

RIGHT
High tides and a clogged sewer overflow system frequently combine to flood Wilmington's low-lying Southbridge neighborhood.

THE CHRISTINA RIVER is a tributary of the mighty Delaware estuary, close enough to the ocean that it is tidal. It meanders through Wilmington like a wobbly *M*. Most of the city sits on the north shore. As long as anybody can remember, the lower-lying south side has experienced periodic inundation; 90 percent of it is within the 100-year floodplain. The first European settlers, being Dutch, were undaunted. They built dikes and ditches there, and grew salt hay for fodder. Iron mills, coal yards, tanneries, and other nastiness arrived on the south shore throughout the 19th century and into the 20th, mostly located along the river's edge. Meanwhile, in the marshy center of the *M*, according to an 1893 newspaper item, there were eight or 10 "flower farms," the largest named Rushland Gardens. A street grid was platted for this whole river-bound southern piece of Wilmington, but only a sliver of it, a neighborhood called Southbridge, was ever developed. In 1900, when the city's total population was nearly 77,000, about 3,000 people lived south of the Christina.



WRONG SIDE OF THE RIVER

SOUTH WILMINGTON WAS WHERE INSALUBRIOUS ENTERPRISES AND MARGINALIZED PEOPLE ENDED UP. CAN A WETLAND PARK MITIGATE THE AREA'S ENDEMIC FLOODING—AND SPUR ITS RENEWAL?

BY JONATHAN LERNER

DOUG BAKER, UNIVERSITY OF DELAWARE

“HOW DO YOU TELL THE WATER, ‘NOT UP HERE!’”

—MARILYN DRYDEN



ABOVE

As long as anyone can remember, Southbridge has flooded when high tide and high rainfall coincide.

OPPOSITE

The T-shaped outline in yellow indicates the park's first phase.

Many were recent immigrants, and some were African Americans with deep local roots; the first independent black Christian church in the United States, the Union Church of Africans, had been founded there by a former slave in 1813.

Today, industry in South Wilmington appears to consist largely of auto junkyards and storage lots for disused trailers and shipping containers. Recently there's been some growth—a shopping center with a supermarket, and a waterfront town house and apartment-tower complex built along the northwestern

edge, facing over the Christina to downtown and the city's thriving Riverfront redevelopment district. Half a mile east, though, across the wetland, Southbridge feels like an isolated village. Its population has dwindled to about 1,500, nearly all of whom are African American. But it's a place with a certain integrity. Many families have lived there for generations. Nearly half the homes are owner occupied. There is an active and effective neighborhood association. Still, it floods.

Now there is a plan to transform the marshy center into South Wilming-

ton Wetlands Park. It's not exactly a new proposal. A 2006 neighborhood plan offered a description that still applies: "Create a Central Park located to the immediate west of Southbridge. Use this park as the lungs of the neighborhood. Its wetlands should be cleaned up and improved for flood retention." But flooding is not the neighborhood's only challenge. Southbridge is more or less surrounded by brownfields left over from those 19th and early 20th century heavy industries. Nearby jobs are few. It's a food desert, with public health issues typical of underserved urban communities

TIDAL CONNECTIVITY ANALYSIS



LEGEND

- FINGER/GORDON AND CITY-OWNED PROPERTY BOUNDARY
- UNRESTRICTED TIDAL INUNDATION (EL. 5.0)
- PARCEL BOUNDARY

COURTESY CITY OF WILMINGTON

RK&K

with an industrial past. The park vision has been enhanced since 2006, with a plan for added street connectivity around the wetland, and with realizations that a cross park trail will link the neighborhood directly to the shopping center and groceries. The park could be an engine of investment, not only for Southbridge, but also for all the nearby underused properties. That could mean infill for new residents and businesses, and new jobs. Another added dimension: The concept of how to handle the wetland itself has been taken far beyond the basics of cleanup and water retention.

The source of the flooding, aside from low elevation and inexorably rising tides, is an overwhelmed combined sewer system. Unresolved, this situation alone could render Southbridge unlivable. Clarence White has owned a body shop and used car business in Southbridge for some 55 years. Recalling a recent daylong, heavy rainstorm, he said, "That last flood, it came up my steps. When the wind is blowing it looks like a river in the street, with whitecaps. It used to be just rain and river water, but now, some of these houses, they say their basements fill up with sewage." People describe sewage bubbling up

through manholes. Third-generation resident Marilyn Dryden remembers her father, who was born in 1922, describing the floods of his childhood. She suggests that the city's occasional efforts to clear storm drains or do other infrastructure work seemed to shift the inundation from one part of the neighborhood to another, adding further unpredictability. "You may think your block isn't vulnerable," she says, "but how do you tell the water, when it's running, 'Not up here!'"

