

# Sea Level Rise: The Water is Upon Us We Cannot Run - We Cannot Hide

May 31, 2024



**Source:** County of Marin: <https://www.marincounty.org/main/sea-level-rise> Rising sea levels resulting from climate change. Mill Valley, Marin, circa 2020.

## SUMMARY

The National Oceanic and Atmospheric Administration (NOAA) projects a 12-inch increase in sea level for the San Francisco Bay Area between now and 2050. This means that for the young girl in the photo above, the water may reach higher than the top of her green boots. The girl in the photograph, and others, may often find themselves in a knee-deep-in-water situation throughout the coming years. Twelve inches in 26 years.

Sea level rise can be as impactful as the fires seen across California and elsewhere in recent years. How? By damaging or destroying properties, rendering homes uninhabitable, making roads impassable, impacting power lines and pipes above and below ground, and threatening lives. However, since the effects of sea level rise are projected for years from now, more immediate issues may be prioritized, regardless of future risks. In addition, the complexity of addressing sea level rise may result in the postponement of critical adaptation actions such as building barrier walls to protect shoreline properties and hardening underground electric and sewage infrastructure. This approach will leave communities exposed to growing flood vulnerabilities.

The consequences of sea level rise will not suddenly bubble up in 2050 in Marin, or elsewhere. Impacts are already being seen and felt and they will become even more apparent and damaging over the coming years. What are the consequences for Marin? A 2017 Marin-focused vulnerability assessment conducted by The Bay Waterfront Adaptation and Vulnerability Evaluation (BayWAVE) describes potential risks caused by a ten-inch increase in sea level by 2050. The assessment points out that in just fifteen years sea level rise may threaten and damage

shoreline buildings, roads and utility systems, impacting all of Marin. The evaluation also finds that a one hundred year storm surge, which would rise sea waters as a result, would render ferry facilities unusable and impede commuters from traveling across the San Francisco Bay. Fire stations in low-lying areas would flood and emergency vehicles would lack the ability to respond to calls for assistance. Some levees, such as those south of Novato would be overtopped, flooding surrounding areas. Pipelines under vulnerable roads, as well as those in and around flood-prone properties would be squeezed between rising groundwater and the roads. As a result, pipes would break, leak, damage roads, impede the movement of cars, and flood properties, including critical infrastructure.<sup>1</sup>

Marin is facing 10-12 inches of sea level rise in the span of 26 years. But the water has already arrived. Marin residents have been experiencing sea level rise and related tidal flooding in Corte Madera, Marin City, Mill Valley, and Sausalito, among other towns. This trend will only increase in frequency and intensity over the coming years.

Focusing on Marin County's bayside areas, this Grand Jury report addresses the following five aspects of sea level rise:

1. Sea level rise projections for 2050, resulting in possible financial losses and other impacts.
2. SB272, titled Sea Level Rise Planning and Adaptation, a 2023 state law requiring all California coastal cities to formulate sea level rise plans to be completed no later than 2034.
3. Information about newly emerging efforts to create a county-wide agency to address sea level rise in Marin, spearheaded by the Board of Supervisors.
4. Details about sea level rise initiatives in Marin that are being conducted independently by cities and towns with great exposure to flooding.
5. A description of how OneShoreline, also known as the San Mateo County Flood and Sea Level Rise Resiliency District, functions. The report describes how OneShoreline functions, its advantages and challenges. OneShoreline offers insights as to how a Marin countywide sea level rise entity could be formed and operate.

Based on its findings, the Grand Jury recommends that the county create an overarching, countywide agency with the ability to require all cities and towns to participate in sea level rise adaptation efforts. In addition, the Board of Supervisors should enlist the participation and support of state and federal legislators in its efforts to create the above-mentioned agency. While the new California sea level rise law establishes a 2034 deadline for each county to submit sea level rise adaptation plans, the Grand Jury concludes that Marin cannot wait ten years to complete such a plan because sea level rise is already impacting its communities, and flood risks will only increase over time.

Scientific assessments and sea level rise descriptions can be found in Appendix A in this report.

---

<sup>1</sup> Marin Shoreline Sea Level Rise Vulnerability Assessment. June 2017. Bay Waterfront Adaptation and Vulnerability Evaluation, BayWAVE. Executive Summary, page 18.

## **BACKGROUND**

### **Why write this sea level rise report now?**

*Because by 2050, NOAA predicts floods will occur ten times more than they do currently.*<sup>2</sup>

A 2020 Marin County Civil Grand Jury report about climate change, including sea level rise, urged the county government to create a multijurisdictional entity to focus on this issue. That Grand Jury found that this new entity should include all eleven cities and towns in Marin and should be able to design and undertake comprehensive adaptation and mitigation initiatives. The impetus for the 2020 report was the persistent lack of a countywide climate change agenda.<sup>3</sup>

In late 2023, the Board of Supervisors heeded the 2020 Grand Jury recommendation.<sup>4</sup> Subsequently, they hired AECOM, a Dallas infrastructure consulting firm, to find the best approach to create such a countywide entity.<sup>5</sup> The Grand Jury advises that as this new process unfolds it behooves the county government to widely inform and educate the public about the nature of this risk and impending sea level rise consequences directly impacting them. Public support for any effort in this area can only be gained if the full impact of sea level rise on both coastal and non-coastal areas is widely understood.

Marin will greatly benefit from acting on the insights and recommendations that this report offers about sea level rise adaptation plans and actions. These insights are based on a review of Marin's bayside cities and towns undertakings to date, as well as examples of sea level rise adaptation efforts elsewhere in the Bay Area.

This Grand Jury report is directed at the Marin County Board of Supervisors. The Grand Jury also seeks to reach the public at large, providing Marin County residents with the most up-to-date sea level rise information. This is as much a service to the community as it is making people aware of rising sea levels and associated risks to them.

---

<sup>2</sup> National Oceanic and Atmospheric Administration, *U.S. coastline to see up to a foot of sea level rise by 2050*, February 15, 2022, <https://www.noaa.gov/news-release/us-coastline-to-see-up-to-foot-of-sea-level-rise-by-2050>, (accessed 3/8/24).

<sup>3</sup> Marin County Civil Grand Jury, *Climate Change: How will Marin Adapt?*, September 11, 2020, <https://www.marincounty.gov/sites/g/files/fdkgoe241/files/2024-01/climate-change-how-will-marin-adapt-2.pdf>, (accessed 5/3/24).

<sup>4</sup> Government Contracts & Bids - GOVCB, *Marin County Sea Level Rise Adaptation Organizational Structure and Decision Making Process*, October 3, 2023, <https://www.govcb.com/government-bids/Marin-County-Sea-Level-Rise-Adaptation-And-NBD10537709459578961.htm>, (accessed 5/3/24).

<sup>5</sup> "Marin County allocates \$500K for sea level rise plan." *Marin Independent Journal*, March 19, 2024, <https://www.marinij.com/2024/03/19/marin-county-allocates-500k-for-sea-level-rise-plan/>, (accessed 5/10/24).

## **APPROACH**

To undertake this sea level rise investigation, the Grand Jury conducted interviews with key stakeholders in Marin in a range of departments within county government offices. Additionally, the Grand Jury interviewed sea level rise experts and non-profit leaders. The Grand Jury also interviewed sea level rise leaders outside of Marin to assess how other Bay Area counties are tackling risks through countywide agencies.

The Grand Jury reviewed the Request For Proposal the county government issued in 2023 to identify and hire consultants that will help find the best approach for a countywide, cohesive, and sustained collaboration among all eleven cities and counties in Marin.

A wide range of Marin-centered sea level rise assessments, as well as scientific reports about climate change and sea level rise on a global scale also inform this report. The Grand Jury reviewed local, state, and national media articles on the subject.

In mid-2023, the Grand Jury identified sea level rise as a topic of critical importance, conducting research for ten months. This report was completed on May 15, 2024.

## DISCUSSION



Flooded path in Mill Valley. King tide on Friday, Jan. 11, 2024  
**Source:** Sherry LaVars, Marin Independent Journal, January 12, 2024

NOAA has estimated that the San Francisco Bay Area will experience at least 12 inches of sea level rise by 2050.<sup>6</sup> The most recent calculations presented by the California Ocean Protection Council indicate that in the next 30 years sea levels are likely to rise between 0.8 feet to one foot in California. This state-wide range starts at a slightly lower level than NOAA's San Francisco Bay Area's estimate.<sup>7</sup> Either way, sea levels between 2050-2055 will be at, or near, one foot higher than they are today.

While mitigation, such as actions conducted to reduce human-caused gas emissions into the atmosphere, is very important, this report focuses on adaptation strategies. Adaptation actions include, among others, building sea walls, protecting above and underground critical infrastructure, and restoring marshlands to reduce the physical impact of raising waters. The Grand Jury focuses on adaptation because mitigation requires global attention. Marin's mitigation actions alone cannot make an immediate and significant difference for its residents to safeguard them from flooding. By implementing adaptation strategies, Marin can protect a wide range of personal property and critical infrastructure faster than any mitigation action could achieve. Through adaptation, Marin will preserve its natural sites, which offer ample recreational opportunities. Furthermore, natural sites help absorb the brunt of climate change in general, and sea level rise in particular.

### **Marin's cities and towns with greater exposure to sea level rise**

This year, 2024, the Transportation Authority of Marin's Board of Commissioners approved funding for a sea level rise study to pinpoint the most exposed and vulnerable areas in the

---

<sup>6</sup> Richard Halstead, "Marin sea level defense costs estimated at \$17B," *Marin Independent Journal*, October 30, 2023, <https://www.marinij.com/2023/10/28/marin-sea-level-defense-costs-estimated-at-17b>, (accessed 3/8/24).

