

To: Chairperson, Hawai'i Board of Land and Natural Resources

Re: Kalaeloa Hybrid Reef Project

Dear Chairperson,

As the Principal Investigator of the University of Hawai'i-led *Rapid Resilient Reefs for Coastal Defense (R3D)* Project, it is my pleasure to submit my full support for agenda items D-4 (Issuance of Right of Entry) and K-2 (Conservation District Use Application) for the Hawai'i Department of Transportation (HDoT) Kaleloa Hybrid Reef Project. I want to commend HDoT for its leadership and willingness to pursue an innovative, nature-based approach to coastal protection, positioning Hawai'i at the forefront of developing resilient solutions to address the growing impacts of climate change and sea-level rise. Our team is a committed partner with HDoT and fully supports the effort to establish a long-term evaluation of the hybrid reef in realistic ocean conditions. I anticipate that the knowledge gained from observing the deployment and growth of the hybrid reef will be crucial to the future development of similar nature-based solutions in our State and around the Pacific.

The planned deployment of the first living coral-reef breakwater is the culmination of four years of extensive research and development led by five laboratories at the University of Hawai'i in partnership with three universities on the mainland. In addition to this team of research scientists and engineers, our team consists of a Waimānalo-based ocean engineering firm—Makai Ocean Engineering, Kuleana Coral Restoration—a Kapolei-based coral restoration non-profit and two concrete-precast firms also in Kapolei—Jensen Infrastructure and GPRM Precast who fabricated the reef less than two miles from the deployment site. This applied research effort has focused on providing an alternative to traditional gray infrastructure through specially designed, wave-attenuating concrete reef structures that support the growth of corals and reef supporting life. This living breakwater will inform future projects to protect shorelines from wave energy and storm surge while accelerating the establishment of healthy, self-sustaining coral reefs.

The Kalaeloa Hybrid Reef will become a living laboratory—a proving ground for state-of-the-art technology and new techniques in the emerging field of nature-based engineering. By establishing this site here in Hawai'i we will be able to observe the changes first-hand and support an informed community on alternative solutions for coastal protection. While evaluating potential sites for the hybrid-reef deployment, we partnered with HDoT to engage key community stakeholders, including the Kalaeloa Heritage and Legacy Foundation, which provided a letter of support; the Makakilo-Kapolei-Honokai Hale Neighborhood Board, which voted in support of the project; and the mālama kai organization Ho'ola Hāni'o, which shared valuable perspectives on the natural and cultural history of the proposed site. Representatives

from these organizations are now partners in the newly established Kalaeloa Hybrid Reef Monitoring Hui and will play an active role in the long-term monitoring and assessment of the project and its effects on the surrounding environment.

Testing of components of the project began in 2023 in Kāneʻohe and Kailua Bays where we honed improved outplanting techniques, and fielded coral settlement experiments yielding dramatic increases in passive coral recruitment and decreased algal competition. The breakwater system has gone through extensive testing to include multiple large-scale wave-flume tests at the Large Wave Flume facility at Oregon State University, and independently assessed by the Army Corps at their Engineering Research and Development Center in Vicksburg, MS. In these tests, the model breakwater reduced over 80% of incoming wave energy while remaining stable in extreme wave conditions. Deployment of the prototype will consist of novel technologies including a shallow-water catamaran that removes the need for crane barges and a novel rotary micropiling system that shrinks the anchoring footprint while reducing sound pollution generated by traditional pile drivers.

The ultimate goal of the project is to provide Hawaiʻi with an effective alternative to traditional shoreline hardening while positioning the state as a global leader in nature-based coastal resilience solutions. To support that objective, the project will validate the technologies and techniques developed during the research phase and share findings proactively and transparently with the community, regulators and industry partners. Our R3D Consortium at the University of Hawaiʻi is a committed partner with HDoT in developing these technologies, measuring their success, and communicating the results in scientific peer-reviewed literature as well as through community-based engagements.

Thank you for the board's consideration of this important matter.

Aloha,
Ben Jones, PhD
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Applied Research Laboratory at the University of Hawaiʻi