The park's first phase is planned for a T-shaped 23-acre site; another 10-acre marshy parcel may be added.

EXISTING WETLANDS



Existing drainage patterns will be preserved. Stormwater from Southbridge will be piped west into the park, where excavation will create additional storage capacity. The park will drain via channels, connecting through a tide gate to the river. That's the flood mitigation piece. Here's the beautiful part: In the course of all that engineering, a cluster of habitats will be created where communities of native wetland species can thrive. "We're restoring ecology. That changed the whole dynamic, the potential of funding sources," says the project's landscape architect, Scott Scarfone, ASLA. (His firm,

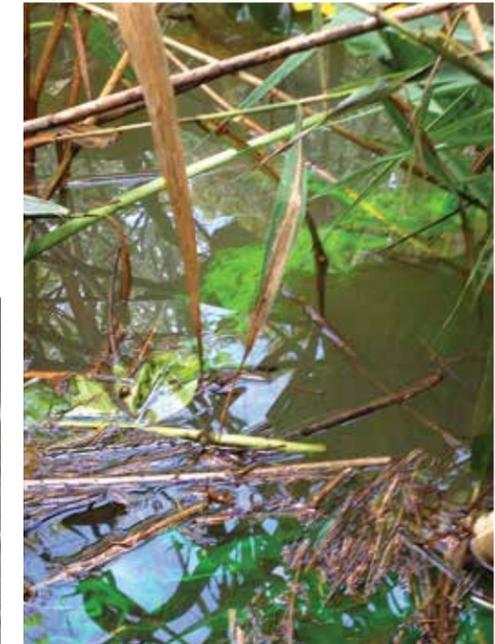
Oasis Design Group, was recently absorbed into Kimley-Horn.) "Every agency that looks at this is going to be on board, because now there's a greater purpose. We can sell this as an ecological project that by the way solves the stormwater problem."

Build an urban park, which is also a succession of naturalized habitats, on brownfields, which must be floodable: Now, there's a piece of work. The site has yet another constraint. An electric transmission line runs straight across it, a rectilinear taunt to the serpentine landforms and wavy surfaces of a tidal marsh

and, come to that, of a park as we commonly picture it. The transmission line's towers can't be moved. In fact, vehicular access to them must be maintained, and excavation can't come so close as to destabilize them. The design solution will also provide the park's main usable feature. A path will trace across the site, from the Southbridge neighborhood on the east to a gateway just across the street from the shopping center on the west. It will traverse wetland areas and channels as a boardwalk—one capable of accommodating utility company trucks—that bridges between "islands," each of which

"WE'RE RESTORING ECOLOGY. THAT CHANGED THE WHOLE DYNAMIC."

—SCOTT SCARFONE, ASLA



will support a transmission pole. The poles maintain their straight order, but the curves of the path and irregular shapes of the upland pieces they stand on will disguise it. For anyone strolling through the wetland, the route should feel as untamed and organic as the sinuous watercourses and undulating vegetation of the re-created wetland environment underfoot.

