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# Local Assessments Section A: **RICHARDSON** *Operational Landscape Unit*

## JURISDICTIONS WITHIN THIS SECTION

*Marin County*

*Tiburon*

*Mill Valley*

*Belvedere*

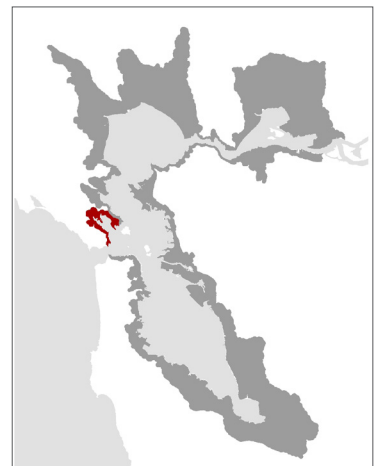
*Sausalito*

*Alto*

*Marin City*

*Strawberry*

*Tamalpais-Homestead Valley*



# HOW TO USE THE LOCAL ASSESSMENTS



## WHO IS THIS FOR?

Anyone interested in understanding their local shared vulnerabilities to flooding and sea level rise.

### Local jurisdictions

- Cities
- Counties
- Special Districts
- Utilities Providers

### Stakeholder Groups

- Non-profits/NGOs
- For-profits/Private
- Associations
- Interested Parties

### General Public

- Residents

### State/Regional

- Caltrans
- MTC/ABAG

## HOW IS IT ORGANIZED?



Local assessments are organized by four regional systems assessed: Transportation, Vulnerable Communities, Priority Development Areas (PDAs), and Priority Conservation Areas (PCAs).

Each part of the local assessment provides varying levels of details at three scales: 1) Operational Landscape Unit (OLU), 2) Individual Descriptions, and 3) Shared Stories of Vulnerabilities in Focus Areas/Areas of Impact. This assessment can be reviewed in whole, or individual parts can be reviewed separately depending on interest and level of detail desired.



## WHAT'S IN THIS ASSESSMENT?

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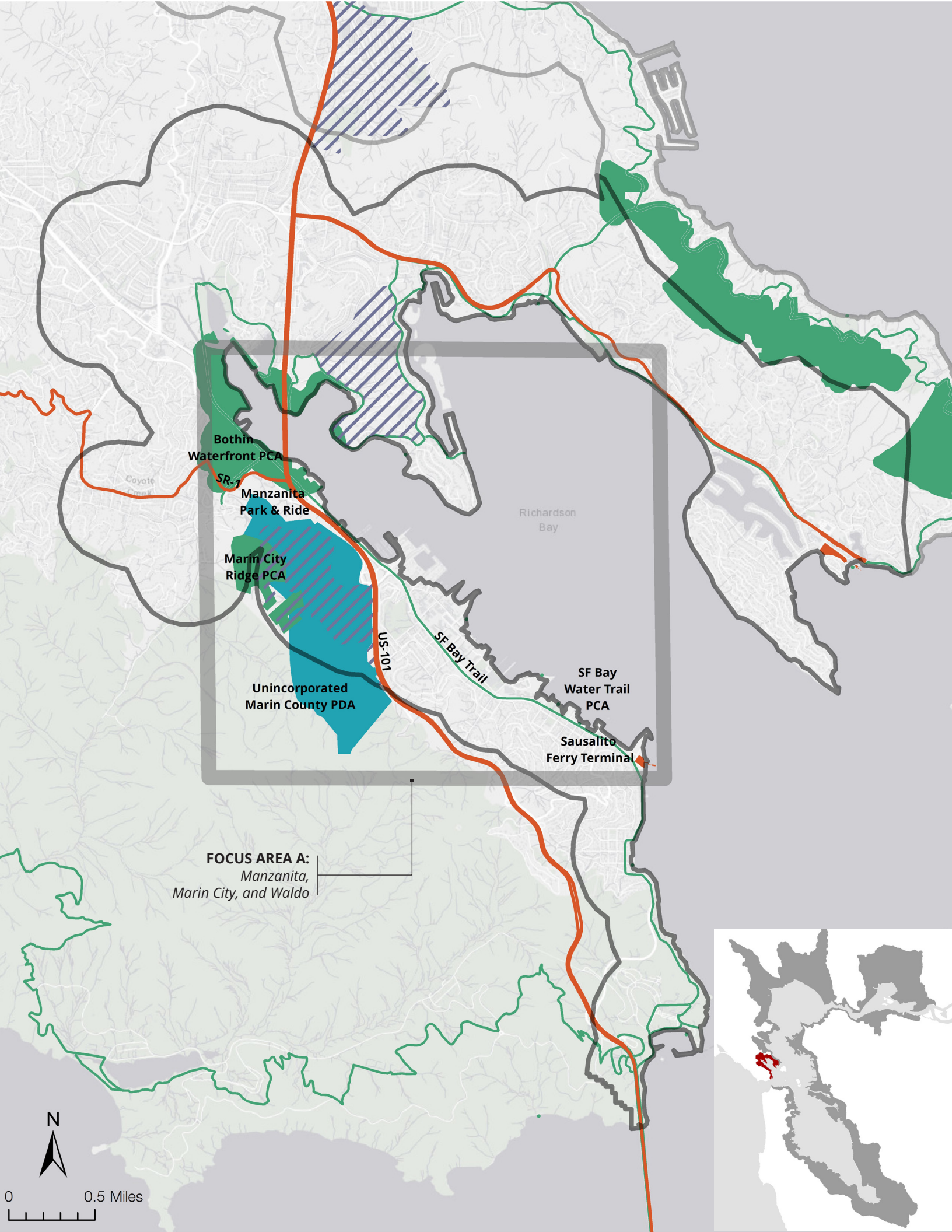
## ***Where are we in the region?***

The Richardson OLU encompasses the entire Richardson Bay in Marin County, ranging from just north of the Golden Gate Bridge on the Southern end to the tip of the Tiburon Peninsula on the northern end. It includes multiple cities on the shoreline, including Tiburon, Mill Valley, Belvedere, and Sausalito, and unincorporated communities including Marin City and Strawberry, as well as several harbors and marinas. Flooding effects from sea level rise occur early and threaten residents as well as the US-101, which is the only land-based transportation route to the North Bay and south towards San Francisco, and SR-1/Shoreline Highway, which is the singular access for Tamalpais Valley and the Marin Parklands, which includes Muir Woods, Stinson Beach and Mt. Tamalpais State Park. Frontline economically challenged communities located here include Marin City, the Gates Co-op Houseboat Community in Sausalito, and boat residents anchored out in Richardson Bay.



Approximate area of the OLU. Photo map data: Google, TerraMetrics, CSUMB SFML, CA OPC.





