



July 14, 2023

Board of Land and Natural Resources

**Waikīkī Beach Improvement and Maintenance Program
Final Environmental Impact Statement (EIS)**

Informational Briefing

Rick Egged, President

Waikīkī Beach Special Improvement District Association

<https://www.wbsida.org/waikiki-beach-improvements>

Envisioning the Future of Waikīkī- An urban beach with strong cultural ties.



Waikīkī's beaches were largely built after the fact to support the growing visitor industry.



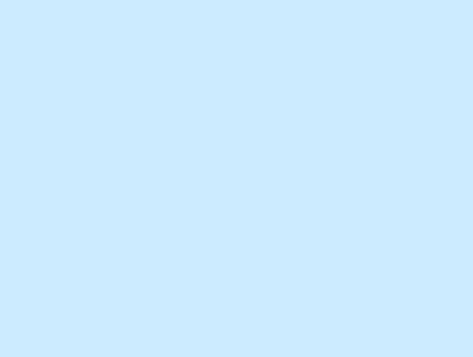
Waikīkī has a long history of erosion.



Beach Loss



Infrastructure Damage



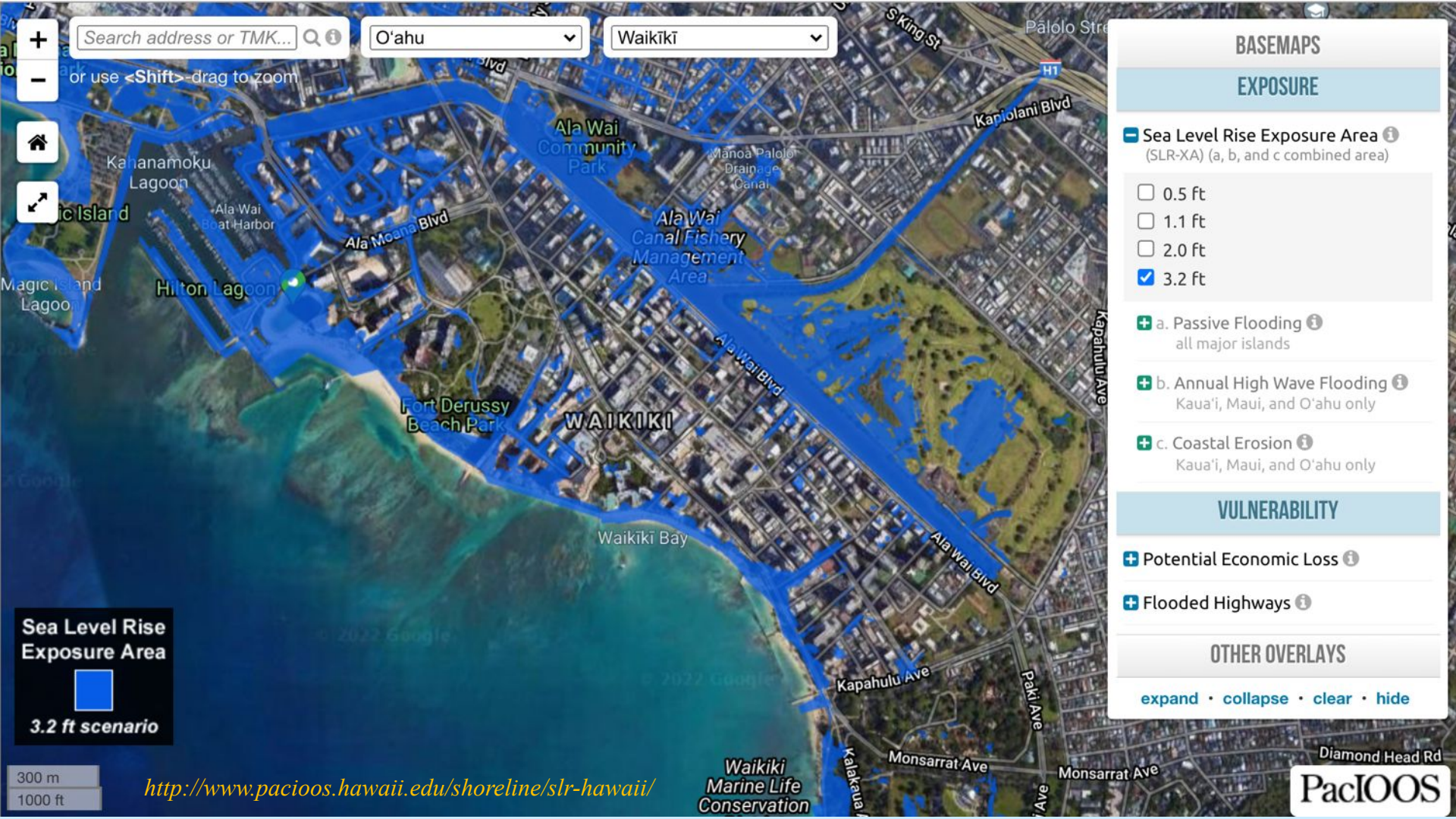
Wave Overtopping



Structural Threats

Stabilization and intervention is necessary if we desire beaches in Waikīkī.





Search address or TMK...

O'ahu

Waikiki

or use <Shift>-drag to zoom



Sea Level Rise Exposure Area

3.2 ft scenario

300 m
1000 ft

<http://www.pacioos.hawaii.edu/shoreline/slr-hawaii/>

Waikiki Marine Life Conservation

BASEMAPS

EXPOSURE

Sea Level Rise Exposure Area ⁱ
(SLR-XA) (a, b, and c combined area)

