

# Sea Level Rise Adaptation Funding and Investment Framework

**Final Findings and  
Current Regional  
Efforts**

November 8, 2023



**Context  
and Focus  
Areas**

Focus Area 1  
**Inventory**

Focus Area 2  
**Existing  
Revenues**

Focus Area 3  
**Exploring  
New  
Funding**

**Next Steps  
and  
Current  
Efforts**

# Sea Level Rise and the Bay Area

The Bay Area is defined by its relationship to water, with our communities and regional culture centered around the Bay, the Delta, and the Outer Coast. **So how do we define what's at stake with sea level rise (SLR)?**

While the Framework explores key financial estimates to tackle this challenge, **it's important to remember why we want to prioritize the needs of people & places we deeply care about.**



# What's at Risk if We Don't Adapt?

## Assets at risk of SLR flooding<sup>1</sup>:

**75,000**  
**total households,**  
including **12,000**  
in the most  
socially vulnerable  
communities<sup>3</sup>.

**200,000**  
**total jobs,** and  
**15,000** total  
businesses.

**20,000**  
**vulnerable acres**  
**at risk,** including  
wetlands,  
lagoons, and tidal  
marshes.<sup>3</sup>



Photo credit: Ben Botkin, 2020

## Estimates of a Subset of Assets at Risk:

*(in 2022 dollars)*

**\$85 billion**

Estimated *assessed value* of parcels at risk<sup>1</sup>

**\$151 billion**

Estimated value of major roadways at risk<sup>2</sup>

<sup>1</sup> Assuming 4.9 feet of inundation by 2050.

<sup>2</sup> Calculated based on 230 miles of vulnerable major class roadways, using a median transportation adaptation cost of \$125,000 per foot. Adaptation assumes only elevation or realignment and not protection in place or multi-benefit solutions.

<sup>3</sup> Social vulnerability defined by the high and highest levels of BCDC's Community Vulnerability Data.

<sup>4</sup> From Adapting to Rising Tides Bay Area, 2020

# Refresher on Framework Project Focus Areas and Outcomes

Focus Areas

**1**

Update and improve regional accounting of anticipated sea level rise adaptation projects.

**2**

Update and characterize existing revenue sources for sea level rise adaptation.

**3**

Study how new revenues for sea level rise adaptation needs can be raised most equitably.

Outcomes

- Update prior regional analyses with local projects from recent planning efforts.
- Estimate the regional sea level rise adaptation need through 2050

- Inventory and forecast revenues for new state and federal funding programs.
- Characterize how existing adaptation funds are dispersed and for what purpose.

- Analyze a range of possible revenue measures at different scales, to understand equitable approaches to close the sea level rise funding gap.

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# Inventory of Adaptation Needs

## Local Adaptation Projects and Study Areas<sup>1</sup>

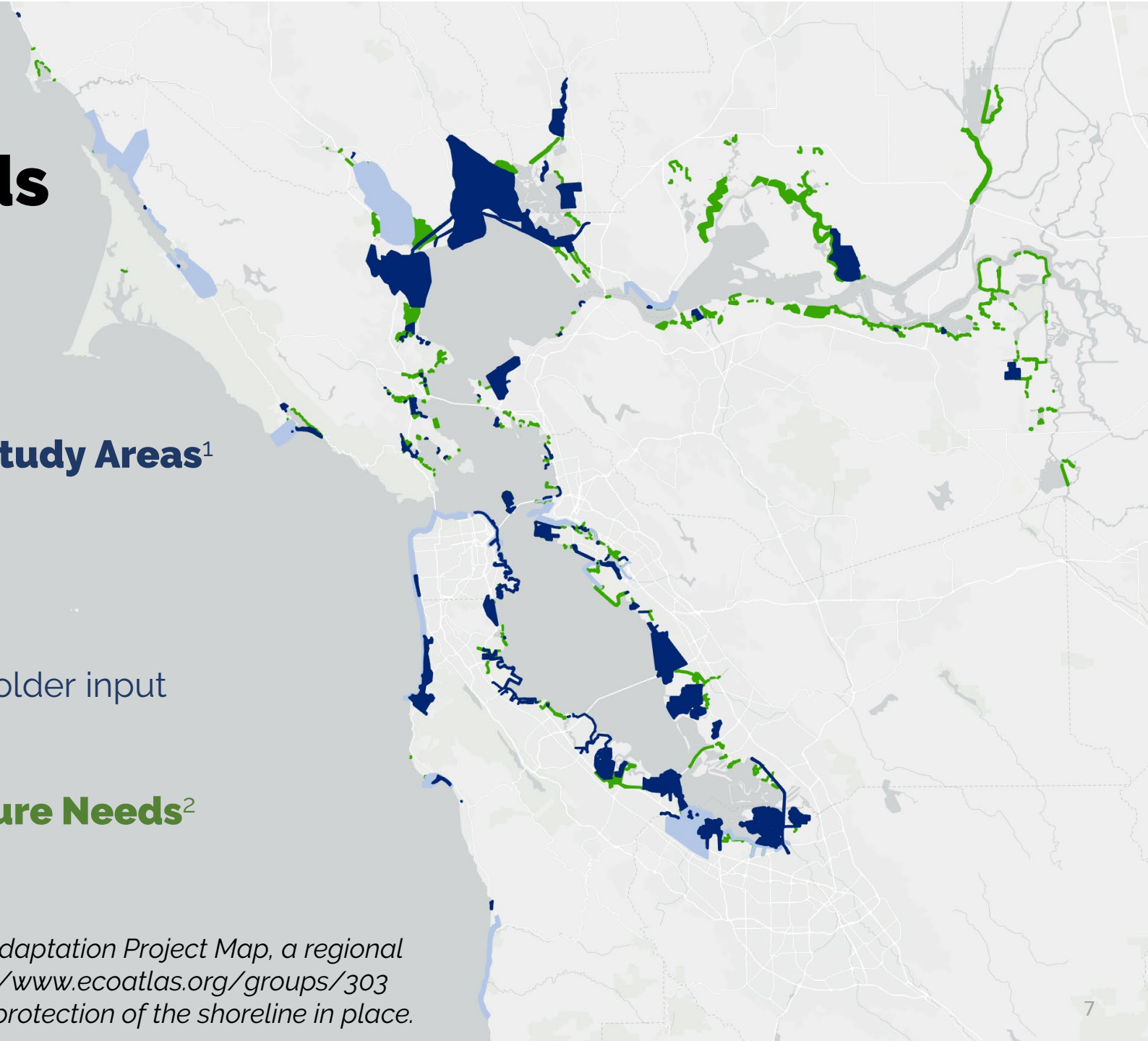
- Local Adaptation Projects
- Local Study Areas