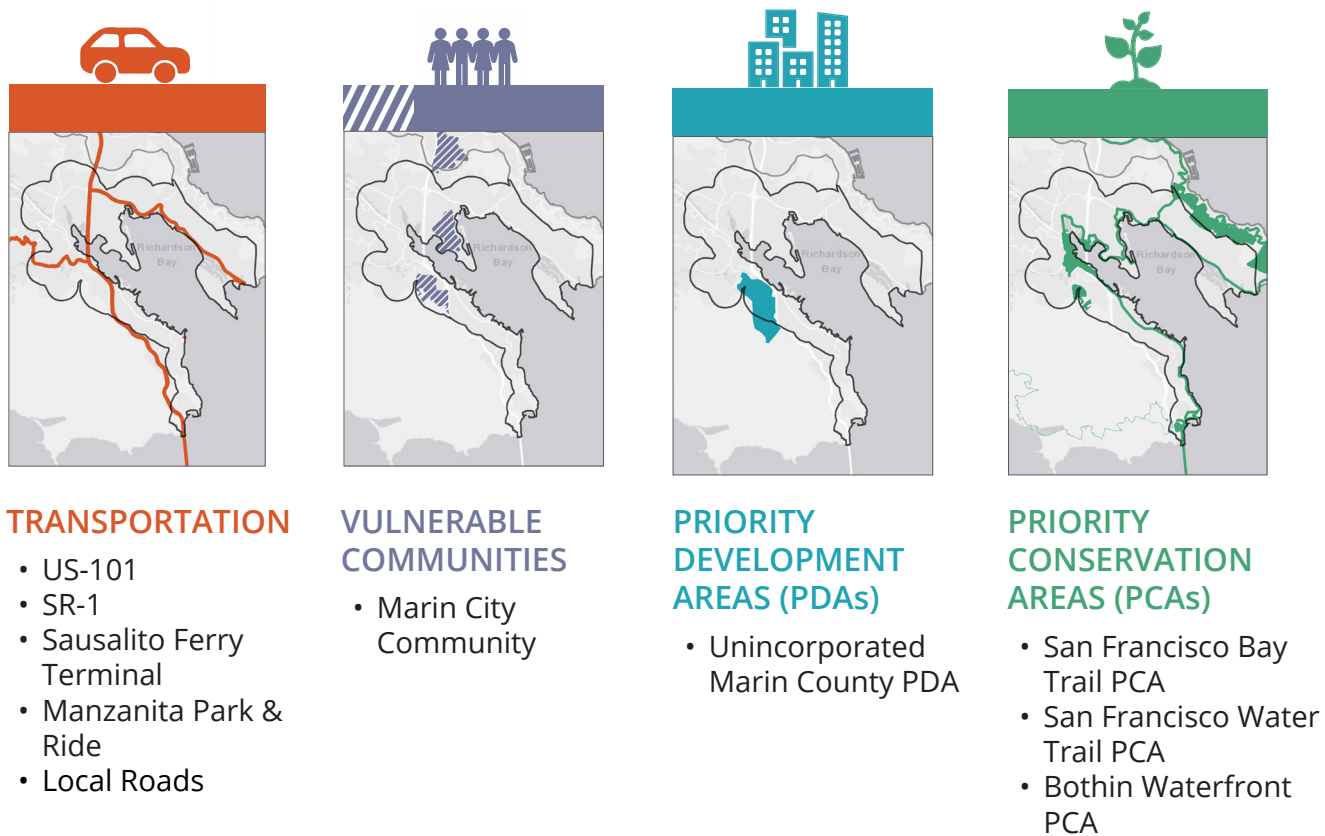


# What regional systems are here?

Operational Landscape Unit (OLU) boundaries were used to organize and help identify regionally significant assets that were co-located together (Methodology can be found in Section 3.0 Local Assessments).

The map in Figure 1a shows the entire OLU, including all the regional systems present. Colors are used throughout this document to help navigate across these four regional systems. Individual assets that were assessed as part of this local vulnerability assessment are listed in the bullets below and can also be found on the labels on the map.

## ◀ Figure 1a. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN BELOW:



# What was assessed?



## TRANSPORTATION



Richardson Bay Bridge and US-101. Photo map data: Google

**US-101** • US-101 is the primary north-south transportation artery through the Marin and Sonoma Counties and provides access to the North Bay and East Bay via SR-37 and I-580. It provides important commuter transportation service for local, regional, and inter-regional automobile and truck traffic, averaging 131,500 vehicles<sup>1</sup> and 2,579 trucks<sup>2</sup> per day. It is also a designated emergency route for the Bay Area<sup>3</sup>. Within this OLU, US-101 is an 8-lane highway in the western section of the OLU between Marin City in the South and Greenbrae in the north. It is the only major roadway in and out of this OLU. The ramp near Bridgeway is first exposed at 36" TWL, with significant flooding impacts at 48" TWL, when flooding impacts the other access roads and Donahue St and Drake Ave leading into Marin City.

**SR-1** • SR-1 provides access to west Marin, including National Parks. There are limited roadways connecting West and East Marin, and the next westbound connecting road is at Sir Francis Drake Blvd in San Rafael. It averages 33,000 vehicles per day.<sup>4</sup> Within this OLU, it is first exposed at 12" TWL at the junction with US-101.



**Manzanita Park & Ride** • Located beneath the US-101 in Manzanita, the Manzanita Park & Ride is a key local hub for accessing Golden Gate Transit, Marin Airporth and “tech business” commute buses, regionally significant Muir Woods Shuttle run by Marin Transit, and carpools, which use the US-101. It already frequently floods due to rainfall and King Tides. It would become permanently inundated as early as 12” TWL.

**Sausalito Ferry Terminal** • Shared by Golden Gate Ferry and Blue and Gold Fleet and owned and maintained by the City of Sausalito, this terminal has an average annual ridership of roughly 800,000 (2015-2017).<sup>5</sup> This is the fourth highest ferry ridership of the Bay Area after Larkspur, Alameda/Oakland, and Vallejo. Fare discounts are provided for seniors, youth, persons with disability, and Medicare users. The Sausalito ferry terminal operates on a floating system that will be able to withstand sea level impacts in the near-term. Access/parking lot impacts to the Sausalito ferry terminal are expected starting at 52” TWL.

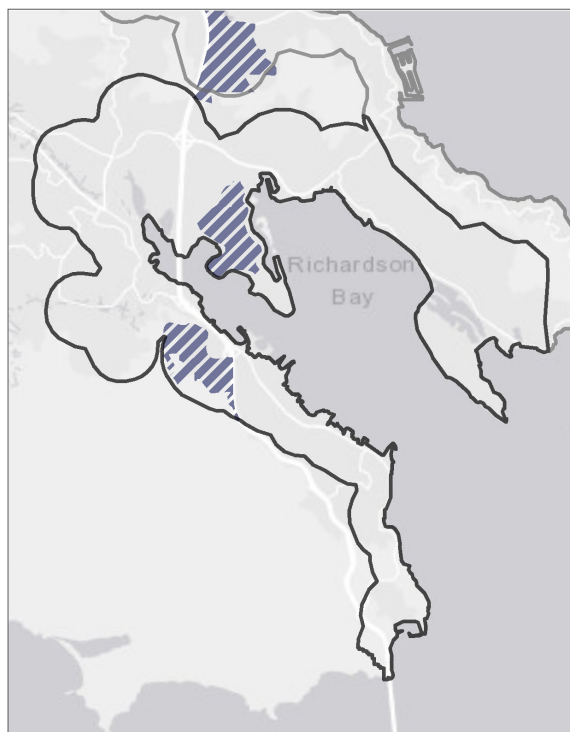
**Local Roads** • Donahue Street and Bridgeway Boulevard are the only access roads for entering and exiting the US-101 in Marin City. If these roads flood, Marin City and the floating home community of Waldo will be isolated. Flooding already beings at 36” TWL on Bridgeway Boulevard and Donahue Street is flooded by 48” TWL.