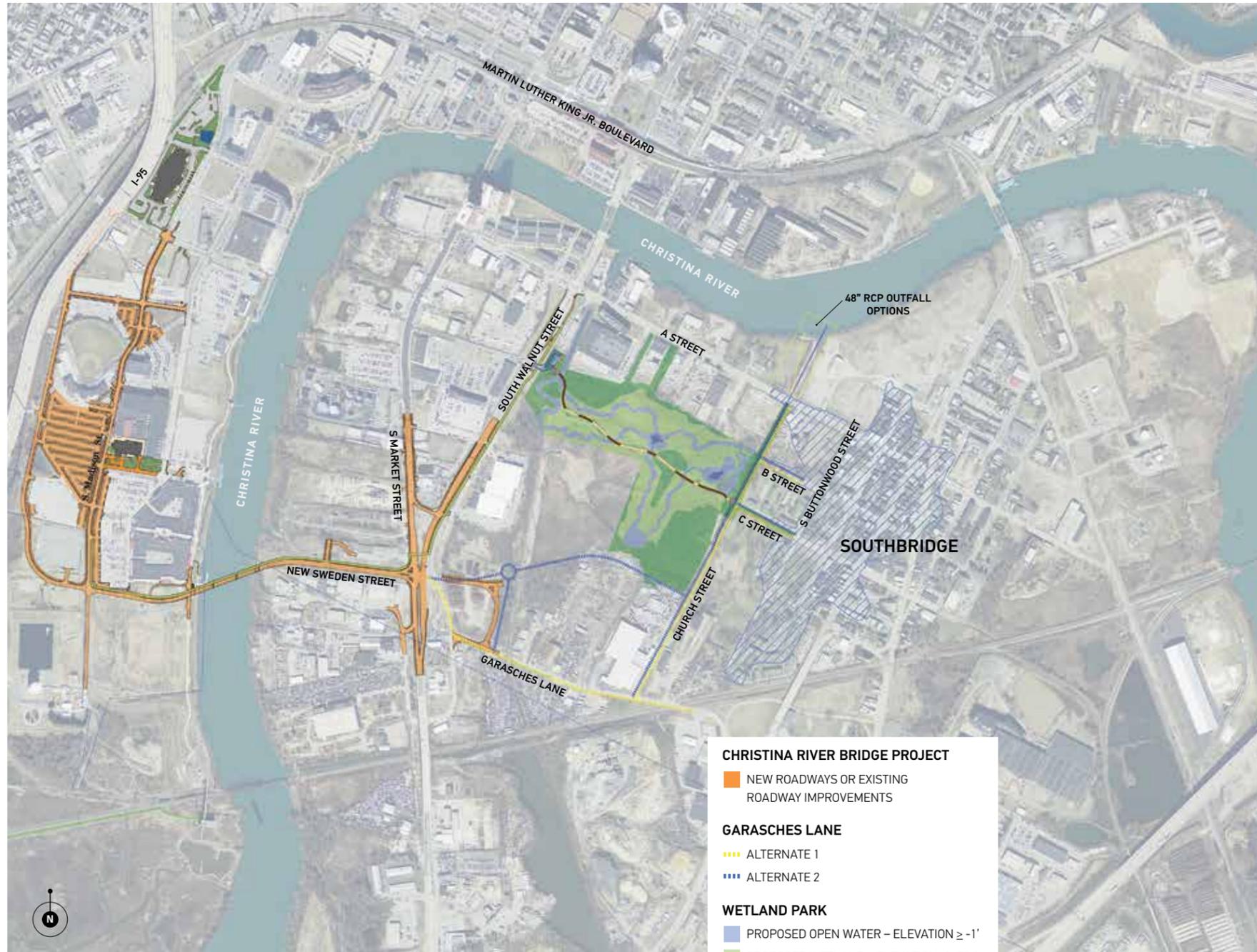
Given that the park will be not only wet but also habitat for delicate species, aside from gazing into it from its periphery, walking or biking on the path will be the principal forms of en-

agement it can provide. That has not stopped Marie Reed, president of the Southbridge Civic Association, from elaborating a bigger dream. She envisions "a kiosk where people can come in and see virtually how the wetland project is built, and how it works, and also learn the history of Southbridge." She has already convinced the Wilmington Housing Authority, which owns a garden apartment complex along the park's border, to allocate one of their units for this purpose. "I want to have Southbridge Rangers," Reed adds, "and use people from the community to be greeters." This may be ambitious, but Scarfone says,

"It's good that people are thinking like that," and points out that something along these lines could provide a sense of security for park users. (Another contiguous six-acre upland parcel may be incorporated and developed as more conventional park space, with picnic pavilions, playing fields, and such. The two likely additions to the first phase will create a roughly square park.)

It's not only the sponginess that will necessarily limit contact between people and the ground. There's also the pollution. "Every bit of dirt that we have to take off the site and

ABOVE
The wetland's surface water quality and hydrology are currently being monitored, to aid in planning for remediation and channel design.



