



DEPARTMENT OF THE ARMY
SOUTH PACIFIC DIVISION, U.S. ARMY CORPS OF ENGINEERS
333 MARKET ST.
SAN FRANCISCO, CALIFORNIA 94105-2195

CESPD-PDC-P

21 June 2010

MEMORANDUM FOR: Commander, Los Angeles District, ATTN: CESPL-PD

SUBJECT: Policy Compliance Review of the Long Beach Breakwater (East San Pedro Bay) CA, Ecosystem Restoration Study, Section 905(b) Analysis.

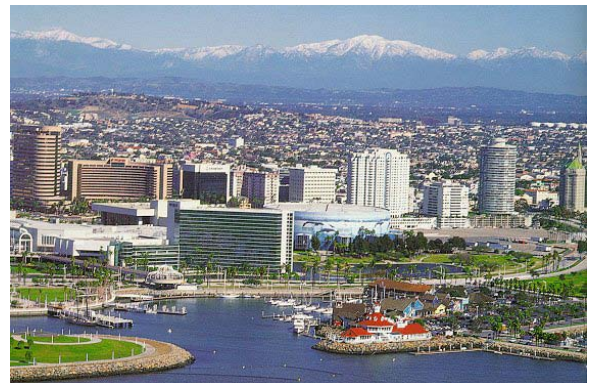
1. Reference: Memorandum, CESPL-PD, dated 27 April 2010, Subject: Long Beach Breakwater, CA (East San Pedro Bay) Ecosystem Restoration Study Reconnaissance Phase 905(b)
2. The subject Section 905(b) was reviewed and the analysis is certified to be in accordance with current policy and priorities. The study will consider creating new rocky reef habitat while also improving tidal and wave induced water circulation. California's ocean fisheries and near coast habitat are experiencing substantial ecological stress. A potential project would improve significant habitat for various rockfish species, ling cod, various invertebrates, kelp and sand bass.
3. In accordance with the Division Commander's delegated authority, the Section 905(b) Analysis is approved. A copy of this memorandum and the approved analysis are also being provided to the HQUSACE's Regional Integration Team.
4. Questions regarding this policy compliance review should be addressed to James J. Conley (415)503-6587.

CF: CEMP-SPD


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Director, Programs



**US Army Corps
of Engineers** ®
Los Angeles District



**Long Beach Breakwater
(East San Pedro Bay)
Ecosystem Restoration Study
Reconnaissance Phase 905(b) Report**

April 2010

**LONG BEACH BREAKWATER (EAST SAN PEDRO BAY)
ECOSYSTEM RESTORATION STUDY
SECTION 905(b) (WRDA 86) ANALYSIS**

1. STUDY AUTHORITY

1.1 AUTHORIZATION

This Section 905(b) (WRDA) Analysis was prepared under the authority of the following Congressional Resolution, which reads as follows:

Senate Resolution, approved 25 June 1969, reading in part:

“Resolved by the Committee on Public Works of the United States Senate, that the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on the Los Angeles and San Gabriel Rivers and Ballona Creek, California, published as House Document Numbered 838, Seventy-sixth Congress, and other pertinent reports, with a view to determining whether any modifications contained herein are advisable at the present time, in the resources in the Los Angeles County Drainage Area.”

1.2 APPROPRIATIONS

Funds in the amount of \$90,000 were appropriated in fiscal year 2010 to initiate and complete the reconnaissance phase of the Long Beach Breakwater (East San Pedro Bay) Ecosystem Restoration Study. Initial research and public outreach were conducted by the City of Long Beach beginning in 2008, external to the U.S. Army Corps of Engineers (USACE), with the hopes that much of that work would be applied to USACE standards for a 905(b) analysis. The City of Long Beach provided funds for the initiation of their own reconnaissance study in the amount of \$100,000 through the City of Long Beach Tidelands Funding (\$100,000) and reimbursed by a California State Coastal Conservancy grant (\$50,000).

2. STUDY PURPOSE

The purpose of the reconnaissance study is to determine if there is a Federal (USACE) interest in participating in a cost shared feasibility study to evaluate problems and opportunities for ecosystem restoration (restoration of habitat areas which historically existed in the region), water quality, and recreation improvements in East San Pedro Bay, Long Beach, California. The City of Long Beach initiated their own study in August 2008. The USACE initiated the reconnaissance study in February 2010. The 905(b) analysis has resulted in the finding that there is a Federal interest in continuing the study into the feasibility phase. The purpose of this Section 905(b) Analysis is to document the basis for this finding and establish the scope of the feasibility phase. As the document that establishes the scope of the feasibility study, the Section

905(b) Analysis is used as the chapter of the Project Management Plan (PMP) that presents the reconnaissance overview and formulation rationale.

3. LOCATION OF STUDY, NON-FEDERAL SPONSOR AND CONGRESSIONAL DISTRICTS

- a. The study area is located offshore of the City of Long Beach, California in the easternmost part of San Pedro Bay. It includes the area between the Long Beach shoreline and the offshore Middle and Long Beach Breakwaters.
- b. The non-Federal sponsor for the feasibility phase of the study is the City of Long Beach.
- c. The study area lies within the jurisdiction of the following Congressional Districts:
 - 1) The 37th District of U.S. Congresswoman Laura Richardson;
 - 2) The 46th District of U.S. Congressman Dana Rohrabacher.

4. PRIOR REPORTS

The following reports were reviewed as part of this study:

4.1 BREAKWATER AND SHORELINE AREA REPORTS

1. *Coastal Erosion Issues Within the City of Long Beach – Draft Report – Prepared by City of Long Beach – June 1994*
2. *Comprehensive Condition Survey – Los Angeles-Long Beach Breakwaters – US Army Corps of Engineers – January 1985*
3. *East Beach Stabilization Project – Tetra Tech, Inc. – August 1991*
4. *East San Pedro Bay Ecosystem Restoration Study – Draft 905(b) Analysis – Prepared by City of Long Beach & Moffatt & Nichol Engineers – July 2009*
5. *Environmental Impact Concerns for Long Beach Harbor – CP “Bud” Johnson – February 2008*
6. *Peninsula Beach Erosion – Draft Feasibility Study – US Army Corps of Engineers, LA District*
7. *Physical and Environmental Changes from the Proposed Removal of the Long Beach CA Breakwater: Implications for Sand Transport, Beach Profiles, Circulation and Water Quality – K. Morris – May 1998*
8. *Review of K. Morris Study by Coastal Frontiers – August 1999*

9. *Port of Long Beach – Pier J Breakwater – Beach Impacts Study – SeaDyn, Inc., July 1995*

4.2 WATER AND SEDIMENT QUALITY DATA SOURCES

1. *ABC Laboratories 2004. Los Angeles Contaminated Task Force Confined Aquatic Disposal Site Long Term Monitoring Program 2002 – 2003*
2. *RWQCB-LA Region and U.S. EPA – Region 9, 2008. Total Maximum Daily Loads for Toxic Pollutants in Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters, Draft: Water Quality Assessment, Problem Statement, Numeric Targets.*
3. *2006 Final 303(d) List – Impairments for San Pedro Bay (includes area shoreward of LB Breakwater): Fish Tissue – DDT, PCBs. Sediment – Chlordane, PAHs, Cr, Cu, Zn, Toxicity. Fish consumption advisory for DDT and PCBs exists in San Pedro Bay and is supported by recent fish tissue results.*
4. *Kinnetic Laboratories, Inc. 2008. City of Long Beach, Recreational Water Quality Source Investigation, Open Coastal Beach Sites.*
5. *U.S. Army Corps of Engineers 2004. Los Angeles District. Los Angeles Regional Dredged Material Management Plan Feasibility Study.*
6. *U.S. Army Corps of Engineers, 2007. North Energy Island Borrow Pit CAD Site Pilot Study 2001-2006 Draft Monitoring Results*
7. *Weston 2006, Supplemental Sampling and Tier III and IV Analysis for LA River Estuary (LARE)*
8. *SCCWRP Bight 2003 Study – Water Quality*
9. *Blooms of Pseudo-nitzschia and Demoic Acid in the San Pedro Channel and Los Angeles Harbor Areas of the Southern California Bight, 2003-2004.*