<sup>7</sup> California Ocean Protection Council and California Ocean Science Trust, *State of California sea level rise guidance: 2024 science and policy update (draft)*, January 2024, p. 7, <https://opc.ca.gov/wp-content/uploads/2024/01/SLR-Guidance-DRAFT-Jan-2024-508.pdf>, (accessed 5/10/24).

county. In its latest draft, this study indicates it will focus on adaptation planning and solutions to sea level rise risks. The study is expected to be completed by the end of 2024.<sup>8</sup>

According to the above-mentioned study's observations to date, there are 19 geographic areas of concern in Marin; most are coastal. Those areas that are not on the coast are nonetheless exposed to groundwater rise and flooding.<sup>9</sup> The areas of concern are the following: Bel Marin Keys, Belvedere and Tiburon, Bolinas, the Hamilton Wetlands, Inverness, Marin City, Manzanita and Tamalpais Junction, Mill Valley, downtown and western Novato, Santa Venetia, Sausalito, Stinson Beach, Highway 37, Highway 101, San Rafael, Kentfield, Corte Madera, Terra Linda, and Larkspur.<sup>10</sup>

The Transportation Authority of Marin's Board of Commissioners indicates that critical infrastructure sites in Marin are at risk of sea level rise. These include: bus stops, hospitals; municipal facilities; fire and police stations; schools; and childcare centers; among others.<sup>11</sup>

The timing and degree of adaptation action will have socio-economic consequences that could lead to unequal results across the Bay Area region and beyond. The San Francisco Bay Conservation and Development Commission (BCDC) indicates that low-income, at-risk communities, particularly those in low-lying areas, are exposed to high levels of disruption caused by sea level rise.<sup>12</sup> Thus, adaptation action plans will be most effective by including components that pinpoint where the highest and most immediate risks are, who is at risk, and what is at risk. As a result, these plans will be able to specify what has to be done and when in order to respond to sea level rise strategically and equitably.

Marin has areas in which geographic, social, and financial stressors exist, creating or accentuation flooding vulnerabilities. These include the Canal neighborhood, Marin City, and areas of Novato.

Marin County Health and Human Services released its climate change vulnerability dashboard in 2024.<sup>13</sup> This dashboard discusses coastal flooding as a result of sea level rise and related risks to vulnerable populations. The document identifies low-lying areas where the elderly, as well as low-income populations reside. During floods, people in these areas may become stranded due to inaccessible roads, or they may lack transportation access if flood evacuations are ordered. Mold

---

<sup>8</sup> Caitlin Hamer, Marin Living, *New study to look at sea level impact in Marin*, 2024, <https://marinlivingmagazine.com/new-study-to-look-at-sea-level-impact-in-marin>, (accessed 3/7/24).

<sup>9</sup> Krissy Waite, "Marin agency's sea level rise study highlights vulnerable areas", *Marin Independent Journal*, February 29, 2024, <https://www.marinij.com/2024/02/29/marin-agencys-sea-level-study-highlights-vulnerable-areas>, (accessed 3/7/24).

<sup>10</sup> Waite, "Marin agency's sea level rise study highlights vulnerable areas"

<sup>11</sup> Waite, "Marin agency's sea level rise study highlights vulnerable areas"

<sup>12</sup> San Francisco Bay Conservation and Development Commission, *Bridging the gap: Funding sea level rise adaptation in the Bay Area*, December 2021, p. 4, [https://www.adaptingtorisingtides.org/wp-content/uploads/2021/12/ART\\_FundingFinancingPaper2021.12.20.pdf](https://www.adaptingtorisingtides.org/wp-content/uploads/2021/12/ART_FundingFinancingPaper2021.12.20.pdf), (accessed 3/18/24).

<sup>13</sup> Marin Health and Human Services, *Marin County Climate and Health*, <https://www.marinhhs.org/marin-county-climate-and-health>, (accessed 4/22/24).

may grow inside their homes, they may be exposed to infectious diseases due to contaminated standing water, and relocation may be difficult due to economic hardships.<sup>14</sup>

The dashboard provides detailed maps for each town in Marin. These maps identify flooding and vulnerability risk areas due to sea level rise, categorizing these as low, moderate, and higher for each town and city in the county. Anyone with computer access can view these maps by going to Marin County Climate and Health (<https://www.marinhhs.org/marin-county-climate-and-health>) and scrolling through this document to identify relevant information.

The Grand Jury surmises that by creating and making public a climate change and sea level rise dashboard, Marin Health and Human Services has made strides in the area of access to information and equity Marin.

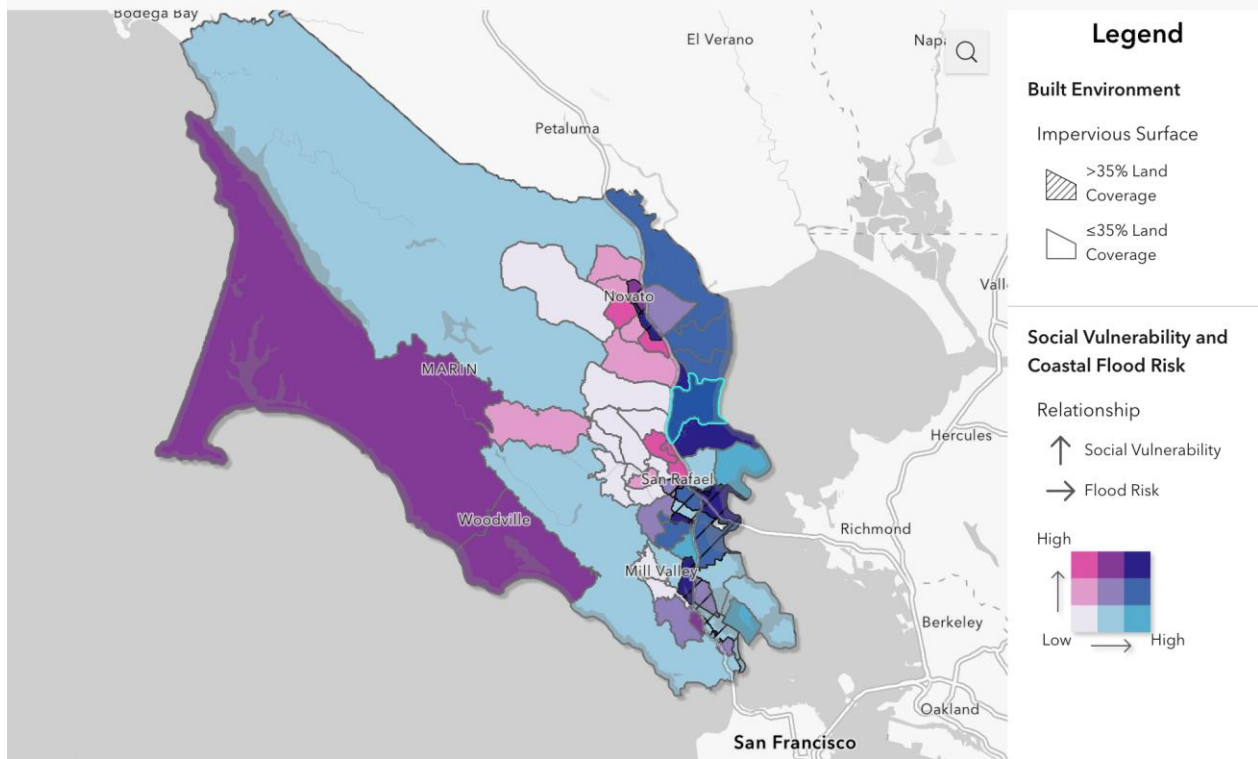
The map below, recently released on the Department of Health and Human Services dashboard, offers a view of sea level rise vulnerability areas in Marin with color-coded coastal flood risk levels.

---

<sup>14</sup> Editorial, “Marin’s plan to address sea level rise must strive for social, economic equity”, *Marin Independent Journal*, April 18, 2024, <https://www.marinij.com/2024/04/18/editorial-marins-plan-to-address-sea-level-rise-must-strive-for-social-economic-equity>, (accessed 4/22/24).

## Map 1

# Marin County Sea Level Rise Vulnerability



Source: Marin Health and Human Services, Marin County Climate and Health <https://marinhhs.org/marin-county-climate-and-health>, (accessed 4/30/24)

## Sea level rise and financial costs

Sea level rise costs will be significant if inaction trumps adaptation advancement. What does this mean for Marin? The county's more than seventy miles of coastline and forty miles of shoreline are subject to sea level rise, tidal, creek, and storm flooding. In fact, 10,000 buildings and 120 miles of roads are found to be exposed to sea level rise risks by 2100.<sup>15</sup>

The San Francisco Bay Conservation and Development Commission estimates that the cost of adaptation in Marin will be approximately \$17 billion.<sup>16</sup> This agency sees dire sea level rise consequences for the Bay Area within the next 40 years. The Commission has also calculated that adaptation costs for the nine Bay Area counties will reach \$110 billion. However, lack of action will result in an estimated \$230 billion in costs related to damages and losses—more than double, compared to adaptation costs.<sup>17</sup> If Marin does not undertake adaptation actions, the costs could be higher than \$34 billion, based on the overall Bay Area projections for inaction.

In 2017, the Bay Waterfront Adaptability & Vulnerability Evaluation program (BayWAVE) completed the Marin Shoreline Sea Level Rise Vulnerability Assessment. The authors of this sea

<sup>15</sup> Richard Halstead, "Marin County allocates \$500K for sea-level rise plan", *Marin Independent Journal*, March 21, 2024, <https://www.marinij.com/2024/03/19/marin-county-allocates-500k-for-sea-level-rise-plan>, (accessed 5/10/24).

<sup>16</sup> Halstead, "Marin sea level defense costs estimated at \$17B".

