

East San Pedro Bay Ecosystem Restoration Feasibility Study

U.S. Army Corps of Engineers and City of Long Beach

DRAFT ALTERNATIVES BRIEF

September 10, 2018

The purpose of this brief is to summarize the preliminary identification of six alternatives as the draft final array of alternatives for the East San Pedro Bay Ecosystem Restoration Project Feasibility Study, being conducted by the U.S. Army Corps of Engineers (Corps) and the City of Long Beach (City). Together, the Corps and City have been developing the study for the purpose of restoring aquatic habitats such as kelp, rocky reef, coastal wetlands and other types historically present in San Pedro Bay of sufficient quality and quantity to support diverse resident and migratory species within East San Pedro Bay. These alternatives, and the process to develop them, are summarized below and will be fully described in the public review of the Draft Integrated Feasibility Report/Environmental Impact Statement-Environmental Impact Report (IFR/EIS-EIR), currently scheduled to be released this winter.

The final array of alternatives described in this brief were developed using the Corps' civil works feasibility study plan formulation process which utilized extensive analysis and screening criteria. Alternatives were developed from combinations of various habitat restoration measures that address the planning objectives. The Corps' Cost Effectiveness/Incremental Cost Analysis (CEICA) evaluation technique was then used to evaluate the various restoration measures to determine which combinations of measures should be carried forward as the most cost-effective and efficient plans. Cost effective means that for a given level of non-monetary output, no other plan costs less, and no other plan yields more output for less money. These cost-effective plans were then examined to determine which are most efficient in the production of environmental benefits; the most efficient plans are referred to as best buy plans. The final array includes three of the best buy plans and represents differing scales of restoration. In addition, two plans were developed that include modifications to the breakwater to address the City's priorities, including habitat restoration, increased flushing, and enhanced recreation, and are also included in the final array.

The six plans in the draft final array of alternatives are as follows and all but Alternative 1 are described on the following pages, and are subject to change in the Draft IFR/EIS-EIR:

Alternative 1: No Action Alternative - This plan is also referred to as the Without Project Condition and represents the conditions expected to exist within the study area in the absence of a proposed water resources project. Since impact assessment is the basis for plan evaluation, comparison and selection, clear definition and full documentation of the without-project condition are essential.

Alternative 2: Kelp Restoration Plan (Best Buy Plan 2)

Alternative 4: Reef Restoration Plan (Best Buy Plan 4)

Alternative 9: Scarce Habitat Restoration Plan (Best Buy Plan 9)

Alternative BW1: Breakwater Western Notching Plan

Alternative BW2: Breakwater Eastern Removal Plan

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Near Shore Rocky reef (shoal): Under Alternative 2, five nearshore rocky shoals would be created to total approximately 16 acres. The nearshore shoals would be created by first depositing a base of stone at the site, then finely placing cap material to obtain sufficient interlocking and depth profiles. Prior to construction, surveys for eelgrass and invasive alga would be conducted in the nearshore placement area. The placement of material would be conducted to avoid or minimize any direct or indirect impacts to existing eelgrass or other resources within the limits of the nearshore placement area. The multifunctional reefs could have an effect on the shoreline erosion rates. Further design would be performed in the Preconstruction and Engineering Design (PED) phase to determine the proper spacing and locations to better stabilize the immediate shoreline.

KELP REEFS

Under Alternative 2, kelp reefs would be established in two zones: (1) along the seaward side of the existing breakwater, and (2) within the open water zone. Each zone is expected to support approximately 61 acres (122 acres total) of giant kelp habitat. To construct these reefs, quarry stone would be transported and deposited from barges in a random manner to achieve 20% total bottom coverage of substrate with only one layer of stone thickness. Establishment of giant kelp on reefs would occur through passive colonization of propagules over time.

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depth. Only a single size stone would be required and interlocking of adjacent stones would not be required for stability due to the depth of placement.

