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LaoLao Bay Watershed

DRAFT Action Plan

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BECQ Division of Coastal Resource Management

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Watershed Action Plan

The following 10-yr goals and short-term actions are intended to inform the implementation strategy included in the watershed management plan. These are based on a review of achievements of the 2012 Conservation Action Plan, stakeholder input garnered during the 2019 watershed workshop, and findings summarized in the interim watershed characterization report.

10-yr Goals

Through 2030, management of the Laolao Bay watershed will target the following goals:

1. Adopt a **sustainable eco-tourism and recreation** approach that protects natural resources and fosters a conservation-minded partnership between public and private landowners by:

- a. Exploring sustainable financing alternatives for management and maintenance of infrastructure and natural resources.
- b. Reviewing environmental enforcement powers, responsibilities, and policies and improving compliance and enforcement.
- c. Identifying feasible land conservation tools to resolve management conflicts with public activities on private land and to prioritize upland areas for acquisition.



2. Maintain or improve **water quality** to meet CNMI standards for the protection and propagation of fish, shellfish, and wildlife and for recreational uses by:

- a. Expanding current monitoring programs to include groundwater, stream, and BMP performance measures.
- b. Investing in long-term inspection and maintenance of drainage improvements and other watershed restoration projects.
- c. Advancing wastewater, stormwater green infrastructure, and unpaved road stabilization projects to reduce land-based sources of pollution and improve resiliency to future storms.
- d. Promoting sustainable agricultural and aquaculture practices.



3. Enhance ecosystem capacity to provide critical **watershed services** such as habitat, recreation, erosion control, and protection against extreme events by:

- a. Protecting vulnerable coastal infrastructure through nature-based shoreline stabilization.
- b. Improving forest habitats through invasive species management and revegetation of native species.
- c. Continuing in-water restoration efforts such as coral nursery (out planting) and fisheries management.
- d. Eliminating illegal dumping.























4. Create **educational opportunities** for residents and visitors to learn and experience the cultural, historical, and natural resources of the watershed by:

























- a. Supporting organizations and volunteer programs that engage and inform stakeholders on watershed stewardship activities.
- b. Finding opportunities to preserve culture and cultural sites.
- c. Conducting multi-media community outreach in DanDan, Papago, and Kagman to raise awareness of past and future watershed management activities.

















5-Yr Objectives and Actions to Achieve Goals

The table below organizes objectives and specific short-term actions to achieve watershed management goals for the LaoLao Bay watershed and to establish trackable measures of progress. A preliminary, planning-level cost estimate and lead implementation agent are included.

 1. By 2030, adopt a sustainable eco-tourism and recreation approach that protects marine and upland natural resources and fosters a conservation-minded partnership between public and private landowners.			
Relevant Goal	Objective/Action	5-yr Cost Estimate	Lead Agent (Other partner)
	1.1 By 2025, a management and sustainable financing plan has been developed for LaoLao bay addressing eco-tourism and recreation.		
	i. Conduct a feasibility study for establishing user fees (or other), controlled visitor access, and corresponding facility upgrades to dive site, cultural/historic sites, and other beach access points (i.e., bathrooms, parking, visitor information, enforcement).	\$25,000	DCRM (NPS)
  	ii. Submit Land and Water Conservation Fund (LWCF) grant application to NPS for improvement project implementation funding (e.g., for bathroom facilities per Jeffery's Beach).	\$5,000	DLNR/Office of Grants Management (NPS)
	1.2 By 2025, environmental regulations, policies, and enforcement mechanisms have been reviewed and updated.		
	i. Utilize NOAA CRCP Cooperative Agreement to conduct regulatory review and enforcement trainings. Include Tasi-Watch in training program. *	\$50,000	BECQ, DFW (NOAA, DOJ)
	ii. Evaluate the benefit of continued Cucumber moratorium and/or designation of locally managed marine protected area (LLMA). *	\$10,000	BECQ
  	iii. Hire community conservation coordinator and provide additional volunteer Tasi-Watch rangers to support enforcement, maintenance, and educational objectives. *	\$250,000	MINA
	iv. Track and report # and type of violations, enforcement actions taken, and remediation actions implemented annually. *	\$5,000	DCRM
 	v. Define "unsustainable" beach activities and repair or replace vehicular barriers, signage, and other features at strategic locations on LaoLao Bay Drive to discourage bad behaviors. *	\$10,000	DCRM
	1.3 By 2025, a plan has been developed for conserving priority parcels (public and private) that have a potential role in enhancing watershed services and/or climate resiliency.		
 	i. Identify feasible legal and financial mechanisms to formally protect existing undeveloped lands that are deemed critical for habitat and water resource management.	\$25,000	OPD/DLNR (DPL)
 	ii. Evaluate upland habitat quality and identify critical parcels for protection and restoration (e.g., sensitive species, connectivity, stabilization, recharge).	\$25,000	Forestry/DFW
  	iii. Identify private properties adjacent to road ROW where easements or purchase could enhance opportunities for infrastructure protection, access, or other improvements.	\$5,000	DCRM

