

**COLLABORATIVE DESIGN NARRATIVE**

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In June of 2013, the Department of Housing and Urban Development, through the Hurricane Sandy Task Force, launched REBUILD BY DESIGN (RBD): a design competition to identify projects that promote resilience by developing regionally-scalable but locally-contextual solutions. Furthermore, RBD looked to produce designs that not only enhance regional resilience to disaster risks, but also support ongoing economic development, ecological health, and well-being of its citizens.

According to the National Disaster Recovery Framework, “Resilience incorporates hazard mitigation and land use planning strategies; critical infrastructure, environmental and cultural resource protection; and sustainability practices to reconstruct the built environment, and revitalize the economic, social and natural environments.” The RBD program is focused on promoting projects that strengthen resilience throughout all aspects of the community including ecological, economic, and social elements. Ideally the built environment helps maintain the natural ecosystem which lessens vulnerability to disaster impacts while also providing collateral benefits the economy, public health, overall wellbeing and quality of life.

The RBD principles include:

- Hazards
  - Flood Risk and Vulnerability
  - Storm Risk
  - Climate Trends
  - Sea Level Rise
- Coastal Environment
  - Natural Resources
  - Environmental Concerns
  - Cultural Resources
- Infrastructure
  - Critical Infrastructure
  - Housing
- Land Surface
  - Land Cover
  - Topography
- Demographic Trends
- Economic Trends
- Public Health

The Living with the Bay Program (LWTB) was selected as one of the winning RBD proposals and was designed to increase community resilience in the Mill River Watershed area of Long Island by lessening risk of tidal and stormwater flooding, while incorporating environmental and social benefits. The LWTB goals and objectives include:

- Increase in community resilience by mitigating local risk from tidal and storm surge flooding
- Improve drainage infrastructure to alleviate local flooding problems
- Incorporate environmental and water quality improvements
- Create and improve public access to the lakes, rivers and the bay

**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

The work covered in this report focuses on interventions within Hempstead Lake State Park (HLSP) which is a part of the larger Living with The Bay project. As the Mill River watershed is an interconnected system, the LWTB project recognizes that both upstream and costal interventions were required to address two of the largest vulnerabilities faced by surrounding communities: coastal surge and stormwater flooding. The interventions proposed within HLSP not only address stormwater flooding concerns, but also look to increase capacity and efficiency of the within the northern end of the system, while simultaneously introducing recreational and educational opportunities for citizens to learn about and connect with their natural environment.

Interventions within HLSP are organized into 4 main areas:

1. Dams, Gatehouse, Bridges
2. Northwest and Northeast Ponds
3. Environmental Education and Resiliency Center
4. Greenways, Gateways and Waterfront Access

### **Dams, Gatehouse and Bridges**

Hempstead Lake State Park falls within the upper portion of the Mill River Watershed and provides key opportunities to improve flood management, enhance the natural ecosystems, provide connectivity between diverse populations, enhance safety and provide emergency response facilities, while promoting environmental education and increased usage of the Park. This section focuses on improvements to the Mill River system located within Hempstead Lake State Park and it enhances the function of the dams as a key instrument for flood mitigation. This work also includes design of pedestrian bridges that are part of the adjacent shared-use path system that increase access and connectivity throughout the park.

#### Northwest Pond Dam/ Open Channels/ Bridges

The NW Pond and dam were constructed in the 1960's around the same time as a large (96" diameter) drainage pipeline was installed through Hempstead to discharge stormwater runoff from the surrounding community into the NW Pond. The dam provided attenuation of peak stormwater flows from the 96" pipe, allowed sediments to settle out of the runoff, and also prevented floatables from reaching downstream into Hempstead Lake. As a result of the dam breach, flow through the NW Pond is uncontrolled bringing sediment and floatables into Hempstead Lake. As a result of the breach, the ponds also lost their holding capacity.

As part of the dam investigations, hydrological modeling of this section of the Mill River was performed for both the existing dam breach condition and for the proposed replacement dam condition. The modeling indicated that having a dam in place at the NW Pond lessened the impacts to the larger Hempstead Lake Dam during a major

**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

storm event. Replacement of the NW Pond dam will maintain more water within the pond limits encouraging the growth of wetlands which in turn will provide filtering and enhanced water quality. The replacement of the dam will help attenuate peak flows from the upstream drainage collection systems allowing for better control of the overall watershed and flood mitigation. By reestablishing the depth in the pond area, the dam will allow sediment to be filtered out before reaching the downstream waters (especially after the “first flush”), thus enhancing and improving water quality downstream.

