When the sea levels rise in the Bay, where will it hurt in Oakland?

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The shoreline along Oakland is a checkerboard quilt of cement, steel and wetlands, with grassy estuaries sandwiched between walls of cement where old terminal buildings rise from the shore, steel pipes send effluent to the Bay and massive container-ship berths receive their payload.

Just inland from this quilt lies a broad north-south strip of railroad and highway. Only after all that, nearly a mile from the shore, lie residential neighborhoods, block after block of shoebox-sized houses in an area known locally as the flatlands.

Their distance from the shoreline leads many Oakland flatland residents into thinking of sea level rise as a remote issue not likely to affect them, based on random interviews when a question about flooding caused people to laugh or raise an eyebrow and point to the scorching sun over drought-worried California.

But it is precisely these flatland neighborhoods that are likely to be flooded — and not only with water but also with a toxic stew of industrial runoff and sewage — when the Bay's sea level rises or a global warming-induced storm occurs, according to an analysis by Climate Central from National Oceanic and Atmospheric Administration data, and to analysis by the San Francisco Bay Conservation and Development Commission, the agency responsible for monitoring the waterfront.

Because the flatlands are the lowest part of the city, they'll receive the backflow from a storm drainage system that relies on gravity when it overflows, and when a sewer system that planners expect will be overwhelmed by sustained high waters malfunctions. Water, and whatever industrial runoff or sewage is mixed with it, would flow back out of storm sewers onto streets, yards and basements.

"Some of the first flooding likely to occur will be in the low-lying areas in Oakland, where the poor people happen to live," said Lindy Lowe, lead senior planner of the Adapting to Rising Tides project of the San Francisco Bay Conservation and Development Commission.

Sea level rise is no longer an "if" occurrence but a "when." Scientists predict a three-foot rise in waters off the U.S. West coast by the year 2100 and, more urgently, a 35 percent chance of a climate-induced storm surge, Hurricane Sandy-style, anytime between now and 2030. That's within the next 16 years, according to Climate Central's latest Surging Seas analysis, released Wednesday. "Even small amounts of sea level rise make rare floods more common by adding to tides and storm surge," Climate Central said. It based its local projections on data from NOAA's water station in Alameda, historic flood data, and National Research Council mid-Pacific Ocean sea level rise projections.

The oceans are getting warmer and higher as glacial ice shelves in Antarctica melt. This May, scientists discovered a major glacier in West Antarctica had detached and begun an irreversible melt.

According to data assembled by Climate Central from NOAA and peer-reviewed scientific papers, melting is on track to produce a sea level rise of 1 to 8 inches by the year 2030 — that's 14 years from now — and up to 19 inches by 2050. Climate Central also states "Rising seas dramatically increase the odds of damaging floods from storm surges," doubling the odds of a "century" or worse flood occurring in the next 16 years. Century floods are defined as "floods so high they would historically be expected just once per century." Locally it would be a surge of three feet above the Bay's mean high tide.

Along Oakland's coast, 19 inches would wash over runways at Oakland International Airport, railway lines and roads that lead to the Port of Oakland and some of the treatment facilities at the vast wastewater treatment plant in West Oakland.

What the Bay Conservation and Development Commission and the East Bay Municipal Utility District and others forecast is that storm surges would flood this infrastructure and then gravitate to the storm drain system, only to be pushed back because the storm drains are already full. The water in the saturated earth would seep into sewer systems, overwhelming them.

"Nobody from the hills to the flatlands will be able to flush their toilets," if a storm surge of the size predicted with rising sea levels were top four feet, said Jeremy Lowe, sea level rise program manager at ESA and author of a tidal wetland design guidelines for San Francisco Bay and an ecosystem-based climate change adaptation plan.

"Most of the effects on communities will be the flooding of infrastructure," said BCDC's Wendy Goodfriend, a senior planner on the Adapting to Rising Tides project, with nowhere for the water to drain. "Drainage is a problem in East Oakland and West Oakland. These neighborhoods rely on sump pumps," she said, to deal with saturated yards and homes during rainy seasons.

"East Oakland has one big pump system, so to keep people's yards and basements and streets dry, it is pumping water out," all the time. "There will be a time when that is not possible," because the water will just be too plentiful.

Indeed it's already happened, that's why officials know it could happen again.

In the El Nino storms of the mid-1990s, parts of East Oakland and West Oakland had streets flooded for days on end.

Barbara Williams, who has lived in East Oakland at 14th Avenue and 23rd Street since she was a little girl, remembers it. "The storm drains couldn't handle all the water" flowing onto 14th Avenue from the sloping streets. "They had sandbags up there," she said, pointing to the streets to the south.

As to whether it could happen again and with much higher waters, "I haven't thought about that," she said. "Where would our shelter be?"

