# Living with the Bay Resiliency Strategy


## Task a. Vision Statement, Purpose, Need, Goals, and Objectives

Prepared by:

TETRA TECH

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**PRESENTED TO**

**Governor's Office of Storm Recovery**
25 Beaver Street
New York, New York 10004

**PRESENTED BY**

**Tetra Tech**
5 Hanover Square
New York, NY 10004

P +1-646-576-4034
F +1-212-480-2836
tetratech.com

Governor's Office of Storm Recovery

TETRA TECH

Prepared by:

Tim Vanderwalker, P.E., C.D.T. Date
Project Engineer

Authorized by:

Michael Bomar, P.E. Date
Project Manager

# TABLE OF CONTENTS



Disclaimer: The information provided in this document is based on the best available data and information provided by others at the time of the preparation of this material and is subject to change.

# 1.0 PURPOSE

To develop a plan to improve drainage and enhance natural resources to minimize the community's risk from flooding and damage to life and property.

In response to the overwhelming disaster that following Superstorm Sandy, the Rebuild by Design (RBD) program, an initiative of the Hurricane Sandy Rebuilding Task Force and U.S. Department of Housing and Urban Development (HUD), sought projects that would provide innovative solutions to large-scale, complex problems involving coastal flooding and aging infrastructure. The RBD program required design teams to evaluate a region's vulnerabilities, strengths, and interdependencies to develop regionally applicable solutions to future flood resiliency.

Through the RBD program, design teams connected to local efforts with the objectives of igniting innovation and executing world class projects. The Living with the Bay (LWTB) project met the objectives of RBD by undertaking a watershed-scale approach to address flooding impacts and bolster resiliency against future storms in areas surrounding the Mill River (River) and Hewlett Bay (Bay) on Long Island, New York. A portion of the LWTB proposal was selected, referred to as "Slow Streams," that proposed a number of improvements specifically for the Mill River watershed.

As one of the primary watersheds on Long Island, the entire Mill River watershed comprises approximately 35 square miles of land area and spans many municipalities within Nassau County. **Figure 1** shows the extents of the Mill River watershed across Long Island. Through centuries of development, the watershed and the River itself have been altered. Urbanization has transformed the area limiting the natural processes of stormwater runoff treatment and flood control leading to environmental impacts to the ecosystem.

Figure 1. Mill River Watershed

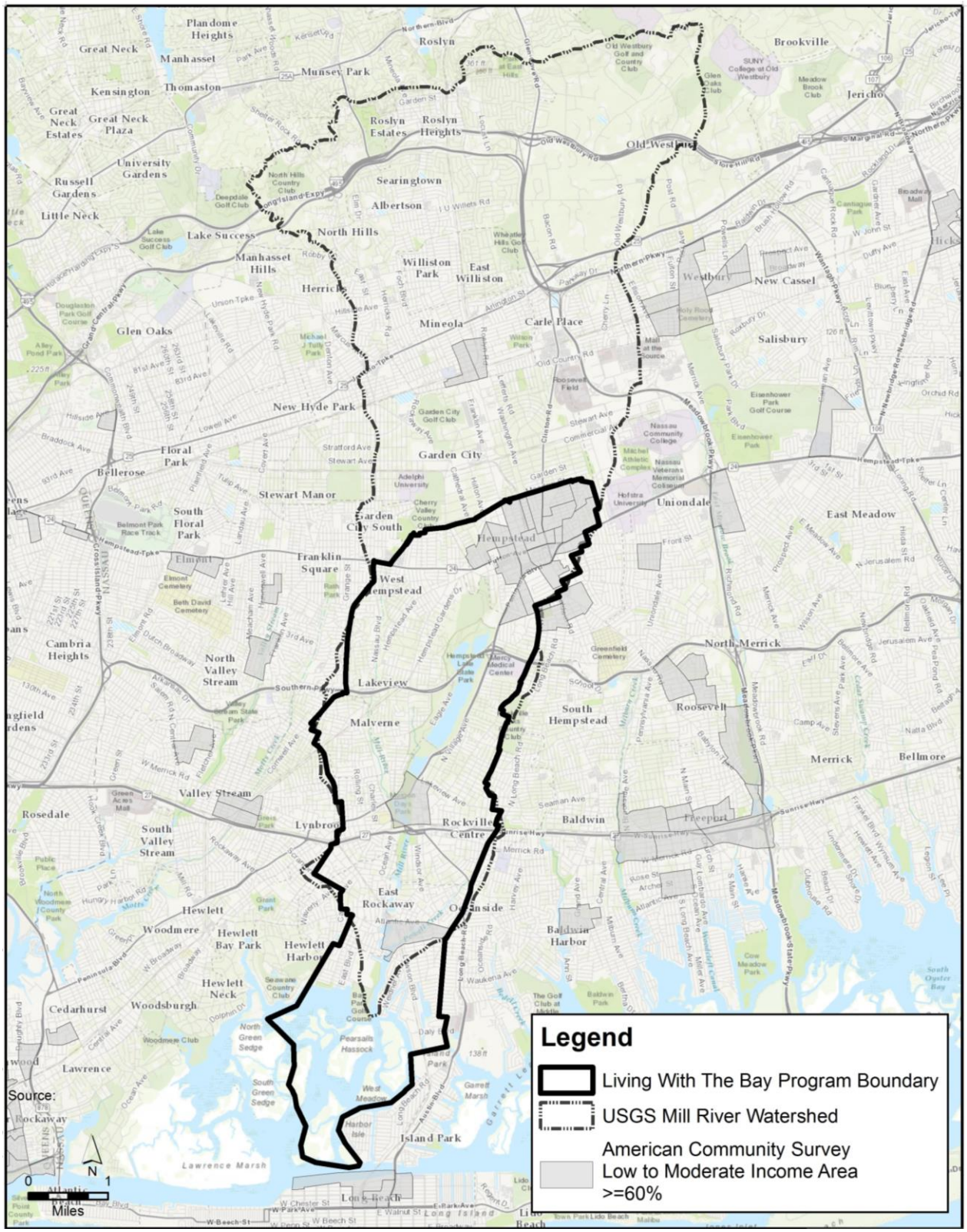
The increase in impervious area in the watershed without mitigating storage or treatment created a need for increased conveyance capacity. Development within the southern watershed area and the coastal zone is increasingly more susceptible to tidal inundation due to a lack of relief in the topography and projected sea level rise. In the upper reaches of the watershed, constructed reservoirs have become a settling pond for siltation and refuse, which negatively affects the natural processes within the ecosystem.