 2. By 2030, maintain or improve water quality to meet CNMI standards for the protection and propagation of fish, shellfish, and wildlife and for recreational uses.			
Relevant Goal	Objective/Action	5-yr Cost Estimate	Lead Agent (Other partner)
	2.1 By 2025, water turbidity continues to be below 50% of 1997 ambient levels as measured through a more comprehensive water quality and biological monitoring program.		
 	i. Conduct wet weather stream monitoring to measure flow and turbidity, nutrients, and bacteria at least (3) key crossings along LauLau bay Rd., (1) in DanDan, and (1) at the stream discharge in Kagman subwatersheds.	\$50,000	BECQ (MINA, NMC)
	ii. Expand on preliminary nutrient study by Dr. Kiho Kim with a more focused effort on Laolao Bay and Kagman watersheds, additional, seasonal sampling, and nutrient source tracking.	\$50,000	American University/BECQ
  	iii. Conduct addition fisheries surveys needed to establish trends in the abundance of a) carnivorous, surgeon and adult parrot fish; b) sea urchins and sea cucumbers; and c) the coral density per unit area and mean colony size. *	\$250,000	DFW
 	iv. Conduct two Creel (shoreline) surveys with new data collection employees. *	\$25,000	DFW (NOAA)
 	v. Conduct household septic system surveys (including DanDan) to evaluate condition and potential wastewater loads to groundwater.	\$125,000	BECQ
	vi. Evaluate performance of wastewater treatment plant and fertilizer management plan at Laolao Bay Resort and Golf.	\$10,000	BECQ
	2.2 Past road improvements and other watershed BMPs are being maintained. *		
 	i. Develop a comprehensive infrastructure maintenance plan that includes location, procedures, frequency, responsible parties, and reporting requirements for road drainage infrastructure, BMPs, revegetation areas, historic sites, trash removal, etc.	\$5,000	MINA (BECQ, DPW, MOS)
 	ii. Adopt and implement a formal agreement for infrastructure maintenance between DPW, MOS, DCRM, and MINA with annual schedule, division of labor, and dedicated 5-yr maintenance budget.	\$50,000	Office of the Governor
	2.3 By 2025, new BMPs are implemented to further reduce sediment loads, other land-based sources of pollution, and vulnerability to storms.		
	i. Design and permit GapGap Rd. stabilization project to reduce erosion and sedimentation and to provide reliable secondary access to properties on LauLau Bay Rd.	\$75,000	BECQ, (DPW, MOS)
 	ii. Conduct a more thorough watershed inventory in DanDan and Kagman subwatersheds as part of a general watershed assessment training for agency staff.	\$10,000	DCRM (NOAA)
 	iii. Implement demonstration green infrastructure improvements at another location in the watershed, such as Dive Site, San Vicente, on an unpaved residential road, or other sites identified during subsequent watershed inventory.	\$250,000	BECQ
  	iv. By 2025 demonstrate sustainable agriculture and/or aquaculture practices at two operations.	\$50,000	Division of Agriculture (NRCS)

