



Kahana Bay Erosion Mitigation

Kahana Bay Steering Committee

Kahana Bay Erosion Mitigation Project

Approving Agency: State of Hawaii Department of Land and Natural Resources (DLNR)
Office of Conservation and Coastal Lands (OCCL)

Preparers

Draft Environmental Impact Statement (DEIS) Document	Oceanit and Earthplan
Wave Assessment Study (Parts I, II and III)	Volker Roeber and Oceanit
Kahana Bay Sand Study	Ecological Monitoring and Analysis, LLC and Oceanit
Marine Resource Assessment and Water Quality Survey	AECOS, Inc.
Terrestrial Biological Resources Study	Oceanit
Community Outreach (Phase I) – Key Informant Interviews	Planning Consultants Hawaii, LLC
Community Outreach (Phase II) – Focus Groups	Oceanit and Earthplan
Archaeological Literature Review and Field Inspection	Scientific Consultant Services, Inc.
Cultural Impact Assessment	Cultural Surveys Hawaii

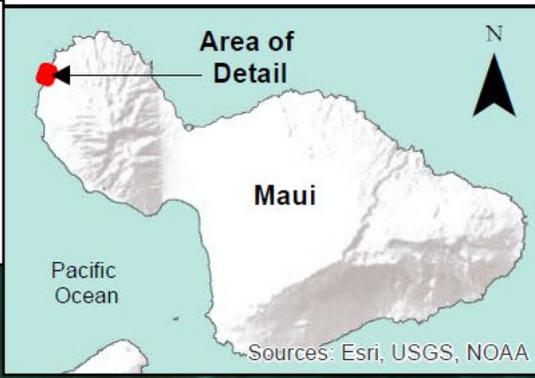


Kahana



Legend

- Parcel Boundaries
- Roads



Source: Esri, Maxar, GeoEye, Earthstar Geographics and the GIS User Community

Kahana Beach - 1949



Kahana Beach - 1975



Kahana Beach - 1988



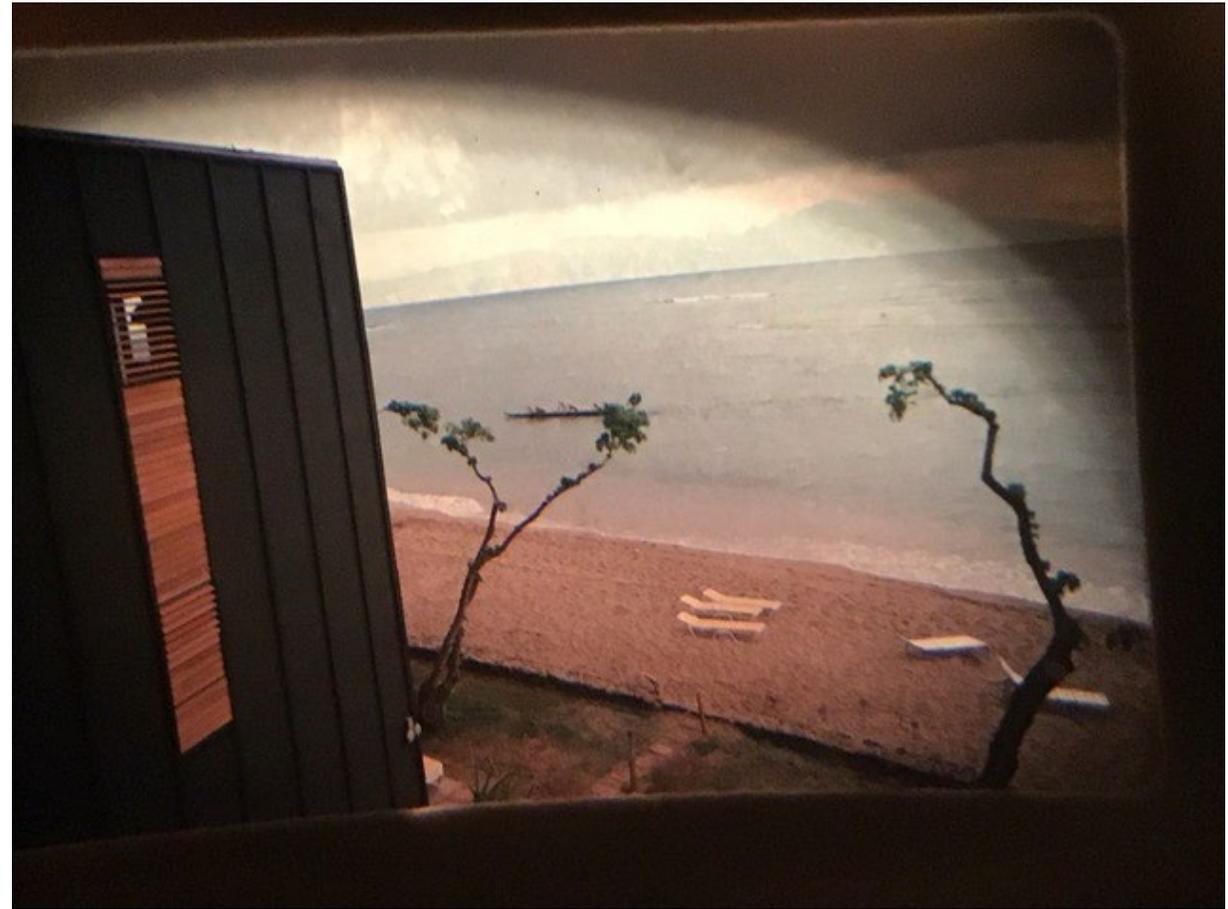
Kahana Beach - 2007



Kahana Beach - 2016



Pohailani Shoreline, 1977



Pohailani Shoreline, 2019





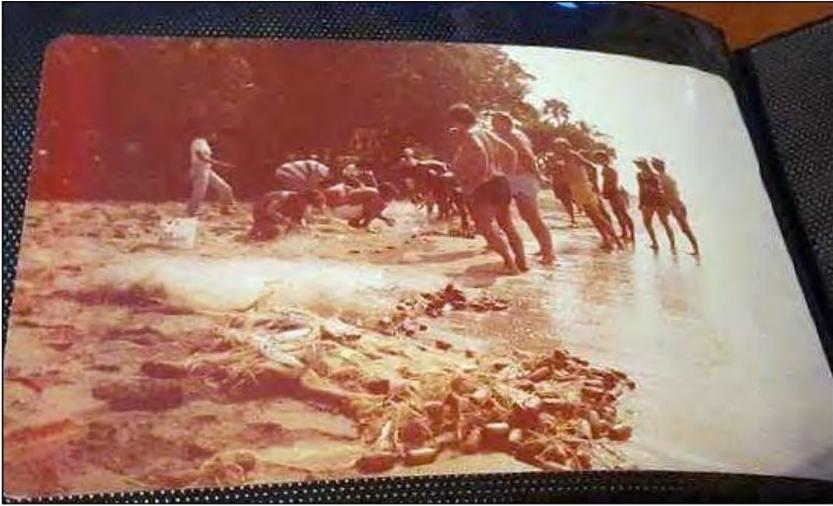
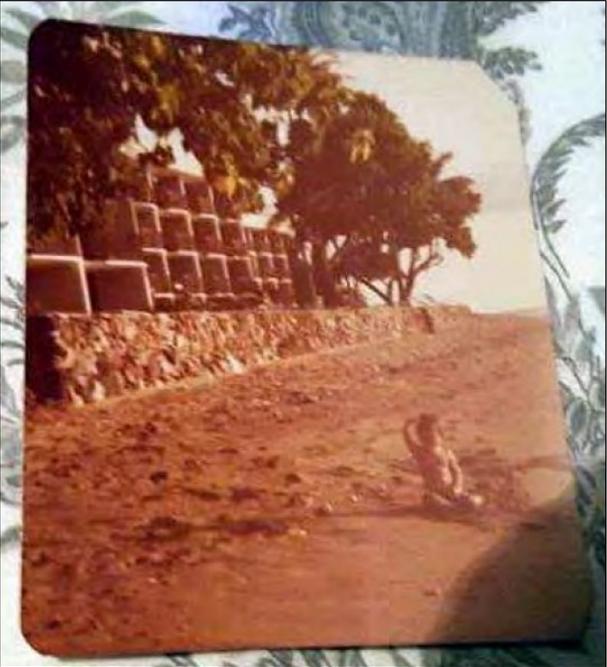
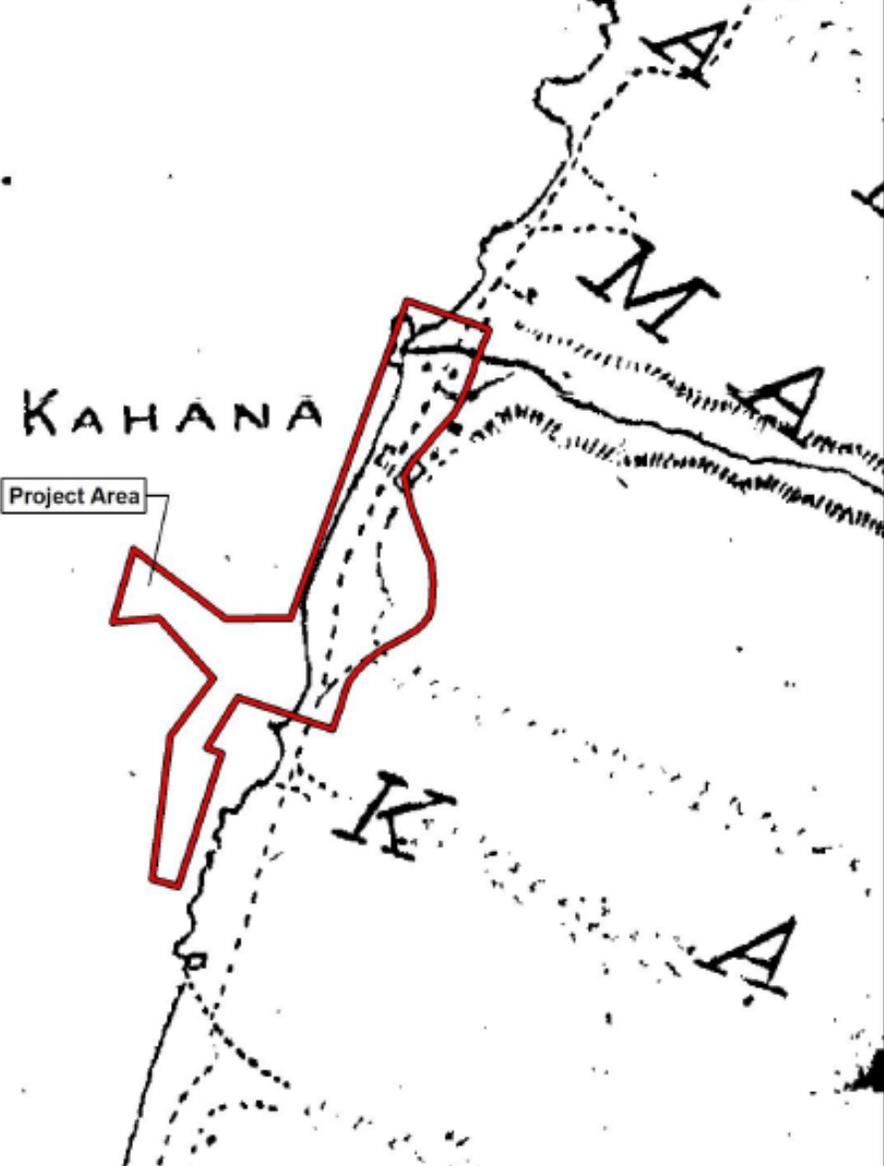
S-Turns Beach

