APPENDIX C

Beach Replenishment Strategy

"The following technical report reflects the findings and data available at the time the report was prepared and may not represent the current conclusions and steps forward in the main text of the HAMP, which has been updated after the completion of these reports. These more detailed technical reports provided in the appendices represent the foundation for the overall approach to the HAMP, but are not "living" documents that reflect updated steps forward, costing, quantities, etc. presented in the main text of the HAMP. The main text of the HAMP represents more current information and recommendations based on updated information, new studies, changes in conditions, new funding sources, and/or new regulations."

HARBOR AREA MANAGEMENT PLAN

IN-HARBOR BEACH REPLENISHMENT STRATEGY

Technical Report

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1.0 INTRODUCTION

1.1 Background

Beach replenishment or nourishment refers to the strategic placement of beach quality sand on an existing beach to provide a source of nourishment for littoral movement or restoration of an eroded beach. Generally, beach nourishment projects are carried out along beaches where a persistent erosional trend exists. To carry out a beach replenishment, sediment with physical characteristics similar to the native beach material is mechanically (bucket) or hydraulically (pipeline) placed. Beach replenishment has proven to be cost effective and environmentally acceptable method of maintaining the recreational, aesthetic, and shore protection aspects of beaches within the Lower Bay.

Current beach replenishment related programs that are ongoing within the Lower Bay include:

Balboa Island Beach Sand Study was begun in 2007 to assess sand management and beach improvement options for Balboa Island. The study is to focus on quantifying existing conditions of sediment transport and effects from natural and man-induced changes. The majority of the effort will be in the South Bay Front of Balboa Island.

There are ongoing beach replenishment projects performed by individual homeowners and homeowners associations throughout the Lower Bay. For example, in 2007, 15 small projects applied for permits under the Regional General Permit #54 (RGP) held by the City of Newport Beach Harbor Resources Division (Harbor Resources Division, no date; USACE, no date). In the past, many of the projects have been maintenance dredging under docks with both ocean and beach disposal. Recent work has been primarily beach disposal due to a shortage of ocean going construction equipment.

1.2 Purpose

At present, there is no management system in place to prioritize selection of beaches in Lower Bay for replenishment or to prioritize the use of dredged material for beneficial reuse. As part of the Harbor Area Management Plan (HAMP), the purpose of this report is to recommend a framework towards coordinating the ongoing and future beach replenishment efforts throughout the Lower Bay.

1.3 Report Organization

This report organizes relevant beach replenishment issue into one document. In the next section, a list of existing beaches in the Lower Bay and their replenishment needs is provided. Constraints on beach replenishment are reviewed and summarized in Section 3. These needs and constraints feed into the development of the use of a weighted alternative matrix to qualitatively rank the beaches to determine which beach would benefit most from replenishment. The alternative matrix and another more quantitative benefit-cost ration analysis for evaluating priority beaches are presented in Section 4. Lastly, findings and recommendations are provided in Section 5.

2.0 BEACH REPLENISHMENT NEEDS

The first step in determining beach replenishment needs is to define the beaches and identify their locations. From there, the need for beach replenishment is typically driven by two factors: how much the beach is used and how much beach area is available. Beach usage is usually determined with beach attendance counts and depends on factors such as available parking, amenities, and beach quality. The amount of beach area required at specific beaches is subjective, with a significant emphasis on how much area existed in the past and what beach goers are accustomed to.

Beach use data is very limited in the Lower Bay. The only source available was a study based on local lifeguard estimates. Beach width and changes in beach width can be determined by direct and indirect measurements from data sources such as:

- Aerial photos;
- Beach profiles or monitoring data;
- Past dredging and replenishment projects (location, quantity, sediment source); and
- Site visits, visual observation, photographs.

For this report, the beach conditions were evaluated based on two days of site visits, aerial photos, as well as beach profiles dredging records provided to us by the City of Newport Beach Harbor Resources Division, the City of Newport Beach GIS group, the USACE Los Angeles District, and the County of Orange Watershed and Coastal Resources Division.