With the replacement of the dam, flows can be directed downstream of the dam through an open channel and culvert under the Southern State Parkway and into Hempstead Lake. A timber pedestrian bridge will be provided to carry a shared use path that encircles Hempstead Lake over this channel. Installation of the bridge will allow removal of existing twin 60” diameter pipes that currently limit flow through the channel (and also create the potential for an unplanned impoundment if blocked) while providing for uninterrupted access to the pedestrian pathway. Modeling indicated that the removal of the twin pipes would enhance the flow between the NW Pond and Hempstead Lake, which is an important aspect of the program goals. This pedestrian bridge will be designed to accommodate pedestrians, horses, maintenance vehicles, as well as other emergency vehicles thereby improving emergency access and response times.

Additional access will be constructed over the existing open channel located immediately upstream of the NE Pond and adjacent to Hempstead High School providing access (along with the proposed multi-use paths designed by others) to wetland areas and other portions of the Park that are currently underutilized, and difficult to access during emergencies. The crossing will be close to other wetland improvements in this area and will provide new opportunities to partner with schools and will provide students with new opportunities for environmental education and/or ecological stewardship. This bridge and (coupled with a second bridge to be located downstream over Schodack Brook) will be designed to the same standards noted above and will improve pedestrian connectivity, safety, emergency response and access while also protecting and enhancing the natural environment around it.

#### Hempstead Lake Dam/ Gatehouses/ Pipe Arch

The Hempstead Lake Dam, gatehouse and pipe arch were constructed in 1873. The dam’s outlet-controls (currently not functional) are housing in the gatehouse structure, that directs water flows through an attached brick pipe arch that extends from the dam into South Pond. This plan will replace all five of the sluice gates at the dam and provide new gate controls in the gatehouse. An operating plan will be developed to actively manage regular water flow in small and large storms events. The impacts of proper management will be realized both upstream on the entire Mill River corridor and down to the bay. Additional repair work will be done to the interior of the brick pipe

**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

arch to improve flow conditions and structural defects. We are coordinating closely with the NYSDEC to design improvements related to the outlet capacity which is effected by the upstream and downstream conditions at the NW Pond Dam, South Pond Dam, and Smith Pond. Trees and vegetation will be removed from the dam as per NYSDEC requirements to ensure the dams integrity and to allow for proper ongoing inspections as required. Removal of the vegetation will also have a positive influence on the public, but opening up spectacular views of the park, lake and of the historic dam structure, as well as providing for a safe, open, and inviting environment and interpretive opportunities of these historic structures.

Installation of new outlet gates, inspection catwalk and water level monitoring equipment at the dam gatehouse will allow for better control of flows through the dam and Park. Flow-control is key to flood protection as well as maintenance of lake levels for recreational and ecological purposes. The proposed work at Hempstead Lake Dam is intended to be completed in concert with work at the NW/NE Ponds and South Pond, but is equally as important as a stand-alone project for overall protection of the watershed.

As historic structures, the gatehouse at Hempstead Lake dam and the inlet gatehouse at South Pond will both be restored with historical accuracy. Aesthetic design will be balanced with security concerns and functionality. Interpretive signage about the history of the area will also be provided.

#### South Pond Dam/ Outlet Weir

Improvements to the south pond Dam combined with the other improvements will enhance the protection of the watershed. As part of the project, trees and other vegetation will be removed, and additional fill may be applied to the crest to address settlement issues and to provide for a uniform slope. These areas will be seeded with native grasses that can be mowed seasonally to facilitate required safety inspections. In addition, vandalized stonework at the historic outlet weir will be restored to ensure the integrity of the outlet structure. Tree removals will open up views of South Pond from the adjacent roadway and Parklands and provide opportunities for park users to enjoy the South Pond and the park from this vantage.

In summary, the Dam work proposed throughout Hempstead Lake State Park is being progressed in accordance with NYSDEC requirements and in coordination with the overall Living with The Bay project to help improve flood management, water quality and ecological conditions throughout the Mill River Watershed. This project will enhance public safety and resiliency, provide connections to the adjacent communities, encourage usage of the natural facilities in the Park, and provide environmental education and interpretation opportunities.

