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## Sea level rise threatening to inundate Highway 37

Coalition of transit, environmental advocates tries to save Bay Area's most vulnerable highway

By John King

The best view of the North Bay shoreline comes and goes quickly, unless you're stuck in heavy traffic while trying to cross the Napa River on Highway 37.

From the crest of the bridge, the panorama is a gentle curve of levee-lined fields along marshes and open water. The range of hills beyond it ascend to the green spread of Mount Tamalpais.

Then you descend and the highway becomes a one-lane artery in each direction where cars move past marshes and farmland for nearly 10 miles — navigating the major Bay Area roadway most vulnerable to climate change.

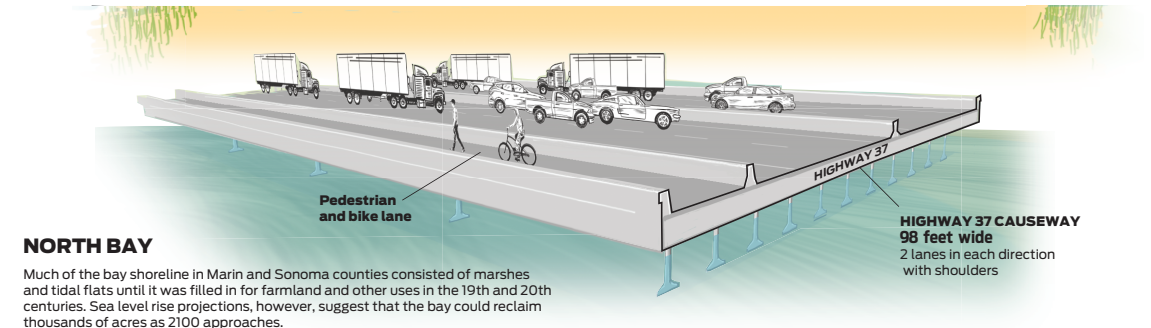
It is by no means the only one. All along San Francisco Bay, low-lying roadways and rail lines face the potential of being flooded as sea levels rise and the bay expands.

"This is a much bigger thing than most people realize," said Randy Rentschler, director of legislation for the Metropolitan Transportation Commission. "The whole area is a transportation network at risk."

That risk is the result of generations viewing the shoreline's shallow tide-lands and mudflats as easy places to build the infrastructure required by a growing region, including highways and railroad tracks lines. The assumption was that the bay was locked in place — portions could be filled in, but it would never grow.

That assumption didn't take into account larger changes in the climate triggered by global temperatures that have climbed steadily since 1980 and show no signs of leveling off.

As a result, a study last year by state and regional agencies said the combination of higher tides and rough



### NORTH BAY

Much of the bay shoreline in Marin and Sonoma counties consisted of marshes and tidal flats until it was filled in for farmland and other uses in the 19th and 20th centuries. Sea level rise projections, however, suggest that the bay could reclaim thousands of acres as 2100 approaches.

### PAST North Bay shoreline, 1858

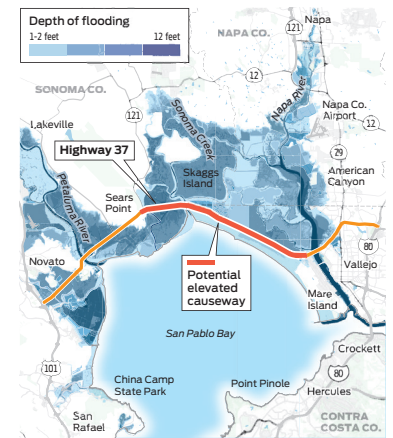


Sources: Metropolitan Transportation Commission, San Francisco Estuary Institute, Mapbox, illustrations created with Mental Canvas

### PRESENT Current shoreline



### FUTURE 36-inch sea level rise



John Blanchard / The Chronicle

storms in coming decades could upend travel in all nine Bay Area counties.

Faced with projections such as these, an unlikely coalition of transportation and environmental advocates have joined together to try and tackle the threats holistically. They want to replace the roadway with a lengthy elevated causeway, ending the threat from higher tides while allowing water to flow across the terrain in more natural ways.

The catch? Such an endeavor would cost an estimated \$4 billion and rely on such proposed revenue streams as a toll on drivers using the highway. It would need to compete for funding with other trouble spots in the region that, with time, will also require adaptation or even relocation.