<sup>17</sup> Wren Farrell, KALW Public Media, *Marin County is preparing for rising sea levels*, October 26, 2023, <https://www.kalw.org/climate/2023-10-26/marin-county-is-preparing-for-rising-sea-levels>, (accessed 4/22/24).

level rise technical report found that shoreline flooding will worsen over the coming years if no countywide actions are taken. They also found that “the market value of vulnerable single family homes could exceed \$20 billion in 2016 dollars.”<sup>18</sup> In 2024 dollars, this figure is nearly \$6 billion higher, or \$26 billion. Notably, this is an estimate for single family homes, and it does not include other structures such as condominiums and apartment buildings, businesses, local government offices, parks, roads, and other critical infrastructure. Thus, the market value of vulnerable properties as a whole, and the resulting risks of financial losses are much bigger.

## **Collaboration is key for effective sea level rise action**

Given the Grand Jury’s jurisdiction, this report concentrates solely on Marin’s governmental agencies. Action needs to be undertaken on a broad scale. Marin’s governmental agencies alone cannot fix the county’s sea level rise risks. Addressing sea level rise requires the knowledge of the scientific community as well as local, state, and federal governmental support—strategic and financial. In addition, philanthropy, non-profit, and for profit entities, working in concert, can and should be part of a broad spectrum of agencies addressing and supporting sea level rise adaptation efforts.

In the San Francisco Bay Area, collaborative efforts are underway. The countywide entity to be established in Marin needs to examine these and other agencies for possible collaborations. The following are seven examples of participating agencies:<sup>19</sup>

1. The Metropolitan Transportation Commission/Association of Bay Area Governments’ (MTC/ABAG) Plan Bay Area 2050
2. Bay Area Climate Adaptation Network (BayCAN)
3. San Francisco Estuary Partnership’s (SFEP) Estuary Blueprint
4. San Francisco Bay Restoration Authority’s (SFBRA) Measure AA
5. San Francisco Estuary Institute’s (SFEI) Adaptation Atlas3
6. San Francisco Bay Conservation and Development Commission’s (BCDC) ART Bay Area project, and
7. BCDC-facilitated Bay Adapt2 initiative

In the following section the Grand Jury provides the most up-to-date available information concerning the following: a new state sea level rise law impacting Marin and all of California’s coastal areas in its 58 counties. The report also details sea level rise actions taken by Bel Marin Keys, Corte Madera, Larkspur, Mill Valley, Novato, Sausalito and San Rafael. While there are eleven cities and towns in Marin, the Grand Jury has chosen to address these seven jurisdictions because of their high levels of exposure to sea level rise.

---

<sup>18</sup> Bay Waterfront Adaptability & Vulnerability Evaluation (BayWAVE), *Marin shoreline sea level rise vulnerability assessment*, June 7, 2017, [https://www.marincounty.org/-/media/files/departments/cd/planning/slr/baywave/vulnerability-assessment-final/final\\_allpages\\_bvbconsulting\\_reduced.pdf?la=en](https://www.marincounty.org/-/media/files/departments/cd/planning/slr/baywave/vulnerability-assessment-final/final_allpages_bvbconsulting_reduced.pdf?la=en), p. xxiv, (accessed 5/10/24).

<sup>19</sup> San Francisco Bay Conservation and Development Commission, *Bridging the gap: Funding sea level rise adaptation in the Bay Area*, December 2021, p. 7, [https://www.adaptingtorisingtides.org/wp-content/uploads/2021/12/ART\\_FundingFinancingPaper2021.12.20.pdf](https://www.adaptingtorisingtides.org/wp-content/uploads/2021/12/ART_FundingFinancingPaper2021.12.20.pdf), (accessed 3/18/24).

Additionally, in the following section, the report describes OneShoreline, a district that directly addresses flood control and sea level rise in San Mateo County. OneShoreline illustrates how a formal, countywide effort can be planned and established. To provide insight for the Board of Supervisors as they work on creating the Marin countywide sea level rise entity, this report describes how OneShoreline was created, as well as the methods it employs to advance sea level rise knowledge, generate action plans, and work collaboratively with its cities and towns.

## **California Sea level rise planning and adaptation bill SB272**

On October 7, 2023, Governor Gavin Newsom signed into law Senate Bill 272 entitled “Sea level rise: planning and adaptation”. The new law, sections 30985-30985.8 of the California Public Resources Code, requires local governments in bay and coastal jurisdictions to create sea-level rise plans based on the best available science, conduct vulnerability assessments, determine adaptation strategies, and identify a list of recommended projects with timelines. Local governments have until January 2034 to develop their state-mandated sea level rise plans.

Reception of SB 272 has been mixed. For example, “the state legislation is a game changer in some ways, but not in others,” says Dana Brechwald, Assistant Planning Director for Climate Adaptation with BCDC. “Before we were trying to get this done on the basis of collaboration, engagement, and goodwill; now it is legislatively mandated.”<sup>20</sup> While the new law stops short of declaring exactly where state funding will come from for sea level rise plans and adaptation projects, it allows the state to prioritize funding for cities and counties with plans in place. The law also empowers BCDC to provide oversight and accountability to accelerate consistent, equitable, and effective shoreline resilience plans that protect vulnerable communities.

Some in the Bay Area are concerned that the 2034 deadline is too late. Others point out that the law applies to cities and counties, but does not include specific requirements for infrastructure such as airports, hospitals, and harbors. No local government can address climate threats alone, so resilience and adaptation plans and activities should align protection across multiple jurisdictions.<sup>21</sup>

## **Sea level rise initiatives in Marin’s bayside communities**

The Marin Climate and Energy Partnership (MCEP) was created in 2007. MCEP is a partnership of the eleven Marin cities and towns, the county government, and three public agencies serving Marin. This partnership was established to provide a vehicle through which members can share resources and secure funding to discuss policies and programs, including emissions and adaptation strategies, as well as collecting data and sharing progress on their plans and actions.<sup>22</sup>

---

<sup>20</sup> Ariel Rubissow Okamoto, Kneedeep Times, *Nested Plans Neck and Neck With Rising Bay*, Nov 1, 2023, <https://www.kneedeepimes.org/nested-plans-neck-and-neck-with-rising-bay>, (accessed 5/3/24).

<sup>21</sup> Ezra David Romero, KQED, *California Mandates Coastal Cities Plan for Future Sea-Level Rise*, Oct 18, 2023, <https://www.kqed.org/science/1984830/california-mandates-coastal-cities-plan-for-future-sea-level-rise>, (accessed 5/3/24).

<sup>22</sup> The Marin Climate and Energy Partnership, <https://marinclimate.org/about-us>, (accessed 4/30/24).

The bayside cities and towns discussed below are part of Marin Climate and Energy Partnership. By virtue of their geographic location, these jurisdictions are directly threatened by sea level rise. They have created independent mitigation or adaptation plans, or a combination of both.

To date, a countywide sea level rise adaptation entity is still absent. As a result, the plans put forth by each city and town remain without integration into a broader, countywide vision and adaptation framework. These individual plans and actions taken to date still have validity. The plans include a plethora of adaptation strategies, such as building walls and protecting marshland, and recognize equity as a key factor to be taken into account. These cities and towns also understand that, in some cases, managed retreat from coastal areas may become the only option. If, and when, the countywide sea level rise adaptation entity is created, these city and town plans will add value to the broader endeavor. They will help reduce the amount of time it will take to create a comprehensive, countywide sea level rise adaptation plan, and offer proven methods that could be expanded.

### **Bel Marin Keys**

Bel Marin Keys is a waterfront development of 702 single family homes located in northeastern Marin. It is bordered by Novato to the west and the San Francisco Bay to the east. The community of Bel Marin Keys is serviced and funded by the Bel Marin Keys Community Services District (BMK Services District). The BMK Services District is a non-enterprise Special District. It is a public entity, not a homeowners association. As such it derives virtually all its revenue from a percentage of the property taxes collected by the County of Marin. The total population serviced by the District is approximately 2,500.

Because Bel Marin Keys borders the San Francisco Bay and surrounds two large lagoons which open into Novato Creek and the Bay, the community is very susceptible to sea level rise. BMK Services District therefore placed a measure on the ballot for March 5, 2024, called Measure G. The ballot title for Measure G was as follows:

Bel Marin Keys Community Services District Infrastructure Special Tax. To protect against climate impacts and establish funding that cannot be taken by the State of California, shall Bel Marin Keys Community Services District's measure levying a special tax for 21 years to finance costs of maintaining, improving, acquiring and constructing existing and new infrastructure, including locks and levees, and dredging waterways, at an initial annual rate of \$1,800 (\$150/month) per taxable parcel (generating \$1,263,600 in tax year 2024-25), increasing 2.5 percent annually thereafter, be adopted?

The measure required a 66.67% majority to pass, and it passed with 79.64 percent of the vote.<sup>23</sup>

---

<sup>23</sup> Bel Marin Keys Community Services District, California, Measure G, Parcel Tax Measure (March 2024) - Ballotpedia, [https://ballotpedia.org/Bel\\_Marin\\_Keys\\_Community\\_Services\\_District,\\_California,\\_Measure\\_G,\\_Parcel\\_Tax\\_Measure\\_\(March\\_2024\)](https://ballotpedia.org/Bel_Marin_Keys_Community_Services_District,_California,_Measure_G,_Parcel_Tax_Measure_(March_2024)), (accessed 5/15/24).

As observed by one of Bel Marin Keys' residents, "This area is the perfect lab for exploring native solutions to sea level rise. It's where people are working to correct the mistakes that were made."<sup>24</sup>

### **Corte Madera**

In 2018, Corte Madera received funds from Caltrans to develop a climate change assessment, which the town conducted between 2019 and 2020.<sup>25</sup> The Climate Adaptation Assessment (CAA) was released in May 2021, and provides action steps to build resilience in light of climate change.