Over in West Oakland, Amber McZeal has thought about it. "I'm pretty familiar with storm surges. I moved here from New Orleans after Katrina," she said. To the prospect of significant flooding from storm drain backflow or infiltrated sewers, "Yeah, it's very real. It's like a plunger going backward," McZeal said. After the levees broke, water gushed into her 7th Ward New Orleans neighborhood and overwhelmed sewer and drainage systems. Her apartment building had 8 inches of water on the ground floor and was rendered unlivable. She had to leave the city.

Agencies, Utilities, City Preparedness

The East Bay Municipal Utility District, which operates the vast wastewater treatment facility in West Oakland that receives sewage from nine East Bay cities, has made preparing for sea level rise and storm surges a priority, said Abby Figueroa, its communications officer. It has been actively upgrading its pumps and sewer interceptor pipes to guard against storm water infiltration and putting in valve protections at the treatment pools to keep out floodwaters. A

lot is at stake: on an average day it treats 63 million gallons of wastewater for some 650,000 customers.

"We think there is going to be a lot more water coming into the plant through inflow and infiltration," based on modeling and assessments of what could happen during sustained higher sea levels, said Abby Figueroa of EBMUD. "So we are working on reducing the inflow and infiltration: reducing the amount of water that comes into our pipes that is not from our customers but from the street runoff." It is working with BCDC in vulnerability assessments.

It has installed monitors and valves within the system so that it can control against inundation where its large pipes collect wastewater from municipal sewer lines and at the plant itself so it can shut off inflow of a magnitude that would harm the plant. These are precautions.

But EBMUD does not own all the pipes that bring water and debris into its wastewater treatment system — not even the majority of them. Cities own the sewer lines that travel under streets, and individual property owners own the sewer laterals that connect buildings with sewer lines. What EBMUD owns is the bid interceptor pipes that collect wastewater from sewer lines.

"It is a regional problem. We are the last stop for this water that gets into the system, but we don't own everything connected to it," Figueroa said. Moreover, the sewer system is separate form the storm drainage system, even though the two commingle when rain is heavy and runoff is high.

"We have to work with municipalities with their systems. If their systems are stronger, they won't introduce extra storm water," Figueroa said.

"The collection systems are quite deteriorated here in the city. We end up taking in a lot of storm water," Figueroa said.

The age of sewer laterals and sewer lines and infiltration from storm water systems are big enough problems that the U.S. Environmental Protection Agency is officially monitoring pipeline upgrades in the area. The EPA and the California Regional Water Quality control Board are requiring six cities — Oakland, Piedmont, Emeryville, El Ceritto, Kensington and Richmond Annex — to fix old sanitary sewer pipes to protect against the infiltration of rainwater. Alameda, Albany and Berkeley also have sewer lateral replacement requirements under their sewer district ordinance.

In Oakland, the City Public Works Department secured funding through Measure B to systematically replace sewer lines, which cover 931 miles under Oakland streets, and has been working to upgrade them.

"It's definitely a place where everyone — the City, agency people, commercial developers and individual property owners — need to become educated," said Kristine Shaff of the City of Oakland Public Works Department.

"Public Works is trying to make people aware of water, drainage, pipes, electric wires," she said. "Infrastructure is something you don't think about until it doesn't work." She said, "People expect to be able to turn the water on, flush the toilet, drive on streets that have street lights."

Voters approved a broad public works measure, known collectively as Measure B, that authorizes the City to upgrade and maintain roads, bridges and sewers. This June, the City is issuing a $40 million bond to fund the sewer work and retire older bonds that funded it previously. So far, the City has constructed 42 miles of new relief sewers and replaced or repaired about 290 miles of sewer pipes.

Oakland passed an Oakland Energy and Climate Action Plan in late 2012 with bold plans to reduce greenhouse gas emissions from Oakland by 36 percent (from 2009 levels) by the year 2020. It details how to reach this goal with public transportation enhancements, bicycle lanes, building code changes and outreach. A small portion of the Plan calls for the City to build resiliency into city planning and to engage the community in resiliency and adaptation plans.

But as environmental activist Margaret Gordon points out, "There's no funding for implementing it. That's just a plan on paper." As a third-generation West Oakland resident and a community organizer with the West Oakland Environmental Indicators Project, she is very concerned that a resiliency plan help individual residents, and not just assure that big developments and infrastructure are still standing.

Nile Malloy, Northern California Program Director for Communities for a Better Environment and Gordon have been active with City officials, Port of Oakland officials and in Oakland Climate Action Coalition deliberations, to make sure that residents of West and East Oakland, that poor people, are not left stranded and struggling to survive, as in Katrina, when the rising seas come to Oakland.

"With sea-level rise, it is storm water and runoff, it will cause flooding and toxins spilling into the street," Malloy said. "What we want to see is some kind of plan from businesses that will prevent toxins from going out onto the streets and into communities."