"Our shoreline really does capture a lot of the issues we're seeing worldwide with respect to sea level rise," said Kendall Webster, a program manager with the Sonoma Land Trust, a nonprofit organization that was founded in 1976 and is active in the protection and restoration of natural spaces

and agricultural land. "If we're going to get this done, we have to work together."

Brian Gilardi is a rarity: a young farmer who has chosen his trade even though he doesn't own land.

"It's plenty of hard work, but it's a lifestyle choice," said Gilardi, who grew up outside Petaluma and now farms 1,500 acres spread among five leased fields. "I see all the traffic on (Highway) 101, bumper to bumper, and it feels like I'm worlds removed from that."

One of his current fields, 190 acres where Gilardi grows oat hay, is owned by the Land Trust. So are the 940 acres directly to the east, former farmland that the trust began restoring as a tidal marsh in 2015. Highway 37 is to the north — as is the area's biggest draw, Sonoma Raceway at Sears Point.

"Some farmers, more of the older generation, don't want to believe in global warming," he said. "I do."

Not that he's worried about being affected anytime soon: His acreage

below Sears Point is protected by levees. They date to the 19th century, when newcomers built them up, making it possible to drain the marshes by keeping out tidal waters. They've been maintained by farmers ever since.

"We're probably in the position right now where most of the levees can handle 2 feet, no problem," Gilardi shrugged, referring to sea level rise. "What happens in 50 or 80 years ... there's a lot of uncertainty in that."

The low-slung terrain along Highway 37 has been altered before.

The two-lane, 9-mile portion between Mare Island and Highway 121 near Marin County roughly follows the path of a low berm that was formed amid marshes by waves depositing silt and sand from San Pablo Bay over thousands of years.

Native Americans used it as a path, which was turned into a dirt road in the late 1800s. In 1928, a private company built a toll road to create a reasonably direct route from Solano County and points east to what now is Highway

101. A decade later, as World War II approached and activity increased at Mare Island Naval Shipyard in Vallejo, California purchased the road and added it to the state highway system.

The only major design tweak to the two-lane stretch came in 1995, when a concrete divider was added to prevent head-on collisions. The real transformation involves traffic — average daily volume has quadrupled since 1960, to 40,000 vehicles.

Viewed strictly in transportation terms, the obvious solution is to add extra lanes. But environmental concerns argue otherwise.

A wider highway would cause extensive damage to an already fragile patchwork of waterways, hay fields and marshes. Add the prospect of higher tides and simply widening what's there makes no sense.

This would allow additional restoration efforts such as the one the Sonoma Land Trust is doing south of Highway 37 alongside Gilardi's leased land.

In all, more than 8,000 acres along San Pablo Bay have been converted from diked farmland into free-flowing marshes by various government agencies and private groups. Early projects were sparked by the desire to create habitat that would nurture the fish, birds and small animals that endure along the bay despite more than 150 years of urbanization.

But the shadow cast by sea level rise makes such efforts even more valuable. If wetlands can get established before tides start climbing rapidly, they'll be able to take root and climb higher — allowing them to grow, in decades to come, at a pace that allows them to adjust to higher waters.

They'll also muffle the force of waves churned up by storms and high winds, preventing the shores behind them from eroding.

By replacing the current road with an elevated causeway, advocates suggest, existing marshes could be enlarged to serve as giant, green sponges to protect the southern portions of Napa and Sonoma counties while also reducing the risk that the rupture of a single levee could submerge Highway 37 and adjacent land.

"Everyone sees there's a huge opportunity — we can improve the marshes and improve the road," said Jeremy Lowe, a senior scientist with the San Francisco Estuary Institute. "People realized that it made sense to work together, rather than say, 'Tell

us what you want to do and we'll oppose it.'"

Caltrans, the state agency that eventually would take the lead on any such project, has signaled that it is open to the idea. Another agency, the California Coastal Conservancy, has been involved from the start.

"This is such a large area, you need to keep moving back and forth between high-level visions and the ground-level reality" in showing how a restored landscape and an improved roadway can co-exist, said Jessica Davenport, a deputy regional manager for the conservancy. "The level of collaboration is really unusual. ... We're committed to talking through the complexities."

The complexities are daunting, no matter how simple a two-lane road through open land might look.

If a family that owns land near Highway 37 decides to retire from farming and sell its land, for instance, environmental groups and government agencies interested in natural restoration aren't the only potential buyers. Municipalities such as Santa Rosa have purchased land where they can dispose of their "biosolids" — treated solid waste that can be used as organic fertilizer. Such properties remain in agricultural use, but they can't be restored as part of a larger natural ecosystem.

