

# Lake Erie Green Infrastructure Project – 2022

## Final Report

**Funded by: US EPA Great Lakes Restoration Initiative, 00E03288-0**

**Project Timeline: 10/1/2022 – 5/31/2025**

### *Project Locations:*

*The project sites are located in Wright Park Beach and Main Street Beach in the City of Dunkirk, NY, 14048. The project will occur within the Canadaway Creek – Frontal Lake Erie Watershed (HUC 0412010102). Latitude and longitude coordinates for the site are 42.49 and -79.3 decimal degrees respectively. This is in the 26th Congressional District of New York.*



### **Project Description:**

High indicator bacteria levels, resulting in beach closings, are observed annually at Chautauqua County's Lake Erie beaches. Beach closings mean increased risk to public safety, potential loss of summer income and indicate overall poor water quality in Lake Erie. This project will focus on priority locations along Hyde Creek, which empties onto Wright Park Beach and also at Main Street Beach in the City of Dunkirk.

The Chautauqua County Soil and Water Conservation District (District) in cooperation with the Lake Erie Watershed Protection assisted the City of Dunkirk in addressing nearshore polluted stormwater runoff from Hyde Creek along with a stormwater outfall onto Main Street Beach. The application of green infrastructure solutions including an engineered

wetland and incorporation of floodplain benches to capture and infiltrate 47 million gallons of stormwater runoff annually, therefore improving water quality. Ecostrategies Engineering LLC assisted the District in the feasibility study, final engineering and post site surveys. The District provided project design, construction inspection and project management. The project consisted of two site, Main Street Beach and Wright Park.

At the Main Street Beach site, a stormwater drainage was redirected from straight discharge onto the public beach and instead outlet to an unused area in the harbor. At the end of pipe, a constructed wetland was installed with a low flow channel and floodplain to accommodate storm events. The entire area was treated for invasives and replanted with native species.

The second location, Wright Park, addressed flooding concerns and stormwater treatment. Upstream of the outlet to Hyde Creek, on Wright Park's public beach, the culvert under Wright Park Boulevard was right sized, allowing stormwater flows to enter the Wright Park area. Once stormwater was encouraged to flood in the park and not the residential neighborhoods, flood benches were installed adjacent to the stream. The on-site invasives were treated and native planted were in the flood plain and buffering the stream through the entire stretch of Wright Park.

## **Background:**

Due to growing concerns about ponding water on Main Street Beach and the water quality of the water, research was done to determine its cause. The District worked directly with the City of Dunkirk's Department of Public Works to identify current and abandoned infrastructure under Lake Front Boulevard to determine the opportunity to catch the stormwater prior to settling on the public beach.



The City of Dunkirk also identified flooding concern at Wright Park Boulevard. The existing culvert at Wright Park Boulevard was insufficiently sized to process stormwater, causing the neighborhood to flood. With right sizing the culvert, it also led to the opportunity to utilize unused areas of Wright Park to detain and treat stormwater through engineered floodplains to mimic the natural function of streams.



To address these concerns the District worked with Ecostrategies Engineering LLC to develop a feasibility study of potential solutions through annual state funding from the Lake Erie Watershed Protection Alliance. Ecostrategies took



the concepts developed by the District and the City and incorporated green infrastructure and sizing that would be suitable to the volumes of stormwater flow.

As an ancillary benefit of this project, a total of 1.7 acres of Japanese knotweed and Phragmites was scheduled for eradication, and the areas replanted with native plants through the design proposal. Restoration of native species along the Lake Erie shoreline, especially wetland ecosystem complexes, also aims to restore critical habitats that have been lost due to development.

Utilizing this design work, the District and LEWPA pursued funding through the Great Lakes Action Agenda to implement the concepts. By constructing these projects, LEWPA can further its mission to “foster collaboration and partnerships within the watershed to address regional water quality and quantity concerns and in doing so, protect and enhance our Lake Erie resource.” LEWPA also strives to support federal and state restoration initiatives such as the Great Lakes Restoration Initiative and the Great Lakes Action Agenda. This project directly supported the Great Lakes Restoration Initiative Action Plan III Focus Area under 3.2: Reduce untreated stormwater runoff. These projects also support Lake Erie LAMP Action 2, Item 2 - *Encourage Investments in Green Infrastructure*.

## **Project Site #1 – Main Street Beach Plan Summary**

A storm drain along Beaver Street was identified to be the main cause of stormwater discharge to the beach. This project included re-routing of the Beaver Street drainage and discharge to the other side of the pedestrian break wall walkway into an unused area in the harbor that consisted of a monoculture of Japanese Knotweed. The



engineered wetland in the Dunkirk Harbor will capture/treat “first flush” of untreated stormwater runoff at Main Street Beach and improve nearshore water quality. The site location is such that high water levels/wave action would protect the constructed wetland from wave and seiche events due to the protection of the inner harbor break wall.

