

Waikīkī Beach Improvement and Maintenance Program Environmental Impact Statement

Informational Briefing to the Hawai'i Board of Land and Natural Resources



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History of Waikīkī Beach

Waikīkī is an engineered coastline

- Almost the entire length of Waikīkī is armored by seawalls
- 37 seawalls were constructed in Waikīkī in the early 1900's
- Waikīkī Beach is almost entirely composed of imported sand
- ~450,000 cubic yards of sand has been placed on Waikīkī Beach
- Beach stability is largely dependent on shoreline structures (groins)
- 42 groins or groin-like structures have been constructed in Waikīkī
- Only the larger groins have been effective in stabilizing the beaches
- Waikīkī Beach has been chronically eroding since the mid 1980's

*Waikīkī Beach consists of man-made beaches
stabilized by man-made structures*

Significance of Waikīkī Beach

Why are the beaches of Waikīkī so significant?

- Waikīkī is a cultural landmark and globally recognized icon of Hawai‘i
- Beaches support a diverse range of uses and are the primary amenity that attracts locals and visitors to Waikīkī
- Waikīkī is the epicenter of Hawaii’s tourism-based economy
- In 2015, Waikīkī generated 41% of the state’s visitor industry activity and 7% to Hawai‘i’s Gross State Product (Porro, 2020)
- Complete erosion of Waikīkī Beach would result in an annual loss of over \$2 billion in annual visitor expenditures (Tarui, et al. 2018)

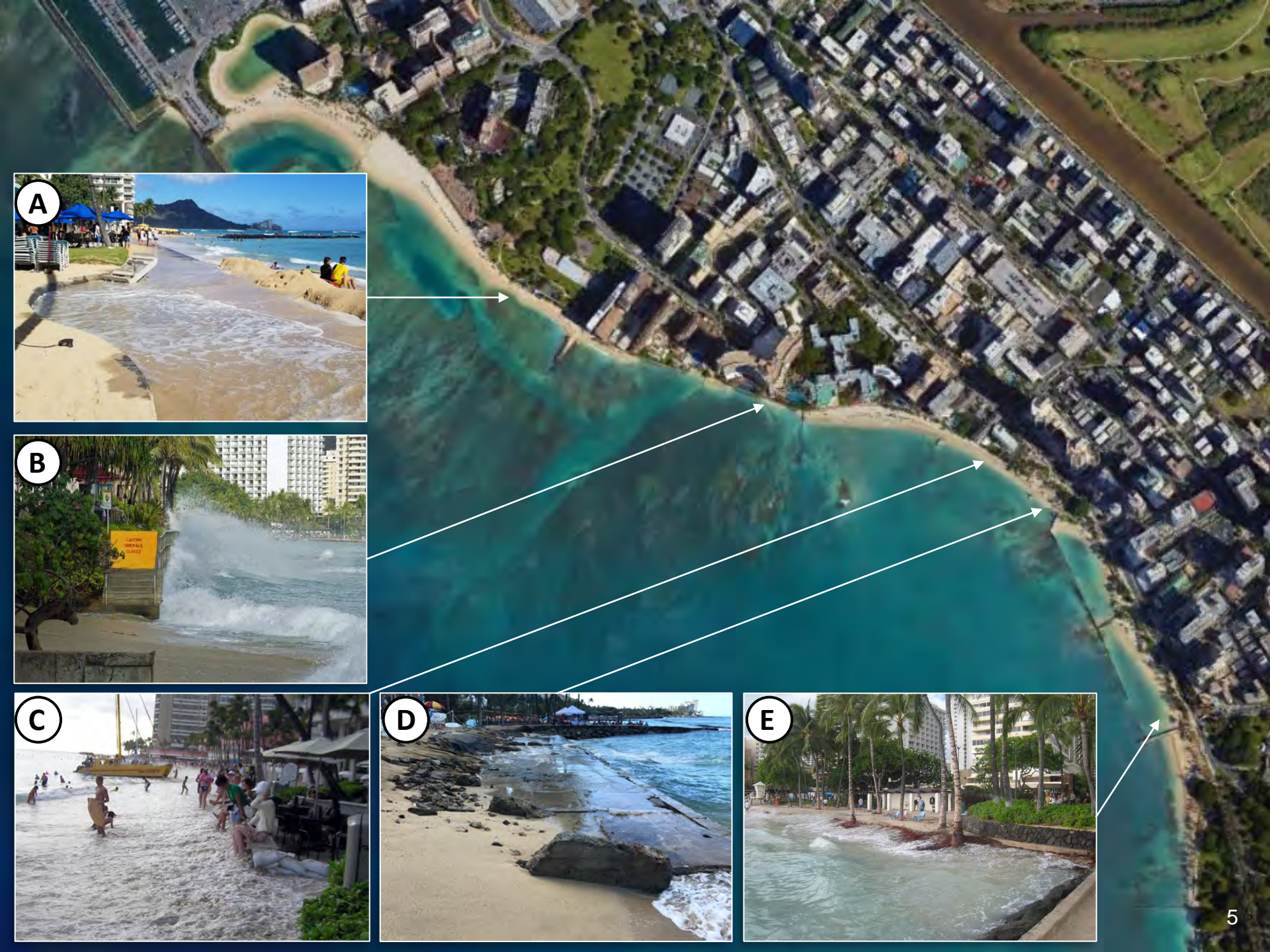
Beaches in Waikīkī are a Public Trust resource with significant cultural, historical, recreational, aesthetic, and economic value