At the onset of developing a plan for LWTB, the Governor's Office of Storm Recovery (GOSR) requested a more refined LWTB program boundary be developed within the larger Mill River watershed with the intent to reduce the area to a more manageable size. The program area limits on the east and west boundary were identified utilizing topographic data for the proximity of Mill River watershed. This area was then slightly modified based on discussions with individual jurisdictions and adjusted to match street alignments to clearly define the program area limits with actual landmarks such as streets. Since fewer drainage issues were identified in the northern portion of the watershed, and this is far removed from the Sandy inundation impacts in the south, the northern boundary was set so that the program area encompassed the Mill River and its primary tributaries as well as a large area of low & moderate income areas in the Village of Hempstead. The south boundary is defined by the coastal marsh areas near the mouth of the Mill River. **Figure 2** shows the Mill River watershed and LWTB program area. The LWTB team have commenced data collection and preliminary design to establish the needs and potential improvements possible for the program area.

To further progress the Mill River project, a Resiliency Strategy (Strategy) will be developed to establish the vision for the program area and determine the goals and the objectives necessary to meet the vision. This vision will serve as the linkage between the resiliency strategy objectives, developed in conjunction with the individual jurisdictions and watershed residents, and the objectives of HUD's Community Development Block Grant (CDBG) program and the RBD principles of flood defense, ecological restoration, access and urban quality, and social resiliency.

The Mill River Strategy will assess the feasibility and prioritization of key improvement projects within the program area with the intent of meeting the vision of the program. The Strategy will also identify how the stakeholders can move forward to address the environmental, economic, social, and infrastructure issues caused by a stormwater management system that has degraded over many years and is vulnerable to storm surge and sea level rise.

Figure 2: Mill River Watershed and LWTB Program Area.



# 2.0 NEED

Over the last century, the program area has become more populated with communities growing around the waterfront – lakes, river, and bay. Increasing populations and continued storm water runoff from development, have created chronic drainage problems and made the communities more susceptible to flooding and water quality problems. The flooding vulnerabilities were proven during Hurricane Irene and Superstorm Sandy.

Several critical issues have been identified through the RBD process. These issues surfaced through existing plan reviews, technical analyses, ongoing public engagement and input, and interagency coordination. The dynamic challenges, which are often interconnected, require comprehensive solutions.

