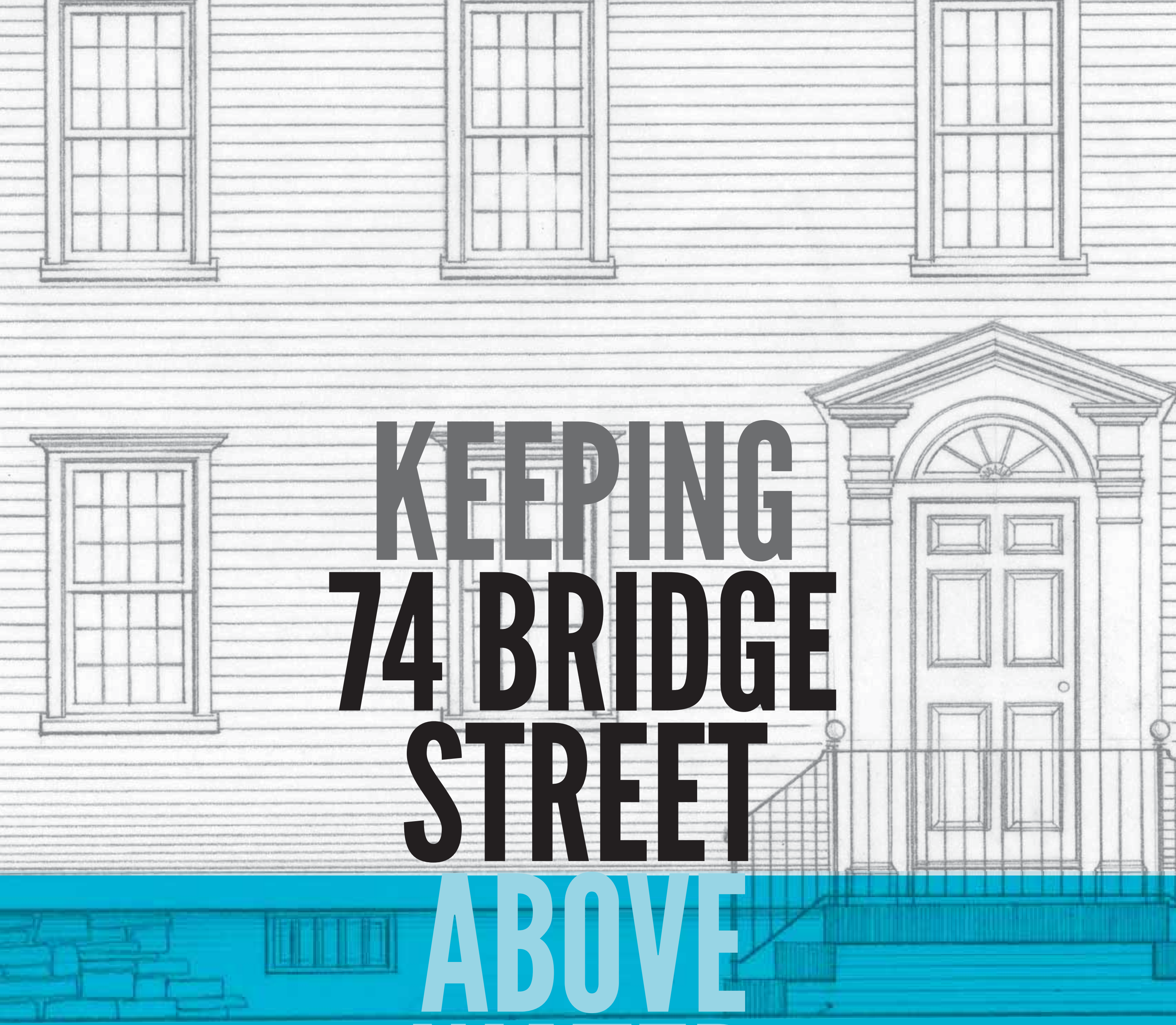


KEEPING 74 BRIDGE STREET ABOVE WATER

Lessons from the City of Newport and the Point Neighborhood on protecting historic structures and neighborhoods from the impacts of climate change

An exhibition produced in conjunction with the Newport Restoration Foundation's *Keeping History Above Water* conference held in Newport, RI, April 10-13, 2016

WWW.HISTORYABOVEWATER.ORG

High surf on Long Wharf during the Hurricane of 1938
Newport Historical Society Collection

TIME AND TIDE WAIT FOR NO ONE.

Although written in another era to describe navigational imperatives that are no longer relevant, this old saw finds dark new meaning in coastal regions throughout the United States and the world. In Newport we see this clearly in historic Easton's Point, within the Newport Historic District (a National Historic Landmark District since 1968). Increased flooding activity and even moderate projections for sea level rise mean a slow moving, but inevitable ballet of water and historic structures in which the Christopher Townsend house at 74 Bridge Street occupies center stage.

Keeping History Above Water, the April 2016 conference organized by the Newport Restoration Foundation around climate change, sea level rise, and historic preservation was an extraordinary opportunity to explore these timely concerns on a national scale. We knew the practical examination of resiliency and mitigation measures for a single historic property would add a vital dimension to the conference proceedings and lead to other tactical advances.

Funded jointly by the Rhode Island Historical Preservation and Heritage Commission, the Historic Preservation Fund of the National Park Service, the City of Newport, and the Van Beuren Charitable Foundation, this project was ably led by a team from Union Studio Architects and Building Conservation Associates and informed by consultation with several others (see page 38). The exhibition of the results, a version of which you will find in this publication, served as a centerpiece to the conference and a basis for conversations that should continue to inspire long-term strategies for some time to come. The case study approach aligns closely with the mission of the Newport Restoration Foundation in its pursuit of practical solutions to historic preservation problems.

A rising tide might float all boats, but it only inundates houses. This publication is a splendid exploration of the subject as it applies to a single house and its unique neighborhood. We hope that it educates and inspires other solutions for saving historic houses and neighborhoods in the face of today's climate realities.

Pieter N. Roos
Executive Director, Newport Restoration Foundation

Support for this project is being provided by a Hurricane Sandy Disaster Relief Grant through the Historic Preservation Fund of the National Park Service awarded by the R.I. Historical Preservation and Heritage Commission. Additional funding has been awarded by the City of Newport under their Impacts of Sea Level Change: PILOTING Toward Solutions grant from the van Beuren Charitable Foundation.

This activity which is the subject of this study has been funded in part with federal funds from the National Park Service, U.S. Department of the Interior, and administered by the R.I. Historical Preservation and Heritage Commission. The contents or opinions contained herein do not necessarily reflect the views or policies of the Department of the Interior or the Historical Preservation and Heritage Commission.

A project of the
HURRICANE SANDY
DISASTER RELIEF GRANTS
FOR HISTORIC PRESERVATION
funded by the National Park Service, U.S. Department of the Interior
administered by the
R.I. Historical Preservation & Heritage Commission

TABLE OF CONTENTS

WHERE ARE WE?

1878 CITY OF NEWPORT
(GALT & HOY BIRD'S-EYE-VIEW)

1777 SHORELINE
(BLASKOWITZ PLAN OF THE TOWN OF NEWPORT)

EASTON'S POINT WAS ORIGINALLY PLATTED BY QUAKERS CIRCA 1725.

IN 1968, DORIS DUKE AND THE NEWPORT RESTORATION FOUNDATION BEGAN INVESTING IN THE NEIGHBORHOOD IN THE WAKE OF URBAN RENEWAL EFFORTS MARKED BY THE CONSTRUCTION OF AMERICA'S CUP AVENUE AND MARKET SQUARE.

ORIGINS OF THE POINT

- Easton's Point (The Quaker Lands) was land originally platted by Quakers circa 1725.
- The Point refers to a small spit of land that once protruded out into the harbor. Over time, the cove that once existed at the southern end of the neighborhood has been infilled and developed.
- In the eighteenth century, the Point Neighborhood was home to artisans, furniture makers, cabinetmakers, and stone-carvers when Newport was an active commercial port in colonial America. Shops and markets were interspersed among the residential dwellings, creating a dynamic waterfront community.
- The Point was an area of production for the maritime industry, well-situated with docks along the harbor.
- After the Revolutionary War, Newport's economy declined. Following the decline, many of the historic homes in the Point were either abandoned or subdivided for use as rooming houses.
- In 1968, Doris Duke and the Newport Restoration Foundation began investing in the neighborhood in the wake of urban renewal efforts marked by the construction of America's Cup Avenue and Market Square.

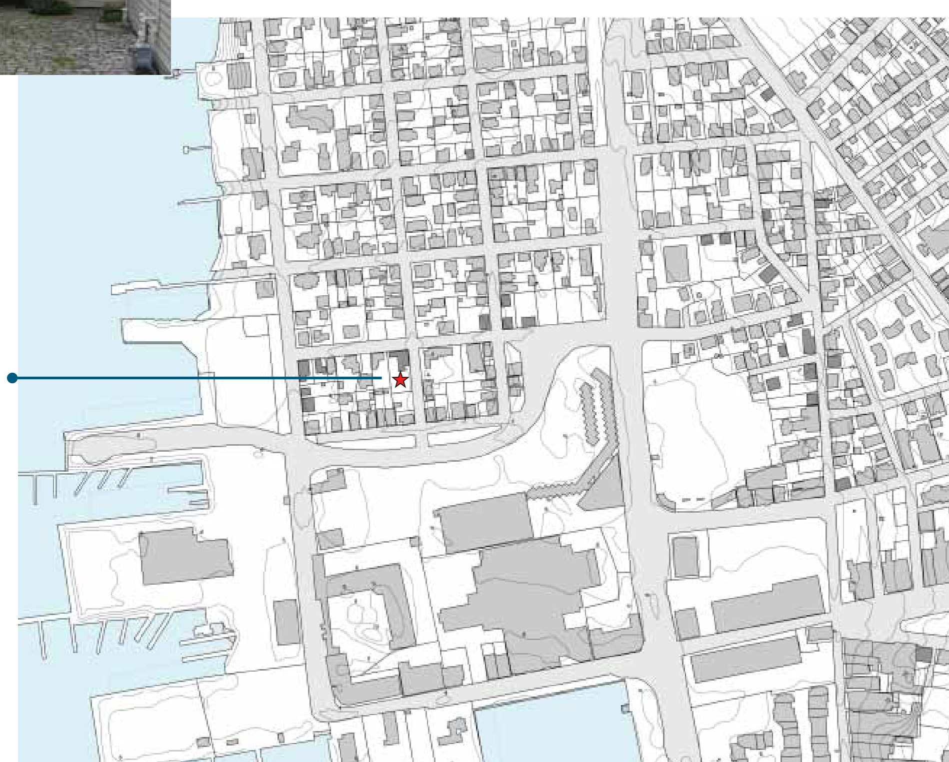
THE POINT NEIGHBORHOOD TODAY

THE POINT IS A DENSE AND COMPACT HISTORIC NEIGHBORHOOD. HOMES TYPICALLY SIT CLOSE TO THE STREET, CREATING A CONSISTENT VISUAL EXPERIENCE ALONG EACH BLOCK. THE NEIGHBORHOOD SCALE AND VARIETY OF ARCHITECTURAL DETAILS MAKE THE POINT A FAVORITE NEIGHBORHOOD TO VISIT AND INHABIT.

DEFINING CHARACTERISTICS

The collection of 18th-century architecture in the Point Neighborhood is defined by wood post and beam construction with heavy plank sheathing. Clapboards and shingles are the primary exterior finish materials. A variety of exterior trim details, including expressive hoods and pediments at windows and doors, provide visual interest along the street. Houses are typically variations on a square plan with a central chimney, with either three, four or five-bay facades. The interior finish is comprised of plaster and lath applied directly to plank sheathing. Roof forms vary from simple gables to hipped roofs, gambrels and mansards.

THE POINT NEIGHBORHOOD



THE CHRISTOPHER TOWNSEND HOUSE, 74 BRIDGE STREET

WHERE ARE WE?

The Newport Restoration Foundation was created in 1968, to meet the urgent need to save the city's rapidly disappearing 18th-century architecture. Doris Duke's formidable resources made possible a preservation effort that few have attempted before or since.

51 BRIDGE STREET circa 1960-1970

51 BRIDGE STREET TODAY

HISTORY OF PRESERVATION

1964 – Newport Historic District Zoning ordinance was created, legally enforcing the principles of historic preservation.

1968 – As a response to the urban renewal projects taking foot in cities across the country, Doris Duke established the Newport Restoration Foundation with an eye toward the preservation of historic urban neighborhoods, rather than singular buildings in isolation.

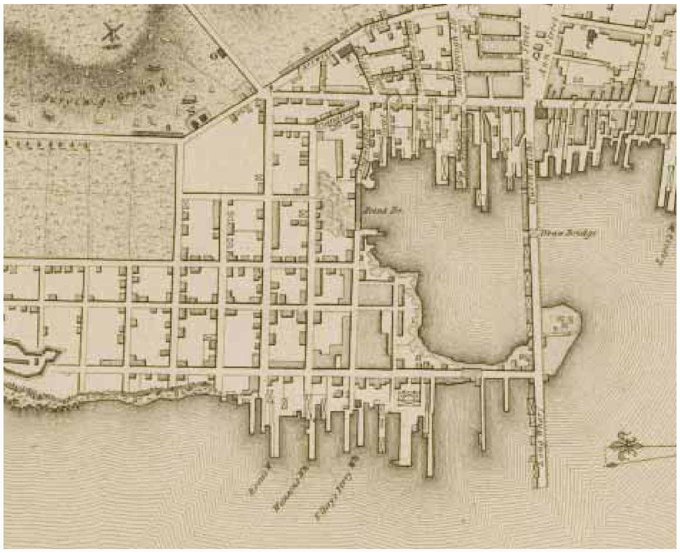
Over the course of its almost 50 year history, the NRF has purchased and restored 83 historic buildings and put them back into use in the community primarily as single family residences. Often, these efforts have involved relocating historic homes to a vacant lot to create a concentration of preserved homes in a single area. The Point is one of several neighborhoods in Newport that has benefited from the Newport Restoration Foundation's efforts.

The entirety of the Point Neighborhood is located within the Newport Historic District, a National Historic Landmark District since 1968.

MANY OF THE HISTORIC 18th CENTURY HOMES ARE NOT ORIGINAL TO THE NEIGHBORHOOD, BUT WERE MOVED TO THE POINT AS PART OF THE NEWPORT RESTORATION FOUNDATION'S PRESERVATION EFFORTS.

