

C O N T R A C O S T A C O U N T Y

Greener, Fatter Levees Boon to Richmond Resilience?

DANIEL MCGLYNN, REPORTER

In early May, despite the now normal issues of groups gathering for video calls and virtual PowerPoints, the San Francisco Bay Restoration Authority voted unanimously to fund the early stages of a massive new infrastructure project along the North Richmond shoreline with a grant of \$644,709. The shoreline is now one step closer to becoming home to a horizontal, or living, levee that provides both flood protection and habitat. The proposed project, in the planning stages since 2017, will be anchored near a wastewater treatment plant managed by the West County Wastewater District. The facility, just north of the Richmond Bridge and situated among the marshes fed by Wildcat and San Pablo creeks, is vulnerable to flooding.

A bulk of the grant will go toward geotechnical, topographical, and other studies of the site to figure out just how big the levee will become. “The proposed project will look at two different scales,” says the San Francisco Estuary Partnership’s Josh Bradt, who is managing the Richmond project for the Restoration Authority. “One will study what it would take to build it just on wastewater district property, while the other will study what it would take to expand the project from Castro Cove in the south all the way to Giant Marsh to the north.” The first option would mean 0.6 linear miles of levee and 2.6 acres of transitional habitat (the zone between tidally influenced marsh and uplands), while the second option would expand the levee to 4.5 linear miles and create 15 acres of transitional habitat.

North Richmond’s future living levee will create a physical barrier between rising seas and critical infrastructure and make the treatment plant more climate resilient. Depending on the final scope, flood protection could extend to other infrastructure such as the Richmond Parkway and nearby communities. The levee also provides an area of retreat in the form of upland habitat for

ecologically important plant and animal species. Existing wetlands in the vicinity are among the best examples of intact marsh environments left in the Bay Area.

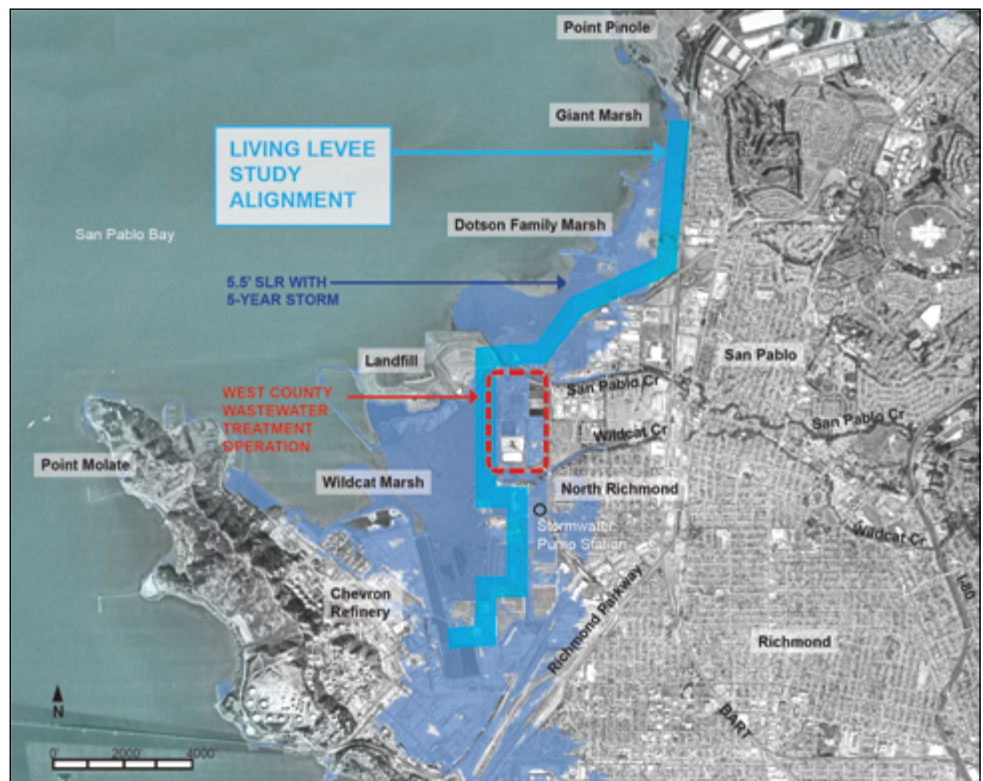
As the name implies, the North Richmond Living Levee won’t just be a static flood control barrier. The plans call for using the levee to address local community demand for more access to the shoreline, as most recently outlined in both the 2018 Resilient by Design challenge and the earlier North Richmond Shoreline Vision plan. Key among the planned features is to use the levee project to connect two segments of the Bay Trail. “The proposed project will go beyond just protecting the water treatment plant ratepayers,” Bradt says. “It will provide a greater public benefit.”