"It's great product," said Gilardi, who receives Santa Rosa biosolids at no cost. "Works very well."

When a formal plan to update Highway 37 does move forward, no matter how audacious or modest, upward of a dozen governmental agencies will scrutinize any proposal. That's also true of whatever is proposed for the highway in Marin County, which also is vulnerable long-term.

There's another constituency: commuters.

For people who drive Highway 37 from their homes in relatively affordable Solano County to jobs in affluent Marin, including thousands of essential workers, this is the most direct route. That's why traffic continues to grow — and why a drive that takes 20 minutes in ideal circumstances can top 90 minutes in the afternoon.

Such a commute is a reality of stratified Bay Area life. It also explains why Caltrans has portrayed any remake of Highway 37 as a social equity issue. And it's why many advocates accept that some version of

the route should remain, even though such a highway would not be located there today.

"Highway 37 is unique in that it's also an environmental justice situation," said Webster of the land trust. "The workers who use it every day need that road for their livelihood. It's not a route for rich techies going to their second homes in Napa."

But no matter how widespread support might be, finding the money to reinvent Highway 37 won't be easy.

A revenue plan from 2019 relied on \$3.3 billion generated over 30 years as part of a \$100 billion regional transportation bond. The pandemic put that bond on indefinite hold. Same for a proposed Highway 37 toll that drivers would be required to pay.

For now, Caltrans is working with federal officials to combine planning with environmental studies to speed up a makeover. The Metropolitan Transportation Commission is exploring how to loosen the commute gridlock in the short term. But those initiatives would cost money, too.

And while Highway 37 is vital to its daily commuters, the number of people who would be affected by its closure is far below the half-million-plus that use Highway 101 every day in southern Marin County. There, a low spot near Richardson Bay already closes occasionally for a few hours when king tides come in. Add another foot, and it could be overwhelmed.

This is the real challenge facing Highway 37 in coming decades: It is only one of many weak links in the intricate transportation chain that loops around the bay.

As far back as 2007, the Bay Conservation and Development Commission released maps showing that 3 feet of sea-level rise would inundate large stretches of the shoreline. More recently, a 700-page report done by the agency in collaboration with the Metropolitan Transportation Commission warned that if rising tides and storms were to lift water levels by 4 feet, 59 miles of highways and freeways along the bay would be knocked out of commission. Such levels would also close 68 miles of freight and commuter rail lines.

The estimated price tag to tackle every potential threat on the list: at least \$19 billion.

"We have a good idea of where vulnerabilities are," Dick Fahey, a senior planner at Caltrans, told a virtual open house focused on Highway 37

this spring. "Do we have the money to fix them all? No."

As sea level rises, more and more shoreline roadways will come under pressure. Each will have its own constituency. But not every weak link can be strengthened simultaneously. Choices might need to be made about where to dig in — and where to pull back.

"It's a big subject, and it's going to take a long time. Fortunately, we're getting started early," Rentschler said. In the long run, "we can protect some routes, but maybe not others."

That reality isn't lost on Lowe of the Estuary Institute. Highway 37 is "not the most important road, and there's only so much Caltrans can spend on it — Highway 101 is in a different league," he acknowledged.

Instead, he makes a counterintuitive argument for why Highway 37 and the environmental restorations alongside it should be tackled sooner rather than later. Arteries like Highway 101 have a succession of trouble spots scattered along the route, and each will need to be fixed in different ways as water levels climb. The proposed remedy for Highway 37 between Mare Island and Highway 121 is straightforward.

Once it is done, it is done.

"Now is the time to do something — before the really big ones crowd everything out," Lowe said. "Above all, it's an essential highway for society. You need to think of it that way."

The threat posed to transportation systems along the bay underscores a larger dilemma faced by the region in adapting to climate change. Assuming that sea level rise projections hold, the trade-offs will get more difficult as 2100 approaches.

The problem isn't that the Bay Area has ignored the specter of rising seas. We're ahead of most regions when it comes to studying the potential impacts and grappling with how to respond. At some point, though, individual efforts won't be enough.

What will be needed is a strong, focused strategy pursued across the region. We'll also need massive ongoing funding sources, such as the \$100 billion, 30-year Bay Area transportation bond that was discussed last year but derailed by the pandemic.

None of this is easy. All of it will be costly. But a response at this scale is critical — and it cannot happen soon enough.