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## VULNERABLE COMMUNITIES



Marin City. Photo map data: Google

**Marin City** • Two block groups were assigned to a community called “Marin City.” The block groups that were assessed can be referenced in the appendix. We have provided some history and context for these areas, primarily gathered via desktop research, and in some cases stakeholder and community vetting. Before this is used for any planning purposes, this data should be ground-truthed and vetted with the communities considered. Similarly, block groups or communities with a similar vulnerability rank could and likely will have very different needs, considerations, and capacities that are critical to bring into the planning process.

Marin City was built by the federal government and the Marin County Housing Authority in 1942 during WW2 in order to house workers from all over the United States that were employed at Marinship, the Sausalito waterfront shipyard. After the end of WW2 many African Americans employed in the Bay Area’s shipyards lost their jobs, raising their unemployment rate to 15 percent, which was 3 times the national average. Many African American shipyard laborers, many of whom had originally come from the Southern states, became permanent residents of Marin City due to discriminatory housing laws in other parts of Marin County, by choice or due to lack of financial resources necessary to leave or relocate. While African Americans only made up around 10% of Marin City’s population during WW2, they quickly became the majority of the community after the end of the war. In 1962, the federal government (HUD) built 297 units of public housing in high rise apartment buildings as well as low-rise units. Golden Gate Village in Marin City serves as Marin Housing Authority’s largest family public housing development in Marin.

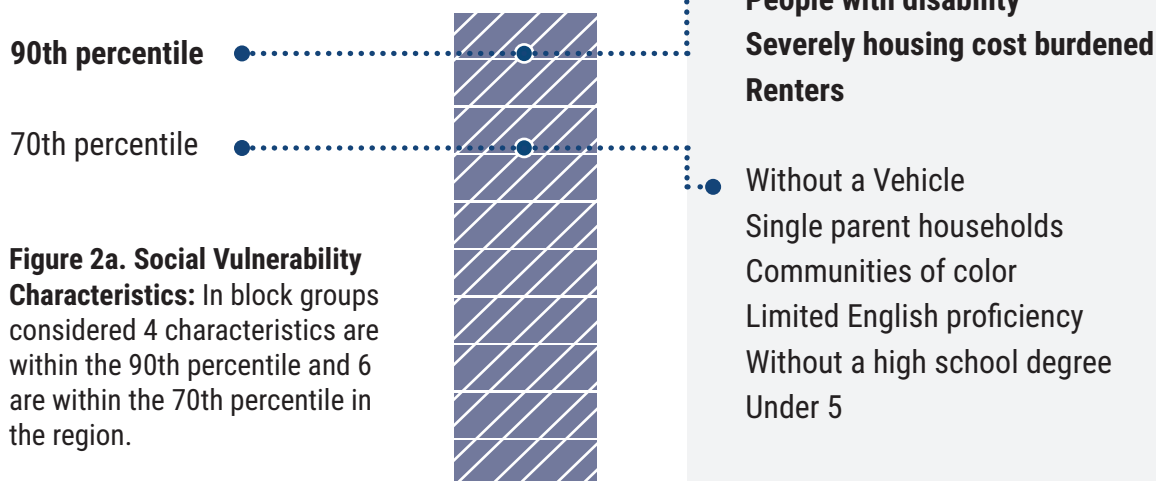


Today, Marin City remains racially and economically in stark contrast to the nearby higher income, predominantly white suburbs of Marin County. The median household income is half that of Marin County, around a third of people live in poverty, and half live in subsidized housing. Community members in Marin City are active and engaged in community building and advocacy and have been actively involved in sea level rise and environmental justice advocacy.

Residential housing is not affected until 52" TWL, but the community is heavily affected by earlier flooding of US-101. Exposure of US-101 access roads begins at 24" TWL, while the highways itself floods at 48" TWL. This does not include storm discharge which already causes flooding here. This early flooding is especially critical here, as it is the only transportation artery in and out of the community. Residential flooding in Marin City begins at 52" TWL, when around 13% of housing units are flooded. At 66" TWL a critical threshold is passed at which point the Gateway Shopping Center and around 60% of residential parcels become flooded.

Two block groups are considered high or highest social vulnerability. Four social vulnerability characteristics are exhibited in at least one block group in the 90th percentile,

## SOCIAL VULNERABILITY PERCENTILES



## SOCIAL VULNERABILITY RANK:

- ☐ Low
- ☐ Moderate
- ☒ High \*
- ☒ Highest \*

## GENTRIFICATION AND DISPLACEMENT RISK:

- ☒ Low Income - Not Losing Low Income Households\*
- ☐ At Risk of Gentrification and/or Displacement
- ☐ Ongoing Gentrification and/or Displacement

\*In block groups considered, this ranking occurred most frequently.

Data Source: ART Bay Area Regional Community Vulnerability Indicators, BCDC (2018).



- Low Income
- People with disability
- Severely housing cost burdened
- Renters
- Without a Vehicle
- Single parent households
- Communities of color
- Limited English proficiency
- Without a high school degree
- Under 5

with six characteristics in the 70th percentile in the region (Figure 2a).

In addition to social vulnerability, Marin City is also impacted by environmental contamination. Marin City is in the 90<sup>th</sup> percentile for Impaired Water bodies according to CalEnviroScreen 3.0. The California Office of Environmental Health Hazard Assessment (OEHHA) states “Streams, rivers and lakes are used for recreation and fishing and may provide water for drinking or agriculture. When water is contaminated by pollutants, the water bodies are considered impaired. These impairments are related to the amount of pollution that has occurred in or near the water body. Groups such as tribal or low-income communities may depend on fish, aquatic plants and wildlife in nearby water bodies more than the general population.”

In this section, social vulnerability was used as the starting place for analysis. Contamination burden was assessed only for the block groups included in the functional community groupings. This means that there could be block groups that score in the moderate, high, or highest for contamination burden that were not ALSO in the designated functional community grouping that were not considered. In short, we only look at areas that have contamination burden if they are also ranked as socially vulnerable.

Four contamination burdens are exhibited in at least one block group at in the 90th percentile in the region (Figure 3a).