- 0.5 ft
- 1.1 ft
- 2.0 ft
- 3.2 ft

a. Passive Flooding ⁱ
all major islands

b. Annual High Wave Flooding ⁱ
Kaua'i, Maui, and O'ahu only

c. Coastal Erosion ⁱ
Kaua'i, Maui, and O'ahu only

VULNERABILITY

Potential Economic Loss ⁱ

Flooded Highways ⁱ

OTHER OVERLAYS

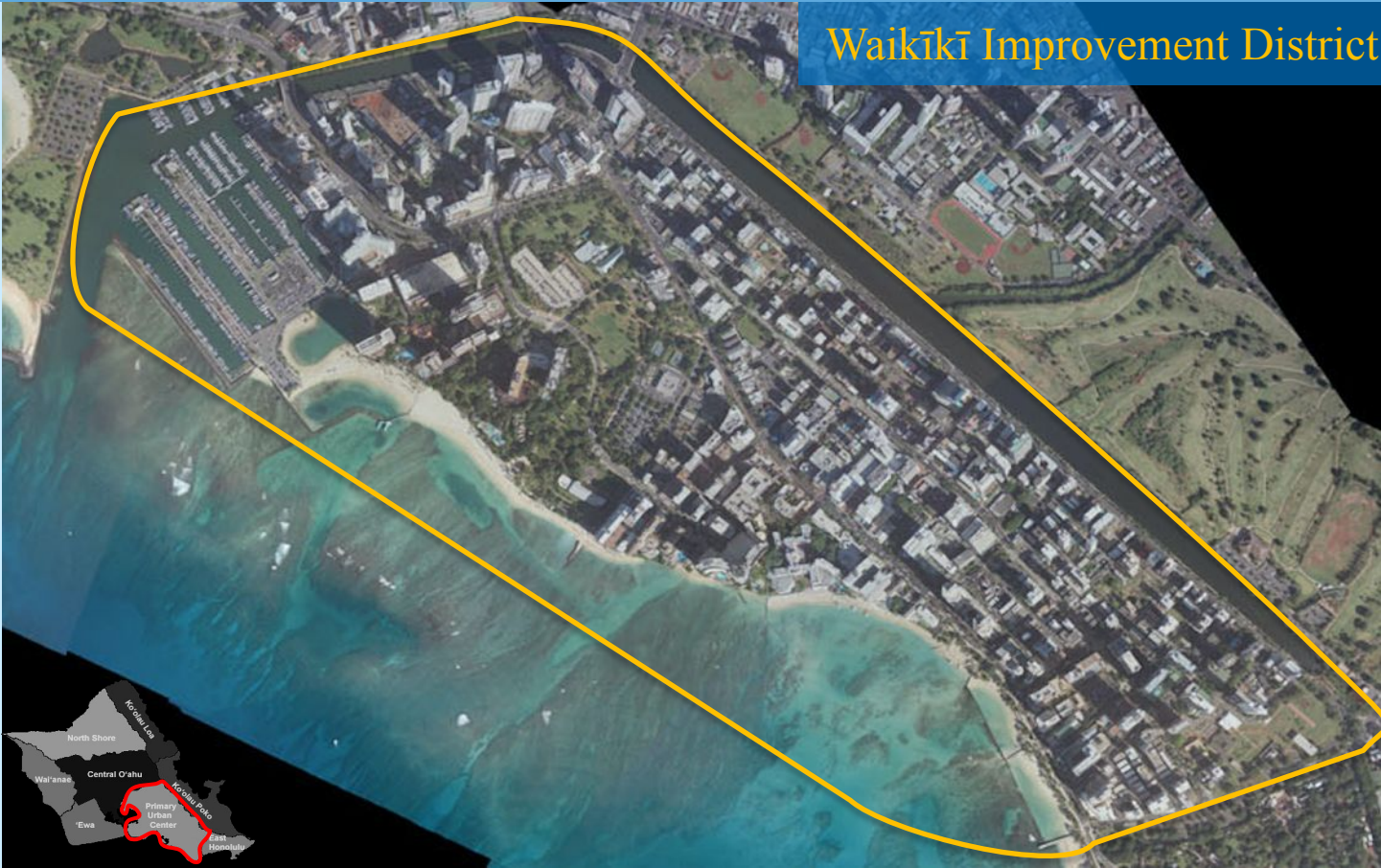
[expand](#) • [collapse](#) • [clear](#) • [hide](#)

PacIOOS

Waikīkī Beach Special Improvement District Association (WBSIDA)



Waikīkī Improvement District



Waikīkī Beach Management Partners

- Dept of Land and Natural Resources
 - Waikīkī Beach Special Improvement District Association
 - University of Hawai'i
- Public-Private Partnership (P³)
 - Cost share with State on beach improvements



WBSIDA
Waikiki Beach
SPECIAL IMPROVEMENT
DISTRICT ASSOCIATION



WAIKĪKĪ
IMPROVEMENT
ASSOCIATION



Waikīkī Beach Management Plan

Forward looking plan for the beach and nearshore



<https://www.wbsida.org/resources>

Comprehensive “vision” for Waikīkī Beach under future scenarios and priorities.

- Stakeholder-driven management and improvements plan.
- Potential cost vs benefit economic assessment of various alternatives.
- Community/stakeholder and visitor surveys of beach experience.



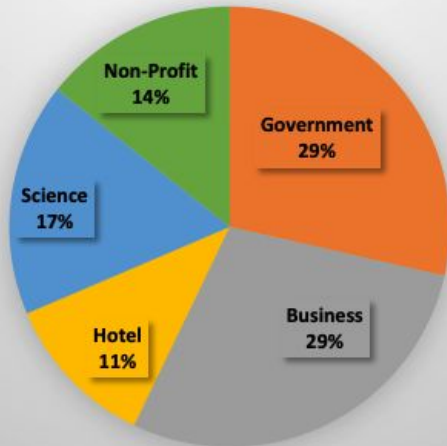
Waikīkī Beach Community Advisory Committee

<https://www.wbsida.org/waikiki-beach-community-advisory-committee>

35 Member Committee

Waikīkī Beach Community Advisory Committee Composition

35 Committee Members Total



Projects

ENVISION WAIKIKI BEACH
 WAIKIKI BEACH COMMUNITY ADVISORY COMMITTEE
 ROYAL HAWAIIAN GROIN
 WAIKIKI BEACH ECONOMIC STUDY
 KING TIDES IN HAWAII

Waikiki Beach Community Advisory Committee

- [Download Committee Summary](#)
- [COMMITTEE MEETING #1 SUMMARY](#)
- [DOWNLOAD 11/7/2017 PRESENTATION](#)

The Waikīkī Beach Community Advisory Committee will help to address the complex issues associated with beach sustainability by building consensus and identifying and resolving conflicts relating to Waikīkī Beach management. The committee will provide important guidance for planning and prioritizing future beach management projects at Waikīkī.

