UNIVERSITY OF HAWAII

Environmental Center
Office of the Director

MEMORANDUM

May 10, 1972

TO: Marvin Miura, OEQC

FROM: Doak C. Cox

HALEIWA BOAT HARBOR IMPROVEMENTS
ENVIRONMENTAL IMPACT STATEMENT

This memorandum responds to your request for a review of this draft environmental impact statement. The following have contributed to our response: A. H. Banner, Hawaii Institute of Marine Biology; G. Dashiell, Pacific Urban Studies and Planning Program; G. Dugan, Civil Engineering; T. T. Lee, Look Laboratory of Ocean Engineering; R. Scudder, Environmental Center; and H. Yamauchi, Water Resources Research Center.

The extent of response we are providing to this impact statement considerably exceeds what we usually provide. I believe that it would be well if we indicated that this extent should not be interpreted as an indication of less than usual adequacy in the present draft of the statement. On the contrary, the greater than usual substance of the draft allows us to be more explicit in our criticism and, furthur, we have found the problems discussed to be interesting.

Our comments will be treated in sections more or less identified with sections in the impact statement.

Description of project and existing facilities

The brief description of the proposed project (p. 2) is adequate neither to convey to the reader the extent of the planned alterations to the Haleiwa small-boat harbor nor the extent to which the plans have been firmed up. To a certain extent the identification in the project description can be supplemented by comparing the air photograph of the existing harbor (p. 7) with the plan for total development (p. 4); but the comparison is made difficult by the different natures and scales of the two illustrations.

It is not clear, for example, that the jetty extending from the outer mole and the fishing pier attached to the breakwater are proposed new construction or that the proposed dredging is not restricted to the outer basin, but that additional dredging will be required to produce a new channel replacing the present channel across which the jetty will be constructed.

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It is our understanding that the plans for the jetty are not yet final but are subject to model testing still in progress.

We understand also that there are two submerged 48-in. pipes, which are of importance to the flushing characteristics of the harbor, connecting the end of the inner basin with the Anahulu River.

Coastal processes and physical oceanographic effects of the project

The brief discussion of coastal processes in the impact statement dismisses the effects of the proposed project on physical oceanography and coastal processes of the area as negligible. The currents in the harbor, and both wind-waves and long-period oscillations, will definitely be altered by the construction of the jetty and revetment and the dredging of the outer basin. The location of maximum wave disturbance will be changed with changes in reflection, refraction, and diffraction characteristics due to changes in the harbor configuration. The statement does not mention a study of the wave and surge characteristics of the harbor, using both hydraulic and mathematical models, in progress at the Look Laboratory of Ocean Engineering. This study can produce information on the effects of the dredging and construction in relation to decreased short-period wave motion in the harbor; possible increased resonant oscillations, and possible problems with wave-induced currents in the entrance channel.

The effects of the jetty construction are not necessarily restricted to the harbor. The waves reflected from it may have influence on the stability of Haleiwa Beach.

The model studies will also be pertinent to the flushing characteristics of the harbor which are discussed in our section on the water quality effects.

Geology and dredging

The geology of the harbor itself is adequately described in the impact statement (pp. 11-19) in relation to the proposed dredging. To avoid possible misconception on the part of readers, however, it might be well to note specifically that the coral underlying the harbor, generally covered with a thin layer of mud or sand, represents an ancient reef and not a living reef or even one recently blanketed with sediments and thus killed. (This remark does not pertain to the living reef outside this harbor.)

The impact statement estimates that sedimentation resulting from the dredging operation will not exceed 1 to 2 inches outside of the main channel and basin, and that the sediments will subsequently be dispersed from their areas of first settlement. It is not clear to what distance a 1-inch layer of sediment may initially extend, nor over what area and to what depth sediments may later be distributed. Certainly anything approaching one inch of sediment deposited on coral would have serious effects, even if in some months it were removed.