- CHRISTINA RIVER BRIDGE PROJECT**
- NEW ROADWAYS OR EXISTING ROADWAY IMPROVEMENTS
- GARASCHESS LANE**
- ALTERNATE 1
 - ALTERNATE 2
- WETLAND PARK**
- PROPOSED OPEN WATER – ELEVATION \geq -1'
 - PROPOSED WETLAND – ELEVATION -1' TO 0'
 - PROPOSED UPLAND – ELEVATION 0' TO 3'
 - SEWER SEPARATION AREA
 - PEDESTRIAN WALKWAY AT GRADE
 - PEDESTRIAN WALKWAY BOARDWALK
 - TRAIL ACCESS



ABOVE AND LEFT
Industrial detritus and invasive vegetation have occupied the site until now.

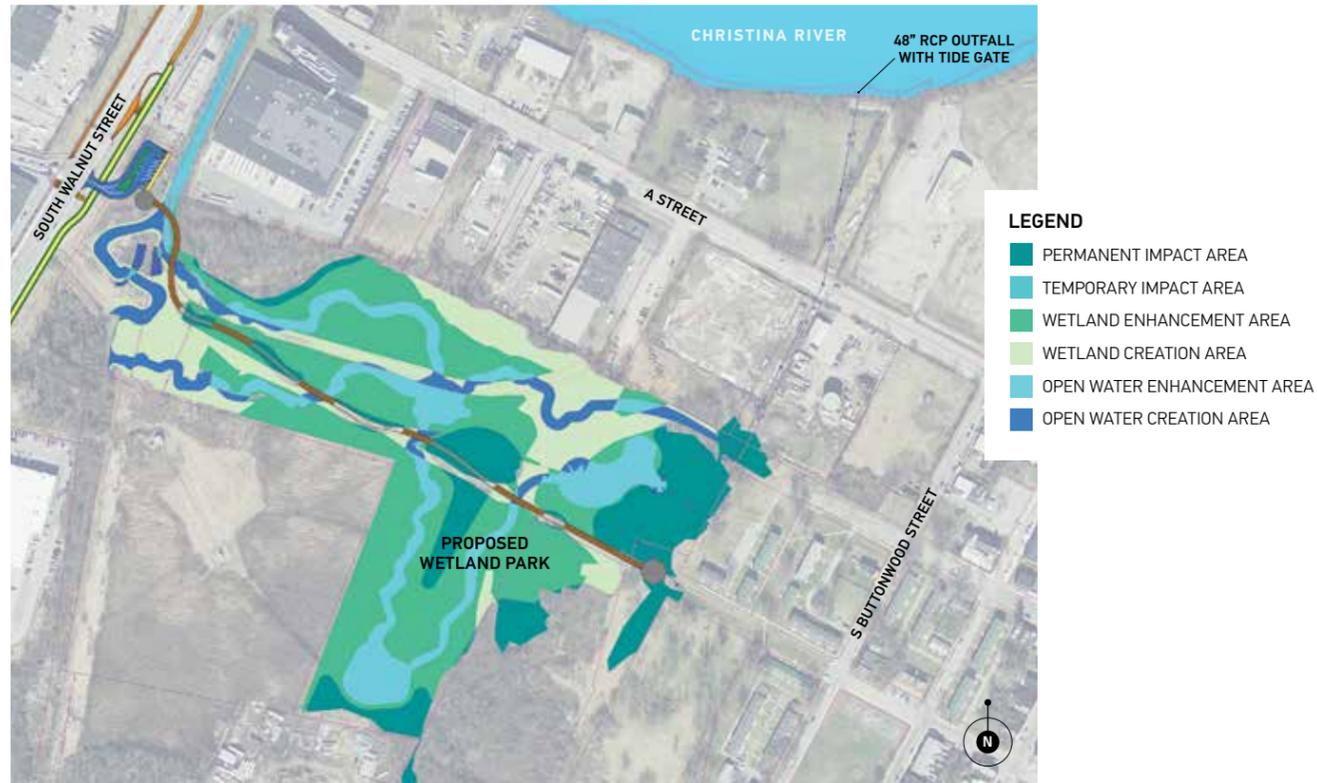
throw away is expensive, because it's contaminated with metals and other things," says the environmental scientist Justin Reel of RK&K, who leads mitigation and hydrological planning for the project. "But for the low-level type of human interaction we're proposing, with a fairly thin cover we can use it on the site effectively. If you don't have frequent, regular, intended exposure, these contaminants aren't super bad. Where we do anticipate frequent soil contact, like our upland islands, we are planning for a cover over top of any native soil." But resolving the polluted soil problem will be complex.

