SOUTH WETLANDS PARK

A look into Philadelphia’s future ecological waterfront park.
A Buckeye butterfly lands on a stand of Rudbeckia on the project site.

Image Credit: OLIN
SOUTH WETLANDS PARK

THIS PROJECT IS GENEROUSLY SUPPORTED BY:

- The William Penn Foundation
- Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation; C2P2, Environmental Stewardship Fund
- The National Oceanographic and Atmospheric Administration and Pennsylvania Department of Environmental Protection, through the National Coastal Zone Management Program.

Prepared for the Delaware River Waterfront Corporation

by OLIN

PROJECT OBJECTIVES

South Wetlands Park will serve as a critical urban link between Philadelphia residents and the Delaware River waterfront. It is an opportunity to engage local communities in meaningful ways, to reinvigorate and protect an endangered habitat, and to create a space for residents to become stewards of their environment. Our vision is access to wild beauty for all: a place where Philadelphians can immerse themselves in the very ecology that sustains the planet and its inhabitants. When completed, South Wetlands Park will stand as a model for future, ecological parks around the city and country.

The project’s Request for Proposals articulated several objectives for the South Wetlands Park:

1. Create a **unique ecological park** in an **urban inter-tidal zone**;

2. Create **unique moments for public enjoyment** of our Delaware riverfront by sensitively braiding public access with the **creation of resilient terrestrial and aquatic habitats** while employing a blend of natural and built systems;

3. Through **good science and robust public participation** craft an accessible, inviting, inclusive and achievable public space that cultivates citizens’ and visitors’ understanding of and appreciation for an ecologically thriving riverfront;

4. Become a **testbed for innovative techniques, technologies and strategies** in the analysis, visioning, engagement, design and monitoring phases for this space. Employ natural processes in bank stabilization, wave energy dissipation or water filtration roles among other possible applications;

5. Design an **integrated public/habitat space** that strives to mitigate, and appropriately anticipate the impacts of global warming, sea level rise and the migration of marsh habitats;

6. Seek to be an **engaging project** with compelling narratives, graphics, signage and public art.

The project is an opportunity to scale the success of individual pier parks like Washington Avenue Pier and Pier 68 to multiple piers, to expand and connect habitat in the inter-tidal and aquatic zones, and to elevate the public experience of urban ecology. Ultimately, South Wetlands Park can serve as a prototype, too—a model for larger landscapes of resilience in the urbanized Delaware and similar tidal rivers.
SAFE, STABLE ACCESS FOR ALL

ROBUST, RESILIENT NATIVE ECOLOGY

ELEGANT PUBLIC FRAMEWORK
The Master Plan for the Central Delaware imagined riverfront public space as resilient civic infrastructure. In addition to neighborhood parks, civic plazas, and event spaces, the Master Plan called for a South Wetlands Park: an ecologically focused place of land and water centered around the crumbling piers and silted berths between Washington Avenue and Mifflin Street. This project represents the incremental realization of this vision, building on the successful upland habitat of Washington Avenue Pier, the permanent and temporary riverfront trails south of Washington Avenue, the planned Washington Avenue Connector, and Pier 68. The challenge and opportunity of the South Wetlands Park is to extend habitat and public access into the inter-tidal and aquatic zones, and in the process to elevate the experience of urban ecology. The team’s analytical and design approach began with a close reading of the site: its piers and berths, their history and current conditions, and the flora, fauna, and people that call South Philadelphia home.
The Master Plan for the Central Delaware (2012) called for an extensive wetlands park in this area.

Pier 70

The piers on site provide upland habitat sloping into the inter-tidal zone.

Pier 70

OLIN
The piers and berths of the South Wetlands Park site were once part of an extensive tidal ecosystem of river, marsh, and mud flat. As Philadelphia developed and expanded, the wetlands south of Center City were first diked and drained for agriculture and then filled to make way for urbanization and port activity. The project site was at the heart of an industrial waterfront until the latter half of the twentieth century, when the departure of manufacturing and port activities left the site abandoned. While the adjacent upland parcels were redeveloped as a big box shopping center, the piers were left to decay and re-vegetate with the berths silting in between. This landscape of neglect began to accrue habitat value for both aquatic and upland species. More recently, DRWC has invested in public access along the riverfront trail and at Pier 68, setting the stage for the South Wetlands Park.

Before settlers came to Philadelphia the river had a much more gradual transition from upland to marsh.

Pro-Colony River Transect

Before urbanization the project site was a part of the Delaware River, and much of South Philadelphia was wetland.