2.1 Existing Conditions

An inventory of beaches in the Lower Bay was developed as a first step in identifying beach replenishment needs. Figures 1 and 2 show maps of all the beaches within the Lower Bay. Table 1 lists these beaches from west to east of Lower Bay and the essential information for each beach including location, public access, boat launch, boat slip, proximity to eelgrass and potential erosion problem. This is followed by a brief description and photographs of each beach.

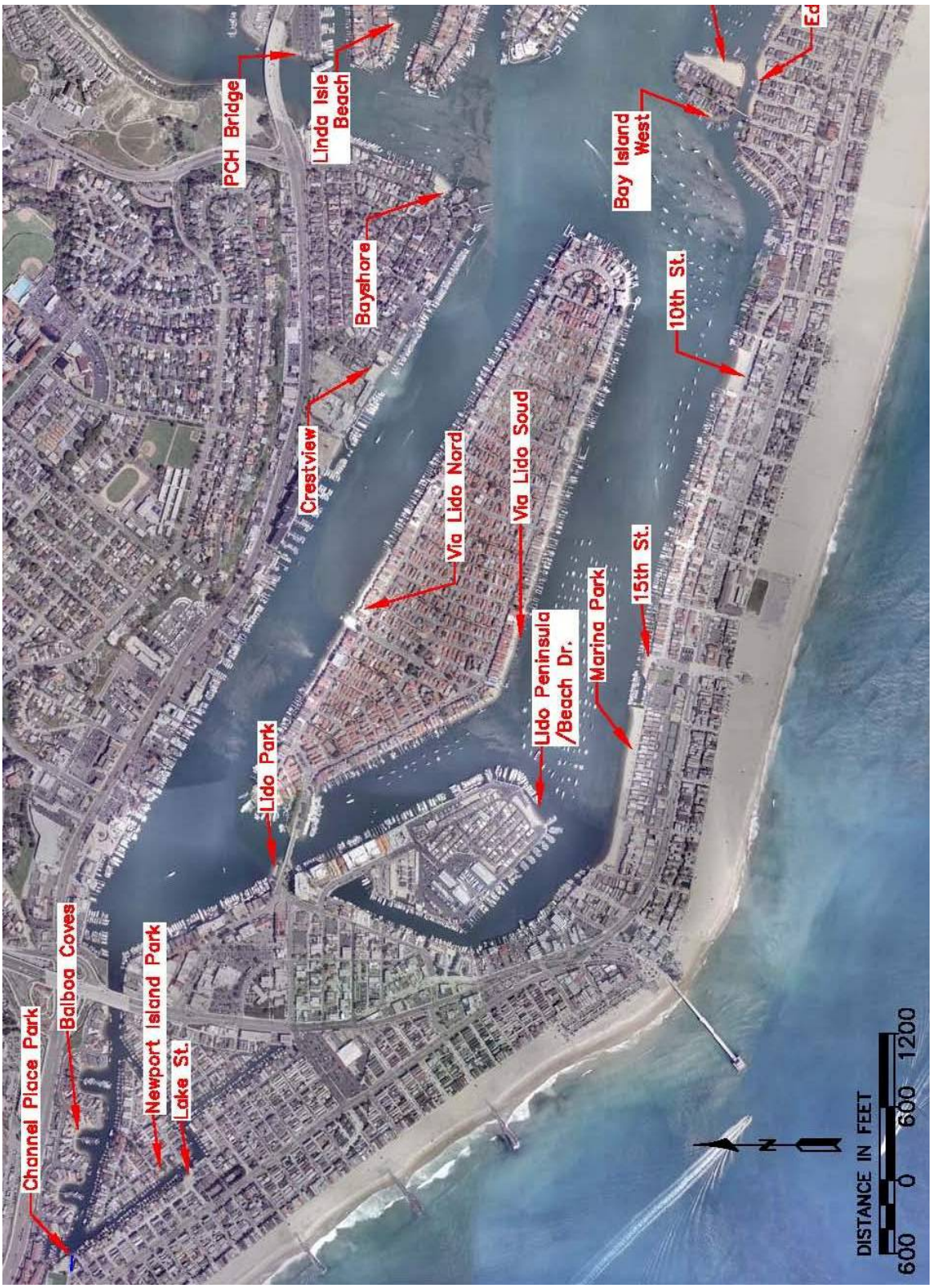

Figure 1. Beaches of West Lower Bay

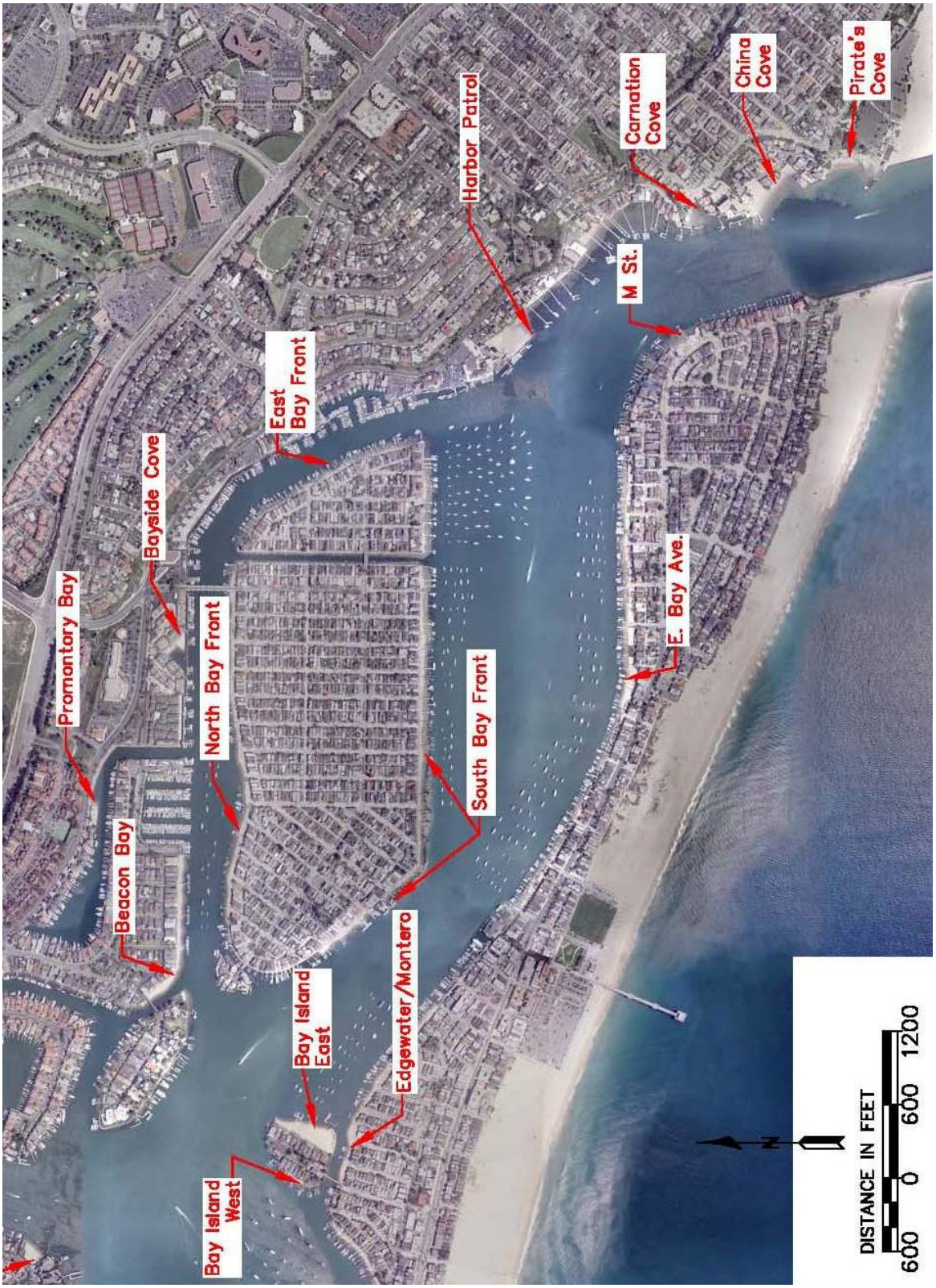

Figure 2. Beaches of East Lower Bay

Table 1. Lower Bay Beaches (Listed West to East)

Number	Beach Name	Location	Public Access	Boat slips	Boat Launch	Erosion Problem	'01-'06 SL Change	Distance to Eelgrass
1	Channel Place Park	Channel Pl. & River Ave.	Yes	yes	No		ND	>30'
2	Balboa Coves	Near PCH	No	Yes	No		ND	>30'
3	Lake St.	38th St.	Yes	No	No		ND	>30'
4	Newport Island Park	Newport Island	Yes	Yes	No		ND	>30'