In its plan, Corte Madera addresses historically disadvantaged communities in its community who are at high risk of floods due to their geographic location. The plan highlights the importance of equity in adapting to climate change and sea level rise. This approach, according to the Corte Madera plan, will help to build equitable resilience.<sup>26</sup>

Corte Madera's Climate Adaptation Assessment provides strategies to address the growing risk of sea level rise floods. The authors of this document identify key elements of the adaptation process, which include: "flood accommodation; shoreline protection; and managed retreat."<sup>27</sup> It is important to recognize that there may come a time when managed coastal retreat is the answer. This recognition points to specific critical action, as difficult and costly as it may happen to be. In Corte Madera, "a large portion of the town currently lies in the floodplain, which is considered a Special Flood Hazard Area (SFHA) designated by FEMA."<sup>28</sup>

Corte Madera is already experiencing floods. Leaders, as well as residents, are aware that frequency and intensity are on the rise. Thus, Corte Madera sees the importance and urgency of building resilience to cope with what is to come. The town understands that flooding conditions may change over time, requiring responsive adjustments to plans and actions. For Corte Madera, flexibility is fundamental.<sup>29</sup>

---

<sup>24</sup> John King, "People who move here don't leave: Why this rich California enclave is bracing homes for rising seas," *San Francisco Chronicle*, March 20, 2024.

<sup>25</sup> *Corte Madera Town Council Staff Report*, November 19, 2020, <https://www.townofcortemadera.org/DocumentCenter/View/5697/6B-Staff-Report-and-Attachments>, (accessed 5/3/24).

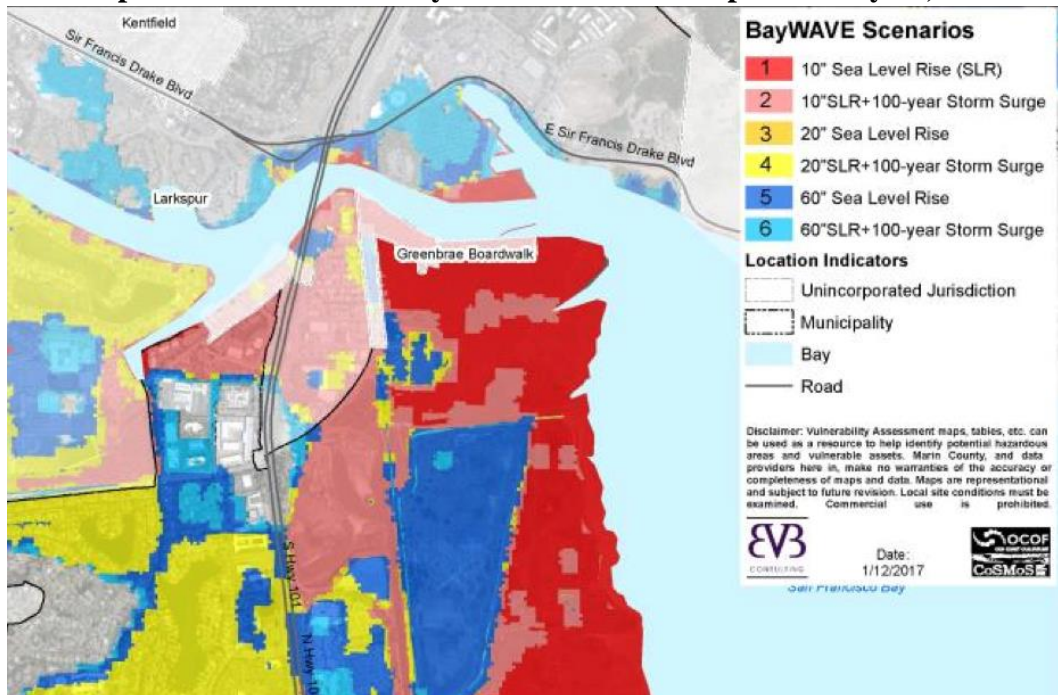
<sup>26</sup> *The Corte Madera Climate Adaptation Assessment: A Roadmap to Resilience*, May 2021, p. 15, <https://www.townofcortemadera.org/DocumentCenter/View/6473/Climate-Adaptation-Assessment>, (accessed 5/3/24).

<sup>27</sup> *The Corte Madera Adaptation Assessment*, p. 71.

<sup>28</sup> *The Corte Madera Adaptation Assessment*, p. 75.

<sup>29</sup> *The Corte Madera Adaptation Assessment*, p. 73.

Map 2 – Corte Madera Bay Wave Scenarios Map - January 12, 2017



Source: Marin Shoreline Vulnerability Assessment, [https://marinflooddistrict.org/documents/corte-madera/?filter\\_categories\[\]=579](https://marinflooddistrict.org/documents/corte-madera/?filter_categories[]=579), (accessed 5/3/24)

## Larkspur

The City of Larkspur is concerned about climate change and its consequences, including fires, heat waves and sea level rise. As a result, Larkspur produced a Climate Action Plan. This plan has focused on mitigation, and most of the current efforts are aimed at reducing greenhouse gas emissions.<sup>30</sup> Mitigation alone is insufficient to tackle ongoing rising sea levels. Larkspur has yet to address sea level rise adaptation.

For the City of Larkspur, the role of local governments centers on reducing greenhouse gas emissions to minimize the impact of climate change. Its Action Plan focuses on practices that can reduce dependence on fossil fuels.<sup>31</sup>

Larkspur presents what it argues are the roles of international, national, and state governments. For Larkspur, these governments should also concentrate on the reduction of gas emissions.<sup>32</sup> To achieve this, Larkspur highlights renewable energy, low carbon transportation, composting, and water conservation. Indeed, the Grand Jury believes that these are all valuable and needed long term strategies and goals, but not enough for Marin to brace for and adapt to rising seas. Even if

<sup>30</sup> City of Larkspur, *Climate Action Plan 2030 - Draft*, June 2021, pp. 1, 15, A-5, <https://www.ci.larkspur.ca.us/DocumentCenter/View/13376/Larkspur-CAP-2030-June-2021-Clean-Copy>, (accessed 5/4/24).

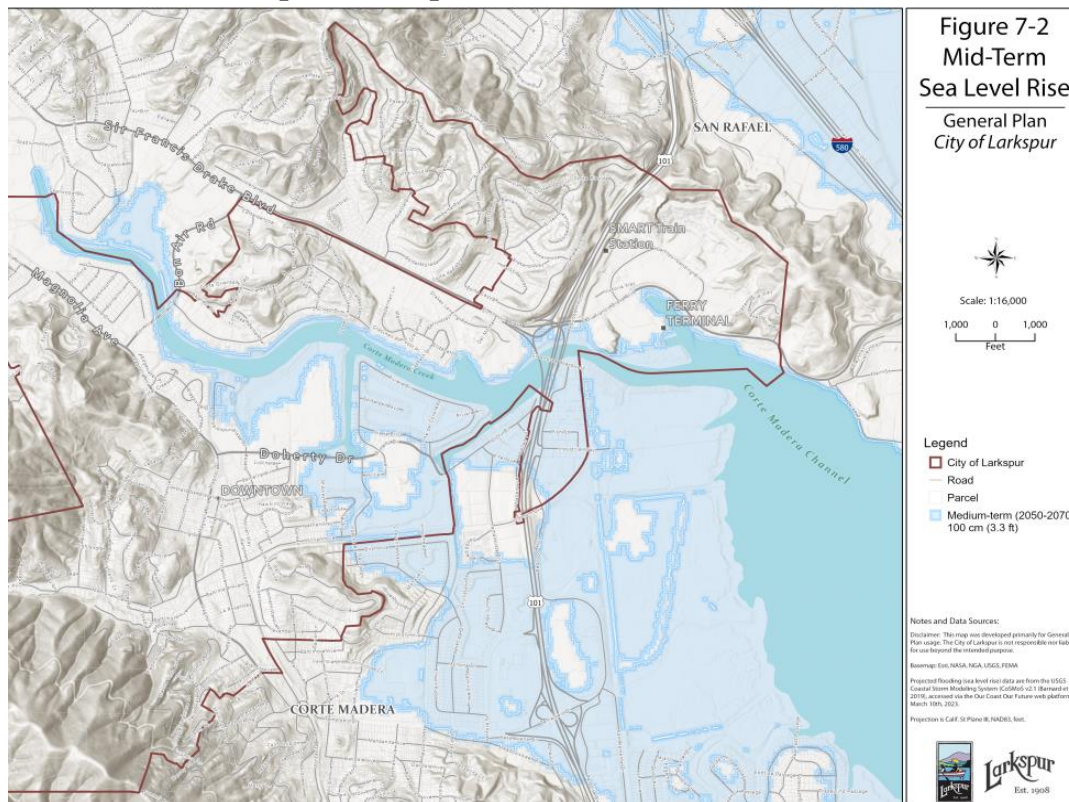
<sup>31</sup> City of Larkspur, *Climate Action Plan 2030 - Draft*, June 2021.

<sup>32</sup> City of Larkspur, *Climate Action Plan 2030 - Draft*, June 2021.

carbon dioxide emissions completely stop now, the carbon will remain in the Earth’s atmosphere for centuries, continuing to warm the planet.<sup>33</sup>

In its plan, Larkspur, like other cities and towns mentioned in this report, recognizes the importance of addressing inequities, and ensuring a “just and fair inclusion into a society in which all can participate, prosper, and reach their full potential.”<sup>34</sup> The map below shows a mid-term sea level rise estimate of up to 3.3 feet between 2050-2070.

**Map 3 - Larkspur - Mid-Term Sea Level Rise**



**Source:** Larkspur Mid-Term Sea Level Rise, City of Larkspur 2040 General Plan, Draft Environmental Report Plan, figure 7-2 <https://www.ci.larkspur.ca.us/DocumentCenter/View/17220/Draft-Safety-Element-41503-draft-pdf>, (accessed 5/15/24).