4.3 BIOLOGY DATA SOURCES

1. *MEC 2002. Ports of Long Beach and Los Angeles Year 2000 Biological Baseline Study of San Pedro Bay. Prepared by MEC Analytical Systems Inc. for the Port of Long Beach Planning Division. June 2002.*
2. *MBC 1984. Outer Long Beach Harbor – Queensway Bay Biological Baseline Survey. Prepared for the Port of Long Beach.*
3. *MBC 2003. Physical and Biological Monitoring at Golden Shore Marine Reserve, Long Beach, California Year 5 (2002). Final Report. Prepared for the City of Long Beach.*
4. *MBC 2006. Eelgrass, Caulerpa, and Giant Kelp Surveys, Prepared for Under Ocean Floor Seawater Intake/Discharge Demonstration Facility, in Long Beach Harbor offshore of Ocean Boulevard between Temple and Cherry Avenues.*

5. *MBC 2008. Status of the Kelp Beds, Ventura and Los Angeles Counties, Central Region Kelp Survey Consortium, 2007 Surveys.*
6. *SCCWRP Bight 2003 Study – Benthic Microfauna*
7. *SCCWRP Bight 2003 Studies - Demersal Fishes and Megabenthic Invertebrates*

4.4 EXISTING USACE PROJECTS/STUDIES RELATED TO THIS STUDY

1. *Comprehensive Condition Survey – Los Angeles-Long Beach Breakwaters – January 1985.* This study provides useful details of the breakwaters' history, their construction and current condition.
2. *Peninsula Beach Erosion – Draft Feasibility Study.* This study provides data regarding erosion of the Peninsula Beach area of Long Beach, which is adjacent to East San Pedro Bay.
3. *Los Angeles River Ecosystem Restoration Study.* This study is for a 32 mile stretch of the LA River within the City of Los Angeles. The study area includes several locations where potential exists for restoring a more natural riverine environment, while maintaining and improving levels of flood protection. Treating effluent river flows by the use of treatment wetlands is also included.
4. *Coyote Canyon- Lower San Gabriel Watershed.* The study focuses on watershed management, flood control, ecosystem restoration and water quality and supply solutions. The watershed encompass approximately 165 sq. miles, located 25 miles east of Los Angeles in Orange County and Los Angeles County, California. The highly urbanized area has residential, commercial and industrial development. The creeks vary between rectangular and trapezoidal concrete and riprap channels. This study is intended to result in a Decision Document for Congressional Authorization of specific projects.

4.5 OTHER EXISTING PROJECTS/STUDIES WHICH PROVIDE RELEVANT DATA TO THIS STUDY

Water Board Total Maximum Daily Loads (TMDLs) Project. Currently, there is an ongoing Water Board TMDL project to address pollutants in the Los Angeles River. Once implemented, the reduction of the pollutants discharged from the LA River will improve water quality conditions in the East San Pedro Bay. These TMDL improvements may supplement the improvements that could arise from the East San Pedro Bay Ecosystem Restoration Study. The TMDL is a number that represents the assimilative capacity of receiving water to absorb a pollutant. The TMDL is the sum of the individual wasteload allocations for point sources, load allocations for nonpoint sources plus an allotment for natural background loading, and a margin of safety.

The following list identifies adopted TMDLs with their effective dates:

- a. Los Angeles River Trash TMDL (Sept 19, 2001)

- b. Los Angeles River Nitrogen TMDL (March 23, 2004)
- c. Los Angeles River and Tributaries Metals TMDL (January 11, 2006)
- d. TMDLs in Development
- e. Los Angeles River Bacteria TMDL

5. PLAN FORMULATION

During a study, six planning steps that are set forth in the Water Resource Council's *Principles and Guidelines* are repeated to focus the planning effort and eventually to select and recommend a plan for authorization. The six planning steps are: 1) specify problems and opportunities, 2) inventory and forecast conditions, 3) formulate alternative plans, 4) evaluate effects of alternative plans, 5) compare alternative plans, and 6) select recommended plan. The iterations of the planning steps typically differ in the emphasis that is placed on each of the steps. In the early iterations—those conducted during the reconnaissance phase—the step of specifying problems and opportunities is emphasized. That is not to say, however, that the other steps are ignored since the initial screening of preliminary plans that results from the other steps is very important to the scoping of the follow-on feasibility phase studies. The sub-paragraphs that follow present the results of the initial iterations of the planning steps that were conducted during the reconnaissance phase. This information will be refined in future iterations of the planning steps that will be accomplished during the feasibility phase.

5.1 NATIONAL OBJECTIVES

1. The national or Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to National Economic Development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation.
2. The USACE has added a second national objective for National Ecosystem Restoration (NER) in response to legislation and administration policy. This objective is to contribute to the nation's ecosystems through ecosystem restoration, with contributions measured by changes in the amounts and values of habitat.
3. There can also be a Federal interest in other related outputs of the alternatives, including recreational benefits. Recreation costs cannot increase the total federal cost by more than ten percent and any recreation features should be formulated to avoid impacts to the primary restoration purpose. If the recreation features comply with the above, the recreation benefits would not be constrained since they are not used in a benefit-to-cost analysis for the restoration. The National Ecosystem Restoration (NER) plan is identified based upon a CE/ICA analysis that ascertains the "best buy plans" of restoration only features. Recreation features must be separably economically justified.

5.2 PUBLIC AND STAKEHOLDER CONCERNS

Public input and outreach, conducted by the City of Long Beach, was critical to this reconnaissance study, given the proposed funding partnership between USACE and the City of Long Beach. A public introduction to the study and three public workshops were held over a two-month period in late 2008. The public outreach approach was structured not only to provide information and allow residents and other citizens the opportunity to provide statements of concerns and interests, but also to work in a hands-on fashion with the consultants and facilitators to develop specific visions incorporating their interests and concerns. Main examples of public concerns and goals from the workshops are summarized below.

1. Inputs from Public Workshops (not intended to be an exhaustive list, but representative of primary public inputs)

Inputs related to habitat

- a. Restore bird / fish habitat
- b. Reintroduce/restore marine life / habitat
- c. Protect existing and develop new kelp habitat
- d. Minimize or at least consider response to displacement of current animals and plants by removal

Inputs related to water quality

- a. Decrease trash / debris on the beach
- b. Train LA River away from shore to divert effluent from recreational areas, or through port area
- c. Prevent LA River trash from reaching the open sea
- d. Address cleaning pollutants from LA River
- e. Press surrounding cities to clean up LA River front and remove debris from main entry points
- f. Address public health issue associated with water quality
- g. Address high rate of illness on boat workers

Inputs related to shoreline protection:

- a. Protect homes
- b. Control beach sand erosion
- c. Restore natural beach re-sedimentation as much as possible
- d. Reduce money spent to move sand from one end of beach to the other

Inputs related to recreation

- a. Increase surfing opportunities

- b. Restore unimpeded natural wave height formation to increase aesthetic beauty to area and augment local economy (e.g. increase residential property values, local/tourist recreational use, downtown commercial value, parking revenue).
- c. Maintain areas with favorable conditions for recreational sailing (low waves/high winds)