Waikīkī Beach Advisory Committee Goals

- ADVISE THE WBSIDA, THE DLNR AND UH SEA GRANT ON THE DEVELOPMENT AND IMPLEMENTATION OF A WAIKIKI BEACH MANAGEMENT PLAN.
- ENSURE THAT FUTURE BEACH MANAGEMENT PROJECTS ADDRESS THE ISSUES AND CONCERNS OF THE WAIKIKI COMMUNITY AND LOCAL STAKEHOLDERS.
- ADVISE THE STATE, COUNTY AND PRIVATE STAKEHOLDERS ON SPECIFIC BEACH MANAGEMENT PROJECTS IN WAIKIKI.
- PROVIDE COMMUNITY COORDINATION, EDUCATION, AND OUTREACH EFFORTS ABOUT BEACH MANAGEMENT ISSUES AND PROJECTS IN WAIKIKI.

Waikiki Beach Community Meetings

February 2018

SU	MO	TU	WE	TH	FR	SA
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

WAIKIKI BEACH COMMUNITY ADVISORY COMMITTEE COMPOSITION



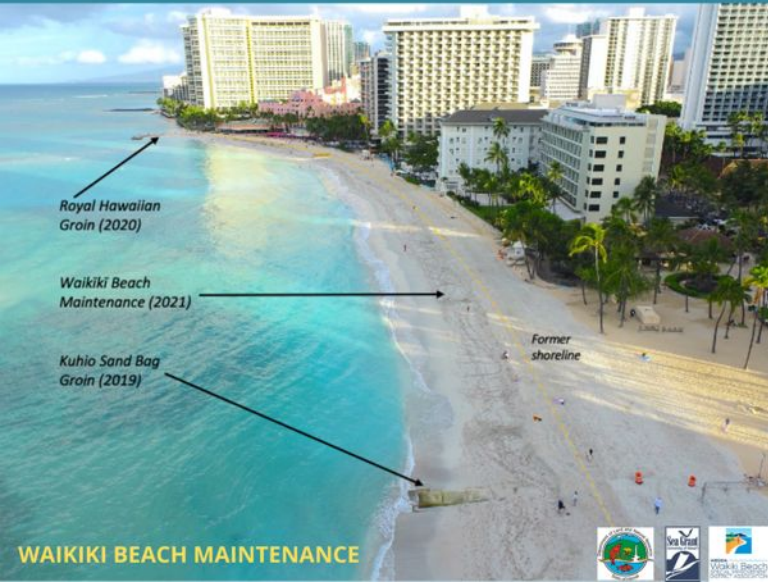
- Business (37%)
- Government (30%)
- Non-Profit (12%)
- Hotel (12%)
- Science (10%)



Waikiki Beach Improvement Accomplishments

- 2019- Kuhio Sand Bag Groin (\$635k)
- 2020- Royal Hawaiian Groin (\$1.5 million)
- 2021- Waikiki Beach Maintenance (\$3.5 million)
- 2021- Waikiki Beach Improvements EIS

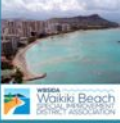
www.wbsida.org



\$5.6 million total
 \$2.8 million
 50% from WBSIDA

Beach Improvement Projects

www.wbsida.org



ROYAL HAWAIIAN GROIN



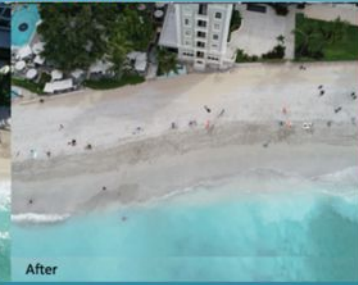
KUHIO SAND BAG GROIN



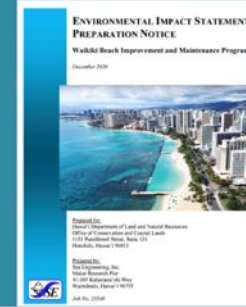
WAIKIKI BEACH MAINTENANCE



Before



After



WAIKIKI BEACH EIS
 CONCEPTUAL DESIGNS

Waikīkī Beach Economic Valuation Study (2018)

- Update to 2008 *Hospitality Advisors* report.
- Partnership with the University of Hawai‘i Dept. of Economics and UH Sea Grant.
- **Economic value estimated at \$2 billion/year.**



University of Hawai‘i Sea Grant College Program

Economic Impact Analysis of the Potential Erosion of Waikīkī Beach A 2016 Update

Nori Tarui
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University of Hawai‘i Economic Research Organization (UHERO), nori@hawaii.edu
Marcus Peng
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Dolan Eversole
University of Hawai‘i Sea Grant College Program, eversole@hawaii.edu



Final Draft
April 6, 2018

Waikīkī Beach Improvements Environmental Impact Statement

**OBJECTIVES ARE A FORM OF CLIMATE
ADAPTATION AND HAZARD MITIGATION.**

Project Objectives:

- Restore and improve the beaches of Waikīkī.
- Increase beach stability through improvement and maintenance of shoreline structures.
- Provide safe access to and along the shoreline.
- Increase resilience to coastal hazards store and improve Waikīkī's public beaches.



Halekulani/Kawehewehe Beach



Waikiki EIS Phase I (Kawehewehe Beach)

\$20 million estimated cost

• (1) T- groin and (1) L-groin

• 20,000 cy of offshore sand from just offshore the Hilton channel.

• New retaining wall along mauka extent of the project.

• Sand is the most expensive portion of the project (\$190/cy) (\$3.8 million)



Kawehewehe Beach

Advertisement

Star  Advertiser
Thursday, December 2, 2021 | Today's Paper | 80°

Advertisement

HAWAII NEWS

Waikiki stakeholders want Gov. David Ige to issue emergency declaration designating Kawehewehe Beach a disaster area

By [Allison Schaefer](#) · Nov. 12, 2021



JAMM AQUINO / JAQUINO@STARADVERTISER.COM

Waikiki stakeholders have asked Gov. David Ige to declare the area of Waikiki Beach in front of the Outrigger Reef hotel a disaster area. Above, Adriano Coretti, left, and Melinda Pinto, visiting from Switzerland, crossed an inundated Kawehewehe Beach walkway.



