strategies, principally due to economic issues	Yes. HIA will help determine if buyout is a suitable approach	Possibly. SLR is likely to significantly jeopardize homes in this area. In the absence of an effective response that risk will become profound in the near future

Appendix B:
Steering Committee

Steering Committee

Name	Organization
Debra Christensen	LEHT Economic Development Commission
Harry Disbrow	Bay Shore Real Estate
Andrea Freidman	NJ DEP
Michael Fromosky	LEHT Assistant Administrator (Former)
Chris Huch	Jacque Cousteau National Estuarine Research Reserve
Richard M Kitrick Esq.	LEHT Economic Development Commission
Eugene Kobryn	LEHT Dep. Mayor, Mayor, Environmental Comm.
Garrett Loesch	LEHT Administrator/ CFO
Ann Mikos	Senior Citizens Advisory Committee
Ken Miller	Resident
Grace Musumeci	EPA
Brunilda Price	Coordinator, Community Health Services Ocean County Health Department
Ed Sink	Resident
Lisa Stevens	Resident, LEHT Council
Leslie Terjesen	Public Information Officer , Ocean County Health Department
Mark A. C. Villinger	Principal Planner, Ocean County Department of Planning

Appendix C:
Stakeholder Engagement Plan

LITTLE EGG HARBOR TOWNSHIP

HEALTH IMPACT ASSESSMENT

STAKEHOLDER ENGAGEMENT PLAN

LITTLE EGG HARBOR TOWNSHIP

NEW JERSEY FUTURE

RUTGERS UNIVERSITY

MAY 2016

LITTLE EGG HARBOR TOWNSHIP
HEALTH IMPACT ASSESSMENT

STAKEHOLDER ENGAGEMENT PLAN

CONTENTS

1. Introduction

The purpose of this Stakeholder Engagement Plan is to promote public understanding of and participation in a Health Impact Assessment (HIA) to evaluate the effect of buyout strategies on community fiscal health, human health, and social vulnerabilities in Little Egg Harbor Township. This HIA is being undertaken as part of the ***Health Impact Project***, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts that encourages the use of health impact assessments to help decision-makers evaluate potential health effects of proposed policies, projects, and programs. The principal parties participating in this Project (project team) - Little Egg Harbor Township, Rutgers University and New Jersey Future - are fully aware of the need for inclusive and meaningful participation of potentially affected parties to support buyout strategies that will be considered through the assessment process. This strategy is intended to help achieve that objective.

The goal of this Stakeholder Engagement Plan is to define the methods that will be employed and the process that will be followed to include as many residents as possible in formulating the assessment of the consequences of a decision whether to engage in a buyout program. Such a program could be an effective approach to reduce vulnerability to future flooding, storms and rising sea levels in shoreline residential areas in the Township that sustained considerable damage from Hurricane Sandy. However, community-wide implications of such a program must be carefully weighed in order to decide whether it would be feasible and advisable to pursue this strategy. The following sections provide background information on the project, the project area and the anticipated project outcomes and outline public involvement tools and activities.

2. The Project

This project will use the HIA process to evaluate the impacts of a proposed buyout plan for the Mystic Island section of Little Egg Harbor (LEH) Township in Ocean County (see project location map). Mystic Island is a low-lying, moderate income, shoreline residential area that sustained considerable damage from Hurricane Sandy. Its geographic and topographic characteristics make it highly vulnerable to severe loss from repetitive flooding and a potentially good candidate for buyouts. To date, 9 homeowners within the project area have expressed interest in taking advantage of this option; however, local officials have reservations due to the probable loss of ratables (municipal revenues from property taxes) and the effect this loss could have on the local economy. The HIA will be a helpful lens through which to evaluate the impacts of buyouts on the community's fiscal health as well as on related human health and social vulnerabilities.

3. HIA Advisory Committee

The HIA Advisory Committee will be comprised of neighborhood and municipal representatives and representatives of organizations and agencies that have specific involvement or interest in community health, vulnerable populations and/or buyout programs (*see* ***Appendix 1- HIA Advisory Committee***). The Advisory Committee will provide critical feedback to help determine which of the community's economic, health and social vulnerability factors will be evaluated and how these factors will be measured. The Committee will also help to identify vulnerable populations within the study area. Finally, the Advisory Committee will serve as the chief review body of the draft

assessment findings and recommendations and it will play a central role in evaluating the project process, impacts and outcomes.

4. Stakeholder Engagement

A variety of tools and methods aimed at facilitating public participation will be employed in each phase of the development of the HIA project. Following is a description of these methods, the phase of the HIA in which they will be employed, their purposes, and how they will be used. (See chart in Appendix 2)

Scoping Phase

Establish and Convene HIA Advisory Committee: The members of the project Advisory Committee have been selected specifically for their knowledge of the community, representation of community interests, their background with buyout programs, or their experience with community health issues.

Identify critical factors for analysis: As a group with a clear stake in the project outcome, the committee is uniquely suited to determine which social determinants of health should be examined.

Identify additional impacted stakeholders: The committee will also have specialized knowledge of other groups and populations likely to be affected by the project and the best means for communicating the findings and recommendations of the assessment and reaching out to such groups to encourage involvement in the HIA process. In addition, the Advisory Committee will help to foster involvement and/or identify any barriers to participation from the groups they represent. Consequently Advisory Committee involvement will be a key element of the stakeholder engagement strategy.

Mailing Lists: The project team, in collaboration with the Advisory Committee, will compile a mailing list for the project. The list will include the email and street addresses of potentially affected homeowners, and renters living within the project area. Particular effort will be made to identify vulnerable populations such as lower-income, elderly or disabled individuals, living in the project area. These parties will receive a letter or email notice of introduction that will describe the project and identify opportunities for participation and input during the assessment process (S*ee* ***Attachment 3 – Notice to Potentially Affected Property Owners and Other Interested Parties***).

Assessment Phase

Data gathering and evaluation: The Advisory Committee members will provide their knowledge of and access to local data sources, and assist in collection of any new data, as needed.

Roundtable Discussion Meetings: Once vulnerable groups within the study area have been identified, project team will arrange at least two roundtable discussion meetings. This input will help focus the direction of the data collection and research, and will also be assessed and included as either part of the baseline assessment, or as support for the impact projections and recommendations of the HIA.

Survey (Tentative): Depending on discussions with the Advisory Committee and other local experts, the project team may compile a short survey to be conducted online and also with paper versions available, to obtain additional public input regarding preferences and opinions about buyout scenarios.

Recommendations Phase

Review preliminary findings: Once the HIA is drafted, the Advisory Committee will be convened to conduct a review of the findings and recommendations. As key stakeholders with specialized background relating to the community, their input will be invaluable in evaluating and prioritizing the HIA recommendations

Hold Public Meeting: A public meeting will be held to obtain input from landowners, renters, and other interested parties at the point shortly after completion of the draft HIA to enable a review of the assessment findings and recommendations. This meeting is intended to provide an opportunity for the community to ask questions and provide input on prioritization of recommendations prior to submission of the draft assessment to the Township Council.

Reporting and Communication Phase

Draft the Dissemination and Communications Strategy: The Advisory Committee will participate in development of a formal plan to inform and engage the broader public about the HIA.

Public Comment Periods: Throughout the life of the project, and particularly after the public meeting to present the draft Health Impact Assessment, the public will have an ongoing opportunity to provide written comments on the draft documents via mail or e-mail.

Responsiveness Summary: All comments submitted by the public will be reviewed and responded to through a responsiveness summary that will be prepared by the project team. Where appropriate, the HIA will be modified to reflect the public input. The responsiveness summary will be posted on the web sites noted below.

Information Repository: The schedule for all public meetings will be posted on the Township's web site. Immediately prior to the public meetings presentation documents will be available for review on the Township's website, http://www.leht.com/. In addition, New Jersey Future (http://www.njfuture.org/) and Rutgers University, through the New Jersey Health Impact Collaborative (http://njhic.rutgers.edu/), will post project information on their web sites

Monitoring Phase

Conduct self-assessment: After the project report has been submitted, the Advisory Committee and the project team will conduct a self-assessment of the process that was followed to complete the HIA including an evaluation of the analytic methods used, the methods employed to engage stakeholders,

challenges and opportunities for improvement, effectiveness of the training and technical assistance and lessons learned.

5. Point Of Contact

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Appendix D:
Fiscal Impact Analysis

Fiscal Impact Analysis
Voluntary Buyout Scenarios in Mystic Island, NJ

Acknowledgement: The New Jersey Health Impact Collaborative thanks faculty and staff from Rutgers Economic Advisory Service (R/ECON) within the Center for Urban Policy Research (CUPR) for their expertise in conducting this analysis. Specifically, we acknowledge the efforts of Michael Lahr, Ph.D., Robert Burchell, Ph.D. and Jay Dahr.

1. BACKGROUND: TRADITIONAL FISCAL IMPACT ANALYSIS

A traditional fiscal impact analysis (FIA) compares the municipal costs of a particular development with the municipal revenues expected to be generated from that development. Calculations are generated using actual municipal budget and tax data in a particular municipality where development is proposed. The method uses average costs per capita to determine the cost increase of each new entrant of a proposed development.

Using municipal financial data, a fiscal impact analysis multiplies the number of new community entrants by the average cost to serve that entrant. Revenues are determined by multiplying new property value times the existing local property tax rate. A net fiscal impact is calculated when costs are subtracted from revenues. If revenues exceed costs, the project is projected to be positive. If costs exceed revenues, the project is negative. This approach to analysis views development as if it is happening under the current fiscal indices of any given municipality. This provides a realistic way of projecting incremental or average cost increases/decreases using actual budgetary information in real communities.

TRADITIONAL FIA: COST CALCULATION

Costs in a traditional FIA are calculated by taking the total costs of municipal services for residential purposes and dividing by the number of residents served. For example: If a municipality of 1,000 persons had a total yearly municipal budget of $520,000 and $500,000 was to serve residential purposes, then costs per capita to serve that municipality would be $500 per year—shown as: $500,000 / 1,000 = $500. Such a per-capita cost procedure can be used to project the cost increases attributable to any size of future development.