## **Northwest and Northeast Ponds**

### North Ponds

The North Ponds area contains two ponds referred to as the Northeast Pond and the Northwest Pond. The ponds are fed by flow from Mill River, groundwater, and from the stormwater drainage systems that outfall into the ponds and Mill River.

### Pond Restoration and Stormwater Mitigation

Over time the watershed for the North Ponds has become more impervious and the flow into the ponds is more polluted from various runoff points surrounding the park. There is significant floatables deposits, sediment load and oil residue apparent near many of the outfalls. Water sampling showed levels of pollutants in the first flush volume. The high sediment load has filled the creek channel and the high velocity of the runoff entering the Mill River channel has resulted in significant erosion of the channel that is deposited into the ponds and surrounding area. This project seeks to mitigate the pollutant levels that enter the ponds and create wetlands to filter other pollutants from the runoff to improve the water quality entering Hempstead Lake and being carried further downstream into the bay.

Impacts from Hurricane Sandy and other storm events lead to breaches when the Mill River watershed saw significant flooding, the need to address the Mill River drainage system and other flood prone areas throughout the region was identified.

The following RBD principals and goals that will be achieved by implementation of the North Ponds Restoration and Stormwater Filtering aspects of the project include:

- Coastal Environment - Cultural Resources. The North Ponds project environmental and stormwater mitigation improvements will improve public open space in a high-density urban environment and adjacent to a public high school. These improvements will result in increased access to natural areas, educational opportunities and recreational facilities. and increase access to natural areas and recreational opportunities
- Coastal Environment - Environmental Concerns. The North Ponds project environmental and stormwater mitigation improvements will reduce the spread of contamination and waste products, promote a clean urban environment through cleaner storm runoff, and remove the accumulation of debris trash and floatable waste products from the park. These improvements will result in allowing for broader use of a public park area that is currently unusable by the community.
- Coastal Environment - Natural Resources. The North Ponds project environmental and stormwater mitigation improvements will improve degraded wetlands and upland areas by the removal of sediments and trash and debris, provide additional wetlands for stormwater filtering for pollutant removal of bacteria,

**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

nutrients and metals, improve operation of the storm drainage system that has been altered over time to reduce the sediment and trash collections aspects. The modifications to the drainage system will result in increased visibility in the north ponds area, additional trails and improved aesthetics. These improvements will result in an improved habitat for local wildlife and improved ecosystem function by increases pond depths and increasing wetland areas. Improvements will result in additional use space within the park which will provide increased opportunities for local business that are related to the park, contribute to the local economy and the area's quality of life, increase tourism through increased use of the park and provide additional outdoor recreation opportunities within the park.

- Hazards – Flood Risk and Vulnerability. The North Ponds project environmental and stormwater mitigation improvements will remove the heavy sediment and debris deposits in the North Ponds area and result in an improved system to capture debris and sediment in new components of the drainage system where they can be monitored, cleaned and removed on a regular basis. These improvements will allow for the maintaining and operating of mitigation components at the entrance to the park, reducing in the buildup of materials throughout the site, and maintaining the pond and wetland environments.
- Hazards – Storm Risk. The North Ponds project environmental and stormwater mitigation improvements will stabilize the channel within the park resulting in a reduction in erosion and capture of sediments that are built-up and have reduced the system capacity.
- Land Surface – Land Cover. The North Ponds project environmental and stormwater mitigation improvements will result in the improvement of ecological processes by filtering stormwater through wetlands. These improvements will result in the reduction of pollutant migration as runoff passes through the system and will address a portion of the runoff from a high density residential area that currently provides little treatment of the runoff from the areas surfaces.

The LWTB program identified primary goals for the Mill River watershed and identified potential projects within the North Ponds that would result in the removal of pollutants from the upper watersheds resulting in cleaner water entering Hempstead Lake and being carried through the Mill River system to the bay. The Proposed North ponds projects that address the primary goals of the LWTB project include:

- Blueway – Create a clean and continuous water system. The North Ponds project environmental and stormwater mitigation improvements meets this objective by including components that collect the floatables and sediments entering the parks property to be collected using methods that will allow for future removal in a cost efficient manner, constructing new filtering wetlands to remove bacteria and nutrients and dredge the ponds to increase storage times for runoff.
- Greenway – Create a continuous route connected to neighborhoods. The North Ponds project environmental and stormwater mitigation improvements meets this objective by including components that provide additional trails and paths that



**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

increase circulation through the North Ponds area and increases the ability of residents to the north of the park to access the park and the trails.