OTHER, ORIGINAL STRUCTURES HAVE BEEN ALTERED IN MANY WAYS. OVER TIME, HOUSES HAVE BEEN ADDED TO, MOVED, AND ELEVATED IN RESPONSE TO NEW SPACE NEEDS, CHANGES IN USE AND ENVIRONMENTAL FACTORS.

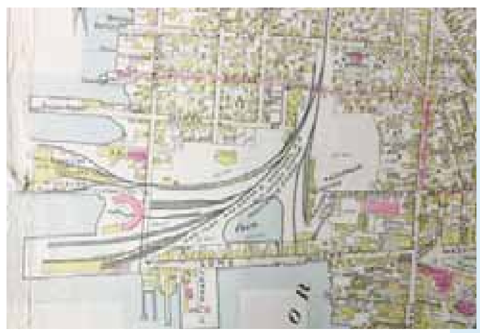
THE POINT NEIGHBORHOOD
EVOLUTION OF THE SHORELINE



1777 SHORELINE
(BLASKOWITZ PLAN OF THE TOWN OF NEWPORT)

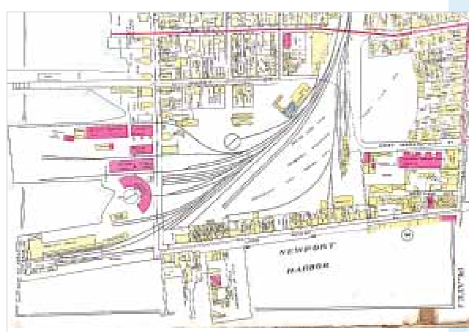
Over time, the original spit of land that was the namesake of Easton's Point has disappeared. The point that once stuck out into Newport Harbor, encapsulating a cove, is now part of one continuous land mass. Long Wharf, running south from Washington Square, once provided direct access to the tip of the Point. Homes on the south side of Bridge Street were waterfront property with docks for merchant trading. Gradually, the basin was filled, decreasing the size of the cove. The New York, New Haven & Hartford Railroad line was extended to terminate at the end of Long Wharf. By 1907 the basin had been completely filled. In 1965 a causeway was built to connect nearby Goat Island to the commercial activity in the center of Newport. In 1988 the Newport Gateway Center opened, largely on the site of the former cove.

1838 SHORELINE
(GEDNEY, WILKES AND BLAKE MAP OF NEWPORT HARBOR)



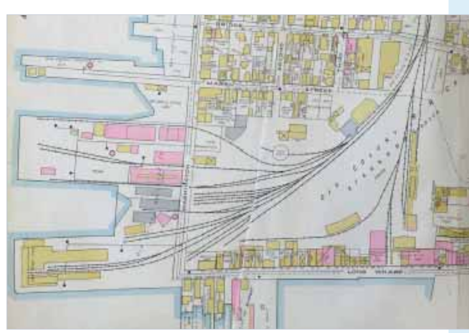
1895 SHORELINE
(EVERTS & RICHARD ATLAS OF SOUTHERN RHODE ISLAND)

1859 SHORELINE
(DRIPPS AND TILLY MAP OF THE CITY OF NEWPORT)



1907 SHORELINE
(L.J. RICHARDS & CO. ATLAS OF THE CITY OF NEWPORT)

1870 SHORELINE
(D.G. BEERS ATLAS OF THE STATE OF RHODE ISLAND)



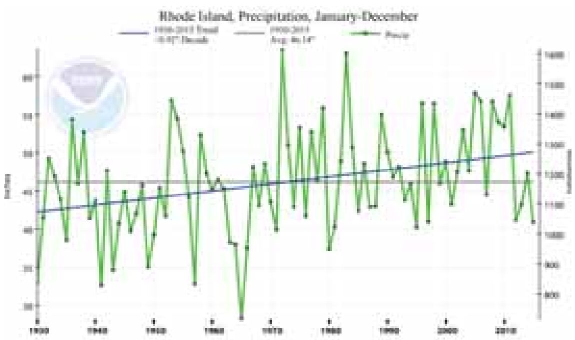
1921 SHORELINE
(SANBORN MAP)

WHY ARE WE HERE?

The Point Neighborhood is more vulnerable than ever.

WHY ARE WE HERE?

Kayaker in Bowen's Wharf after Hurricane Sandy, 2012.
Newport Historical Society Collection



Average annual precipitation for Rhode Island for the period 1930 to 2016. Data provided by the National Climatic Data Center.

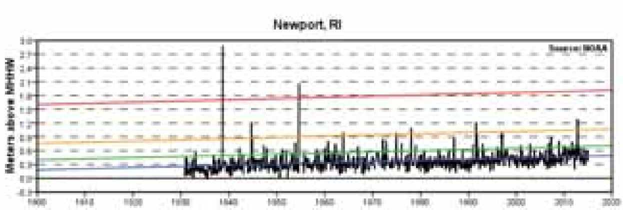
Flash flooding on Bridge Street due to confluence of heavy rains and high tide. Stormwater cannot drain into harbor during high tide. Photo: L. Lewis (July 01, 2015)

FLOODING DUE TO PRECIPITATION EVENTS

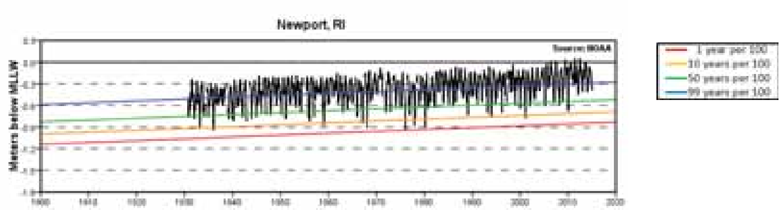
The Point Neighborhood has witnessed a number of extreme storm events over the course of its history. During each of these storm events, the Point Neighborhood has experienced flooding - due either to storm surge that enters the neighborhood through the drainage system, or to fresh stormwater that cannot escape during high tides. Trends show that the number and severity of precipitation events is increasing, which will undoubtedly increase the occurrence of flooding in the Point.

FLOODING DUE TO EXTREME HIGH TIDES

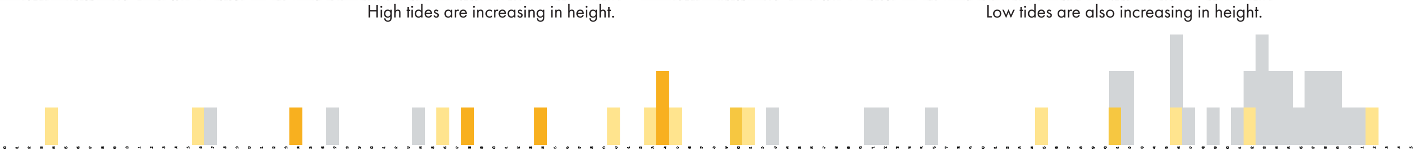
Extreme high tides also impact the probability of flooding. When the tide is high, stormwater is not able to drain out into the harbor. Tide gates installed in the infrastructure system close during high tide to prevent the tidal waters from flowing into the system. However, if a storm occurs during high tide, the stormwater in the city's infrastructure system backs up behind the tide gates, flooding the neighborhood. Trends indicate that extreme high tides are rising and becoming more frequent - the high tide in Newport has risen 8 inches in the past 75 years. The high tides will only continue to increase in height with rising sea levels.



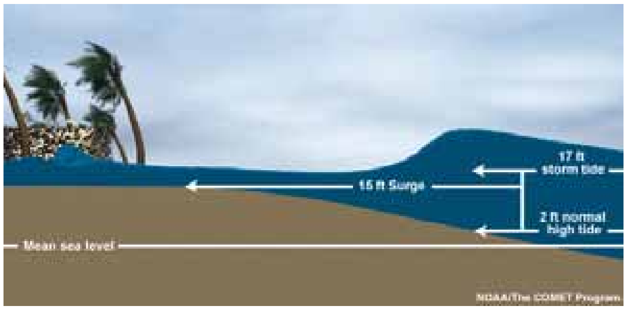
High tides are increasing in height.



Low tides are also increasing in height.

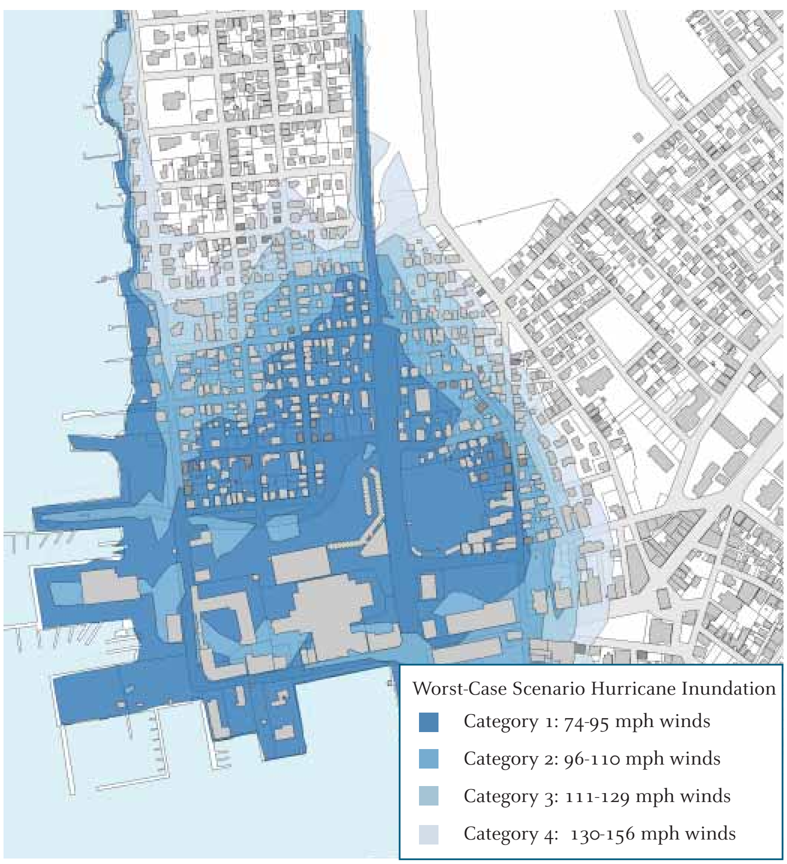


SOUTHERN NEW ENGLAND STORM EVENTS 1900-2016



Storm surge that carries water inland due to high winds and elevated sea levels (storm tides).

Flooding at 74 Bridge Street the day after Hurricane Sandy (2012) and lunar high tide. Flooding was caused by a storm surge from the ocean that came up through portions of the storm drain system that did not have tide gates installed.
Photo: T. Hockaday



Storm surge projections for Category 1 - 4 hurricanes. Does not include projected sea level rise.

FLOODING DUE TO STORM SURGE

Independent of extreme precipitation events, flooding caused by storm surge has also disrupted life in the Point Neighborhood. Storm surge occurs when storm winds push the elevated ocean water toward the coastline. Storm surges can be quite powerful and damaging to buildings along the coast and often affect the accessibility of evacuation routes. Storm surges can reach quite far inland and their extent will only increase with rising sea levels.

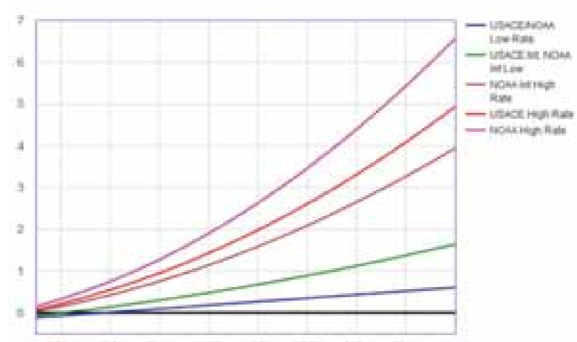
FLOODING DUE TO SEA LEVEL RISE

Sea level rise is caused by warming global temperatures, melting ice sheets, and the expansion of warmer ocean waters. Sea level rise poses a long-term threat to the viability of the Point Neighborhood.

Historical data indicates that the rate of sea level rise is increasing. As of January 26, 2016 the Rhode Island Coastal Resources Management Council adopted NOAA's high-model projections for sea level rise. The high model projects 1 foot of sea level rise by 2035, 3 feet of sea level rise by 2065, and close to 7 feet of sea level rise by 2100.

While it is not clear what the exact sea levels will be in the future, it is clear that sea level rise will have a permanent impact on our way of life.

Increased sea levels will exacerbate the challenges that already exist in the neighborhood posed by rising daily high and low tides, extreme storm surges and associated flooding events. Our coastal neighborhoods will be at severe risk of damage if we do not take action now.



Sources: NOAA & USACE

SEA LEVEL RISE IS ACCELERATING AND HAS PERMANENT IMPLICATIONS FOR THE LONG-TERM PRESERVATION OF THE HISTORIC FABRIC OF THE POINT NEIGHBORHOOD

WHAT IS AT RISK?

Our history and our community.

WHAT IS AT RISK?

NEWPORT'S HISTORY:

968 HISTORIC STRUCTURES ARE LOCATED IN NEWPORT'S FLOODPLAIN.

THE ASSESSED VALUE OF THESE HISTORIC STRUCTURES IS $559,992,649.

NEWPORT'S HOMES:

53% OF THE ACREAGE OF NEWPORT LIES IN THE FLOODPLAIN.

53% OF THE PARCELS IN NEWPORT'S FLOODPLAIN ARE RESIDENTIAL LOTS

NEWPORT'S RESOURCES:

$3,817,860,900 OF POTENTIAL PROPERTY LOSS IN NEWPORT'S FLOODPLAIN.

53% OF TAXES COLLECTED FROM NEWPORT BUSINESSES COME FROM BUSINESSES THAT LIE IN NEWPORT'S FLOODPLAIN.

NEWPORT'S LIVES:

OUR SAFETY IS THREATENED BY FLOODING AND ACCESS TO EVACUATION ROUTES.

200 NAMED ROADS IN NEWPORT RUN THROUGH THE FLOOD PLAIN.

The Point Neighborhood requires a new level of preservation, a coordinated effort among policy-makers, non-profits and residents, that is guided by a shared vision for adaptation to the effects of climate change.

OUR HISTORY AND OUR COMMUNITY

As a historic neighborhood within the city of Newport, the Point is a vital cultural resource for the city and for the state. Its living collection of 18th-century buildings teaches us about our past and provides lessons for how we might build in the future. The architecture and urbanism of the Point creates a unique sense of place, making it a sought-after destination for residents and tourists alike.