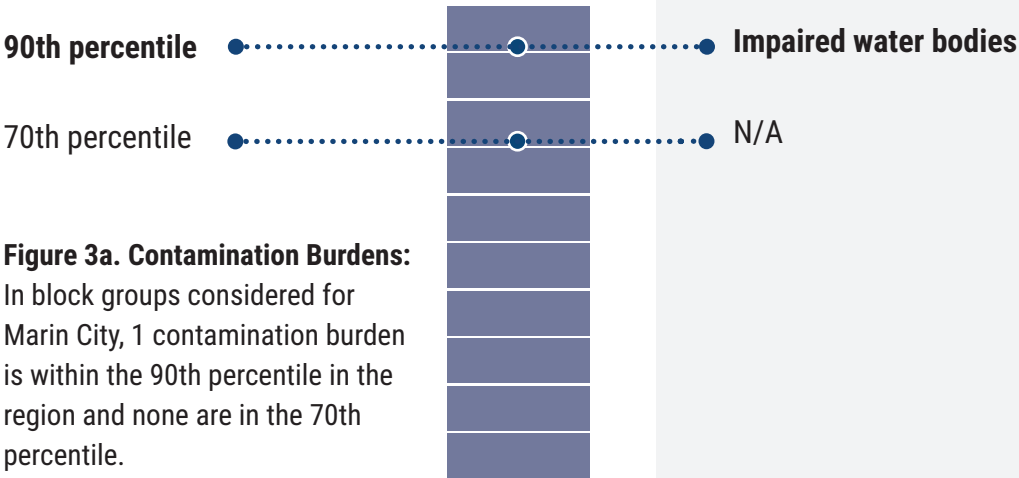
CONTAMINATION BURDEN RANK:

- ☒ Low \*
- ☐ Moderate
- ☐ High
- ☐ Highest

\*In block groups considered, this ranking occurred most frequently.  
  
Data Source: ART Bay Area Regional Community Vulnerability Indicators, BCDC (2018).



CONTAMINATION BURDEN PERCENTILES FOR MARIN CITY








**Figure 3a. Contamination Burdens:**  
In block groups considered for Marin City, 1 contamination burden is within the 90th percentile in the region and none are in the 70th percentile.



Critical services and facilities that provide food access, medical care, and emergency services will also be impacted by flooding. Table 1a provides details on what critical facilities may be at risk. First exposure of assessed critical facilities begins at 77" TWL.

Total water levels (TWLs) are used to represent various combinations of temporary and/or permanent flooding that may occur with future sea level rise. Values in the table reflect potential risks to critical facilities in the absence of adaptation planning.

## EXPOSURE OF CRITICAL SERVICES AND FACILITIES IN MARIN CITY

Critical Facilities/Services Impacted		12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
<b>Places of Faith</b>	St Andrew Presbyterian Church (Donahue St, Sausalito)										
<b>Hospitals</b>	The Marin City Health and Wellness Center (Drake Ave, Sausalito)										
<b>Police and Fire Stations</b>	Marin County Sheriff's Substation and Fire Station (Drake Ave, Marin)										
	Marin County Fire Department Marin City (Drake Ave, Marin)										
<b>Community Services</b>	Groceries and Goods at Target (Donahue St, Sausalito)										

**Table 1a. Critical Services and Facilities:** First exposure of critical services and facilities. Blue bars represent when asset is first exposed to flooding.



A view of Marin City. "Richardson Bay" by eethaann is licensed under CC by 2.0



## PRIORITY DEVELOPMENT AREAS (PDAS)



Unincorporated Marin County PDA South. Photo map data: Google.

**Unincorporated Marin County PDA** • The Unincorporated Marin County PDA encompasses urbanized areas along the 101 Corridor throughout Marin County, specifically land within a half mile of US-101. The Transit Neighborhood PDA actually covers two distinct areas: a portion just south of the Downtown San Rafael PDA in a neighborhood called California Park, and a southern portion on Richardson Bay that includes Marin City. The Marin City regional transit hub located on Donahue Street near Terners Drive provides access to Golden Gate Transit, Marin Transit as well as the Muir Woods and West Marin Stage shuttle service and is the second busiest bus transfer location in Marin County, serving more than 3,000 people daily.

Marin City is currently primarily residential in use and contains the only family public housing building in Marin County. Commercial uses are concentrated in the Gateway Shopping Center. Plans for the PDA include additional housing, a range of jobs, expansion of existing commercial and industrial areas, and new workforce housing.<sup>6</sup>

Marin City is unique in that there is only a singular point of vehicular access between it and the rest of Marin County at Donahue Street underpass and highway ramps. There is no alternative access if the road at this location is impassable. Marin City has a history of experiencing major flooding that has disrupted movement of people in and out of the community. Inability to move in and out of Marin City is especially concerning due to the large number of older adults whose



medical needs require access to health services located outside of the community.

Exposure of US-101 access roads beings as early as 24" TWL, while the highway itself floods at 48" TWL. This does not include storm discharge which already causes flooding here, impacting access in and out of the community. At 66" TWL a critical threshold is passed at which point the Gateway Shopping Center and around 60% of residential parcels become flooded.

*Note: this PDA contains portions within this OLU and the San Rafael OLU. This section describes the portion of the PDA within this OLU. The portion in San Rafael OLU is described in the San Rafael OLU section.*

## CURRENT AND FUTURE HOUSING AND JOBS



### Residential Housing Units

Existing in 2010:	1,664
Projections for 2040:	1,791
Percent Growth:	141.5%



### Job Spaces

Existing in 2010:	625
Projections for 2040:	739
Percent Growth:	321.1%

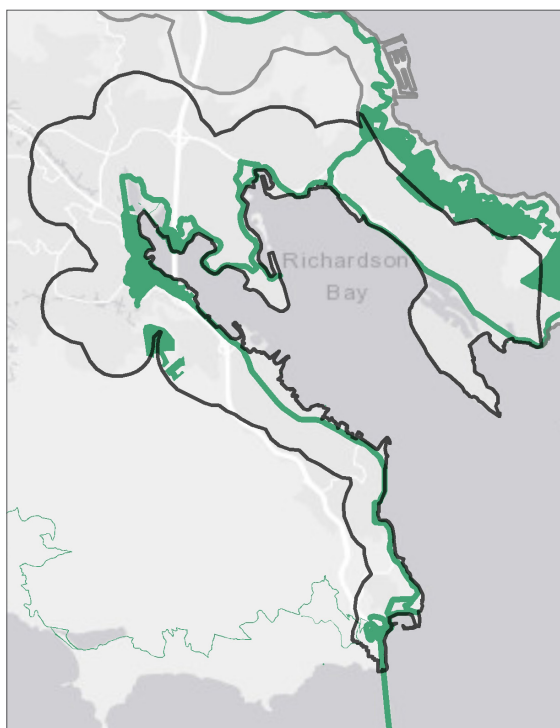
Data Source: Plan Bay Area 2040, MTC/ABAG (2017).

## EXPOSURE OF CRITICAL FACILITIES

No critical facilities that were analyzed were impacted within the Unincorporated Marin County PDA. However, other critical facilities outside the scope of this project may be impacted.



## PRIORITY CONSERVATION AREAS (PCAS)



Bothin Marsh and San Francisco Bay Trail. Photo map data: Google.

**San Francisco Bay Trail PCA** • The San Francisco Bay Trail is a 500-mile regional trail that, upon completion, will circumnavigate the bay. The trail connects people and communities to each other, to parks and open space, to home, work and recreation, and to countless areas of cultural and historic interest. It provides opportunities for health and fitness, increased transportation options, opportunities to observe, learn about, and care for the environment, and provides economic benefits to the region through growing tourism.<sup>7</sup> Within this OLU, the Bay Trail exists along nearly the entire shoreline. A notable section is the Mill Valley-Sausalito Multiuse Trail, a former railroad right of way atop an earthen berm that serves Mill Valley, Marin City, Waldo Point and Sausalito. The only proposed sections in the entire OLU are located near the census-designated places of Strawberry and Alto. The trail is first exposed at 12" TWL, with significant flooding impacts by 36" TWL.