### Mill Valley: Mitigation and Adaptation

Mill Valley’s 2040 Climate Action Plan (CAP), adopted by a unanimous vote of the City Council on May 6, 2024, was incorporated into its General Plan. The CAP details actions the community and local government have taken to reduce greenhouse gas emissions and implement adaptation strategies going forward.<sup>35</sup> Mill Valley successfully achieved its 2020 emission reduction targets (20 percent below year 2000 levels). This city is currently working to identify reduction opportunities, while addressing the need to develop and fund sea level rise adaptation

<sup>33</sup> Morgan Kelly, “Even if emissions stop, carbon dioxide could warm earth for centuries.” Princeton University, <https://www.princeton.edu/news/2013/11/24/even-if-emissions-stop-carbon-dioxide-could-warm-earth-centuries>, November 24, 2023, (accessed 5/14/24).

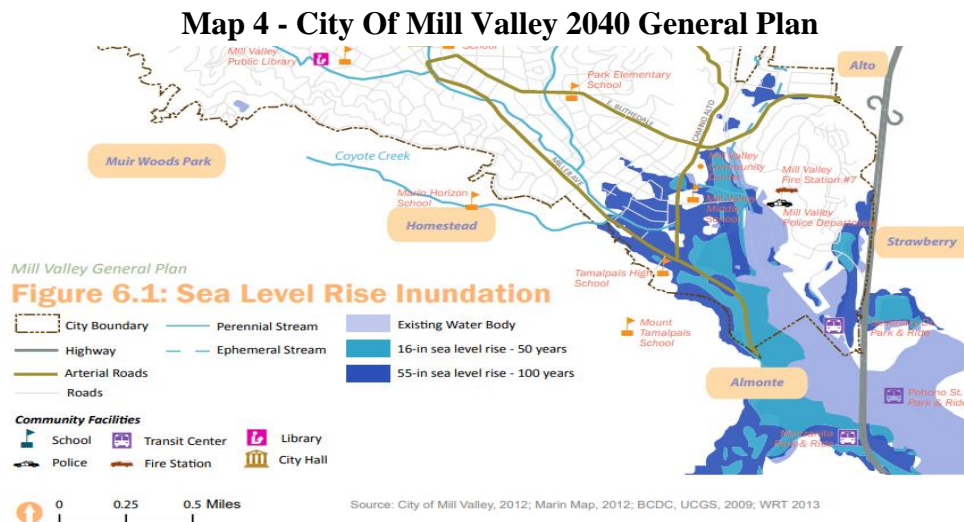
<sup>34</sup> City of Larkspur, *Climate Action Plan 2030 - Draft*, June 2021.

<sup>35</sup> City of Mill Valley, *Mill Valley General Plan 2040, Chapter 6, Climate Action*, <https://www.cityofmillvalley.org/DocumentCenter/View/950/Climate-Action-PDF>, (accessed 5/3/24).

plans. In furtherance of these goals, Mill Valley in conjunction with Tiburon, approved the hiring of a Climate Action Sustainability Coordinator in early 2023.<sup>36</sup>

Mill Valley has begun to evaluate long term adaptation strategies. The city proposes to establish a permanent funding mechanism through its budget. In doing so, Mill Valley will be able to address natural systems and infrastructure that are vulnerable to sea level rise and more extreme storm conditions.<sup>37</sup>

The Mill Valley 2040 General Plan acknowledges that sea level rise will increase the “areas subject to flooding to include the low-lying areas of Mill Valley from Bothin Marsh to Sycamore Park.” The extent of flooding due to sea level rise, as shown in Figure 6.1 below, is extensive. “By 2050, daily high tides are projected to inundate the same area that is currently subject to flooding by a 100-year flood event.”<sup>38</sup> Mill Valley is endeavoring to build a comprehensive approach that prepares for and responds to the expected impacts of climate change and sea level rise, including the identification of populations and neighborhoods most vulnerable to these impacts in conjunction with all levels of government and stakeholders.<sup>39</sup>



**Source:** City of Mill Valley, 2012, Mill Valley 2040 General Plan, Climate Action, Chapter 6, <https://www.cityofmillvalley.org/518/MV2040-General-Plan>, (accessed 5/15/24)

<sup>36</sup> Town of Tiburon, *Tiburon and Mill Valley Join Forces to Hire a Climate Action Sustainability Coordinator*, February 7, 2023, <https://www.townoftiburon.org/CivicAlerts.aspx?AID=348>, (accessed 5/3/24).

<sup>37</sup> City of Mill Valley, *Mill Valley General Plan 2040, Chapter 6, Climate Action*.

<sup>38</sup> City of Mill Valley, *Mill Valley General Plan 2040, Chapter 6, Climate Action*.

<sup>39</sup> City of Mill Valley, *Mill Valley General Plan 2040, Chapter 6, Climate Action*.

## **Novato**

The City of Novato published a White Paper on Sea Level Rise and Adaptation in March of 2015, with stated goals for 2035. Novato then identified funding as a critical element in its efforts to address sea level rise. Also, Novato asserted that “while we will not be able to stop the rise in sea levels resulting from these changes, we have the opportunity and must plan to adapt to this change.”<sup>40</sup>

In the City of Novato, a range of areas are at risk of flooding, including its valley floors, properties in low-lying areas, and regions that were once marshland and have since been filled. Novato’s main transportation corridors (Highway 101 and Highway 37) are at risk of sea level rise flooding, while the Novato Sanitary District, located on the shoreline (in particular its electrical systems), is also vulnerable.<sup>41</sup>

Novato is a member of the North Bay Watershed Association (NBWA), which includes Marin, Napa and Sonoma Counties. NBWA seeks to engage jurisdictions across county lines to work together on the protection of local watershed resources. This entity analyzes and addresses issues tied to the management of the North Bay watersheds, and it has also been working on sea level rise research.<sup>42</sup>

In its General Plan 2035, Novato addresses climate change and highlights the importance of reductions in emissions. In its climate change agenda, Novato also emphasizes the protection of creeks and streams through zoning codes and restoration of previously damaged waterways as conditions for approval of development projects, all of which are adaptation strategies.<sup>43</sup>

---

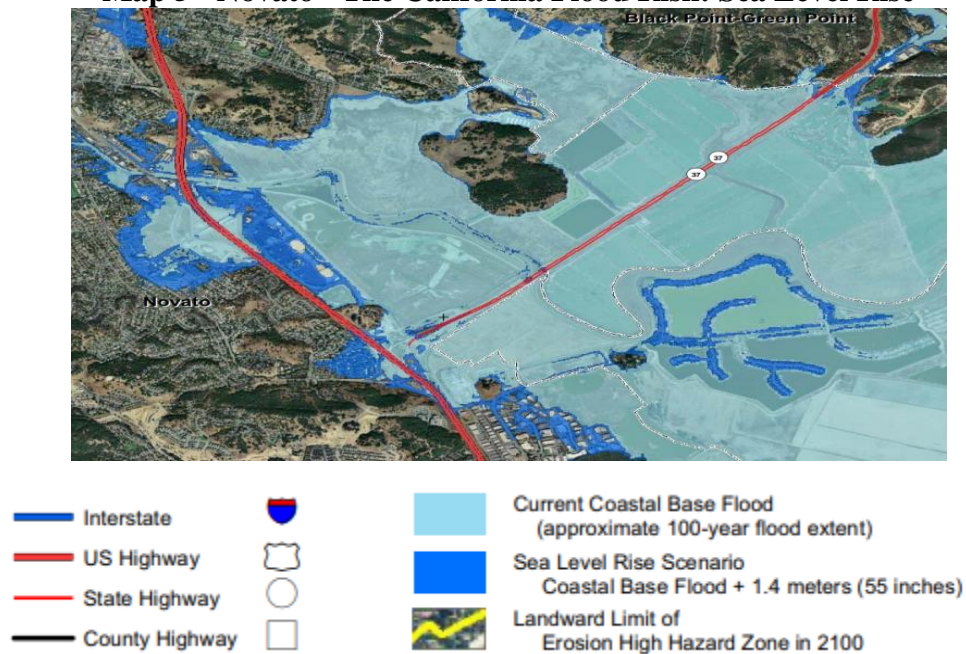
<sup>40</sup> City of Novato, *General Plan 2035 Policy White Paper, Sea Level Rise and Adaptation*, March 2015, <https://www.novato.org/home/showpublisheddocument/12603/635609875925570000>, (accessed 5/1/24).

<sup>41</sup> City of Novato, *General Plan 2035 Policy White Paper, Sea Level Rise and Adaptation*, p. 18.

<sup>42</sup> City of Novato, *General Plan 2035 Policy White Paper, Sea Level Rise and Adaptation*, p. 9.

<sup>43</sup> City of Novato, *General Plan 2035, Adopted October 27, 2020. Chapter 3, Environmental Stewardship*, p. 26, <https://www.novato.org/home/showpublisheddocument/32287/637526315486370000>, (accessed 5/1/24).