~1,200 ft. of Temporary
Emergency Erosion Control





Cultural Practices, Cultural Impact Assessment 2020



Marine Resource Assessment, 2021



Hard bottom benthic environment

Unconsolidated benthic environment



Community Outreach

- According to Planning Department staff, over 40 meetings discussing the Kahana erosion problem with the community since 2012
- EIS outreach efforts: Prior to EISPN (2019)
 - Meetings with cultural practitioners and environmentalists
 - Interviews with key stakeholders, resulting in 14 recommendations to address in the EIS
- DEIS Focus Groups – October 2020
 - Four groups: Cultural, Environmental, Recreational and Local Residents
 - Approach: Common shared interests → Participants build upon each other's input → constructive feedback
 - Result: Influential in determining the scope of DEIS studies and content

Common topics raised by community during outreach efforts and where they are addressed in DEIS

TOPIC	DEIS SECTIONS
Managed retreat: benefits, costs, analysis	2.5.2 – Managed Retreat
Cultural use and Hawaiian traditional practices	3.4.4 – Cultural Impact Assessment Appendix H – Cultural Impact Assessment 3.4.3 – Archaeological Resources
Ocean water quality	3.1.6.2 – Water Quality - Potential Impacts and Proposed Mitigation Measures
Quality and compatibility of mined sands	2.2.4 – Sand Sources for Sand Nourishment and Vegetated Berm 3.1.4 – Soils and Sand Quality Appendix B – Kahana Bay Sand Study

TOPIC	DEIS SECTIONS
Sedimentation threat from current erosion trends	3.2.4 – Erosion Hazard 3.1.4 – Soils and Sand Quality
Impacts on existing marine habitats	3.3.4 – Marine Biological Resources 3.3.5 – Fish Habitat 2.2.5.5 – Construction Best Management Practices
Impacts on seabed due to sand mining	3.1.3 – Geology, Topography, and Bathymetry
Ocean currents and surf sites	3.2.1 – Coastal Processes Appendix A – Wave Study
Public use of groins and public shoreline access	3.5.1 – Recreational Facilities and Resources

Current Situation

- Severe chronic + episodic erosion
- Piecemeal erosion control measures
- Risks to public health & safety, environmental quality, cultural resources, infrastructure, and marine habitats



Project Goals

- Holistic, regional approach → Resilient, sustainable solution
 - Considers the coastal dynamics of the entire beach cell
- Restores + preserves beach and coastal resources
- Minimizes environmental impacts and maintenance
- Immediate solution to manage erosion for the coming decades
- Accounts for sea level rise projections
- Compatible and consistent with existing federal, state, and county regulations, policies, and plans

Proposed Action



Beach Nourishment

Approx. 50,000 – 100,000 cubic yards of sand

Restore to approx. 1975 beach width (65 ft on average)