"It's one thing to clean up an area for humans. But if you're bringing burrowing animals in, or shellfish," a more stringent standard might be required, says Marian Young, the president of the remediation consultancy BrightFields. Scarfone quips, "For the amount of remediation we need, all the earthworms in the world aren't going to be able to do." Normally, he says, "for projects like this, you cap it. But here, we want to re-create a functioning system."

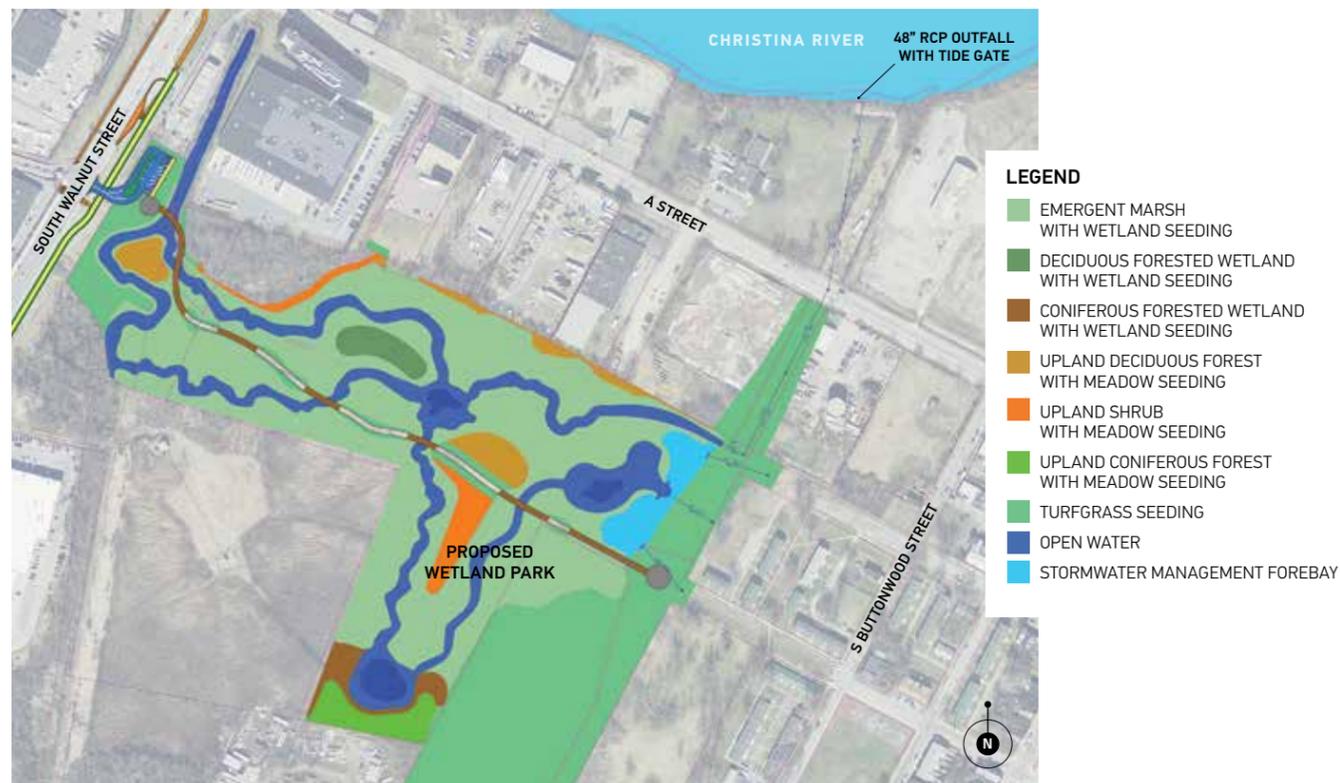
This spring, the future park was cleared of dense *Phragmites*. The resulting open, savanna-like vista gave

a delightful hint of how it might eventually look—or feel, anyway, because it has yet to be sculpted and engineered. Added water storage capacity and created habitats that can resist recruitment of invasives like *Phragmites* will both be achieved with a single strategy, lowering the site to alter the hydrology and establish "a different water regime than we have right now, which is very irregular and storm driven," Reel says. When there is a flush of stormwater from the residential neighborhood, it will collect in a forebay, to let sediment settle, and then will cross the site through a winding network of channels and