Waikīkī Sea-Level Rise Adaptation Initiatives



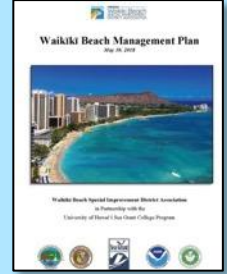
Waikīkī Beach Improvements FEIS



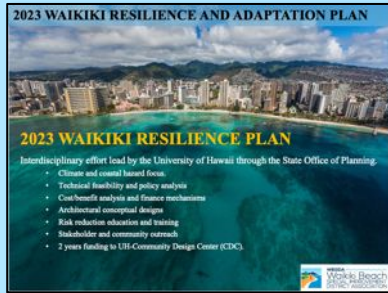
Royal Hawaiian Groin



Waikīkī Beach Maintenance



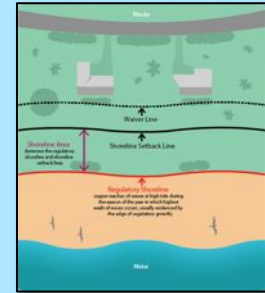
Waikīkī Beach Management Plan



Waikīkī Resilience and Adaptation Plan



Waikīkī Urban Design Strategies (UH)



C&C of Honolulu Revised Shoreline Setbacks

2023 WAIKIKI RESILIENCE AND ADAPTATION PLAN



2023 WAIKIKI RESILIENCE PLAN

Interdisciplinary effort lead by the University of Hawaii through the State Office of Planning.

- Climate and coastal hazard focus.
- Technical feasibility and policy analysis
- Cost/benefit analysis and finance mechanisms
- Architectural conceptual designs
- Risk reduction education and training
- Stakeholder and community outreach
- 2 years funding to UH-Community Design Center (CDC).

Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, Waikiki

PRINCIPAL INVESTIGATOR:

Wendy Meguro, AIA, LEED AP BD+C, Assistant Professor, University of Hawai'i School of Architecture and Sea Grant College Program

CO-INVESTIGATOR:

Charles "Chip" Fletcher, PhD, Associate Dean and Professor, University of Hawai'i School of Ocean and Earth Science and Technology

RESEARCHERS:

Josephine Briones; Doctorate of Architecture (DArch) Candidate, University of Hawai'i at Manoa
Ireland Castillo, DArch Candidate, University of Hawai'i at Manoa



Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, **Waikīkī**

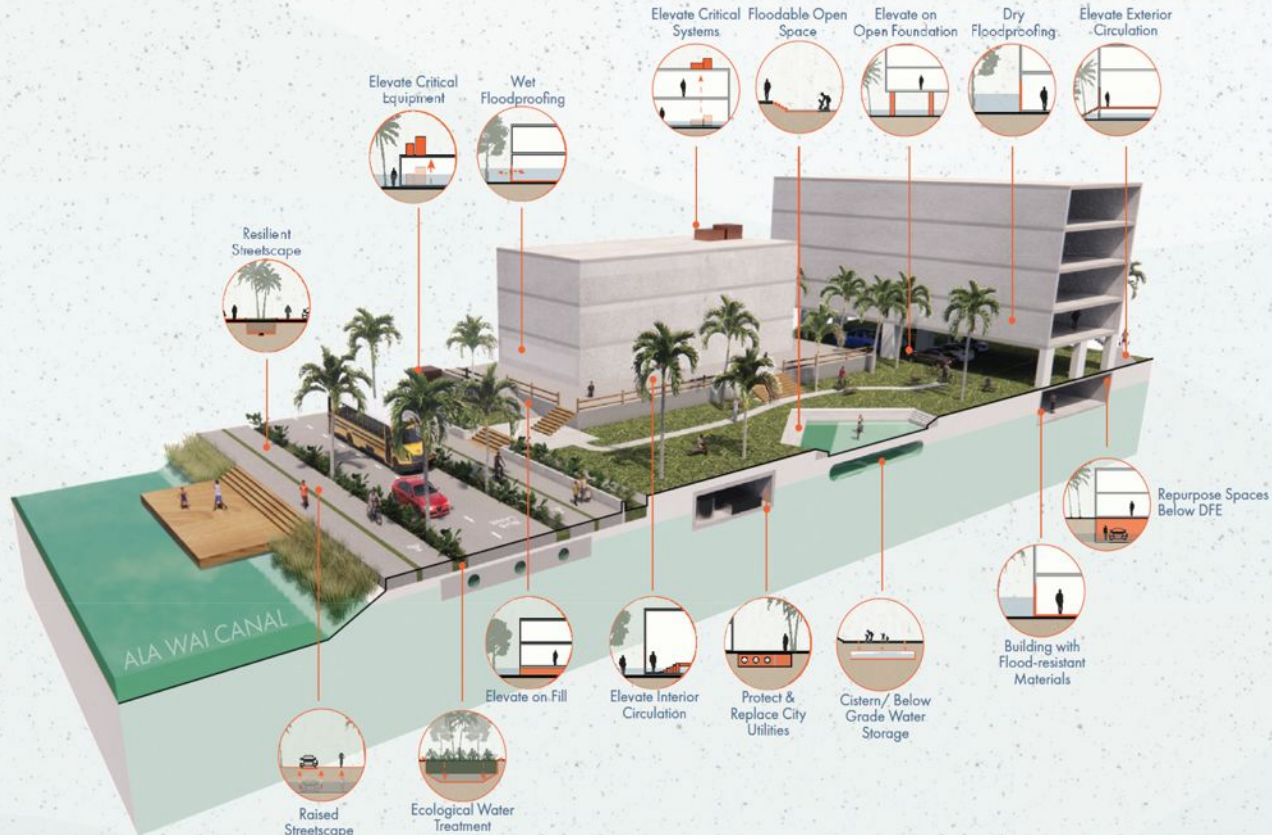


Figure: Potential sea level rise adaptation strategies for Waikiki, HI. By Desiree Malabed, UH School of Architecture, Sea Grant College Program, and School of Ocean and Earth Science and Technology.