If, control of the sedimentation seems desirable, either because of possible biological effects or to avoid violation of the Class AA water quality standards in Waialua Bay, the area to be dredged in the outer basin, at least, might be isolated by a plastic curtain with its upper edge suspended by surface floats and its lower edge held against the bottom by weights. Accumulations of sediments could be removed by the sand recovery system developed at the University of Hawaii under its Sea Grant program. Considering the natural discharge of sediments to Haleiwa Bay by the Anahulu River, however, it seems unlikely that such extreme control measures will be warranted.

The statement does not indicate where the dredging spoil will be deposited. Presumably the spoil will be used as fill in either the inner or the outer mole, or both. The major control of importance will be on the water returning from the spoil area.

The statement does not discuss interference with the use of the harbor by the dredging operations in the outer basin where some boats are now moored or in the channel which must be traversed by boats entering and leaving the harbor.

Water quality: water-use classification

The impact statement recognizes (pp. 1 and 22) that the waters of Waialua Bay have been placed in use - Class AA in the State Water Quality Standards (Publ. Hlth. Regs., Chapt. 37-A, Sec. 5.A.1(a)). The statement does not, however, discuss the classification of the harbor waters. According to the Water Quality Standards, the waters of Haleiwa are assigned to Class B (Sec. 5.A.1(c)). However, this designation is explicitly restricted "to a limited area next to boat docking facilities in bays and harbors." "The rest of the water area in such bay or harbor shall be Class A unless given some other specific designation in Section 5" (Sec. 3.A.3). Inasmuch as the outer basin of Haleiwa small-boat harbor represents a part of Waialua Bay separated from the rest of the Bay by a breakwater and a mole, we interpret the waters as being in use Class AA except where they are "next to boat docking facilities."

According to the impact statement (p. 5) the present harbor was constructed in 1965; actually, before that date there was a stub breakwater.

The harbor consists of two major sections, a part of the estuary of the Anahulu River from which the river was diverted in 1965 by the construction of the present river channel (Impact statement, p. 5) and a part of Haleiwa Bay, itself a part of Waialua Bay, which was separated from the rest by a breakwater and a jetty, constructed in 1965. Before 1965 there was a stub breakwater and a dock on the west bank of the estuary. Berths were created in the former estuary in 1967. Hence, clearly the estuary section of the harbor was included in the Class B designation of the Water Quality Standards which were adopted in December 1967 and approved in January 1968.

If the outer basin of the harbor is regarded as part of Waialua Bay not next to boat docking facilities, its waters may be considered Class AA waters. If the outer basin is considered to have been separated from the Bay by the 1965 jetty, its water may be considered Class AA waters. Only if the Class B designation is interpreted as applying to waters next to not only existing boat docking facilities but also intended boat docking facilities can the waters of the basin conceivably be considered Class B waters.

Unless, by this interpretation, the waters are now considered Class B waters, they should presumably be reclassified if intensive harbor use is to be made of them. Otherwise the users of the harbor may be placed in jeopardy with respect to the State Water Pollution Control Regulations (Publ. Hlth. Regs., Chapt. 37) through the minor pollution incidental to their normal in-harbor activities. The proposed dredging might well be prohibited in Class AA waters by the standard pertaining to total dissolved solids, salinity, and currents (Chapt. 37-A, Sec. 6.B.5.) and possibly other standards. No matter what the classification, such activities as the dredging necessary to the improvement planned will, presumably, require a discharge permit from the Department of Health because of the turbidity that will result from them, although greater departure from natural levels of turbidity is allowed in Class B waters than in Class A or particularly Class AA waters.

Water quality effects

With respect to the water quality of Waialua Bay, note is made of the data available through the 1962 study by Belt, Collins and Associates but the data are not used in the statement. No mention is made of the 1967 water quality in the bay collected by R. M. Towill Corp. (Rept. to Dept. Publ. Wks., C&C, Honolulu), nor that collected at Haleiwa Beach by the Department of Health. No water quality data pertinent to the present harbor are presented in the statement.