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SANDY ISLAND

Under Alternative 9, a 24-acre sandy island would be constructed in the nearshore zone. Silt or sand would be dredged and used as fill material until the desired elevation is reached. A cover layer of white sand would be placed on top of the fill material to attract birds. Slopes would consist of two layers of riveted rock with a portion of a constructed beach with a natural profile.

OPEN WATER ROCKY REEFS

Under Alternative 9, seven rocky reefs would be created in the open water. Each open water rocky reef would be approximately 15 acres, for a total of 102 acres of rock reef habitat. Construction methods for open water rocky reefs would be the same as described for near shore rocky shoals under Alternative 2.

WETLANDS NEAR LOS ANGELES RIVER AND PIER J

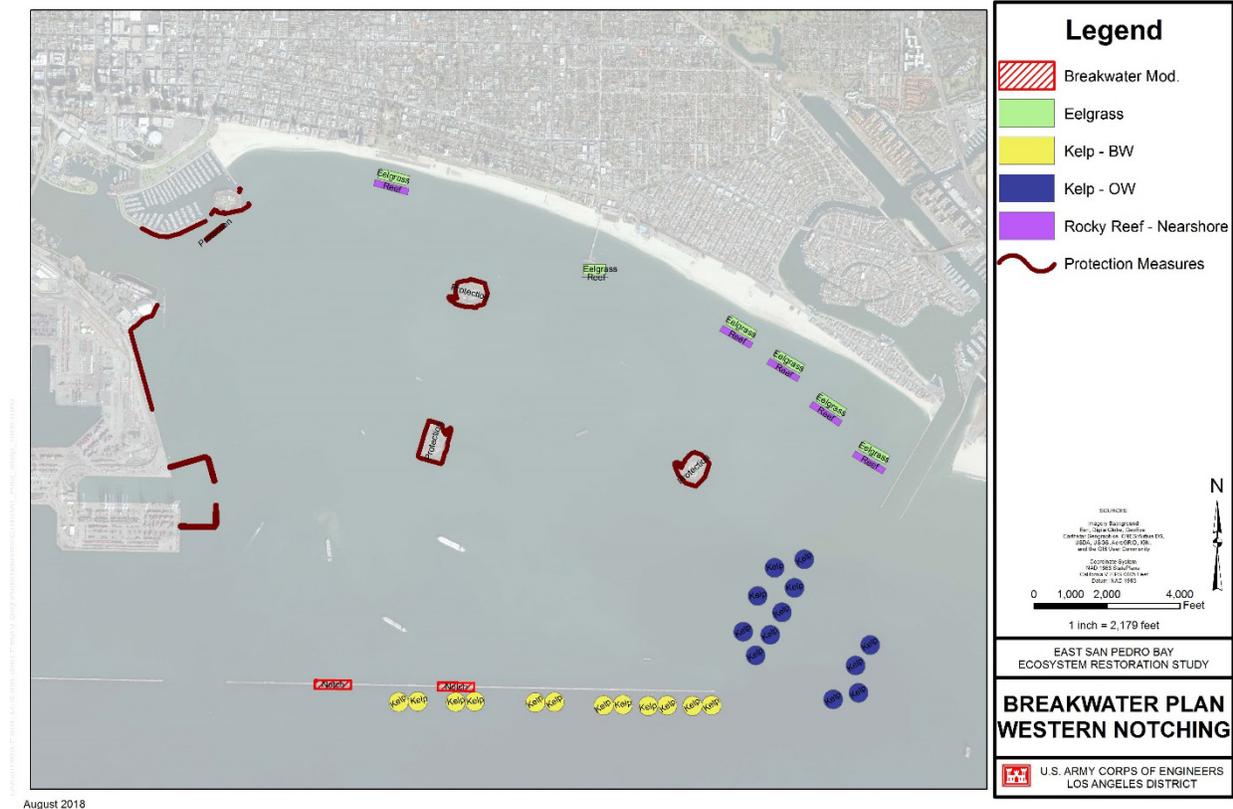
Under Alternative 9, two wetland areas would be created: (1) a 10-acre wetland near the mouth of the Los Angeles River and (2) a 42-acre wetland near Pier J. The perimeter of the wetland would be a stone foundation of quarry run material with pre-cast concrete segments filled with ballast (rock). The interior would be sand or silt (fill material) covered with clean sand to reach required elevation. Most likely a cofferdam dam would be needed. Caisson perforations would be included to absorb wave energy.