IMPACT AREAS



PLANTING AREAS



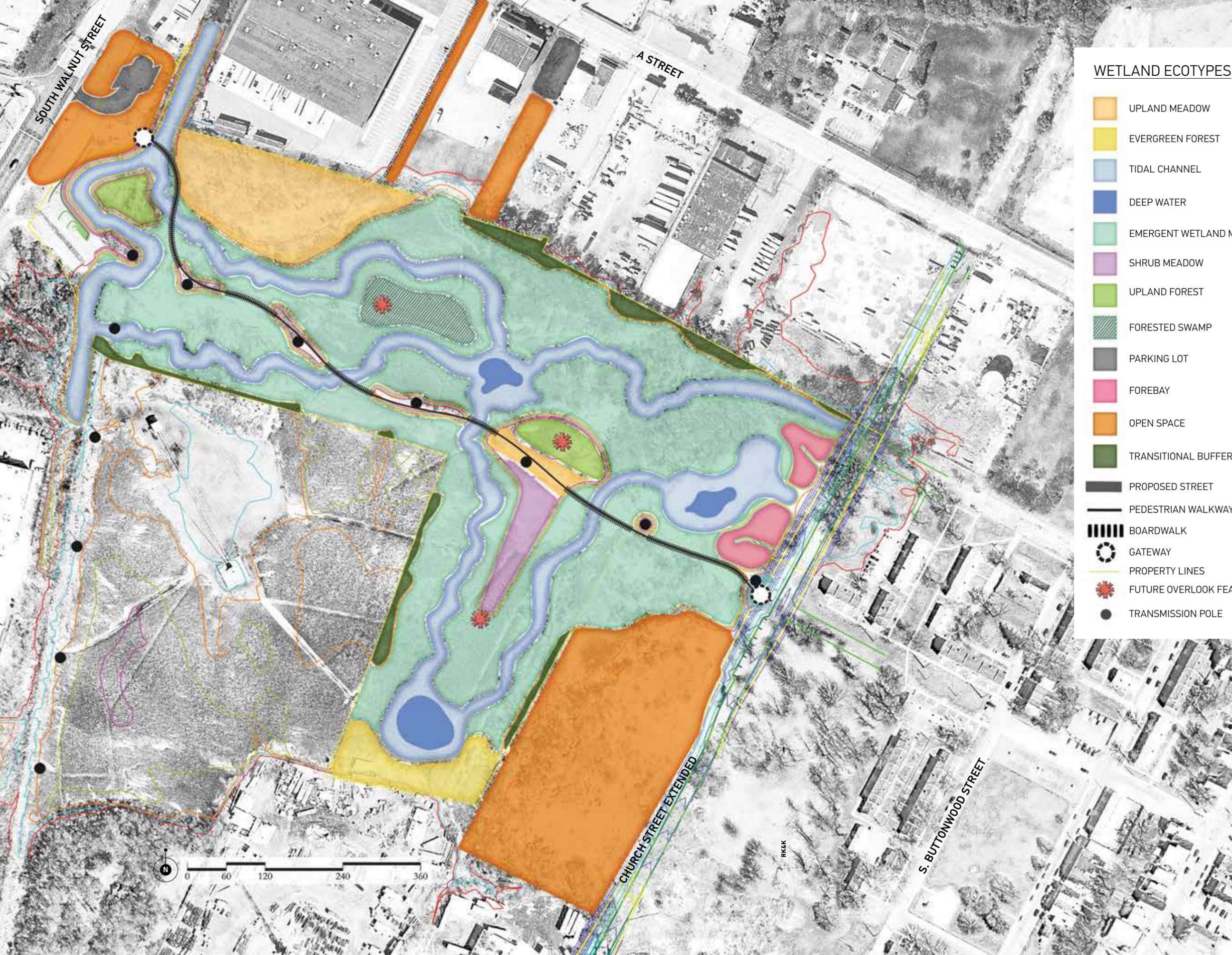
ponds. These eventually converge on a short, straight connection from the park to the river that is partly open ditch and partly pipe. At the river, the flow, as it is currently, will be controlled by a self-regulating tide gate.