Issues & Problems

Why are beach improvements and maintenance needed in Waikīkī?

- Beaches have been chronically eroding since the mid-1980's
- Erosion causes beach narrowing and beach loss
- Wave overtopping and flooding, particularly during high tide/surf events
- Frequency/severity of erosion and flooding will increase with sea level rise
- Reduced recreational dry beach area
- Limited lateral shoreline access (no lateral access in some areas)
- Environmental and aesthetic degradation
- Structural damage and vulnerable infrastructure
- Hazardous conditions and risks to public health, safety, and welfare

These problems are being exacerbated by sea level rise



Environmental Impact Statement

Programmatic EIS

"Program" means a series of one or more projects to be carried out concurrently or in phases within a general timeline, that may include multiple sites or geographic areas, and is undertaken for a broad goal or purpose

Program Proponents

- Hawai'i Department of Land and Natural Resources (DLNR)
- Waikīkī Beach Special Improvement District Association (WBSIDA)

Program Objectives

- Restore and improve public beaches in Waikīkī
- Increase beach width and improve beach stability
- Provide safe access to and along the shoreline
- Increase resilience to coastal hazards and sea level rise

Nature-based Solutions

- Beach restoration is widely recognized as a nature-based approach to environmental resource restoration
- In some cases, structures are needed to restore and maintain natural resources (e.g., dunes, coral reefs, streams, estuaries, wetlands, etc.)
- In some cases, structures are needed to stabilize restored beaches (e.g., groins, breakwaters, sand retaining walls)
- Groins are engineered structures that are designed to mimic natural landscape features (headlands) to produce curved beaches

Natural and nature-based solutions may be natural (produced purely by natural processes) or nature-based (produced by a combination of natural processes and human engineering)

Bridges, T. S., J. K. King, J. D. Simm, M. W. Beck, G. Collins, Q. Lodder, and R. K. Mohan, eds. 2021. Overview: International Guidelines on Natural and Nature-Based Features for Flood Risk Management. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Examples of Nature-based Solutions



Dune Restoration | Katwijk, Netherlands



Stream Restoration | Seoul, Korea



Living Shoreline | St. Andrew Bay, Florida



Artificial Reef | Maiden Island, Antigua

Proposed Actions

Beach Maintenance refers to:

Actions that involve using existing sand or adding sand with no new structures or modifications to existing structures. Beach maintenance options include beach nourishment, sand backpassing, sand pushing, and sand pumping.

Beach Improvements refers to:

Actions that involve adding new sand, constructing new structures, and/or modifying existing structures. Beach improvement options include beach nourishment with stabilizing groins, segmented breakwaters, and modifications to existing structures.