Life on the Point is emblematic of the state of Rhode Island's coastal identity. It is a living demonstration of the deep connection we have always had with the sea.

Beyond the historical and cultural significance of the Point, the economic value that this neighborhood contributes to the City of Newport is critical. The tax revenue generated from the properties in the Point helps sustain the City of Newport as a whole. If all properties in the Newport floodplain retreated, the city would lose maritime industries, its attractive open waterfront, and much of its identity.

It is time to start thinking about how to preserve Newport's history, its sense of place, its economic base and its culture in the face of predicted environmental threats.

WHAT NEEDS TO BE DONE?

A SEQUENCE OF ACTIONS

In the face of mounting environmental pressures, we need to begin taking action to ensure the long term preservation of this critical neighborhood and its historic buildings.

IDENTIFYING SOLUTIONS

OUR APPROACH

We have organized the problem-solving effort into four chapters. Each chapter presents a particular problem and then a range of possible solutions that are available. The chapters address 1) stormwater, 2) sea level rise, 3) design and policy regulations at the neighborhood level, and 4) a case study for 74 Bridge Street.

The solutions presented will involve a range of options, some of which are worth considering for implementation across the entire neighborhood and others of which are appropriate for implementation at individual lots. Not all solutions are mutually compatible or immediately applicable for implementation in the historic Point Neighborhood.

The icons identified below serve as graphic keys to the problems at hand, the solutions being proposed, and the stakeholders involved.

Lastly, the most appropriate solutions will be summarized in a series of recommendations.

THE FOUR CHAPTERS:

STORMWATER

- Existing infrastructure
- Solutions
    - Neighborhood
        - Increase capacity
        - Decrease pressure
        - Protecting the house

SEA LEVEL RISE

- Problem
- Solutions based on conservative projections
- Solutions based on accelerated projections

POLICY AND DESIGN

- Challenges
    - Maintaining building & street character
- Recommendations
    - Design guidelines

CASE STUDY: 74 BRIDGE STREET

- Introduction and history
- Defining the challenges
- Current conditions
- Flooding scenarios
- Near-term strategies

WHO IS INVOLVED:

The solutions that follow range in scale from application at the individual property level to application across an entire neighborhood. The stakeholders responsible for implementing these solutions have been identified as follows:

- HOMEOWNER
- NEWPORT RESTORATION FOUNDATION
- CITY OF NEWPORT

EXISTING PROBLEMS:

The forces that contribute to flooding in the Point Neighborhood have been identified as follows:

- TIDES
- STORM SURGE
- PRECIPITATION
- SEA LEVEL RISE
- DRAINAGE
- TIDE GATE

POTENTIAL SOLUTIONS:

We have identified a variety of solutions that address the existing problems in the Point Neighborhood. These solutions range in scale from that of the home to that of the city. Each solution is represented by an icon that will be described in further detail according to its specific implementation.

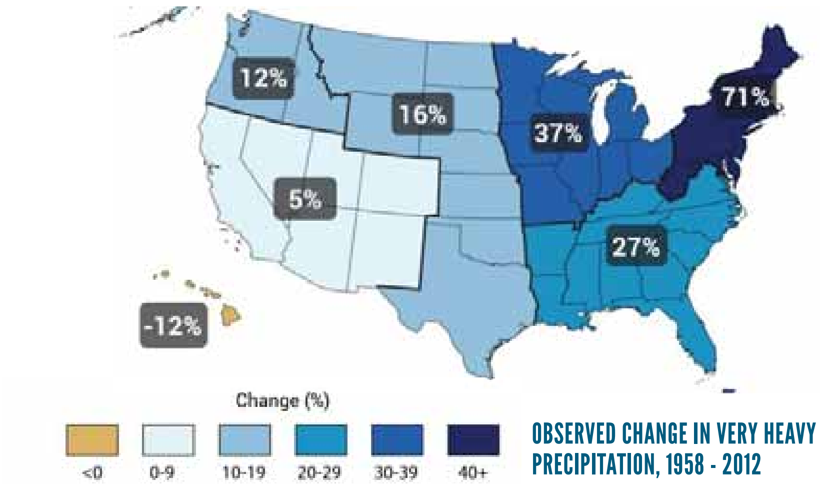
- ELEVATE LOWEST LEVEL
- ELEVATE ENTIRE STRUCTURE
- ELEVATE STREET & SITE
- SLOPE GRADE
- ELEVATE CRITICAL SYSTEMS
- RAIN BARRELS
- SUMP PUMP
- VENTILATE CRAWLSPACE
- CISTERNS
- PERMEABLE STREETS & GUTTERS
- COASTLINE PLANTINGS
- WILDFLOWER MEADOW
- RAILROAD BED GREENWAY
- RESIDENTIAL DRY WELL
- NEIGHBORHOOD DRY WELL
- INCREASE PIPE SIZE
- PUMP STATION
- OUTFALL TIDE GATES
- LEVEE
- LARGE SCALE BARRIER
- RAIN GARDENS

STORMWATER

Current infrastructure is dramatically compromised when storm events coincide with high tide.

STORMWATER SYSTEM CONDITIONS

SINCE 1958, VERY HEAVY PRECIPITATION EVENTS IN NEW ENGLAND HAVE INCREASED BY 71%.



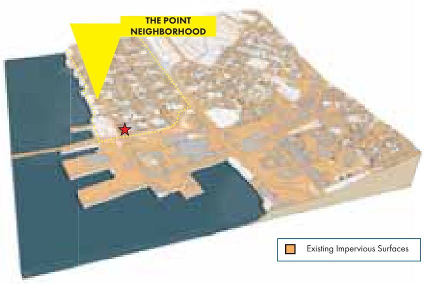
OBSERVED CHANGE IN VERY HEAVY PRECIPITATION, 1958 - 2012

THE POINT NEIGHBORHOOD SITS AT ONE OF THE LOWEST ELEVATIONS IN NEWPORT. EXISTING INFRASTRUCTURE CAN NO LONGER MANAGE THE INCREASING FREQUENCY AND VOLUME OF WATER IMPACTING THIS AREA.

CURRENT ISSUES:

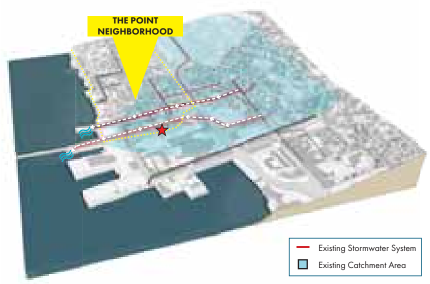
1. Major stormwater piping runs through the Point, carrying stormwater from a large catchment uphill.
2. Current stormwater infrastructure is quickly overwhelmed during storm events - causing upwell flooding that can quickly submerge the streets and flood homes in the lowest lying areas of the Point.
3. There are few, if any, natural drainage devices in place to augment and support the pipe system in place.
4. A high water table necessitates that any infiltration systems must be of a large capacity to allow slow infiltration over time.

IN 2012, ONE INCH OF RAIN PRODUCED ABOUT 860,000 GALLONS OF DISCHARGE AT THE WASHINGTON STREET OUTFALL.



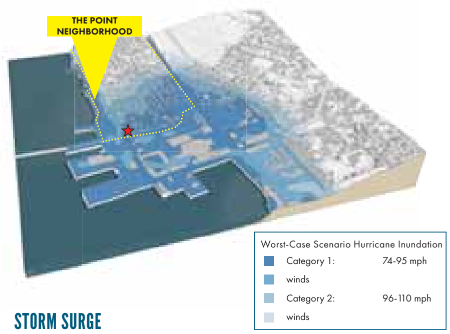
IMPERVIOUS SURFACES

Impervious surfaces uphill contribute a large volume of water that must pass through the downhill stormwater system running through the Point.



STORM & SEWER LINES

Storm drains empty directly into the harbor. During high tides, sea water can back flow into the storm system, preventing drainage and forcing sea and stormwater up through the catch basins and onto the streets of the Point.



STORM SURGE

If a significant rain event is coupled with storm surge, the lack of the stormwater infrastructure system's capacity greatly amplifies the risk of flooding.

STORMWATER SOLUTIONS

INCREASE CAPACITY

RESPONSIBLE STAKEHOLDERS

ACTION ITEMS:

1. Increase holding capacity of the existing system by adding larger pipes and underground cisterns that will allow for temporary storage of stormwater that can be released slowly and under favorable conditions.

2. Invest in stormwater infrastructure improvements like outfall tide gates and pump stations so the existing drainage system is not crippled during high tide storm events.

3. Establish a stormwater management district and incentives program to decrease the volume of uphill rainwater flowing into the stormwater systems.

OUTFALL TIDAL GATE

The installation of an outfall tide gate would minimize tidal water back feeding the stormwater system.

INCREASE PIPE SIZE

Larger pipes will increase the holding capacity of the system during storm events that occur during high tide.

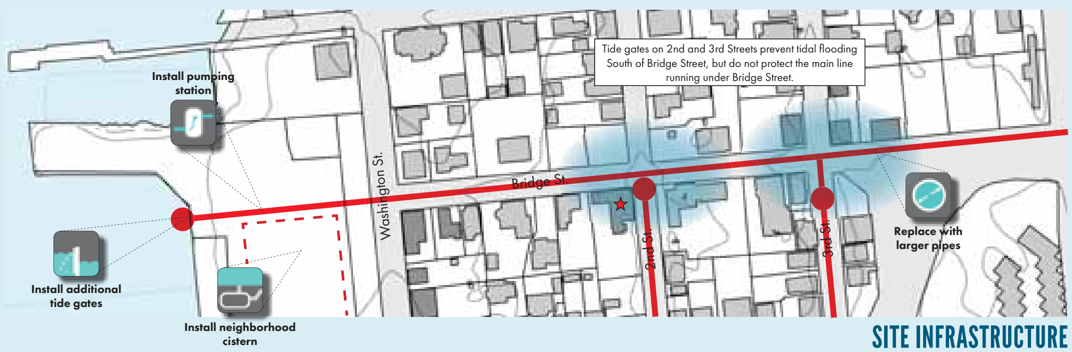
PUMPING STATION

In the event of a significant storm event that might overwhelm the system during high tide, a pump station can be utilized to divert outflow above the tide line.

NEIGHBORHOOD CISTERN

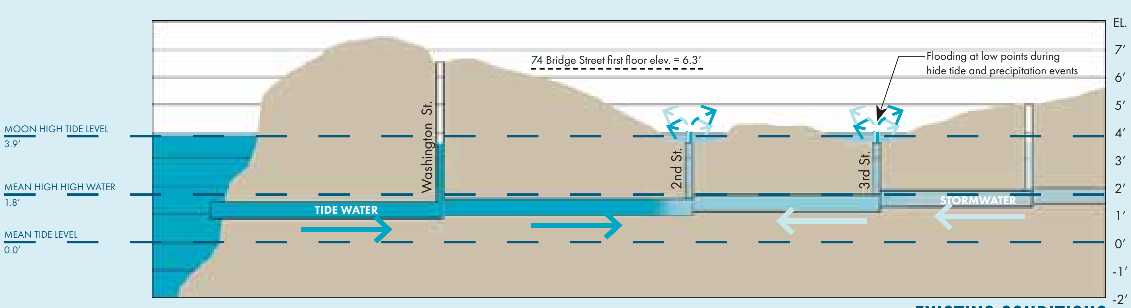
To augment increased pipe sizes, a large cistern could be installed at a public area, like a nearby park.

Due to impervious surfaces uphill and a large catchment area, one inch of precipitation can produce as much as 860,000 gallons of discharge at the Washington Street outfall (according to the 2012 CSO masterplan). This puts overwhelming pressure on the stormwater system that runs under Bridge Street.



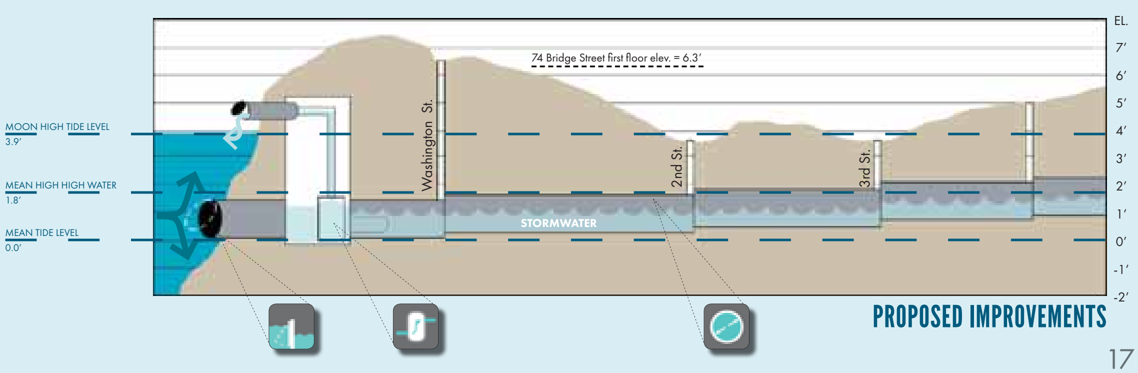
SITE INFRASTRUCTURE

The current system uses a sequence of 48" pipes to move the stormwater runoff into the harbor. When precipitation events coincide with high tide, tide waters back up into the system, preventing the storm runoff from flowing out to the harbor. This creates flooding at the low points of the system, especially at 2nd and 3rd Streets.



EXISTING CONDITIONS

An **outfall tide gate** would prevent tide waters from entering the system, allowing the pipes to hold stormwater until the high tide subsides. Installing **larger pipes** would increase the holding capacity of the system. A **pump station** would provide emergency relief in the event that the pipes meet capacity, re-directing storm water to discharge above the high-tide line.



PROPOSED IMPROVEMENTS

STORMWATER SOLUTIONS

DECREASE PRESSURE: NEIGHBORHOOD

EXISTING IMPERVIOUS SURFACES

POTENTIAL GREEN INFRASTRUCTURE

RESPONSIBLE STAKEHOLDERS:

LARGER SCALE STRATEGIES CAN KEEP A CERTAIN VOLUME OF RAIN WATER FROM EVER ENTERING THE STORMWATER SYSTEM. GREEN INFRASTRUCTURE CAN SERVE A CRITICAL PRACTICAL FUNCTION WHILE ALSO PROVIDING USABLE AND BEAUTIFUL GREEN SPACES AND AMENITIES FOR THE COMMUNITY.

