

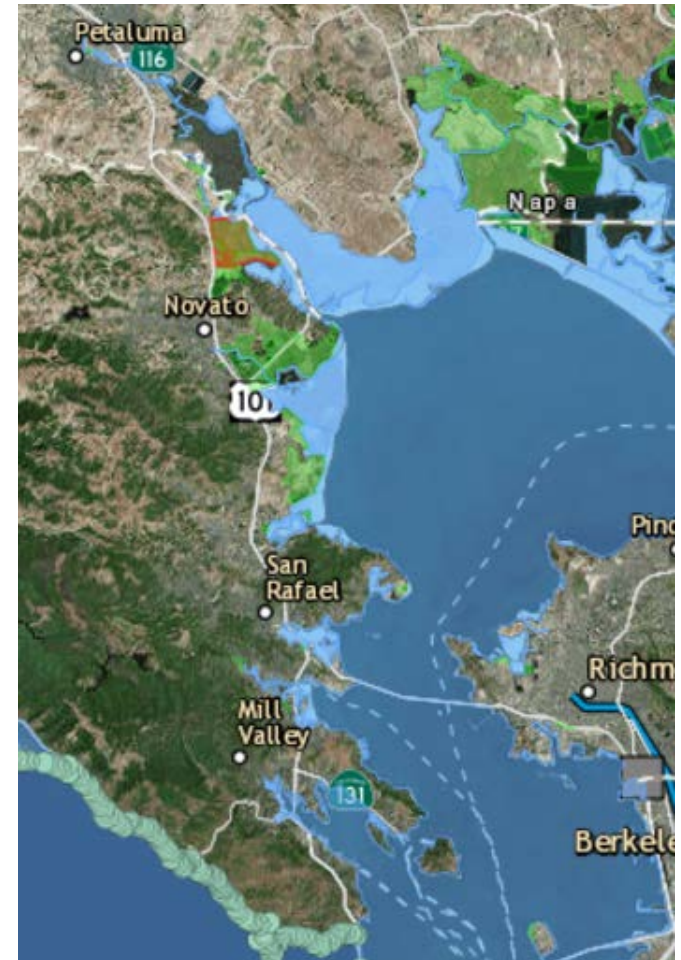
An aerial photograph of Marin Bay during King Tides. The water is a light blue-grey color, and the exposed mudflats are a brownish-orange. A large, white, lattice-structured tower stands in the water on the left. In the center, there is a small island or peninsula with several buildings, including a white house and a blue building, and a parking lot with many cars. The background is a dense forest of green trees. The text "Marin Bay Shoreline Sea Level Rise Vulnerability Assessment" is overlaid in large, bold, black letters at the bottom of the image.