5	Lido Park	Via Lido Bridge	Yes	Yes	No		ND	>30'
6	Lido Peninsula/Beach Dr.	East end of Lido Peninsula	Yes	Yes	No		ND	>30'
7	Marina Park	Balboa Peninsula	Yes	No	Yes		ND	>30'
8	15th St.	Balboa Peninsula	Yes	Yes	Yes		ND	>30'
9	Via Lido Nord	Lido Isle	Yes	No	No		ND	>30'
10	Via Lido Soud	Lido Isle	No	No	No		ND	>30'
11	10th St	West Bay, Balboa Peninsula	Yes	Yes	No		ND	>30'
12	Crestview	Bayshores	No	Yes	No		ND	>30'
13	Bayshore	Bayshores	No	Yes	No		ND	<15'
14	Bay Island West	Bay Island	No	Yes	No		ND	>30'
15	Edgewater/Montero	Balboa Peninsula	Yes	Yes	No		ND	>30'
16	Bay Island East	Bay Island	No	Yes	No		ND	Varies
17	PCH Bridge	South of PCH Bridge	No	No	No		ND	>30'
18	Linda Isle	Linda Isle	No	Yes	No		ND	>30'
19	Beacon Bay	Harbor Island Blvd.	No	No	No		ND	15'-30'
20	North Bay Front	Balboa Island	Yes	Yes	Yes	Anecdotal	ND	Varies
21	South Bay Front	Balboa Island	Yes	Yes	Yes	Anecdotal	ND	Varies
22	E. Bay Ave	NE Side of Balboa Peninsula A – N St.	Yes	Yes	Yes		ND	Varies
23	Promontory Bay	Bayside Dr.	No	No	No		ND	>30'
24	Bayside Cove		No	No	No		ND	>30'
25	East Bay Front	Balboa Island	Yes	Yes	Yes		ND	Varies
26	Harbor Patrol	Corona del Mar	Yes	No	Yes		ND	<15'
27	M St.	Channel Rd., Balboa Peninsula	Yes	Yes	No		ND	>30'
28	Carnation Cove	Corona del Mar	No	Yes	No	Anecdotal	+10'	>30'
29	China Cove	Corona del Mar	Yes	No	No	Anecdotal	-20'	>30'

Table 1. Lower Bay Beaches (Listed West to East)

Number	Beach Name	Location	Public Access	Boat slips	Boat Launch	Erosion Problem	'01-'06 SL Change	Distance to Eelgrass
30	Pirate's Cove	Corona del Mar	Yes	No	No		ND	>30'

Notes:

Public Access is an indication of the public's ability to get to and use the beaches. If the beach cannot be accessed by the public, then economic benefits to the public are minimal and the current status of beach width cannot be assessed for this report. Access was determined during the site visits of the current study.

Boat Slips column indicates that boat slips are nearby and would be the primary limit on additional sand capacity.