The project design incorporated green infrastructure features, including native grasses, plantings and shrubs. These promote biodiversity while also working to improve water quality through various mechanisms.

## Project Site #2 – Wright Park Plan Summary

Hyde Creek, which runs through Wright Park, outlets onto Wright Park Beach, a public bathing beach on Lake Erie. This tributary receives stormwater flows from an approximately 230 acre urban/suburban watershed and its water quality could impact the recreational opportunities at the bathing beach. To address these concerns, two pocket wetlands within the creek's floodplains were proposed to treat low flow storm events, creating floodplain benches to increase infiltration and allow storage during high flow events, incorporating buffers of native plants, installing rock check dams to slow the stream velocity and trap debris/sediment before it enters Lake Erie.

The project design incorporated green infrastructure features, including native grasses, plantings and shrubs. These promote biodiversity while also working to improve water quality through various mechanisms.

### Approach:

The District puts out an annual bid for equipment (machinery and operator) as well as using state and county bids for construction materials. This allows the District to have oversight of project costs and ensure a cost-effective approach to project implementation. The District advertises the bid and solicits local minority and women owned businesses directly. The outreach is documented through the District's annual bid process.

Once the contractor was selected, the District coordinated construction inspection through coordination with Ecostrategies Engineering LLC for critical components. Construction began in Fall of 2022, starting with the most upstream component, the Wright Park Boulevard culvert replacement. Work on the culvert was complex due to



the city infrastructure that was known and unearthed during construction. This led to a change in the original design of the culvert shape and rerouting of a city water line.

The stream was stabilized downstream of the culvert utilizing streambank stabilization and engineered rock riffles to maintain the stream channel from headcutting but still allow for aquatic movement within the stream. Floodplain and pocket wetland creation started in Winter 2022. During the regrading of the site elevations, Japanese Knotweed root wads were removed and disposed of offsite. This allowed for more affective herbicide treatments



in Spring 2023. The site was graded and temporarily stabilized with hydroseed while major construction work moved to the Main Street Beach site.

At the Main Street Beach site, more reconnaissance was done on the matrix of infrastructure under Lake Front Boulevard. Additional pipes needed to be verified

and capped before the Beaver Street stormwater pipe would be rerouted to the other side of the pedestrian walkway and into the Dunkirk Harbor.

Once rerouted, the monoculture of Japanese Knotweed and an additional stand of Phragmites was mechanically removed and disposed of offsite. This was easier to do for this site due to the sand that it was growing in, providing better success of root wad removal. The sand at the site was shaped and graded to form a low-flow channel, flood bench and protection from wave and seiche activity. Rock rip-rap protect the structures through grade controls at the downstream end of micropools in the channel. In summer 2023, an herbicide application was performed at both sites to treat any re-emergent Japanese Knotweed and Phragmites.

Through winter 2023, it became apparent that the sand dune protection on the harbor side was not sufficient. A spring seiche event eroded the toe of the dune. Rock rip-rap was placed to protect the toe and outfall of the wetland during high water events.

In Spring-Summer 2024, the site was planted with native, low growing shrubs and herbaceous plants. The plants were tubed to protect during subsequent herbicide applications and to offer stability for development of roots. Woody species include: Beach Plum, Dune Willow, Dwarf Bush Honeysuckle, Eastern Sand Cherry, River Birch, Sandbar





Willow. Herbaceous species include: American Beach Grass, American Bur Reed, Arrow Arum, Blazing Star, Blue Flag Iris, Blue Vervain, Bitterweed, Boneset, Canada Germander, Cardinal Flower, Duck Potato, Foxglove Penstemon, Fox Sedge, Golden Ragwort, Helen's Flower, Indiangrass, Ironweed, Joe-Pye Weed, Juncus effusus, Little Bluestem Grass, Lizard's Tail, Marsh Mallow, Marsh Rattlesnake Master, Narrow Leaved Mountain Mint, New England Aster, Pickerel Weed, Prairie Cordgrass, Purple Coneflower, River Oats, Soft Rush, Soft Stem Bulrush, Swamp Milkweed, Swamp Sunflower, Switchgrass, Tall White Aster, Tussock Sedge, Virginia Mountain Mint, Wild Bergamot.



Plantings were also completed at the Wright Park project. A buffer was installed along the entire length of the stream corridor through the park and additional herbaceous plants were added to the floodplains and pocket wetlands. Species include: American Hazelnut, American Sycamore, Bald Cypress, Basswood, Black Gum, Buttonbush, Ninebark, Northern Red Oak, Pussy Willow, Quaking Aspen, Red Maple, Red Mulberry, Red Osier Dogwood, River Birch, Smooth Sumac, Spicebush, Staghorn Sumac, Sugar Maple, Swamp Rose, Swamp White Oak.