RIPTA INTERMODAL STATION

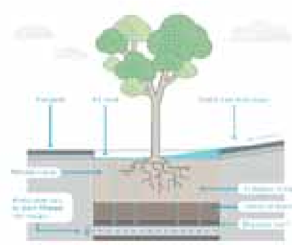
THE CORNERSTONE OF FUTURE GREEN INFRASTRUCTURE DEVELOPMENT AT THE POINT?

ACTION ITEM:

As part of the planned improvements currently being considered for the Intermodal Station near the Visitor's Center, the city should engage RIPTA (Rhode Island Public Transit Authority) to explore how best to reduce impervious surfaces and increase drainage capacity around the RIPTA Intermodal Station. These changes would signal an investment in the future of the Point Neighborhood and set the standard for future green infrastructure improvements.

RAIN GARDENS

Rain gardens are planted depressions that allow rainwater runoff from impervious areas to be temporarily stored during a rain event and then absorbed once the rain and runoff subsides.

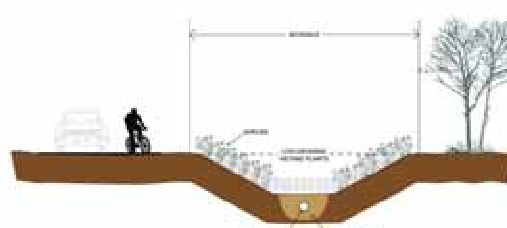


RAILROAD BED GREENWAY

The right-of-way of the rail line could be an excellent stop gap for the large volume of water coming from uphill. This area could be re-purposed as a pedestrian greenway, creating a pleasant walking/biking experience while providing a much needed opportunity to collect and infiltrate rainwater.

APPROPRIATE COASTLINE PLANTINGS

The coastline could be reinforced with appropriate plantings that help retain water, prevent flooding, and resist erosion.



WILD FLOWER MEADOW

A wildflower meadow is a mix of hardy flowering native plants and grasses. Meadows absorb more water than conventional lawns and are a low-maintenance strategy for managing stormwater, filtering stormwater, promoting groundwater infiltration and preventing flooding.

PERMEABLE STREETS & GUTTERS

Permeable paving materials allow stormwater to filter through to the soil below. Permeable paving can be used on various portions of the public right-of-way. **This could be an effective solution uphill from the Point** and it is one with historic precedent in Newport. High water tables in the Point district itself, however, make this infiltration technique less effective.

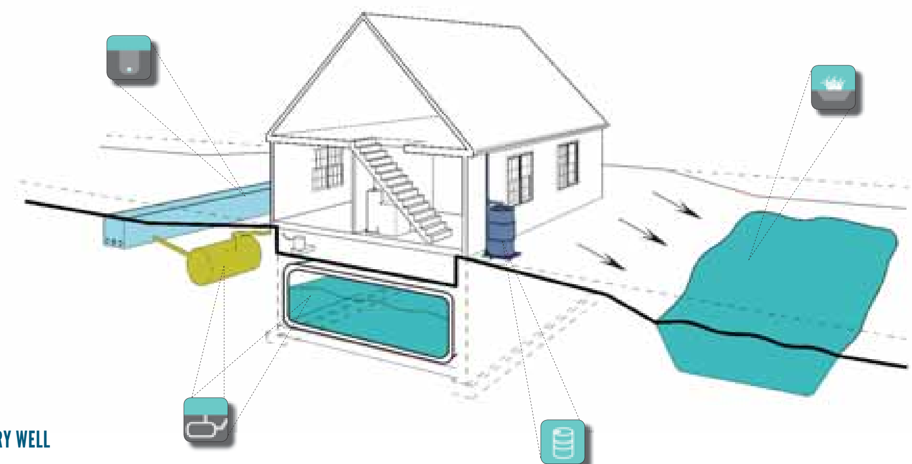
STORMWATER SOLUTIONS

DECREASE PRESSURE: HOME

RESPONSIBLE STAKEHOLDERS:

CAPTURING STORMWATER AT INDIVIDUAL PROPERTIES WILL BE A CRITICAL COMPONENT OF ANY LONG-TERM STORMWATER SOLUTION FOR THE POINT NEIGHBORHOOD.

PROPERTIES UPHILL FROM THE POINT ARE JUST AS CRITICAL AS THOSE IN THE POINT ITSELF.



RAIN BARRELS

By detaining the stormwater runoff during a rain event, homeowners can help add capacity to the city's storm system and reduce overflows. The collected rain water can be reused for irrigation to water lawns, gardens, window boxes or street trees. Water not used is infiltrated slowly once storm events pass.

CISTERNS

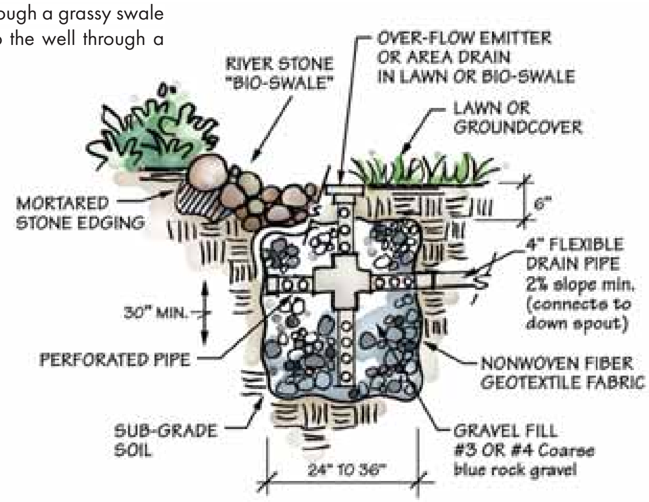
Operating under the same principle as a rain barrel, a cistern is a large capacity container used to collect stormwater from a roof and other impervious surfaces around a building. After the storm event, the water is then re-introduced into the storm water system or can be utilized by the homeowner for a variety of applications. In areas where basements see regular flooding, it is possible to convert basements to house cisterns.

RAIN GARDENS

A rain garden is a planted depression that uses native plants and landscaping to soak up stormwater that flows from downspouts or simply flows over land during a rain event. The center of the rain garden holds several inches of water, allowing stormwater to gather during a rain event. Once the storm abates, the water will slowly infiltrate into the ground as the watertable permits.

DRY WELL

Dry wells are small, excavated pits, filled with stone or gravel that temporarily store stormwater runoff until it infiltrates into the surrounding soil. The stormwater can come straight off of the roof of a house via a downspout that either indirectly or directly connects to the dry well. It can travel indirectly to the dry well through a grassy swale or it can travel directly into the well through a pipe.

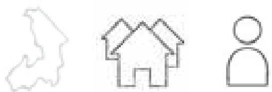


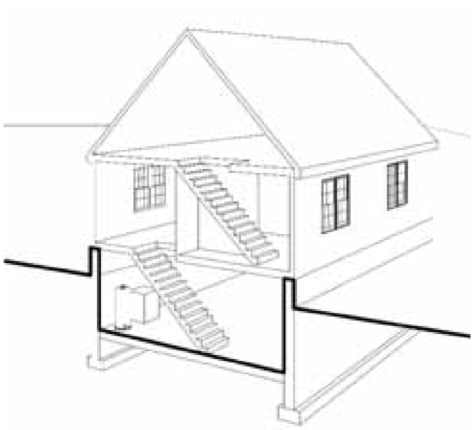
DRY WELL DETAIL

STORMWATER SOLUTIONS

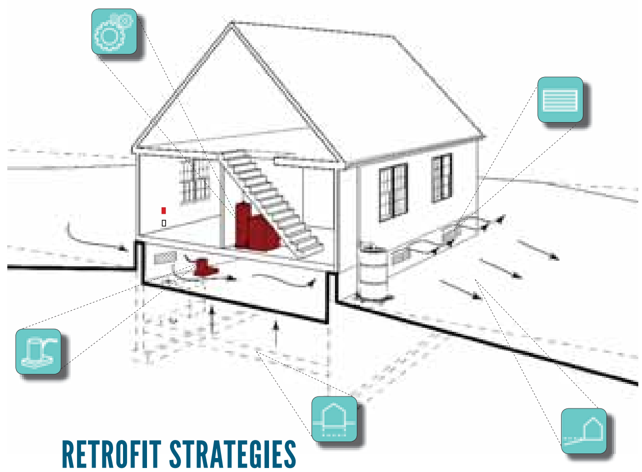
PROTECTING THE HOUSE

RESPONSIBLE STAKEHOLDERS:





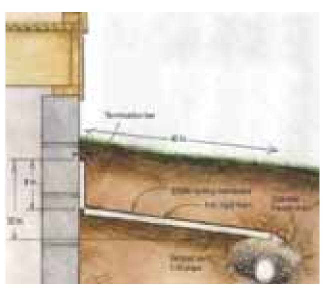
EXISTING CONDITIONS



RETROFIT STRATEGIES

DIVERT RAINFALL

Grading the lot away from the house uses the force of gravity to ensure that excessive rainwater does not collect against the foundation of the home - increasing the likelihood of water infiltration. When coupled with other retention strategies, this can be a simple and cost effective first tier strategy for protecting existing homes.



SUMP PUMPS

Where risk of groundwater infiltration is high, a sump pump is a traditional solution for mitigating intermittent water infiltration. If the water table is high enough that groundwater is nearly always present in the sump, other alternatives will need to be considered.

ELEVATE CRITICAL SYSTEMS

The basement of a building is a common place to keep mechanical equipment, but it is also the most vulnerable to flooding. Elevating critical systems within the building to a dedicated mechanical room will protect the equipment, ensuring that your home remains comfortable and safe in a flood event.

RAISE BASEMENT

Raising the basement and turning it into a crawl space mitigates the risk of persistent groundwater infiltration where the water table is high (like at 74 Bridge Street). The gravel and soil that fill the space where the basement used to be drain naturally and quickly. Sometimes only a few feet of elevation are enough to get the basement out of the water table.

FLOOD VENTS

Flood vents are becoming a regular addition to homes that are prone to minor flooding regularly. The vents enable water to enter and exit the crawl space freely - decreasing pressure on foundation walls during flood events and ensuring that the crawl space can empty and dry out once the flood event passes.

BASEMENT CISTERN

Waterproofing your basement and turning all or part of it into a cistern is a consideration when the existing basement has become unusable due to persistent flooding or ground water infiltration. The water collected can be used for irrigation and/or treated and reused for potable applications before being slowly re-introduced into the storm water system once the storm/flood event has passed.

SEA LEVEL RISE

Projected sea level rise suggests that long term strategies must be considered if we aim to preserve our historic coastal neighborhoods.

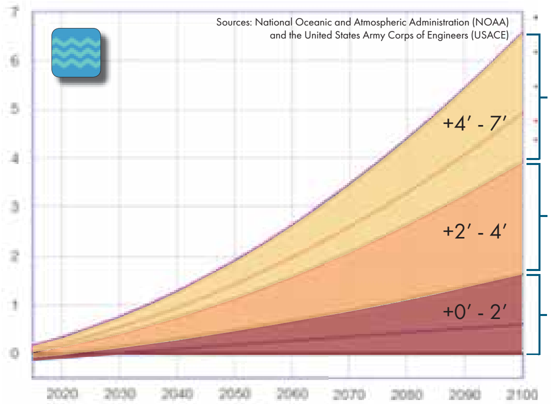
SEA LEVEL RISE
PROBLEM

Rhode Island could see up to seven feet of sea level rise by 2100.

There are three ways to respond to sea level rise: resist, raise, or retreat.

Newport's identity is tied to the water...

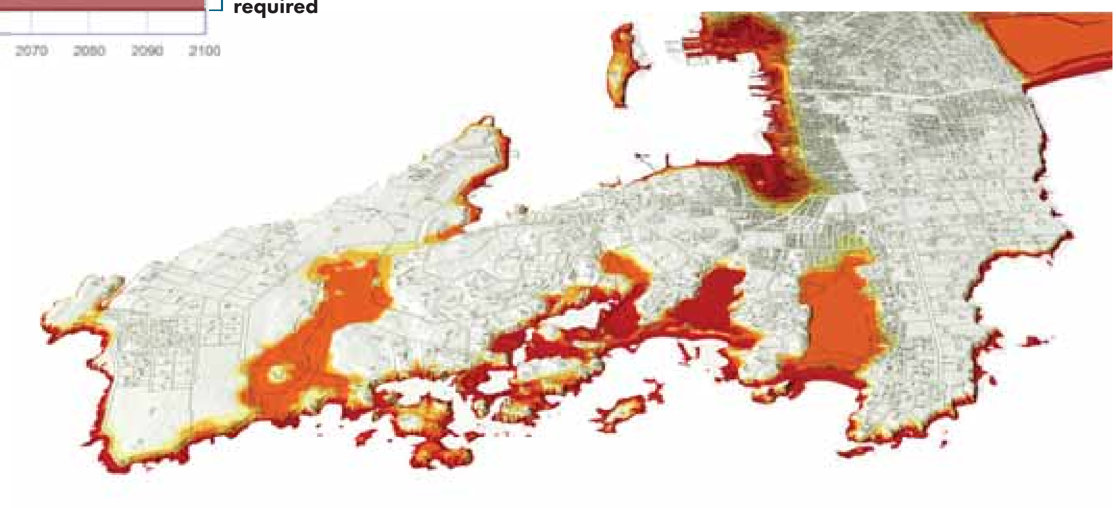
It cannot retreat.



Sea Level Rise continues to accelerate at the rates seen in the last 20 years: **State and City-wide interventions required**

Sea Level Rise accelerates slowly: **Neighborhood-scale interventions required**

Sea Level Rise remains constant: **House-scale interventions required**



NEWPORT PROPERTIES IN THE FLOODPLAIN:

37 HOTELS

585 BUSINESSES

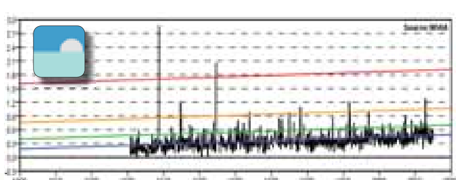
1,324.3 ACRES OF RESIDENTIAL LAND

2459.32 ACRES TOTAL

ASSESSED VALUE: $3,817,860,900

GLOBAL CLIMATE CHANGE

- Air temperature: +1.3°F since 1912
- Water temperature: Consistent Increase
- Sea Level 1900-2000: +.07" per year
- Sea Level 1993-2003: +.13" per year

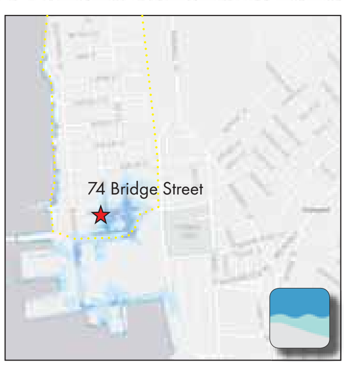


CLIMATE CHANGE IN RHODE ISLAND

- Air temperature: +1.7°F since 1905
- Water temperature: +4°F since the 1960's
- Sea Level 1930-1990: +.1" per year
- Sea Level 1990-2009: +.14" per year

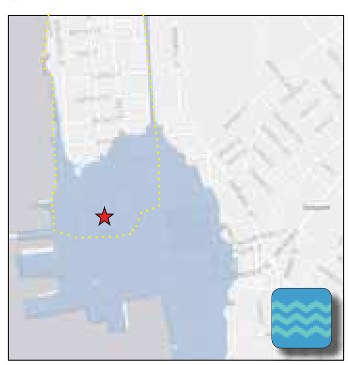
TIDE VOLATILITY IN NEWPORT

The combined forces of sea level rise and increasingly volatile high tides mean that a high tide in 2016 reaches about 20" higher than it would have in 1930.