Creates continuous lateral shoreline access



Vegetated Berm

Berm along the backshore to prevent wave run-up

Planted with native coastal flora

Serves as sand reservoir for beach system



Beach Stabilization

Seven T-groins extending 215 ft offshore on average

Reinforced headland at north boundary

Will help keep restored sand in place

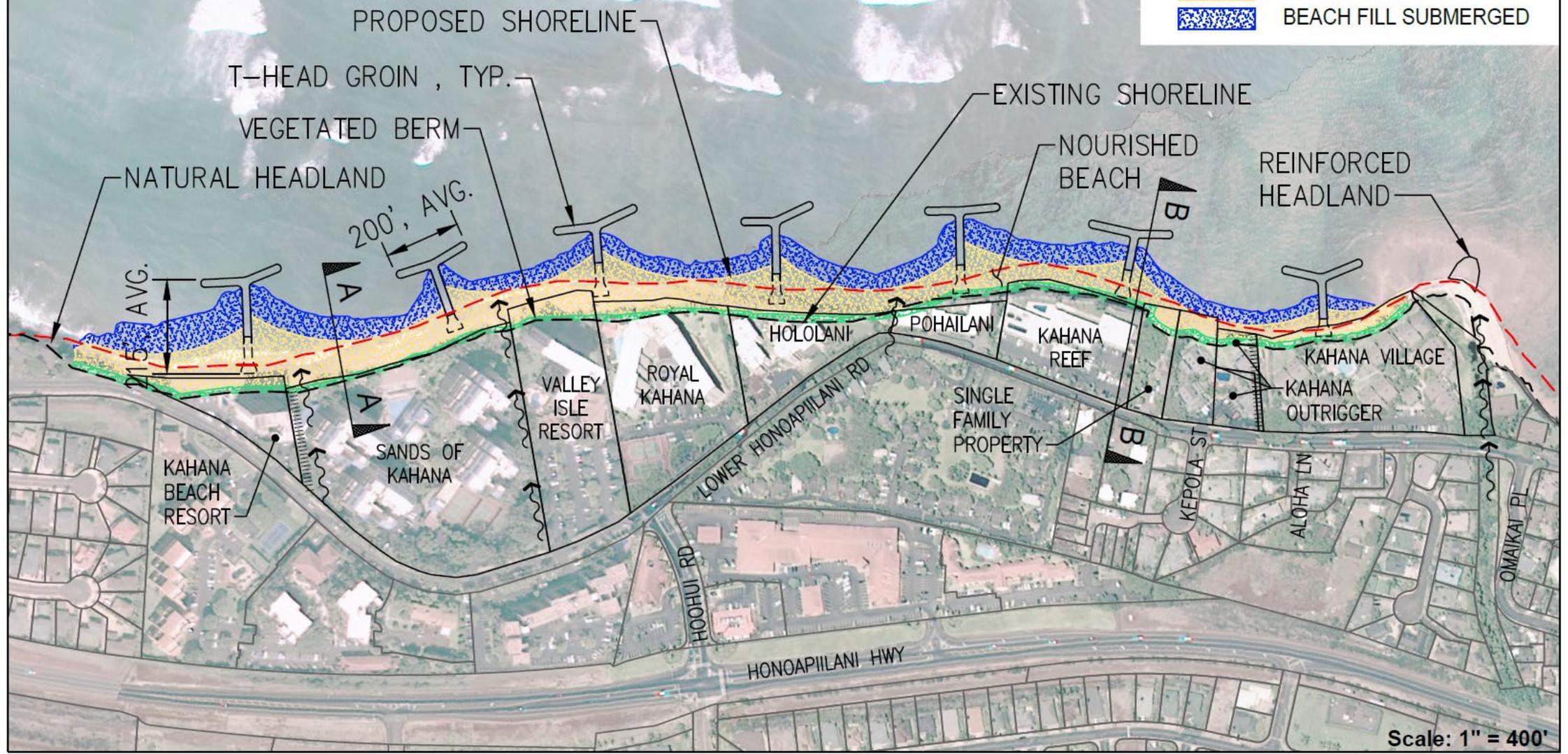
Creates six new coves

May provide new marine habitat

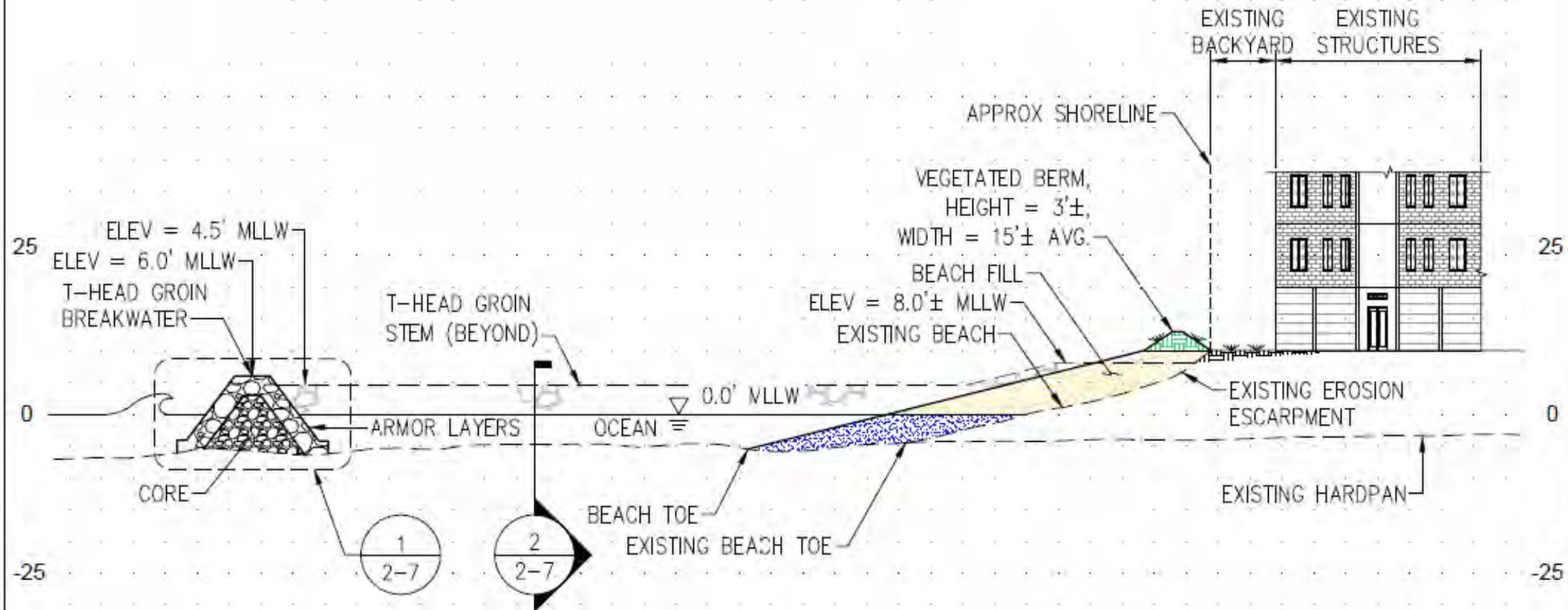


AutoCAD SHX Text
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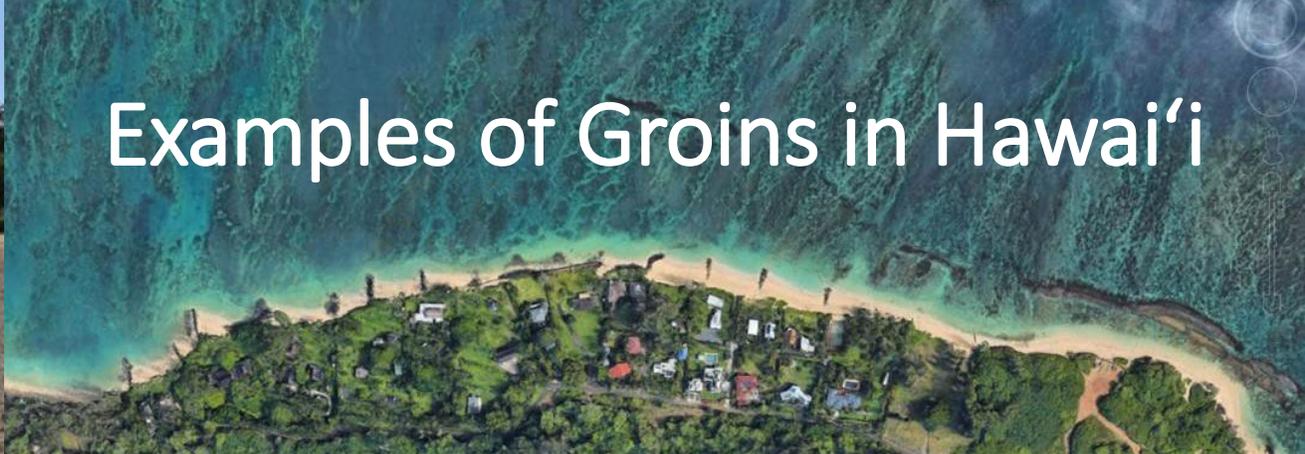
LEGEND	
	PARCEL BOUNDARIES
	APPROX EXIST SHORELINE
	APPROX 1975 BEACH
	DRAINAGE WAY
	PUBLIC BEACH ACCESS
	VEGETATED BERM
	BEACH FILL
	BEACH FILL SUBMERGED



Scale: 1" = 400'



Vert Scale: 1" = 25'
Horiz Scale: 1" = 50'