Inputs related to Long Beach Breakwater reconfiguration

- a. Reuse breakwater material for new kinds of habitat (diving, fishing, birds, etc)
- b. Use removed breakwater materials as artificial reef and protection of vulnerable oil islands, beaches, Belmont pier
- c. Increase porosity of breakwater for selective wave passage
- d. Shorten west end of breakwater to allow waves to wash out area of highest contamination
- e. Remove the top of the breakwater to create a habitat and generate some wave action
- f. Remove breakwater and build more oil and recreational islands/habitat edges in the harbor to slow down and disperse wave energy while still allowing the circulation and cleansing effect of the waves
- g. Remove breakwater entirely, and build several smaller breakwaters instead
- h. Create retractable or deployable breakwater to mitigate storm and high swells
- i. Create access to expanded breakwater with new surf break and funding from real estate sales
- j. Harness wave energy at gaps in breakwater system

Other miscellaneous inputs

- a. Protect existing navigation ways and commercial use of the Port of Long Beach
- b. Investigate Navy's need for this specific ammunition loading area
- c. Reduce the amount spent by the Long Beach Aquarium to import water for their tanks by improving water quality
- d. Consider effects of rising sea level into simulations and calculations

In addition to the public workshops, meetings were conducted with individual stakeholder groups to solicit their input. Key constraints, as well as opportunities, were identified as part of this process. Some of the concerns and interests from each of the stakeholder groups are listed below (in alphabetical order).

2. Carnival Cruise Lines
 - a. Have experienced no downtime in their five years of operation
 - b. Support potential community benefit, but want no negative impact on operations
 - c. Potential for increased maintenance dredging resulting from increased wave action.
3. City of Long Beach – Marinas / Lifeguards
 - a. Trash on beach easier to pickup than trash in harbor
 - b. Breakwater provides critical recreational benefit – provides unique sailing environment – great wind and little wave action
 - c. Increased wave penetration – impact on docks/facilities
 - d. Impacts to navigation safety – cited the example of the Zuniga Jetty hazard at entrance to San Diego Bay
 - e. Concerned if the breakwater was lowered, that a gap could not be marked well enough, as vessels already hit the breakwater in its current condition
 - f. Impacts to fishing habitat
 - g. Impacts to bait barge operations
 - h. Increased surf and related activity may impact operations
 - i. Breakwater provides recreational benefit for swimming – small surf great for young kids
 - j. Belmont Pier dock and sport fishing operations
4. City of Seal Beach
 - a. Also have water quality issues
 - b. Impacts to sand transport and beach nourishment
 - c. Impacts to coastal flooding along East Beach
 - d. Impacts on disaster preparedness / tsunami
5. Peninsula Beach Preservation Group
 - a. Many of Long Beach peninsula residents opposed to breakwater modification
 - b. Concerned about protection of property along the shoreline (potential for property damage and long-term costs for sand replenishment)
 - c. Concerned with the effects of rising sea level
 - d. Loss of “calm harbor” and resultant economic and recreational impacts
 - e. Pollutant “flushing” to open ocean (versus stopping pollutants at their source)

- f. Loss of habitat along existing breakwater
6. Port of Long Beach / Jacobsen Pilots / Operators (PMSA / SSA)
- a. Impacts to existing habitat value
 - b. Increased wave penetration into commercial berths, especially during south swell:
 - 1. Pier J
 - 2. SE Basin
 - 3. West Basin
 - 4. Cost of tug operations if wave action increases – also fewer number of tugs available now to help keep ships in place at berth
 - 5. Fatality to ship crew during surge
 - c. Increased wave activity at anchorages:
 - 1. Transfer of personnel could become more difficult and unsafe
 - 2. East anchorages get more use since can accommodate larger ships
 - d. Potential impact to “Port of Refuge” – safe harbor for damaged ship
 - e. Navigation hazard
 - f. Impact to City’s Confined Aquatic Disposal site
7. Surfrider Foundation
- a. Want beach like Seal Beach, Huntington Beach, South Bay beaches – the difference is waves
 - b. Want to improve water quality and reduce trash and debris
 - c. Want to improve sediment quality along shoreline
 - d. Want to reduce breakwater height and plant kelp
 - e. Want economic benefit of cleaner beach
8. THUMS Oil Islands
- a. Increased exposure to wave damage – cited significant damage in 1983 storms
 - b. Impacts to operations – travel from SE Basin to islands 24/7
 - c. Island White presently has surge problems during occasional wave events that impacts barge loading operations
 - d. Make sure consider any impacts to underwater pipelines to THUMS – water/oil/gas

9. U.S. Coast Guard

- a. Loss of safe anchorage capacity
- b. Impact to lightering / bunkering operations
- c. Impact to cruise ship operations
- d. Navigation safety associated with any breakwater modifications
- e. Potential impact to present security benefit provided by physical barrier

10. U.S. Navy – Naval Weapons Station (NWS)

- a. Navy has an operational requirement to be able to load ammunitions inside the breakwater at least twice a year
- b. Impacts to ammunition transfer at Explosives Anchorage if the sea states rise to an unacceptable level
- c. Operations at Explosives Anchorage may increase in future due to increasing constraints with trucking of ammunitions
- d. Impact of increased wave penetration into NWS berth
- e. Impacts to dredging of NWS

11. USC Sea Grant Workshop (scientists and biologists familiar with San Pedro Bay)

- a. Not a lot of existing reports and data for the area, with the exception of the Ports Biological Baseline Studies and existing City of Los Angeles monitoring sites near the mouth of the LA River.
- b. The area is a “hotspot” for Harmful Algal Blooms (HABs), which are thought to be created by a combination of natural and non-natural inputs of nutrients and a circulation pattern which tends to retain the nutrients in the water column and allows the algal to bloom. These HABs are harmful to both marine life and humans.
- c. The breakwater itself provides an important protected habitat used by several bird species for roosting and nesting and for several invertebrate species.
- d. Perception that the LA River is probably not the only contributor to pollution in the Harbor. Other potential sources cited were the San Gabriel River and storm drains runoff.
- e. SCE staff provided insight as to how to best create conditions for successful kelp establishment.
- f. General consensus that increases to water clarity and reduction of nutrient load would restore conditions for marine habitat.

5.3 VIEWS OF OTHER RESOURCE AGENCIES

Because of the funding and time constraints of the reconnaissance phase, only limited and informal coordination has been conducted with other resource agencies. Discussions with the resources agencies were focused on identifying any additional study reports or information regarding the San Pedro Bay region, and general views regarding the need for ecological restoration. Agency views were also sought regarding the types of habitats that they would consider of particular value in a restoration effort. The persons contacted by the City of Long Beach, on an individual basis, are shown below:

Agency	Contact
National Marine Fisheries Service (NMFS)	Bryant Chesney
U. S. Fish and Wildlife Service (USFWS)	Ken Corey
U. S. Environmental Protection Service (EPA)	Peter Kozelka
California Department of Fish and Game (CDFG)	Bill Paznokas, Loni Adams
Regional Water Quality Control Board, Los Angeles Region	Shirley Birosik, Michael Lyons, L.B. Nye

Most agency staff indicated that data for the East San Pedro Bay area was sparse but a few additional documents of relevance were obtained (in addition to those documents that had already been obtained). These included:

1. Recent kelp surveys that document the linear kelp beds associated with the breakwater and other riprap protects areas within San Pedro Bay,
2. A survey conducted for the City of Long Beach desalinization intake structure that identified the presence of eelgrass in nearshore waters fronting the beach at approximately Cherry Avenue, and
3. The draft toxics TMDL for the greater Los Angeles/Long Beach Harbor waters.