RI CRMC STORMTOOLS

NO SEA LEVEL RISE 10-YEAR FLOOD EVENT



RI CRMC STORMTOOLS

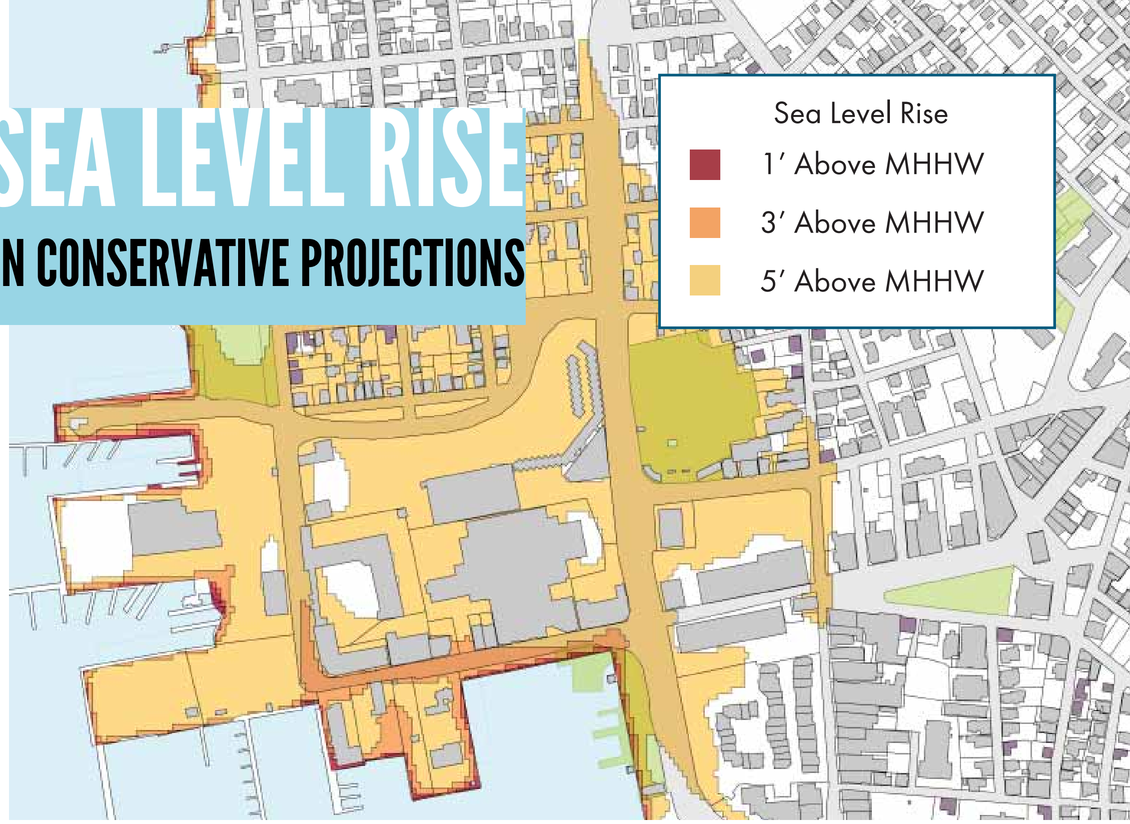
5' SEA LEVEL RISE NO PRECIPITATION

RI CRMC STORMTOOLS

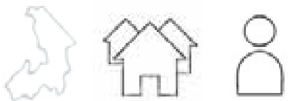
5' SEA LEVEL RISE 100-YEAR FLOOD EVENT

SEA LEVEL RISE

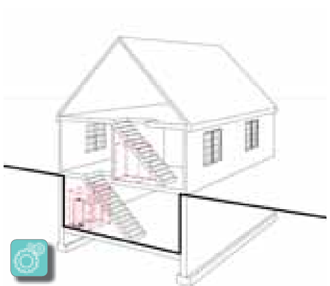
SOLUTIONS BASED ON CONSERVATIVE PROJECTIONS



RESPONSIBLE STAKEHOLDERS:

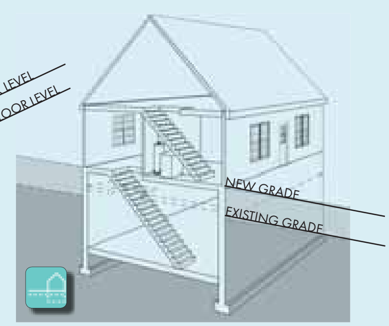


EVEN WITH A LOW RATE OF SEA LEVEL RISE, LOW-LYING NEIGHBORHOODS IN NEWPORT NEED TO PREPARE FOR MORE REGULAR FLOODING.



ELEVATE CRITICAL SYSTEMS

ELEVATE HOME



ELEVATE HOME & SITE

NEAR TERM:

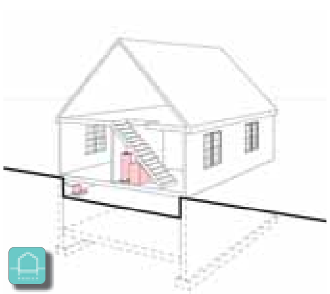
- Elevate critical systems
- Fill basements
- Waterproof basement for use as cisterns

NEAR/MEDIUM TERM

- Raise homes in low-lying areas

MEDIUM/LONG TERM

- Raise streets and infrastructure in the lowest lying areas of the neighborhood



ELEVATE BASEMENT LEVEL

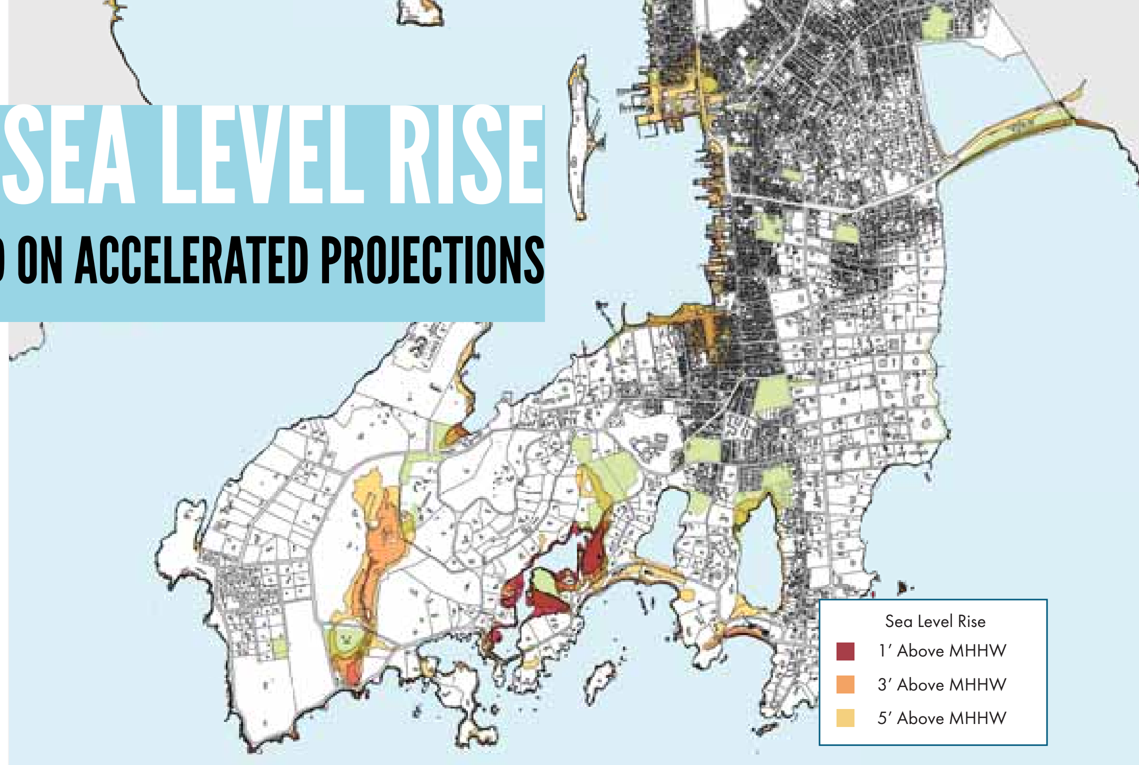
WATERPROOF BASEMENTS FOR USE AS CISTERNS

Source: Rhode Island Floodplain Mapping Tool

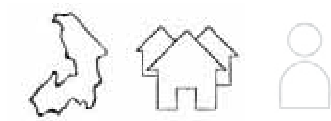
RAISING THE HOME	VS.	RAISING THE NEIGHBORHOOD
Cost for the Homeowner		Cost for the Homeowner
No Cost for the City		Cost for the City
Can be done incrementally (home-by-home)		Must be done as a large, coordinated effort (across entire neighborhood)
Has potential to damage historic character of homes and streetscape		Could preserve historic character of homes and streetscape
Would require strict design guidelines to maintain character		Would require design guidelines to establish relative relationships between streets, houses, and neighboring properties
Height of elevation limited by historic character		Could raise site higher than projected sea levels

SEA LEVEL RISE

SOLUTIONS BASED ON ACCELERATED PROJECTIONS



RESPONSIBLE STAKEHOLDERS:



IF NOAA'S MOST AGGRESSIVE PROJECTIONS COME TRUE, LARGER-SCALE MEASURES MUST BE CONSIDERED TO PRESERVE THE FUTURE OF NEWPORT AND RHODE ISLAND.

THERE ARE CURRENTLY 27,512 STRUCTURES IN RHODE ISLAND THAT ARE VULNERABLE TO FLOODING.

SOLUTIONS

As sea level rise continues to accelerate, Newport will eventually need to look for large-scale solutions to prevent regular flooding in the Point and other low-lying neighborhoods. With about a quarter of their country lying at or below sea level, the Dutch have developed several flood management techniques that could help Newport keep the water at bay.

One technique that the Dutch have employed since the 11th century is the levee or dike, a constructed wall along the coastline that protects the country from the sea. Constructing these levees along the most vulnerable neighborhoods could protect Newport from both storm surges and sea level rise.

If levees prove insufficient, entire sites could be raised, including the infrastructure, to lift the whole neighborhood out of the floodplain.

If sea levels rise to the point where much of coastal Rhode Island is at risk, a project like the Dutch "Delta Works" could be undertaken at the mouth of Narragansett Bay. Completed in 1997, the "Delta Works" (right) closes off the sea estuaries of the Zeeland province and protects much of inland Holland from flooding. It is designed to withstand a 10,000 year flood.

NEAR TERM:

- Build levees at the park and against the cove to protect from storm surge over the walls

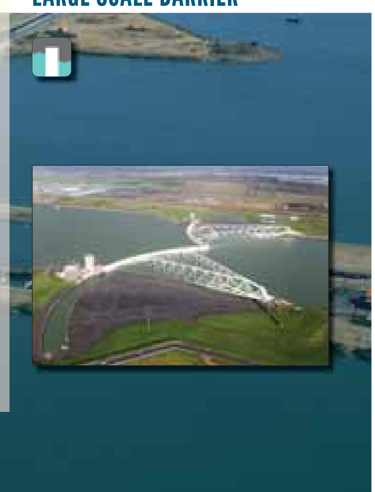
MEDIUM/LONG TERM

- Raise streets and infrastructure in the low-lying areas of the city

LONG TERM

- Construct large scale sea walls or barriers at the mouth of Narragansett Bay

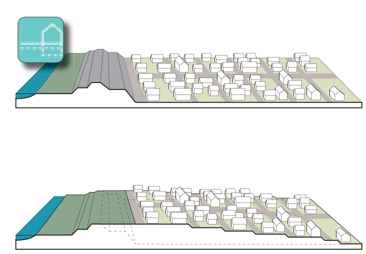
LARGE SCALE BARRIER



LEVEES

12-meter high mixed-use levee in Scheveningen, the Netherlands

RAISE STREETS & INFRASTRUCTURE



When a levee becomes insufficient, the entire site can be raised above the floodplain.

In response to the threat of extreme flooding, the Netherlands has built large scale barriers that protect the country from 10,000-year flooding events, but still allow major cities to function as active ports.

PROTECTING THE POINT

Any changes to the existing neighborhood must be both historically appropriate and responsive to environmental challenges.

POLICY AND DESIGN

CHALLENGES IN MAINTAINING BUILDING AND STREET CHARACTER

CONVENTIONAL METHODS FOR PROTECTING HOMES AGAINST FLOOD RISK ARE NOT ALWAYS COMPATIBLE WITH PRESERVING THE CHARACTER OF HISTORIC DISTRICTS LIKE THE POINT.

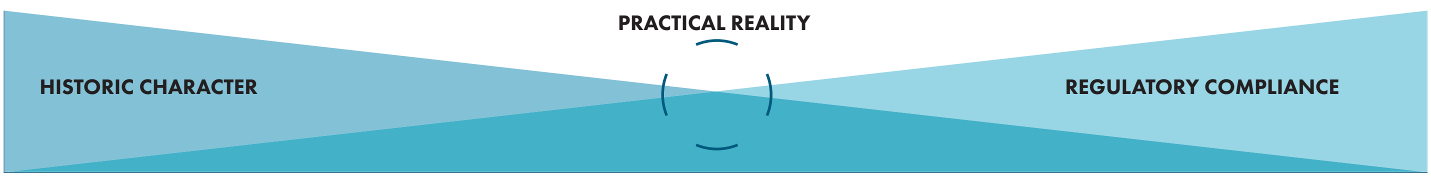
IN THESE CASES, FEDERAL AND STATE FLOOD REGULATIONS ARE OFTEN UNABLE TO BE MET WITHOUT SEVERELY COMPROMISING THE HISTORIC FABRIC - LEAVING OWNERS WITH LIMITED OPTIONS FOR PROTECTING THEIR HOMES.