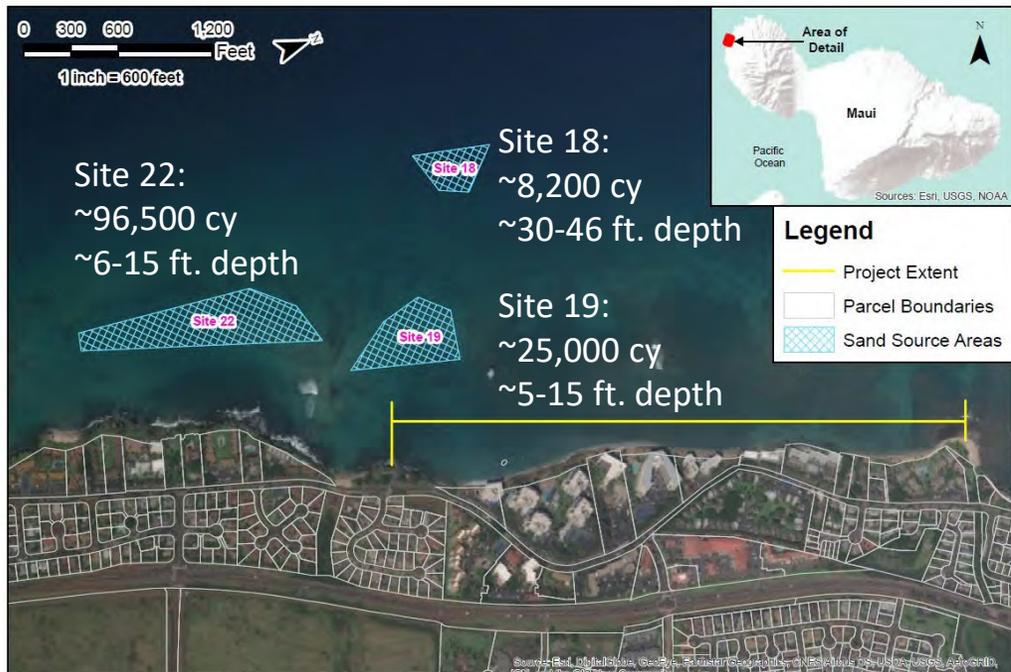


Figure 2-12: Sand from Site 18

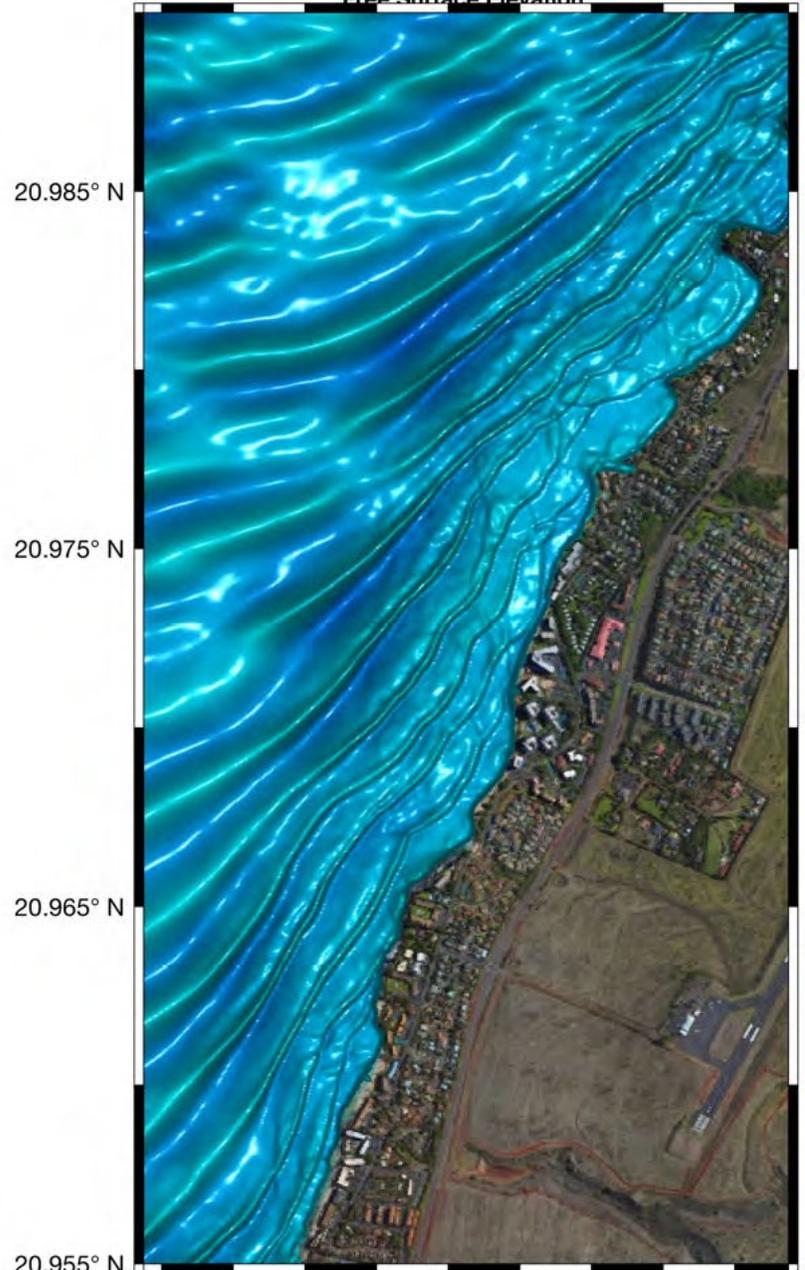


Figure 2-10: Sand from Site 22

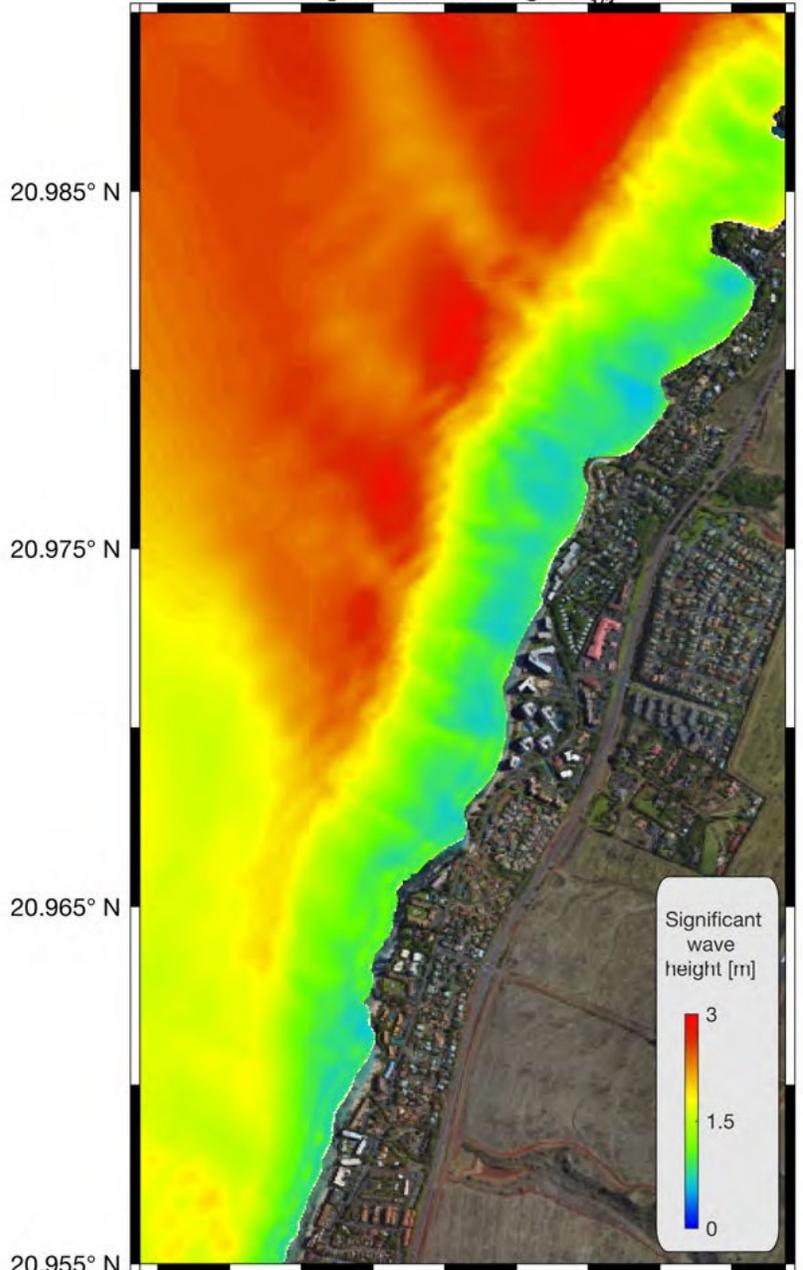


Figure 2-11: Sand from Site 19

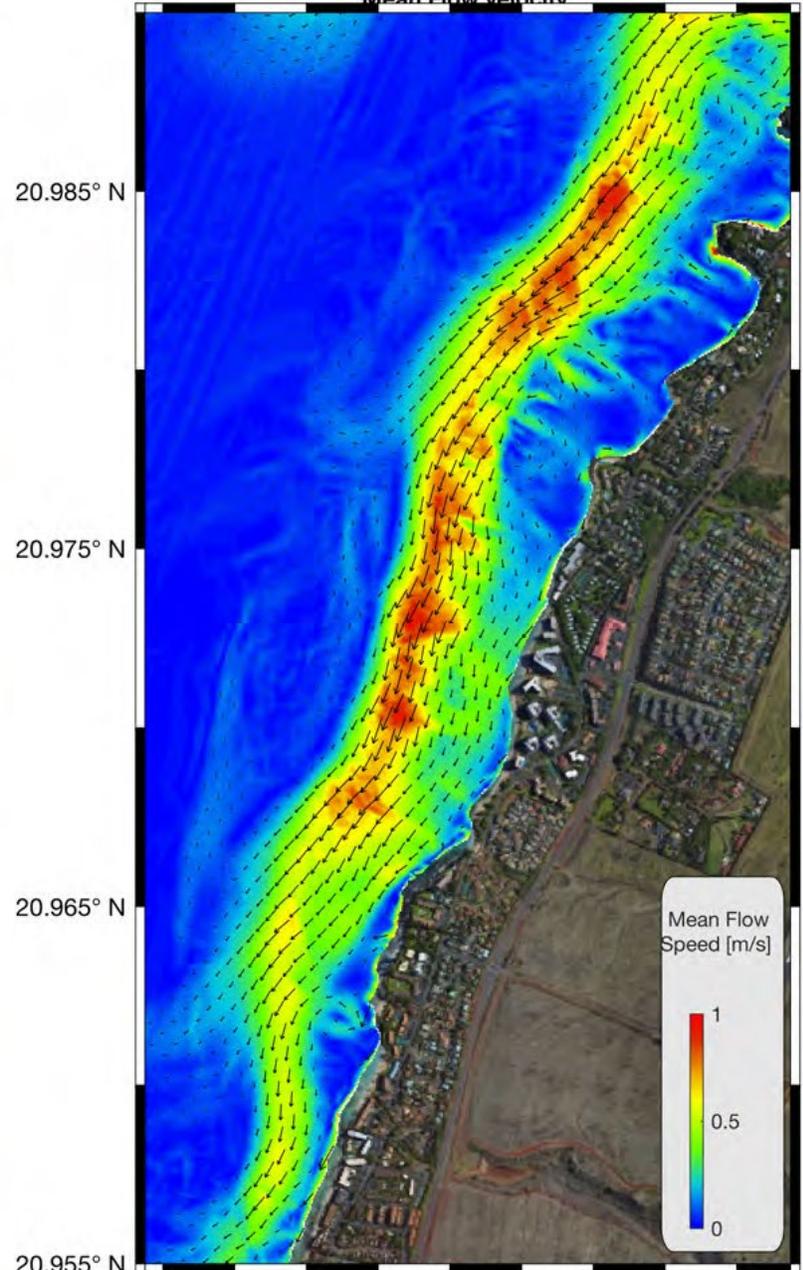
Free Surface Elevation



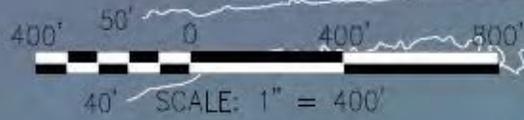
Significant Wave Height H_{1/3}



Mean Flow velocity

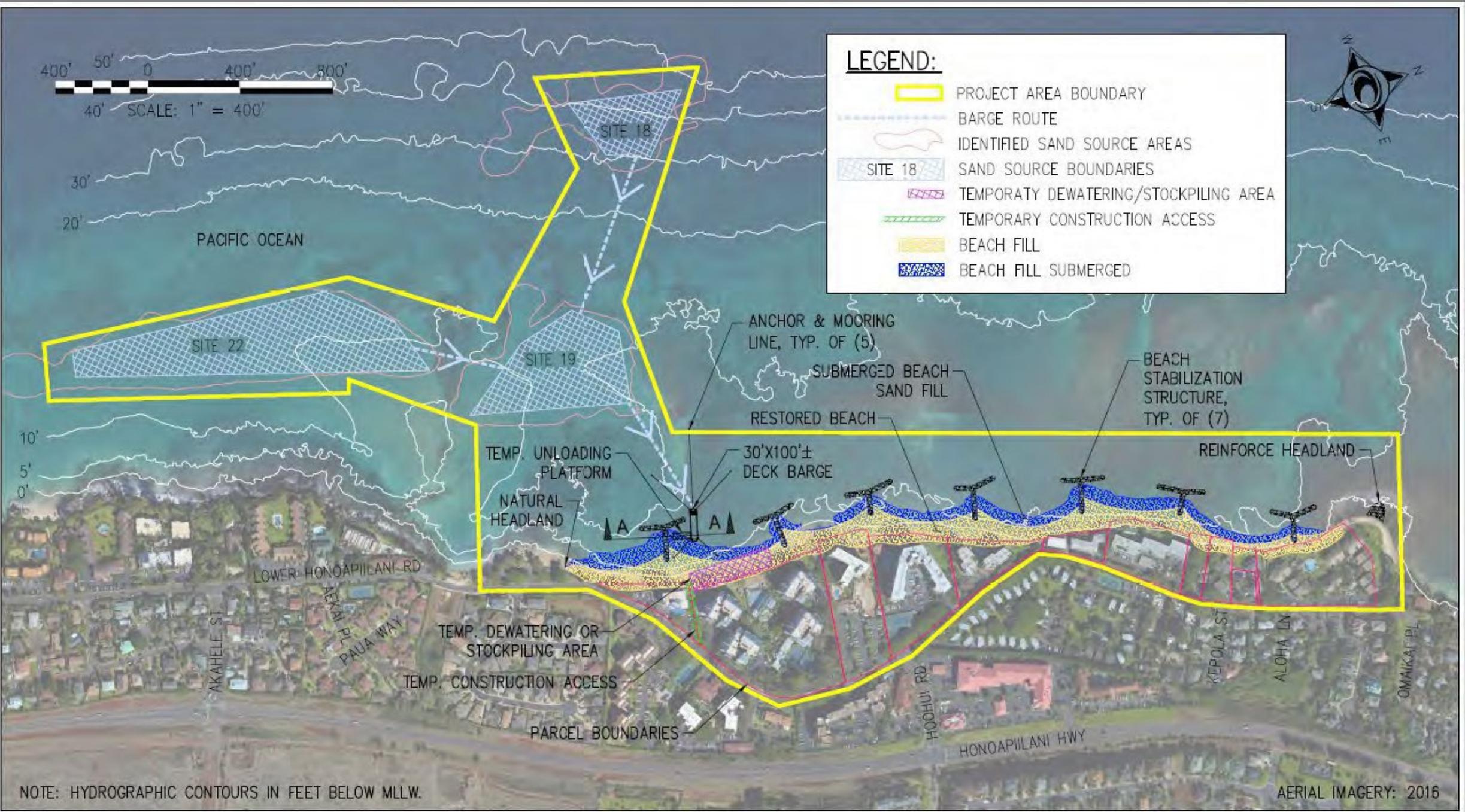


1-year Northwest swell



LEGEND:

- PROJECT AREA BOUNDARY
- BARGE ROUTE
- IDENTIFIED SAND SOURCE AREAS
- SITE 18 SAND SOURCE BOUNDARIES
- TEMPORARY DEWATERING/STOCKPILING AREA
- TEMPORARY CONSTRUCTION ACCESS
- BEACH FILL
- BEACH FILL SUBMERGED



NOTE: HYDROGRAPHIC CONTOURS IN FEET BELOW MLLW.