The construction of a living levee on the North Richmond shoreline demonstrates the challenges and opportunities of adapting to climate change — and reimagining what the future could hold throughout Contra Costa County. Many of the 19

cities within the county, along with the county itself (large swaths, like North Richmond, are unincorporated and under county control) are planning projects to prepare for future weather volatility.

So far the adaptation efforts in the county have been decentralized. There is no clear-cut guidance or overarching governance structure with the teeth or budget to hasten the pace of resiliency projects. The county does have a five-year-old climate action plan focused on increasing the use of renewable energy. Updates to the plan, now underway, include better ways to measure and track progress toward goals.

Meanwhile, sea-level rise along the county’s sprawling shoreline continues at a rapid pace. According to a study prepared for the county last year by graduate students at UC Berkeley’s Goldman School of Public Policy, average projected countywide sea-level rise may hit up to a foot in the next decade, two feet by 2050, and more than five feet by the end of the century.



The North Richmond Living Levee study area. Source: Mithun



Channelized Rheem Creek has flooded neighborhoods in North Richmond and nearby Rollingwood. Photo: Margarito P Gomez

Much of the potential for climate change adaptation in Contra Costa County is outlined in a Bay Conservation and Development Commission (BCDC) Adapting to Rising Tides (ART) report. The ART research cut the county into two halves. Findings on the western part of the county (Richmond to Bay Point) were published in 2017, while the research for the eastern part of the county (the Delta) was released in April of this year. The report identified three big near-term climate-related county-wide issues.

The first is the loss of jobs and the impact that rising seas and other weather-related disruptions will have on the local economy. Contra Costa County is still very much defined by its working shoreline, which hosts four of the five major Bay Area refineries, as well as warehousing and manufacturing facilities, and major railways. According to the 2017 ART report, there are 4,853 industry-zoned acres at risk of flooding in the county. All four major refineries fall into that category.

The second ART finding is that climate change impacts will not be evenly dispersed among communities and residents. Unless there is a major change, the same communities that bear the brunt of the emissions and poor air quality from the oil and gas sector — the county's largest industry — are the same ones likely to end up under water. "The county contains seven out of the ten largest industrial pollution sources in the Bay Area," says Jody

London, Contra Costa County sustainability coordinator and lead on its climate action plan. "There is a lot of concern about the impacts that has on health; disadvantaged communities are disproportionately impacted by these activities."

These concerns are leading some in the county to push for major structural change in the local economy. "The Sustainability Commission, which is a county advisory body, is recommending that the board of supervisors adopt a climate emergency resolution," says London. One of the recommendations is to create a carbon transition advisory group. "[We want to know] what it looks like for health, jobs, and revenues if there is less fossil fuel activity in the county — how do you plan for that?"

Also on the environmental equity front, existing flood control initiatives are not evenly distributed across the county. Efforts are underway to change that. On the banks of Rheem Creek — which flows through Richmond, the city of San Pablo, and the unincorporated county neighborhoods of Rollingwood and North Richmond — residents are currently working with the Watershed Project (a Richmond-based nonprofit), the national conservation organization American Rivers, staff from the City of Richmond, and other local stakeholders to study nature-based ways to make the creek function again.

For years the channelized Rheem Creek has flooded two blocks of the neighborhood that lies on the border

HIGHTIDE

Anatomy of a Horizontal Levee

Horizontal levees are to flood control what electric cars are to personal transportation. In both cases, the two innovations leverage existing infrastructure and ways of thinking while also making an attempt to be less environmentally damaging than their predecessors.

As with some other nature-based adaptation strategies, the idea of a horizontal levee is relatively new. So new, in fact, that there still isn't agreement about what to call them (ecotone levee and living levee are still in the running). Regardless of the name, the concept was first pioneered as part of shoreline protection efforts along the Chesapeake Bay. Imported to the San Francisco Bay Area, the first major horizontal levee was constructed in 2015 for the Oro Loma Sanitary District in San Lorenzo (see "Nudging Natural Magic," Estuary News, December 2017).