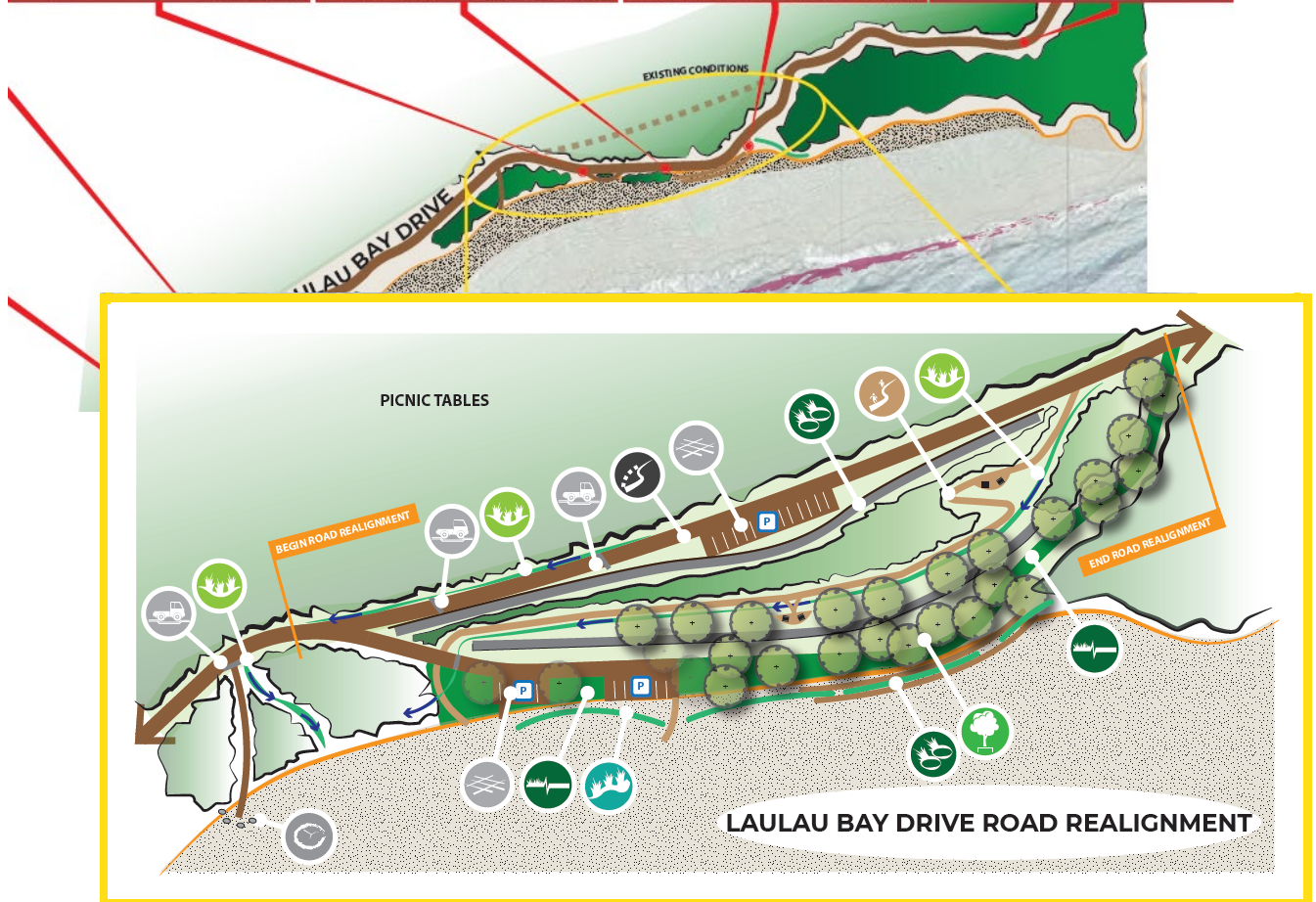
 3. Enhance ecosystem capacity to provide critical watershed services such as habitat, recreation, erosion control, and protection against extreme events.			
Relevant Goal	Objective/Action	5-yr Cost Estimate	Lead Agent (Other partner)
	3.1 By 2025, evaluate forest habitat quality and develop an approach to invasives management.		
	i. Develop revegetation, invasives species management, and plant monitoring plan (maps, designs, procedures, and costs) for public lands (e.g., near quarry in DanDan). *	\$25,000	Forestry/DFW (MINA, DCRM)
	ii. Contact private landowners in the watershed and identify those interested in an assessment of habitat quality and preparation of an invasives management on their property	\$25,000	Forestry/DFW (MINA, DCRM)
	iii. Coordinate with Forestry to plant 1,000 native trees in the Laolao watershed.	\$35,000	MINA
	iv. Conduct at least three separate field demonstration trainings on invasive removal for volunteers at priority locations. *	\$15,000	Forestry/DFW (MINA, DCRM)
	v. Conduct stream assessment to identify bank stabilization, in stream habitat restoration, and buffer revegetation locations.	\$10,000	BECQ
	3.2 By 2025, implement shoreline stabilization and Lau Lau Bay Rd. protection measures using a combination of structural and living shoreline techniques.		
	i. Develop a shoreline revegetation, invasives species management, and plant monitoring plan (maps, designs, procedures, and costs) for Laulau Bay Rd. *	\$50,000	DFW/BECQ (NRCS)