AERIAL IMAGERY: 2016

Artistic Renderings: Before & After



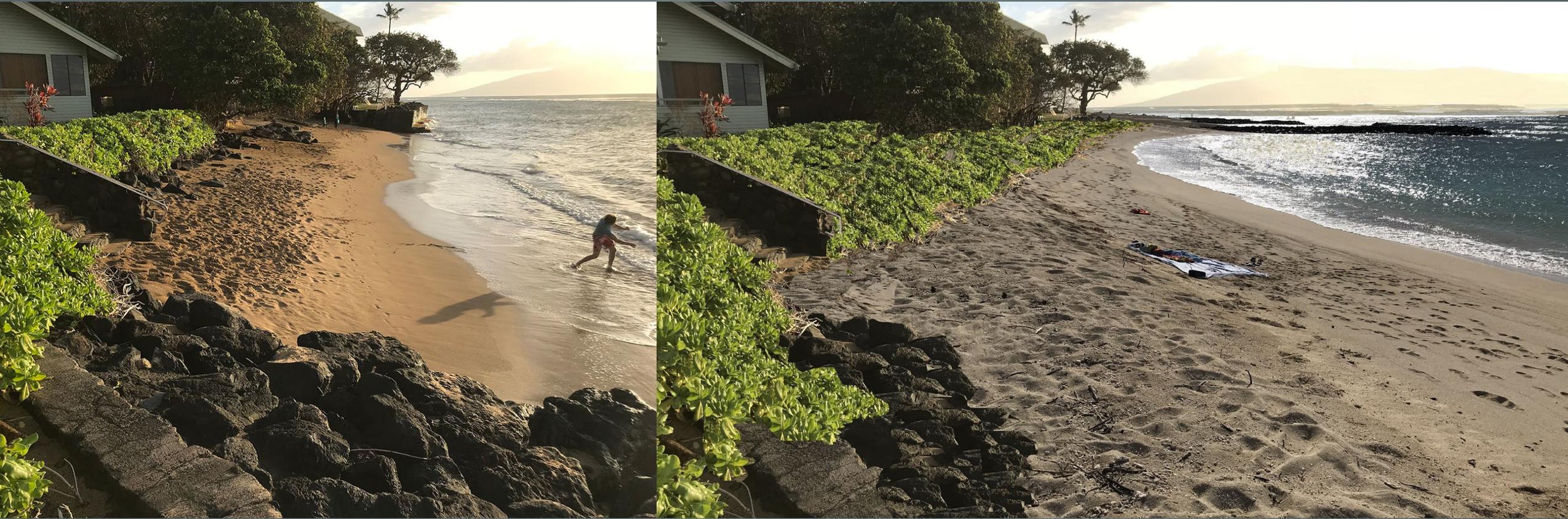
Looking south along the shoreline at Hololani Resort Condominiums

Artistic Renderings: Before & After



Looking north along the shoreline from the southern end of the project site

Artistic Renderings: Before & After



Looking south along the shoreline from the Kahana Outrigger Beach



Secondary Alternative

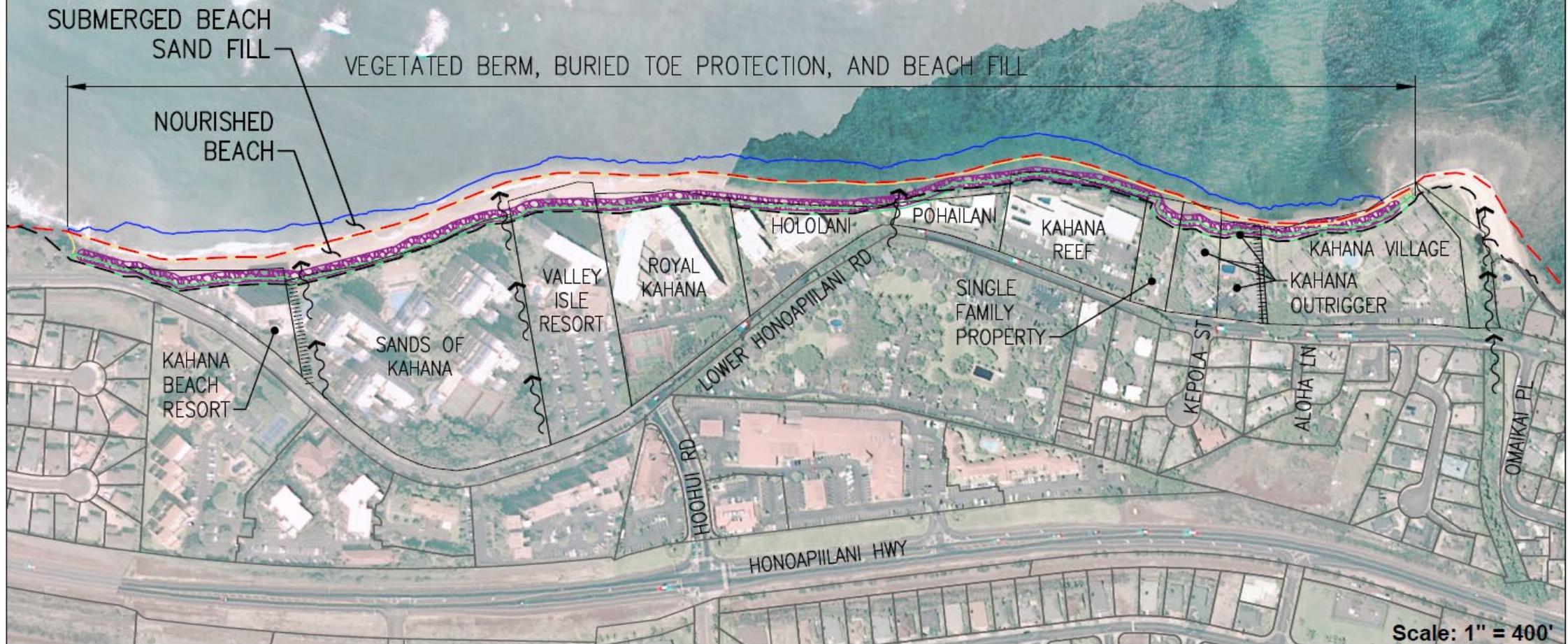
Beach nourishment without stabilization

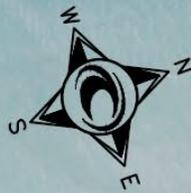
- Beach nourishment, vegetated berm, buried toe protection
- Lower construction costs, higher maintenance costs
- Without stabilization, renourishment needed approx. every 9 years
- With stabilization, renourishment needed after approx. 30 years



LEGEND

- PARCEL BOUNDARIES
- - - APPROX EXIST SHORELINE
- - - APPROX 1975 BEACH
- ▨ BURIED TOE PROTECTION
- ▨ VEGETATED BERM
- ▨ BEACH FILL
- ▨ BEACH FILL SUBMERGED





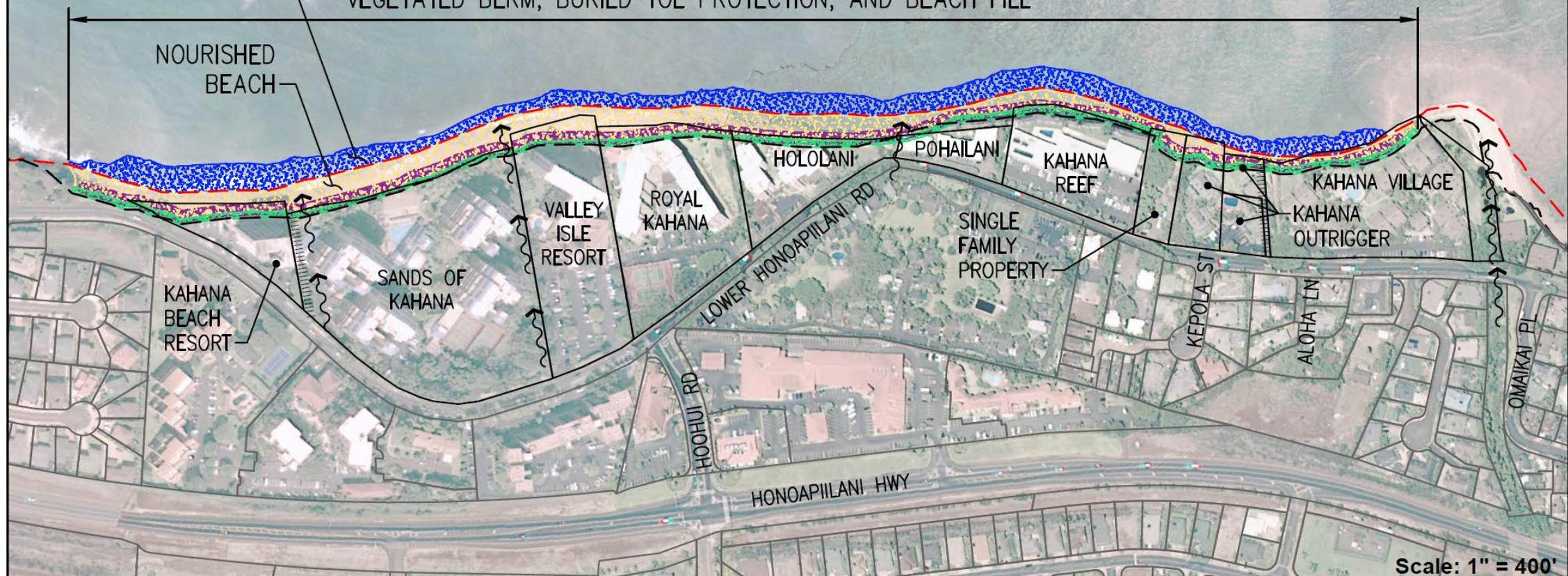
LEGEND

- PARCEL BOUNDARIES
- - - - APPROX EXIST SHORELINE
- - - - APPROX 1975 BEACH
- ▬ BURIED TOE PROTECTION
- ▬ VEGETATED BERM
- ▬ BEACH FILL
- ▬ BEACH FILL SUBMERGED