Marin Bay Shoreline Sea Level Rise Vulnerability Assessment

Photo of Buck's Landing during King Tides flown by LightHawk

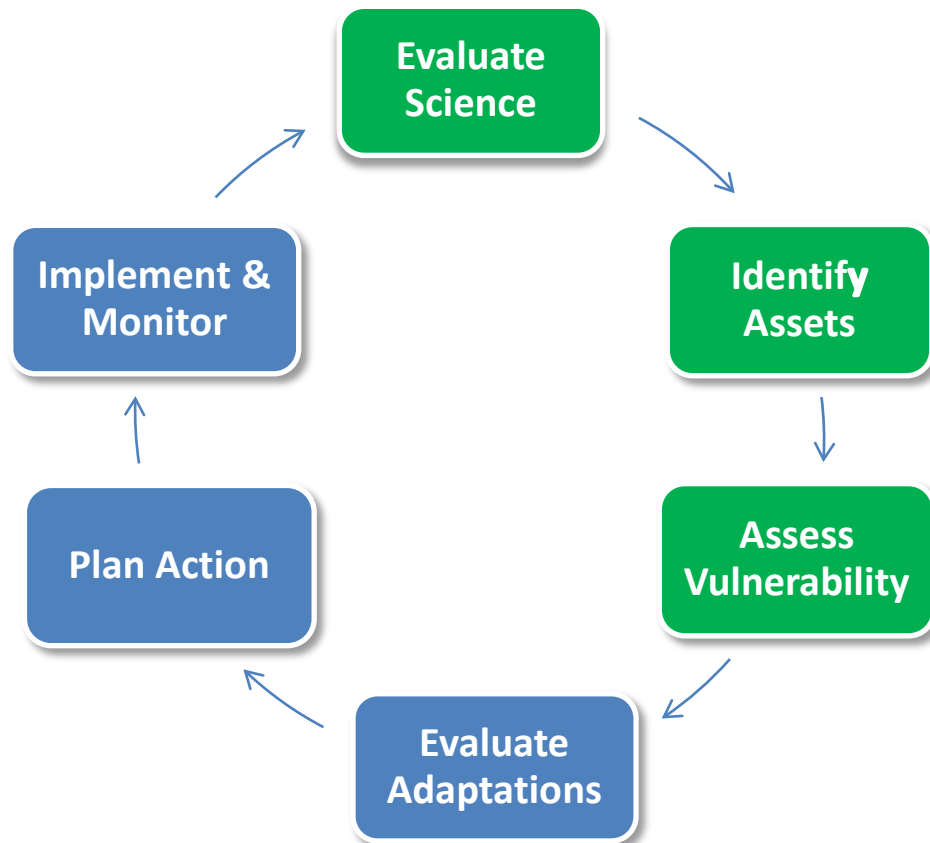
What we did

- Marin County led a project to quantify the impacts to our communities and infrastructure from sea level rise and storms
- Involved public and private stakeholders and coordinated with all cities and towns, and with local, regional, and state agencies to understand how the impacts affect Marin



Our Coast Our Future web viewer displaying 10 inches of sea level rise with the 100-year storm, which is comparable to our winter storms.

What is a Vulnerability Assessment?

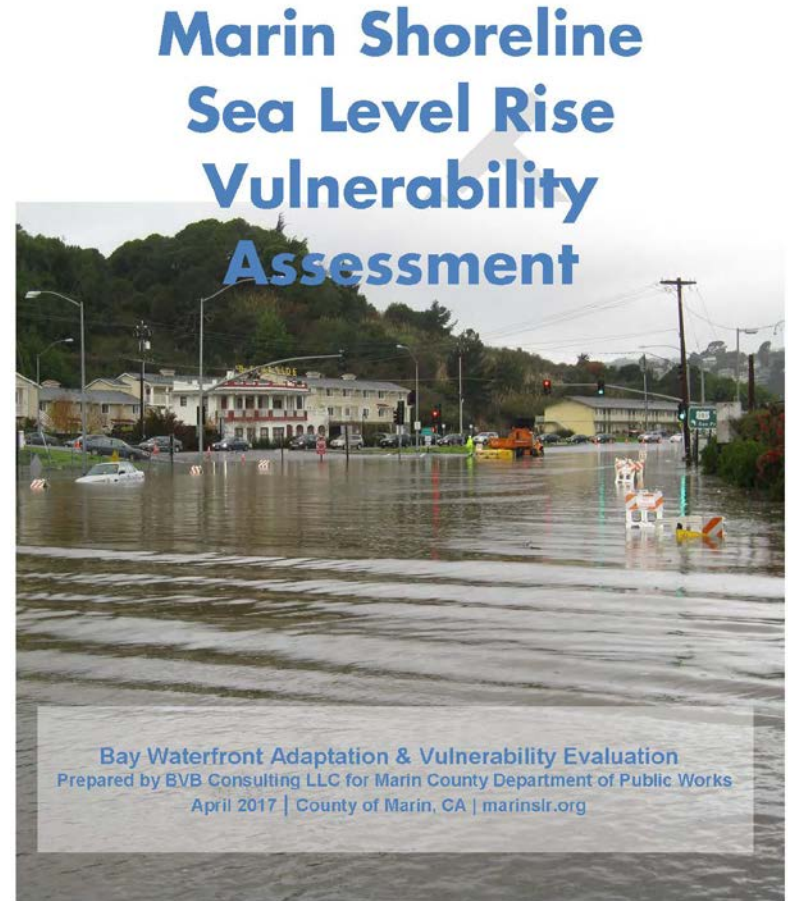


- A Vulnerability Assessment uses map-based data to catalog what is exposed and how sensitive it is to sea level rise
- It builds a foundation for understanding and planning for sea level rise adaptation

Marin County is using State guidance to assess our vulnerability to sea level rise.