BUILDING

At-grade Occupied Space(s)

Related Strategies:

Prioritize:

01



:Relocate Critical Systems

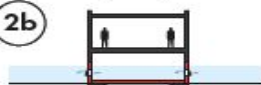
2a



:Dry Floodproofing

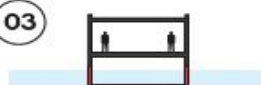
OR

2b



:Wet Floodproofing

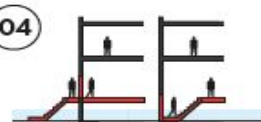
03



:Building w/
Flood-resistant materials

If possible,

04



:Elevate Lowest Interior Floor with
Exterior/Interior Access to DFE



ADAPTATIONS (2050)

MHHW (2021)
 +1' 2" SLR
 +0' 8" KING TIDE
 APPROX. TOTAL: ↑ 1' 10"



← Transportation + Open Space Strategies →



← Coastal Waterfront Strategies →



← Building Strategies →



Envisioning Sea-level Rise Adaptation Strategies for Waikīkī. (University of Hawai'i, 2023)

Living with frequent flooding, elevated walkways, one-way drainage, wave energy dissipation, living shoreline, beach nourishment, wet floodproofing

ADAPTATIONS (2100)

MHHW (2021)
 +5' 10" SLR
 +0' 10" KING TIDE
 APPROX. TOTAL: ↑ 6' 8"



Envisioning Sea-level Rise Adaptation Strategies for Waikīkī. (University of Hawai'i, 2023)
 Living with frequent flooding, elevated walkways, one-way drainage, wave energy dissipation, living shoreline, beach nourishment, wet floodproofing

MAHALO

An aerial photograph of Waikiki Beach in Honolulu, Hawaii. The image shows a dense cluster of high-rise hotels and residential buildings along the coastline. The beach is sandy and curves along the shore. The ocean is a vibrant turquoise color, with waves breaking near the shore. In the background, the iconic Diamond Head volcanic crater is visible, rising above the city. The sky is a mix of blue and light clouds, suggesting a clear day.

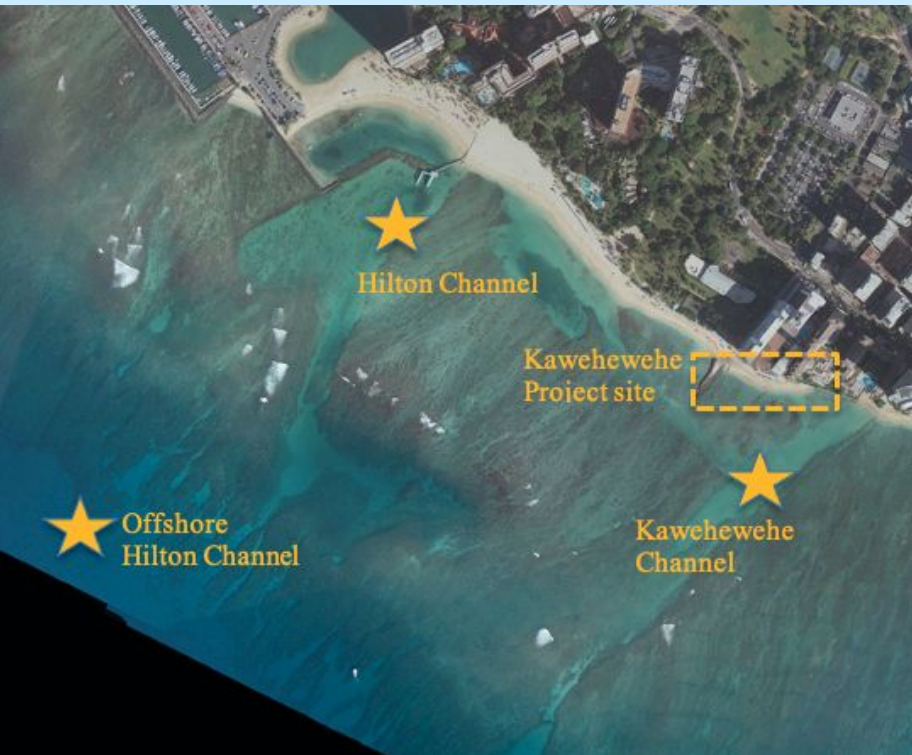
**Rick Egged, President
Waikīkī Beach Special Improvement District Association**

Kawehewehe Beach Restoration Concept



- Small-scale, shallow water operation
- Demonstration aspect (statewide application)
- Low(er) costs


Kawehewehe Beach Restoration Concept



April, 2023 Status

- Draft Scope of work shared with the DLNR as a template.
- Intention is to facilitate a contract from the DLNR for the project.
- Design-build with plans and permits for the construction.
- WBSIDA is coordinating with the DLNR on costs and cost-sharing.

Excerpt from Dr. Chip Fletcher's May 9,
2023 Presentation to the WBSIDA Annual
Membership Meeting

An aerial photograph of a tropical beach. The left side shows a wide, sandy beach with some faint tracks. The right side shows the ocean with clear, turquoise water transitioning to a darker blue. The shoreline is marked by white foam from gentle waves.

Is it possible to redesign
Waikīkī in response to SLR?

Community Design Responses to SLR



PRINCIPAL INVESTIGATOR

Wendy Meguro, MS, MA, LEED AP B+C, Associate Professor,
School of Architecture and Sea Grant College Program



CO-INVESTIGATOR

Charles "Chip" Fletcher, PhD,
Interim Dean,
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CLIMATE CHANGE ADAPTATION SPECIALIST

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School of Architecture



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Sea Grant College Program



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Previous Researcher, WCIT



Aiko Tells, BEnvD,
School of Architecture



Christopher Lomboy, DArch
POLYLINE Design



Andrew Tang,
Hawaii's Public Housing Authority

PRESENT CONDITONS (2021)