Agency contacts generally recognized that the Harbor water is degraded, but also noted that information on habitat and water quality is limited in this portion of the Harbor and that additional survey work would be necessary to quantify the magnitude and extent of degradation. Concerns were expressed by NMFS and CDFG staff regarding the apparent frequency and impacts of red tides that appear to be associated with this region, although neither agency maintains historical records of red tides or fish kills in this area. Both agencies recognized that blooms are known to occur all along the coastline including areas without major input from urban rivers. As discussed previously, USC faculty stated that the area is a “hotspot” for Harmful Algal Blooms (HABs), which are harmful to both marine life and humans.

The breakwater itself was noted to provide an important protected habitat used by several bird species for roosting and nesting and for several invertebrate species. This was considered a positive element of the current configuration that should be considered. Several people questioned whether the current protected waters within the breakwater provided for unique nursery and foraging habitat or if these waters would likely not differ from uses along open coastal areas of southern California.

Most agencies expressed interest in restoration/improvement activities to increase rocky bottom and kelp habitat areas. Both types of habitats provide refuge and nursery habitat for important managed fisheries.

5.4 BASELINE CONDITIONS

The study area (Attachment A) is located within East San Pedro Bay between the Long Beach Shoreline and the offshore Long Beach Breakwaters, east of the Port of Long Beach. To the west and northwest of San Pedro Bay are the communities of San Pedro and Wilmington, respectively and to the east the community of Seal Beach. The study area includes the waters in the immediate vicinity (and shoreward) of the breakwaters, the beaches of Long Beach spanning from the mouth of the Los Angeles River southward to the San Gabriel River, and the upstream reaches of the Los Angeles River that have direct impact on the Bay. A watershed perspective will be assessed in the study to identify how this effort may be integrated in a collaborative manner into larger watershed efforts being conducted by others. For example, coordination with other studies and efforts to target pollution and debris clean up further upstream of LA River. The study may consider the benefits of addressing ecosystem restoration measures within the LA River watershed. It is important to note that the boundaries of the study area as stated are preliminary and will be refined based on findings during the feasibility phase of the study.

The Los Angeles and Long Beach harbors consist of about 1,800 acres of water in the inner navigation channels, 5,700 acres of landfill, and 6,000 acres of water (sheltered anchorages and navigation channels) between the landfills and the nine miles of Federally constructed and maintained breakwaters. This study would investigate two of the most prominent and contributing features within the Study Area, the Long Beach Breakwater and the Los Angeles River:

- 1) Long Beach Breakwater. San Pedro Bay is protected by three breakwater sections, totaling 8.6 miles in length, with two openings to allow ships to enter the Ports of Los Angeles and Long Beach. These openings divide the breakwater into three sections: the San Pedro Breakwater, the Middle Breakwater, and the Long Beach Breakwater. The San Pedro and Middle Breakwaters protect the Ports of Los Angeles and Long Beach, respectively. The 2.5 mile Long Beach Breakwater is the easternmost breakwater. The Long Beach Breakwater was authorized by Congress in 1940 as an extension to the San Pedro Bay Breakwater to provide a protected anchorage for the U.S. Navy's Pacific Fleet. Construction of the breakwater by the federal government began in 1941 and was completed in 1949. As a federal project, the USACE maintains jurisdiction of the breakwater. The purpose of the ecosystem restoration study is to evaluate ecosystem restoration measures within East San Pedro Bay. In order to design a restoration project, reconfigurations of the Long Beach Breakwater, as it affects the water quality and hydrodynamics of the area, may be analyzed as part of an array alternatives. Potential reconfiguration could also provide an opportunity for rocky materials from the breakwater reconfiguration to be used for ecosystem restoration measures.

- 2) Los Angeles River. The Los Angeles River (LAR) is a major flood control waterway for the Los Angeles watershed basin. In the 1930s, USACE began channelizing the river

for flood control and by 1954, the entire length of the river was channelized. The river is now operated and maintained by the USACE and the LA County Department of Public Works. The LA River discharges into San Pedro Bay. Alternatives for this ecosystem restoration project may look at changes needed within the LAR, as it negatively impacts the overall health of the bay.

In addition to the Breakwater and the River, the study area contains several locations in which there is potential for ecosystem restoration and recreational opportunities. The entire study area will be analyzed for ecosystem restoration opportunities.

5.4.1 BIOLOGICAL RESOURCES

Prior to urbanization and port development (circa 1870), the Los Angeles and San Gabriel Rivers commingled in a large estuary at San Pedro Bay - approximately 3,450 acres of slough, mudflats, and salt marsh. By the 1930's, harbor-oriented channelization and landfill projects had largely reshaped the lagoon into the Los Angeles and Long Beach Harbors. The estuary underwent extensive industrial, commercial, and residential development, and its ecological diversity decreased. This led to a change of the historic estuarine habitat into mainly deepwater habitat, particularly due to development at the ports. The ecological importance of the estuary has significantly increased over time, however, due to the scarcity of estuarine resources in the southern California bight.

First ecological studies of the Los Angeles and Long Beach Harbors began in the 1950s. These studies revealed the marine environment was severely polluted (Reish 1959). Dissolved oxygen was at one time depleted from the harbor waters and resulted in the elimination of the macro fauna (USFWS 1989). However, the benthic fauna has substantially restored since 1970 when national and state regulations were implemented to restore biota diversity and water quality.

Presently, marine habitat in San Pedro Bay includes natural open water and sandy-bottom benthic habitats, as well as artificial habitats created by harbor structures. Organisms living in or on the sandy-bottom provide a food source for fish, invertebrates, and other organisms. Species richness is often lower in sandy-bottom habitats compared to other vegetated habitats. A large portion of East San Pedro Bay is characterized as sandy-bottom. The subtidal zone (i.e., always covered with water) along the Long Beach shoreline is also characterized as sandy or soft bottom. Eelgrass, a type of submerged aquatic vegetation, was detected in the vicinity of Cherry Beach in 2009. Areas with eelgrass are high in productivity and are important to fish and other organisms as a direct or indirect source of food. Despite the presence of eelgrass, the soft bottom subtidal zone along the Long Beach shoreline is degraded with significant amounts of trash lying on the bottom and embedded in the sand.

Hard bottom or substrate habitats are of important ecological value as they provide food, shelter, and spawning and nursery areas to a wide variety of fish and shellfish species, and many other organisms. Hard substrates provide surfaces for the attachment of invertebrates and algae. Hard substrate habitats in San Pedro Bay are limited and include the breakwaters and jetties within the harbor complex as well as at pilings that support wharves and piers, and along the shoreline of the basins and channels. Additionally, the shore protection around the three oil islands within East San Pedro Bay provide hard substrate habitat. Hard bottom or substrate habitats support

algal growth typical of rocky subtidal and intertidal communities. Breakwaters and jetties characteristically are populated by green algae (*Ulva sp.* and *Enteromorpha sp.*), and several species of red algae, and kelp (giant kelp (*Macrocystis pyrifera*) and feather boa kelp (*Egregia menziesii*)). Extensive kelp beds with fully formed kelp canopies create kelp forests that are highly productive habitats. Kelp forests provide habitat to a large variety of species, including invertebrates, fishes, birds, and mammals.

Historically, extensive kelp beds were known to occur in the San Pedro Bay area, near Point Firmin (e.g. Horseshoe Kelp). The Horseshoe Kelp bed was reported to be two miles long and one-quarter to one-half mile wide (equates to 320 to 640 acres) and in water depths of 80 to 90 feet. This kelp bed disappeared in the 1920s to 1930s. The lack of kelp recovery at Horseshoe Kelp is not fully understood, however, it may be attributable to poor circulation or water quality (pers. comm.. Chesney 2010).