OYSTER BEDS

Under Alternative 9, less than one acre (0.03 acres) of oyster beds would be created at the existing Alamitos Bay jetties. If needed, bathymetry of the oyster bed areas would be raised by placing appropriate substrate stone. A base layer of shell-hash (typical material used for oyster bed establishment) would be required. Once the shell-hash is placed, active “seeding” of the bed with juvenile oysters would be conducted.

DRAFT ALTERNATIVE BW1

Breakwater Western Notching Plan + Best Buy Plan 2 (Modified)



The Breakwater Western Notching Plan (Alternative BW1) includes all of the ecosystem restoration measures specified for Alternative 2 along with the following additional measures:

BREAKWATER MODIFICATION

Under this plan, two 1,000 foot notches on the western portion of the existing Long Beach Breakwater would be created. Stones removed from the breakwater would be reused to build protective structures around the Oil Islands, Pier J structures, and the parking lot near Junipero Beach. Stones would be removed by crane, cleaned, and transported by barge to serve as protective measures for the oil islands. The remaining sand and clay core material would remain in place to be naturally transported or dredged and utilized as fill material.

PROTECTIVE MEASURES

Under this alternative, protective measures would be needed to limit the impacts from increased wave energy on existing infrastructure. The increase of wave heights will cause additional damage to the existing revetments from Pier J to the Queen Mary and near Shoreline Marina. To reduce the risk of failure, the revetments should be rehabilitated to withstand the new wave climate with only minor maintenance over the structural life. For this study, the rehabilitation of the revetments was used to account for total project costs. Increased periodic maintenance could be considered instead (no

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construction of reinforced revetment, decreasing the total first cost [construction]); however, this option would leave a significant risk of structural failure that would require emergency repairs and may affect adjacent infrastructure.

Protective measures would include increasing the amount of protection (armoring) of the existing oil islands and Pier J (see red lines on map). This would be accomplished by placing a second layer of larger stone along the existing slopes of the oil islands. A cast-in place concrete parapet wall would also be added on top of the revetment. The nearshore rocky reefs would be increased in elevation to provide for a similar level of protection against runup and erosion from Alamitos Bay to Belmont Pier. A small emergent breakwater would be created to protect Belmont Pier from increased wave energy. Increases in wave heights as a result of Alternative BW1 alters the longshore sediment transport in the area of Junipero Beach and adjacent areas (but not as to threaten other structures). The increase in wave heights are not anticipated to cause damages from overtopping, but would increase the longshore transport rates to a point where the parking lot will begin to be undermined within 10-15 years without any additional action. An offshore submerged breakwater will decrease the incident wave energy thus reducing the local sediment transport and protecting the existing infrastructure.

ADDITIONAL NOTES

Impacts to the Port of Long Beach, the Navy and other navigational interests resulting from the Breakwater Western Notching Plan remain under analysis. Measures to reduce or mitigate for these impacts are also under development. Those impacts and potential mitigation measures would be more thoroughly presented in the Draft IFR/EIS-EIR.