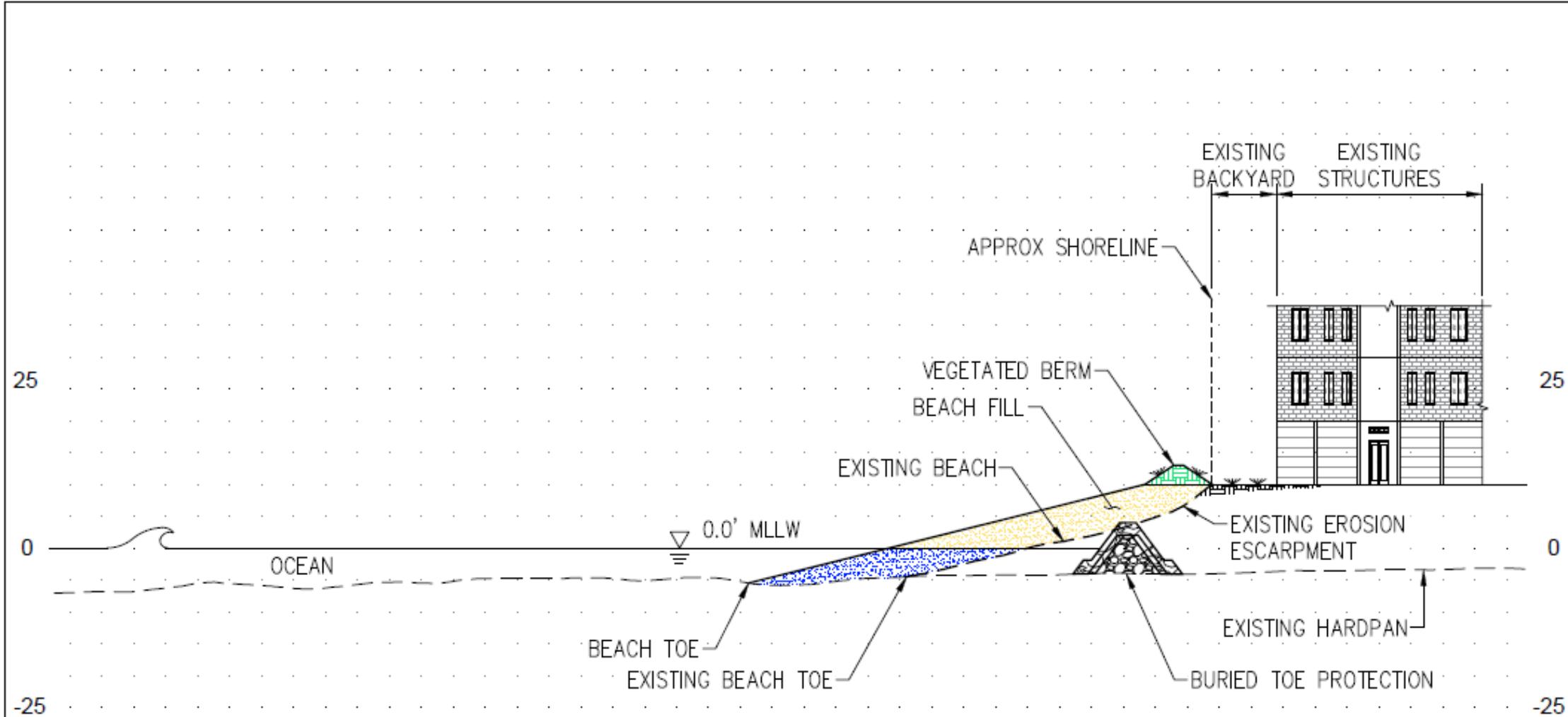
SUBMERGED BEACH SAND FILL

VEGETATED BERM, BURIED TOE PROTECTION, AND BEACH FILL

NOURISHED BEACH



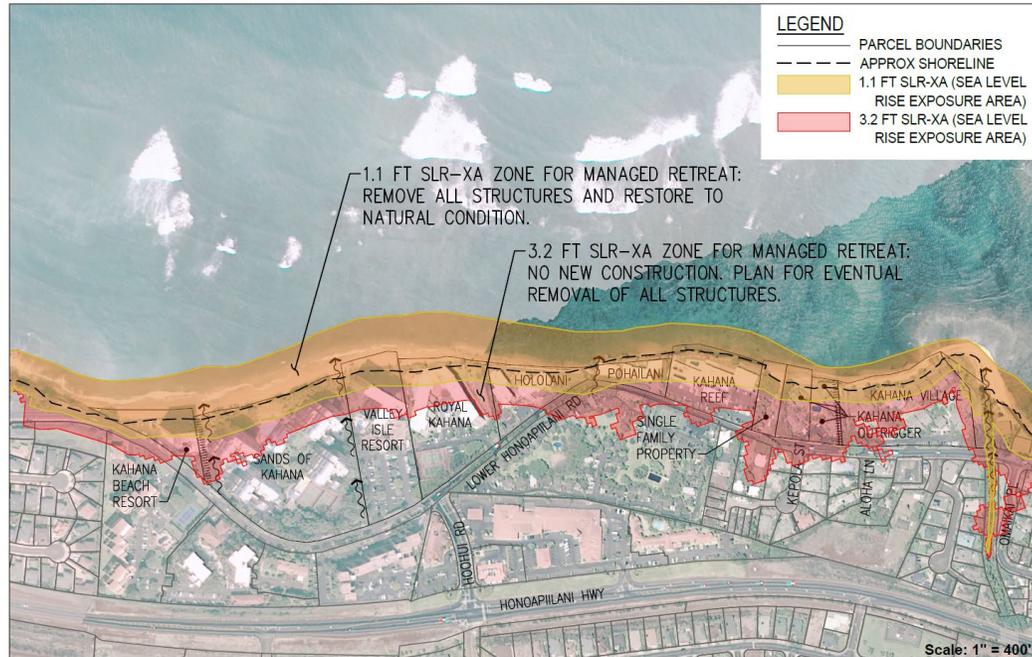
Scale: 1" = 400'



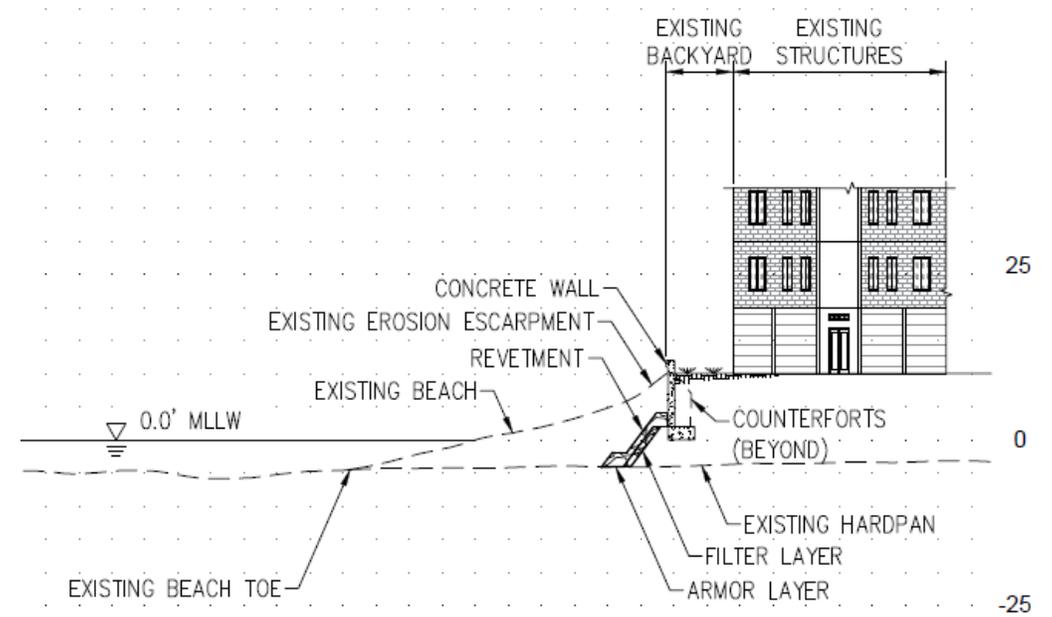
Vert Scale: 1" = 25'
Horiz Scale: 1" = 50'

Alternatives Considered

- Shoreline Armoring
- Managed Retreat
- Accommodation



Managed Retreat Concept



Shoreline Armoring Concept



Photograph taken August 2019

Figure 2-21: Rock Revetment at Kaka'ako Waterfront Park, Honolulu, O'ahu, Hawai'i

Alternative Considered: Shoreline Armoring

Vertical seawalls or sloping revetments built along the entirety of Kahana Bay shoreline

- + Provides physical protection of existing infrastructure
- May exacerbate shoreline erosion and beach loss on adjacent properties
- Amendment to HRS Chapter 205A Coastal Zone Management: "Prohibit construction of private shoreline hardening structures, including seawalls and revetments, at sites having sand beaches . . ."