**192** projects in original inventory  
**132** projects updated with stakeholder input  
**Includes 47** new projects added

## Potential Protective Infrastructure Needs<sup>2</sup>

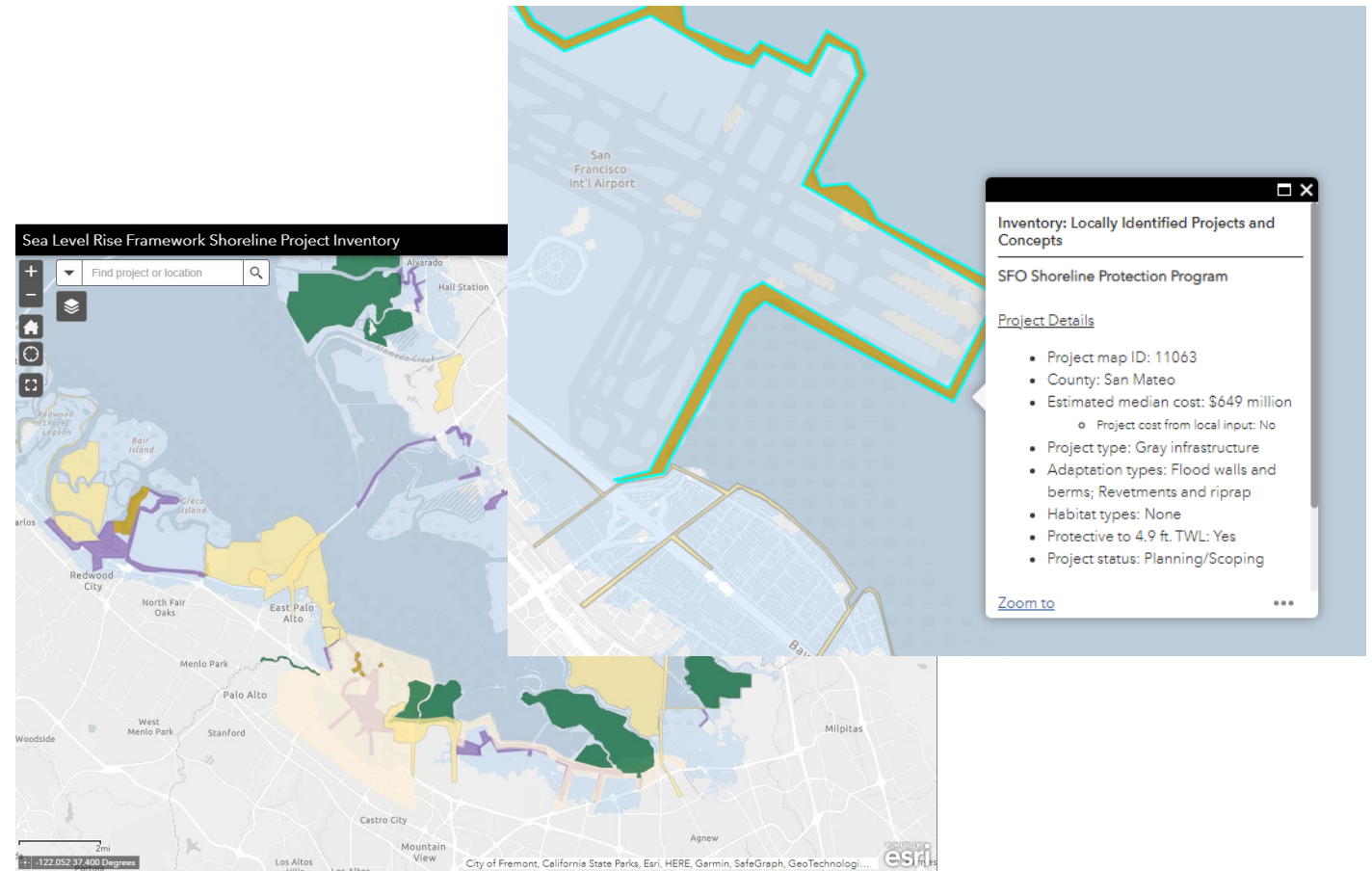
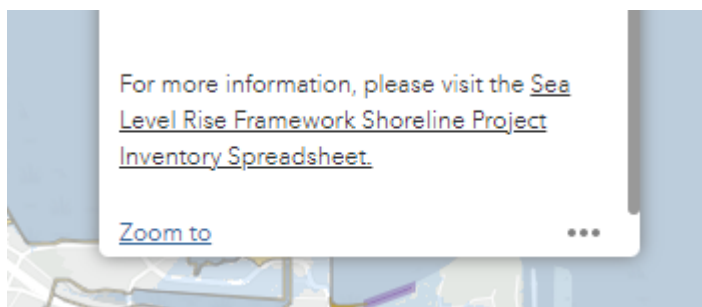
- Placeholder Adaptation Needs