RESPONSIBLE STAKEHOLDERS:

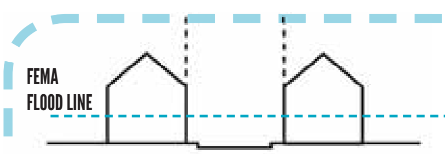
Historic streetscape in the Point Neighborhood.

70 Bridge Street in the Point Neighborhood. After much back and forth with the community and local historic district, the owner was able to raise their home to mitigate much of the flood risk, but well below the height that would have brought them closer to regulatory compliance.

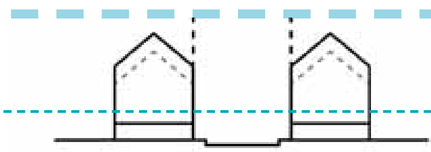
Image from *Homeowner's Guide to Retrofitting* published by FEMA.



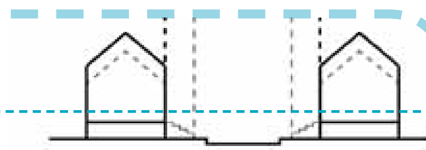
RECOMMENDATIONS FOR ELEVATING HOMES IN THE HISTORIC POINT NEIGHBORHOOD



Existing condition.



Raise house below FEMA flood line and add stoop at street.



Raise house below FEMA flood line, set house back from street and add front stoop.

REGULATORY COMPLIANCE	
PRACTICAL REALITY OF FLOODING	
HISTORIC CHARACTER	■
POSSIBLE ON SMALL LOT	■
AFFORDABILITY	■

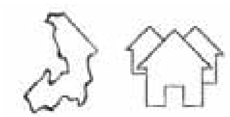
REGULATORY COMPLIANCE	
PRACTICAL REALITY OF FLOODING	■
HISTORIC CHARACTER	■
POSSIBLE ON SMALL LOT	■
AFFORDABILITY	◢

REGULATORY COMPLIANCE	
PRACTICAL REALITY OF FLOODING	■
HISTORIC CHARACTER	■
POSSIBLE ON SMALL LOT	◢
AFFORDABILITY	◢

POLICY AND DESIGN

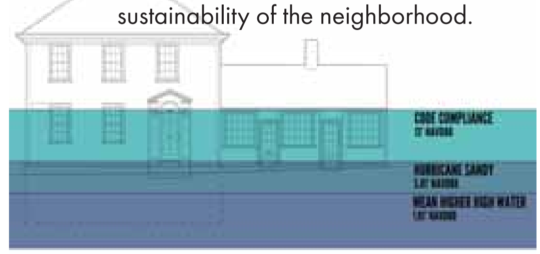
PROTECTING THE POINT: DESIGN GUIDELINES

RESPONSIBLE STAKEHOLDERS:



POLICY CHALLENGES: FLOOD INSURANCE

- Existing historic homes in the Point Neighborhood sit well below FEMA's design flood elevation of 13' above NAVD88.
- Flood insurance is mandatory for federal regulated mortgages, but because of their low elevations, homes located in the southern portion of the Point neighborhood are subject to cost-prohibitive full risk flood insurance rates.
- Home mortgages in the Point have become non-existent. Interested home buyers must purchase their properties outright.
- The difficulty of obtaining mortgages and insurance threatens the long-term sustainability of the neighborhood.

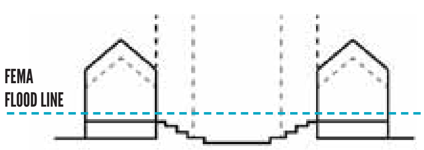


ELEVATING ALL HOMES IN THE FEMA FLOODPLAIN TO COMPLY WITH EXISTING REGULATIONS WOULD DESTROY THE CHARACTER OF THE POINT NEIGHBORHOOD

...BUT...

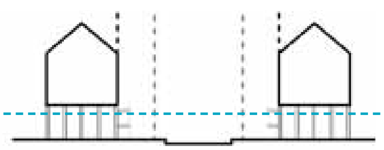
IF HOMES CANNOT BE ELEVATED ABOVE THE FEMA FLOOD LINE - FLOOD INSURANCE AND MORTGAGES (which require flood insurance) ARE DIFFICULT OR IMPOSSIBLE TO SECURE.

HOW DO WE SUSTAIN THIS HISTORIC URBAN NEIGHBORHOOD IN THE FACE OF THESE CHALLENGES?



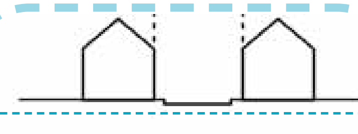
Raise house below FEMA flood line, set house back from street, and terrace site stairs.

REGULATORY COMPLIANCE	
PRACTICAL REALITY OF FLOODING	
HISTORIC CHARACTER	
POSSIBLE ON SMALL LOT	
AFFORDABILITY	



Raise house on posts above FEMA flood line, set house back from street, and add entrance stairs.

REGULATORY COMPLIANCE	
PRACTICAL REALITY OF FLOODING	
HISTORIC CHARACTER	
POSSIBLE ON SMALL LOT	
AFFORDABILITY	



Raise all houses, streets and site infrastructure above FEMA flood line.

REGULATORY COMPLIANCE	
PRACTICAL REALITY OF FLOODING	
HISTORIC CHARACTER	
POSSIBLE ON SMALL LOT	
AFFORDABILITY	

SEVERAL ELEVATION TECHNIQUES ARE NOT APPROPRIATE FOR IMPLEMENTATION IN THE HISTORIC POINT NEIGHBORHOOD

LONG TERM POSSIBILITY DRIVEN BY SEA LEVEL RISE / ALTERNATIVE TO LARGE-SCALE BARRIER

IN THE ABSENCE OF DESIGN GUIDELINES - THE CHARACTER OF THE POINT IS AT RISK AS HOMEOWNERS STRUGGLE WITH THE PRESSURES OF INSURANCE COSTS AND INCREASED FLOOD RISK.

POLICY AND DESIGN

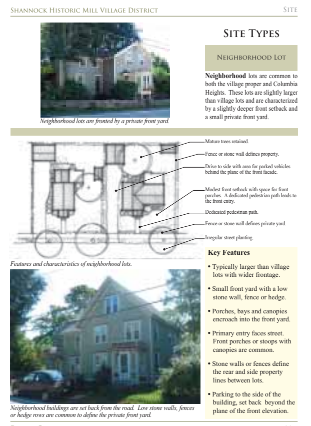
PROTECTING THE POINT: DESIGN GUIDELINES

DESIGN GUIDELINES REPRESENT AN AGREED-UPON APPROACH FOR FUTURE DEVELOPMENT.

DESIGN GUIDELINES ALLOW FOR A PREDICTABLE PERMITTING REVIEW PROCESS.

RESPONSIBLE STAKEHOLDERS:

EXAMPLES OF DESIGN GUIDELINES FOR HISTORIC NEIGHBORHOODS



1. Design guidelines document the existing character of a neighborhood, including building setbacks, lot coverage, height, and proportions of openings.

2. Design guidelines help ensure that future development is in keeping with the existing character of a historic neighborhood.

3. Design guidelines set forth agreed-upon metrics for future development in an existing neighborhood.

4. Design guidelines calibrated for the Point Neighborhood could recommend techniques for elevating buildings, or the entire site, without severely impacting the existing sense of place.

5. Design guidelines can provide direction for implementing green infrastructure techniques at the neighborhood level and on individual residential lots.

WITH COMMUNITY DEVELOPED DESIGN GUIDELINES, AN AGREED-UPON SET OF STRATEGIES WILL ENSURE THAT ALTERATIONS MEET THE COLLECTIVE EXPECTATIONS OF ALL INVOLVED.

PRESERVING 74 BRIDGE STREET

As storms continue to become more severe and tides continue to rise, this property – along with many others – faces increasing risk of damage due to flooding.

74 BRIDGE STREET

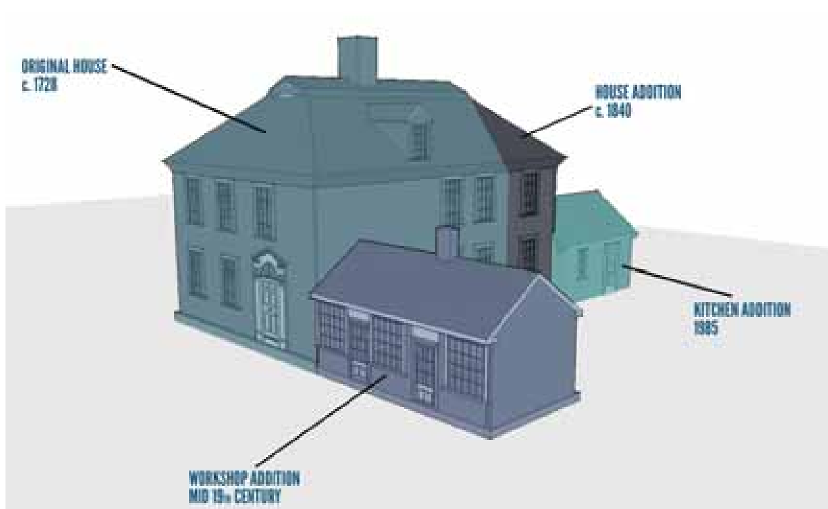
CHRISTOPHER TOWNSEND HOUSE SEEN FROM BRIDGE STREET c. 1920

INTRODUCTION AND HISTORY

The Christopher Townsend House is located at 74 Bridge Street in Newport's historic Point Neighborhood within the bounds of the Newport Historic District.

74 Bridge Street is significant both for its age and generally good state of preservation and for its connection to the renowned family of Newport cabinetmakers. The property was bought by Christopher (1701-1787), who was the father of the much celebrated John Townsend (1733-1809), in 1725. Stylistic elements and dendrochronology concur on a date of around 1728 for the earliest part of the structure. A square plan with two bays, this core was enlarged with an additional bay to the south before 1840, the most likely date as well for the reworking of the roof from what was presumably a simple gable to a gable-on-hip. The house is adjoined to the west by a smaller one-story addition that measures approximately twelve by twenty feet in area. At one time thought to have perhaps been Townsend's workshop, more recent scrutiny of building materials, including dendrochronology, suggests that the "shop" currently on site was constructed in the mid-nineteenth century from materials at hand. The kitchen addition on the south elevation was constructed in the 1980s.

The earliest part of the house is plank on frame construction while the addition to the south is a later stud construction. Three main rooms surrounded the large central chimney with an entry hall and staircase in the northwest corner. When it was enlarged in the nineteenth century, an additional staircase was added at the point of intersection between old and new construction, and the staircase to the attic was relocated to the back of the house. Most significant of interior finishes are the wood paneled mantel surround of the front (northeast) parlor fireplace and the turned balusters of the front staircase. Both are rare early survivals of finely finished carpentry traditions in Newport – important corollaries to the more numerous examples of cabinetmaking for which, at this time, Newport was already becoming so highly regarded.



74 Bridge must have been a lively center of activity for much of the eighteenth century. Christopher Townsend and wife Patience Easton (a direct descendant of the original proprietors of Easton's Point) had six children. During the French occupation of 1780-81, a naval officer was billeted at 74 Bridge Street. On his death in 1787, Christopher willed the house to Christopher Jr., a clockmaker and engraver. Less is known about nineteenth-century habitation. George and Charles Green bought the house from a Mrs. Southland in 1828, and "Chas Green," identified in some census records as a shoemaker, is listed as an owner as recently as 1907. In 1960, the house was rescued from possible demolition by Mrs. William Holland Drury, who in turn bequeathed the house to her daughter Mrs. Robert H. I. Goddard. It stayed in the Goddard family until the Newport Restoration Foundation purchased the house in 2014 from Robert Ives Goddard III of Providence.

DEFINING THE CHALLENGES

DESIGNING FOR THE ENVIRONMENT AT 74 BRIDGE STREET

FLOODING

Located just two blocks inland from the Newport Harbor at an intersection that sits only four feet above sea level, 74 Bridge Street is subject to tidal and groundwater flooding as well as storm surge and stormwater runoff. As storms continue to increase in frequency and strength and tidal levels continue to rise, 74 Bridge Street faces ever increasing levels of flooding.

ENVIRONMENTAL FACTORS

SEA LEVEL RISE

Sea level has risen approximately 11 inches in the past 100 years in the Newport region. With ground water levels already higher than the basement floor, flooding in the basement is a daily occurrence. Without the sump pump in constant operation, there would be an average of 9 inches of standing water at high tide.

STORM EVENTS

In 2012, Hurricane Sandy brought over 7 inches of standing water into the kitchen wing and flooded the basement up to the first floor framing. This corresponded to water levels approximately 4 feet above Mean Higher High Water.

REGULATORY ISSUES

Base flood elevations and associated building requirements are governed by state building codes and by FEMA. These regulations can be difficult to achieve and can be in direct conflict with other regulations for historic buildings. At 74 Bridge Street, the base flood elevation dictated by building codes would require the house to be elevated seven feet.

INFRASTRUCTURE CHALLENGES

Inadequate infrastructure leads to amplified water levels on the site during heavy storm events. Tidegates adjacent to the property can increase floodwater on the site under certain conditions. During flooding, sewers back up creating the issue of brackish water accumulation on the property.