### PCA DESIGNATION:

- ☒ **Natural Landscapes**
- ☐ Agricultural Lands
- ☐ Urban Greening
- ☐ Regional Recreation

### FUNCTIONS/BENEFITS:

- **Recreation**
- **Community Health**
- **Transportation**
- **Economic Development**
- **Environmental Stewardship**

*Data Source: MTC/ABAG Priority Conservation Areas Program (2017).*



**San Francisco Bay Water Trail Sites PCA** • The San Francisco Bay Area Water Trail is a network of launching and landings sites for non-motorized watercrafts (e.g. kayaks, stand-up paddleboards, wind and kite surf, etc.) around the San Francisco Bay and its major tributaries, including the San Joaquin River, Napa River, and Petaluma River.<sup>8</sup> Within this OLU, there are 10 Water Trail Designated Trailheads (6 near Sausalito, 2 near Strawberry, and 2 near Tiburon). The trailheads are first exposed at 12" to 24" TWL, with significant flooding and access impacts at 48" TWL.



"Biking in Marin" by Fabrice Florin is licensed under CC by 2.0





**Bothin Waterfront PCA** • The Bothin Waterfront PCA covers the Bothin Marsh Preserve. The 106-acre tidal wetland is home to several endangered species, shorebirds and waterfowl and is located in Mill Valley, alongside SR-1/Shoreline Highway, US-101 and Richardson Bay. It includes flat trails for walking, hiking, and biking, including the Charles McGlashan Pathway, which links the Tamalpais Valley/Almonte community with the Mill Valley-Sausalito Multiuse Path, and provides access from Manzanita and Waldo Point. It is first exposed at 12" TWL, with significant flooding beyond the marsh and into the developed shoreline at 36" TWL.

There are many ecosystem services of the Bothin Waterfront PCA including providing habitat, recreation, and stormwater services (Figure 4a).

#### PCA DESIGNATION:

- ☒ **Natural Landscapes**
- ☐ Agricultural Lands
- ☐ Urban Greening
- ☐ Regional Recreation

#### FUNCTIONS/BENEFITS:

- **Recreation**
- **Community Health**
- **Environmental Stewardship**
- **Economic Development**
- **Transportation**

*Data Source: MTC/ABAG Priority Conservation Areas Program (2017).*





# ECOSYSTEM SERVICES



## Habitats

Bird Hot Spots	186 acres
Ridgway's Rail	124 acres
Sandy Gravel Beaches	62 acres
Tidal Marsh	186 acres



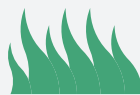
## Stormwater

Annual Runoff Retention	66 million gallons
Groundwater Recharge	N/A
Flood Water Retention	4.9 million gallons



## Recreation

Approximate Visitation Rates	42 photo user days (PUD)
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## Carbon Storage

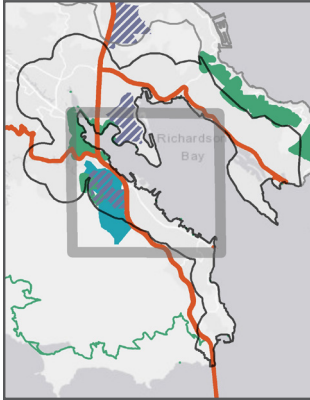
No soil organic matter quantified.	N/A
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**Figure 4a. Ecosystem Services of PCAs.** Statistics on habitats, recreation, carbon storage and stormwater retention in PCAs. Data by the ART Bay Area Natural Capital Project (2019).



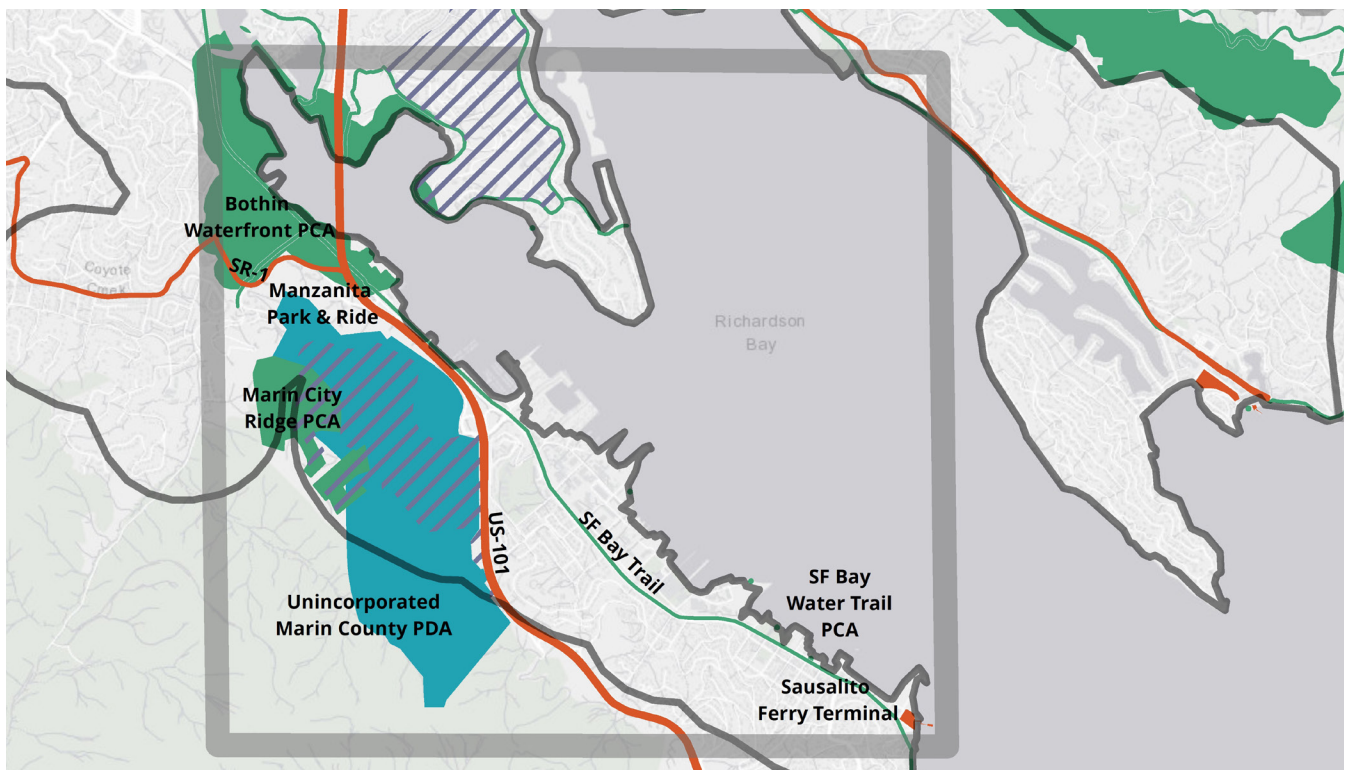
# Focus Area A:

## *Manzanita, Marin City & Waldo*



### **Location**

This Focus Area is located within the western half of the OLU and encompasses the communities of Manzanita, Marin City, and Waldo, which include commercial businesses, residential areas and houseboat marinas (Figure 5a).