Open water or pelagic habitats are areas in the water column of the open ocean. Organisms associated with this habitat occur within the water column, above the seafloor and below the surface. The open ocean habitat sustains a relatively large number of species of fish, marine mammals, turtles, and invertebrates that use this area for spawning, breeding, feeding, or growth to maturity. Open water or pelagic habitats exist throughout San Pedro Bay.

The migratory bird community is dominated by coastal water birds, shorebirds, and waterfowl. Migratory birds use San Pedro Bay during annual migrations and for overwintering. Some have also become year-round residents. The diverse bird community is made up of about 150 species. The inner harbor is a major resting area for water birds.

Feeding and roosting are two principal activities in the project vicinity. Birds using sheltered waters within the harbor for feeding and resting include loons, grebes, surf scooters, and lesser scaup. The sheltered waters offer mollusks and fish that are preyed upon by these species. Rip-rap shoreline is preferred by spotted sandpipers, surfbirds, willets, and pelagic cormorants. The small intertidal mudflat at Shoreline Aquatic Park (adjacent to the Los Angeles River estuary) is important foraging habitat for western sandpipers, semi-palmated plovers, and marbled godwits. This habitat is also used extensively by mew, ring-billed, and California gulls as a resting area. Buoys, barges, and pilings are primary roosting sites for double-crested cormorants, gulls, and brown pelicans.

A number of special status species occur within the study area. They include the California least tern (*Sternula antillarum browni*), western snowy plover (*Charadrius alexandrinus nivosus*), Peregrine falcon (*Falco peregrinus anatum*), Belding's savannah sparrow (*Passerculus sandwichensis beldingi*), black skimmer (*Rynchops niger*), common loon (*Gavia immer*), loggerhead shrike (*Lanius ludovicianus*), and the burrowing owl (*Athene cunicularia*).

5.4.2 WATER RESOURCES

Water resources in the study area include Los Angeles and Long Beach Harbors, the Los Angeles and San Gabriel Rivers, and the Pacific Ocean. Because of past dredging and filling, construction of breakwaters and other structures, plus intensive use of the area, the chemical

character of constituent waters has been significantly altered. River flows have also been greatly altered by flood control projects.

Water quality in San Pedro Bay is affected by factors such as climate, water circulation, biological activity, surface runoff, effluent discharges and accidental discharges of pollutants from shipping activities as well as water flushed from the harbor and vessel activity.

Studies during the 1950s revealed poor water quality conditions in the bay, particularly at the harbors. Circulation patterns were altered as breakwaters, channels, slips and basins were constructed. In the mid-1950s, restricted water circulation caused anoxic conditions at some of the slips and basins. Significant amounts of wastes were emptied into the waters, which also contributed to depletion of dissolved oxygen (DO) concentrations. However, water quality conditions have changed significantly since the 1970s as national and state regulations were implemented to restore biota diversity and water quality.

Although water quality in the bay has improved over the past several decades, it remains degraded as industrial effluents and untreated run-off from storm drains and the surrounding area continue to be discharged into San Pedro Bay. These sources of contamination result in elevated levels of trace metals and organic chemicals in some areas, as well as elevated levels of bacteria (total coliforms, fecal coliforms, and *Enterococcus*). Additionally, trash and debris from the Los Angeles River continue to be a major problem within the bay, and along the Long Beach shoreline. Beach closures and water advisories occur often in Long Beach.

5.4.3 RECREATION

Aside from the port operations, recreation activities account for most of the land and water uses in the general area. Recreation uses encompass onshore and near shore activities. Onshore recreation resources include beaches, parks, recreation facilities, and other visitor-serving attractions such as the Queen Mary. Shoreline Village, aquariums, fishing areas, hotels, and restaurants are located along Queen's Way Bay (the mouth of the Los Angeles River Estuary). Recreation opportunities involve passive activities such as sightseeing, sunbathing, and picnicking. Active uses include bicycling, sailing, swimming, shoreline and pier fishing. Shoreline and near shore uses that depend on land-based operations include such activities as sport fishing, commercial cruises, tour boats, boating, and sailing. Within the Los Angeles and Long Beach Harbor complex, several major charter boat companies provide charter service to Avalon and Isthmus Cove on Santa Catalina Island. These recreation charters also serve specialized activities, including sport fishing, scuba diving, whale watching, and harbor touring. The City of Long Beach contends that recreational opportunities are severely degraded when compared to other beach communities due to a lack of surf, large amounts of trash and debris on the beaches, and poor water quality.

Commercial fishing within the bay is limited to a live-bait fishery, while a variety of commercial fisheries occur outside the harbors. Trap fisheries extend offshore from just outside the harbor breakwaters, while set and drift nets are restricted to beyond 3 miles from shore. Trawling occurs in deeper offshore waters. Primary target species from the various fishing operations include anchovies, squid, California halibut, rockfish, crab, and lobster.

5.5 PROBLEMS AND OPPORTUNITIES

The evaluation of public concerns often reflects a range of needs, which are perceived by the public. This section describes these needs in the context of problems and opportunities that can be addressed through water and related land resource management. For each problem and opportunity, the existing conditions and the expected future conditions are described below.

There are two basic categories of problems and opportunities. One category is for the problems and opportunities associated with Ecosystem Restoration and the other is for the problems and opportunities associated with Recreation (i.e. swimming, surfing and other beach-related activities).

Ecosystem problems have been identified by both USACE and by the local sponsor, with the latter supported by the inputs from the stakeholder groups and literature review.

5.5.1 ECOSYSTEM PROBLEMS

1. Lack of rocky reef / hard bottom habitat. Rocky reef and other hard bottom habitat are considered to provide valuable habitat for economically important fish and macroinvertebrates. Current hard bottom habitat is limited to linear features of the breakwater and riprap protecting the THUMS oil islands and Port facilities. An artificial reef (mitigation as part of the Montrose settlement) is planned to be established west of Belmont Pier. Historically, rocky reef areas existed in San Pedro Bay prior to development of the Ports / Harbors.
2. Lack of kelp habitat. Both kelp and high relief, hard bottom habitats are considered to be important habitat for various rockfish species, ling cod, kelp and sand bass, as well as a variety of invertebrates. Kelp habitat within San Pedro Bay is limited to linear features associated with the breakwater and other rock structures. Historically, it is known that there have been extensive kelp beds in the San Pedro Bay area, e.g. Horseshoe Kelp. The Horseshoe Kelp Bed was reported to be two miles long and one-quarter to one-half mile wide (equates to 320 to 640 acres) and in water depths of 80 to 90 feet. This kelp bed completely disappeared in the 1920s to 1930s.
3. Other habitats. The soft bottom subtidal zone along the Long Beach shoreline is degraded with significant amounts of trash lying on and embedded within the bottom. Eelgrass beds, considered to be high in productivity and important to fish and other organisms, is limited in coverage and density along the Long Beach shoreline.
4. Reduced transmissivity (clarity) of the harbor waters. Transmissivity of the harbor waters is impacted during storm events as a result of discharges from the Los Angeles River or in association with Harmful Algal Blooms. Poor circulation within the breakwater contributes to persistence of turbid water in San Pedro Bay.
5. Impacted harbor water circulation. As part of the City's study, water quality monitoring was conducted in 2008 in this region during dry weather conditions provides evidence that the plume from the Los Angeles River Estuary frequently impacts the western portion of the beach from Shoreline Harbor to Belmont Pier. Monitoring conducted

subsequent to an early season storm event provided further evidence of poor flushing in this segment of the Bay. Decaying duckweed that had been discharged from the River during this event remained suspended in the nearshore waters for over a week. Recent three-dimensional modeling developed for the Port's Water Resources Action Plan (WRAP) and two dimensional-modeling of tracer particles from the Los Angeles River conducted as part of this reconnaissance study provide further corroboration of the poor circulation.