Map of Philadelphia Waterfront, 1788

Industry brought drastic and lasting changes to the Delaware River and the project site.

Project Site, 1925

Image Credit: DRWC
Over the last year, OLIN and DRWC have reached out to the public for inspiration and feedback. These engagement events took place both in-person and remotely, helping to shape the design of the park to the needs and wants of the local community.

**Stakeholder Walkshop (September 25, 2019)**
OLIN hosted a meeting of representatives from local community-based organizations at the project site. The groups represented at the walkshop were the Pennsport Civic Association, the Dickinson Square West Civic Association, the Queen Village Neighbors Association, Whitman Council Incorporated, Seventh Street Community Civic Association, and the Central Delaware Advocacy Group. Stakeholders agreed that the unique character of the piers and the experience available would be a draw for people and several mentioned the need for a boat launch, similar to the one at Bartram’s Garden. Stakeholders encouraged the design team to make the park fun and evoke excitement while remaining ecologically robust.

**Pop-Up Engagement (October 6, 2019)**
The OLIN team set up pop-up stands outside stores in the Pier 70 Shopping Center, the local SEPTA bus stop, Pier 68, and Washington Avenue Pier. Each pop-up stand included information regarding the project as well as several questions designed to gauge people’s use and interest in the Delaware River Waterfront. The pop-up engagement recorded responses from almost 150 individuals. This preliminary data showed that the waterfront is used for activities across a broad spectrum, including arts, culture, nature, and exercise. Water-based recreation was the one activity that seemed to be lacking in engagement, suggesting a potential programmatic element for the Wetlands Park.

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Nature and water access were some of the most mentioned topics at the Pop-Ups.

Pop-Up Engagement

- Keep the feel of nature along the trail despite the development on the west side.
- “Trash Clean-up on the shore. Safety for families & animals!”
- Learn about the river!
- It would be nice if they could have water activities - kayak, canoe...
- Activities for early elementary kids.
Bio-Blitz (October 6, 2019)
At the same time as the pop-up, the OLIN team and ecologists from Applied Ecological Services (AES) held a public Bio-Blitz on site. A Bio-Blitz is a quick and thorough effort by scientists, naturalists, and volunteers to identify as many living species as possible on a given site. This environmentally focused, engaging activity educates participants about site ecology while providing useful data to supplement the team’s ecological survey.

Public Open House (January 8, 2020)
OLIN and DRWC held a public open house at the Edward O’Malley Athletic Association in South Philadelphia. The team shared project information and goals with attendees and gathered feedback from the public on goals and challenges of the wetland park. The data from the open house showed that people wanted a more ecological park with a focus on education and public access. They also shared a desire to maintain the character of the existing piers.

Facebook LIVE Presentation (May 29, 2020)
The OLIN team and DRWC shared the process and early park designs with the public through Facebook LIVE. During this presentation the public was invited to ask questions, give feedback, and share the project with others. The initial feedback to the park designs were very positive though some questions were raised about how people and a robust ecology might interact or clash.

Online 3D Model & Survey (May 2020 - October 2020)
In addition to the online presentation the design team also set up an interactive 3D model of the proposed park design that the public could explore on their own. The model included renderings of the future park, ecology, public feedback and more. Viewers were then asked to provide feedback through an online survey that the design team used to hone in the final aspects of the design.

On Site Signage (June 30, 2020)
Signs were posted on site that provide links to project information and raised awareness about the project. Signs have increased the number of views to the online 3D model and the survey. The signs were produced in English, Spanish, Chinese, Cambodian, and Vietnamese. The on site signage will help to raise awareness and excitement about the new park.
Upland Ecology
The piers host an emergent, eclectic mix of native, exotic, and invasive species that reflect the site’s urban soils and history of disturbance. Pier 64 has the highest percentage of invasive species, although several large native trees exist at the perimeter. Pier 67 has the least vegetation, with a few hardy natives and invasives that have taken root in the exposed concrete. Pier 70 contains the most robust and diverse vegetation, with a substantial and partially native tree canopy. These conditions create different opportunities for habitat creation, including meadow, shrub thicket, and woodland. Varying habitat types can be achieved through invasive removal, selective canopy thinning, and planting of appropriate native plants. One challenge to habitat creation is the existing population of feral cats, which can have a devastating impact on wildlife, particularly birds.