Boat Launch indicates whether a beach allows launching of hand carried water craft (Newport Beach, 2001).

Erosion. Most evidence of shoreline erosion within the Lower Bay is limited to personal accounts and photographs. Nevertheless, this has been sufficient to initiate beach replenishment projects in the past.

'01-'06 SL Change indicates the amount of shoreline change observed between the 2001 and 2006 aerial photographs provided by Newport GIS. ND = shoreline change was "not detectable" or less than the detectable limit. Of the beaches reviewed, Carnation Cove stands out as the only beach with a significant increase in shoreline position. In 2001, there was not beach, and by 2006 there was approximately 10 feet of dry beach.

Distance to Eelgrass The distances were measured from the 2006 aerial photograph provided by the City of Newport Beach GIS department. <15' = there was no possible footprint within the beach that would be greater than 15 feet from eelgrass boundaries. 15'-30' = eelgrass was found between 15 to 30 feet from any possible replenishment boundary. >30' = there are replenishment boundaries that are farther than 30 feet from eelgrass boundaries. Varies = eelgrass was found from <15' to >30' from possible replenishment boundaries. In many instances the only location that would be greater than 30' from eelgrass was on the intertidal region of the beach.

All of the beaches within the Lower Bay are described in greater detail below. Ground level photos, where available, were taken during site visits of October 2 and October 6, 2007. Ground level photos were only taken at beaches that have public land access.

Channel Place Park

Channel Place Park is a public beach with a playground and other amenities. Additional sand capacity on the beach is limited by sand retention groins at either end, which function to separate the sandy beach from nearby boat slips. Currently, the beach could accept on the order of tens of cubic yards without overflowing beyond the end groins.

Figure 3. Channel Place Park

Balboa Coves

The four beaches at Balboa Coves are not publicly accessible via land. The beaches were relatively stable between the 2001 and 2006 as determined from aerial photographs. From the aerial photographs, it seems that any replenishment would cause a negative impact on the many boat slips within the coves.

Figure 4. Balboa Coves

Lake Street

The beach at Lake Street and 38th Street is bound on either end by the 38th Street Bridge and an impermeable patio, shown in the photo below. Additional sand capacity is available at this beach on the order of tens of cubic yards.

Figure 5. Beach at Lake Street

Newport Island Park

This public park is located on the south shore of Newport Island near the intersection of Marcus Avenue and 38th Street. All beaches on Newport Island are excluded from replenishment under the RGP. Replenishment can be permitted with additional sediment testing and acquisition of an amendment to the RGP. Due to the nearby boat slips, the beach has a small capacity for additional sand on the order of tens of cubic yards.

Figure 6. Beach at Newport Island Park

Lido Park

The beach at Lido Park is located on the north-west side of the Via Lido Bridge. It is bounded by a groin on the west and the bridge to the east. The current beach is at capacity. Any additional sand would likely slip around the groin into the nearby boat slips.

Figure 7. Beach at Lido Park

Lido Peninsula/Beach Dr.

This beach is located on the south east tip of the Lido Peninsula. Based on visual inspection, the sand ranged from very fine at the water line to very coarse at the beach berm. Sand retention groins are located at both ends of this pocket beach to prohibit sand migration out of the beach and into the nearby boat slips. The current beach is at capacity.

Figure 8. Beach at Lido Peninsula

Marina Park

The beach at Marina Park is located between 16th Street and 19th Street on the north shore of the Balboa Peninsula. This beach can accommodate a relatively large quantity of replenishment sand on the order of hundreds of cubic yards.

Figure 9. Beach at Marina Park

15th Street

No beach replenishment is permittable within 1,000 feet of the 15th Street public pier under the RGP. If beach replenishment is desired, additional sediment testing and an amendment to the RGP would be required. The current beach width appears adequate. Any beach replenishment would likely impact the 15th St. Pier docks and nearby boat slips.