Broadly speaking, there are five overriding factors that result in critical issues framed for action in the Strategy.

- Stormwater
- Storm surge
- Riparian flooding
- Coastal erosion
- Water quality

Data gathered following Sandy shows the impact of the storm surge flood inundation on parcels within the program area as shown in **Table 1**.

Table 1: Impacted Parcels of Sandy Storm Surge Inundation within the LWTB Program Area.

| Description | By Parcel | | By Area (Ac) | |
|---|---|---|---|---|
| | Count | % of Total Parcels | Sum Acres | % of Area |
| COMMERCIAL | 315 | 8% | 184 | 7% |
| COMMUNITY SERVICES | 111 | 3% | 1,382 | 55% |
| INDUSTRIAL | 32 | 1% | 16 | 1% |
| PUBLIC SERVICES | 1 | 0% | 2 | 0% |
| RECREATION AND ENTERTAINMENT | 43 | 1% | 73 | 3% |
| RESIDENTIAL | 3292 | 80% | 628 | 25% |
| VACANT LAND | 80 | 2% | 113 | 5% |
| WILD, CONSERVATION LANDS AND PUBLIC PARKS | 2 | 0% | 3 | 0% |
| NA | 245 | 6% | 95 | 4% |
| **TOTAL** | **4,121** | | **2,498** | |

## 2.1 STORMWATER

Elevated downstream water elevations, insufficient conveyance capacity, or an inadequate number of drainage inlets create nuisance flooding in the upstream areas of the watershed during rainfall events. During rain events, stormwater management in the program area is currently provided via surface runoff, inlet collection, and piped conveyance with limited storage provided for retention in upstream areas. The multiple stormwater systems outfall to the River and Bay within the program area. The River and Bay surface water elevation creates a downstream elevation that dictates the minimal water elevation upstream from the receiving waters. The existing systems have potential for limited capacity at each stage of the collection and conveyance system. Limited inlets cause ponding of water due to being overwhelmed with runoff volume attempting to drain through orifices too small for the flow. Stormwater pipes may have limited capacity and can restrict flow causing upstream ponding. A lack of backflow prevention causes the system to surcharge with water from the receiving water bodies, thus pervading the system and limiting the available storage for upstream runoff prior to discharge.

## 2.2 STORM SURGE

A lack of backflow prevention on the stormwater management systems introduces a susceptibility of low-lying upstream areas to flooding. In addition, saltwater intrusion in the system causes corrosion and shortens the life span of drainage structures. Storm surge also further deteriorates eroded coastal marshlands in the estuary. During events of major storm surge, seawalls and bulkheads may overtop, which causes inundation into the shoreline communities. Many neighborhoods within the program area are located along the shoreline of the Bay and River and are extremely susceptible to storm surge. These area may be served by an adequately sized stormwater management system; however, storm surge above the bulkheads and seawalls renders these systems ineffective.

## 2.3 RIPARIAN FLOODING

Urban and suburban development has encroached into the natural floodplain of the watershed. During storm events with an elevated downstream water elevation, riparian flooding extends into the River overbanks and thus, development within the floodplain, affecting the access to emergency facilities.

## 2.4 COASTAL EROSION

The LWTB program area includes the majority of the Bay, extending south to Reynolds Channel. Much of the Bay is comprised of salt marshlands, although several navigable channels exist through the bay to connect recreational boaters on Long Island to Reynolds Channel and further to the ocean. Over time, marshland vegetation and coastal landmass has degraded without restoration or enhancement. During storm surge events and as sea level rises, wave action will create an increasing threat to areas adjacent to the marshlands due to a lack of wave energy dissipation.

## 2.5 WATER QUALITY

An increase in impervious area within the program area with a lack best management practices (BMPs) to treat runoff has polluted the natural and man-made waterbodies. A number of pollutant sources have been identified in the watershed characterization process, with a primary focus on sediment and nutrients that impact habitat throughout the River corridor and contribute to possible eutrophication in the Bay. As coastal marshland areas erode, pollutants from atmospheric deposition such as lead are exposed, increasing the human health risks for the local community and further degrading the local environment.

# 3.0 VISION STATEMENT

*The Strategy will identify prioritized projects to improve community resiliency in the program area by mitigating flood impacts from stormwater and storm surge as well as implementing components such as ecological marshland restoration, enhancing public access to the waterfront, and providing educational opportunities on stormwater and environmental management.*

Through stakeholder-driven action, the Strategy will bolster the goals and objectives of the residing communities to recover in the wake of storm and flood events, by fostering economic vitality, protecting the environment, and focusing on the health, safety, and well-being of the community.