Wetland Ecology
Wetlands on this site can represent historic, native freshwater tidal marshes and increase education and awareness of the hallmark feature of the Delaware Estuary. However, they must be carefully constructed in this highly modified reach of urban river, which is constrained between the shipping channel and upland land uses. Although the bathymetry of the berths has become much shallower, the top layer of sediment is unconsolidated muck and fine flocculation particles, or “floc.” Removing the top layer of floc and installing a stable aggregate substrate will allow for more successful establishment of freshwater mussels, submerged aquatic vegetation, and emergent wetland vegetation. As the piers decay, they can be integrated into the wetland planting, providing higher ground for marsh migration as sea levels rise.

The freshwater tidal marsh at John Heinz National Wildlife Refuge serves as a reference for wetland restoration
John Heinz National Wildlife Refuge
Image Credit: Andrew F. Kazmierski
Participants at the Bio-Blitz identified 84 individual Species

October 6 Bio-Blitz Results

iNaturalist
Environmental Assessment
The team’s environmental assessment of the site extracted groundwater and soil samples from 10 borings, which were tested for polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and the 8 RCRA heavy metals. Although trace concentrations were detected, the majority of concentrations were below the Pennsylvania Department of Environmental Protection’s (PEDEP) Statewide Health Standards for recreational use. Two samples, one soil and one groundwater, exceeded these standards. However, both samples were extracted at depth and will not require remediation for park use unless these areas are substantially excavated.

Pier Conditions Inspection
The design team performed an underwater inspection of Pier 64, Pier 67, Pier 70, and associated shorelines. With the exception of the recently installed rip-rap shorelines, all bulkhead and pier structures are in poor, serious, or critical condition according to the ASCE Waterfront Facilities Inspection and Assessment rating. The team does not recommend the use of any existing structures in their current state for public access, and do not believe that in-place maintenance of the piers is feasible or meets the criteria for the expected lifespan of the proposed improvements. The team recommends demolition of the existing structures or partial demolition with substructure improvements.

Many of the structures on site are currently unsafe for public use
Pier 64
Image Credit: OLIN
Sea Level Rise
Relative sea level rise (RSLR) projections are important for understanding both future marsh health and the resilience of investments in public access. Based on a 50 year design life and the confidence level of projections, the team has chosen RSLR to 2080 as the design case. The City of Philadelphia’s “Toward a Climate-Ready Philadelphia” report projects a middle high range estimate (75th percentile) of 34.25 inches, or 2.85 feet RSLR by 2080. With this amount of sea level rise, high tide will fully inundate Piers 67 and 70. Sea level rise will also impact the elevation of flood events, which may be further influenced by more extreme precipitation.

Wind and Wake Analysis
Waves generated by wind and boat wakes can impact both coastal structures and wetlands. The wave analysis was based on a 100 year return period for wind speed, as well as the wakes generated by vessels typically found on the Delaware (tugs and container ships). The greatest wave height – 3 feet – was generated by the tug. This wave height suggests a low-moderate wave energy site, which will require wave attenuation for successful wetland establishment.

3D analysis of sea level rise in 2080 shows Pier 70 and 67 completed inundated at high tide.
2080 SLR Middle High Estimate
The site today holds a wild charm: the emergent nature, the quiet expanse of the river, the geological quality of the crumbling piers, and the opportunities for fishing, foraging, and exploration. We can’t lose that. It draws visitors today, not only to the formal landscapes of Pier 68 and the river path, but also to the informal terrains of Piers 64, 67, and 70. It’s what makes this place special and experientially distinct from other riverfront landscapes like Race Street Pier or Spruce Street Harbor Park.

And yet, we can do better. From an ecological perspective, that wildness is severely limited and a shadow of what was once here. The upland habitat is short on diversity and long on invasives, but the real lack is in the water. Less than five percent of freshwater tidal wetlands remain in the United States. The Delaware Estuary retains more than anywhere else, but they are scarcest in the urban corridor between Wilmington, Philadelphia, and Trenton. Naturally functioning tidal wetland habitat does not exist at the site due to the historical use, structured edges, and wave energy. We have a rare opportunity here to restore freshwater tidal wetland and to offer Philadelphians the experience of a habitat that has almost vanished from this urban river. Below the water line, we can create habitat for rare species like the Delaware’s thirteen native freshwater mussels, eleven of which are listed as threatened or endangered.

Habitat establishment at South Wetlands Park will deliver functional benefits to the city and watershed. Living shorelines and riparian habitat stabilize banks while tidal marsh can reduce sediment transport—both contributing to reduced coastal erosion. Marsh plants naturally attenuate wave energy; the constructed wave attenuators that enable marsh establishment adjacent to a commercial shipping channel will further protect shorelines and allow for the deposition of sediment while serving as mussel habitat. Mussels, in turn, filter suspended particles and nitrogen, improving water quality.