Water quality monitoring and a baseline survey are appropriately called for (p. 23) but the institutional responsibility for the monitoring is not indicated, and it is not recognized that a "one-shot" or short-term survey will not adequately indicate base lines under varying natural or present conditions.

There are a number of oversimplifications and misleading statements in the discussion of water quality, for example those dealing with (p. 23):

a. The "purifying" effect of dissolved oxygen on organic contaminants;

b. The assurance against bacteriological degradation in surfing and swimming areas; and

c. The effectiveness of flushing in removing pollutants from the harbor.

In a discussion of possible increases in pollution concentrations in and near the bay, use is made in the statement of a model developed by Ketchum (pp. 24-25). There appear to be some typographical errors or omissions in the mathematical expression of this model. More seriously, the model was developed for a multi-segment estuary and its application to a single-segment harbor is dubious; the model deals with the effects of a single pollution episode and not continuously generated pollution; and the model assumes conservative pollutants and cannot be used to predict concentrations of pollutants subject to settling or to biological uptake.

So far as the physical effects of flushing are concerned, the results of the Look Laboratory study already mentioned would be of greater pertinence. This study has as yet not taken into account the effects of the two 48-in. pipes reported to connect the inner basin with Anahulu River, which are not mentioned in the impact statement either.

With respect to sanitary quality, the impact statement notes (p. 27) the freedom of small-boat harbors in California from coliform bacterial concentrations exceeding standards, but does not note whether the standards in question are the pertinent Hawaiian standards (Publ. Hlth. Regs., Chapt. 37-A, Sec. 6.B.1) nor whether the boat harbors are in or next to stream-mouth estuaries. With more pertinence, the statement might have noted that most stream-mouth estuaries in Hawaii apparently have coliform concentrations exceeding the Hawaiian standards (Cox and Gordon, 1970, U.H. Water Resources Res. Ctr. Tech. Rept. 31).

The statement recognizes the critical importance of controls on human excretory products. The plan calls for the construction of three "comfort stations" in addition to one now existing. The type and capacity of these stations is not discussed in relation to potential odor problems or means for sewage disposal, except for the statement that the latter will be acceptable to the Department of Health.

The Harbors Division prohibition against living aboard any boats except transient ones is mentioned (p. 24), but the number of possible transients and prospective lengths of stay are not indicated nor is it recognized that the problem of sewage discharges from small boats in harbor is not yet adequately taken care of by this prohibition.

The statement does not discuss certain other kinds of pollution that are particularly associated with harbor operation whose increase may be expected to result from the expanded use of the Haleiwa small-boat harbor. These include petroleum contaminants and heavy metals thought to be derived from anti-fouling bottom paints.

Two-cycle outboard motors, particularly, discharge considerable amounts of pollutants in their exhausts. Average discharges have been estimated as follows (English, McDermott, and Henderson, Jour. Water Polln. Control Fed. 35(7) 1963):

Pollutant	Discharge (gram/gallon fuel)
Non-volatile oil (presumably from oil mixed with fuel)	105
Volatile oil (presumably from fuel)	57
Lead	0.53
Phenols	0.60
COD	432
BOD	160

Heavy metal concentrations in the waters are probably low, but accumulations in the bottom sediments may be very high. The Oahu Water Quality Program found the following levels in the bottom sediments at the Ala Wai small-boat harbor (work areas 6 and 7, Part I, p. VI-50):

Pollutant	Concentration (ppm)
Mercury (Hg)	58
Arsenic (As_2O_3)	212
Copper (Cu)	7,000
Zinc (Zn)	1,420
Lead (Pb)	5,000

The dredging operations may reintroduce some of these pollutants into the water.