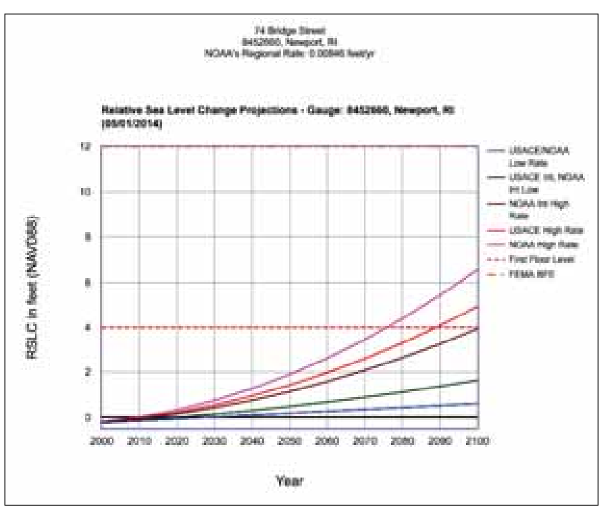
DESIGN FACTORS

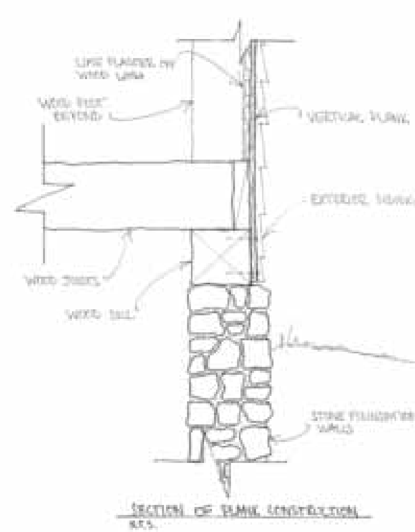
MATERIALS

The original plank construction, stone foundations, and lime based plaster finishes of 74 Bridge Street are inherently resilient to deterioration and mold formation that result from cyclical wetting in a way most contemporary materials are not. New and replacement materials should be both environmentally and historically appropriate.

CONTEXT

74 Bridge Street is located in the historic Point Neighborhood. Changes made to the house's exterior fabric, its elevation, or to its siting impact not only this property, but the character of the surrounding landscape.





CURRENT CONDITIONS

FLOOD LEVELS AND MITIGATION MEASURES

74 BRIDGE STREET IS VULNERABLE TO DAILY TIDAL FLOODING AND INCREASINGLY THREATENING STORM EVENTS. IN ADDITION, TODAY'S STRINGENT CODES WOULD REQUIRE THE BUILDING TO BE ELEVATED APPROXIMATELY 7 FEET.

MITIGATION MEASURES IN PLACE

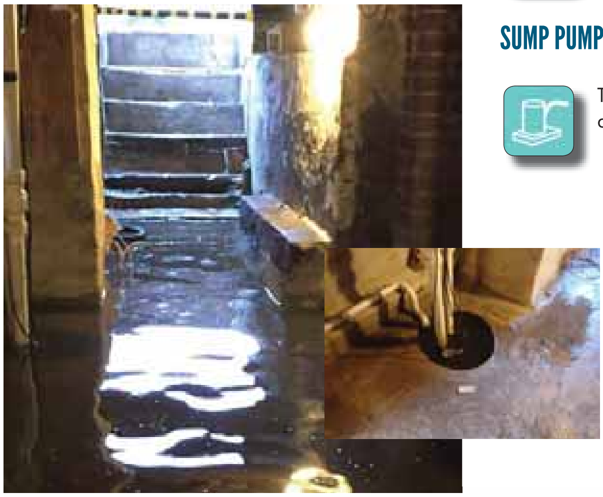
In order to handle the frequency and level of flooding that are already seen at 74 Bridge Street, the NRF has undertaken several measures to minimize water levels and damage in the house. A sump pump was installed in the basement and the hot water heater was elevated to the kitchen wing. Additionally, all electrical wiring in the basement was raised to the level of the first floor framing, waterproof wiring was installed, and protective covers were placed over light fixtures.

ELEVATED BOILER

The water boiler was moved from the basement up to the kitchen addition. While this prevents the boiler from experiencing daily exposure to water, it is still susceptible to flooding from major storms.

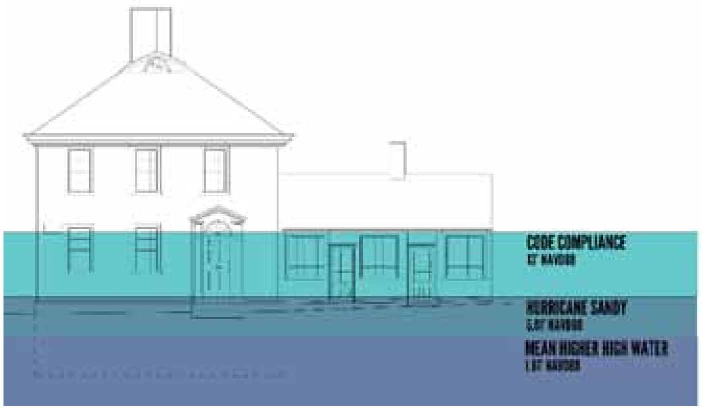
SUMP PUMP

Two sump pumps have been installed in the basement and run constantly. If the pumps are turned off, 9"-10" of standing water accumulate.



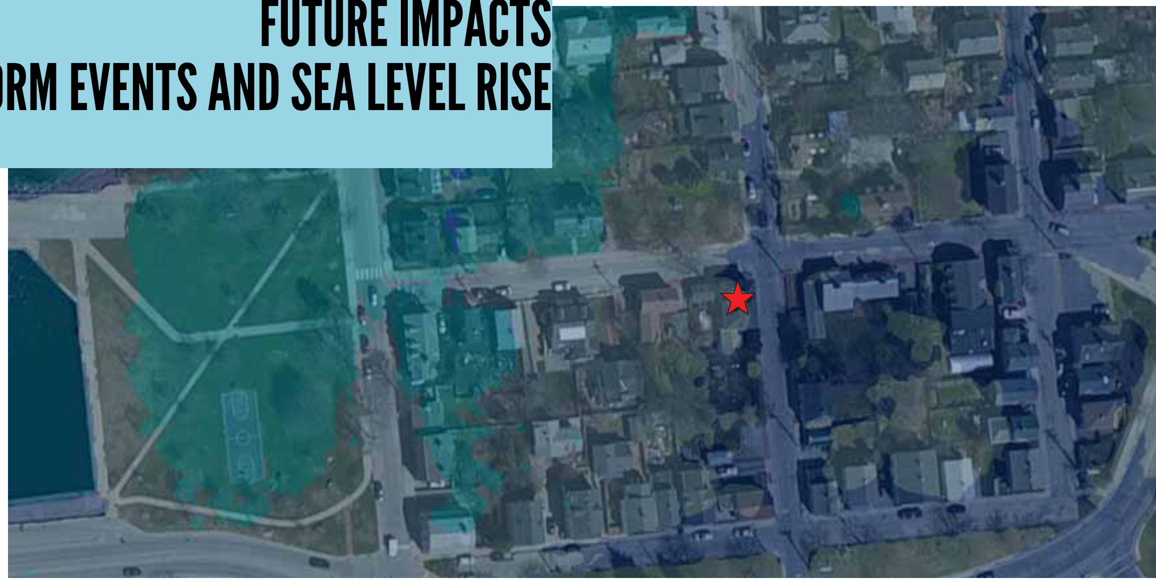
74 Bridge Street has seen a number of record breaking flood events in its life span, as well as progressively rising tide levels. In the past century, the house has weathered storms increasing in frequency and intensity including the New England Hurricane of 1938, Hurricane Carol in 1954, and more recently Hurricanes Irene in 2010 and Sandy in 2012, which brought water four feet above Mean Higher High Water levels.

Mean Higher High Water, which is the average elevation of higher high water levels measured each day, is already well above the basement floor level of the house. Tidal high water levels are increasing measurably, exposing the property to consistently higher water levels. By current FEMA designation, the property has a base flood elevation of 12'-0" NAVD with additional regulations imposed by the State of Rhode Island, meaning that the building would need to be elevated approximately seven feet in order to be compliant with current regulations.



FLOODING SCENARIOS

FUTURE IMPACTS
STORM EVENTS AND SEA LEVEL RISE



GLOSSARY OF TERMS

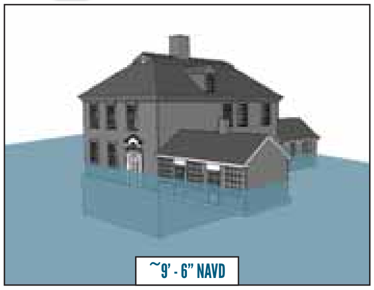
NAVD88 = North American Vertical Datum
MHHW = Mean Higher High Water
100-Year Storm = Storm with a 1% chance of occurrence annually

Future levels based on NOAA sea level rise projections.

SEA LEVEL RISE

+

100-YEAR STORM



=

TOTAL WATER LEVEL

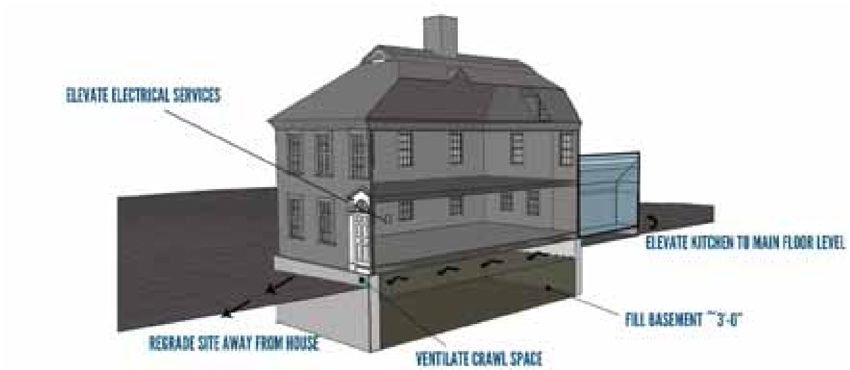
NEAR TERM STRATEGIES

IMPLEMENTATION OF MITIGATION MEASURES AT 74 BRIDGE STREET

There is no single solution to mitigate flooding at 74 Bridge Street, but rather a series of interventions that will allow the building to perform with minimal flood damage and maximum occupant comfort during short-term flooding events. Shown below, the multi-faceted recommendations can be implemented in stages, and have a combined effect of greatly improving the resiliency of the house under current seawater and floodwater levels. The approach includes:

- Filling the basement approximately 3′-0″, bringing it above the level of current high tide levels.
- Ventilating the new crawl space to prevent moisture damage.
- Raising electrical wiring and outlets above flood levels.
- Elevating the kitchen wing to the elevation of the main house.
- Regrading the site so that flood waters drain away from the house.

RESPONSIBLE STAKEHOLDERS:

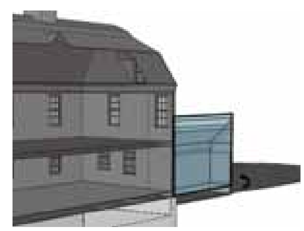


FILL BASEMENT ~3'-0"

Filling the basement to a height approximately three feet above the current floor will elevate the floor above current high tide levels. This will eliminate the need for a constantly operating sump pump.

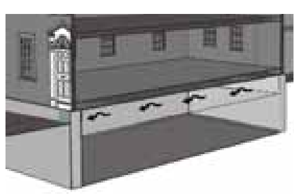
ELEVATE KITCHEN ADDITION TO LEVEL OF MAIN HOUSE

The kitchen addition to the rear of the main house sits nearly a foot below the primary finish floor level. As a result, the kitchen is the first space to flood, which has led to damage of appliances and finishes during past storm events. Elevating this space to match the level of the main house will raise it above previous flood levels without dramatically changing the house's context on the site.



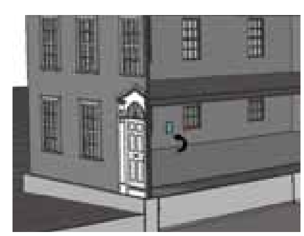
VENTILATE CRAWL SPACE

Installing air vents to the newly created crawl space both allows water to flow through during floods and allows air to ventilate the space after wetting. This both minimizes hydrostatic pressure on the foundation walls and prevents mold growth and material degradation of elements exposed to water.



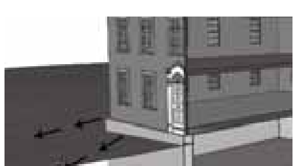
ELEVATE ELECTRICAL WIRING AND RECEPTACLES

Electrical wiring and receptacles are vulnerable to even minor flooding due to their location at the base of the walls. Running wiring from above and elevating outlets will protect the house's electrical circuitry during storm and flood events.



REGRADE SITE AWAY FROM HOUSE

Currently, the grading of the site is not designed to optimize drainage. Regrading so that the ground slopes away from the house on all sides would minimize the impact of floodwater infiltration and loading on the existing house.



THE IMPLEMENTATION OF NEAR-TERM STRATEGIES WILL MINIMIZE THE IMPACT OF REGULAR FLOODING THAT OCCURS DUE TO ELEVATED HIGH TIDES AND INCREASING LEVELS OF STORMWATER FOR THE NEXT SEVERAL DECADES.

LOOKING FORWARD & LOOKING BACK

Planning for the years ahead.

Recognizing our partners and explaining the process.

LOOKING FORWARD

PLANNING FOR THE YEARS AHEAD

WHAT ARE THE GOALS FOR THE FUTURE?

- ENSURE RESIDENTS' SAFETY
- PROTECT STRUCTURAL INTEGRITY OF BUILDINGS
- ENSURE CONTINUED USE OF BUILDINGS
- PRESERVE HISTORIC CHARACTER OF NEIGHBORHOOD

HOW DO WE WEIGH THE DECISIONS AHEAD OF US?