Because the shoreline here is home to industry rather than residents, Malloy said negotiations with business is their main front. "Business and industry have to address what we can do to lower the impact."

Malloy said their best business partner is the Port of Oakland. "They are the frontline of defense from sea level rise, so much of the infrastructure and wetland restoration would be on their lands," Malloy said.

The Port of Oakland owns both the shipping port and Oakland International Airport — both of which would suffer severe damage in the event of a 100-year-storm of three feet or more — and miles and miles of wetlands in between.

The Port has restored and protected 71 acres of wetlands along the coast, donating them to Martin Luther King, Jr. Shoreline Park. So far, those wetland acres are Oakland's major defense against sea level rise.

It is assessing several other actions including rebuilding a levee in the south of the Bay, near its runways.

Richard Sinkoff, the director of environmental programs and policy at the Port, said protecting the port and the communities are one and the same thing.

"73,000 jobs are related to the port. So it is a critical issue for us, what we do to protect our facilities and our operations and also protect the adjeacent communities," he said. "Really, in the area of sea level rise, to a certain extent, we are all vulenrable together: the Port, the airport and nearby communities are all low-lying," he said.

The Port wasn't always so community-minded. It took Margaret Gordon and activists like her to get the Port to agree to mitigate diesel air pollutants by requiring ships to switch to electric power when idling, and turning off diesel motors.

Malloy wants other businesses to take on tasks, and the city and people to plan for what's coming.

"We know what happened in Sandy and in the aftermath of Katrinia in New Orleans, particularly in adaptation planning, so we've been trying to push an equity agenda, because at the end of the day, it's about who gets resources, where the resources go, and what infrastructure is buffered."

Flatlands Preparedness

The flatlands neighborhoods are where the majority of Oakland residents live — certainly the majority of its working class and low-income residents. The poverty level is above 20 percent and unemployment in the flatlands hovers in the 15 to 18 percent range, according to the U.S. Census Bureau accounts for various zip codes. The flatlands are home, also, to gun violence and joblessness, mediocre schools and prostitution. They're home to a lot of despair and worry.

When environmental and community activists try to get people galvanized over the risks that global warming induced sea level rise could bring, they don't find much interest among residents – nor among elected officials.

"It's a hard sell because people's immediate priorities are unemployment, crime: immediate crises," said Catalina Garzon, Community Strategies Program Director at the Pacific Institute. Also, "People have been hearing about the drought, and they say, 'so now you're talking to me about flooding?'"

But it is people like Williams, who has no car, and depends on her walk along 14th Avenue to get her groceries, who will be left vulnerable. Yet as the heavy metal bars on nearly every door and first floor window in her neighborhood tell, crime is the issue here, not weather.

"There is excellent reason why our poorest communities are not engaged. The truth is, if you are struggling to put food on the table, or worried about the crack house next door, it is a luxury to worry about the possibility of an earthquake or sea levels rising in 30 years from now," said Ana Marie Jones of Collaborating Agencies Responding to Disasters, a nonprofit

agency trying to help Bay Area communities prepare for rising sea levels, earthquakes and other disasters.

“And if 97 percent of the community is checking out, you will not have political leadership taking this up,” Jones said.

For Janice and Leander Sellars in West Oakland, the prospect of floods seem real. They have happened here before in their neighborhood of Chester Street and 4th Avenue, but it pales to them in comparison to other neighborhood problems in West Oakland.

“It wasn’t that bad, we’d just kick it around,” Janice Sellars says of the ankle deep water that covered her street for days. “Hell, I’ve seen worse.”

But it wasn’t actually just water they were kicking around. A former chemical plant in the area left so much lead and other toxins in the soil that the Environmental Protection Agency ordered a soil remediation for the whole area, and City workers came in and covered lawns with tarpaper gravel and new dirt to avoid exposure to lead. But all that was after the flood and the kicking around in the stuff.

It is the fear of toxins and disease being introduced into ground water and soil from flooding that has Fruitvale resident Carolyn Norr worried. She has a two-year-old son and is about to deliver another child.

“Having a child made me really think of our responsibility around this,” she said. Sea level rise, and the disruptions to life as we know it that it will bring, “is something we know is going to happen but we are sort of putting this thing off to our kids to deal with,” she said.

But by allowing our human-created fossil fuel emissions to disrupt the climate, change the sea level and induce storms “is huge — it’s a huge experiment and we don’t know all that is going to happen.”

“This disrupts the balance that has been sustaining us for millennia. It could bring different waterborne diseases, different types of mosquitos,” Norr said. “I don’t know if I can say which will impact my child the most, air pollution or sea level rise, but in general, we are messing with the stability of the world, and it is not good.”