Beach maintenance and improvements are urgently needed to restore and preserve Waikīkī Beach for future generations

Example of Beach Maintenance

Waikīkī Beach Maintenance (2021)

Before



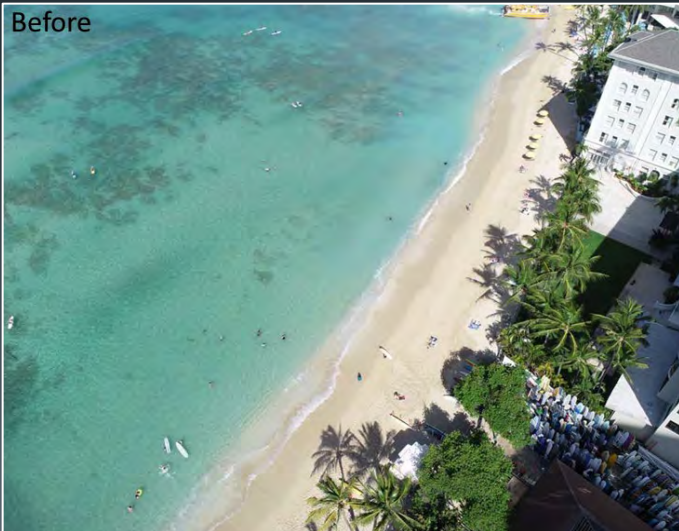
BEFORE

After



AFTER

Before



After



Example of Beach Improvements

Kūhiō Sandbag Groin (2019)



BEFORE



AFTER



Example of Beach Improvements

Royal Hawaiian Groin Replacement (2020)



BEFORE



AFTER

Existing Policy Framework

Beach restoration is allowed and encouraged through:

- Hawai'i State Planning Act (Chapter 226, Hawai'i Revised Statutes)
- Coastal Zone Management (Chapter 205A, Hawai'i Revised Statutes)
- Conservation District (Chapter 13-5, Hawai'i Administrative Rules)
- Small-scale Beach Nourishment Program (existing)
- Small-scale Beach Restoration Program (proposed)
- Hawai'i Sea Level Rise Vulnerability and Adaptation Report (2017)

Beach restoration is widely recognized as a nature-based solution and sea level rise adaptation strategy that is promoted by the U.S. Army Corps of Engineers, FEMA, DLNR, and other agencies

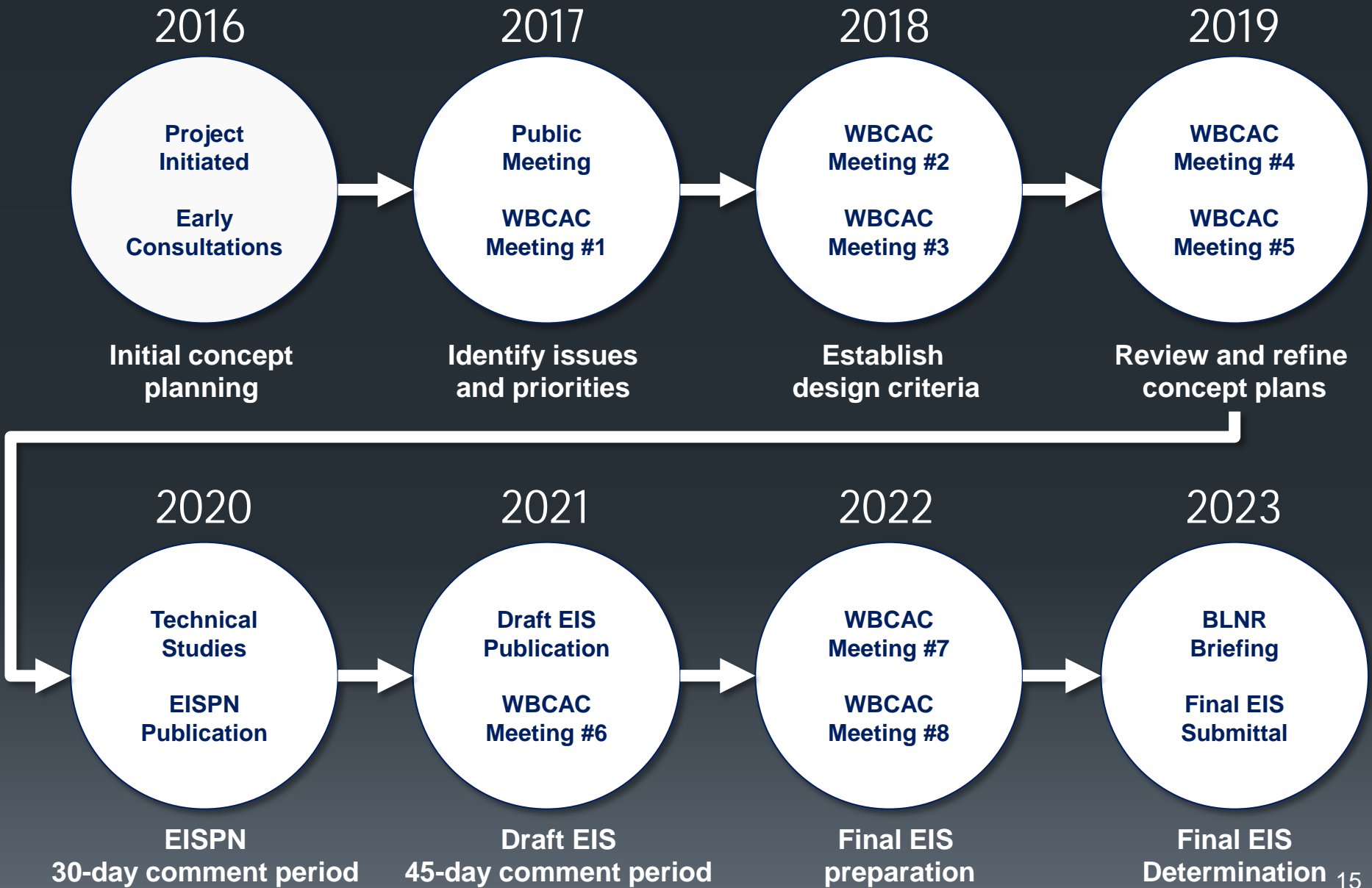
Waikīkī Beach Community Advisory Committee (WBCAC)