	ii. Design and permit shoreline stabilization measures at locations severely impacted by typhoon Yutu (e.g., Laulau Bay Rd., parking, and boat ramp).	\$275,000	BECQ (DFW)
 4. Create educational opportunities for residents and visitors to learn and experience the cultural, historical, and natural resources of the watershed			
	4.1 By the end of 2025, develop a new Social Marketing Campaign to raise awareness and generate public support for Laolao management priorities (e.g., land conservation, habitat restoration, pollution reduction, and infrastructure resiliency).		
	i. Distribute targeted messages to residents in Laolao and DanDan on septic systems maintenance, native and invasive plants, and onsite runoff management options for unpaved roads and driveways.	\$15,000	MINA, DCRM
	ii. Watershed Warriors to coordinate with teachers and Tasi Watch to develop classroom and field trip activities for elementary, middle, and high schools related to watersheds and climate adaptation.	\$25,000	DCRM (Dept Education, MINA)
	iii. Install (or replace) signage for recreational users on best practices for marine, beach, and upland resource protection at entrance and 4 key access points along Lau Lau Bay Rd.*	\$15,000	DCRM
	4.2 Offer at least one opportunity a year for others to engage in watershed management activities.		
	i. Provide donation/sponsorship opportunities to dive operators, hotels, and MVA and volunteer activities (e.g., tree planting, invasives removal) to tourists.	\$5,000	MINA
	ii. Evaluate potential opportunities for formalizing an upland hiking trail to expand upland watershed and forest education opportunities.	\$10,000	DLNR, Forestry (NPS)