Marin's report – what it is

- A study of the bay shoreline
- Used the best available science combined with over 100 stakeholder interviews
- A summary of the findings presented in two major sections: Assets and Locations
 - Assets include: land, buildings, transportation, utilities, agriculture, habitats and wildlife, recreation, emergency services, and cultural resources



Why we did it



Highway 37 during winter 2017 storms. The roadway was closed for a record 27 days this winter due to flooding.

- The flooding that Marin already experiences will become the “new normal”
- Rising seas will make current winter flooding conditions permanent
- Our infrastructure is aging – knowing what is at risk across the region will make planning more timely and cost-effective

Why we did it

- It's a slow-moving emergency that needs our attention now
- Flooding, whether from a storm event or rising seas, knows no boundaries, and we will all be affected
- Public and private collaboration is essential to address the issues we will face as a community

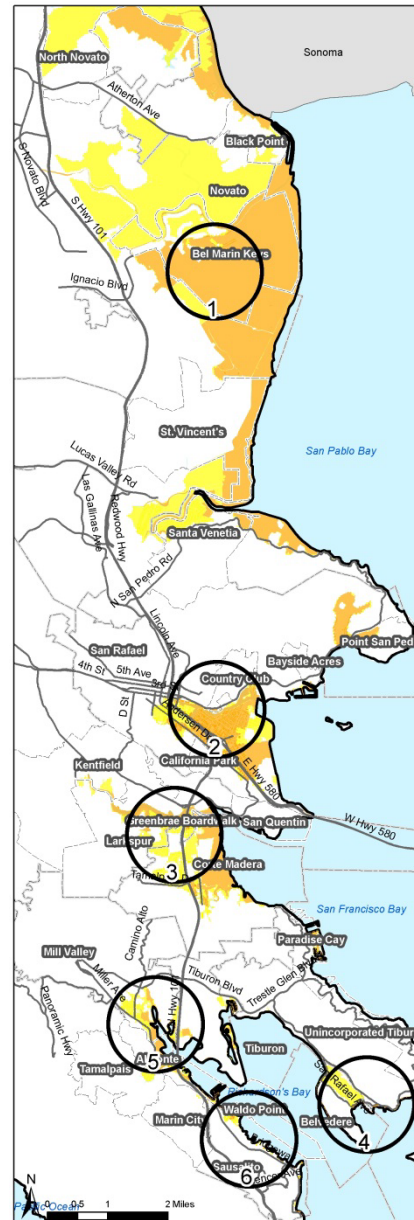


Storm photos from winter 2017 from Tam Valley (above) and Gallinas Creek (below)



What it isn't

- Does not change existing policies or regulations
- Does not prioritize areas or suggest adaptation measures
- Does not include flooding from creeks or stormwater systems
- Does not incorporate field work