- Social Connectivity – Develop projects that are linked to the community. The North Ponds project environmental and stormwater mitigation improvements meets this objective by including components allowing park user greater access to the area, the ability to view the improvements, and offer opportunities for education on the importance of the water system and the filtering components of the natural environment.

The North Ponds project environmental and stormwater mitigation improvements will address the following North Ponds objectives of the LWTB project including:

- Purifying – Improve the water quality of the runoff that enters surface waters and to support ecosystem restoration.
- Buffering - Increase buffering capacity of the precipitation runoff and slow down the surface drainage rate through increased filtering.
- Ecological Biotope – Create diverse habitats and restore the environmental characteristics and quality of the area.
- Attractive Landscape - Provide improvements that increase the aesthetic of the place.

### **Environmental Education and Resiliency Center**

As the importance of global climate change increasingly impacts people around the world, it is more and more important to prepare everyday citizens and develop effective response strategies to more common extreme weather conditions. Education is an impactful way to increase community engagement and the ability of a community to prepare for, react and respond to extreme weather events. The Environmental Education and Resiliency Center (The Center) and Greenway at Hempstead Lake State Park will be a new and unique hands on learning center about storm resiliency, environmental management and will provide education opportunities for the immediate community as well as the region regarding the principals of Rebuild By Design, the Mill River Corridor and the impacts of climate change and how the natural ecosystem plays a critical role in the environmental resiliency of the surrounding area. The greenway and trails will provide a physical connection linking the ecological network and the communities along the Mill River Corridor.

The Center is being designed to act as a “coordination center” during times of emergency, if necessary, and can be used for the following purposes:

- "Command Post" for local disaster response coordination either for agency staff or other agencies such as the NYS Park Police. The existing parking area (field 1) is also utilized by PSE&G for emergency response staging of equipment in advance of severe weather events. The Center will provide a location for PSE&G staff to coordinate equipment staging, enhancing their emergency response to

**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

restore critical utilities and thereby help to promote economic resiliency in the community and region.

- The Center may also serve as an information center if needed, for local residents after an emergency. Parking is available in field 2 or access via the greenway that provides connection points to the surrounding neighborhoods and communities. The building will include a full building load emergency generator to provide resiliency and continued functionality during power outages.

On a daily basis, the trails and greenway will be open to the public for recreational use (walking, jogging, biking, horseback riding, bird watching, etc.) providing connection points to the surrounding neighborhoods and an economical way for people to exercise, increasing health and well-being of its users, with attention to developing physical environmental connections to nearby underserved communities. The trails and greenway will also provide access to the ponds and lake for other types of recreation such as fishing and kayaking. The Center will provide a central focal point and core for the park with connections to the greenway, providing educational and community spaces connected to an overlook deck with views of Hempstead Lake, a point where permits and services can be administered, and park information explaining the critical messages of climate change impacts, community resiliency processes, environmental preservation, and local relevance. The Center will also provide essential facilities to help with building partnerships with local school districts to utilize the education space and wet lab for hands-on learning and activities, engaging young minds through activities that reflect their local surroundings and fosters stewardship. The Center will be focused primarily around the importance of parks and wetlands, specifically during extreme weather conditions. There will also be information about the Mill River Corridor system as a whole, local wildlife and history of the area.

Additionally, Hempstead Lake State Park has adopted the National Park Service's "Every-Kid-in-a Park" program which provides free entry for 4<sup>th</sup> grade students and their families to the park. The program encourages children at a critical development age to learn and explore about the importance of local and national parks and waters. Hempstead Lake State Park also participates in larger State Parks program that provides grants to Title 1 schools to reimburse them for bussing costs for field trips to State Park facilities.

The Center is also being designed to include space to provide for additional partnerships for organizations such as the Nassau County Law Enforcement Explorer Program that will use the Center for training space to promote and deliver their programs within the park. This volunteer program provides an opportunity for at risk young adults and many from low to moderate income areas to receive basic law enforcement training and to learn about career opportunities within law enforcement. In addition to training and education, volunteers participate in community service events throughout the year to encourage volunteerism and build stronger communities. The space necessary for this program also will serve as a center



**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

for local community outreach by the police, educating and positively engaging young people with officers through mentoring and education; further strengthening the connection to the community.