A broadcast seeding of these plants were also completed at both sites in Fall 2024 to allow for native seeds to cold stratify during the winter season.

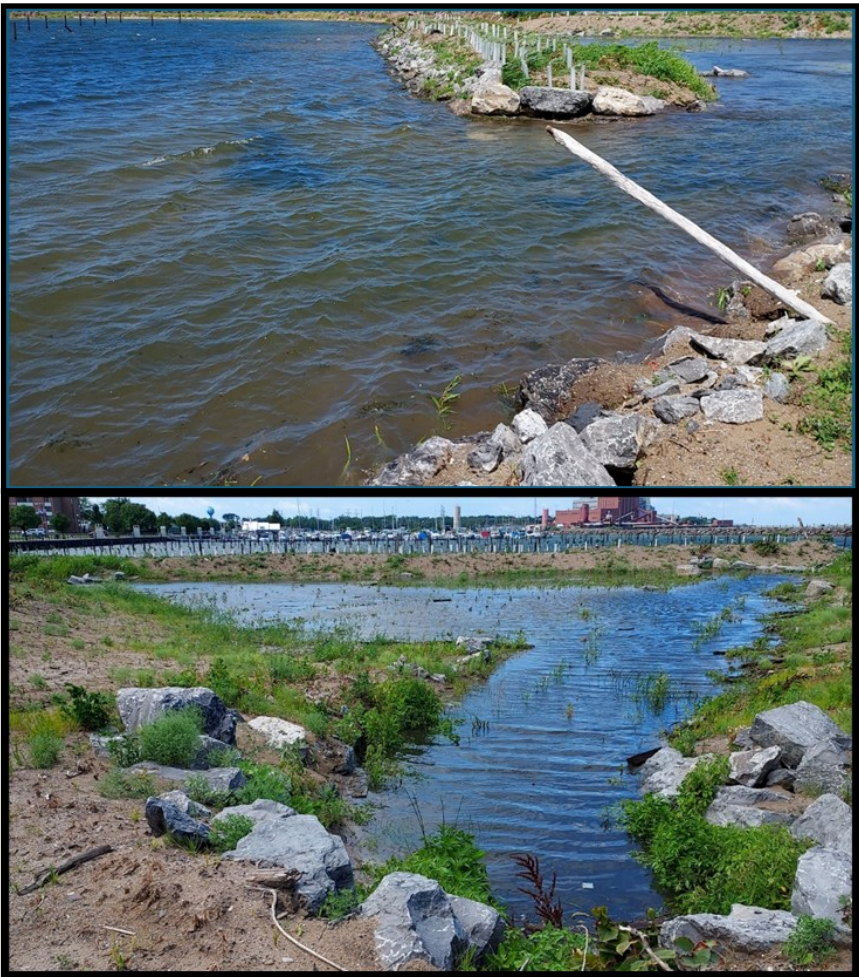
This project was tested in Summer 2024, when a high water seiche event inundated the project. The rock rip-rap afforded protection of the sand and when the water receded, the wetland was virtually undisturbed, reaffirming its long-term stability in this dynamic shoreline system.

**Results:**

The project, even with challenges as existing infrastructure was unearthed, has been completed to achieve the overall goals.

Stormwater will now flow through restored natural systems to allow native plants and retention time do the long-term work of water quality improvement at the outlets of these systems, and ultimately Lake Erie.

Through the construction of this project, 0.042 million gallons of untreated stormwater runoff are now captured and treated through 0.7-acre of new floodplain and wetland complexes. In addition, 0.43 miles of Lake Erie shoreline and riparian corridor has been restored.



**GLRI ACTION PLANS MEASURABLES**

The project(s) contribute to or support the GLRI Action Plan measure(s):

3.2.1 - Estimated gallons (in millions) of untreated stormwater runoff captured or treated.

Expected Results Upon Completion  
Cumulative Progress

0.042 millions of gallons  
0.042 millions of gallons

3.2.2 - Miles of Great Lakes shoreline and riparian corridors restored or protected.