1: Southern Bel Marin Keys



2: State Route 101
@ State Route 580



3: Riviera Circle



4: Tiburon/Belvedere



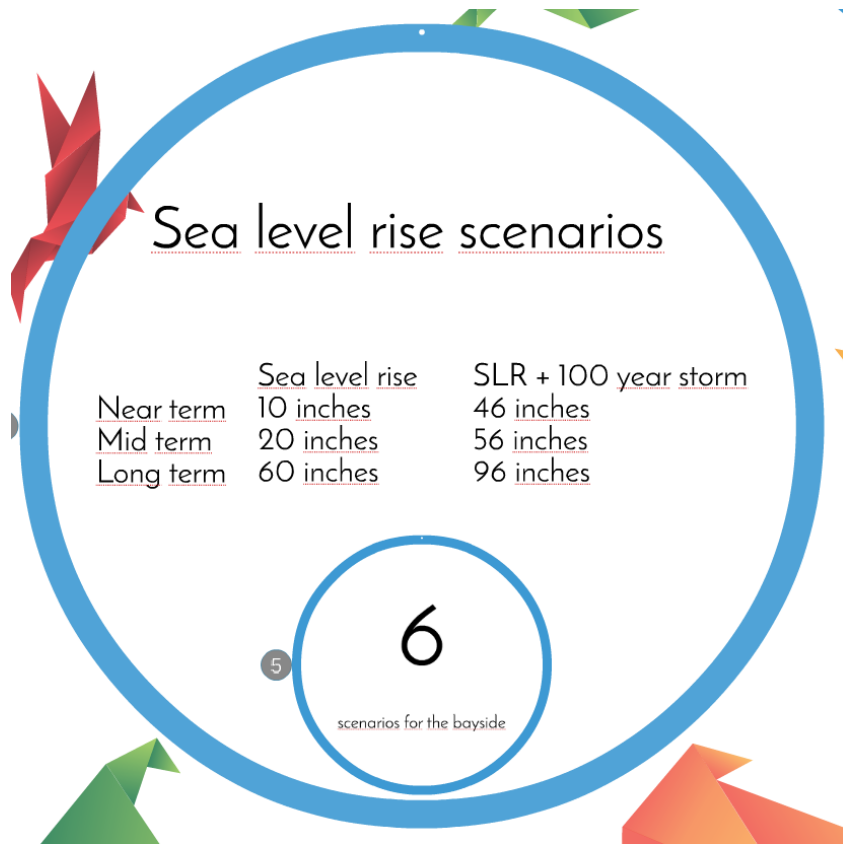
3: Mill Valley



4: Marinship

Mid-century projections from the Vulnerability Assessment: 20 inches of sea level rise and 20 inches with the 100-year storm

How we did it



Sea level rise scenarios used for the Vulnerability Assessment

- Used a statewide sea level rise model developed by the United States Geological Survey (Google: Our Coast Our Future to view over 40 scenarios!)
- Analyzed the impacts of 6 scenarios, ranging from 10 inches to 96 inches of sea level rise
- Describes the impacts in text, graphics, and tables by individual assets and then lumped by community

What does it say?

- Impacts will extend beyond the flooded shoreline edge and will change our county in the future
 - Transportation, emergency services, water, sewer and other utilities, as well as many neighborhoods, commercial areas, and public areas like beaches, wetlands and our access to the water

IMPACTS AT-A-GLANCE: SCENARIO 2

5,000 acres flooded @ MHHW	200,000+ residents plus commuting employees
8,000 acres flooded @ MHHW +100-year storm surge	2,000 agricultural acres (mostly ranch)
4,500 homes, businesses, & institutions	Property Owners County of Marin Municipalities Caltrans Sanitary Districts Water Districts Fire Districts Sausalito Police Department CHP SMART GGBHTD MTA PG&E AT&T CADFW
80 miles of wet road, 3 ferry landings, 5 marinas, 4 boat launches	
Beaches Tidal Marshes Eelgrass beds Wetlands	

What happens in San Rafael?

IMPACTS AT-A-GLANCE: SCENARIO 6

2,121 acres	58,000 people
4,700+ living units	
7.5 road miles	475 commercial parcels
Storm and tidal impacts already occur	
\$2.6 billion in assessed property value; \$1.7 billion in single-family home market value ¹²	City of San Rafael San Rafael Sanitation District Property Owners HOAs Caltrans