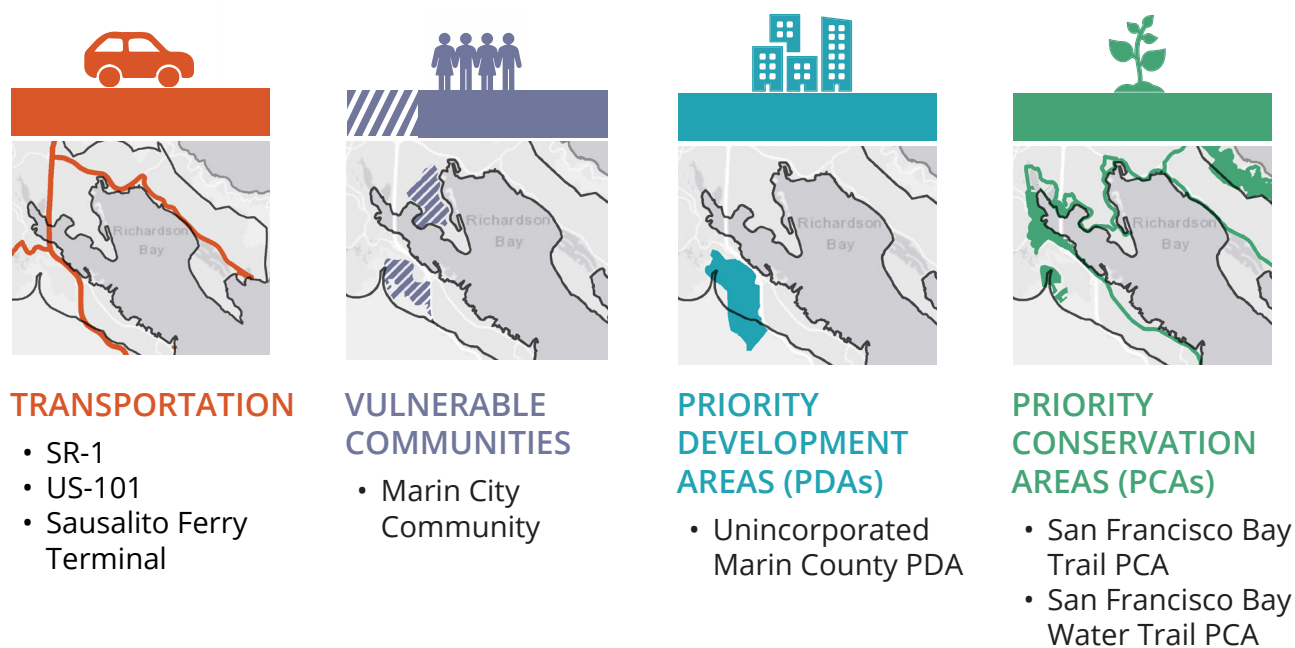
**Figure 5a. Top: Identification of where Focus Area is within OLU. Bottom: Map of Focus Area containing regional systems.** Individual assets assessed in this Focus Area are labeled on the map and listed on the following page.



## Why shared stories of vulnerability?

This Focus Area was selected because it contains a variety of regional systems, including numerous transportation routes, a PDA, multiple PCAs, and the Marin City vulnerable community. Due to overlap and dependencies among these regional systems in this area, the vulnerabilities of these systems to flooding and sea level rise are discussed together in shared stories of the shoreline, overtopping, and exposure to flooding as water levels rise. The goal of communicating shared vulnerabilities and consequences is to encourage multi-benefit solutions through collaborations and coordination.

### Figure 5a. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN THIS FOCUS AREA LISTED BELOW:





# Shoreline today and into the future

## SHORELINE TYPE STORY

### *What is the shoreline made up of now?*

The shoreline here is primarily within unincorporated areas of Marin County. US-101 adjacent to Marin City, Waldo, and Manzanita are all located along the shoreline. An at-grade portion of the Mill Valley-Sausalito Multiuse Path is also adjacent to the shoreline. The shoreline at Manzanita and Almonte is mainly comprised of a narrow band of wetland adjacent to slightly upland areas further inland.

## SHORELINE DEVELOPMENT STORY

### *How will the shoreline change in the future?*

Multiple conversations are underway to evaluate adaptation measures for the US-101 and SR-1 intersection (where the Manzanita Park & Ride is located) due to its regional criticality and already-occurring flooding. Additionally, the Bothin Marsh Evolving Shorelines Project (a joint project between One Tam, the Golden Gate National Parks Conservancy, and Marin County Parks) is exploring possible adaptation strategies for the Mill Valley-Sausalito Multiuse Path<sup>9</sup>, on top of the former railroad right-of-way on a berm. Traversing Bothin Marsh, the pathway already floods during King Tide events and its location inhibits sediment flow from both local creeks and the Bay.