Biological impact

The description in the impact statement of the biota of the harbor area (pp. 29-43) appears to be accurate and adequate. The coral flats outside the breakwater appear normal except that there is a somewhat heavier growth of algae, especially Ulva (which indicates a high nitrate concentration). The sand bottom within the breakwater is, as is to be expected, without much life. Within the inner harbor there appears to be little marine life, again as is to be expected. Before the diversion of the Anahulu River, the biota in the estuary were, of course, subject to great osmotic shock, and that may still be the case if water from the present mouth circulates into the harbor.

The statement concludes that the major effects on the biota will be the direct effect of dredging on the benthic biota and the effect of the silt from the dredging operation, again principally on the benthic biota. Since there appear to be no living corals inside the breakwater and, even where old coral must be dredged, the bottom is generally covered with mud or sand, the effects are estimated to be of small importance.

The importance of the control of sedimentation, particularly from water returning from the dredging spoil area is discussed in our section on geology and dredging.

Cultural and socio-economic impact: Recreation

The impact statement discussion of the recreational effects of the harbor (pp. 44-46) rests on data from the 1967 State of Hawaii Comprehensive Outdoor Recreation Plan (SCORP) and on the Boat Launching Facilities Master Plan (BLMFP). Because these effects actually constitute the rationale for the harbor improvement project, the accuracy of their description is important. The BLMFP data used in the statement are relatively up to date (1971), but the 1967 SCORP is not only out of date but, in its ranking of the popularity of various outdoor recreational activities, used a very small sample possibly subject to bias in favor of persons and families with more than average leisure time and financial resources.

Unfortunately, unlike the 1967 SCORP report, the 1971 SCORP report does not include data on pleasure boating. We understand that data was collected in several pleasure boating activities and is stored on tape so that it can still be analyzed. There is in the 1971 SCORP report a ranking of activities which includes "fishing-boat, deep sea" but this omits rowing, canoeing, sailing, motor boating for pleasure, water skiing, and possibly boating as a means of access to reef and other near-shore fishing sites.

Actually popularity rankings in the SCORP reports indicate usage, not demand. If lack of facilities is a present contraint on use, the demand, the future use, and the impact on recreation may be considerably underestimated by data on present use. It would be helpful if data could be presented on backlogs of applicants for berths and moorings, delays in launching, etc. We have observed that even on a weekday afternoon there is considerable congestion around the present launching ramp at Haleiwa.

The SCORP data are not broken down finer than by islands. It would be quite pertinent to note that, except at Haleiwa, there are no present launching ramps on the north coast of Oahu from Kaena Point (actually Pokai Bay) to Kahana Bay and no present harbors to Kaneohe Bay. The impact statement does contain discussions of the lack of potentials for development of harbors on the north coast (which are criticized in our section on alternatives), but this lack is appropriately distinguished from the lack of present facilities. Table VIII (p. 45) indicates actual and projected launchings and launching facility needs specifically related to Haleiwa and Table IX (p. 49) shows a breakdown of the demand for facilities by boat length but the sources for these data are not indicated.

It is significant that the 1967 SCORP listed sail boating and power boating as second and third highest among "Activities respondents desire with equipment provided at reasonable cost" (Table 36), with the total of these two (23% for Oahu) clearly ahead of the first, horseback riding (17%). If the "fishing-boat, deep sea" activity is added, the total for Oahu would be 31%. Among "New activities respondents desire to try" (p. 39) sail boating was ranked fourth (11% on Oahu).

It would be valuable if the notes in the impact statement on natural distribution of pleasure-boat ownership by family income (p. 46) could be substantiated for Oahu. Unfortunately the income breakdown in SCORP includes only the "fishing-boat, deep sea" category referred to above.

Cultural and socio-economic impact: Hazards

One aspect of impacts not discussed in the statement is the aspect of hazards to which the use of the harbor will contribute. Any recreational activity presents some hazards as well as benefits to human health. The hazards associated with any water sports, including boating are not negligible. There are, however, some hazards that should be specifically taken into account at Haleiwa, hazards to the users of the harbor but more especially to the facilities and the boats. These are the hazards from storm waves and tsunamis.