Map 96. San Rafael Sea Level Rise and 100-year Storm Surge Scenarios

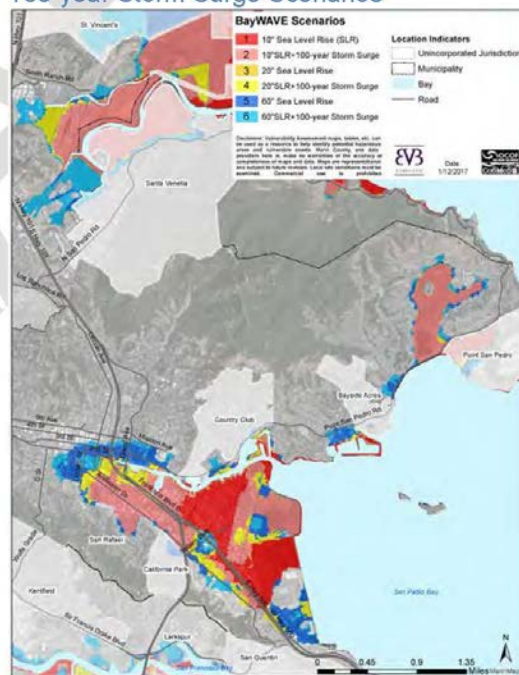


Table 104. San Rafael Vulnerable Parcels by Land Uses

Land Use	Scenarios					
	1		3		5	
	Near-term		Medium-term		Long-term	
	#	Ac.	#	Ac.	#	Ac.
Commercial Improved	116	98	213	267	419	527
Commercial Unimproved	16	89	21	108	54	149
Common Area	2	2	3	5	20	26
Industrial Improved	45	21	97	50	153	83
Industrial Unimproved	3	0.6	7	1	17	5
Residential	492	46	883	88	1,798	196
Mobile Home					154	1
Multi-Family Improved	78	34	104	44	136	54
Multi-Family Unimproved	2	0.2	3	0.6	4	1
Single Family Attached	382	5	634	10	1,084	38
Single Family Improved	20	4	127	31	390	76
Single Family Unimproved	8	3	12	3	27	26
Tax Exempt	22	53	57	193	159	530
Exemption Improved	13	6	18	10	22	12
Exemption Unimproved					1	0.5

Source: MarinMap, CoSMoS

Table 103. San Rafael Vulnerable Residential and Commercial Parcels

Land Use	Scenarios					
	Near-term		Medium-term		Long-term	
	1		3		5	
	#	%	#	%	#	%
Residential	492	3	883	6	1,798	12
Commercial	132	11	234	19	475	40
Industrial	48	17	104	37	170	61

Source: MarinMap, CoSMoS.

Table 105. San Rafael Vulnerable Buildings by Scenario

Scenarios		Buildings	
		#	%
Near-term	1	410	2
	2	1,846	10
Medium-term	3	1,088	6
	4	2,097	11
Long-term	5	2,495	13
	6	3,247	18

Source: MarinMap, CoSMoS

What happens in San Rafael?