Project design was driven by community stakeholders

- WBCAC consists of key stakeholders representing a diverse range of knowledge, experience, interests, and perspectives in Waikīkī
- WBCAC consists of over 35 members representing business (29%), government (29%), science/engineering (17%), hotels/resorts (14%), non-profits (11%)
- WBCAC was established to:
 - Identify issues, priorities, and design criteria
 - Provide guidance and feedback on conceptual designs
 - Inform project development and selection
- Eight (8) WBCAC meetings were held from 2017 to 2022

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

Community Engagement



Media Coverage

- 2017** “Public forum to address future of Waikīkī beaches.” (Star Advertiser)
“State looks through proposed solutions to Waikīkī beach erosion” (KHON2)
- 2019** “Hawai‘i Allocates \$13M to keep Waikīkī Beach from disappearing” (Star Advertiser)
“Hawai‘i invests \$13 million to repair state’s most visited beach (Fox News)
- 2020** “Got any ideas to prevent Waikīkī’s beaches from disappearing?” (Star Advertiser)
“EISP Scoping Meeting for the Waikīkī Beach Improvement and Maintenance Program” (DLNR Press Release)
“State Proposed Waikīkī Beach Improvements; public comments welcome” (KITV)
- 2021** “DLNR: Waikīkī Beach Improvement and Maintenance Program” (KHON2)
“Surfers challenge proposal adding T-head groins to Waikīkī Beach” (Star Advertiser)
“Plans for \$12 million Waikīkī Beach improvements released” (Star Advertiser)
“Public has until July 23 to comment on proposed Waikīkī beach improvement plan” (Star Advertiser)
“New beach could come to Waikīkī as part of improvement and maintenance program” (KHON2)
“DLNR May Build More Groins in Waikīkī” (www.jetsetter.com)
“As rising seas invade Waikīkī resorts, state proposes adding more groins” (Star Advertiser)
“Column: Hawai‘i’s ocean users must beware Waikīkī shoreline plan” (Star Advertiser)
“Future of Waikīkī Beaches May Rely on \$12M Shoreline Stabilization Project” (Hawai‘i Public Radio)
“How Will Urban Honolulu Deal With The Rising Ocean” (Hawai‘i Business Magazine)
“Waikiki stakeholders want Governor Ige to designate Kawehewehe Beach as a Disaster Area” (Star Advertiser)
- 2022** “Hawaii’s famed Waikiki Beach could disappear by the end of the century. It’s not the only one.” (SFGATE)
“The Battle to Save Waikiki Beach” (Politico)
“Two of Waikiki’s Oldest Beach Clubs Are Struggling to Come to Grips with Climate Change” (Civil Beat)

Planning and Design Criteria

WBCAC identified key issues, priorities, and design criteria

- Improvements must be stakeholder driven and support or improve the widest possible array of existing and future uses
- Existing beach and ocean-based recreational activities shall be preserved or improved to the maximum extent practicable
- Improvements should increase beach stability and sand retention
- Improvements should increase the resilience and sustainability of the Waikīkī shoreline
- A primary design consideration is predicted future sea level rise
- Improvements should consider sea level rise through the year 2060
- Include provisions for extending their functional life until 2080
- Improvements may be implemented concurrently or sequentially and be scaled and/or adapted based on changing conditions
- Improvements are programmatic in nature and together form an overall plan for the Waikīkī shoreline for approximately 50 years