- IMPACT ON HISTORY/CULTURE/IDENTITY
- EFFECTIVENESS IN PROTECTING THE POINT
- FINANCIAL COST
- TIMELINE

INCREASE CAPACITY OF EXISTING INFRASTRUCTURE

- Install outfall tide gate
- Increase pipe size
- Install pump station
- Install neighborhood cistern below Storer Park

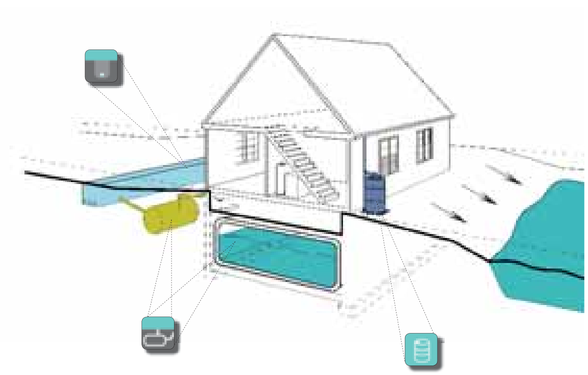
STORMWATER NEXT STEP:

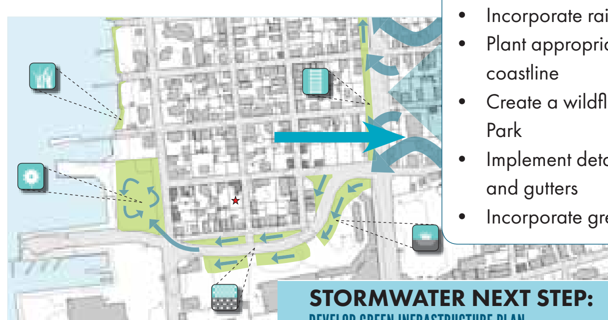
CREATE PHASED PLAN FOR UPGRADING EXISTING STORMWATER INFRASTRUCTURE

- Establish stormwater management districts to fund stormwater services
- Determine benchmarks that would trigger next upgrade
- Determine how benchmarks are monitored

DECREASE PRESSURE ON EXISTING INFRASTRUCTURE

- Develop railroad bed greenway
- Incorporate rain gardens
- Plant appropriate species along coastline
- Create a wildflower meadow at Storer Park
- Implement details for permeable streets and gutters
- Incorporate green infrastructure strategies





STORMWATER NEXT STEP:

DEVELOP GREEN INFRASTRUCTURE PLAN

- City-wide plan would institute regulations to address stormwater drainage for municipal open space and private industrial, commercial and residential lots
- Consider parcel-based billing system based on percentage of impervious surfaces on lot and offer incentives to encourage property owners to implement green infrastructure techniques
- Incentivize new development (including at RIPTA's Intermodal Station) to incorporate strategies

DECREASE PRESSURE USING STRATEGIES AT RESIDENTIAL LOTS

- Install rain barrels
- Install cisterns
- Create rain gardens
- Install dry wells

STORMWATER NEXT STEP:

DEVELOP STORMWATER BEST PRACTICE GUIDE FOR HOMEOWNERS

- Calibrate techniques and details for implementation in historic districts
- Coordinate techniques and implementation with district-wide design guidelines

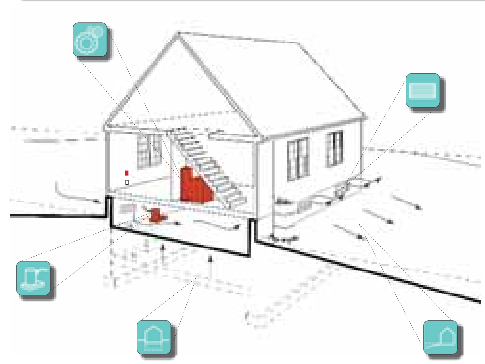
PROTECT HOMES FROM FLOODING

- Grade site away from house
- Install sump pump
- Elevate critical systems
- Raise basement
- Install flood vents
- Waterproof basement

STORMWATER NEXT STEP:

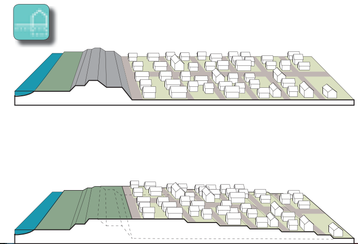
PROVIDE FLOOD MITIGATION MANUAL FOR PROPERTY OWNERS

- Calibrate techniques and details for implementation in historic districts
- Coordinate techniques and implementation with district-wide design guidelines



THERE ARE MORE QUESTIONS THAN THERE ARE ANSWERS:

- HOW IS THE VALUE OF A 300 YEAR-OLD PLACE QUANTIFIED?
- WHAT ACTIONS ARE NECESSARY EVEN WITHOUT SEA LEVEL RISE?
- HOW MUCH MORE WOULD IT COST TO ADD A BUFFER TO EXISTING INFRASTRUCTURE PROJECTS TO ACCOUNT FOR SEA LEVEL RISE?
- HOW WILL THESE PROJECTS BE FINANCED? HOW IS PAYMENT STRUCTURED OVER TIME?
- WHAT ARE THE BENCHMARKS THAT TRIGGER THE SUCCESSIVE PHASES IN A LONG-TERM VISION? HOW ARE THOSE BENCHMARKS MEASURED?
- HOW MUCH TIME DO WE NEED TO PLAN? AND TO BUILD?
- WHO SHOULD BE INVOLVED IN THE DECISION-MAKING PROCESS? WHO WILL BE RESPONSIBLE FOR IMPLEMENTING THE AGREED-UPON CHANGES?



SHORT-TERM PLANNING FOR SEA LEVEL RISE:

- Elevate critical systems
- Elevate basement level
- Waterproof basement

MID-TERM PLANNING FOR SEA LEVEL RISE:

- Raise homes in low-lying areas
- Build levees

LONG-TERM PLANNING FOR SEA LEVEL RISE:

- Raise streets and infrastructure
- Construct large-scale barrier

SEA LEVEL RISE NEXT STEP:

CREATE LONG-TERM VISION FOR THE POINT

- Could be one part of larger city-wide visioning process
- Involve all stakeholders in process
- Weigh short-term financial costs against long-term benefits - economic, social and environmental
- Identify best options for city's and neighborhood's goals
- Quantify benchmarks that will trigger each successive phase
- Establish savings plan for implementing projects

PROTECT THE POINT

- Document existing historic architectural and urban character in the Point Neighborhood
- Establish maximum allowable first floor level
- Recommend setbacks, techniques and details for elevating buildings
- Provide details for green infrastructure strategies in historic neighborhood
- Provide details for flood-proofing in historic neighborhood

DESIGN NEXT STEP:

CREATE DESIGN GUIDELINES FOR THE HISTORIC POINT NEIGHBORHOOD

- Design guidelines should respond to goals set forth in long-term neighborhood visioning process
- Design guidelines should be agreed-upon by all stakeholders
- Design guidelines can be incorporated into permitting process
- Design guidelines will be calibrated for historic Point Neighborhood

PLANNING FOR THE IMPACTS OF CLIMATE CHANGE, INCLUDING SEA LEVEL RISE AND INCREASED PRECIPITATION EVENTS, WILL RAISE MANY MORE QUESTIONS THAN THERE ARE ANSWERS....
A THOUGHTFUL, INTEGRATED VISION THAT IS ADAPTABLE AND CONSIDERS THE NEEDS OF ALL MEMBERS OF THE COMMUNITY IS REQUIRED.

LOOKING AROUND:

USEFUL POLICY EXAMPLES

- Financing Stormwater Retrofits in Philadelphia and Beyond
- Philadelphia Homeowners Guide to Stormwater Management
- Simsbury Stormwater Design Guidelines, Simsbury, CT
- Green Streets Stormwater Management Plan, City of Milwaukee
- Boston Complete Streets, City of Boston
- The Urban Implications of Living with Water, ULI Boston
- Retrofitting Buildings for Flood Risk Manual, NYC Department of City Planning
- Vacant Basements for Stormwater Management Feasibility Study, City of Milwaukee
- Waterplan 2 Rotterdam, Municipality of Rotterdam, The Netherlands
- Rotterdam Climate Proof Adaptation Programme, Rotterdam, The Netherlands
- Large-scale infrastructure - Delta Works, The Netherlands

LOOKING BACK

PLANNING FOR THE YEARS AHEAD

OUR PARTNERSHIPS

In fall 2015, the Newport Restoration Foundation engaged Union Studio Architecture and Community Design from Providence, RI and Building Conservation Associates from Newton, MA to undertake a case study of 74 Bridge Street, a recently acquired historic home in Newport's Point Neighborhood with additional project management consultation from Mohamad Farzan of NewPort Architecture. The objective of the exercise was to outline interventions that would protect the house from the flooding that is occurring on a daily basis, and that will only worsen with rising sea levels. The results of the exercise were intended to be used as a model for owners of similar homes, in equally threatened locations.

Early on in the process, it became evident that a case study such as this had to be considered within the context of the broader neighborhood. The effects of flooding and rising sea levels are not unique to 74 Bridge Street; they are issues that the neighborhood, the city, and the state should be considering as we all work to understand how best to chart a path forward knowing that the earth's climate is rapidly changing.

THE PROCESS

The findings documented first in the exhibit, and now this publication, are the result of a two day charrette held on January 21 - January 22, 2016 in Newport, RI. The charrette convened a group of professional architects, engineers, planners, landscape architects, historians and preservationists to discuss the case study of 74 Bridge Street, and the issues facing the Point at large. Staff from the City of Newport and from the Newport Restoration Foundation participated in the discussions, as well as residents and members of the Point Association.

The charrette included a walk-through of the Point neighborhood, a walk-through of 74 Bridge Street, a presentation of existing conditions and a series of break-out discussions, organized by neighborhood level issues and building level issues.

The exhibit at the Keeping History Above Water Conference, April 10-13, 2016, documented the ideas that came out of the two-day charrette process.

Thank you to the Newport Historical Society for use of historic storm photographs in their collection.

Special thanks also to iolabs for their in-kind donation toward printing the exhibition boards.

iolabs
PHOTO, FINE ART + EXHIBITION SERVICES

Support for this project was provided by a Hurricane Sandy Disaster Relief Grant through the Historic Preservation Fund of the National Park Service awarded by the R.I. Historical Preservation and Heritage Commission. Additional funding has been awarded by the City of Newport under their *Impacts of Sea Level Change: PILOTING Toward Solutions* grant from the van Beuren Charitable Foundation.

RI Historical Preservation & Heritage Commission

NATIONAL PARK SERVICE

vbcf

CHARRETTE LEADERS

Douglas Kallfelz	**Union Studio, Principal**
Stephanie Zurek	**Union Studio, Associate**
Lisa Howe	**Building Conservation Associates, Director**
Lori Ferriss	**Building Conservation Associates, P. E.**

CHARRETTE PARTICIPANTS

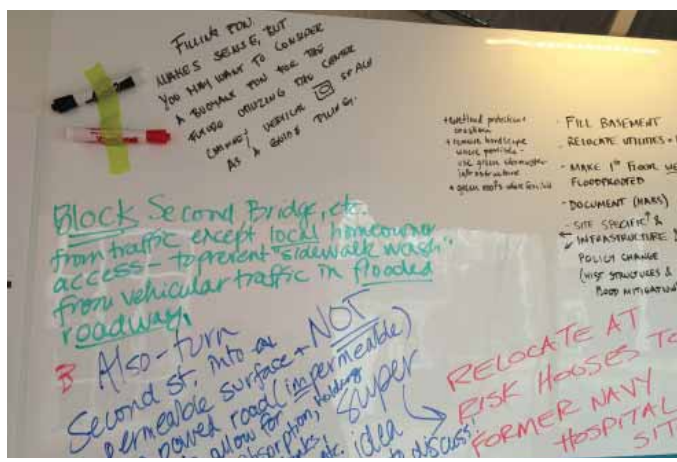
Helen Johnson	City of Newport, Preservation Planner
Jean Carroon	Goody Clancy, Principal
Jon Ford	Horsley Witten Group, Civil Engineer
Jenny Parker	National Park Service, Technical Preservation Services, Architectural Historian
Shanti Anderheggen	National Trust for Historic Preservation, Director, Easement Program
Mohamad Farzan	NewPort Architecture, Principal
Frank Amaral	NRF, Grounds and Gardens Supervisor
Ashley Braquet	NRF, 2015 Conference Research Fellow
Robert Foley	NRF, Director of Preservation
Tom Goddard	NRF, Board of Trustees
Marc Lennon	NRF, Heating and Maintenance Supervisor
Kelsey Mullen	NRF, Coordinator for Academic Programs
Margot Nishimura	NRF, Deputy Director for Collections, Programming and Public Engagement
Pieter Roos	NRF, Executive Director
Sean Sullivan	NRF, Foreman of Preservation Properties
Tanya Kelly	PLACEstudio Landscape Design, Principal
Tom Hockaday	Point Association, President
Richard Youngken	Preservation Planner
Laurie Ossman	Preservation Society of Newport County, Director of Museum Affairs
Kaity Ryan	Preservation Society of Newport County, Manager of Preservation Policy
Pam Rubinoff	RI Coastal Resources Management Council, Senior Coastal Manager
Joanna Doherty	RIHPHC, Senior Architectural Historian
Virginia Hesse	RIHPHC, Principal Historical Architect
Katy B. Jurczyk	RIHPHC, Senior Historic Preservation Specialist
Roberta Randall	RIHPHC, Architect
Edward Sanderson	RIHPHC, Executive Director & State Historic Preservation Officer for Rhode Island
Ambar Espinoza	RI Public Radio, Environmental Reporter
Lauren Carson	RI State Legislature, R.I. State Rep., House District 75
Matthew Bronski	Simpson Gumpertz and Heger, Principal

Workshop photos by Caroline Goddard

CONFERENCE WORKSHOP

On the last day of the Keeping History Above Water conference, a workshop was held at 74 Bridge Street for conference attendees. Break-out groups discussed topics ranging from infrastructure solutions to adaptation strategies for historic properties and the development of preservation guidelines. Participants commented on the recommendations highlighted in the exhibit, and added their own insight and suggestions. A wide range of promising ideas surfaced from the workshop:

- Project requires big picture vision and planning at the state level, with a number of critical stakeholders
    - Apply for a planning grant from the Rhode Island Department of Environmental Management
    - Army Corps of Engineers can perform surveys in many communities
    - Establish funding for low and moderate income communities
    - Examine lock system in Narragansett Bay to protect state against sea level rise.
- Use Point Neighborhood as pilot project for state, with NRF continuing to take a leadership role in process
- Create stormwater management district
- City to apply for grant funding from Environmental Protection Agency for stormwater management
- Create Hazard Mitigation Plan at both state and local levels to qualify for FEMA funding in event of storm damage
- Establish a Maritime Heritage District
- Leverage National Historic Landmark status of the Newport Historic District, which includes the Point neighborhood
- Research FEMA grants for individual homeowners to elevate homes
- Create stormwater storage basin at DEM Pier
- Create separate district with design guidelines
- Structure flood insurance plans to cover only vulnerable sections of buildings; remaining sections above the flood plain would be self-insured or standard coverage



Comments and suggestions from participants in the *Keeping History Above Water* conference were encouraged as a critical component of the dialogue.

Many thanks to our build and installation team from the Newport Restoration Foundation: Sean Sullivan (Foreman of Preservation Properties), Brian McCarthy (Paint Supervisor), and Peter Raposa (Carpenter);
with Tim Alsheimer, Frank Amaral, Brian Boyle, Mike King, Marc Lennon, John Padien, Lloyd Sisson, and Jeremy Weinand.

KEEPING HISTORY ABOVE WATER

APRIL 10-13, 2016 | NEWPORT, RI

NRF

UNION STUDIO
ARCHITECTURE & COMMUNITY DESIGN

BCA

With special thanks to **Union Studio Architecture and Community Design** for graphic design services for the 74 Bridge Street Exhibition at the *Keeping History Above Water* conference and for this publication.