Map 97. Southern San Rafael Vulnerable Buildings

Vulnerable Assets

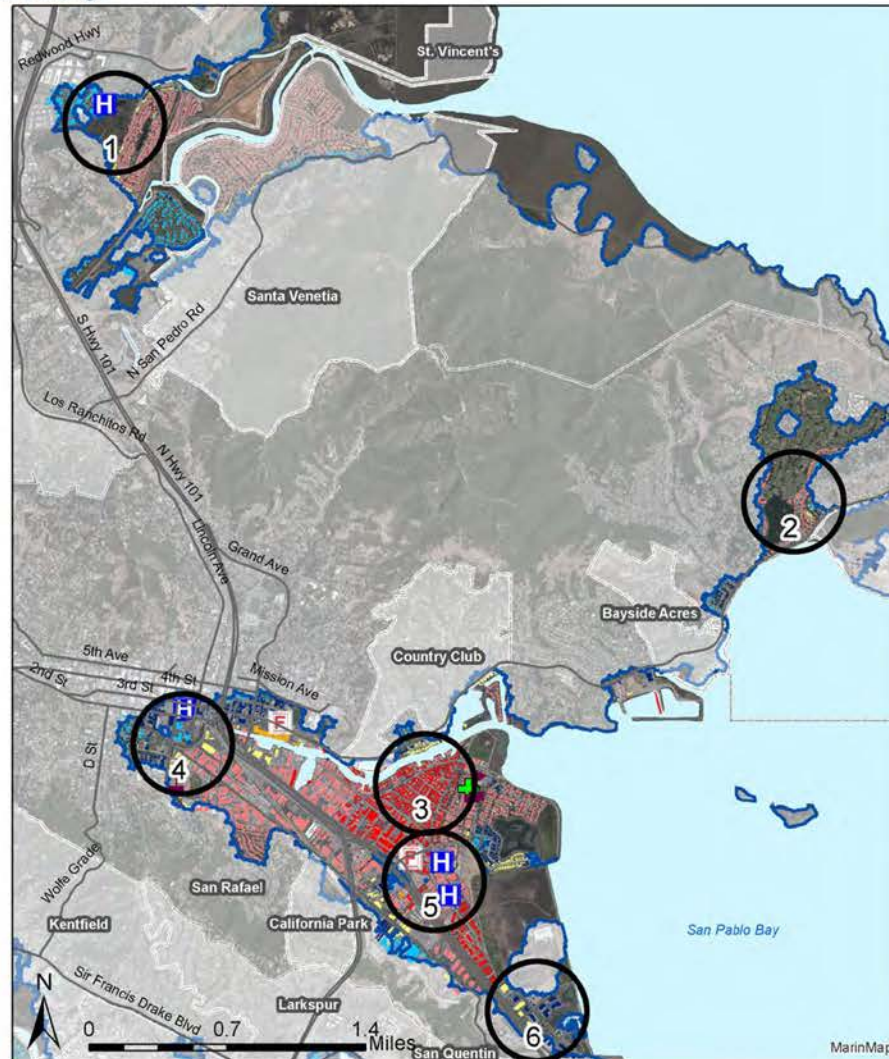
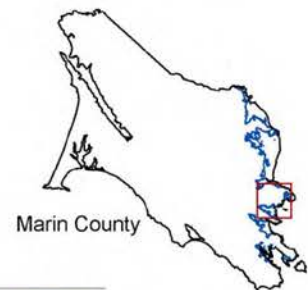
-  School
-  Medical Facility
-  Emergency Shelter
-  Fire Station

Vulnerable Buildings

-  Scen. 1: 10" Sea Level Rise (SLR)
-  Scen. 2: 10" SLR+Storm Surge
-  Scen. 3: 20" Sea Level Rise
-  Scen. 4: 20"SLR+Storm Surge
-  Scen 5: 60" Sea Level Rise
-  Scen. 6: 60"SLR+Storm Surge

Location Indicators

-  Unincorporated
-  Municipality
-  Road
-  Bay
-  Inland Extent: Sea Level @ 60"+100-year Storm