Figure 2-22: Seawall fronting the Kahana Beach Resort (June 2019)

Alternative Considered: Managed Retreat

Conceptual plan to remove and relocate structures and infrastructure out of vulnerable areas (i.e., SLR-XA 1.1 ft) and prohibit new development within SLR-XA 3.2 ft area.

- + Long-term solution to coastal hazards
- No comprehensive State or County plans or policies currently in place for this complex and expensive endeavor; significant costs related to property acquisition, residential displacement, replacement structures, redevelopment of infrastructure
- Significant time required to plan and implement retreat, while the current erosion hazard would remain an imminent threat to public safety
- Unknown impact to Maui County real property tax payments due to loss of property value
- Unknown impact to Maui County budget

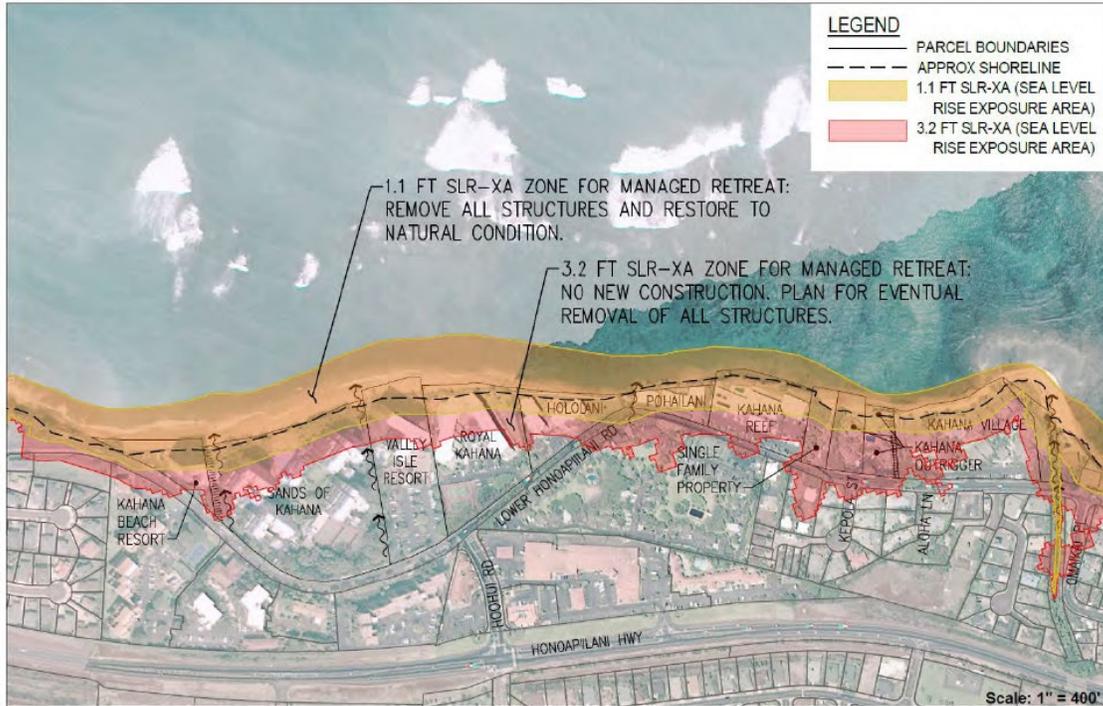


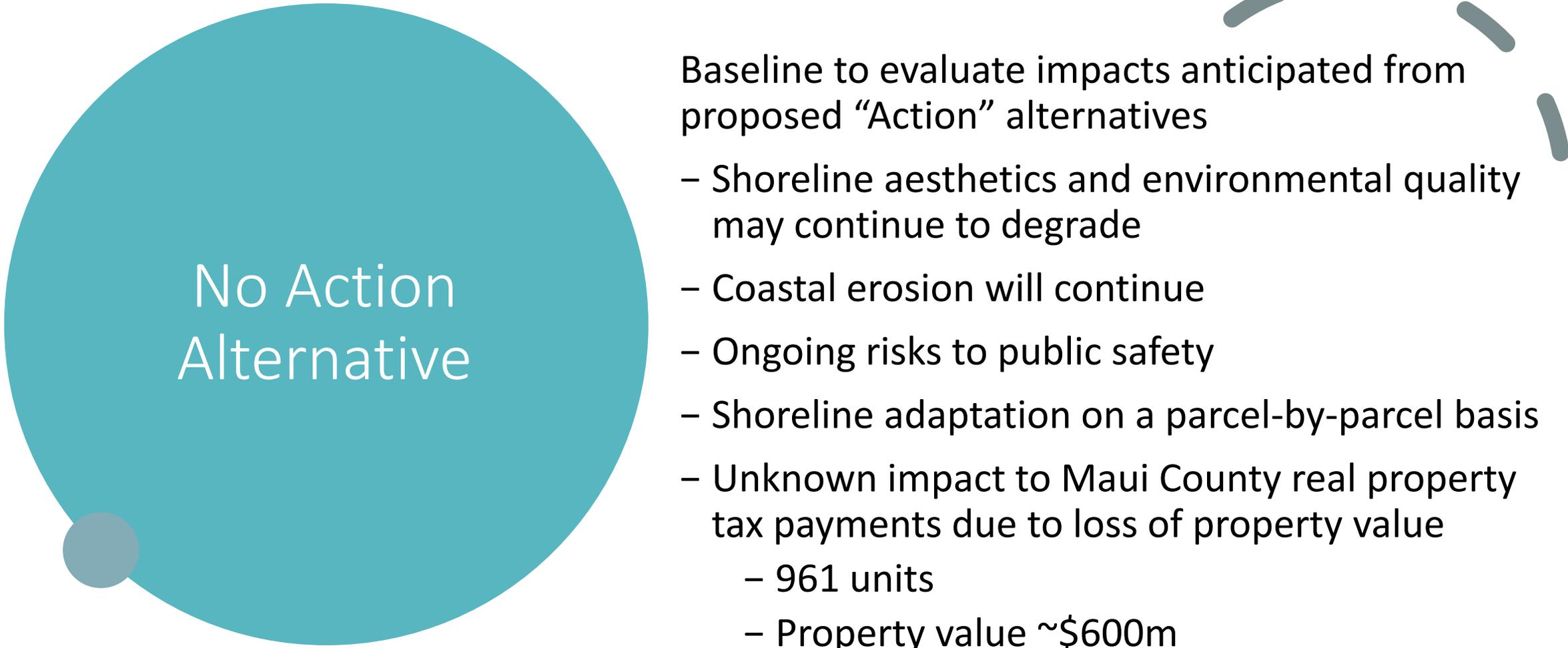
Figure 2-23: Alternative 4: Managed Retreat



Alternative Considered: Accommodation

Adapt existing properties to allow them to withstand coastal hazards (e.g., convert ground floors into areas that can accommodate inundation; support foundations against soil erosion; elevate roadways, etc.)

- + Existing structures may be left in place
 - + Shoreline may migrate naturally
 - Reduction of usable space on ground floors; significant maintenance; foundation design issues; existing utilities and other infrastructure are not resistant to flooding and erosion
- 



No Action Alternative

Baseline to evaluate impacts anticipated from proposed “Action” alternatives

- Shoreline aesthetics and environmental quality may continue to degrade
- Coastal erosion will continue
- Ongoing risks to public safety
- Shoreline adaptation on a parcel-by-parcel basis
- Unknown impact to Maui County real property tax payments due to loss of property value
 - 961 units
 - Property value ~\$600m

Comparison of Project Alternatives

Alternative	Estimated Cost (Construction + Maintenance)	Sand Quantity Needed (cy)	Maintenance	Estimated Timeline for Implementation
Beach Nourishment with Stabilizing Structures (Proposed Action)	\$26M - \$40M	50,000 – 100,000 cy	Renourishment approximately after 30 years. Inspect structures after major storm events	3 years
Beach Nourishment without Stabilizing Structures	\$30M - \$45M	Up to 75,000 cy	Renourishment approximately every 9 years	3 years
Shoreline Armoring	\$18M - \$22M	0	Inspect structures after major storm events	3 years
Managed Retreat	\$508M - \$620M	0	None	20 years
Accommodation	Unknown	0	Unknown	Unknown
No Action	Unknown	0	Unknown; would be done by each parcel	Unknown

Cost + Funding

Proposed Action

- Construction: \$19M - \$30M
- Sand management over 50-yrs: \$7M - \$10M
- Total: \$26M - \$40M

Maui County Community Facilities District (CFD)

- Taxes only the KBSC properties
- No County general fund obligation
- Potential grants (reimbursement only)

Community Facilities District



Examples of Existing County Owned Coastal Structures in Hawaii

- Wailuku-Kahului Wastewater Reclamation Facility: EO 3006 to COM (revetment structure) (to be converted to easement)
- Kanaha Beach Park: EO 2358 to COM (groins, beach, etc.)
- Hookipa Beach: EO 1198 to the COM (seawall, beach, etc.)
- Maipoina Oe Iau Beach (Ohukai Beach), Kihei: EO 1431 to COM (revetment, drainage, beach, etc.)
- Kihei Memorial Park: EO 1431 (pier, beach, etc.)
- Kekaha Beach EO 149-2 to COK (revetment)
- Mauna Lahilahi Beach Park – EO 4637 to CCH (breakwater, revetment, beach)
- Kawaihoa Beach Park (Kailua Beach Park) – EO 0115 to CCH (boat ramp, beach)
- Maunalua Bay Beach Park EO 2626 to CCH (revetment, etc.)
- Makai Pier in Makapuu - EO 0092 to the CCH (pier)