The communities within the Mill River Watershed will recover from the effects of flooding events to build a stronger, more economically robust community that is more resilient to these events. Flood reduction projects within the program area will intertwine to improve the health and vitality of the Mill River corridor, from the headwaters of Hempstead Lake to the coastal areas of Hewlett Bay.

# 4.0 GOALS AND OBJECTIVES

To bring the vision for the Strategy to fruition, a specific plan that identifies real, quantifiable, and measurable means for accomplishing the vision must be established.

Watershed-wide, the long-term goals to meet the vision are as follows:

- **Goal A:** *Resilience* – Increase community resilience with respect to sea level rise and extreme weather events
- **Goal B:** *Quality of Life* – Preserve quality of life in the community during natural disasters, emergency events, and tidal inundation.
- **Goal C:** *Environmental Improvements* – Restore the environmental health and water quality in the watershed.
- **Goal D:** *Waterfront Access* – Create and improve public access to the waterfront – lakes, river, and bay.
- **Goal E:** *Public Education* – Provide opportunities to educate the public on the multiple benefits of integrated water management and on safely interacting with shared resources.

These goals will be used to evaluate and prioritize projects in the LWTB program area that meet HUD's national objectives and the RBD principles.

## 4.1 GOAL A. *RESILIENCE*

Increased resilience to tidal inundation can be obtained through a multitude of measures:

- Setting finish floor elevations (FFEs) of structures above a minimum acceptable elevation
- Designing stormwater infrastructure to account for a minimum downstream water elevation
- Providing protective barriers at a set elevation
- Restoring and/or expanding coastal protection features such as marshlands and living shorelines
- Wet flood-proofing structures that can be inundated
- Dry flood-proofing structures for complete protection
- Retreating from the area and restoring natural conditions

These objectives can be met through policy implementation at the government level and proper design and oversight at the engineering design and planning level.

To provide resilience during extreme weather events, increased storage and capacity for stormwater systems can be provided during redevelopment, removal and replacement, and capital improvement projects. Increased conveyance and storage measures can be constructed that meet a minimum level of service standard for flooded conditions. Seawalls above flood and storm surge elevations and backflow prevention can also increase the area of protection landward from storm surge.

Proposed projects included in the Strategy will aim to provide stormwater management and tidal protection infrastructure that will increase the resiliency of the existing system and reduce the impacts of flooding.

## 4.2 GOAL B. *QUALITY OF LIFE*

During an emergency, whether a natural disaster, extreme weather event, or tidal inundation, the continued operation of infrastructure and life-saving services is paramount. To preserve a consistent quality of life, the Strategy will identify critical infrastructure, including emergency service facilities and evacuation routes to ensure residents have a safe community during major weather events and can return to their homes quickly in the event of an evacuation. Projects related to these facilities should be prioritized to meet the goals of the Strategy.

## 4.3 GOAL C. *ENVIRONMENTAL IMPROVEMENTS*

The natural environment in the program area has deteriorated through development and major storm events. As water quality has decreased in the program area, the natural resources and habitat have begun to suffer. Extreme storm events, including hurricanes, have caused damage that has degraded the natural coastal marshlands at the mouth of the River. Objectives addressing these issues should be quantifiable and targeted toward identifying the cause of historical environmental degradation and providing a means for improvement. This typically includes participation in a program identifying pollutants of concern and their sources, setting limits of pollutant loading, and monitoring waterbodies to determine compliance. The restoration of coastal marshland acreage will also be included in the Strategy to improve coastal resiliency as well as natural habitat.

## 4.4 GOAL D. *WATERFRONT ACCESS*

The program area includes many waterbodies that enhance the quality of life of the residents and provides opportunities for environmental education, appreciation, and recreation. Providing public access to these waterbodies links multiple communities, provides neighborhood amenities, traditionally increases property values, expands health benefits, and increases the residents' stake in the protection of the watershed.

## 4.5 GOAL E. *PUBLIC EDUCATION*

Superstorm Sandy created a storm surge that pushed seawater through the bays, inundating most of Southern Long Island. The Bay, a cherished resource to Long Island residents, became a damaging force inspiring fear. The Strategy will highlight flooding and water quality issues throughout the program area, showcasing the interconnectedness of the watershed and re-instilling a comfort level between residents and the waterfront. This will encourage more active stewardship during sunny days and better prepare residents during extreme weather events.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