The Center building itself will be designed to reduce environmental demands, both in initial cost and lifecycle cost in a responsible fashion. Aside from the obvious benefits of lower operating costs of an environmentally conscious building, the building will be used to educate users about sustainable building practices and construction. The building will be designed with the following key features:

- Robust and sustainable exterior envelope optimized to suit local climate demands.
- Awareness of solar impacts (i.e. siting) and control (i.e. glazing) to reduce heating and cooling loads.
- LED lighting with occupancy sensing and daylight harvesting to reduce electrical usage.
- Photovoltaic roof panels to offset electricity energy usage.
- High-efficiency, low/no water plumbing fixtures.

The Environmental Education and Resiliency Center and Greenway will connect the adjacent neighborhoods and communities with the natural environment and promote environmental awareness, ecological and public health as well as promote the overall wellbeing and quality of life of the region by providing opportunities for recreation, education, interpretation and improved community relations related to preparedness for future storms as well as the environmental, social and economic resiliency and emergency services.

### **Greenway, Gateways and Waterfront Access**

Hempstead Lake along the old Mill River corridor is a key component in the strategy needed to improve the water quality, decrease stormwater flooding, while incorporating environmental co-benefits such as water quality improvements, ecological restoration, and aquifer recharge, community and social, resiliency, education, recreation (Greenway Corridor) and quality of life.

The park enhancements and improvements will include new amenities; pedestrian lake interaction and accessibility; a new education and visitors to welcome the community and to educate the people on the history of the place and the important role it plays in the economy, health, and safety of the community; Schodack Brook Bridge crossing to allow users to now be able to traverse the entire park from north to south; bridle trail improvements; a new 50 car space area for regional commuters to park and enjoy the park and the Mill River Corridor; enhanced bird watching opportunities, through a newly designed and developed wetland that will also improve the water quality and storm water events; interpretive and educational signage; connectivity to the high

**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

school, as well as gateways that will allow the public easy pedestrian access to and from all surrounding neighborhoods.

### Gateways

The gateways will provide a direct, pedestrian access from the adjoining neighborhoods, a significant portion of which are low to moderate income communities into the Mill River Corridor and HSLP, where currently there are none. The gateways will open access into the neighborhoods providing more opportunities for adjoining neighbors to freely access the park. These gateways will also provide a sense of security within the park, by opening up views, providing additional access points for pedestrians as well as emergency vehicles.

### Greenway

The greenway provides a unique opportunity to connect the public to an ecologically significant watershed corridor allows the public to walk the corridor and learn along the way about the river system through educational signage. Some of the positive impacts and results include:

- Environmental Benefits - Reduces environmental impacts- Ped access and Bikes, no cars mean, no fossil fuels mined, no air pollutants are generated, less maintenance is needed on roads,
- Improved Public Health (Collateral Benefit) - breathe cleaner air; walking and exercise improves the immune system and circulation, which means less lost workdays, increased productivity and less money spent on healthcare costs.
- Experience - People experience and learn about *nature through direct contact* and interpretative signage
- physiologically improvements - nature relaxes the body and reduce toxins
- improves the immune system - Walking through the corridor
- Mental health - improves with connecting with nature through exercise, experience, site, and sounds

### Piers/Kayak Launch

Floating piers and kayak launches will allow the public to have direct access to the middle of the River Corridor. The Piers allow the user to be placed directly over the water to experience and see and feel the place. Kayak launch gives the public one more layer of interaction by allowing the use to float on top of the water and be physically connected. In addition to the piers and launches, docks will be included for the local community use for fishing, education piers, bird watching areas for locals (Audubon).

### Greenway Parking Lot



**LIVING WITH THE BAY – A REBUILD BY DESIGN PROJECT  
NY STATE PARKS - HEMPSTEAD LAKE STATE PARK  
HEMPSTEAD, NY**

Upgrades to the parking lot will provide visitors, both locally and from the larger region additional parking so they can access the greenway and the existing and proposed park amenities. Resulting from the Greenway Trail, environmental interpretation and programming as well as other future community enhancement programs that will be developed will be a multi-purpose Environmental Education and Resiliency Center, the park anticipates an increase in visitation which necessitates this improvement. In addition, the entrances to the parking lot will also have direct access to/from the Long Island Railroad local stations and access from other public transportation.