<sup>1</sup> Includes projects identified in BCDC's Shoreline Adaptation Project Map, a regional project inventory hosted through EcoAtlas: <https://www.ecoatlas.org/groups/303>  
<sup>2</sup> Placeholder needs determined by assuming the protection of the shoreline in place.



# Shoreline Project Inventory and Interactive Map

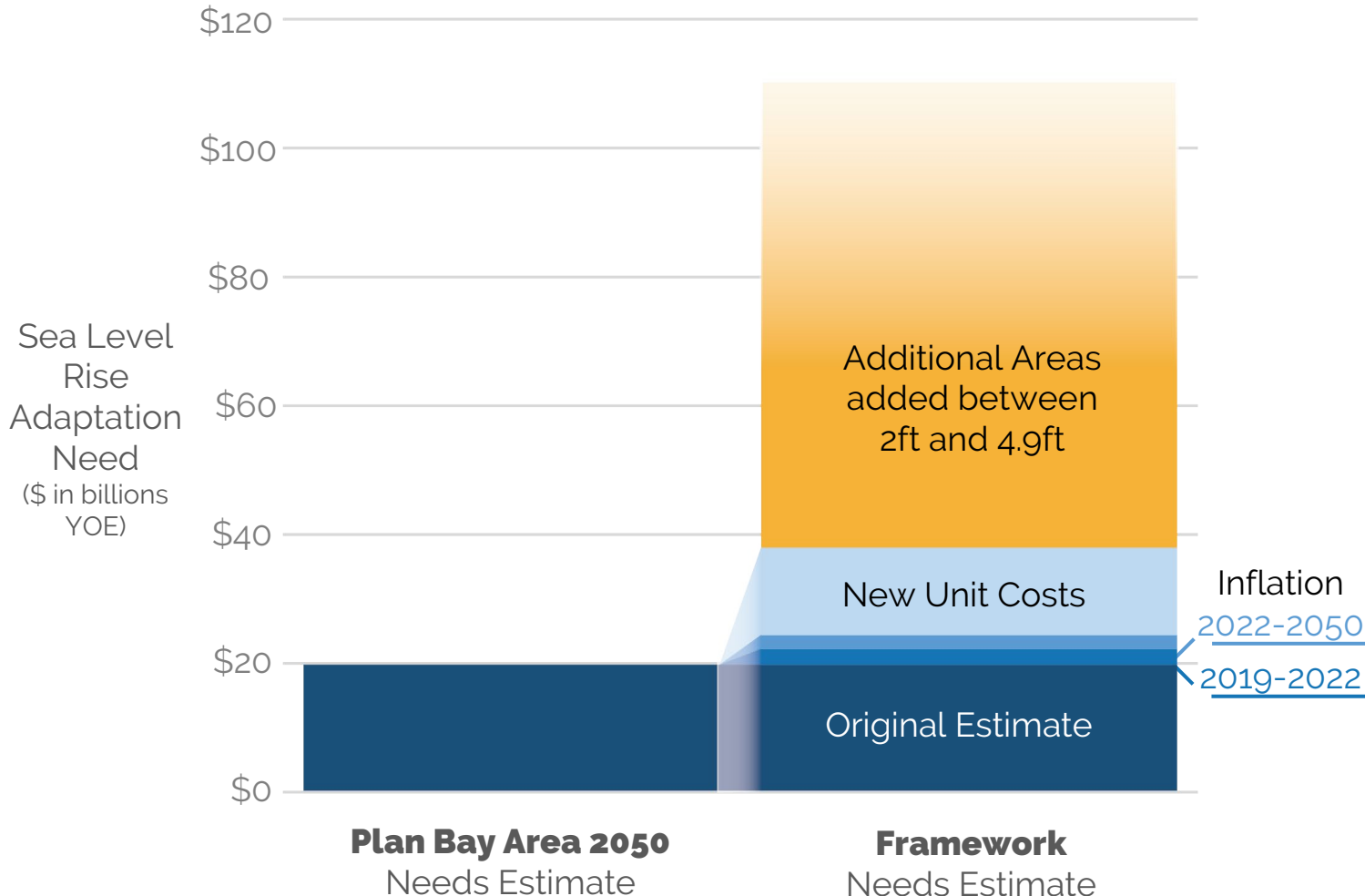
- The Shoreline Project Inventory and Interactive Map were released in June.
- They make up two formats of the same resource: users can explore visually or use a table.
- On the interactive map, click on a project to learn more. The interactive map links directly to a downloadable spreadsheet with the same information.