6. Contaminants in the sediment (metals, pesticides, bacteria). Concentrations of metals and pesticides in sediments have been shown to be highest at sites within the Los Angeles River Estuary. Limited spatial data suggests that concentrations decline substantially with distance from the mouth of the estuary. Bacteria in the sand along the shoreline are also potentially problematic.
7. Contaminants in the water column (metals, nutrients). Water quality monitoring conducted to monitor conditions during placement of sediment at the North Energy Island Borrow Pit Confined Aquatic Disposal (CAD) site indicated that background concentrations of metals were elevated above California Ocean Plan criteria. Nutrient concentration in the Los Angeles River are often highly elevated during early season storm events, but also can be elevated in association with dry weather discharges. Elevated nutrient concentrations from the Los Angeles and San Gabriel Rivers may contribute to HABs that appear to be more frequent and intense in San Pedro Bay.
8. Trash/floating debris. Trash and floating debris from the Los Angeles River are considered to be a major problem in this region. Due to the prevailing winds, trash and floating debris are ultimately deposited on the beaches. The largest quantities of trash and debris wash up on the western end of the City beaches, but significant quantities are also collected at the far eastern end, adjacent to the Alamitos Bay jetty. Aside from aesthetic issues, organic matter associated with these materials harbor bacteria and evidence suggests that bacteria regrowth may occur in the wrackline along the beach.

5.5.2. RECREATION PROBLEMS

The problems associated with the existing recreational uses are characterized by those problems associated with water quality and those associated with wave height / wave activity.

1. Impaired swimming / water recreation due to elevated bacteria levels and trash/debris in the water and along the shoreline. Fecal indicator bacteria are commonly elevated in dry weather discharges from the Los Angeles River. Periodic sewage spills also contribute to elevated bacteria levels in the River. An average of 4,000 tons of trash and debris is deposited on City beaches annually. The prevailing winds out of the southwest tend to transport the brackish water surface plume towards the western end of the ocean beaches between Shoreline Marina and the Belmont Pier. During periods when the winds shift to a more southerly pattern, the plume is quickly transported to the beach face with limited additional dilution. Bacterial water quality criteria for full body contact are exceeded when such conditions are concurrent with elevated fecal indicator bacteria in the River.

2. Lack of wave activity for recreational activities. Wave heights along the Long Beach shoreline are currently not suitable for some recreational activities such as surfing. In contrast, nearby beaches such as Seal Beach and Huntington Beach have larger waves and are popular areas. Many long-time residents of Long Beach have noted that prior to the existence of the Long Beach Breakwater, the area was popular for surfing. In addition to the primary recreational objective of improving swimming conditions, local surfing groups (e.g. Surfrider Foundation) would like to restore the surfing conditions that Long Beach once had.

It is assumed that the existing conditions would remain unchanged and possibly would become worse over time if no project is implemented.

5.5.3. ECOSYSTEM AND RECREATION OPPORTUNITIES

Opportunities were identified by the public, stakeholder groups, and resource agencies. In general, the opportunities to address the existing ecosystem and recreation problems are as follows:

1. Restoration of degraded ecosystem in the study area (i.e. Rocky reef/hard bottom, nearshore/softbottom). Rock could be used to create new rocky reef and kelp habitat areas. Coupled with the improved water quality, this is expected to create viable rocky reef / hard bottom and kelp habitat conditions within East San Pedro Bay. In addition, restoring high and low relief rocky reef habitat would increase nursery habitat and refuge for rock fish.
2. Eliminate or reduce discharges of pollutants from the Los Angeles River into the East San Pedro Bay area. This is expected to improve water quality for both ecosystem and recreational benefits.
3. Increase tidal circulation and wave-induced mixing of the harbor waters. This increased circulation and mixing is expected to improve water quality and clarity, which would lead to a restored ecosystem, improve conditions to restrain/preclude Harmful Algal Blooms (HABs) formation, as well as improved recreational swimming conditions.
4. Increase wave height along the shoreline, while still providing adequate shore protection. This increased wave height is expected to help improve water quality, while also potentially creating recreational surfing and other wave activities conditions along certain sections of the shoreline.

The opportunities identified by both USACE and the sponsor were used as the basis of the measures/alternatives developed for the reconnaissance study and discussed further below.

5.6 PLANNING OBJECTIVES

The national objectives of National Economic Development (NED) and National Ecosystem Restoration (NER) are general statements and not specific enough for direct use in plan formulation. The water and related land resource problems and opportunities identified in this study are stated as specific planning objectives to provide focus for the formulation of

alternatives. These planning objectives reflect the problems and opportunities and represent desired positive changes in the without project conditions. The planning objectives are specified as follows:

1. To restore marine and aquatic habitat of sufficient quality to sustain or enhance marine and aquatic communities, e.g. kelp beds, shallow rocky reef areas and other habitats;
2. To restore and preserve the marine and aquatic ecosystems by improving impaired sediments and water quality in East San Pedro Bay;
3. To increase recreational opportunities (surfing, swimming, beach use, tourism, etc.) in East San Pedro Bay and its immediate surrounding beaches and beach communities.

5.7 PLANNING CONSTRAINTS AND CONSIDERATIONS

Unlike planning objectives that represent desired positive changes, planning constraints represent restrictions that should not be violated. The planning constraints identified in this study are discussed below.

1. The Long Beach Breakwater is outside of the City's Local Coastal Program / land use plans, i.e. the breakwater is in federal waters. However, the breakwater definitely affects land and water use in its wave shadow. These uses are as follows and are considered to be constraints for all alternatives:
 - a. Bird and fish habitat. Endangered/threatened/sensitive species must not be adversely affected. In addition, consideration must be given to the existing habitat uses of the breakwaters and the potential to impact/displace these habitats.
 - b. Shoreline structures and beaches. Existing residences, public infrastructure, marinas, other structures and recreational beaches must be protected from increases in erosion, wave related damages, and coastal flooding.
 - c. Port of Long Beach. Commercial berths must be protected from unacceptable increases in wave penetration. In addition, anchorages and the "port of refuge" area (safe harbor for damaged ships) must be protected from excessive wave activity.
 - d. U.S. Navy explosives anchorage. This anchorage is located leeward of the Long Beach Breakwater and is used by U.S. Navy ships to transfer explosives and/or sensitive electronics equipment. This capability must be retained.
 - e. THUMS Oil Islands. The existing shore protection around these oil islands was based on wave conditions with the existing breakwater configuration. These islands will continue to require protection from storm wave's penetration.

- f. Confined Aquatic Disposal (CAD) site. A CAD site, for contaminated sediments disposal, exists leeward of the Long Beach Breakwater, near the mouth of the LA River. The CAD site cap stability must be preserved.
 - g. Navigational safety. Safe navigation must be maintained for all vessels entering and exiting the area.
 - h. Recreation. There are also concerns regarding impacts to existing recreational uses of the area leeward of the breakwater (e.g. recreational sailing). The calmer waters leeward of the breakwater provide a unique open ocean condition for recreational sailors.
2. **Sea Level Rise**. The potential impacts of future sea level rise must be considered for all alternatives, including increased wave overtopping, erosion, and shoreline retreat.
3. **Environmental Resource and Agency Constraints**: Applicable environmental requirements must be met for a feasibility level study. Environmental acceptability must be ascertained; adverse impacts should be avoided if possible or minimized, if avoidance is not possible..