For example: If a new development is contemplated, each additional person projected to reside in that development would drive up municipal costs by $500. If a proposed development would add 5 new houses and 20 new residents to that municipality, the total municipal costs of serving those 20 additional residents would be estimated as: $500 per person x 20 new persons = $10,000.

TRADITIONAL FIA: REVENUE CALCULATION

Revenues are calculated in a similar way to costs. Projected property tax revenues are multiplied by the number of new residential units and/or by the square footage of non-residential space proposed. This method is effective and sufficiently accurate because municipal property taxes are calculated based on the assessed value of property units and related improvements, not by a count of their occupants. For example: If the same 5-house, 20-person development mentioned above generated a total of $1,500 of total municipal revenues per dwelling unit ($150,000 x

$.01) the development would be estimated to generate $7,500 in added tax revenues: 5 units x $1,500 each = $7,500. The overall fiscal impact of the simplified example above results in total costs of $10,000 and total revenues of $7,500. Thus, the project would be negative overall with a deficit of $2,500.

2. "REVERSE" FISCAL IMPACT ANALYSIS

While a traditional fiscal impact analysis is used to project the impacts of a proposed development being added to a community, this report seeks to analyze the fiscal impacts of current development being taken *from* the community through buyout and demolition. In essence, a "reverse" fiscal impact analysis is needed. The calculations for municipal costs and revenues are reversed. The costs to the municipality are the revenues lost. These are the property tax revenues that will disappear as a result of the loss of properties. The revenues to the municipality are the cost savings that might result due to cutbacks in personnel and other expenditures after properties are demolished and services are no longer required for these properties. It is important to focus on this difference all the way through the analysis. Costs to the municipality are the revenues immediately lost; revenues to the municipality are the cost savings that might take place in the shorter or longer run. This will be demonstrated in the example below.

3. ASSUMPTIONS INCLUDED IN THIS FISCAL IMPACT ANALYSIS

- Buyout and demolition results in immediate lost revenues—the revenue losses are effectively costs to the municipality.
- Reduced population results in lower demand for municipal services. These service decreases are effectively cost savings to the municipality, thereby enhancing its revenue stream.
- The analysis compares municipal revenue loss from the demolition of properties to the total reduction in municipal services (supported by the property tax) due to any subsequent population loss.
- If the revenue loss is greater than the savings generated by the reduced cost of services, then the result is a negative fiscal impact for the municipality. If the revenue loss is less than the savings generated by the reduced cost of services, the result will be a positive fiscal impact for the municipality.
- When calculating "cost," this analysis does not account for the buyout cost, closing costs, management costs, or demolition costs for any property included in the demolition. It is assumed that 100% of these costs are funded by authorities other than the municipality.
- Fiscal impacts are cumulative. While the impact of one additional unit lost may be imperceptible, the cumulative impact of many units can be financially burdensome.
- Buyout and demolition may affect different municipal services in different ways. Demolitions of dwelling units may reduce demand for emergency services but would not likely affect Township road maintenance costs.
- All buyout properties' characteristics are identical for purposes of cost/revenue except as indicated in the example below. The characteristics of the set of buyout properties are representative of the characteristics of properties in the studied jurisdiction.

4. CAVEATS AND CONSIDERATIONS

It is important to note the following considerations that were not included or assumed in the analysis:

- The analysis did not consider impact on the regional High School that most LEH students attend.
- The analysis does not consider any revenue that may be generated from restoration of the bought out area (e.g. eco-tourism opportunities with the related local economic value that could result, property value increases, etc.).
- The analysis does not consider avoided costs to the municipality and other non-bought-out-residents resulting from reducing risk and vulnerability.
- The analysis does not determine threshold effects (i.e. how many homes have to be purchased before a quantum expenditure change would occur) on township services (sanitation, public works, power, etc.).
- The analysis does not include projection of changes in future property values.
- The analysis does not include the option for relocation of a certain percentage (up to 25% of displaced residents) within the township.

5. FISCAL IMPACT METHODOLOGY

The following paragraphs develop the anticipated fiscal effects from the buyout and demolition of 500 properties and 100 properties, respectively, on Mystic Island. The analysis shows how the changes in property tax revenue that result from buyouts affect the budgets of both Little Egg Harbor Township and Little Egg Harbor K-6 School District. This district serves students in grades K through 6 residing in the Township by operating two elementary schools and an early childhood center.

The analysis begins with this baseline data:

- Total population of Little Egg Harbor Township (2014 ACS): 20,396
- Total number of students in Little Egg Harbor K-6 District: 1,623
- Number of housing units in Mystic Island CDP: 3,459
- Township budget (2015): $22,380,347.88
- Township budget Per-capita: $22,380,347.88 / 20,396 = $1,097
- K-6 School District Budget = $21,846,226
- Per student cost of K-6 school operations: $21,846,226 / 1,623 = $13,460

It is customary in analyses such as this to estimate the share of the municipal budget that is spent servicing residential properties by calculating the average of two proportions—the proportion of the total count of parcels in the municipality that is residential and the proportion of the total property valuation of the municipality that is residential. In the case of Little Egg Harbor Township:

((10,000 residential parcels / 10,200 total parcels) + ($2,428,504,439 residential valuation / $2,588,389,802 total valuation)) / 2 = (98% + 94%) / 2 = 96%

In addition, projected population loss and loss of school-aged children associated with property loss are calculated as follows: 33% of all homes are seasonal/vacant; such housing is assumed to have neither long-term residents (population) nor any school children attending local schools. About 27% of all homes have three or more bedrooms, each with an average of 3.774 residents, 0.691 of whom are school-aged children attending grades K-6. About 40% of units have two or fewer bedrooms each with an average of 2.032 residents, 0.057 of whom are school-aged children attending grades K-6.

Thus, the calculation for population per property is:

Units of residential property X (0.33 * 0 + 0.27 * 3.774 + 0.4 * 2.032)

The calculation for school-aged children per property is:

Units of residential property X (0.33 * 0 + 0.27 * 0.691 + 0.4 * 0.057)

6. ANALYSIS SCENARIOS USING "AVERAGE COST" METHOD

In Fiscal Impact Scenario #1, 500 properties in the Mystic Island CDP are bought out. This is considered the "high end" of property buyouts, based on current resources. In Fiscal Impact Scenario #2, 100 properties are bought out. This would be considered a "lower end" and likely more realistic number of total properties that could be bought out with existing programs and resources. (See full HIA report for rationale and description of scenarios.)

The fiscal calculations for these scenarios use the "average cost" method. While the figures below assume full ability of the Township to cut the appropriate level of costs, the realities of lesser levels of cutback are discussed in the next section. The results are provided on the following pages.

FISCAL IMPACT SCENARIO #1: 500 PROPERTIES

Projected Population Impact

- Projected population loss: 500 * (0.33 * 0 + 0.27 * 3.774 + 0.4 * 2.032) = 916
- K-6 School Age Children Loss (S.A.C.): 500 * (0.33 * 0 + 0.27 * 0.691 + 0.4 * 0.057) = 105

Property and Housing Unit Loss

- Current Housing units in Mystic Island (2013): 3,459
- Housing units eliminated: 500
- Percent of Mystic Island housing units removed: 14.46%

Total Revenue Losses

- Average House Value in Mystic Island CDP: (0.27 / 0.67) (average home price of 2-bedroom homes) + (0.4 / 0.67) (average home price of 3+ bedroom homes) = (0.27 / 0.67) ($190,195) + (0.4 / 0.67) ($278,832) = $243,113
- Township general tax rate: 0.00560
- K-6 School general District tax rate: 0.00446
- Average House's Township tax payment: $243,113 * 0.00560 = $1,361
- Average House's K-6 School District tax payment: $243,113 * 0.00446 = $1,084
- Total Township Revenue Loss: 500 * $1,361 = $680,500
- Total K-6 School District Revenue Loss: 500 * $1,084 = $542,000

Total Cost Savings

- Township Budget Per Capita: $1,097
- Township Cost Savings from reduced population: 916 * $1,097 * (96% of budget spent servicing residential properties) * (share of Twp revenue from property tax $15,294,083.38/$22,380,347.88) = $659,219
- K-6 School District Budget per student = $13,460
- K-6 School District Cost Savings: 105 * $13,460 * (share of school revenue from property tax $11,023,550/$21,846,226) = $713,148

Township Fiscal Impact

- Total Township Revenue Loss: $680,500
- Total Township Cost Reduction: $659,219
- Net Fiscal Impact: $21,281 LOSS

K-6 School District Fiscal Impact

- K-6 School Tax Revenue Loss: $542,000
- K-6 School Cost Reduction: $713,148
- Net Fiscal Impact: $171,148 gain

Summary Fiscal Impact

- Township Fiscal Impact: $21,281 LOSS
- K-6 School District Impact: $171,148 gain

FISCAL IMPACT SCENARIO #2: 100 PROPERTIES

Projected Population Impact

- Projected population loss: 100 * (0.33 * 0 + 0.27 * 3.774 + 0.4 * 2.032) = 183
- K-6 School Age Children Loss (S.A.C.): 100 * (0.33 * 0 + 0.27 * 0.691 + 0.4 * 0.057) = 21

Property and Housing Unit Loss

- Housing units in Mystic Island (2013): 3,459
- Housing units eliminated: 100
- Percent of Mystic Island housing units removed: 2.89%

Total Revenue Losses

- Average House Value in Mystic Island CDP: (0.27 / 0.67) (average home price of 2-bedroom homes) + (0.4 / 0.67) (average home price of 3+ bedroom homes) = (0.27 / 0.67) ($190,195) + (0.4 / 0.67) ($278,832) = $243,113
- Township general tax rate: 0.00560
- K-6 School general District tax rate: 0.00446
- Average House's Township tax payment: $243,113 * 0.00560 = $1,361
- Average House's K-6 School District tax payment: $243,113 * 0.00446 = $1,084
- Total Township Revenue Loss: 100 * $1,361 = $136,100
- Total K-6 School District Revenue Loss: 100 * $1,084 = $108,400