An open flow to the Christina and its tides was considered. That would promote the wetland's naturalization and its connection to fisheries. But properties surrounding and contiguous to the park are low-lying. The park "could be potentially completely full of tidal inundation," Reel says, "and flood all our neighbors around the edges of the site." But the tide

gate creates other problems. Young explains that when stormwater is filling the park while simultaneously "the river is high, the gate will be closed and make a big lake. You have to have the stormwater holding, but the plants can only stand it for a certain amount of hours." Meanwhile, enticing fish to travel in from the river through the pipe, to populate the new habitat, is also a problem, but maybe illumination inside the pipe will attract them. The ditch and pipe connection, however, doesn't even belong to the city. "Where it outfalls back into the wetland is probably the most contaminated part of the

project,"—a PCB dump, Scarfone called it. "It's a point source. Every time water flushes over here and back into the river, it picks up some of that." Remediation is obligatory, "which requires destabilizing some of these edges, and they're owned by other people." There's a gas station on one side and a property development company's offices on the other. "It's one challenge after the other that fascinates you and makes a project super exciting," Reel says, "I'm normally engaged in wetland habitat creation and restoration as a compensatory project for some permit. In those situations, we

ABOVE Earlier this year, dense *Phragmites* were cleared from the site.



WETLAND ECOTYPES

- UPLAND MEADOW
- EVERGREEN FOREST
- TIDAL CHANNEL
- DEEP WATER
- EMERGENT WETLAND MARSH
- SHRUB MEADOW
- UPLAND FOREST
- FORESTED SWAMP
- PARKING LOT
- FOREBAY
- OPEN SPACE
- TRANSITIONAL BUFFER
- PROPOSED STREET
- PEDESTRIAN WALKWAY
- BOARDWALK
- GATEWAY
- PROPERTY LINES
- FUTURE OVERLOOK FEATURE
- TRANSMISSION POLE

- UPLAND MEADOW**

 - Agrostis alba* (Redtop)
 - Andropogon gerardii* (Big bluestem)
 - Dichanthelium clandestinum* (Deertongue)
 - Ilex glabra* (Inkberry)
 - Lolium perenne ssp. multiflorum* (Italian ryegrass)
 - Panicum virgatum* (Switchgrass)
 - Penstemon laevigatus* (Eastern smooth beardtongue)
 - Rhus copallinum* (Winged sumac)
 - Rhus glabra* (Smooth sumac)
 - Rubus flagellaris* (Northern dewberry)
 - Rudbeckia hirta* (Black-eyed Susan)
 - Sambucus nigra* (Black elderberry)
 - Solidago juncea* (Early goldenrod)
 - Sorghastrum nutans* (Indiangrass)
 - Viburnum dentatum* (Southern arrowwood)
- EVERGREEN FOREST**

 - Ilex glabra* (Inkberry)
 - Ilex opaca* (American holly)
 - Pinus taeda* (Loblolly pine)
- EMERGENT WETLAND**

 - Acorus calamus* (Calamus)
 - Cephalanthus occidentalis* (Common buttonbush)
 - Hibiscus moscheutos* (Crimsoneyed rose mallow)
 - Iris versicolor* (Harlequin blueflag)
 - Leersia oryzoides* (Rice cutgrass)
 - Nuphar lutea* (Yellow pond-lily)
 - Peltandra virginica* (Green arrow arum)
 - Pontederia cordata* (Pickerelweed)
 - Sagittaria latifolia* (Broadleaf arrowhead)
 - Schoenoplectus pungens* (Common threesquare)
 - Symphotrichum novae-angliae* (New England aster)
- SHRUB MEADOW**

 - Cornus amomum* (Silky dogwood)
 - Ilex verticillata* (Common winterberry)
 - Morella pensylvanica* (Northern bayberry)
 - Sambucus nigra* (Black elderberry)
 - Viburnum dentatum* (Southern arrowwood)
- UPLAND FOREST**

 - Betula lenta* (Sweet birch)
 - Carya glabra* (Pignut hickory)
 - Diospyros virginiana* (Common persimmon)
 - Fagus grandifolia* (American beech)
 - Liriodendron tulipifera* (Tulip tree)
 - Quercus alba* (White oak)
 - Quercus rubra* (Northern red oak)
- FORESTED SWAMP**

 - Acer rubrum* (Red maple)
 - Liquidambar styraciflua* (Sweet gum)
 - Magnolia virginiana* (Sweetbay)
 - Nyssa sylvatica* (Black gum)
 - Quercus phellos* (Willow oak)
- FOREBAY**

 - Iris versicolor* (Harlequin blueflag)
 - Juncus canadensis* (Canadian rush)
 - Juncus effusus* (Common rush)
 - Scirpus cyperinus* (Woolgrass)
 - Typha latifolia* (Broadleaf cattail)

SOUTH WILMINGTON WETLAND PARK AXON



THE CITY'S ECONOMIC DEVELOPMENT DIRECTOR HOPES TO ATTRACT INVESTMENT NEAR THE SITE, "SPACE THAT IS NOT A JUNKYARD."