"City of Sausalito" by Pierre André is licensed under CC BY 2.0



"View from Sausalito" by sm123le is licensed under CC BY 2.0



# Current and future flooding risk

## OVERTOPPING STORY

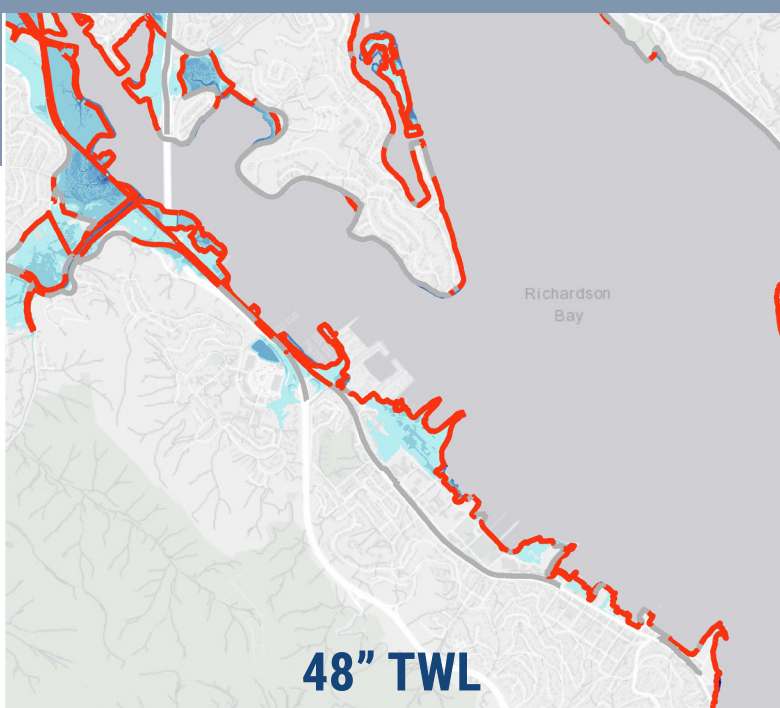
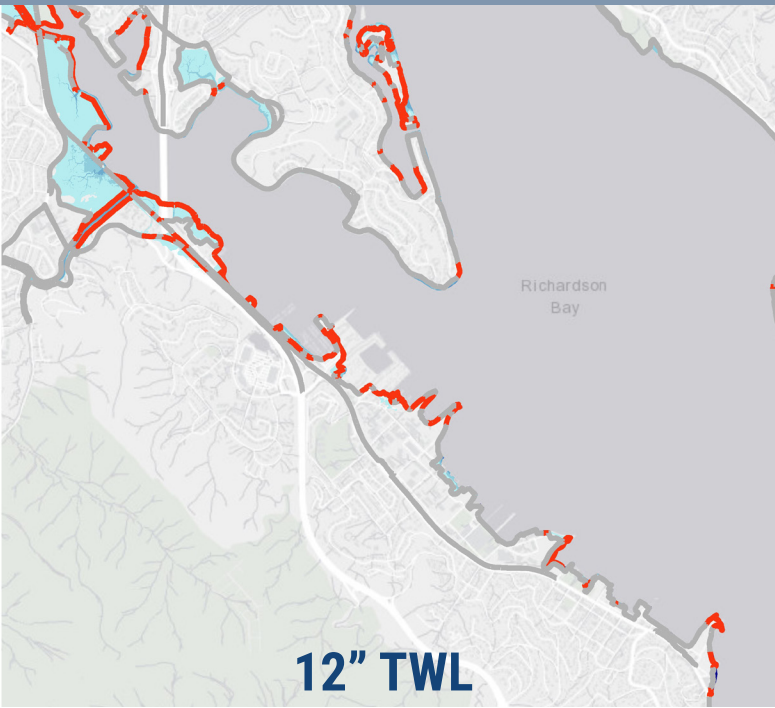
### *Where is water coming over the shoreline?*

Overtopping begins immediately at 12" TWL (Figure 6a) at Waldo Point Harbor and at the Bothin Marsh Bay Trail section (Mill Valley-Sausalito Multiuse Path). Overtopping occurs further upstream Coyote Creek by 24" TWL. The section of Bay Trail at the northern end of Sausalito protects the local access roads to the US-101, but becomes overtopped as early as 24" TWL, impacting Bridgeway. At 48" TWL overtopping reaches a critical threshold that leads to flooding of all US-101 access roads and the US-101 itself. Another critical threshold is reached at 66" TWL, when overtopping leads to the flooding of large portions of residential downtown Marin City as well as the local shopping center.

## FLOODING EXPOSURE STORY

### *Where does flooding occur?*

SR-1, Manzanita Park & Ride, and the Bay Trail close to the highway touchdown start to become exposed as early as 12" TWL. These areas are already frequently closed during heavy rainfall and King Tide events. SR-1 is the only southern access to west Marin, including the Marin Parklands. At 24" TWL, the Bay Trail becomes almost completely flooded in the Bothin Marsh and along Manzanita. Waldo also starts to experience flooding of the commercial area around Gate 5 Road, the houseboat marina parking lots and Bridgeway Boulevard, which also serves as an access road to the US-101 Northbound. Significant residential exposure occurs in the community in Tamalpais Junction Valley along Coyote Creek. At 48" TWL Donahue Street, the only local road in and out of Marin City becomes flooded. Donahue street also serves as the only access point to US-101, which itself serves as the only regional auto connection in and out of Marin County. Additionally, portions of Marin City, Tamalpais Junction Valley, Almonte, and Mill Valley become exposed. Residential flooding in Marin City begins at 52" TWL, when around 13% of housing units are flooded. At 66" TWL a critical threshold is passed at which point the Gateway Shopping Center and around 60% of residential parcels become flooded. The parking lot and access to the Sausalito Ferry Terminal also becomes exposed at 52" TWL, which is another form of transportation in and out of Southern Marin County (Figure 7a).



# OVERTOPPING AND FLOODING ▲

**Figure 6a. Two total water levels selected that demonstrate first overtopping and/or significant flooding thresholds.** Visit the Bay Shoreline Flood Explorer ([explorer.adaptingtorisingtides.org](http://explorer.adaptingtorisingtides.org)) to see more TWLs.

- No overtopping
- Overtopping
- Shallower depth of flooding
- Deeper depth of flooding

# ▼ FIRST FLOODING OF REGIONAL SYSTEMS ASSESSED

Regional Systems Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
SR-1	🚗									
Manzanita Park & Ride	🚗									
US-101	🚗									
San Francisco Water Trail PCA	🌱									
San Francisco Bay Trail PCA	🌱									
Bothin Waterfront PCA	🌱									
Local Roads		🚗								
Marin City Community				👥						
Sausalito Ferry Terminal				🚗						
Unincorporated Marin County PDA						🏠				

**Figure 7a. First exposure of regional systems.** Individual assets within the four regional systems in this area are shown and colored bars represent when each asset is first exposed to flooding impacts.



# Shared vulnerabilities to flooding

## SHARED VULNERABILITY STORIES

Vulnerability assessments were conducted on individual assets and then shared vulnerabilities were identified for regional systems within each Focus Area. The vulnerability statements below reflect shared stories of vulnerability. Our goal is to emphasize the interconnections among and across local systems, and encourage shared multi-benefits adaptation solutions.



### 1. Regional Transportation: US-101 and SR-1

The functions of the US-101 and SR-1, as critical transportation arteries for goods and people movement, are vulnerable to sea level rise at the Manzanita and Marin City interchanges. Flooding would impact the local community's ability to commute and access their homes as well as severely limit north-south connections for the entire North Bay, causing indirect impacts on traffic in other areas in the Bay. Lack of redundant roads also has further implications on the evacuation ability of residents in the surrounding cities. Additionally, as the roads are located near the shoreline, they currently provide ad-hoc tidal flood protection to local communities, yet are owned, managed, and governed independently, complicating coordination of adaptation strategies.



### 2. Social Vulnerability: Marin City Vulnerable Community

Marin City and Northern Sausalito provide housing and services to the local communities. They are vulnerable to sea level rise through direct flooding of the developed areas as well as the flooding of their access roads and the regional transportation arteries, the US-101 and SR-1. Marin City has a high percentage of low-income citizens, renters, and people with disabilities, which reduces their ability to prepare for, respond to and recover from flood events.



"Birds of Bothin Marsh" by Fabrice Florin is licensed under CC BY 2.0

### 3. Regional Recreation: Bay Trail

The Bay Trail, also known as the Mill Valley-Sausalito Multiuse Path, provides recreation and commuter transit and is the most heavily trafficked multiuse path in Marin County Parks. Located on former rail right-of-way raised berms and at-grade natural shorelines, several sections are already subject to flooding today during King Tide events, limiting shoreline recreation and non-motorized commute options for surrounding communities.