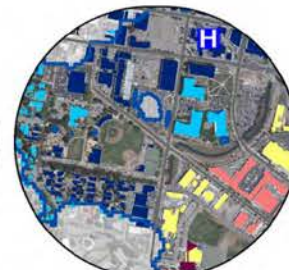
1: Las Gallinas



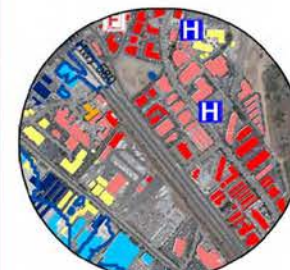
2: Peacock Gap



3: Canal Neighborhood



4: Downtown



5: State Route 580

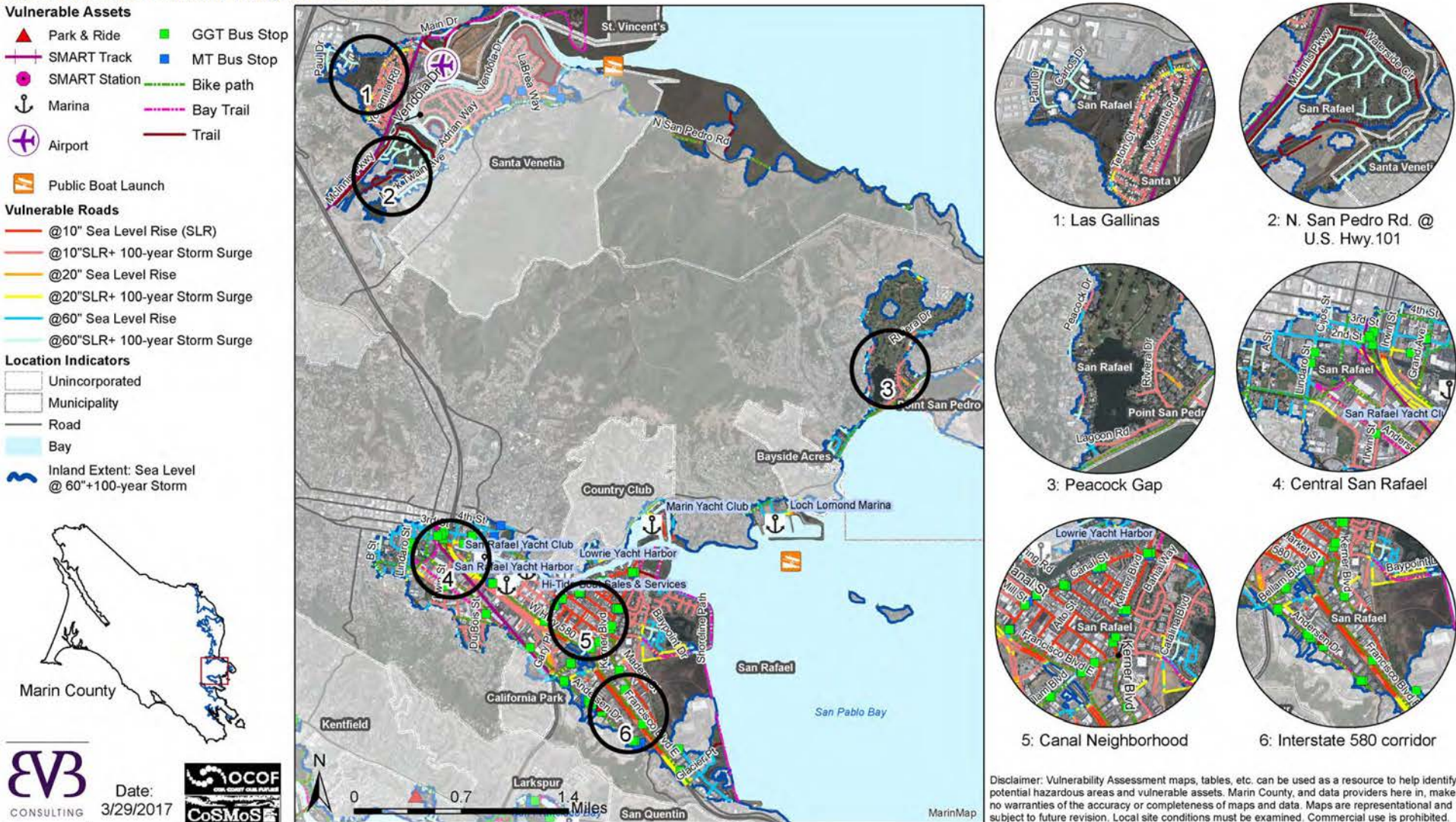


6: End of Kerner Blvd.

Disclaimer: Vulnerability Assessment maps, tables, etc. can be used as a resource to help identify potential hazardous areas and vulnerable assets. Marin County, and data providers here in, make no warranties of the accuracy or completeness of maps and data. Maps are representational and subject to future revision. Local site conditions must be examined. Commercial use is prohibited.

Doesn't stay in San Rafael....

Map 98. San Rafael Vulnerable Transportation Assets



What did we learn?



- There are no solutions that “fix” everything
- There is a lot to do!
- And there is also a lot we CAN do, especially if we start planning now
- We’re in this together

What's next?



1982 flooding at Jackson's Hardware

- Planning for adaptation will occur over time and involve the public and multiple agencies and jurisdictions
- Public review draft is available. Written comments due May 29th to Chris Choo, cchoo@marincounty.org
 - Civic Center 308, BOS, Library
 - San Rafael, Corte Madera, Novato, Mill Valley, Tiburon/Belvedere



Thank you

www.MarinSLR.org