Revetment at Wailuku-Kahului Wastewater Reclamation Facility

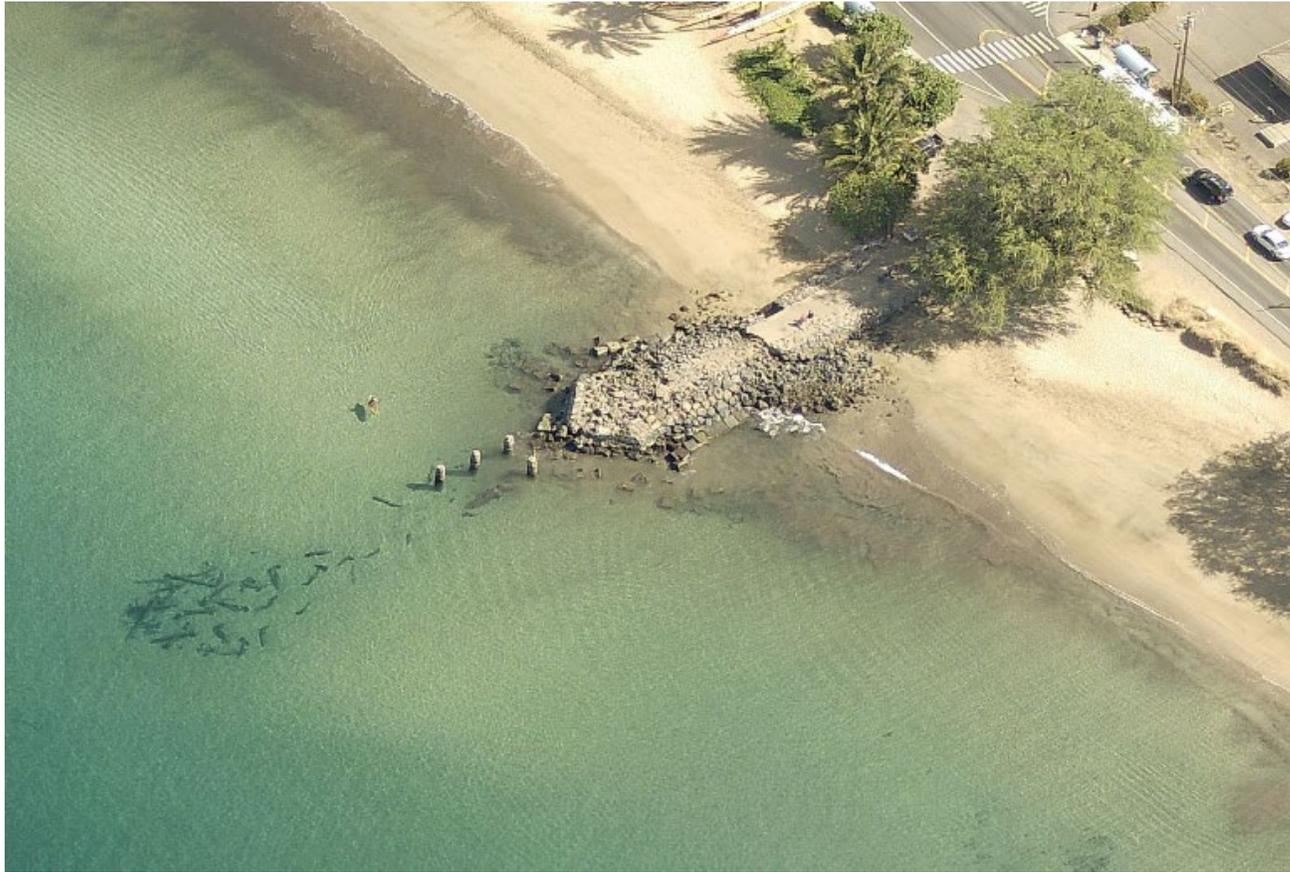


Groins at Kanaha Beach Park





Hookipa Beach Seawall



Kihei Memorial Park and Ohukai Beach



Mauna Lahilahi Beach Park



Potential Impacts

Impacts of the proposed project



- Ecological Impacts
- Cultural + Archaeological Impacts
- Socioeconomic Impacts
- Recreation Impacts
- Coastal Processes & Surf Impacts

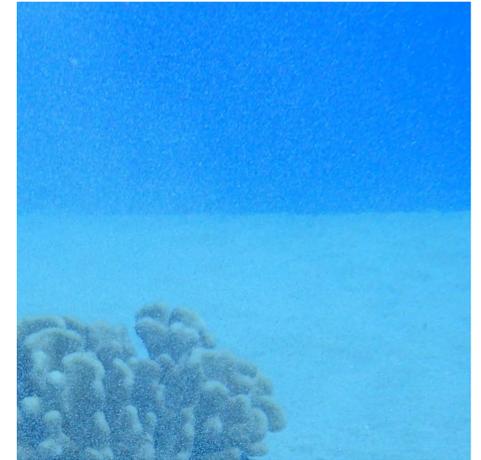
Ecological Impacts

- Long-Term Impacts

- Groins offer structural complexity and topographical relief as opposed to the existing shallow reef flat. This will provide increased habitat for corals, fish and other marine species
- Fish species richness, biomass, and abundance may improve over time
- Reduced erosion → decreased turbidity and nutrient runoff → improved water quality
- Increased beach area provides habitat for turtles, monk seals, sand crabs, etc.

- Short-Term Construction Impacts

- Best management practices to reduce risks to ocean water quality (e.g., turbidity curtains)
- Respecting coral spawning season (June-Sept)
- Potential for relocating corals, etc. from direct impact areas



Cultural + Archaeological Impacts

- Stabilization may help prevent erosion, keeping inland archaeological artifacts in place
- Project will support continued cultural practices (fishing, gathering, surfing, etc.)
- Fishing and gathering conditions may improve over time
- Archaeological monitors may observe construction activities to monitor for possible archaeological and cultural resources and halt activities until issues are resolved



Socioeconomic Impacts

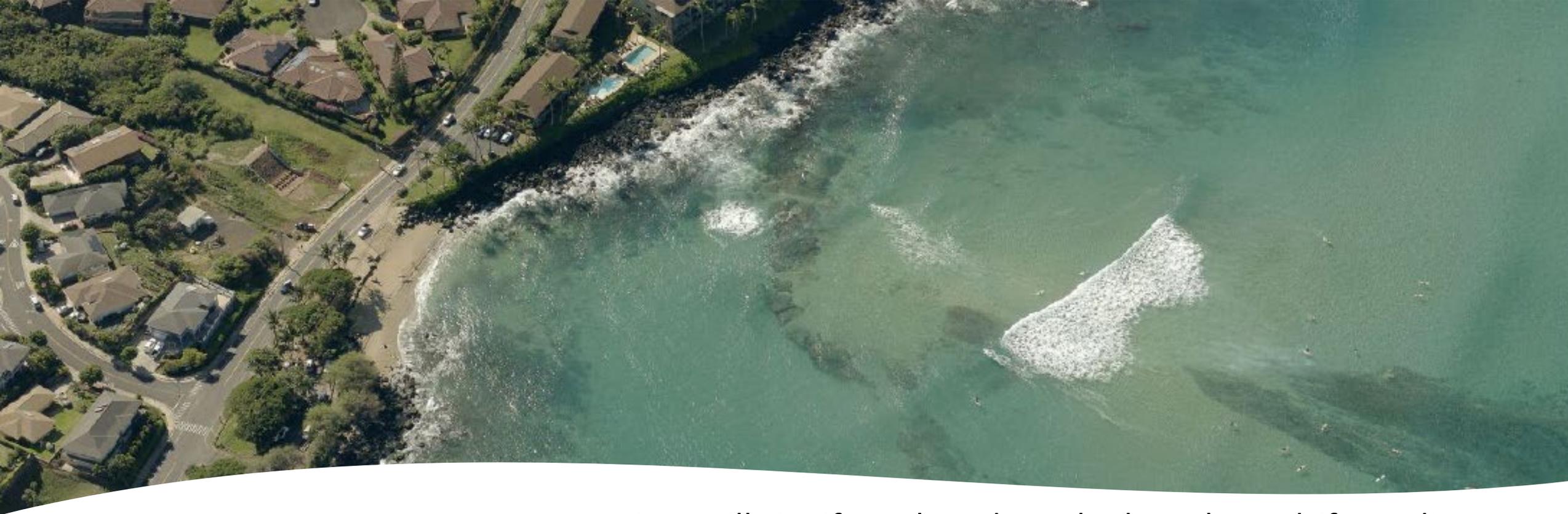
- Enhances and protects shoreline resources for the use and enjoyment of local residents
- Maintains occupancy, business and employment in the area for local residents
- Helps to support property values → tax income to support County budget
- Protects roadways and other public infrastructure from flooding & erosion
- Best management practices to mitigate construction impacts to the community, residents, and nearby businesses



Recreation Impacts

- Restored beach will provide significantly more onshore space for beach activities
- Widened beach will ensure continuous lateral shoreline access
- Seven T-groins → Six new protected coves
- Nearshore fishing conditions may improve over time
- Shifts lateral nearshore access outside T-heads





Coastal Processes & Surf Impacts

- Project will significantly reduce the longshore drift eroding Kahana Beach
- Stabilizing structures will reduce wave energy impacting shoreline
- Stabilizing structures will not create significant rip currents
- The surf breaks along this coast will not be affected
- Offshore waves and currents will not be affected

Mahalo



Michael Foley, Ph.D., P.E.
Sr. Coastal Engineer
Email: kahana@oceanit.com
Office: 808.531.3017

WAI Committee

From: Michael Foley <mfoley@oceanit.com>
Sent: Thursday, June 1, 2023 4:23 PM
To: WAI Committee
Subject: Kahana Bay Erosion Mitigation Project (WAI-1(6))
Attachments: 230605 Maui Council WAI - Kahana Slides.pdf

Dear WAI Committee,

Please find attached slides for agenda item WAI-1(6) on the Kahana Bay Erosion Mitigation Project on Monday, June 5.

Thank you for this opportunity to present to your distinguished committee on this important issue. I look forward to seeing you Monday afternoon.

Aloha,
Mike



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