Concepts for Specific Actions

The following descriptions and concept snap shots are provided for several of the priority projects identified in the short-term actions. Additional detail will be provided in the final watershed plan to support next steps.

A. LauLau Bay Drive and Shoreline Resiliency Project (see 3.2(ii))

Typhoon Yutu took a bite out of the beach, parking lot, and a section of LauLau Bay Dr. Temporary boulder stabilization was put in place to keep the road open. Given that SLR projections show this section of road is highly vulnerable, a longer-term solution may include a combination of road realignment, revegetated/living shoreline, restructuring of parking, and beach access controls. The proposed concept extends from the “boat ramp” area east to the section of road that was hit hardest by the storm. It includes a focus on native vegetation, elevated vistas for picnic tables and hangout spots, and drainage control features to protect the road and beach pathways from erosive runoff. Boulders are also proposed at the terminus of the boat ramp road to prevent vehicles from driving on the beach. This location offers an opportunity for education signage. The biggest constraint to this project is that private land ownership on the north side of LauLau Bay Dr. may prohibit road realignment.

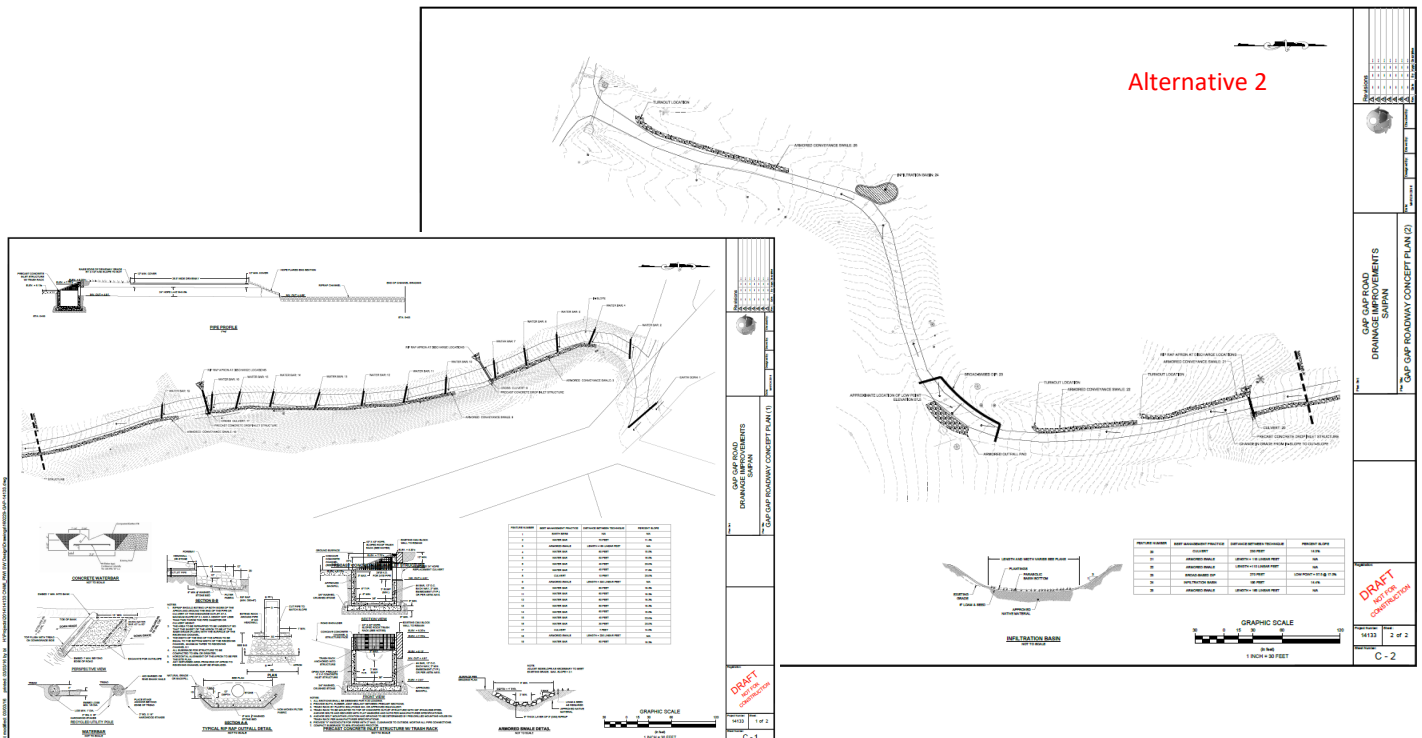
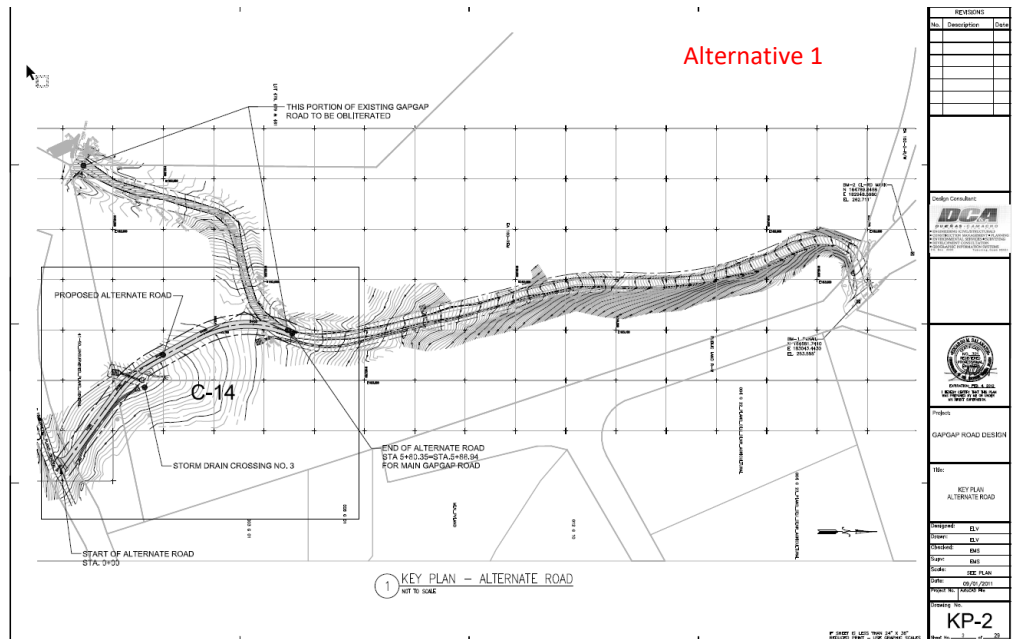