Total Cost Savings

- Township Budget Per Capita: $1,097
- Township Cost Savings from reduced population: 183 * $1,097 * (96% of budget spent servicing residential properties) * (share of Twp revenue from property tax $15,294,083.38/$22,380,347.88) = $131,670
- K-6 School District Budget per student = $13,460
- K-6 School District Cost Savings: 21 * $13,460 * (share of school revenue from property tax $11,023,550/$21,846,226) = $142,630

Township Fiscal Impact

- Total Township Revenue Loss: $136,100
- Total Township Cost Reduction: $131,670
- Net Fiscal Impact: $4,430 LOSS

K-6 School District Fiscal Impact

- K-6 School Tax Revenue Loss: $108,400
- K-6 School Cost Reduction: $142,630
- Net Fiscal Impact: $34,230 gain

Summary Fiscal Impact

- Township Fiscal Impact: $4,430 LOSS
- K-6 School District Impact: $34,230 gain

IF ONLY A PORTION OF SAVINGS ARE REALIZED

The previous analysis only applies to a scenario wherein the Township and K-6 School District can immediately adjust their capital and infrastructure to the population loss these buyouts would cause. In reality, if a certain percentage of the Township's population leaves, all the Township's personnel and operating costs cannot be lowered by an equivalent percentage. Just as the incremental cost of an additional user (or even a few new users) for most municipal services and facilities is often very low or negligible, similarly the incremental cost reduction due to the loss of a single user (or even the loss of several users) is also often very low or negligible. Thus, quite possibly, only a fraction of the estimated cost savings outlined in the analysis above could be realized by the Township. Below are calculations of the fiscal impact on the Township and K-6 School District for two hypothetical cases: one in which 50% of the theoretical savings are realized; one in which 25% of the savings are realized.

500 Properties, 50% Savings Realized

Township Fiscal Impact

- Total Township Revenue Loss: $680,500
- Total Township Cost Reduction: $659,219 * 0.5 = $329,610

K-6 School District Fiscal Impact

- K-6 School Tax Revenue Loss: $542,000
- K-6 School Cost Reduction: $713,148 * 0.5 = $356,574
- Net Fiscal Impact: $185,426 LOSS

Summary Fiscal Impact

- Township Fiscal Impact: $350,890 LOSS
- K-6 School District Impact: $185,426 LOSS

100 Properties, 50% Savings Realized

Township Fiscal Impact

- Total Township Revenue Loss: $136,100
- Total Township Cost Reduction: $131,670 * 0.5 = $65,835

K-6 School District Fiscal Impact

- K-6 School Tax Revenue Loss: $108,400
- K-6 School Cost Reduction: $142,630 * 0.5 = $71,315

Summary Fiscal Impact

- Township Fiscal Impact: $70,265 LOSS
- K-6 School District Impact: $37,085 LOSS

500 Properties, 25% Savings Realized

Township Fiscal Impact

- Total Township Revenue Loss: $680,500
- Total Township Cost Reduction: $659,219 * 0.25 = $164,805

K-6 School District Fiscal Impact

- K-6 School Tax Revenue Loss: $542,000
- K-6 School Cost Reduction: $713,148 * 0.25 = $178,287

Summary Fiscal Impact

- Township Fiscal Impact: $515,695 LOSS
- K-6 School District Impact: $363,713 LOSS

100 Properties, 25% Savings realized

Township Fiscal Impact

- Total Township Revenue Loss: $136,100

- Total Township Cost Reduction: $131,670 * 0.25 = $32,918

K-6 School District Fiscal Impact

- K-6 School Tax Revenue Loss: $108,400
- K-6 School Cost Reduction: $142,630 * 0.25 = $35,658

Summary Fiscal Impact

- Township Fiscal Impact: $103,182 LOSS
- K-6 School District Impact: $72,742 LOSS

The analysis is summarized in the following table:

500 Properties					
100% of Savings Realized		**50% of Savings Realized**		**25% of Savings Realized**	
Twp	K-6	Twp	K-6	Twp	K-6
$21,281 LOSS	$171,148 gain	$350,890 LOSS	$185,426 LOSS	$515,695 LOSS	$363,713 LOSS
$2.19 LOSS per parcel	$17.64 gain per parcel	$36.17 LOSS per parcel	$19.12 LOSS per parcel	$53.16 LOSS per parcel	$37.50 LOSS per parcel
100 Properties					
100% of Savings Realized		**50% of Savings Realized**		**25% of Savings Realized**	
Twp	K-6	Twp	K-6	Twp	K-6
$4,430 LOSS	$34,230 gain	$70,265 LOSS	$37,085 LOSS	$103,182 LOSS	$72,742 LOSS
$0.44 LOSS per parcel	$3.39 gain per parcel	$6.96 LOSS per parcel	$3.67 LOSS per parcel	$10.22 LOSS per parcel	$7.20 LOSS per parcel

7. SUMMARY FINDINGS OF FIA

In addition to the net gains and losses to each budget found in the table above, the impact of those average gains and losses per parcel (remaining after the buyout) in the Township is also presented. As can be seen, if the theoretical maximum 100% of savings is realized, the Township budget will suffer a slight loss (almost breakeven) and the K-6 School District budget will receive a significant gain. But if 50% of savings are realized, both the Township and school budget will suffer substantial losses, and if only 25% of savings are realized, both budgets will suffer considerably greater losses. As will be seen in the next section, however, perhaps *all* these scenarios are too optimistic -- Township and K-12 School District officials we spoke with stated that as a practical matter it would be very difficult if not impossible to realize *any* savings to either budget if either of the two scenarios were to occur.

8. ANALYSIS VIA INTERVIEW METHOD

Township

Representatives of the research team spoke with Little Egg Township Business Administrator Mr. Garrett Loesch, to gain a more localized grasp of the short- and medium-term fiscal effects of the potential buyouts on the Township budget. The following scenario was posed to Mr. Loesch:

> One hundred contiguous residential properties on Mystic Island, east of Radio Road, along Dory, Boat, and Brig Streets, would be purchased and revert to publicly owned, vacant property. Assume all parcels would be vacated at the same time, and there would be no added cost to the budget for the demolition and cleanup. Once vacated, the owners' property tax obligations would end. The area would be returned to a natural state with no municipal services required (roads would be abandoned). As a result of the action the Township would lose about 168 permanent residents and 68 seasonal residents.

Mr. Loesch indicated that even if all the units were converted to open space, the area would still require emergency access, and bulkheads might be needed to stabilize the shoreline in the area. While provision of bulkheads is currently a homeowner responsibility, they would be turned over to the Township when the properties were purchased. Further, bulkheads last about 20 to 30 years. So if the purchased properties had older bulkheads, they would have to be replaced at considerable cost. Open marshland has few costs, but if the site were to be developed into a recreational area, the Township would bear additional costs. Building a marina would be too costly an activity for the Township to consider.

He added that a 100-property buyout would not result in any major decrease in costs. Snow-plowing costs would be reduced slightly; police patrol costs increased slightly; but all other costs would be largely unaffected. On the other hand, tax revenues would decrease by $100,000 to $200,000, and that shortfall would have to be covered by remaining Township residents. It should be noted that many of the units under consideration have already been elevated and replaced (using RREM and FEMA funding), so it may not be possible or appropriate to purchase them in totality. Furthermore, most current homeowners in Mystic Island enjoy direct boat access to the Atlantic Ocean that their properties provide and, as a result of the lack of other access points, may be un-interested in buyout and relocation.

In summary, Mr. Loesch further suspected that at least in the short- and medium-term, and likely indefinitely, the Township likely would face very few decreases in actual costs, but potentially, would suffer a significant reduction in property tax revenue due to the buyout of properties in Mystic Island. He further indicated that the Township already faced the choice of eliminating municipal services or raising taxes. During budget planning in 2010, the Township laid off 11 police officers, 4 clerks, reduced the construction official to part-time, and forced furlough days for all employees. Currently, if faced with buyouts, the Township would likely raise taxes, as services currently cannot be reduced or eliminated. Buyouts also would result in the County receiving less tax revenue. The Utility would lose water and sewer revenues, and the Mystic Island fire district would experience a decrease in revenues. These budgets have long-term fixed costs such as debt service, infrastructure repairs, equipment needs, and other capital needs that are not reducible in the short term and will expire not for as much as 15 to 20 years into the future.

The typical area resident has probably not calculated into their plans the long-term effects of sea-level rise and storm impacts. It is fairly apparent that state and regional authorities have not fully incorporated such calculations into their plans (rebuilding barrier islands, bridges, and infrastructure). As such, it might be imprudent to expect the Township government to lead the way.

The School District

An interview was also conducted with K-6 School District Business Administrator Ms. Jann Cohen. She indicated that a loss of 27 K-12 students [the 100-property proposal] would not result in a budget reduction or reduced state-aid, although there might be some reductions in the smaller school aid programs. Taxes would need to be increased, albeit not by much, to cover the shortfall of a 100-property buyout. The school system has already reduced staff via attrition over the last two years, as enrollment in the District has declined from 1,752 two years ago to 1,623 last April. (Note: This is a much larger decline, due in large part to families departing the area after Sandy, than the buyout scenario would cause.) The School Board, like all school boards in New Jersey, is constrained by a 2% state-mandated cap on annual *revenue* increases, although they are permitted to increase budgets (and revenues) over the cap for certain costs, such as unforeseen health care cost increases. But if the district lost 135 K-12 students [the 500-property proposal], some educators would likely have to be laid off.