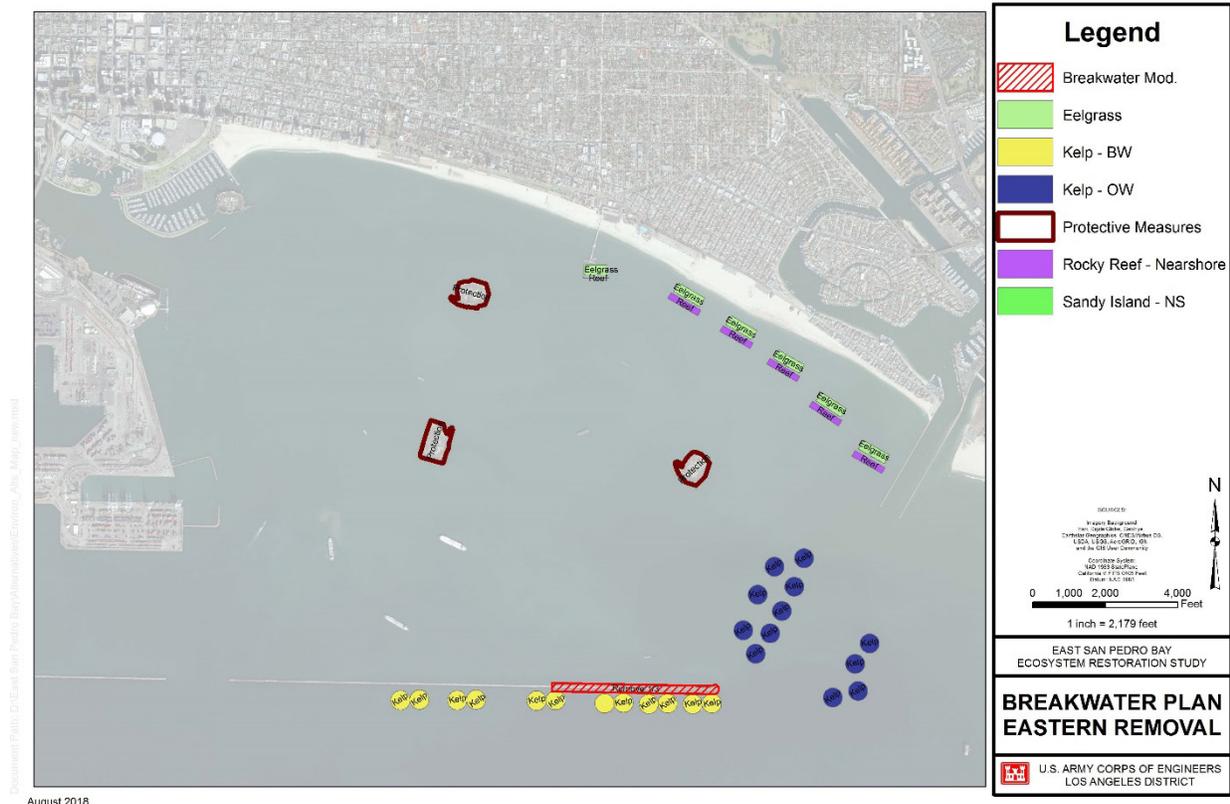
Slight modifications from Alternative 2 would be necessary for this and the other breakwater plan. These include a shifted rocky reef shoal/eelgrass bed to provide coverage for Peninsula Beach, and kelp beds being split apart to allow for boat passage out of Alamitos Bay.

For NEPA (National Environmental Policy Act) analysis purposes, the team is currently reviewing the compatibility of breakwater modification measures to the other best buy plans, Alternative 4 and Alternative 9.

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DRAFT ALTERNATIVE BW2

Breakwater Eastern Removal Plan + Best Buy Plan 2 (Modified)



The Breakwater Eastern Removal Plan (Alternative BW2) includes all of the ecosystem restoration measures specified for Alternative 2 along with the following additional measures:

BREAKWATER MODIFICATION

Under this Breakwater Plan, approximately 1/3 (approximately 24-acres) of the existing Long Beach Breakwater would be removed. Stones removed from the breakwater would be reused to build protective structures around the Oil Islands and Belmont Pier only. Armoring methods for these features would be as described for the Alternative BW1.

PROTECTIVE MEASURES

Under this alternative, protective measures would be needed to reduce impacts to existing infrastructure and shoreline development from increased wave energy and coastal flooding. These would require increasing the amount of protection (armoring) of the existing oil islands and the creation of a small emergent breakwater to protect Belmont Pier. Additionally, the nearshore reefs would need to be constructed to a higher elevation to achieve a similar level of protection as the existing Long Beach Breakwater to the shorefront structures and limit excessive shoreline erosion along East Beach.

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Slight modifications from Alternative 2 are the same as described above.

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