### 4. Regional Habitat: Bothin Marsh

Bothin Marsh provides critical habitat for endangered species, recreation opportunities to visitors as well as ad-hoc flood protection for Mill Valley residents and is one of the few remaining marshes in this area of the Bay. The marsh has limited room to migrate inland due to transportation infrastructure on the western edge. Permanent inundation of the Bothin Marsh would threaten critical species habitat as well as have impacts on the recreational and flood protection value it poses to local communities.





# Shared consequences to flooding

## SHARED CONSEQUENCE STORIES

This section translates shared vulnerability statements into stories of shared consequences. The ART program considers consequences through frames of sustainability: Society and Equity, the Economy and the Environment.



**Society and Equity** • Marin City's vulnerability to flooding has many consequences for this economically challenged community. Flooding at the US-101 interchange creates the possibility of isolating the community and roadway flooding on US-101 may entirely prevent highway movement into and out of Marin City.

The local community would be especially burdened during an extended flood event due to limited financial resources. Both car and bus transit would be directly impacted by the flooding of US-101, leading to people not being able to reach their homes and jobs. It is unclear whether the emergency shelters, in the MLK Academy and churches, would provide enough capacity during a major flood event. There is also a public health risk posed by overburdening the only local health care center and fire station during emergency situations.

Flooding of the Bay Trail and Sausalito Ferry Terminal access would prevent use by daily commuters and also poses an emergency evacuation risk, being the only alternative regional transportation pathway in this area if US-101 is impassable as well.

The Bay Trail provides free shoreline recreation and transportation to all residents of the Bay Area. If the Bay Trail adjacent to Marin City is disrupted or permanently damaged, residents will lose recreation and non-motorized travel opportunities. The Bay Trail also allows limited-mobility residents to access the shoreline; however, even temporary flooding or mud and debris can preclude these individuals from using the trail. Since flooding will sever connectivity along the Bay Trail, these negative effects would extend to neighboring Bay Trail segments as well.



**Economy** • The closure of US-101 would have impacts on the entire regional economy by preventing commuters from traveling between their homes and workplaces, limiting transport of goods, and by incurring the costs of recovery after a flood event. Flood damage to public housing and its subsequent repair also poses a potential cost for local and regional taxpayers.

Flooding and long-term disruption of the Bay Trail due to flooding would reduce its transportation and recreational benefits and limit access to places of work, school, commerce and living.

**Environment** • Permanent inundation in this Focus Area would cause the small, yet valuable stretches of wetland in the Bothin Marsh to disappear. Due to development near the shoreline there is little, if any, potential for inland migration, resulting in a loss of habitat and recreational value.



The Bay Trail provides millions of Bay Area residents an opportunity to see the bay, wildlife, and natural areas, which helps build support for environmental protection and restoration. If the Bay Trail is disrupted or damaged, this opportunity will be diminished or lost altogether. The Bay Trail also provides additional shoreline protection by acting as the first line of defense in many areas of the shoreline.

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# Advancing adaptation solutions

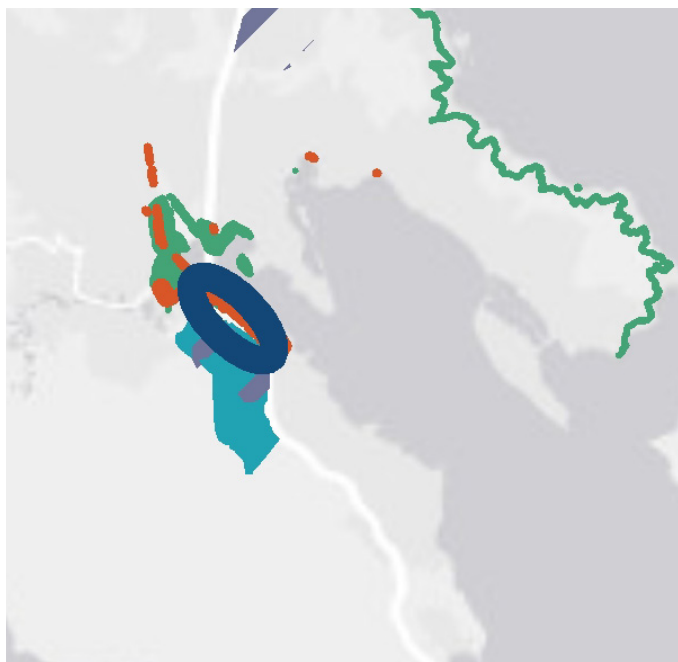
## FITTING INTO REGIONAL STORY

### *How are local areas contributing to Regional Hot Spots?*

The regional scale analysis of ART Bay Area identified clusters of highest consequences around the region, called “Regional Hot Spots.” These areas include places that contain the top five highest consequences in the region for 1) any transportation asset and 2) either a PDA or PCA, and 3) the presence of a vulnerable community block group.

Dataset were identified for each regional system to provide a measure of consequence to quantify impacts in the event of flooding. A full list of consequences used for each regional system can be found in Chapter 2.1 Regional Hot Spots.

### Regional Hot Spot at 24” TWL



- Regional Hot Spot
- Transportation Infrastructure
- Vulnerable Community
- PDA
- PCA

**Figure 8a. Richmond Hot Spot:** At 24” TWL this Focus Area contains clusters of assets that have among the highest consequences of flooding in the region.

This Focus Area is part of a Regional Hot Spot, meaning it contains a cluster of assets that have among the highest consequences of flooding in the region.

The Marin City area is a Regional Hot Spot only at 24” TWL (Figure 8a).

The assets driving the Marin City cluster at 24” TWL The Marin City cluster is driven by the Regional Bicycle Network, visitation to the Bothin Waterfront PCA, and social vulnerability in local block groups with significant social vulnerability and contamination.

Chapter 4 Regional Adaptation provides adaptation responses for regional issues.

# Endnotes

- 1 "Traffic Census Program | Caltrans," Facts and Figures, 2019, <https://dot.ca.gov/programs/traffic-operations/census>.
- 2 "Traffic Census Program | Caltrans."
- 3 Lifeline Routes, Open Data Layer Library (San Francisco, CA: Metropolitan Transportation Commission, October 2, 2019), <http://opendata.mtc.ca.gov/datasets/lifeline-routes>.
- 4 "Traffic Census Program | Caltrans."
- 5 "Golden Gate Ferry: Research Library," accessed September 3, 2019, <http://goldengateferry.org/researchlibrary/statistics.php>.
- 6 "Housing and Jobs: PDAs, PCAs, & Urban Boundaries in Marin County," Plan Bay Area (Metropolitan Transportation Commission, n.d.), [https://www.planbayarea.org/sites/default/files/marin\\_pda\\_map-4.26.pdf](https://www.planbayarea.org/sites/default/files/marin_pda_map-4.26.pdf).
- 7 "San Francisco Bay Trail – A 500-Mile Trail Around the Bay," The San Francisco Bay Trail, 2019, <https://baytrail.org/>.
- 8 "San Francisco Bay Area Water Trail."
- 9 "Bothin Marsh Open Space Preserve: Evolving Shorelines, a Vision for the Future and a Plan for Today" (One Tam, Marin County Parks, and Golden Gate National Parks Conservancy, n.d.), <https://parksconservancy.app.box.com/s/98ed6aotyyhs44nh0qtocjInt3mb8430>.

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