[Link to the Shoreline Project Inventory Interactive Map](#)



# Estimate of Adaptation Funding Needs



## Key Assumptions

- Increased **sea level rise height** from 2-feet to 4.9-feet<sup>1</sup>.
- Assumed **“protect in place” adaptation action for all vulnerable shoreline**, including areas without planning and those in need of augmented plans.
- **Per-unit cost estimates** increased.
- **Inflation** over the past three years has been higher than the 2.2% assumed in Plan Bay Area 2050. In addition, the Framework assumes a higher rate of 3.0% going forward.<sup>1</sup>

<sup>1</sup> Increased planning height to exceed state recommendation of 3.5' and coincide with similar planning trajectories by many local efforts.

# Adaptation Needs

What is the regional estimate to fund adaptation?

# \$110 billion

Estimated cost of sea level rise adaptation through 2050 (in Year of Expenditure dollars)

- \$52 billion: Estimated cost for known or planned projects
- \$54 billion: Estimated placeholder cost for areas with adaptation needs
- \$3 billion: Estimated additional sediment management needs<sup>1</sup>

## The estimate includes:

- Assumed “protect in place” adaptation action for all vulnerable shoreline, including low density areas and agricultural land
- Assumed areas vulnerable to up to 4.9 feet of inundation are protected

## The estimate does not include:

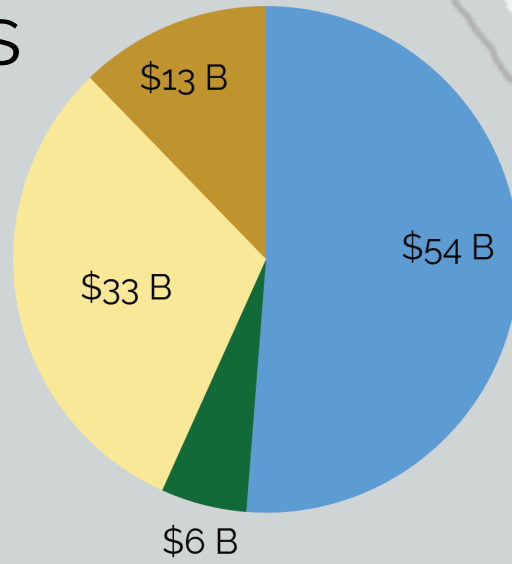
- Alternative approaches that do *not* protect in place, which could change the cost estimate for adaptation in some shoreline segments
- Building code or other local policy adjustments
- Riverine and groundwater adaptations
- Adaptation plans made by utilities

<sup>1</sup> Estimate developed by BCDC and SFEI analysis.