South Wetlands Park will be small, in habitat terms, but will connect to much larger ecological systems. Ultimately, it will connect us, too: when we see migrating birds pause for rest or hook a fish in the river, this slice of urban habitat takes on much larger significance. But we should not assume that everyone will appreciate the wildness of the site today or the wildness of a purely restoration-driven landscape. To experience the power of that bird or fish, you must first be drawn in. You must feel welcome, safe—and maybe inspired.

Our goal is to offer wild beauty to all: a place where Philadelphians can immerse themselves in the very ecology that sustains the planet and its inhabitants. Wild beauty for all means building on, rather than erasing, the emergent ecology of today. Wild beauty for all means creating the conditions for a more robust, resilient, and diverse ecology of the future. Wild beauty for all means safe passage to the piers and water. It means paths that accommodate a range of abilities. It means basic affordances for pausing and resting, for old or young, for deaf or blind or unable to walk. It means setting the stage for civility and inclusiveness with high quality design that communicates care and generosity while offering total immersion.
Flowering snakeroot owns the understory on Pier 70.

Image Credit: OLIN
VISION - SITE PLAN

- Fishing Platform / View North
- Breakwaters
- Boardwalk on New Piles
- Kayak Channels
- Viewing Steps
- Adventure Path
- Viewing Steps
The concept for the South Wetlands Park creates numerous opportunities to explore the wetland and upland communities found in the park. Boardwalks act as the main circulation system throughout the park, while kayak channels provide access and adventure in the water. These channels also allow larger fish such as Alewife/Herring and Sturgeon species, many of which are of conservation concern, into the protected waters behind the breakwaters. These fish are host species crucial to the reestablishment of freshwater mussels.

An adventure path provides a more hands-on experience as it winds through the wet meadow and upland communities, eventually tying in to a path on Pier 64 that leads down to the water and views of the river.

South of Pier 70, a floating dock provides canoe and kayak launch access to the river. The associated boathouse and trailhead pavilion provides small boat storage and a comfort station with bathrooms and water fountain to serve the park and the southern terminus of the Delaware River trail.
A lower viewing platform on pier 64 provides views to the river, wetlands, and existing historical structures.

Pier 64
Kayak channels throughout the wetlands create passage ways for fish and ways for the public to engage with the wetlands up close.

Kayak and Fish Channels

The path on Pier 64 cuts into the terrain to provide a unique experience.

Pier 64 Path
The views from Pier 67 look directly upstream towards the Ben Franklin Bridge. The design calls for a seating element built using pieces of the pier.
Pier 70 has the most robust ecology on site. The park design keeps this intact while allowing for safe access with boardwalks and seating.

Pier 70

The kayak channel cuts through the base of Pier 67 to allow for more habitat, water movement, and access.

Pier 70
The OLIN team completed this initial feasibility and concept design phase in October 2020. Bringing the park vision to fruition will require additional stages of design and planning work as well as fundraising for construction. The next stage of work will focus on making sure that the design vision complies with the requirements of state and federal permits, and will likely involve an Environmental Assessment (EA). Following preliminary approvals, the team will begin working on the technical drawings and specifications required to build the park.

Construction will be phased. Phasing allows for the park to be built as funds become available, and it also provides the opportunity for learning through monitoring and adaptive management. Creating a freshwater tidal wetland on an urban river is a new and innovative endeavor, so future phases will benefit from the findings of the Phase 1 project.

The diagram to the right outlines a likely Phase 1 for the park. The proposed Phase 1 includes one pier (Pier 70) and one berth - the fundamental units of the project - along with the full complement of upland and wetland habitat envisioned for the site. A combined boardwalk and wave attenuator will shelter new wetland plantings and provide a connection between Pier 70 and the existing park at Pier 68. The proposed Phase 1 will also include a floating canoe and kayak launch as well as a boathouse building with restrooms anchoring both water access and the southern trailhead of the Delaware River Trail.

The remainder of the park may be built as one phase or a series of smaller phases. A timeline for construction has not yet been established, but will ultimately depend on the availability of funding. As the project continues, DRWC and the OLIN team will provide updates through the website, social media, and community meetings.
Phasing begins with Pier 70, the boat launch, and the connection to Pier 68. The rest of the park will be constructed in future phases.

| Phasing Diagram |

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*Estimated construction costs include the following markups: General Requirements & Mobilization (10%), Overhead & Profit (15%), Escalation (3% per annum, assumed for 18 months), and Design Contingency Assumptions (15%).