Waikīkī Beach Sectors



***WBCAC prioritized beach improvements and maintenance in four beach sectors:
Fort DeRussy, Halekūlani, Royal Hawaiian Beach, Kūhiō Beach Park***

Fort DeRussy Beach Sector



Fort DeRussy Beach Sector



Proposed Action: Small-scale Beach Nourishment and Periodic Sand Backpassing

Halekūlani Beach Sector



Halekūlani Beach Sector



Proposed Action: Beach Nourishment with Stabilizing Groins

Royal Hawaiian Beach Sector



Royal Hawaiian Beach Sector



Proposed Action: Periodic Beach Nourishment

Kūhiō Beach Sector



Deteriorating outer crib walls



High tide flooding at west end of Kūhiō Beach (credit: Hawaii Sea Grant, 2017)



Kūhiō Beach Nourishment (2006)



High tide flooding at east end of Kūhiō Beach (credit: Hawaii Sea Grant, 2017)

Kūhiō Beach Sector



Proposed Action ('Ewa Basin): Beach Nourishment with Segmented Breakwater
Proposed Action (Diamond Head Basin): Beach Maintenance (Sand Pumping) 26

Evaluation of Potential Impacts

EIS evaluates a wide range of potential impacts:

- Traditional and Cultural Practices (e.g., ritual bathing)
- Historical, Cultural, and Archaeological Resources (e.g., iwi kūpuna)
- Water Quality (e.g., turbidity, discharge in marine waters)
- Marine Habitat (e.g., coral reefs, essential fish habitat)
- Rare, Endangered, and Protected Species (e.g., turtles, monk seals)
- Beach Appearance (e.g., sand color, beach shape)
- Shoreline Access (e.g., beach closures during construction)
- Ocean Recreation (e.g., ocean access, surfing waves)
- Ocean Safety (e.g., during construction)
- Economic (e.g., commercial operations during construction)
- Navigation (e.g., catamaran operations)
- Other (e.g., barge operations, dewatering basin, equipment, noise)

Studies and Assessments

EIS analysis is robust, comprehensive, and thorough:

- Cultural Impact Assessment
- Historical Architecture Overview
- Historical Archaeology Overview
- Ka Pa'akai Analysis
- Marine Biology And Water Quality Assessment
- Recreational Impact Study
- Offshore Sand Investigations
- Dredging Impact Analysis
- Turbidity Analysis
- Numerical Wave Modeling
- Sediment Transport Modeling
- Current And Circulation Modeling
- Wave Reflection Analysis

Mitigation Measures

Best Management Practices

- Sand dewatering
- Turbidity curtains
- Erosion containment
- Spill containment
- Public safety measures

Monitoring

- Cultural and archaeological
- Protected species
- Benthic species and habitat
- Water quality
- Beach performance

Cultural Impact Assessment

Cultural Impact Assessment (CIA)

- CIA conducted by International Archaeology, LLC
- Reviewed 10 previous cultural studies in Waikīkī
- Consulted 213 Waikīkī cultural stakeholders and community members
- Presentation to O'ahu Burial Council (OBC)

Additional Cultural Studies and Assessments

- Historical Architecture Overview
- Historical Archaeology Overview
- Ka Pa'akai Analysis

Ka Paʻakai Analysis

Identified Concerns

1. Inadvertent exposure of cultural material, particularly iwi kūpuna
2. Impacts to fishing, gathering, and marine habitat
3. Impacts to healing and purification rituals in the waters of Kawehewehe
4. Impacts of ongoing development and loss of Hawaiian sense of place

Recommendations

1. Carefully evaluate new sources of replenishment sand to confirm they do not contain iwi kūpuna or other cultural material
2. Monitor all ground-disturbing work for exposed or disturbed cultural material and develop a plan to protect these resources
3. Reasonably address concerns from community members about the disposition of cremated remains
4. Protect Kawehewehe from damage and allow cultural practitioners reasonable access to the area during construction work
5. Engage cultural stakeholders and the community in future project planning

Waikīkī Beach Improvement and Maintenance Program

For additional information about the Program, please visit:
<https://dlnr.hawaii.gov/occl/waikiki/>