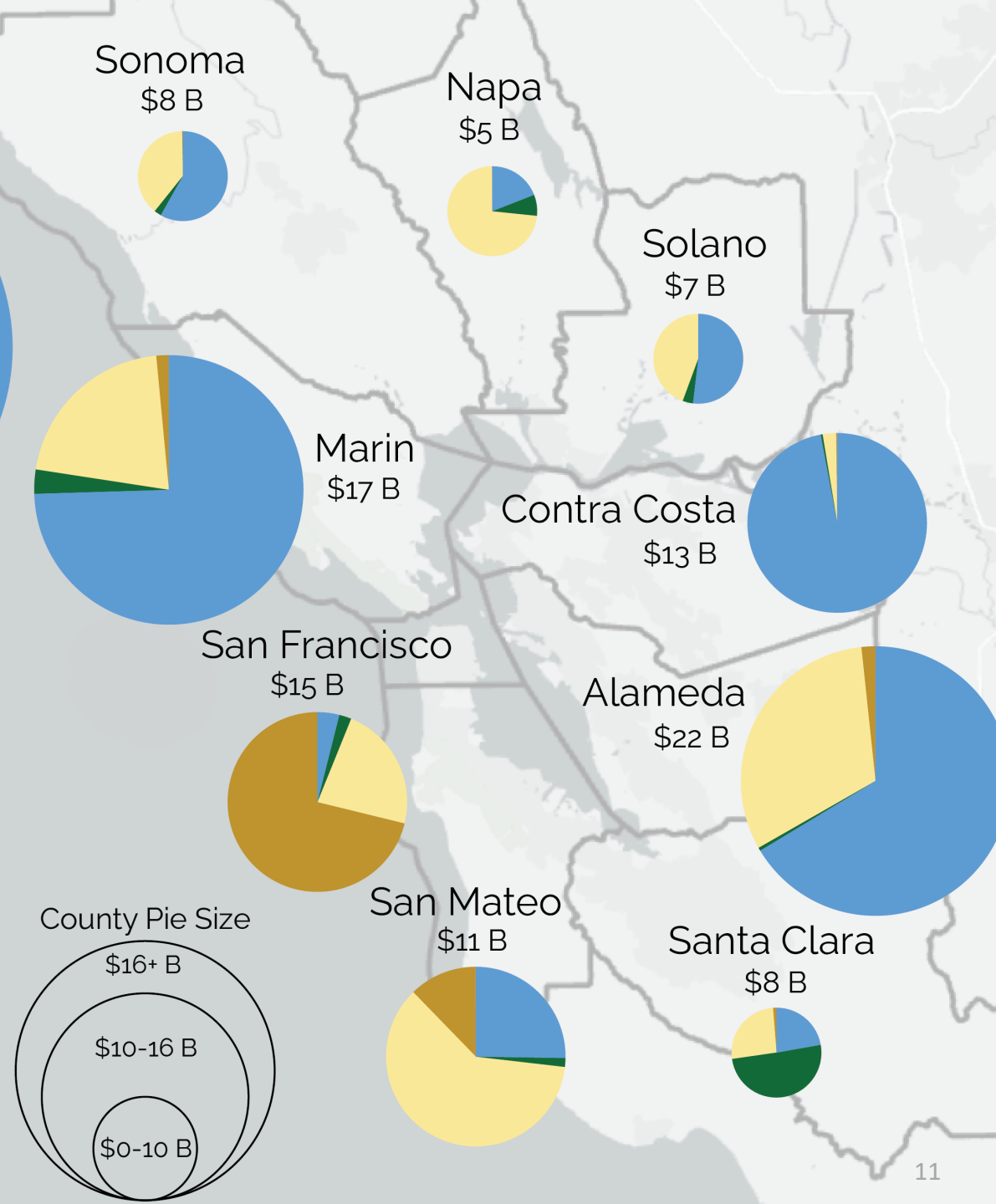
# Adaptation Needs

## Additional Findings

- Most planned projects are hybrid, representing a focus on multiple benefits.
- Alameda and Marin are estimated to have the highest adaptation costs.
- Significant implementation gaps are present across the region; the largest gaps are in Alameda, Contra Costa, and Marin<sup>2</sup>.



**Escalated Regional Cost by Project Type<sup>1</sup>**  
\$110 billion (B)



<sup>1</sup>Values represented in Year of Expenditure dollars; Regional cost includes \$3B in additional sediment need.

<sup>2</sup>Locally identified projects do not account for studies or plans without defined interventions.

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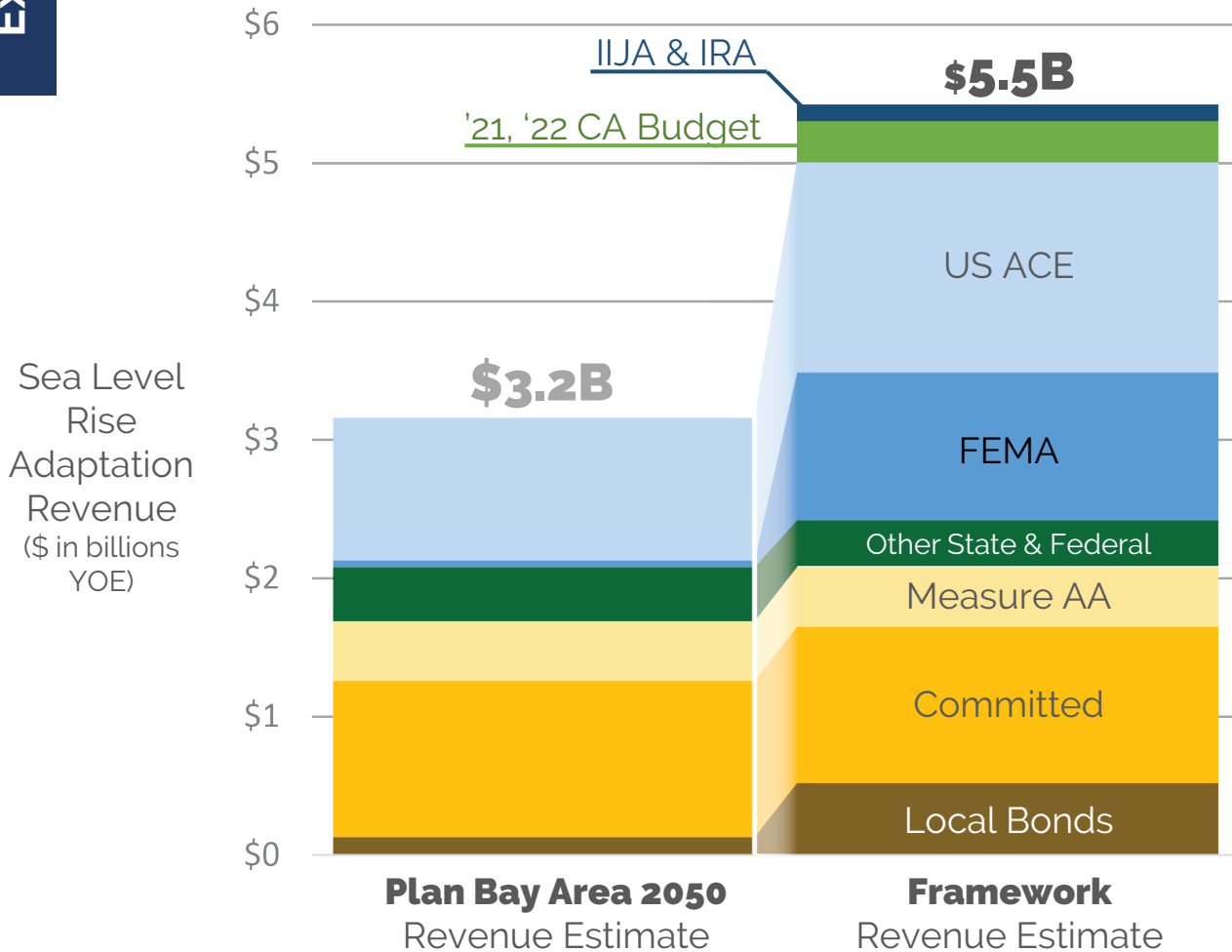
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# Forecasting Existing Public Revenues