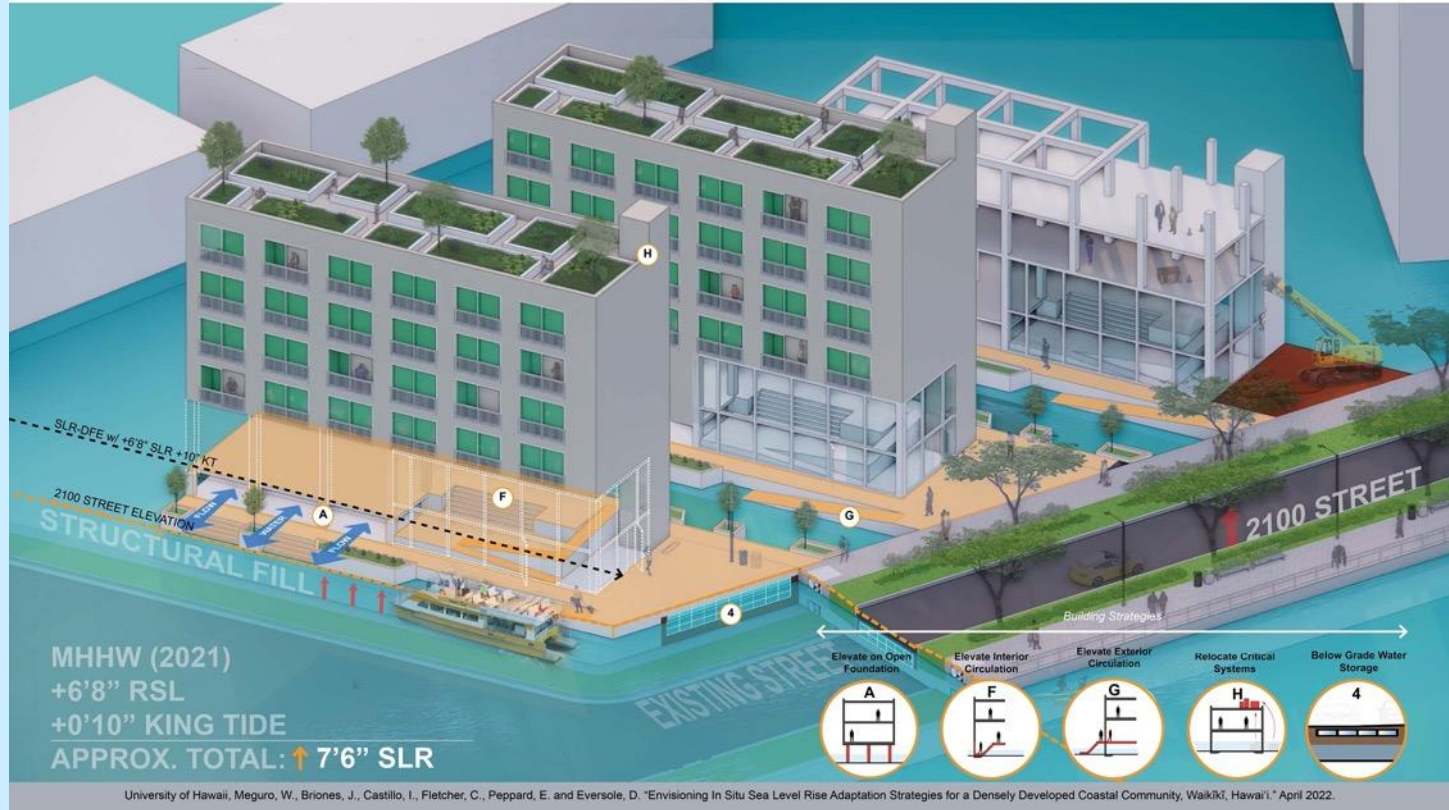


RETROFIT - OPTION 2 (2050)



Living with frequent flooding, repurpose at grade space to allow for flooding, relocate ground floor use, elevate exterior circulation, relocate critical systems, wet floodproofing, rainwater collection

NEW CONSTRUCTION (2100)



University of Hawaii, Meguro, W., Briones, J., Castillo, I., Fletcher, C., Peppard, E. and Eversole, D. "Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, Waikiki, Hawai'i." April 2022.

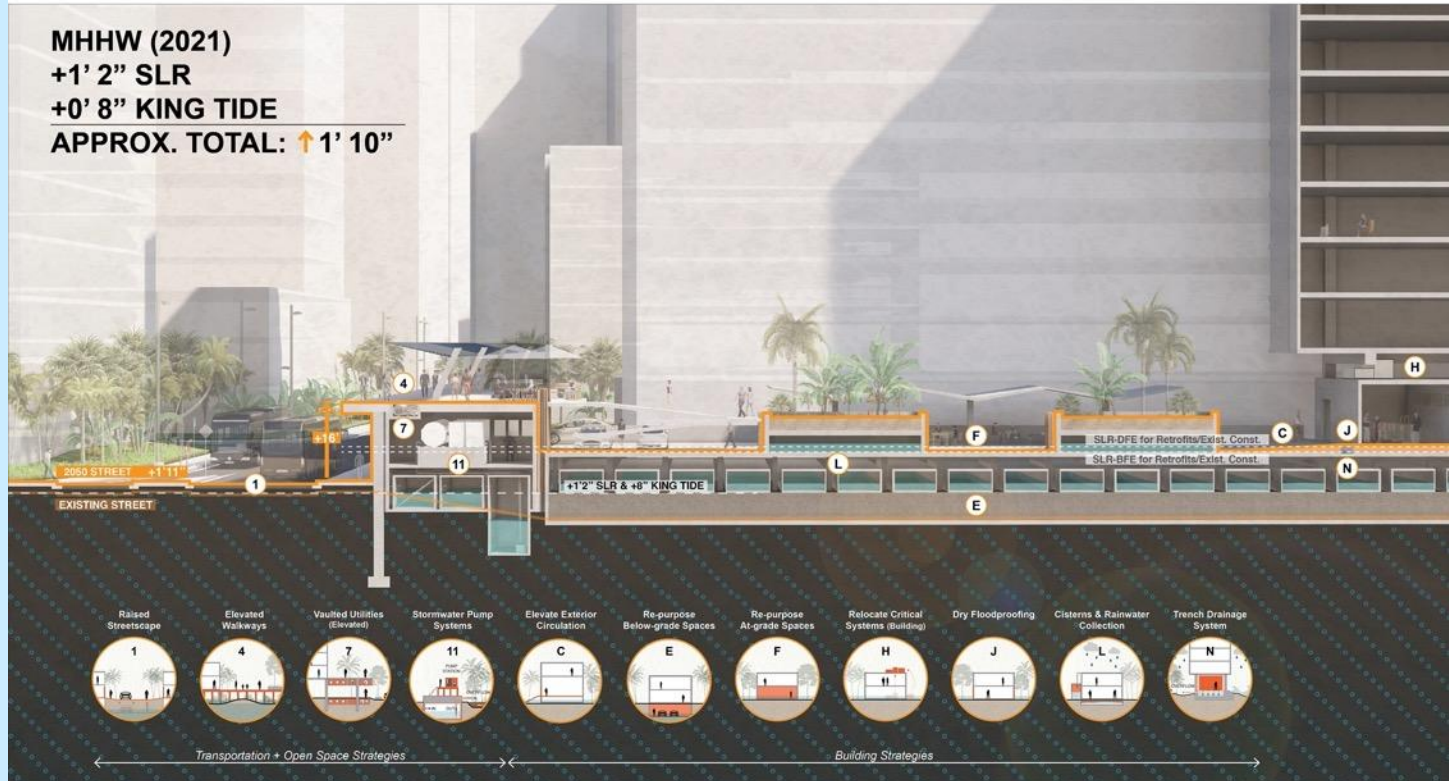
Living with permanent inundation, elevate on open foundation, elevate interior & exterior circulation, relocate critical systems, below grade water storage