As with the case of the Township, the budget of the K-6 schools would face short-term pressures—revenues from property taxes would decrease by a much greater amount than would costs since most of the school district's costs are essentially fixed. That is, they cannot be readily reduced to accommodate the count of students that would leave the district if buyouts took place. A saving grace for the school district's budget is that it receives significant state aid. While the formula that directs such aid would mandate aid reductions due to the decline in the count of students, the State has *de facto* declared that it will not decrease state aid to school districts that experience a sudden decline in student population, especially under emergency conditions. In this vein, the District could net more state aid per student as a result of the buyouts, at least in the short run.

9. OVERALL CONCLUSIONS

Assuming either of the proposed buyout scenarios (500 properties or 100 properties) goes forward, if/when Township officials make full commensurate cutbacks, Little Egg Harbor Township will experience a negligible loss, while the K-6 School District budget will witness a gain. This calculation was done using the "average costing" method, which assumes that the municipality and the school district will in the future be able to reduce their costs in proportion to the percentage of residents and schoolchildren that the Township will lose. The reality is that the Township and School District are likely to be unable to reduce costs in direct proportion to population loss, and if the Township and School District are only able to reduce costs by half of the potential savings, both budgets will experience substantial losses. Talks with Township and K-6 School District officials found that in practice it would be very difficult to cut costs. In fact, the Township recently conducted a round of layoffs and cost slashes. In light of this, the buyouts would likely force an increase in township and local school taxes. Township officials further note that the public is unexcited by the buyout proposals. After all, a defining amenity on Mystic

Island and, indeed, of greater Little Egg Harbor Township is owning a home on a channel upon which you can steer your boat directly to the sea.

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Addendum:

THE ALTERNATIVE TO PROPERTY BUYOUTS

Prepared by Mathew Brener, PE; BRS, Inc. for New Jersey Future

Little Egg Harbor Township's *Floodplain Management Plan* identifies *Property Protection* as a set of measures that may mitigate impacts to the community from the increased risk of catastrophic flooding due to the combined effects of sea level rise, coastal erosion and climate change. One of these Property Protection measures is *property acquisition* or "buyouts" by the Township to add to the municipality's protected open space inventory in the floodplain. Open space at the shoreline provides a buffer that protects the rest of the community. Township acquisition and demolition of residential properties in the floodplain that are subject to repetitive flood losses serve a dual purpose of adding to the protective open space buffer and moving families out of harm's way. Purchasing and demolishing clusters of homes or whole neighborhoods maximizes the benefits of the increased floodplain buffer.

The Health Impact Analysis (HIA) provides a financial breakdown of the costs and benefits to Little Egg Harbor Township associated with property buyouts. Through traditional financial impact analysis techniques, actual Township budget and tax assessment data is used to calculate the marginal net gain or loss the municipality would realize from removing existing residences. The financial impact analysis calculates the variable cost of Township-provided services (such as sanitary sewer or police and fire protection) to residential structures, and then balances costs against expected tax revenues.

Mystic Island was selected as the case study for the buyout analysis because it is one of the most vulnerable areas in the Township to flooding, storm-damage and the impacts of sea- level rise. The entire neighborhood is located within the 100-year floodplain, and it has the highest concentration of repetitive loss properties in Little Egg Harbor. Most of the businesses within the Township that have the potential to be affected by flooding events are small retail establishments and marinas located in Mystic Island. This was the area of the Township hit hardest by Superstorm Sandy; the storm substantially damaged a large percentage of the neighborhood's homes (i.e. the total costs of restoring the structure was at least half of its market value). In addition, Superstorm Sandy silted in many of Mystic Island's lagoons and the resulting decreased water depth has significantly limited boat access from homes along these waterways. Coastal erosion and the degradation of Mystic Island's coastal marshes also increased the vulnerability of near-shore structures to damage from storms and flooding events; the Township is susceptible to erosion along the Great Bay and Little Egg Harbor, as well as those areas along the tidal lagoon system which are not stabilized.

In view of the factors outlined above, Mystic Island is the area of the Township most likely to experience economic benefits from a focused buyout program. However, the financial analysis projects only modest savings to the Township under the most conservative assumptions. Further, these are marginal or incremental savings per residence and any savings the Township might realize from a decrease in services would accumulate slowly, and would depend largely on the number and location of the properties purchased.

Buyout Alternative

Buyouts represent a strategic retreat from the shoreline. However, the future for Little Egg Harbor is not retreat from the shore, but a managed plan to protect the shoreline from sea level rise and increased vulnerability to storm surge. All federally-funded buyout programs are strictly voluntary and depend on the full cooperation of the property owners and the leadership of local officials. Because residents of coastal areas tend to have strong commitments to living at the shore it is likely that the community would be resistant to buyout proposals.

However, although not quantified in this analysis because of their varying nature, there are cost consequences, in addition to the continued provision of services, associated with maintaining and protecting the long-term economic viability of Mystic Island. These costs should be factored into the Township's considered assessment of whether or not it should pursue property buyouts as a flood plain management strategy. These cost factors are described below:

Marsh protection: Marshland stabilization and shoreline reinforcement will be essential to protect property and mitigate the combined effects of sea level rise, coastal erosion, flooding, and storm damage. If such measures are not taken, the accumulated real costs to property owners of inhabiting a vulnerable zone may ultimately result in declining property values in Mystic Island and adversely affect the Township's tax base in a manner similar to property buyouts. Further, if property owners can no longer pay their taxes or decide to abandon their property prior to making necessary repairs due to repeated flooding events, the Township could incur additional costs associated with management of such properties.

The potential vulnerabilities of Little Egg Harbor's shore communities to future coastal erosion and sea level rise have been well-documented in the recent reports completed for the Township. According to the *Floodplain Management Plan*[1], during a Category 1 storm event storm surge would inundate most of the marsh areas on the coats of the Township with up to six feet of storm surge, while Mystic Island and other neighborhoods in that area could experience storm surge up to 3 feet in depth. During a Category 2 storm event, storm surge would further inundate the Township, with surge levels reaching above 9 feet in many of the Bayfront marsh areas. A Category 3 storm event would produce storm surge greater than 9 feet along all of the Township's shoreline, with inundation reaching Route 9 in the northern portion of Little Egg Harbor.[2] Storm surge would be increase as sea levels rise. With a one foot increase in sea levels, much of the marshland along the Bayfront would be affected. However, with the exception of a small area in the southern portion of the Township that would revert to open water, much of the tidal marsh would continue to protect the Bayfront. With two feet of sea level rise, water will further encroach on the land area of Little Egg Harbor along the Bayfront and in the marshes.

Increasing flooding impacts: As sea levels rise and marshes retreat, it's likely that Little Egg Harbor Township will become more vulnerable to flooding impacts. By 2050 a considerable portion of the protective marsh areas that currently buffer vast extents of Little Egg Harbor Township's coastal areas will be inundated and will not provide protection for more inland developed areas such as Mystic Island.

[1] http://ecode360.com/30116995

[2] Average wind speed for a *Category 1* hurricane is 74-95 mph, which typically produces minimal damage. For a *Category 2* hurricane, winds are from 96- 110 mph. Superstorm Sandy was a Category 2 hurricane when it impacted the New Jersey shore communities. A *Category 3* hurricane is considered to be a major hurricane with winds from 111-130 mph.

The 2015 *Vulnerability and Exposure Analysi*s prepared for the Township by New Jersey Future anticipates sea level rise of 1.48 feet by 2050[3], which would result in approximately 700 residential lots within the flood hazard area becoming permanently inundated. A 1-percent annual flood in 2050, coupled with anticipated sea level rise, would result in the inundation of approximately 4,000 residential lots, including all of Mystic and Osborne Islands.

Coastline hardening/shoreline stabilization: The Township's *Floodplain Management Plan* and *Strategic Recovery Plan*[4]*,* following the lead of the *Ocean County Hazard Mitigation Plan,* identify several important strategies that will be necessary to the long-term protection of the coastal communities of the Township. Without a program to acquire and demolish structures in Mystic Island, considerable funding will be needed to protect the neighborhood's residences and commercial structures in the event of future storms and flooding. Many of the actions contemplated in the reports have community-wide impacts and their implementation costs would not necessarily be affected by the inclusion or exclusion of 500 homes in Mystic Island. These projects include: public information and outreach; improvements to the Township's emergency management systems; GIS mapping capabilities; and amending zoning to increase permit review efficiency. However, there are property protection actions and structural projects that will require incremental but significant implementation investments to maintain the long-term economic viability of Mystic Island such as:

- Installation of bay-front energy dissipation structures to prevent coastal erosion and help to reduce undermining of bulkheads.
- Installation of riprap along the shoreline to reduce marsh degradation.
- Repair to the Iowa Court seawall.
- Repair/replenish eroded beach and dock at Dock Street/Parkertown Dock.
- Maintain and repair Township bulkheads.
- Remedial dredging of lagoon inlets and channels.
- Maintain, repair, and clean the Township drainage system including required storm drainage inspections and improvements in Mystic Island and Great Bay Blvd.
- Restoration of marsh areas and thin layer to raise marsh elevations; shoreline stabilization

Post-storm cleanup costs: The Township also experiences costs for clean up after storms. Although at the present time the municipal expenditures have been relatively manageable, as storm and flooding frequency increases with rising sea levels over time, cleanup costs in Mystic Island, as well as other developed areas along the Township's shoreline, will become a progressively significant financial burden. Furthermore, although not a factor for the municipal budget, private costs associated with post-storm cleanup and protecting individual property owners is considerable. In Little Egg Harbor Township estimates for elevating homes above base flood elevation following Hurricane Sandy ranged from $32,000 to over $100,000 depending on unit size. This does not include the myriad considerable costs to clear debris and restore or rebuild damaged structures. And the increasingly regular incidence of

[3] Source: "*A Geological Perspective On Sea-Level Rise and Its Impacts Along the U.S. Mid-Atlantic Coast*", K. G. Miller, R.E. Kopp, B.P. Horton, J.V. Browning, A. C. Kemp, AGU Publications, Department of Earth and Planetary Sciences, Rutgers University, 5 Dec. 2013

[4] http://www.leht.com/admin/data/img/uploads/LEHT_strategic_recovery_planning_report_05-22-2014.pdf

nuisance flooding suggests that residents throughout the community will continue to incur these costs. Over time, these conditions are likely to adversely affect the market value of the homes and businesses that occupy these shore-line locations.