## Updated Revenue Forecast (2022-2050)



### Key Updates

- Federal action by IIJA & IRA account for ~\$120M in new revenues.<sup>1</sup>
- 2021 and 2022 State budget line items account for ~\$800M in new revenues.<sup>2</sup>
- Emergence of FEMA's BRIC program greatly increases anticipated FEMA revenue.
- Inclusion of \$425M SF Prop A (2018)<sup>3</sup> increases locally generated sources.

<sup>1</sup> US ACE's IIJA allocation increase is not yet accounted for. It may add between \$0.02-0.15B. Waiting for US ACE feedback.

<sup>2</sup> The Governor's proposed 2023 budget is estimated to reduce the regional estimate by \$200M.

<sup>3</sup> Prop A was not included in Plan Bay Area 2050 because the analysis focused on areas that flooded with only 2' of permanent rise.

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# Exploratory Funding Sources: Context

To fill this funding gap, the region may need multiple additional funding sources at multiple scales.

The Framework explored three possible new revenue measures at the local, county, and regional scales to understand:

- **Revenue generation potential:** how much funding can be raised annually?
- **Bond issuance potential:** how funding can different measures raise for near-term project implementation?
- **Initial equity implications:** who pays?

Three measures were reviewed based on their overall feasibility and regional precedence.



<sup>1</sup> Including value capture mechanisms such as Community Facilities Districts and Tax Increment Financing.

**Note:** This Framework research is high level and exploratory only, and it is intended to provide insight for further research and discussion in the years ahead.

# Case Studies for Three Funding Measure Types

**Key Finding:** Regional and/or local measures will not be capable of closing the funding gap. Additional funding from federal and/or state sources will also be necessary.

## Scale: County & Regional

Regional and county taxes distribute tax burden across wider base

## Scale: District-based (sub-local)

Only parcels that directly benefit pay

### Parcel Tax

- Typically a flat rate property tax: each parcel charged the same amount
- Does not account for value or size of the property

### Ad Valorem Property Tax/GO Bond

- Property-related tax that *can* be progressive: higher assessed properties pay more
- Subject to Prop 13 limitations

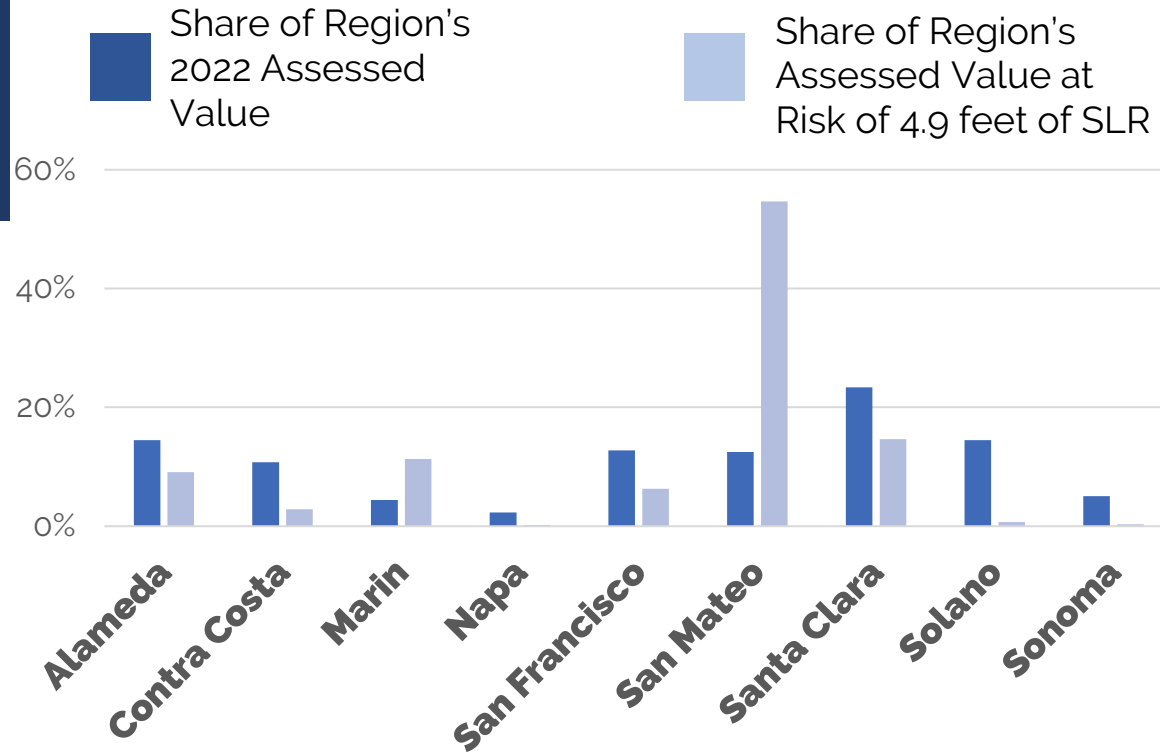
### Assessment District

- Directly tied to specific benefits
- Most feasible in areas with greater resources and/or more direct impacts of SLR