PRESENT CONDITIONS (2022)



ADAPTATIONS (2050)

MHHW (2021)
+1' 2" SLR
+0' 8" KING TIDE
APPROX. TOTAL: ↑ 1' 10"

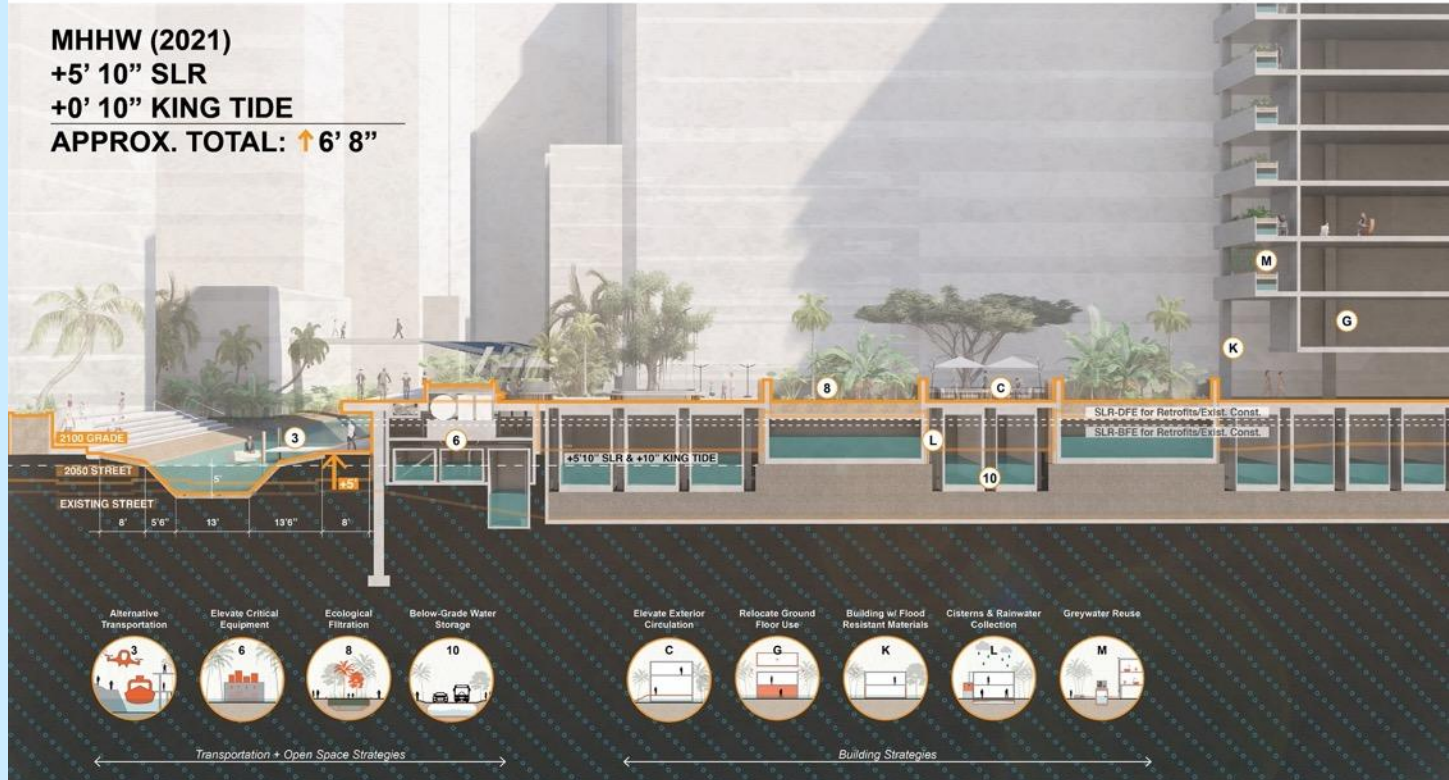


University of Hawaii, Meguro, W., Fletcher, C., Briones, J., Casey, G., Failano, G., Malabed, D., and Tepley, E. "Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, Waikiki, Hawaii." April 2023.

Living with frequent flooding, raised streetscape, elevated walkways, vaulted utilities, stormwater pump systems, elevated exterior circulation, repurpose below-grade spaces, relocate critical systems, dry floodproofing, cisterns and rainwater collection, trench drainage system.

ADAPTATIONS (2100)

MHW (2021)
+5' 10" SLR
+0' 10" KING TIDE
APPROX. TOTAL: ↑ 6' 8"



University of Hawaii, Meguro, W., Fletcher, C., Briones, J., Casey, G., Failano, G., Malabed, D., and Teeples, E. "Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, Waikiki, Hawaii." April 2023.

Living with permanent inundation, alternative transportation, ecological filtration, relocate critical systems, below grade water storage, elevated exterior circulation, relocate ground floor use, building with flood resistant materials, cisterns and rainwater collection.