Expected Results Upon Completion  
Cumulative Progress

0.10 miles  
0.43 miles



## Budget:

Lake Erie Green Infrastructure Project - 2022				
<u>BUDGET</u>				
10/01/2022 – 5/31/2024	Original Budget	EPA Funded	In Kind	Total
Personnel w/ Fringe	\$ 25,000.00	\$ 5,000.00	--	\$ 5,000.00
Engineering	\$ 10,000.00	\$ 9,999.13	--	\$ 9,999.13
Supplies	\$ 0	\$ 0	--	\$ 0
Travel	\$ 0	\$ 0	--	\$ 0
<u>Heavy Construction</u>				
Wright Park Beach Site & Main Street Beach Site	\$ 573,300.00	\$ 605,000.87	\$ 9,592.17	\$ 614,593.04
Construction contingency 2%	\$ 11,700.00			
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<b>Total</b>	<b>\$ 620,000.00</b>	<b>\$ 620,000.00</b>	<b>\$ 9,592.17</b>	<b>\$ 629,592.17</b>

The majority of the EPA funding was dedicated towards the construction at the two project sites. Personnel was reduced to contract administration to allow for additional plantings and invasive species management to be conducted into Spring 2025. The project was largely in-budget and on time. Cost overruns were covered through state funding via the Chautauqua County Soil and Water Conservation District.



Nesting Northern map turtle (*Graptemys geographica*) in bottom right, utilizing the Main Street Beach wetland site in early Summer 2025.



## **Post Construction Monitoring and Maintenance:**

The District and the City's Department of Public Works crews through its Streets and Parks Departments will assume overall operation and maintenance responsibilities of the green infrastructure projects completed. Maintenance tasks will mainly entail monitoring changes after significant storm events, maintaining mowing restrictions, and woody debris removal as needed. The District is committed to perform annual monitoring of the site and will offer the City technical assistance and guidance should any questions or concerns arise with their operation and maintenance responsibilities.

Two specific additional items that will be monitored by the District will be future seiche events and invasive species. Of particular concern, the impact seiche and seasonal events might have on the Main Street Beach Wetland. Past projects of green infrastructure along Lake Erie's shoreline in New York State have had repeat damage from seasonal or seiche events. The protection afforded this project by the inner break wall is one of the criteria for selecting the project site, however, monitoring will be done to maintain long term success.

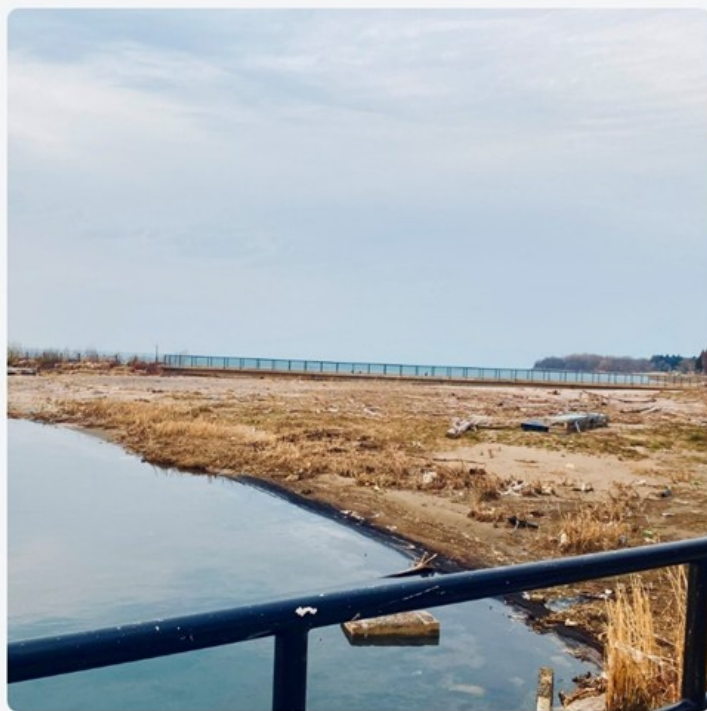
Additionally, invasive species monitoring and management will continue at the two project sites through LEWPA's annual state funding. With the large initial investment for Japanese Knotweed and Phragmites eradication, it is important to continue to spot treat to allow native species sufficient time to become establish. Monitoring will also focus on new invasive species who may come into the project site in subsequent years. Coordination of follow up treatment will be done through the District and working with the City of Dunkirk.

## **Wege Small Cities Sustainability Best Practices Award:**

The City of Dunkirk, NY was recognized by the Great Lakes & St. Lawrence Cities Initiative as one of two cities to win the Wege Small Cities Sustainability Best Practices Award. The Wege Award highlights small cities, with populations of under 100,000 and with limited resources, who demonstrate leadership in tackling water quality issues while ensuring economic vitality and social equity. This award specifically recognizes meaningful projects that balance economic, social, and environmental aspects of protecting water quality that could be used as a best practice inspiration for other cities. In addition to being recognized as a winner of the Wege Award, the City of Dunkirk received a \$3,750 award.



## Project Photo Documentation:



Main Street Beach Wetland Progression: Spring 2023—Summer 2025





Main Street Beach Storm Drain Outlet Progression: Post Construction—Summer 2025





Wright Park Wetland Progression: Post Construction—Summer 2025





Wright Park Wetland Progression: Post Construction—Summer 2025