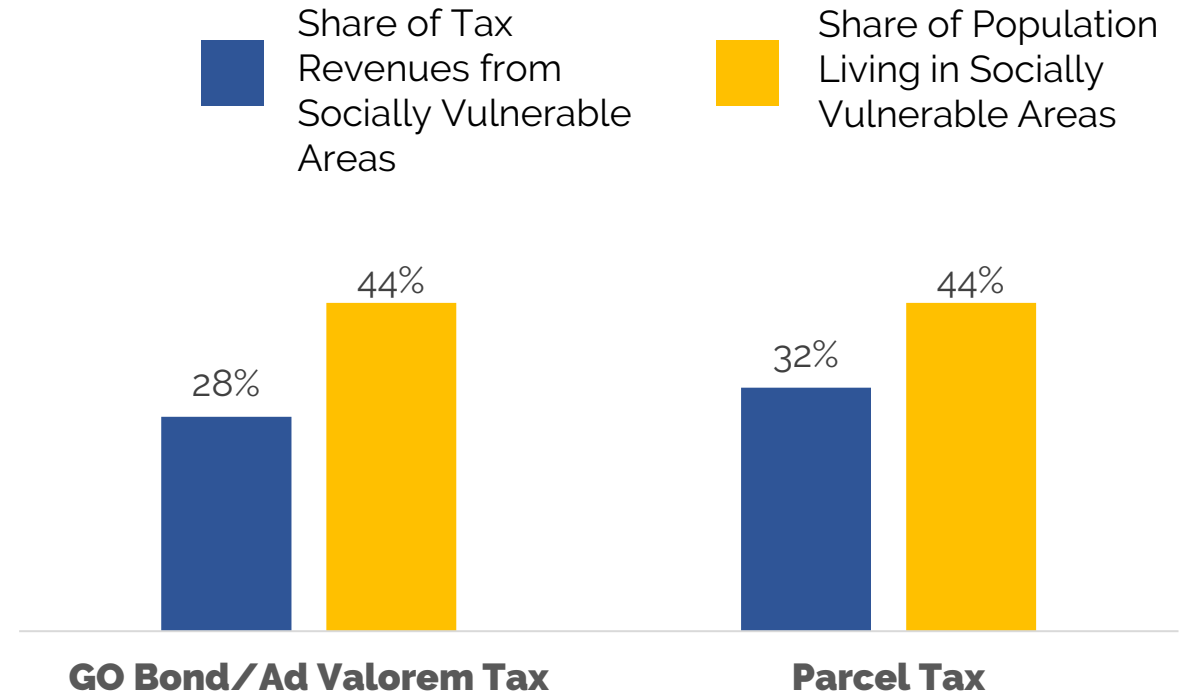
# Exploring Potential Revenue Sources

## Geographic Equity Lens



**Key Findings:** For geographic equity, using multiple types of funding measures would help to balance tax burden.

## Social Equity Lens



**Key Findings:** Parcel taxes are less socially equitable than an ad-valorem tax, as they place a higher burden on socially vulnerable areas<sup>1</sup>.

<sup>1</sup> Social vulnerability defined by medium, high and highest levels of BCDC's Community Vulnerability Data.

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# Adaptation in Progress

While there's much to be done ahead, major projects across the region are already underway.