Appendix E:
Health and Safety Roundtable - Questions and Summary Notes

Mystic Island Voluntary Buyout Health Impact Assessment

Health and Safety Roundtable Questions

To get to know each other a little, let's go around the room and share with each other this basic information.

a. Your first name or nickname?

b. In what part of LEH do you live? (Lagooned? Waterfront?)

c. How long have you lived here?

d. How many of you lived in LEH during Hurricane Sandy?

e. What were some of your personal experiences during and after Hurricane Sandy?

- Did you evacuate?
- Were you without power?
- Was your home or apartment damaged? How was it damaged?
- Is it repaired now, or have there been any lasting effects of the damage to your home?
- What other impacts did you experience? (injury, etc.)

GENERAL PHYSICAL AND MENTAL HEALTH

1. ***How would you <u>generally</u> assess the current physical health and health behaviors of Mystic Island residents? (***physical health conditions like chronic diseases and behaviors like smoking, drinking)
    a. How has general physical health changed since Sandy? Short and long term?
    b. Are there vulnerable populations that are disproportionately less healthy or disproportionately impacted?

2. ***How would you <u>generally</u> assess the current mental and emotional health of Mystic Island residents?*** (stress, anxiety, PTSD, drug addictions, sleeping problems)
    a. How has the mental and emotional health changed since Sandy? Short and long term?
    b. Are there vulnerable populations that are disproportionately affected?

GENERAL SOCIAL AND COMMUNITY HEALTH

1. How strong is the social fabric in Mystic Island?

a. Sense of community – strength of social organizations and neighborhoods
b. Identity with "place"
c. Has the strength of the community changed since Sandy?

2. How would Mystic Island residents rate quality of life factors?

a. Satisfaction with neighborhood (noise, smells, amenities)
b. Safety of neighborhood (traffic, construction/demolition, crime)
c. Access to goods and services

d. How are these quality of life and social factors affected by routine and storm flood events?

EXPERIENCES WITH CHRONIC FLOODING

1. How often do you witness "nuisance" flooding? (either high tide or Nor'easter)

2. How often are you personally impacted by flooding?

a. Would you say you have become accustomed to the flooding?

b. What adjustments do you make when you expect flooding to occur?

c. Have these adjustments or your degree of fear and dread changed since Sandy?

3. Do any of you regularly evacuate when you expect flooding?

a. Where do you go?

b. How long do you stay?

4. Do you have a car/truck or other vehicle?

a. Do you have to move your vehicle because of chronic flooding?

b. How would you describe the impacts of having to do this?

IMPACTS OF CHRONIC FLOODING ON HOUSE/HOME

1. Has your home/apartment ever been impacted by nuisance flooding?

a. What type of impacts do you experience? (Standing water? Plumbing backups?)

b. About how often?

c. Do you have renters/homeowners insurance and flood insurance?

d. Did/does insurance cover the damage?

2. What do you do to limit damage from chronic flooding?

3. Are you responsible for or have you ever had to clean up after being flooded?

a. Did you take precautions to protect your health when cleaning up?

b. What kind of precautions do you take?

c. Do you think you have the information you need to clean up safely?

IMPACTS OF CHRONIC FLOODING ON WORK/WAGES

1. Have you missed work because of nuisance flooding?

a. About how often?

b. Why did you miss work?

i. Physically sick or injured

ii. Stress/anxiety

iii. Had to clean-up damage

iv. Could not get to work because I lacked transportation

v. Place of work was closed due to flooding or the threat of flooding

IMPACTS OF FLOODING ON HEALTH/WELL-BEING

1. Other than what we've talked about already, tell us how you think <u>either</u> Sandy-related or nuisance flooding impact your health?

a. Is it difficult to get prescriptions and or other needed medical care after flooding events?

b. Is it difficult to access healthy food options during and after flooding events?

c. Do you regularly have any restrictions on the use of drinking water?

d. Does flooding create a mold problem in your house?

e. Are abandoned homes a health issue in your neighborhood? How? (rodents, crime, mold)

f. Are your toilets/bathroom facilities functioning during and after flooding events?

g. When you anticipate or experience flooding, would you say you smoke more?

h. When you anticipate or experience flooding, do you consume more alcohol?

i. Does flooding cause you or your family to be stressed, depressed or anxious?

j. Have you or a family member ever sought counseling or other services to help you cope with flooding?

2. Do you actively participate in water-based recreational activities in and around LEH?

a. What kind of activities?

b. Does flooding impact these activities?

c. Do you ever recall any warning about the safety of water quality in the Bay or lagoons during or after flooding events?

OPINIONS ABOUT POTENTIAL EFFECTS OF BUYOUT PROGRAM

1. ***How do you think a buyout of anywhere from 100 to 500 properties in Mystic Island would affect physical, mental, social and economic health for residents? What is your reaction?***
    a. Financial impacts?
    b. Mental health?
    c. How will a buyout affect LEH and Mystic Island social fabric?
    d. What if most residents stayed in LEH?

2. ***How could the bought-out land be used to best provide local benefits?***
    a. Is there a need for additional local recreation and public access?
    b. Preferences for use of new open land? Would you use it for walking/biking trails? Public access to the bay? Floating docks?
    c. What benefits could it provide?

HEALTH IMPACT ASSESSMENT PROJECT

Little Egg Harbor Township

3.23.15 Health and Safety Roundtable Meeting Summary

Attendees:

Jeanne Ellis ..... Zonta Club of Southern Ocean County, Jeannine@hotmail.com, 609-760-4120
Diane Lipton..... Zonta Club of Southern Ocean County, dllopiton@comcast.net, 609-296-3198
Harry Disbrow ..... Bayshore Agency Realtor, hd@bayshorerealty.com, 609-296-7111
Jason Worth..... T and M Associates, jworth@tandmassociates.com, 908-601-0661
Mark Ellis..... LEHT, Zoning CFM, ellis@leht.com, 609-296-7241
Sandra Johnson..... LEH Board of Health, sandij49@msn.com, 609-296-9058
John Kehm..... LEH Committee, kehmfam2@comcast.net, 609-214-1238
Ed Sink..... LEH resident, ecsink@comcast.net, 609-296-9221
Mike Fromosky ..... LEH Asst. Administrator, fromo@comcast.net, 609-290-5062
Ollie Clifford ..... LEH Township, Clifford@leht.com, 609-294-9071
Penny Hughes.....Tuckerton Food Pantry

Staff:

Karen Lowrie ..... Rutgers NJHIC, klowrie@rutgers.edu, 848-932-2708
David Kutner..... NJ Future, dkutner@njfuture.org,
Megan Callus..... NJ Future, mcallus@njfuture.org, 203-313-1924
Aram Jaffery ..... Rutgers student, aj466@scarletmail.rutgers.edu, 718-219-8275

Meeting Purpose:

To obtain qualitative input from local stakeholders representing health and safety interests and organizations to inform both the baseline health assessment and the health impact projections of the Mystic Island Voluntary Buyout HIA.

Attendees

Introduced themselves, identified home location and summarized their Sandy experience:

- Jeanne Ellis- Mystic Shores, worked with Sandy victims through Zonta Club. Jeanne felt that many people in the shelters during Sandy shouldn't have been there. There should have been more shelters with accommodations for people of special needs.

- Diane Lypton- 3' of water in home, house damaged by not totaled, had to decide what to throw away, Zonta – women helping women
- Harry Disbrow- local realtor, helped many Sandy victims
- Jason Worth- evaluated Sandy damage
- Mark Ellis- zoning officer
- Sandra Johnson- lived in Little Egg for 43 years, half the time lived in Jefferson Lake, after storm volunteered for CERT (Community Emergency Response Team
- John Kehm- Township Council, active volunteer
- Ed Sink- assisted people to clean out houses, cooked meals for volunteers with Operation Blessings
- Mike Fromosky- Township's go to person for recovery programs
- Ollie Clifford- acting construction official, lives on lagoon, 32" of water in home, evacuated through 1-2 feet of water when ordered and returned to do whatever was needed, electrical inspector at the time, Township resident for 23 years.
- Penny Hughes

Organizations involved post-Sandy

- Sandy Community Emergency Response Team
- Operation Blessing
- Samaritan's Purse
- Masonic Temple
- Lighthouse Alliance Church
- Red Cross (note: many participants expressed negative comments about Red Cross)

GENERAL PHYSICAL AND MENTAL HEALTH

- General note: Facilitators asked about "general" and baseline health, but participants quickly took the question directly to Sandy. It is THE health issue for Mystic Island, and the feeling is that before Sandy, everything was very normal.
- Food pantry experienced 66% increase in demand since last year, 35 - 40 new families per month. Increase can be attributed to Sandy as well as Atlantic City job losses.
- Residents are still consumed with Hurricane Sandy and fearful. Significant time and energy is spent discussing the storm.
- The storm had MAJOR impact on mental health.
- Concerns about the mental health of **children** – They may not be receiving adequate counseling, had "Open Healing"
  - Children tend to be resilient, if they are stressed it tends to be reflect parents' behaviors
  - It was expressed that if parents are coping, the children will follow suit
  - Children more likely to suffer stress if Post-Sandy issues are ongoing.
  - Many children did not return to Pre-K programs after storm
  - Suggestion made to reach out to Susan Railman who's worked with children in the school system.
- Flooding now triggers a more traumatic psychological response. Before it was just a nuisance and tolerated, now it is associated with the trauma of hurricane Sandy. Before storm, residents didn't pay attention to weather forecasts, now all reports of possible storms cause concern. Irene was a "cry wolf" problem because, despite dire forecasts, it didn't cause problems.