5.8 MEASURES TO ADDRESS IDENTIFIED PLANNING OBJECTIVES

A management measure is a feature or activity at a site, which address one or more of the planning objectives. An array of alternatives will be analyzed as part of the feasibility study. The alternatives may comprise of structural, nonstructural, or a combination of structural and nonstructural measures. A wide variety of measures were considered in the Long Beach preliminary study, some of which were found to be infeasible due to technical, economic, or environmental constraints (discussed in section 5.6). The descriptions and results of the evaluations of the measures considered in this study are presented below.

- 1. Non-Structural Non-structural measures have not been identified as part of the preliminary analysis; however nonstructural measures will be analyzed and considered during the feasibility study.
- 2. Structural Structural measures will be developed and analyzed during the Feasibility Phase to meet the study objectives. Any structural alternatives would be formulated to satisfy restoration of the degraded ecosystems.

The following structural measures have been identified:

- a. Reconfiguration of the Long Beach Breakwater,
- b. Restoration of kelp and/or rocky reef habitat areas (either by importing new rock or using rock available from breakwater reconfiguration), and
- c. Construction of a training structure and other changes to address specifically the Los Angeles River pollutant discharges.

5.9 PRELIMINARY ALTERNATIVES

Preliminary alternatives are comprised of one or more management measures that passed the initial screening conducted by the City of Long Beach, (i.e. the evaluations discussed above). The descriptions and results of the evaluations of the preliminary measures/alternatives that were considered in this study are summarized below:

1. No Action. USACE is required to consider the option of “No Action” as one of the alternatives in order to comply with the requirements of the National Environmental Policy Act (NEPA). No Action assumes that no project would be implemented by the Federal Government or by local interests to achieve the planning objectives. No Action, which is synonymous with the Without Project Condition, forms the basis from which all other alternative plans are measure.
2. Construct the rocky reef and/or kelp reef feature to restore impacted/lost ecosystem habitat. These areas could be created from either imported rock or from removed breakwater sections. The latter (breakwater reconfiguration) could provide rock to create on the order of 500 acres of kelp bed (the size of the historic Horseshoe Kelp Bed) and 50 acres of high and low relief rocky reef areas. This is proposed for further consideration based on direct replacement of lost habitat in San Pedro Bay. This is considered to be technically feasible, although navigational constraints would need to be addressed.
3. Reconfigure the LB Breakwater and construct the rocky reef and/or kelp reef feature(s). This alternative is proposed for further consideration based on the potential water quality improvements suggested by the hydrodynamics modeling and the potential ecosystem restoration benefits. Alternatives are considered to be technically feasible, although navigational, wave impacts, and shoreline erosion constraints would need to be addressed. Secondary measures carried forward with the breakwater configuration may include construction of new breakwater sections, groins, nearshore reef breakwaters, and beach nourishment.
4. Changes to Los Angeles River. Change alignment of LA River discharge. Water quality may be improved by constructing a shore-perpendicular rock “training” structure to redirect the LA River discharge away from the Long Beach shoreline. Rock from removed breakwater section(s) could be used for this construction, or rock could be imported from off-site sources. The new structure could also provide additional shore protection to the downtown marina and would provide new rocky habitat area. This alternative may include measures to address pollutants in LA River.

5.10 CONCLUSIONS FROM THE PRELIMINARY SCREENING

The preliminary screening suggests that alternatives that address opportunities to both restore the marine ecosystem and enhance recreation, while accommodating constraints, have the greatest potential for implementation. Restoration of the reef and kelp habitat within San Pedro Bay can be enhanced by improving the water quality, clarity, and circulation. A means to accomplish this could be a reconfiguration of the Long Beach Breakwater, which has the added benefit of providing an in-water, local source for reef creation material. The potential magnitude and types

of benefits from the proposed actions were evaluated based on: a) hydrodynamic and water quality modeling results, b) discussions with resource agency staff and knowledgeable individuals, and c) literature review.

Ecosystem benefits associated with the proposed measures would include: a) re-establishment of kelp beds which once existed in the region (potentially 500+ acres, the size of the historic Horseshoe Kelp Bed); b) construction of high and low relief rocky reef areas (potentially 50+ acres) for fish refuge and invertebrates habitat; c) reduction of occurrence of harmful algal blooms; and d) increased water clarity to restore conditions for kelp, eelgrass and other habitats. The former two benefits are to restore historic ecosystems, which once existed in the San Pedro Bay region. Both kelp and rocky reef / hard bottom habitats are considered to be important habitat for various rockfish species, ling cod, kelp and sand bass, as well as a variety of invertebrates (e.g. lobster).

The potential environmental impacts would be the loss of rocky habitat from the removal of breakwater section(s). This would be mitigated for by the creation of new rocky reef and kelp habitat areas elsewhere in the region using rock from the removed breakwater section(s).

As discussed previously, preliminary hydrodynamic/water quality modeling results suggest breakwater reconfiguration could improve existing conditions relative to wave height and pollutant concentration. Both wave height and pollutant concentration are proxies of water quality. Improvements to water quality in turn would lead to restored ecosystem and recreational swimming conditions. In addition, increased wave height would improve conditions for wave activities (such as surfing and body-surfing). Therefore, the hydrodynamics modeling results suggest potential benefits to ecosystem restoration and recreational enhancements.

As discussed previously, the project could result in improved conditions for recreational swimming and surfing. These improved recreational conditions would be incidental and primarily result from the project's increased: a) water quality and b) wave heights in the study area. The project could also result in diminished conditions for novice swimming, recreational boating and kiteboarding. However, the potentially negative effect of the project on certain recreational uses is expected to be: a) partially mitigated by the positive effect of improved water quality on those same recreational uses; and b) minimal for certain alternatives listed above. If the project results in a *net increase* in the study area's recreational value, as is expected, it will lead to economic benefits for the nation and region. Any recreational features which are not purely incidental to the project would have to be separably economically justified.

An important factor in the decision to move forward with the feasibility study is the basic assumption that the planning constraints listed previously can be accommodated. Key constraints include the Port of Long Beach berths, Navy anchorage, Long Beach peninsula, THUMS islands, marinas and docks, CAD site and navigational safety. Significant effort (and potentially additional costs) will be required to address these constraints for ecosystem restoration in the San Pedro Bay Study Area.

Based on this information, alternatives to address the planning objectives appear viable and long-term ecosystem and recreational economic benefits have the potential to outweigh implementation costs.

5.11 ESTABLISHMENT OF A PLAN FORMULATION RATIONALE

The conclusions from the preliminary screening form the basis for the next iteration of the planning steps that will be conducted in the feasibility phase. The likely array of alternatives that will be considered in the next iteration includes re-creating reef and kelp habitat, reconfiguring the Long Beach Breakwater, and/or creating a LA River training structure. Future screening and reformulation will be based on the following factors: ecosystem benefits (as measured by changes in both the amounts and values of habitat), recreational benefits, constraints accommodation, and construction costs.

6. FEDERAL INTEREST

Since there appear to be feasible and viable alternatives to potentially improve the degraded state of the Bay, there is Federal interest in conducting the feasibility study. In accordance with current administration policy, there is a federal interest in studies that provide a comprehensive approach to evaluating environmental restoration problems and opportunities that also effectively balances the need for sustainable economic development with the need for protection of natural resources, and this project study area has opportunities to provide for habitat restoration in a rapidly urbanizing environment. There is also a Federal interest in other related outputs of the alternatives including incidental recreational opportunities that could be developed within existing policy. Based on the preliminary screening of alternatives, there appears to be potential project alternatives that would be consistent with Army policies, costs, benefits, and environmental impacts. The reconnaissance study finds that there is a Federal interest in continuing the study into the feasibility phase.