B. GapGap Road Stabilization Project (see 2.3(i))

GapGap Rd. provides alternative access to the eastern portion of LauLau Bay Rd. It is a steep, unpaved road running north to south that connects the paved road near the old detention center with LauLau Bay Dr. near the Dive Site parking lot. GapGap Rd. was built/has been maintained with few features to control drainage; thus, it is subject to significant and chronic erosion and surface degradation that is considered one of the most significant remaining sources of watershed sedimentation. In many cases, portions of GapGap Rd. are impassable to vehicles. Yutu-inflicted damage to LauLau Bay Rd. certainly highlighted the importance of having a reliable, secondary access road.

Over the years various design alternatives have been discussed from paving, to realignment, to a series of drainage features specifically for unpaved roadways. One or a combination of these options should be pursued.

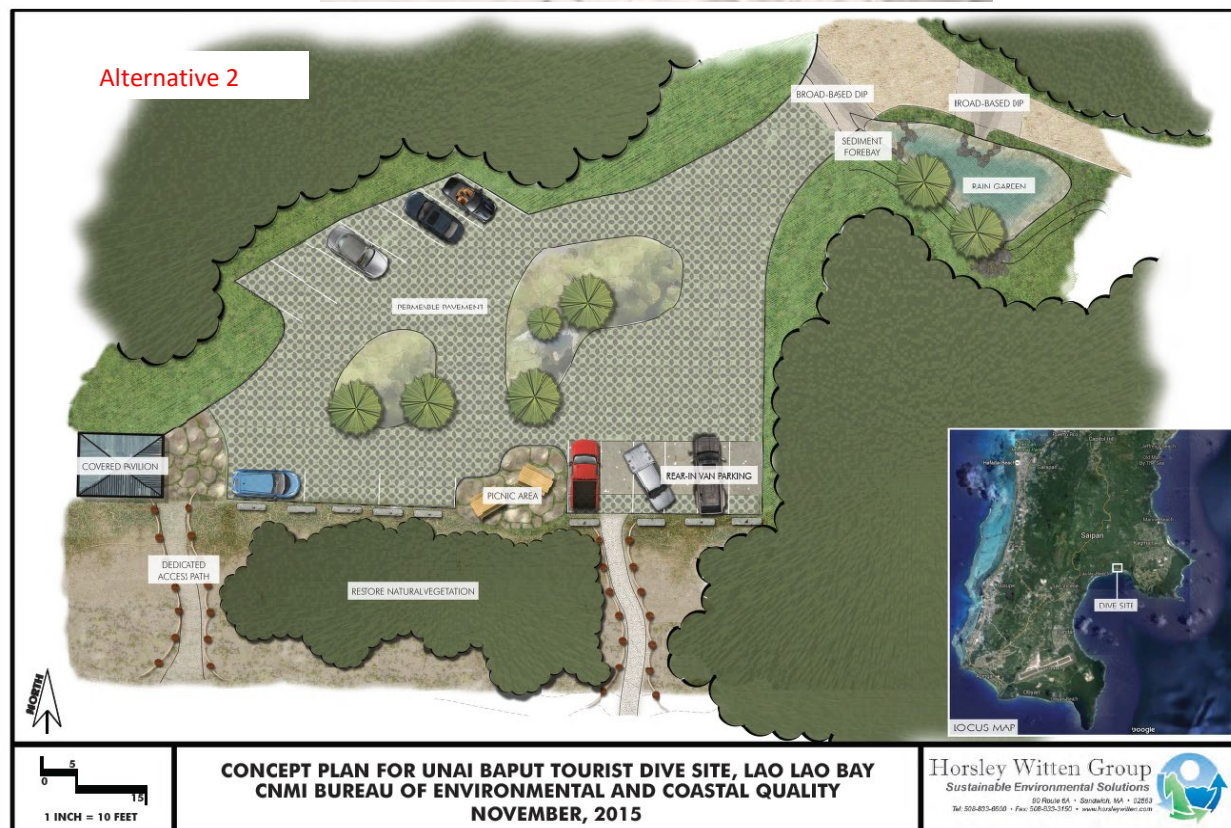
Constraints to moving forward with a project like this appear to be related to private ownership of road corridor, lack of an agency champion, and reluctance to making it “easy” to access LaoLao beach.



C. Dive Site Green Infrastructure Project (see 2.3(iii))

The Dive Site is a popular tourist destination in LaoLao Bay and the parking area attracts much of the frequent vehicular traffic on LaoLao Bay Rd. The parking lot also serves the Unai Baput historic/cultural site located across the road. The Dive Site parking lot today lacks organization as to where people are meant to park, load and unload equipment, and access the beach. LaoLao Bay Drive and GapGap Road direct stormwater runoff down into parking area, which in combination with the vehicular and pedestrian uses, has negatively impacted the parking surface and protective beach vegetation. The proposed design alternatives create space for a stormwater conveyance, dedicated walking paths, and beach revegetation. Permeable pavers may be an option for the parking surfaces. Additional amenities to consider at this site include dumpsters, educational signage, pavilion repair, bike racks, and bathroom facilities. Signage should focus on the best practices for the protection of marine resources, as well as descriptions of improvements made at the Dive Site.

The biggest challenge with this project is that this site is not publicly owned. It is not clear if a written agreement with the landowner exists for public usage of the site. This location should be a priority for land conservation easement, purchase, or other legal mechanism needed to move forward with site improvements and long-term site maintenance.



D. Unpaved Road and Driveway Disconnection Projects (see 2.3(iii))

Runoff from unpaved roads, temporary or permanent, can convey sediment onto paved roads, clog piped drainage infrastructure, or discharge turbid water to the ocean. Without proper road design, unpaved roads can become a constant maintenance burden, especially steep ones. There are numerous examples of unpaved driveways and residential roads in the watershed that are exporting sediment. A residential road and driveway disconnection program could demonstrate installation and maintenance of a variety of techniques (e.g., waterbars, dips, ditch check dams, and turnouts). The intent of the program would be to encourage residents to install simple practices on private roads and driveways to help reduce sedimentation and road surface maintenance frequency. Potential improvements were identified for two residential locations: Bentana Drive and an unpaved road off of Isa Dr. across from LauLau Bay Rd.