Quality Of Life – Post Sandy

- Less traffic due to less people remaining in town and fewer vacationers.
- Drop is church attendance believed to correlate with residents leaving.
- Road conditions are a big problem but the Township can't afford to fix them until the pipes underneath can be repaired.
- There is sometimes floating debris in times of minor flooding.
- Houses that are currently abandoned tend to be the ones that caused major community problems in the past.
- Abandoned homes – major resident complaint
  - Odor Issues
  - Property Value concerns
  - Appearance of abandoned homes is distressing
  - Mold Risks
  - Lack of lights in houses at night makes neighborhood darker.
  - Participants noted that there is <u>not</u> a squatting or other crime problem in the abandoned homes.
- Poor road conditions due to heavy construction equipment fixing homes.
- Drop is church attendance believed to correlate with residents leaving.
- Road conditions are a big problem but the Township can't afford to fix them until the pipes underneath can be repaired.
- Local businesses have been affected by fewer people around town and fewer vacationers.
- Issues are compounded by financial downturn and problems in Atlantic City – LEH jobs have been lost, and also many people from Atlantic City regularly call Township services for assistance
- Gas and electric company tell people to call churches for assistance but they typically have limited resources.

Social Fabric

- People generally aren't as "rooted" as they used to be.
- Mystic Island used to have lots of renters but they are leaving the area.
- Hurricane Sandy brought community together. Closer relationships with neighbors from shared experience of Sandy and volunteering together. These relationships still existing.
- There has been more real estate activity in past year or so. Real estate agents find themselves serving as de facto counselors, listening to people's Sandy woes.

Equity Issues

Seniors

Seniors are considered most vulnerable populations and disproportionately affected by Sandy

- Stress causing long-term affect like rise in blood pressure.
- Life savings are in their homes and they cant recoup the costs
- Many want to elevate their homes but physical limitations prevent their ability to get into raised homes. Elevators are not a cost-effective or practical solution.
- Because they no longer have mortgages, they often don't purchase flood insurance and have little personal money to fix damages.

- Many still live in flooded homes – potentially getting sick from living in moldy homes (no real data on this).
- Live on fixed income
- Suffer stress from sense of "not being in control"
  - Income limitations limit options – often unable to elevate or move
  - Sentimental losses
- Increased strain form supporting children's whose homes were flooded
  Seen negative changes in cognitive ability (could be due to stress from storm)

- Debate for older people who live on fixed income – fix, move or live in house the way it is
- Medical facilities that are used are Atlantic County and Southern Ocean hospitals.

Medically Challenged

Hurricane Sandy demonstrated that the current shelter is not suitable for those with significant medical conditions.

Low Income Residents

Lower income residents (renters) and seniors are the populations who are leaving, they often can't afford to elevate homes.

Flooding Exposure And Perspective:

Past Flooding Exposure

Storm of 1962 caused significant damage

Current Flooding Exposure

Roadways flood twice a month on new and full moons. Although residents need to move cars from floodways during these events, they know the tide schedule, work around it and don't feel burdened by it.

- The consensus was that there would always be people who want to live by the water and would be willing to accept the conditions. It's part of the territory if you're "willing to live on an island."
- People will likely grow accustomed to the increase in flooding if it's gradual
- People may now view chronic flooding differently, minor flooding is more traumatic after Sandy.
- Don't' know if there would be a "tipping point" at which residents would leave due to repeated minor flooding. It can get tiresome, especially for older people.
- Flooding is more likely toward the north end of Mystic Island because elevation is slightly lower there.

- The term "Nor 'easter" is scary. (A scarier term than even "hurricane.")

Hurricane Sandy Flooding

Normal flooding is "dealt with." But "Sandy was different." It was the first time that pollutants – not just sea and rainwater - entered homes.

- Pump stations shut down
- Oil mixed with the water.
- Debris was floating around.
- Shut down shell fisheries for several months
- One resident, Rob Cisco (?) suffered from a life threatening condition after handling wet debris

Residents still see large impact flooding as a rare event.

Buy-Out Program

- Target area: Both sides of Radio Road, along Dory, Grigg and Boat Rds. The lagoon is shallower there, so doesn't hold as much water.
- LEH: 866 people were selected for buy-outs
- 8 of those were interested, 11 applied for blue-acres funding
- Resident Perspective on Buy-out program
  - People won't do it unless they get a good deal.
  - Homeowners have a greater opportunity to get more money, a better price, for their home from a private buyer than the government.
  - Agreement that "some areas should have never been built in the first place."
  - Since you can't buy them all, participants felt that the gain to resilience is not worth the effort.
  - There are not enough homes that can be purchased to make a difference.
  - Buy-outs are intended for large parcels of land, like the beach.
  - Concern that the open space from the buy-outs would not benefit the residents, although there was agreement that some passive recreation could work there, and that the town would benefit from another park. It could also bring people into the township.
  - Some residents felt that consensus would never be reached on whether buy-outs would be beneficial or harmful for the town.
  - Township could benefit from a concentrated acquisition but it would be cost-prohibitive

Appendix F:
Interviewee List

NEW JERSEY FUTURE

RUTGERS
Edward J. Bloustein School of Planning and Public Policy

HEALTH IMPACT ASSESSMENT PROJECT

Little Egg Harbor Township

INFORMANT INTERVIEWS

Name	Affiliation
Jann Cohen	Little Egg Harbor Township School Business Administrator
Garrett Loech	Little Egg Harbor Township Business Administrator
Liz McDevitt	A Future With Hope (AFWH)
Brunilda Price, Coordinator	Coordinator, Community Health Services, Ocean County Health Department
Norb Psudy	Geomorphologist, Director, Sandy Hook Cooperative Research Programs of the Institute of Marine and Coastal Sciences
Bobbie Ridgeley	Executive Director , A Future With Hope
Leslie D. Terjesen	Public Information Officer, Ocean County Health Department
Julie Weiner-Swarez	Mystic Island resident

Appendix G:
Mystic Island Community Health and Resilience Survey

RUTGERS
Edward J. Bloustein School of Planning and Public Policy

NEW JERSEY FUTURE

INFORMED CONSENT

Mystic Island Community Health and Resilience Survey

You are invited to participate in a research study that is being conducted by the New Jersey Health Impact Collaborative at Rutgers University's Bloustein School. The purpose of this research is to determine how decisions that are made to improve the resilience of your community to future flooding will impact public health.

This survey research is anonymous. Anonymous means that there will be no recorded information about you that could identify you. There will be no linkage between your identity and your response in the research. If you agree to take part in the study, you will be assigned a random code number that will be used on each survey. There will be no way to link your responses back to you. Therefore, data collection is anonymous.

The research team and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All study data will be kept for three years.

There are no foreseeable risks to participation in this study. In addition, you may receive no direct benefit from taking part in this study.

Participation in this study is voluntary. You may choose not to participate, and you may withdraw at any time during the survey procedures without any penalty to you. In addition, you may choose not to answer any questions with which you are not comfortable.

If you have any questions about the study or study procedures, you may contact Jeanne Herb (contact info below. If you have any questions about your rights as a research subject, please contact an IRB Administrator at the Rutgers University, Arts and Sciences IRB:

Jeanne Herb

33 Livingston Ave

New Brunswick, NJ 08901

phone: 848-732-2725

email: jherb@ejb.rutgers.edu

Arts and Sciences IRB

Rutgers, The State University of New Jersey Office of Research Regulatory Affairs

335 George Street

Liberty Plaza /Suite 3200

If you are 18 years of age or older, understand the statements above, and will agree to participate in the study, check "Yes," If not, please check "No".

- ❍ Yes
- ❍ No

TELL US ABOUT YOUR HOME AND COMMUNITY

1. Do you live either all or part of the year in Little Egg Harbor or Tuckerton, NJ?

- ❍ Yes
- ❍ No

2. In which part do you live?

- ❍ Mystic Island – lagooned
- ❍ Mystic Island – upland (not lagooned)
- ❍ Osborne Island
- ❍ Other part of Little Egg Harbor
- ❍ Tuckerton

3. Please answer the following about where you live in Little Egg Harbor/Tuckerton:

- ❍ I own the residence and live there all year (primary).
- ❍ I own the residence and live there part of the year (seasonal).
- ❍ I rent the residence and live there all year.
- ❍ I rent the residence and live there part of the year (seasonal).
- ❍ Other _____ _____

4. Does the property where you live border the bay or wetlands (marsh)? (If you look out your front or back door and there is no other built property between yours and the bay, then you border the bay or marsh).

- ❍ Yes
- ❍ No
- ❍ Not Sure

5. For how long have you lived in this residence (for at least part of the year)?

- ❍ Less than 2 years
- ❍ 2-5 years
- ❍ 6-10 years
- ❍ 11 – 20 years
- ❍ More than 20 years

6. Is your residence currently:

- ❍ On slab or block
- ❍ On pilings
- ❍ Not sure
- ❍ Other_____

7. If on slab or block, do you have plans to elevate?

- ❍ Yes, in the coming year
- ❍ Yes, in 1-2 years
- ❍ Not sure
- ❍ No
- ❍ Other:_____

8. If on pilings, did you elevate BEFORE Hurricane Sandy?

- ❍ Yes
- ❍ No
- ❍ Not sure

9. Please list any concerns about your home being elevated:

_____

_____

10. Please rate your level of agreement with the following statements about the <u>current state (in 2015) of your neighborhood</u> in Little Egg Harbor:

	Strongly Agree	Agree	Not sure/ No opinion	Disagree	Strongly Disagree
I know my next-door neighbors well.	❍	❍	❍	❍	❍
I know the other residents on my street well.	❍	❍	❍	❍	❍
There are strong social ties between people in my neighborhood.	❍	❍	❍	❍	❍
I socialize with my neighbors.	❍	❍	❍	❍	❍
I am concerned about traffic safety.	❍	❍	❍	❍	❍
I am concerned about safety of construction activities.	❍	❍	❍	❍	❍
There is a crime problem in my neighborhood.	❍	❍	❍	❍	❍
There is often too much noise.	❍	❍	❍	❍	❍
There are often bad smells.	❍	❍	❍	❍	❍
I have adequate access to healthy foods/groceries.	❍	❍	❍	❍	❍
I have adequate access to healthcare.	❍	❍	❍	❍	❍
I have adequate access to recreational facilities.	❍	❍	❍	❍	❍