A horizontal levee is a different shape than a conventional riprap-over-dirt levee and can support vegetation. When built in combination with water treatment infrastructure, this new kind of levee can provide flood control as well as habitat and water quality benefits. In the case of Oro Loma, treated freshwater from the plant is filtered through the sloping, terraced levee, irrigating plantings. In the process, plants and microbial processes remove more nitrogen, phosphate, and pharmaceutical traces from the irrigation water than standard wastewater treatment, according to Oro Loma studies. The design of the levee also creates an opportunity to restore, or at least mimic, historic marsh habitat. A well functioning marsh isn't just a wide plain subject to the feast and famine of tidal influence. Rather, a healthy marsh is full of nuance and gradients in the form of slopes and uplands that provide shelter — and in the case of sea-level rise — a place for marsh species to retreat. **DM**

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between the city of Richmond and Rollingwood. With funding from the Coastal Conservancy, a solutions-oriented group was able to interview community members about the creek's history and behavior. The group found that most of the creek is choked with vegetation behind fences on private property, and that the creek issues have been jurisdictionally ambiguous, resulting in decades of inaction.

By piecing together the community interviews and some mapping work, the Rheem Creek group found that the creek bed has risen higher than the surrounding neighborhood in some places due to years of sediment build-up. The group is now studying how best to fix the situation with nature-based solutions. Ideas include planting shade trees to stifle creekside thickets and incorporating floodplain into a local park design. "There's not much we can do with the actual channelized structure of the creek," says Aysha Massell, director of California Integrated Water Systems for American Rivers. "But we intend to develop a robust monitoring and maintenance plan."

What marries all of the climate change adaptation plans and projects together in Contra Costa County is the opportunity to create a new sector of the economy and local jobs that foster equity, access, and a strong sense of place. "North Richmond is one of the most disadvan-

taged communities in the Bay Area. So we are engaged in placemaking efforts, including better access to Wildcat Creek, which will hopefully make people more aware that they are living near the mouths of two major creeks in the East Bay," says John Steere, a planner for Contra Costa County helping local groups build watershed connections. "Tying local jobs with green infrastructure planning and maintenance is really a public benefit."

There is plenty of recognition of the need for climate change adaptation projects, and no shortage of ideas about what kinds of projects to build or organize. Between federal, state, and local funding bodies, there isn't even a lack of money to get these projects off the ground. The biggest bottleneck in the resiliency pipeline is reluctance among local governments, land managers, and grantees to back projects that have no clear strategy for covering the long-term expenses of nature-based infrastructure like rain gardens, urban forests, and complete streets.

"There has to be funding for green infrastructure operations and maintenance, otherwise that's where those projects go to die," says Juliana Gonzalez, the executive director of the Watershed Project. Gonzalez and Steere are working to create a Green Benefit District, which is a potential new funding model for long-term restoration and

greening projects. The Dogpatch and Northwest Potrero Hill neighborhood Green Benefit District in San Francisco is an example of how this model could work. While that district raises money through parcel taxes, Gonzalez is advocating for alternative funding such as new traffic or redevelopment fees, mitigation funding from polluting industries, and climate adaptation funding for disadvantaged communities. "The idea is that the more we get people involved and can pay them to be block ambassadors or work on local conservation crews, then when the horizontal levee comes online we can create local jobs and local stewardship."

In a larger context, the North Richmond living levee project is a demonstration of what can happen when several major stakeholders work together — along with a strong community voice. The working group for the North Richmond living levee includes officials from the county, the city of Richmond, the wastewater district, Chevron, and the East Bay Regional Park District, all collaborating to figure out how to make the most of the project. "I really hope this approach of developing alignment among multiple stakeholders is something that will take off," Bradt says. "Especially if it can show that there is a way to leverage resources and dollars to have a greater impact."

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Students from a San Francisco State Wetlands Ecology class plant *Suaeda californica* over an arbor of tree branches in the transition zone of a multi-habitat living shorelines experiment at Contra Costa's Giant Marsh. The arbors will provide areas of high water refuge for wetland birds and mammals. Read more and see videos of this landscape scale experiment in shoreline adaptation, in which oyster reefs and eelgrass beds will help buffer the county from the advancing Bay, in *Estuary News* June 2019, *Supershore at Giant Marsh*. Photo: Kathryn Boyer.