Map 5 - Novato - The California Flood Risk: Sea Level Rise



Source: Pacific Institute, Sea Level Rise, Hazmaps, Novato, [https://pacinst.org/reports/sea\\_level\\_rise/hazmaps/Novato.pdf](https://pacinst.org/reports/sea_level_rise/hazmaps/Novato.pdf), (accessed 5/3/24)

### Sausalito

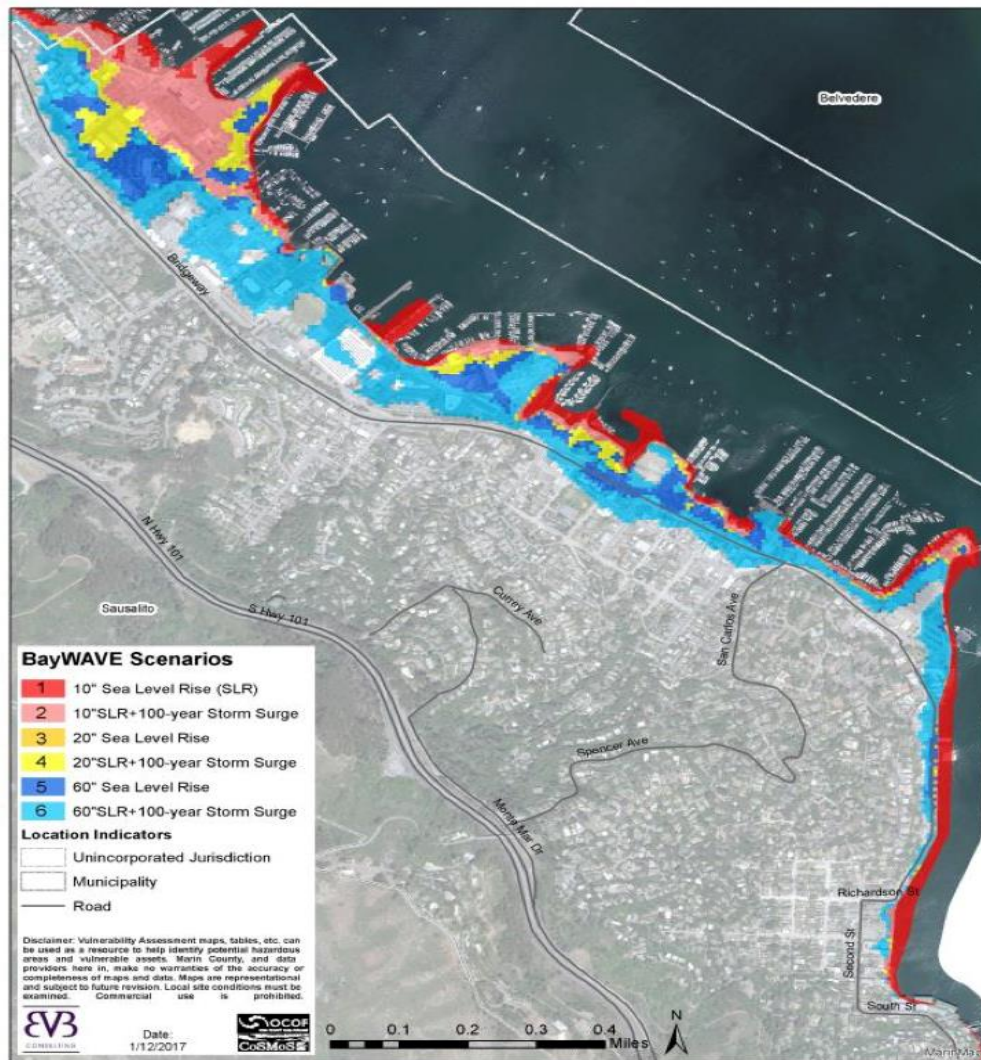
Sausalito has been addressing sea level rise.<sup>44</sup> Although much of the housing in Sausalito is above current sea level, parts of its critical infrastructure are in areas exposed to sea level rise, thus needing adaptation measures. Damages such as floods impacting sewer and stormwater systems and major roads could interfere with people’s ability to reach places such as work, schools, hospitals, and airports, among others. Sausalito’s main underwater sewer pipes are already vulnerable to rising seas.

Sausalito established a Sea Level Rise Task Force created by Mayor Jill Hoffman in March 2021 “to kick start our sea level rising planning as a community.”<sup>45</sup> The city has adopted a Shoreline Adaptation Plan that includes community engagement, and it is scheduled to begin during the spring of 2024.

<sup>44</sup> City of Sausalito, *Sea Level Rise*, p. 11, <https://www.sausalito.gov/city-government/hot-topics/sea-level-rise>, (accessed 5/3/24).

<sup>45</sup> City of Sausalito, *Sea Level Rise Task Force*, <https://www.sausalito.gov/city-government/hot-topics/sea-level-rise/sea-level-rise-task-force>, (accessed 5/2/24).

Map 6 - Bay Wave Scenarios Map - January 12, 2017 Sausalito



Source: Marin Shoreline Vulnerability Assessment, [https://marinflooddistrict.org/documents/corte-madera/?filter\\_categories\[\]=579](https://marinflooddistrict.org/documents/corte-madera/?filter_categories[]=579), (accessed 5/15/24)

## San Rafael

Within San Rafael, the Canal neighborhood sits in low-lying ground which is significantly vulnerable to sea level rise.<sup>46</sup>

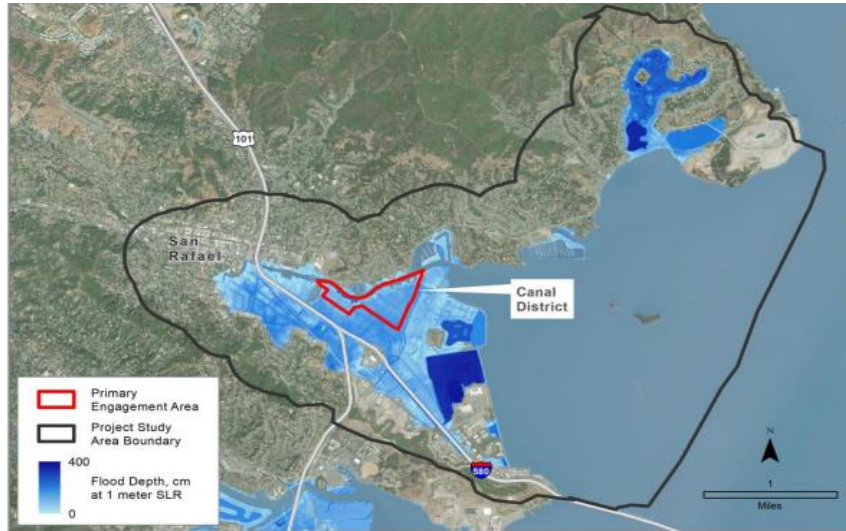
In order to address the significant vulnerability of the Canal area, San Rafael put forth a Request for Proposal (RFP) in August 2023, requesting sea level rise adaptation planning services to conduct community-centered studies and create an actionable plan. The proposal indicates that the Canal District is at greatest risk of flooding due to sea level rise, when compared to other areas in the city of San Rafael.<sup>47</sup>

<sup>46</sup> Annie Sneed, Bay Adapt, *Elevate Communities to Lead: A Story from San Rafael's Canal Neighborhood*, January 19, 2024, <https://www.bayadapt.org/blog/elevate-communities-to-lead-a-story-from-san-rafaels-canal-neighborhood>, (accessed 5/10/24).

<sup>47</sup> City of San Rafael, *Request for Proposal (RFP): Sea Level Rise Adaptation Planning Services*, August 21, 2023, <https://www.cityofsanrafael.org/rfp-slr>, (accessed 5/1/24).

The project, with equity as a central tenet, is led by the City of San Rafael, the County of Marin, two community-based organizations, which are the Canal Alliance, and the Multicultural Center of Marin, as well as the University of California at Berkeley. The State Coastal Conservancy and the Governor’s Office of Policy & Research have provided funding for this undertaking.<sup>48</sup>

**Map 7 - San Rafael Depicting Flooding In The Canal District**



**Source:** City of San Rafael, Request for Proposal for sea level rise adaptation planning services, August 21, 2023.

## Tiburon

Based largely on the Marin Shoreline Sea Level Rise Vulnerability Assessment prepared in June 2017 as part of the BayWAVE program, Tiburon is in the process of confronting the threats it faces from sea level rise. The primary vulnerabilities are the Downtown area, the Blackie's Pasture area, and the Greenwood Cove area of Tiburon, pictured below.

<sup>48</sup> City of San Rafael, *Request for Proposal (RFP): Sea Level Rise Adaptation Planning Services*.

## Map 8 - Sea Level Rise In Tiburon

### SEA LEVEL RISE IN TIBURON

- Main Street/ Downtown
- Blackie's Pasture
- Greenwood Cove

- Legend**
- Shallow Groundwater
  - Existing Water Bodies
  - 60 inches SLR + 100-year storm
  - City Boundary



Source: Sea Level Rise in Tiburon [PowerPoint Presentation \(createtiburon2040.org\)](https://www.createtiburon2040.org/), (accessed 4/25/24)

In March 2021, Tiburon launched its survey on “Adapting to Sea Level Rise.” The purpose of the survey was to seek public input on how Tiburon should respond to rising seas in the three areas discussed above. The survey also sought to assist Tiburon planners in preparing its General Plan 2040. Concurrently, Tiburon created a sea level page as part of the Tiburon Town website, this contains a PowerPoint presentation on the issue of sea level rise.<sup>49</sup>

The Tiburon Town Council adopted its General Plan 2040 and certified the Final Environmental Impact Report (FEIR) on May 22, 2023.<sup>50</sup> Section 11.5 of the Tiburon General Plan 2040 (under Chapter 11, Safety and Resilience), discusses the threats to Tiburon from sea level rise, its vulnerabilities, and the possible adaptation strategies to confront those threats.

### San Mateo County Flood Control and Sea Level Rise Resiliency District, also known as OneShoreline

The Grand Jury studied San Mateo County’s OneShoreline as part of its investigation to learn how the county was able to create a countywide agency. The Grand Jury was interested in identifying specific elements of this effort (i.e. political support, public response, funding sources) that can serve as potential guidance for Marin County’s current efforts to plan and establish its own countywide sea level rise entity.