11. If you lived in your current home prior to Hurricane Sandy, please rate your level of agreement with the following statements about your neighborhood <u>in the few years PRIOR to Hurricane Sandy</u>:

	Strongly Agree	Agree	Not Sure/ No Opinion	Disagree	Strongly Disagree	N/A
I knew my next-door neighbors well.	❍	❍	❍	❍	❍	❍
I knew the other residents on my street well.	❍	❍	❍	❍	❍	❍
There were strong social ties between people in my neighborhood.	❍	❍	❍	❍	❍	❍
I socialized with my neighbors.	❍	❍	❍	❍	❍	❍
I was concerned about traffic safety.	❍	❍	❍	❍	❍	❍
I was concerned about safety of construction activities.	❍	❍	❍	❍	❍	❍
There was a crime problem in my neighborhood.	❍	❍	❍	❍	❍	❍
There was often too much noise.	❍	❍	❍	❍	❍	❍
There were often bad smells.	❍	❍	❍	❍	❍	❍
I had adequate access to healthy foods/groceries.	❍	❍	❍	❍	❍	❍
I had adequate access to healthcare.	❍	❍	❍	❍	❍	❍
I had adequate access to recreational	❍	❍	❍	❍	❍	❍

facilities.						

12. For you, how important are each of the following to you about living in Little Egg Harbor or Tuckerton:

	Very Important	Somewhat Important	Not at all important	Not Sure/ No Opinion
Social connections	❍	❍	❍	❍
Location near the water	❍	❍	❍	❍
Family history	❍	❍	❍	❍
Affordability	❍	❍	❍	❍
Amenities (parks, culture)	❍	❍	❍	❍
It's where I want to be.	❍	❍	❍	❍
Other	❍	❍	❍	❍

TELL US YOUR EXPERIENCES WITH NUISANCE FLOODING

Think about NUISANCE flooding that occurs in your community. In this section we are NOT talking about big storms like Hurricane Sandy that had a storm surge from the ocean that caused massive flooding. When answering questions in this section, we want you to think about the problems and impacts you experience from regular flooding that occurs during full and new moons or minor rain storms.

13. About how often does NUISANCE flooding occur in your neighborhood?

- ❍ More than once a month
- ❍ About once a month
- ❍ About 5-10 times per year
- ❍ Between 2- 5 times per year
- ❍ About once a year
- ❍ Fewer than once a year

14. If your home is damaged by nuisance flooding, does insurance normally cover the cost of making repairs and/or replacing household items?

- ❍ Insurance covers all costs.
- ❍ Insurance covers some costs.
- ❍ Insurance does not typically cover the costs.
- ❍ I don't have insurance.
- ❍ My home is never damaged by nuisance flooding.
- ❍ Don't know / not sure
- ❍ Other_____

15. During nuisance flooding, which of the following do you normally experience, and how severe is the impact?

	Severe Impact	Moderate Impact	Very little or No impact	Not sure/ No opinion
Flooding-related Injuries	❍	❍	❍	❍
Feelings of isolation	❍	❍	❍	❍
Flooded streets affecting my ability to drive	❍	❍	❍	❍
Damage to my residence	❍	❍	❍	❍
Limited access of emergency vehicles	❍	❍	❍	❍
Storm sewer backups	❍	❍	❍	❍
Floating debris	❍	❍	❍	❍
Toxics – Water Contamination	❍	❍	❍	❍
Mold growth in home	❍	❍	❍	❍
Elevated stress levels in myself or my family	❍	❍	❍	❍
Impact on my property value	❍	❍	❍	❍
Effect on local businesses	❍	❍	❍	❍
Loss of electricity	❍	❍	❍	❍
Other_____	❍	❍	❍	❍

16. What other concerns do you have about nuisance or routine flooding in your community?

_____

_____

TELL US YOUR EXPERIENCES WITH STORM FLOODING

Now think now about STORM flooding that occurs from nor'easters, tropical storms, and hurricanes. In the next question, we are NOT asking about Hurricane Sandy, but about other severe storms.

17. During and in the immediate months after STORM events, which of the following do you normally experience, and how severe is the impact?

	Severe Impact	Moderate Impact	Very Little or No impact	Not Sure/ No Opinion
Storm-related Injuries	❍	❍	❍	❍
Feelings of Isolation	❍	❍	❍	❍
Flooded streets affecting my ability to drive	❍	❍	❍	❍
Damage to my residence	❍	❍	❍	❍
Concern about my ability to fix my home	❍	❍	❍	❍
Limited access of emergency vehicles	❍	❍	❍	❍
Cleanup of trash and debris	❍	❍	❍	❍
Storm Sewer backups	❍	❍	❍	❍
Mold growth in home	❍	❍	❍	❍
Toxics - Water Contamination	❍	❍	❍	❍
Floating debris	❍	❍	❍	❍
Elevated stress levels	❍	❍	❍	❍
Loss of electricity	❍	❍	❍	❍
Impact on my property value	❍	❍	❍	❍
Effect on local businesses	❍	❍	❍	❍
Increased crime in neighborhood	❍	❍	❍	❍
Increased smoking	❍	❍	❍	❍

Increased drinking alcohol	❍	❍	❍	❍
Poorer eating habits	❍	❍	❍	❍
More sleeplessness	❍	❍	❍	❍
Increased drug use	❍	❍	❍	❍
Other	❍	❍	❍	❍

18. Were you living in your residence in Little Egg Harbor during Hurricane Sandy (October 2012)?

❍ Yes
❍ No

19. Did you evacuate your residence?

❍ Yes, before Sandy hit
❍ Yes, during Sandy
❍ Yes, after Sandy
❍ No

20. If yes, for how long?

❍ Less than one week
❍ Between on week and one month
❍ 1-3 months
❍ 3-6 months
❍ 6 months – 1 year
❍ More than one year
❍ Still not returned

21. Where did you go?

❍ Went to stay with a friend or family member in Little Egg Harbor or Tuckerton
❍ Went to stay with a friend or family member outside of Little Egg Harbor or Tuckerton
❍ Went to an emergency shelter in Little Egg Harbor or Tuckerton
❍ Went to an emergency shelter outside of Little Egg Harbor or Tuckerton
❍ Stayed in a hotel/motel
❍ Other _____

22. Now thinking about Hurricane Sandy in particular, which of the following did you and/or someone in your household experience in the immediate weeks following of the storm and up to six months later and how severe was the impact?

	Severe Impact	Moderate Impact	Very little or no impact	Not sure/ No opinion
Storm-related Injuries	❍	❍	❍	❍
Feelings of Isolation	❍	❍	❍	❍
Flooded streets affecting my ability to drive	❍	❍	❍	❍
Damage to my residence	❍	❍	❍	❍
Concern about my ability to fix my home	❍	❍	❍	❍
Limited Access of emergency vehicles	❍	❍	❍	❍
Cleanup of trash and debris	❍	❍	❍	❍
Storm Sewer backups	❍	❍	❍	❍
Mold growth in home	❍	❍	❍	❍
Floating debris	❍	❍	❍	❍
Elevated stress levels in myself or my family	❍	❍	❍	❍
Loss of electricity	❍	❍	❍	❍
Impact on my property value	❍	❍	❍	❍
Effect on local businesses	❍	❍	❍	❍
Increased crime in neighborhood	❍	❍	❍	❍
Increased smoking	❍	❍	❍	❍
Increased drinking alcohol	❍	❍	❍	❍
Poorer eating habits	❍	❍	❍	❍

More sleeplessness	❍	❍	❍	❍
Increased drug use	❍	❍	❍	❍
Other_____	❍	❍	❍	❍

23. Which of the following have you experienced in the PAST TWO YEARS SINCE the immediate six months following Sandy, and how severe was the impact?

	Severe impact	Moderate Impact	Very little or no impact	Not sure/ No opinion
Feelings of isolation	❍	❍	❍	❍
Concern about my ability to fix my home	❍	❍	❍	❍
Cleanup of trash and debris	❍	❍	❍	❍
Mold growth in home	❍	❍	❍	❍
Increased crime in neighborhood	❍	❍	❍	❍
Elevated stress levels in myself or my family	❍	❍	❍	❍
Impact on my property value	❍	❍	❍	❍
Effect on local businesses	❍	❍	❍	❍
Increased smoking	❍	❍	❍	❍
Increased drinking alcohol	❍	❍	❍	❍
Poorer eating habits	❍	❍	❍	❍
More sleeplessness	❍	❍	❍	❍
Increased drug use	❍	❍	❍	❍
Other_____	❍	❍	❍	❍

24. Since Hurricane Sandy, how much MORE do you fear rising waters and flooding compared to before the storm occurred?

- ❍ A great deal
- ❍ Somewhat
- ❍ Not much
- ❍ Not at all

25. If your property was damaged, did/does insurance or government recovery programs cover the cost of making repairs and/or replacing household/personal items?

- ❍ Insurance/programs covered all costs.
- ❍ Insurance/programs covered some of the costs.
- ❍ Insurance/programs did not cover any of the costs.
- ❍ Don't know / Not sure

26. Have you or a family member sought counseling or other mental health services to help you cope with Sandy recovery?

- ❍ Yes
- ❍ No
- ❍ Don't know / Not Sure

27. What other concerns do you have about storm or hurricane flooding in your community and how it affects or has affected your health?

_____

_____

TELL US YOUR OPINIONS ABOUT RESILIENCE OPTIONS

One option to improve the resilience of the community to future flooding (reduce future storm damage) is for some Mystic Island residents to sell their homes in a voluntary buyout program. If this occurs in a concentrated area, it could create new open space along the bayfront.