PRESENT CONDITIONS (2022)



ADAPTATIONS (2050)

MHW (2021)
+1' 2" SLR
+0' 8" KING TIDE
APPROX. TOTAL: ↑ 1' 10"



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Living with frequent flooding, elevated walkways, multi-purpose levee, ecological filtration, floodable open spaces, retention basins

ADAPTATIONS (2100)

MHW (2021)

+5' 10" SLR

+0' 10" KING TIDE

APPROX. TOTAL: ↑ 6' 8"



University of Hawaii, Meguro, W., Fletcher, C., Briones, J., Casey, G., Failano, G., Malabed, D., and Teeples, E. "Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, Waikiki, Hawai'i." April 2023.

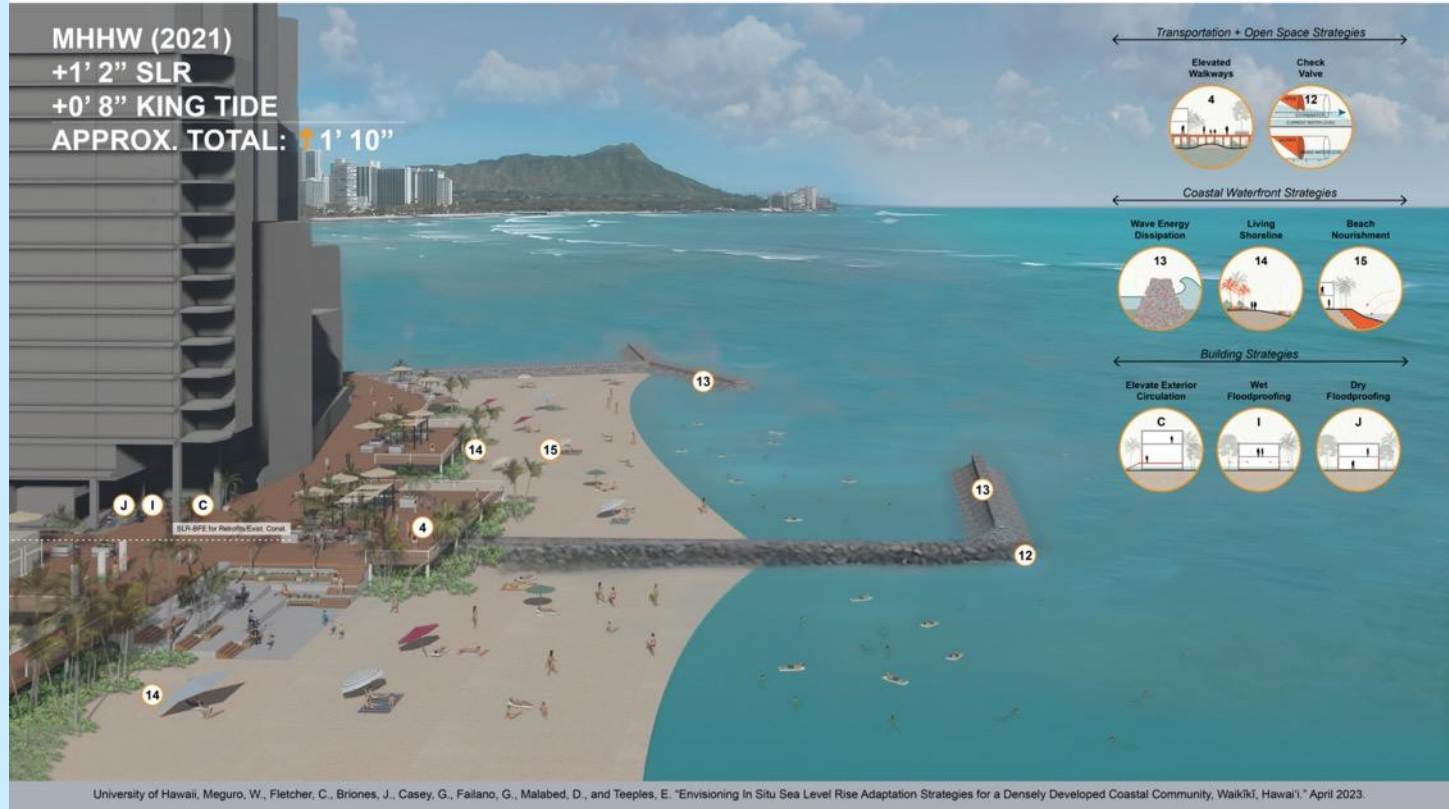
Living with permanent inundation, elevated walkways, multi-purpose levee, ecological filtration, floodable open spaces, retention basins

PRESENT CONDITIONS (2022)



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ADAPTATIONS (2050)



Living with frequent flooding, elevated walkways, one-way drainage, wave energy dissipation, living shoreline, beach nourishment, wet floodproofing

ADAPTATIONS (2100)

MHW (2021)

+5' 10" SLR

+0' 10" KING TIDE

APPROX. TOTAL:  6' 8"



University of Hawaii, Meguro, W., Fletcher, C., Briones, J., Casey, G., Failano, G., Malabed, D., and Teeples, E. "Envisioning In Situ Sea Level Rise Adaptation Strategies for a Densely Developed Coastal Community, Waikiki, Hawaii." April 2023.

Living with permanent inundation, elevated walkways, one-way drainage, wave energy dissipation, living shoreline, perched beach, wet floodproofing

JUNE
22nd
2023

12:00 PM -
1:30 PM HST



Envisioning Sea Level Rise

Adaptation Strategies For Waikīkī, HI

[CLICK HERE TO REGISTER](#)

Join us for a virtual discussion on site-specific adaptation options for an beachfront area in Waikīkī, Honolulu; featuring presentations, an expert panel, and audience input. AIA credit is pending approval for architecture attendees.



A VIRTUAL EVENT HOSTED BY:

University of Hawai'i
Sea Grant College Program Center for Smart Building and Community Design
School of Ocean and Earth Science and Technology
School of Architecture Environmental Research and Design Lab



CONTACT US
csbcd@hawaii.edu

PROJECT WEBSITE
SCAN ME!



An aerial photograph of Waikiki Beach in Honolulu, Hawaii. The image shows a wide, sandy beach curving along the coast. Several large, T-shaped concrete breakwaters are visible in the shallow water, designed to protect the beach from erosion. In the background, a dense urban skyline of high-rise buildings is visible under a blue sky with scattered clouds. The water is a clear, light blue-green color.

Thank you for your time

<https://www.wbsida.org/waikiki-beach-improvement> Engineering By Jonathan Quach, Independent Contractor.