In 2015, the San Mateo Civil Grand Jury issued a Report, “Flooding Ahead: Planning for Sea Level Rise,” that posed the following question: “What actions can the County of San Mateo, and the 20 cities and two relevant local special agencies within the county, take now to plan for sea

<sup>49</sup> Tiburon General Plan Update, *Adapting to Sea Level Rise*, March 2021, <https://createtiburon2040.org/wp-content/uploads/2021/03/Adapting-to-Sea-Level-Rise-Presentation-March-2021.pdf>, (accessed 5/3/24).

<sup>50</sup> Create Tiburon 2040, *General Plan 2040*, <https://createtiburon2040.org/draft-general-plan>, (accessed 5/3/24).

level rise?” San Mateo county concluded that it was best to create a single, countywide entity to address sea level rise planning.<sup>51</sup>

In April of 2018, the City/County Association of Governments of San Mateo County (C/CAG) Countywide Water Coordination Committee began to develop a proposal to form a countywide agency to address sea level rise, flooding, coastal erosion, and regional stormwater infrastructure. The Committee recommended that new legislation could expand the scope of the existing San Mateo County Flood Control District to incorporate sea level rise in its mission. As a result, a new law was instituted in 2019, Assembly Bill 825. This new law gave rise to the San Mateo County Flood and Sea Level Rise Resiliency District.<sup>52</sup> This District, also called OneShoreline, was established in 2020.

From interviews, the Grand Jury learned that two important elements enabled the creation and operations of OneShoreline. First, the passing of Assembly Bill 825 stemmed from direct support from Congresswoman Jackie Speier, Dave Pine of the San Mateo County Board of Supervisors, and Paul Okada, Chief Deputy County Counsel for San Mateo.

Second, OneShoreline received funding from each of its cities and towns. In addition, the District began receiving funding through taxes from local entities. OneShoreline has been able to stimulate and garner support from local entities by pointing out the increasing cost of flood insurance premiums.

In 2023, OneShoreline created and released its countywide Administrative Draft of the Planning Policy Guidance, after receiving input from a wide range of relevant entities.<sup>53</sup> The Marin County Civil Grand Jury learned through interviews that seeking community input was an important step in creating the expansion of the original District. Such input came from the San Francisco Bay Conservation and Development Commission, the City and County Association of Governments of San Mateo County, and the San Francisco Estuary, among others. The policy guide is available to San Mateo’s county cities and towns for the creation and implementation of effective sea level rise adaptation plans. In addition, the policy is a useful resource and tool available to any other entity working on sea level rise issues, Marin County included.

### **Marin County tax and bond fatigue**

The financial resources required to identify and assess current and future risks posed by sea level rise, as well as the costs to develop and implement protective solutions are estimated to reach \$17 billion. Raising the funds to identify and assess the risks through taxation, while possible, is not a given. Recent bond measures designed to raise several hundred million dollars for infrastructure were defeated at the polls, raising the specter of tax and bond fatigue in the county.

---

<sup>51</sup> 2014-2015 San Mateo Grand Jury Final Report, *Flooding Ahead: Planning For Sea Level Rise*, p. 1, [https://www.sanmateo.courts.ca.gov/system/files/sea\\_level\\_rise.pdf](https://www.sanmateo.courts.ca.gov/system/files/sea_level_rise.pdf), (accessed 5/3/24).

<sup>52</sup> OneShoreline, *Our History*, <https://oneshoreline.org/our-history>, (accessed 5/3/24).

<sup>53</sup> OneShoreline, *Building Solutions for a Changing Climate. Planning Policy Guidance*, June 2023, pp. 9-12, <https://oneshoreline.org/wp-content/uploads/2023/09/OneShoreline-Planning-Policy-Guidance-Final-June-21-2023-For-Web.pdf>, (accessed 5/3/24).

Raising \$17 billion far exceeds the county's ability to achieve via taxation. The funds to address sea level rise will need to be amassed over decades, and Marin will need to rely upon state and federal resources to address the shortfall. In addition, philanthropic funds may be available.

Marin will need to execute a strong public relations effort to create and maintain public endorsement of its work to mitigate the effects of sea level rise. These efforts will need to include both coastal and non-coastal areas as everyone in the county will be affected by this problem.

### **Grand Jury's Key Observations**

The Grand Jury's investigation shows that 2050 sea level rise projections for Marin are significant and have been identified by a range of scientific studies. This report's review of cities and towns shows that while there is no countywide action in Marin yet, some of these jurisdictions have been in collaboration with other entities, including Napa and Sonoma. Additionally, whether through science, or direct observation of climate conditions, cities and towns in Marin have made efforts to understand and create plans to address sea level rise trends. These towns understand that sea level rise can undermine the safety and stability of their natural environments, as well as private property and critical infrastructure. The Bel Marin Keys example shows that this jurisdiction has taken direct sea level rise action, starting with recognizing the issue, creating adaptation plans, followed by raising funds, and ultimately implementing its strategies.

The Grand Jury observes that the actions taken by the cities and towns point to an adaptation mode that is already in place and functioning. The next logical step is multijurisdictional coordination involving planning and action. This appears to be achievable.

Regional sea level rise projections show that the impacts will be felt not just in Marin, but across the Bay Area. No county can function in isolation from others, which is why collaborations are already underway, and should be continued, expanded and strengthened. Marin must not be an exception to this approach.

Due to where low-income, under-represented communities reside, namely low-lying coastal areas, the impact of sea level rise will affect them sooner and perhaps harder than others. As a result, a plethora of studies, several of the cities and towns described in this report, and the Marin Health and Human Services Department point out how important it is to address equity as it pertains to sea level rise adaptation, while also tackling the county as a whole.

Delaying adaptation actions across the county until 2034 as provided by SB272 leaves Marin unnecessarily vulnerable to sea level rise. Immediate action is imperative.

Stemming from the facts gathered for this investigation, both scientific and action-oriented, the Grand Jury arrives at the following findings and recommendations:

## **FINDINGS**

- F1.** A comprehensive countywide agency is necessary to effectively address the impacts of sea level rise in Marin County.
- F2.** To be effective, a countywide agency created to address sea level rise in Marin County should include the County of Marin, all cities and towns, and appropriate special districts in Marin County as funding participants.
- F3.** The complete failure to create and implement effective countywide sea level rise adaptation projects in Marin County will result in significant damages and losses to commercial and residential properties as well as infrastructure, both public and private.
- F4.** The 2034 deadline imposed by Sections 30985-30985.8 of the California Public Resources Code for each California county to submit its official sea level rise mitigation plan is “too little too late” for Marin county, and delaying action until then will expose coastal and Bay areas to unnecessary flooding risks, financial and other losses.
- F5.** Under-represented populations reside in areas that are severely vulnerable to sea level rise because they are in low-lying ground.
- F6.** Sea level rise plans to be developed by a countywide entity should include adaptation strategies that directly apply to under-represented communities in low-lying areas with great exposure to sea level rise, such as the Canal District, areas of Novato, and Marin City, among others.

## **RECOMMENDATIONS**

By March 20, 2025, the following actions should be implemented by:

- R1.** The Board of Supervisors, in collaboration with Marin county cities, towns, Bel Marin Keys Community Services District and Marin Water should create a comprehensive countywide agency with authority to plan and implement adaptation efforts addressing the impacts of sea level rise in Marin County.
- R2.** The Board of Supervisors should actively enlist the participation and support of state and federal legislators toward the creation and funding of this comprehensive countywide agency.
- R3.** The Board of Supervisors should require the newly created countywide entity to create plans that recognize and address sea level rise exposure and the specific risks to the populations in the Canal District, Marin City, specific areas in Novato, and all low-lying geographic regions where lower income populations reside. The plan should identify and address the risks impacting those populations, which include:
  - (a) risks of becoming stranded due to inaccessible roads;
  - (b) lack of transportation if evacuations are called;
  - (c) mold that may grow inside their homes;
  - (d) exposure to infectious diseases due to contaminated standing water;
  - (e) need to relocate temporarily or permanently as a result of floods; and
  - (f) other community-specific risks identified in regional assessments.

## **REQUIRED RESPONSES**

Pursuant to Penal Code section 933.05, the Grand Jury requires responses from the following governing bodies within 90 days:

- The Marin County Board of Supervisors [F1-6, and R1-3 (a), (b), (c), (d), (e), (f)]

## **INVITED RESPONSES**

For the following invited respondents, the Grand Jury would greatly appreciate responses within 90 days.

- Bel Marin Keys Community Services District
- City of Corte Madera
- City of Larkspur
- City of Mill Valley
- City of Novato
- City of Sausalito
- City of San Rafael
- City of Tiburon
- Marin Municipal Water District

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted in accordance with Penal Code section 933 (c) and subject to the notice, agenda and open meeting requirements of the Brown Act.

Note: At the time this report was prepared information was available at the websites listed.

Reports issued by the Civil Grand Jury do not identify individuals interviewed. Penal Code Section 929 requires that reports of the Grand Jury not contain the name of any person or facts leading to the identity of any person who provides information to the Civil Grand Jury. The California State Legislature has stated that it intends the provisions of Penal Code Section 929 prohibiting disclosure of witness identities to encourage full candor in testimony in Grand Jury investigations by protecting the privacy and confidentiality of those who participate in any Civil Grand Jury investigation.

## APPENDIX A: Sea Level Rise Background Information

### What contributes to climate change

The California Ocean Protection Council projects that sea level will rise by 1.6 ft to 3.1 ft, and possibly higher by 2100.<sup>54</sup> The melting of glaciers and increasing temperatures due to emissions will determine the specific degree of sea level rise by the end of this century.<sup>55</sup> However, sea level rise will not be immediately stopped even if emissions are reduced. In fact, temperatures and sea level would continue to rise for several decades.<sup>56</sup>

Where does sea level rise come from? Sea level rise results from the effect of rising temperatures on the melting of ice sheets and glaciers, as well as the expansion of water as it warms.<sup>57</sup> Sea level rise is one of a multitude of outcomes of climate change, including increases in droughts and fires, bigger storms and related flooding, and a warming climate.