During the storm of 1 December 1969 three boats at the Haleiwa small-boat harbor were sunk and two slipped their moorings and were wrecked on shore (Honolulu Star Bulletin, 3 December 1969), although the harbor master remarked that the damage was "fantastically low" considering the size of the waves. This was clearly a storm of unusual severity, but the existence of the hazard should be recognized in the impact statement and the frequency of such storms should be estimated together with the damage rate.

The major tsunamis affecting Haleiwa during the last 50 years have been the following (Shepard, Macdonald, and Cox, 1950, Scripps Inst. Oceanog. Bull. 5(6) 391-528; Cox and Mink 1963, Bull. Seismol. Soc. Amer. 53(6), 1191-1209; Pararas-Carayannis, 1969, World Data Center A--Tsunami, 69-2, ESSA Coast & Geod. Survey):

Date	Source	Runup height at Haleiwa (ft)
1923 February 3	Kamchatka	12
1946 April 1	E. Aleutian Is.	10
1952 November 4	Kamchatka	8-13
1957 March 9	Western Aleutian Is.	13
1960 May 22	Chile	8

The following notes on the effects of these tsunamis have been drawn from a cursory examination of newspaper accounts, and records of the tsunami research program at the Hawaii Institute of Geophysics.

The February 1923 tsunami flooded the railroad that then ran next to the shore and damaged a bridge at Sea View Inn. No reports of damage to boats at Haleiwa have been found (Star Bull., 3 Feb. 1923). The April 1946 tsunami dislodged the railroad bridge again (Honolulu Advertiser, 1 Apr. and 3 Apr. 1946) and cast a crashed boat up on the beach at Haleiwa.

Runup heights of the November 1952 tsunami ranged from 8 to 13 feet in Haleiwa Bay and reached 17 feet on the point to the west. The waves damaged several rowboats, but most sampans apparently rode out the waves at their moorings in the Anahulu estuary without damage. There was considerable damage to Sea View Inn (Star Bulletin, 5 Nov. 1952).

The effects of the March 1957 tsunami were described as worse than those of any previously experienced at Haleiwa. The waves flooded the part of the town that then lay inland of the present Haleiwa Beach park as well as the coast west of Haleiwa Bay. Several sampans at the Anahulu estuary were demolished, two of them washing ashore at Sea View Inn (Sunday Advertiser, 10 Mar. 1952).

The consequences of the May 1960 tsunami at Haleiwa were relatively insignificant.

All of these tsunamis occurred before the present small-boat harbor was constructed.

The present extended breakwater would probably result in some reduction of wave height in its shelter, but since even the 1960 tsunami had a height more than sufficient to overtop the jetty and the mole it is certain that most, and perhaps all of these tsunamis would have resulted in damage to boats and probably facilities if the proposed small-boat harbor had been in existence at the times of their occurrence.

The frequency and damage of tsunamis in the enlarged small-boat harbor should be estimated in the impact statement.

Alternatives

In three discussions of alternatives the impact statement indicates that "there are no other feasible locations for a boat harbor along the North Shore" of Oahu (p. 8), that "the existing figuration of the 27 mile long North Shore is such that there is no economically feasible locations [sic] which could serve as an alternative" (p. 46), and that there are no other feasible locations for a boat harbor along the North Shore except Kaiaka Bay which was examined in 1962 and rejected because of the level of pollution there, rough conditions at the entrance and high costs (p. 51). It seems clear that there are no alternatives on the North Shore that are preferable to the Haleiwa small-boat harbor from a purely economical standpoint. It may well be that there are no alternatives which are preferable from combined economic and environmental considerations. It may be doubted, however, that no other North Shore site would have appeared feasible for development as a small-boat harbor if the Haleiwa one did not exist.

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