28. If you own your residence and were to receive fair compensation for your home, how interested would you be in selling as part of a buyout program?

- ❍ Very interested
- ❍ Somewhat interested
- ❍ Not interested
- ❍ Don't own home
- ❍ Not sure

29. What would make you more interested in this option?

_____

_____

30. If you own your residence and were to receive fair compensation for your home, would you likely relocate:

- ❍ to another part of Little Egg Harbor or Tuckerton
- ❍ outside of Little Egg Harbor or Tuckerton, but in Ocean County
- ❍ to another part of New Jersey
- ❍ outside the state of New Jersey
- ❍ Don't know / Not sure

31. Please rate your level of agreement with each of the following statements:

	Strongly Agree	Agree	Not Sure/ No Opinion	Disagree	Strongly Disagree
I am concerned about how a loss of homes in Mystic Island would affect neighborhood social networks.	❍	❍	❍	❍	❍
I am concerned that a loss of homes might increase my taxes.	❍	❍	❍	❍	❍
I think a loss of homes might increase my property value.	❍	❍	❍	❍	❍
I think a loss of homes might reduce future flooding impacts.	❍	❍	❍	❍	❍
I think a loss of homes might increase future flooding impacts.	❍	❍	❍	❍	❍
I think that more open space along the bayfront could be a positive asset for Mystic Island.	❍	❍	❍	❍	❍
I don't think Mystic Island needs more open space along	❍	❍	❍	❍	❍

the bayfront.					

32. What other concerns do you have about a buyout of properties?

_____

_____

33. Would you use new open space along the bayfront in Mystic Island if: (please select all that apply):

	Would be likely to USE the space	Might use the space	Would likely NOT use the space
it had a walking/biking path?	❍	❍	❍
it had water access?	❍	❍	❍
there were parking?	❍	❍	❍
it had benches?	❍	❍	❍
it had safety against crime (lighting, patrols, etc.)?	❍	❍	❍
it had safe access (road crossings)?	❍	❍	❍
it had disability (ADA) access?	❍	❍	❍
Other_____	❍	❍	❍

34. What other recommendations or concerns do you have about new open space along the bayfront in Mystic Island?

_____

_____

GENERAL HEALTH STATUS

This set of questions is about your general state of health. Your answers to these questions will give the research team a better idea about the current health of residents of your area. Remember, your answers to ALL the questions in this survey are anonymous. There will be no way to connect you with your answers.

35. Would you say that your health in general is?

- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

36. During the past month, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

- ❍ 0 days
- ❍ 1-3 days
- ❍ 4-6 days
- ❍ 7-10 days
- ❍ More than 10 days
- ❍ Don't know

37. Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMO's, government plans such as Medicare, or Indian Health Service?

- ❍ Yes
- ❍ No
- ❍ Don't know/ Not sure

38. About how long has it been since you last visited the doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.

- ❍ Less than 6 months
- ❍ 6 months to one year
- ❍ 1-2 years
- ❍ 2-5 years
- ❍ More than 5 years

39. How often in the past 12 months would you say you were worried or stressed about having enough money to pay your rent/mortgage? Would you say:

- ❍ Always
- ❍ Usually
- ❍ Sometimes
- ❍ Rarely
- ❍ Never
- ❍ Don't know / Not sure

40. How often in the past 12 months would you say you were worried or stressed about having enough money to buy nutritious meals? Would you say:

- ❍ Always
- ❍ Usually
- ❍ Sometimes
- ❍ Rarely
- ❍ Never
- ❍ Don't know / Not sure

41. Has a doctor, nurse, or other health professional EVER told you that you had any of the following?:

	Yes	No	Don't know/ Not sure
Angina or Coronary Heart Disease?	❍	❍	❍
Stroke?	❍	❍	❍
Asthma?	❍	❍	❍
Skin Cancer?	❍	❍	❍
Other types of cancer?	❍	❍	❍
Chronic Obstructive Pulmonary Disease or COPD, Emphysema or Chronic Bronchitis	❍	❍	❍
Some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?	❍	❍	❍
Depressive Disorder, including depression, major depression, dysthymia, or minor depression?	❍	❍	❍
Kidney Disease? (Do NOT include kidney stones, bladder infection or incontinence.)	❍	❍	❍
Diabetes?	❍	❍	❍

42. Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone, including occasional use?

❍ Yes
❍ No
❍ Don't know / Not sure

43. Do you have serious difficulty walking or climbing stairs?

❍ Yes
❍ No
❍ Don't know / Not sure

44. During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

- ❍ Yes
- ❍ No
- ❍ Don't know / Not sure

45. If yes, how many times did you take part in this activity during the past month?

- ❍ Once
- ❍ Twice
- ❍ 3-4 Times
- ❍ More than 4 times

46. Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?

- ❍ Yes
- ❍ No
- ❍ Don't know / Not sure

47. Other than cost, there are many other reasons people delay getting needed medical care. Have you delayed getting needed medical care for any of the following reasons in the past 12 months? Select the most important reason.

- ❍ You couldn't get through on the telephone.
- ❍ You couldn't get an appointment soon enough.
- ❍ Once you got there, you had to wait too long to see the doctor.
- ❍ The (clinic/doctor's) office wasn't open when you got there.
- ❍ You didn't have transportation.
- ❍ Other_____ (specify) _____
- ❍ No, I did not delay getting medical care/did not need medical care.
- ❍ Don't know / Not sure

TELL US ABOUT YOURSELF

The last set of questions are about you as an individual. Your answers to these questions will help the research team understand the range of people that filled out the survey and whether the answers to the questions were different depending on the individual characteristics of survey participants.

48. What is your age?

- ❍ Under 18
- ❍ 18-35
- ❍ 36-50
- ❍ 51-65
- ❍ 66-75
- ❍ Over 75

49. Are you Hispanic, Latino/a, or Spanish origin?

- ❍ Yes
- ❍ No

50. Which one or more of the following would you say is your race? Select all that apply.

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Asian

51. What is your sex?

- ❍ Male
- ❍ Female
- ❍ Transgender / Other

52. How many children less than 18 years of age live in your household?

- ❍ Zero
- ❍ 1-2
- ❍ 3-4
- ❍ 5 or more

53. What is the highest grade or year of school you completed?

- ❍ Never attended school or only attended kindergarten
- ❍ Grades 1 through 8 (Elementary)
- ❍ Grades 9 through 11 (Some high school)
- ❍ Grade 12 or GED (High school graduate)
- ❍ College 1 year to 3 years (Some college or technical school)
- ❍ College 4 years or more (College graduate)

54. Are you currently...?

- ❍ Employed for wages or salary
- ❍ Self-employed
- ❍ Out of work for 1 year or more
- ❍ Out of work for less than a year
- ❍ A homemaker
- ❍ A student
- ❍ Retired
- ❍ Unable to work

55. What is your annual household income from all sources?:

- ❍ Less than $25,000
- ❍ $25,000 - $50,000
- ❍ $50,001 – $75,000
- ❍ $75,001 – $100,000
- ❍ $100,001 +

56. Do you have a cell phone for personal use?

- ❍ Yes
- ❍ No
- ❍ Don't know / Not sure

THANK YOU FOR YOUR RESPONSE!

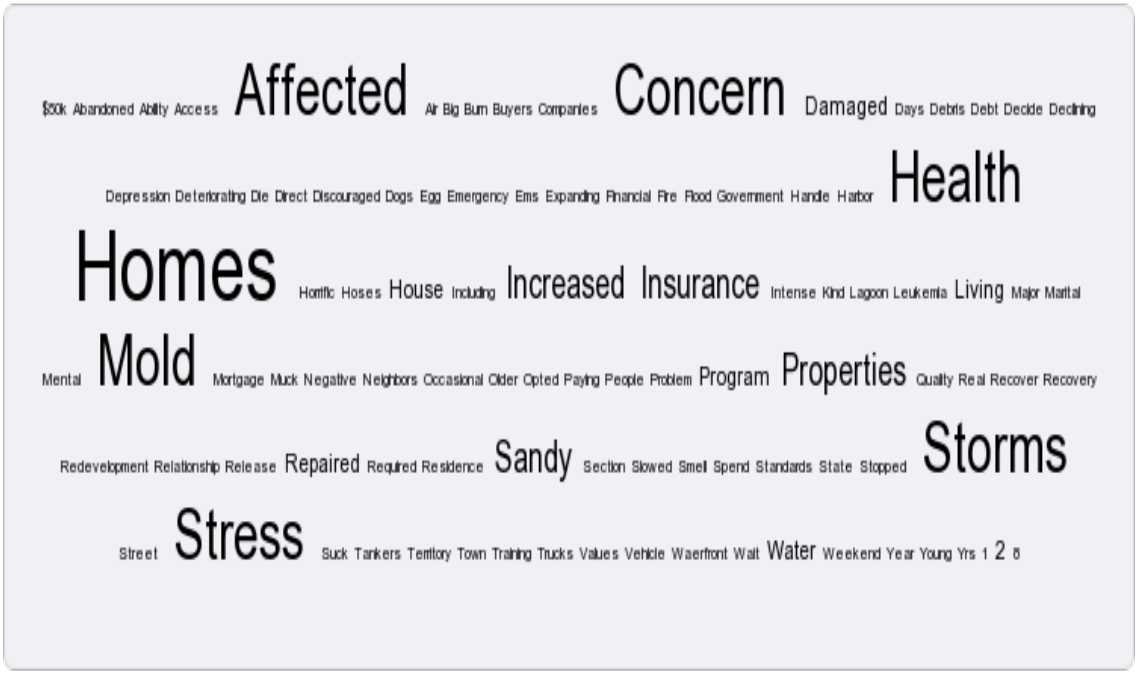
Appendix H:
Word Clouds from Survey Open-Ended Responses

Word Cloud:

What other concerns do you have about a buyout of properties?

Word Cloud:

What other concerns do you have about storm or hurricane flooding in your community and how it affects or has affected your health?



Word Cloud:

What would make you more interested in this buyout option?