National and international scientific entities, including oceanic, climatological, and astronomical organizations are calling for a redoubling of efforts towards adaptation and mitigation, as are financial bodies across the globe. The goal is to reduce the negative effects of climate change and sea level rise as much as possible. The agencies calling for these efforts include National Aeronautics and Space Administration (NASA), Environmental Protection Agency (EPA), NOAA, the European Union (EU), Environmental Resilience Institute, World Economic Forum, California Ocean Protection Council, California Ocean Science Trust, San Francisco Bay and Conservation Commission, and many others; all are cited in this report.

**Is it human activity?** Years of research consistently show that human activity created the atmospheric conditions that unleashed the rapid warming of Earth. Scientists have shown with a great degree of confidence (greater than 95 percent) that climate change is the result of emissions caused by human activity since the start of the Industrial Revolution. Thus, now “carbon dioxide, methane, and nitrous oxide concentrations are more abundant in the earth’s atmosphere than any time in the last 800,000 years.”<sup>58</sup> The scientific record shows climate changes naturally occur over very long periods of time. Earth has undergone major climate change events, leading to periods of a very warm planet, as well as periods as an icy one. However, these slow changes do not account for the rapid warming the planet has experienced in the last several decades.<sup>59</sup>

There are other theories about climate change causes that have been tested by NASA, NOAA, and other space and climatological institutions. For background purposes, it is important to point these out, given the variety of opinions that surround climate change. Here are two of these alternatives explained:

---

<sup>54</sup> California Ocean Protection Council, *State of California Sea Level Rise Guidance: 2024 Science and Policy Update*, 2024, <https://opc.ca.gov/2024/01/draft-slr-guidance-2024>, (accessed 4/1/24).

<sup>55</sup> Princeton University, Center for Policy Research in Energy and the Environment, *Sea Level Rise*, <https://cpree.princeton.edu/sea-level-rise>, (accessed 4/1/24).

<sup>56</sup> David Herring and Rebecca Lindsey, NOAA, *Can we Slow or even Reverse Global Warming?*, October 12, 2022, <https://www.climate.gov/news-features/climate-qa/can-we-slow-or-even-reverse-global-warming>, (accessed 4/1/24).

<sup>57</sup> NOAA-National Oceanic and Atmospheric Administration, *Is sea level rising? Yes, sea level is rising at an increasing rate*, January 20, 2023, <https://oceanservice.noaa.gov/facts/sealevel.html>, (accessed 2/29/24).

<sup>58</sup>

U.S. Environmental Protection Agency, *Causes of Climate Change*, <https://www.epa.gov/climatechange-science/causes-climate-change#3-foot>, (accessed 3/13/24).

<sup>59</sup> U.S. Environmental Protection Agency, *Causes of Climate Change*.

**Is it the sun's activity?** NASA points out that since 1978, data show that the amount of solar energy reaching Earth has not increased. This indicates that the sun is not the culprit, nor is it a contributing factor of climate change, which has accelerated since then.<sup>60</sup> Further, NASA explains that “the amount of solar energy Earth receives has followed the Sun’s natural eleven-year cycle of small ups and downs with no net increase since the 1950s. Over the same period, global temperature has risen markedly.”<sup>61</sup>

**Is it the volcanoes’ activities?** NASA research demonstrates that while volcanic eruptions release CO<sub>2</sub> and other gasses into the atmosphere, emissions due to human activity surpass those of all volcanic eruptions combined by more than 100 times.<sup>62</sup>

The European Commission indicates that changes in solar radiation or volcanic activity have led to less than plus or minus 0.1 degrees Celsius rising temperatures since 1890.<sup>63</sup> In contrast, since 1982, temperatures have been increasing at a rate of plus 0.2 degrees Celsius per decade.<sup>64</sup> NOAA reports the same 0.2 degrees Celsius decadal increase for the same period.<sup>65</sup>

### **How much will sea level rise cost in California and across the globe?**

Nearly seventy percent of California’s residents live in coastal areas. In addition, millions of people visit yearly, making this a \$45 billion-dollar a year coastal economy.<sup>66</sup> Sea level rise puts this state-wide economic engine at risk.

Across the globe, sea level rise is projected to cost trillions of dollars in damages by 2100. Estimates about the estimated costs of global sea level rise vary; however, all are in the trillions of dollars. With an increase of 1.5 degrees Celsius, global sea level rise could cost \$10.2 trillion per year by 2100.<sup>67</sup> The Energy Policy Institute at The University of Chicago estimates that “the global economy would face damages reaching \$2.9 trillion to \$3.4 trillion per year from sea level

---

<sup>60</sup> NASA Global Climate Change, *Is the sun causing global warming?*, <https://climate.nasa.gov/faq/14/is-the-sun-causing-global-warming>, (accessed 2/29/24).

<sup>61</sup> NASA Global Climate Change, *Is the sun causing global warming?*.

<sup>62</sup> NASA Global Climate Change, *What do volcanoes have to do with climate change?*, <https://science.nasa.gov/climate-change/faq/what-do-volcanoes-have-to-do-with-climate-change>, (accessed 2/29/24).

<sup>63</sup> European Commission, Climate Action, *Causes of climate change*, [https://climate.ec.europa.eu/climate-change/causes-climate-change\\_en](https://climate.ec.europa.eu/climate-change/causes-climate-change_en), (accessed 3/11/24).

<sup>64</sup> European Commission, Climate Action, *Causes of climate change*.

<sup>65</sup> National Oceanic and Atmospheric Administration, *Climate change: Global temperature*, January 18, 2024, <https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature>, (accessed 3/11/24).

<sup>66</sup> California Ocean Protection Council and California Ocean Science Trust, *State of California sea level rise guidance: 2024 science and policy update (draft)*, January 2024, p. 5, <https://opc.ca.gov/wp-content/uploads/2024/01/SLR-Guidance-DRAFT-Jan-2024-508.pdf>, (accessed 5/10/24).

<sup>67</sup> Rebecca Ochs, European Scientist, *Rising sea levels could cost \$14 trillion a year by 2100*, 05.07.2018, <https://www.europeanscientist.com/en/environment/rising-sea-levels-could-cost-14-trillion-a-year-by-2100>, (accessed 3/13/24).

rise by the end of the century.”<sup>68</sup> Alternatively, through adaptation and mitigation measures, the Institute estimates the annual cost of sea level rise would be \$400-\$520 billion annually.<sup>69</sup>

---

<sup>68</sup> Energy Policy Institute at The University of Chicago, *Sea Level Rise will Cost the Global Economy Trillions without Efforts to Adapt*, May 6, 2022, <https://epic-staging.uchicago.edu/insights/sea-level-rise-will-cost-the-global-economy-billions-trillions-without-efforts-to-adapt>, (accessed 3/4/24).

<sup>69</sup> Energy Policy Institute at The University of Chicago, *Sea Level Rise will Cost the Global Economy Trillions without Efforts to Adapt*.

## APPENDIX B: PHOTOGRAPHS AND FIGURES USED IN REPORT

### Photographs

1. First Photograph - Little girl running through water page 1. **Source:** County of Marin: <https://www.marincounty.org/main/sea-level-rise> Rising sea levels resulting from climate change. Mill Valley, Marin, circa 2020.
2. Second Photograph - Flooded bike path at Exit 445B page 5. Flooded path in Mill Valley. King tide on Friday, Jan. 11, 2024 **Source:** Sherry LaVars, Marin Independent Journal, January 12, 2024

### Maps

1. Marin County Sea Level Vulnerability. **Source:** *Marin Health and Human Services, Marin County Climate and Health*, <https://marinhhs.org/marin-county-climate-and-health>
2. BayWave Scenarios January 12, 2017 Corte Madera. **Source:** Marin Shoreline Vulnerability Assessment, [https://marinflooddistrict.org/documents/corte-madera/?filter\\_categories\[\]=579](https://marinflooddistrict.org/documents/corte-madera/?filter_categories[]=579)
3. **Source:** Larkspur Mid-Term Sea Level Rise, City of Larkspur 2040 General Plan, Draft Environmental Report Plan, figure 7-2, <https://www.ci.larkspur.ca.us/DocumentCenter/View/17220/Draft-Safety-Element-41503-draft--pdf>
4. City of Mill Valley 2040 General Plan. **Source:** City of Mill Valley, 2012, Marin Map, 2012. Mill Valley 2040 General Plan, Climate Action, Chapter 6, <https://www.cityofmillvalley.org/518/MV2040-General-Plan>
5. Novato The California Flood Risk: Sea Level Rise. **Source:** Pacific Institute, Sea Level Rise, Hazmaps, Novato, [https://pacinst.org/reports/sea\\_level\\_rise/hazmaps/Novato.pdf](https://pacinst.org/reports/sea_level_rise/hazmaps/Novato.pdf)
6. BayWave Scenarios January 12, 2017 Sausalito. **Source:** Marin Shoreline Vulnerability Assessment, <https://marinflooddistrict.org/documents/sausalito/>
7. Map of San Rafael Depicting the Canal District. **Source:** City of San Rafael, Request for Proposal for sea level rise adaptation planning services, August 21, 2023, [https://storage.googleapis.com/proudcity/sanrafaelca/uploads/2023/08/RFP-compled-8\\_21\\_23-CLEAN-1.pdf](https://storage.googleapis.com/proudcity/sanrafaelca/uploads/2023/08/RFP-compled-8_21_23-CLEAN-1.pdf)
8. Sea Level Rise in Tiburon. **Source:** Seal Level Rise in Tiburon, <https://createtiburon2040.org/wp-content/uploads/2021/03/Adapting-to-Sea-Level-Rise-Presentation-March-2021.pdf>