→ try to find the nicest, most natural site we can get our hands on. I don't normally do it in the middle of an urban situation, right next to a neighborhood, or incorporate urban stormwater into the site."

The economic reverberations of new parks are well documented. "When government spends in an area, it sends a message," says Jeffrey Flynn, Wilmington's director of economic development. "We're hoping this \$40 million investment drives private investment" in housing and new commercial activity—specifically "space that is not a junkyard...something

OASIS DESIGN GROUP (NOW PART OF KIMLEY-HORN)

OASIS DESIGN GROUP (NOW PART OF KIMLEY-HORN)

that requires employees." His office has informally calculated that within 10 to 15 years, improvement of underdeveloped parcels in a 100-acre zone of influence surrounding the park could bring in \$5 to \$7 million annually in additional property tax revenue. That may seem slight, but property tax accounts for about a third of the city's \$150 million budget. That's aside from "revenues you can't measure. It's going to psychologically have a great impact for a historically disadvantaged community and residents who may not have been exposed to a natural feature like this."

The Nature Conservancy, which has recently focused its energy on nature-based solutions for urban problems, is participating in the project. They've helped the city purchase some of the land, for example, and are helping navigate the project's regulatory hurdles. This model of an engineered wetland as both stormwater separation infrastructure and civic space, with all the potential knock-on benefits, can be replicated, says Richard Jones, the organization's Delaware state director. "Cities tend to have a fair amount of space that is degraded, or has been overlooked. If you have nature there already and can improve

it and make it work for you, that's fantastic. But what if you don't? What if it's parking lots? Can you still make use of that? The answer is yes."

A new amenity like a park often drives up nearby property values, leading to the displacement of long-time residents. This seems less inevitable in South Wilmington. Property taxes there only go up if the millage rate is raised, which is rare, or improvements are made on a specific property that raise its individual assessment. They are not adjusted for every owner as a result of changes in the market. "People come in and

ABOVE
Boardwalks sturdy enough to carry utility vehicles will link "islands" that support transmission towers.

OPPOSITE
The park is expected to spur redevelopment in surrounding areas.



ABOVE
On the south shore, berms and privately owned sites make the river's edge inaccessible now.

LEFT
The north shore has been redeveloped with a pedestrian walkway.

OPPOSITE
The site—here a distant brown smudge—is surrounded by development.

start doing infill housing? The assessed value of the surrounding properties doesn't change," Flynn says. And Wilmington speculators and landlords have little motive to force rents up. While the trend for central-city living does express itself there, and the new park should make this part of town more desirable, a great deal of new housing is being built on empty land that was cleared at midcentury for urban renewal or was formerly industrial, in both downtown and along the riverfront. Wilmington seems insulated from the housing shortages and price inflation occurring in many cities.

What it is not insulated from is climate change. As with any adaptation project, this is the unknowable: How fast and how far will the water rise? "Our tidal connectivity goes away in about a two-foot sea-level-rise scenario," because gravity will no longer drain the park into the river, Reel explains. "The wetland complex and habitat we created would remain, and we would still have our resiliency and stormwater storage for the neighborhood. But we would have to get that water out, and be ready for the next storm, through a pumping system." In the longer run, he suggests that the wetland might need

to be expanded, and that additional pumping systems and perhaps revetments be built in the larger South Wilmington area.

"We certainly don't want to make this level of investment for a 20-year life span, or a 50-year life span. So what's our 100-year life span, or our 200-year life span?" he asks. "That long-term approach is bigger than the one adaptation for this system." ●

JONATHAN LERNER'S MEMOIR OF THE WEATHER UNDERGROUND, *SWORDS IN THE HANDS OF CHILDREN: REFLECTIONS OF AN AMERICAN REVOLUTIONARY*, HAS BEEN PUBLISHED BY OR BOOKS.

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