7. PRELIMINARY FINANCIAL ANALYSIS

As the local sponsor, the City of Long Beach will be required to provide 50 percent of the cost of the feasibility phase. The local sponsor is also aware of the cost sharing requirements for potential project implementation. A letter of intent from the local sponsor is included as Attachment B.

8. ASSUMPTIONS, EXCEPTIONS AND QUALITY OBJECTIVES

8.1 FEASIBILITY PHASE ASSUMPTIONS

The following critical assumptions will provide a basis for the feasibility study:

Without Project Condition Assumptions:

1. Continued degradation of the current East San Pedro Bay habitat will occur without intervention to correct deficiencies and restore an environment.
2. Existing development will remain and population will continue to increase with resultant impacts.

3. The demand for recreational activities in the study area will increase.

8.2 POLICY EXCEPTIONS AND STREAMLINING INITIATIVES

The study will be conducted in accordance with the Principles and Guidelines and U. S. Army Corps of Engineers regulations. Exceptions to established guidance have not been identified at this time that will streamline the feasibility study process that will not adversely impact the quality of the feasibility study. Approval of the Section 905(b) Analysis by HQUSACE results in the approval of the following policy exceptions and streamlining initiatives:

1. The feasibility phase of study will require extensive coordination with the sponsor and public input, in relation to formulation of overall plans and other related projects in and around the Study Area.
2. Comprehensive project implementation with an overall coordination of projects although some may be with other non-Federal sponsors or under different authorities.
3. NEPA and CEQA documentation will be prepared as part of an integrated document package.
4. A Coordination Act Report (CAR) will be prepared by the U.S. Fish and Wildlife Service in support of the plan formulation process.
5. An incremental analysis will be performed as part of the evaluation of ecosystem restoration alternatives
6. Further definition and analysis of proposed alternatives may lead to alternative Corps authorities for implementation.
7. An early, informal working relationship will be implemented with the various governmental resource agencies.

8.3 QUALITY OBJECTIVES

Feasibility Phase studies will be accomplished to meet the following quality objectives:

1. Information developed and subsequent project recommendations will be adequately described for the local sponsor to make an informed decision on future participation.
2. Quality control through the feasibility study phase will be in compliance with USACE of Engineers Quality Control Plan as documented in the Los Angeles District OM 1100-1-2.

9. FEASIBILITY PHASE MILESTONES

<u>Milestone</u>	<u>Description</u>	<u>Duration (mo)</u>	<u>Cumulative (mo)</u>
Milestone F1	Initiate Study	0	0
Milestone F2	Public Workshop/Scoping	2	2
Milestone F3	Feasibility Scoping Meeting	15	17
Milestone F4	Alternative Review Conference	12	29
Milestone F4A	Alternative Formulation Briefing	6	35
Milestone F5	Draft Feasibility Report	3	38
Milestone F6	Final Public Meeting	1	39
Milestone F7	Feasibility Review Conference	1	40
Milestone F8	Final Report to SPD	3	43
Milestone F9	DE's Public Notice	2	45
Milestone F10	Chief's Report	4	49

10. FEASIBILITY PHASE COST ESTIMATE

The City of Long Beach has agreed to be the local sponsor for the project and cost share 50 percent of the feasibility study. The current estimated total study cost is \$8,000,000 (rounded). A more detailed estimate and cost share breakdown will be included in the Project Management Plan (PMP).

<u>Description</u>	<u>Total Cost</u>
Feas - Surveys and Mapping except Real Estate and GIS	\$600,000
Feas - Hydrology and Hydraulics Studies/Report (incl. Coastal)	\$2,000,000
Feas – Geotechnical Studies/Report	\$250,000
Feas – Engineering and Design Analysis Report	\$400,000
Feas – Value Engineering	\$30,000
Feas – Socioeconomic Studies	\$340,000
Feas - Asset Management Analysis/Report	\$70,000
Feas – Environmental Studies/Report (Except USF&WL)	\$1,229,000
Feas - Fish and Wildlife Coordination Act Report	\$45,000
Feas - Geographic Information System Development	\$300,000
Feas - HTRW Studies/Report	\$50,000
Feas - Cultural Resources Studies/Report	\$250,000
Feas - Cost Estimates	\$120,000
Feas - Regulatory	\$30,000
Feas - Public Involvement Documents	\$152,000
Feas - Plan Formulation and Evaluation	\$670,000
Feas - Final Report Documentation	\$50,000
Feas - Technical Review Documents	\$100,000
Project Management and Budget Documents	\$320,000
Supervision and Administration	\$0
Project Management Plan for Project Implementation	\$50,000
PED Cost Share Agreement	\$20,000
Sub-Total	\$7,076,000
Contingency	\$1,061,400
Cost Share Total	\$8,137,400
IEPR	\$200,000
STUDY TOTAL	\$8,337,400

11. POTENTIAL ISSUES AFFECTING INITIATION OF FEASIBILITY PHASE

Continuation of this study into the cost-shared feasibility phase is contingent upon an executed Feasibility Cost Sharing Agreement (FCSA). Failure to achieve an executed FCSA within 18 months of the approval date of the Section 905(b) Analysis will result in termination of the study.

The schedule for beginning the feasibility study is August 2010. Based on the schedule of milestones in Paragraph 9, completion of the feasibility report would be in September 2014.


12. PROJECT AREA MAP

A map of the study area is provided as Attachment A.

13. RECOMMENDATIONS

I recommend that the Long Beach Breakwater (East San Pedro Bay) Ecosystem Restoration Study proceed into the feasibility phase. The U.S. Army Corps of Engineers shall finalize negotiations of the Project management Plan and enter into a Feasibility Cost Sharing Agreement (FCSA) with the City of Long Beach.

16 April 2010
Date



Thomas H. Magness
Colonel, US Army
District Engineer
Los Angeles District

ATTACHMENT A

(Project Study Area)



ATTACHMENT B

(Letter from Intent from Sponsor)



CITY OF LONG BEACH

OFFICE OF THE CITY MANAGER

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PATRICK H. WEST
CITY MANAGER

April 8, 2010

Colonel Thomas H. Magness
District Engineer, Los Angeles District
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, CA 90053-2325

Subject: Long Beach Breakwater (East San Pedro Bay Ecosystem Restoration)

Dear Colonel Magness:

On July 24, 2007 the City Council directed staff to fund a reconnaissance study of the Long Beach Breakwater and work with the Army Corps of Engineers to review and make a determination of federal interest. The City of Long Beach supported the U.S. Army Corps of Engineers reconnaissance study to assess potential Federal participation in the Long Beach Breakwater (East San Pedro Bay Ecosystem Restoration) study.

At this time, the City of Long Beach supports the recommended feasibility study to evaluate opportunities for ecosystem restoration (restoration of habitat areas which historically existed in the region), and water quality and recreation improvements in East San Pedro Bay in Long Beach, California.

The City has reviewed the 905(b) Analysis Reconnaissance Report prepared by the Corps and is interested in developing a cost sharing agreement with the U.S. Army Corps of Engineers. However, the City's commitment to enter into a cost sharing agreement is subject to the City's final review and approval of the Project Management Plan and a vote by the City Council, tentatively scheduled for June 2010. The City understands that a Feasibility Cost Sharing Agreement will have to be signed prior to initiating the feasibility study. The City also understands that a feasibility study must be cost shared 50 percent Federal and 50 percent non-Federal, and of the 50 percent non-Federal share, up to 100 percent may be in-kind services.

The City of Long Beach looks forward to working with the U.S. Army Corps of Engineers, Los Angeles District in completing the feasibility study, pending approval of the Long Beach City Council. If you have any questions, you can contact Tom Modica, Manager of Government Affairs, at (562) 570-5091.

Sincerely,

Patrick H. West
CITY MANAGER