LEGEND

(A) STABILIZED INLET FLUME

(B) SEDIMENT FOREBAY

(C) CHECKDAM WEIR

(D) WATERBAR OR DIP

(E) STORMWATER TREATMENT

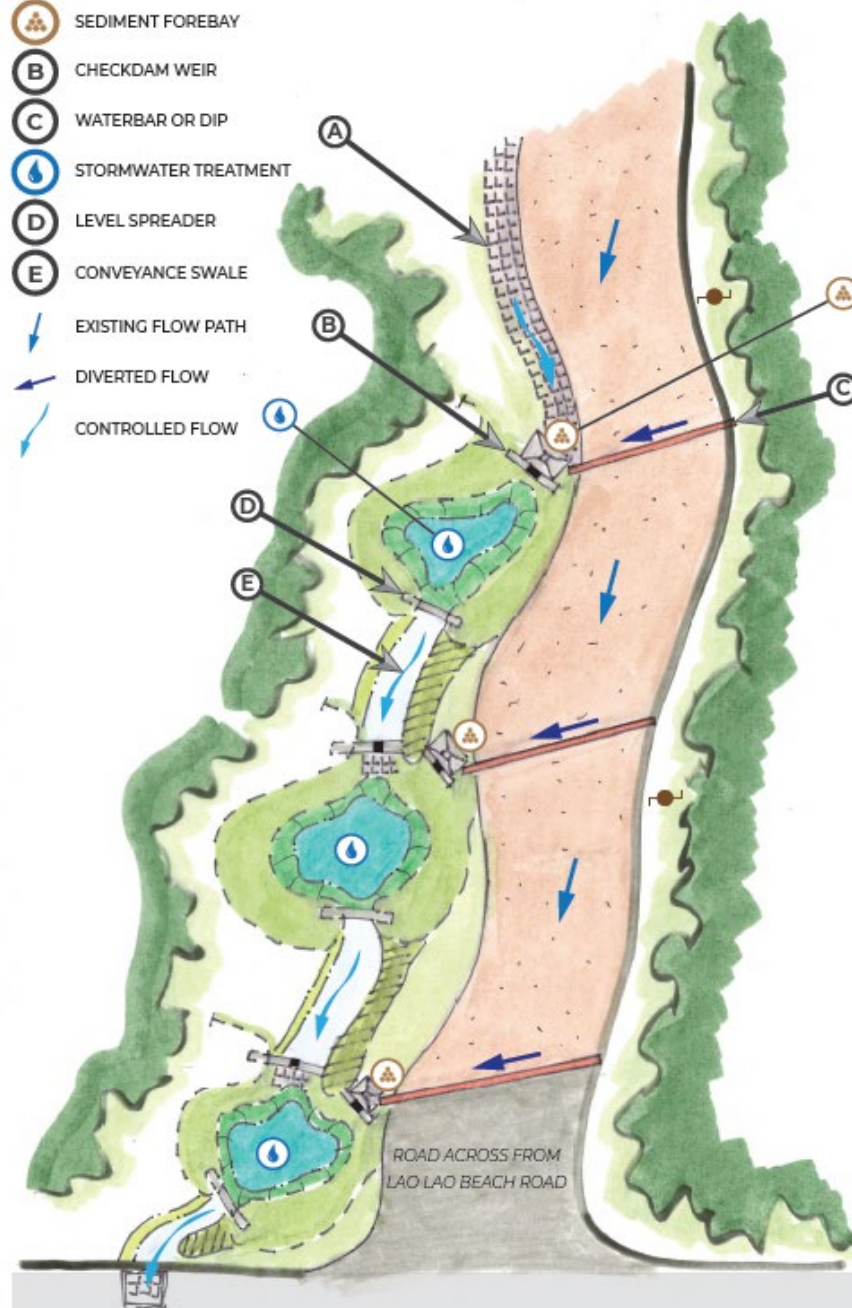
(F) LEVEL SPREADER

(G) CONVEYANCE SWALE

EXISTING FLOW PATH

DIVERTED FLOW

CONTROLLED FLOW



EXISTING CONDITIONS

DATE: (01/15/20)



(A) STABILIZED INLET FLUME



(E) STORMWATER TREATMENT AREA