## SR-37 Corridor Adaptation

*Transportation Project*

Estimated Cost: \$8 billion

Status: Planning

## North Richmond Shoreline Living Levee

*Ecotone Levee*

Estimated Cost: \$16 million

Status: Design

## Foster City Levee Improvement

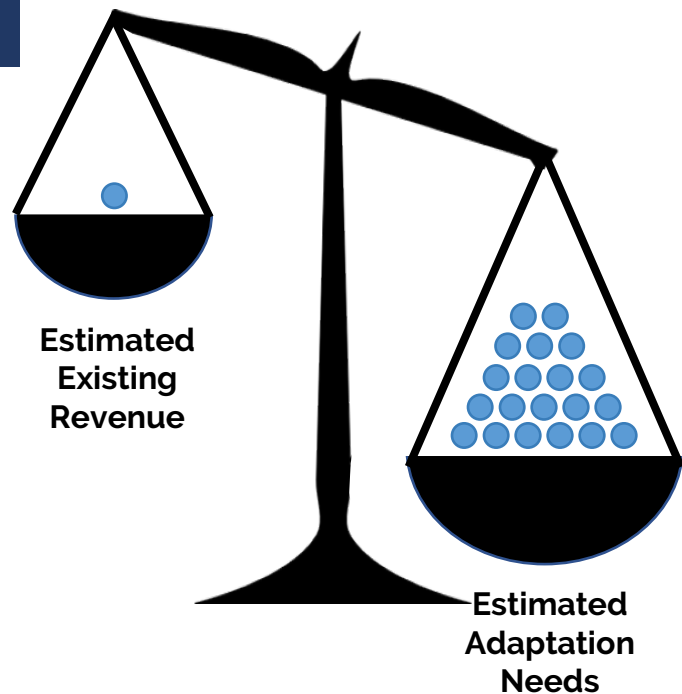
*Levees and Restoration*

Estimated Cost: \$90 million

Status: Construction



# Recap of Key Learnings



● Represents \$5.5 billion

1. **Mix of “Green” and “Grey”.** Roughly half of the known project costs are for green or hybrid projects, reflecting the region’s shift towards multi-benefit adaptation.
2. **Significant Funding Gap.** Current revenues are inadequate to meet the need, leaving a funding gap of over \$100 billion.
3. **Key Differences between Counties.** More than 50% of the costs are in only three counties, and the level of local planning for sea level rise varies widely.
4. **Multiple Fund Sources Required.** Even with prioritizing and phasing adaptation projects, there is no single funding measure that will be able to fill the gap.
5. **Prioritizing Equity.** GO bonds/ad valorem property taxes place a lower burden on socially vulnerable areas while providing a greater benefit to socially vulnerable areas than their regional share.
6. **Importance of Regional Approach.** Differences among counties in terms of vulnerability, level of planning, and our findings are all indicative of the need for a regional approach for funding and project development to avoid leaving anyone behind.

# What's Next After the Framework?

- 1. Prioritize SLR investments through upcoming plans to reduce the funding gap.** This includes exploring which resilience projects require early actions and which low-density areas might be more appropriate for lower cost solutions. **[BCDC & MTC/ABAG]**
- 2. Explore how envisioned regional measures can make communities and transportation more resilient.** To the extent possible, planned measures for affordable housing and transportation should integrate policies or programs to advance more resilient outcomes. **[MTC/ABAG]**
- 3. Complete and maintain the development of the Shoreline Adaptation Project Mapping Program** to ensure that the region has access to the best possible inventory data. **[BCDC, others]**
- 4. Engage, educate, and mobilize elected officials to accelerate advocacy at the federal and state levels to secure more monies for the Bay Area.** Messaging the magnitude of the need here in the San Francisco Bay Area and competing for available funds will be key. **[BCDC, MTC/ABAG, BARC, others]**
- 5. Better define lead roles for funding plans and projects in the Bay Area.** The lack of clear roles and process to secure monies and distribute them equitably hinders the Bay Area's ability to mitigate climate impacts. **[TBD]**
- 6. Support cities, counties, and the private sector to develop funding and financing tools at multiple scales.** **[TBD]**

# Current Regional Efforts

Two current regional efforts are building off the Framework effort to continue advancing sea level rise planning in the Bay Area. The efforts are developing in close coordination. Key Framework assumptions and findings have been integrated into both efforts, including the Framework Shoreline Project Inventory.

## Plan Bay Area 2050+ (MTC/ABAG)



## Regional Shoreline Adaptation Plan (BCDC)



# Regional Shoreline Adaptation Plan

An implementing project of **BAY ADAPT**

# Plan Bay Area 2050+

## Framework Next Steps: 1, 4

MTC/ABAG is currently developing Plan Bay Area 2050+, a limited and focused update to the Bay Area's long range comprehensive planning effort. The environmental strategy "Adapt to Sea Level Rise" focuses on the protection of shoreline communities affected by sea level rise, setting initial regional priorities for sea level rise projects.

Plan Bay Area 2050+ advances the Framework in three specific ways:

- **Update the project inventory** with local outreach through spring 2024.
- **Update project cost and existing revenue assumptions with the best available data.**
- The updated project inventory will be **sorted into initial prioritization categories**, creating a 1.0 version of project prioritization on which future efforts can refine and expand.

Plan Bay Area 2050+ will be adopted in 2025. Plan Bay Area is updated every four years; future iterations will continue to advance the strategy with the best available data and assumptions. For more information on Plan Bay Area 2050+ and how to get involved, please contact Rachael Hartofelis ([rhartofelis@bayareametro.gov](mailto:rhartofelis@bayareametro.gov)).

# Regional Shoreline Adaptation Plan

Framework Next Steps: 1, 3, 4

BCDC's Regional Shoreline Adaptation Plan is a groundbreaking effort. As the first sea level rise adaptation plan for the region, it will establish guidelines and best practices to shape how the region plans for adaptation. The plan is a key part of implementing the Bay Adapt Joint Platform, and is being developed with support from the California Ocean Protection Council.

In addition to integrating key assumptions and data from the Framework, the Regional Shoreline Adaptation Plan will also include outputs of Plan Bay Area 2050+. As such, the plan can push regional adaptation efforts even further:

- It will **set regional guidelines for sea level rise adaptation**, which will be used to inform future local project and adaptation plan development.
- The recently signed bill SB272 establishes the requirement of sub-regional adaptation plans for Bay communities, which the RSAP will support. The plans will **fill local adaptation gaps** identified by the Framework, while also encouraging sub-regional collaboration.

The Regional Shoreline Adaptation Plan is currently underway. Initial outputs of the plan, including regional sea level rise guidelines, are anticipated in late 2024. For more information on the Regional Shoreline Adaptation Plan and how to get involved, please contact Dana Brechwald ([dana.brechwald@bcdcc.ca.gov](mailto:dana.brechwald@bcdcc.ca.gov)).





**Thank you!**