Figure 10. Beach at 15th Street

Via Lido Nord

The photo below shows the beach at Via Lido Nord at Koron Street. Additional sand capacity on the beach is limited by sand retention groins, which function to separate the sandy beach from nearby boat slips. The current distance between the high tide water line and the end of the east groin is approximately 5 feet. Any additional sand should be placed in the middle of the beach, far from boat slips at either end.

Figure 11. Beach at Via Lido Nord

Via Lido Soud

Additional sand capacity on the beach at Via Lido Soud is limited by the size and placement of sand retention structures. The boat launch ramp in the photo below is protected on the edges by small groins which serve to keep sand from migrating onto the ramp surface. The vertical distance from the beach surface to the top of the groin is a few inches. Public land access to this beach is difficult. Visual inspection of the beach sand yielded grain sizes from medium to coarse sand.

Figure 12. Beach at Via Lido Soud

10th Street

There is a public beach at 10th Street and West Bay Avenue. It is bound on either end by structures functioning as sand retention groins. The beach is wide, but still has capacity to accept on the order of tens of cubic yards of additional sand without impacting the nearby boat slips.

Figure 13. Beach at 10th Street

Crestview and Bayshore

Crestview Beach is located at the intersection of Crestview Drive and Bayshore Drive. Bayshore Beach is located on the south east corner of the Bayshore development. These beaches are inaccessible to the public by land. They appear stable, near to eelgrass beds, and bound by boat slips. Any replenishment would have to be small, on the order of tens of cubic yards.

Figure 14. Crestview and Bayshore Beaches

Bay Island West

There is a small beach on the west shore of Bay Island. In 2007, a sand retention wall was proposed for this beach to hold sand up onto the beach and keep it from migrating into the boat slips (Rossmiller, 2007). The beach has no public access, is small, and bound by boat slips, so replenishment capacity is small, on the order of tens of cubic yards.

Figure 15. Beach at Bay Island West

Edgewater/Montero

The beach near the junction of Edgewater Avenue and Montero Avenue is bound on either end by boat slips and offshore by eelgrass. Nevertheless, there are long stretches between boat slips (hundreds of feet) and the eelgrass beds are located more than 30 feet from possible replenishment locations. Therefore, this could receive hundreds of cubic yards of replenishment sand.

Figure 16. Beach at Edgewater and Montero Avenues

Bay Island East

The beach on the east side of Bay Island is inaccessible to the public by land. This beach has boat slips along the majority of its length, with one open area at the north end. The beach is relatively wide compared to other beaches within the Lower Bay and would likely have a low attendance due to it being located on a private island. It could accept on the order of tens of cubic yards without impacting navigation.

Figure 17. Beach at Bay Island East

PCH Bridge

The beach just south of the Pacific Coast Highway Bridge is inaccessible to the public by land. It is currently fenced off and occupied by numerous sculling boats (not shown).

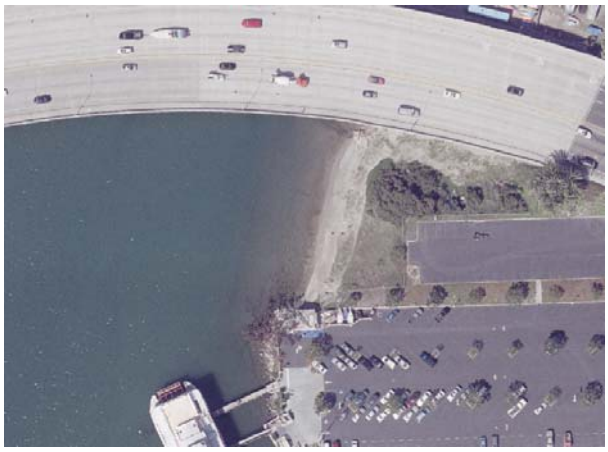

Figure 18. Beach at PCH Bridge

Linda Isle

This beach is inaccessible to the public by land. From aerial photographs it appears that no additional sand could be placed without impacting navigation in nearby boat slips.

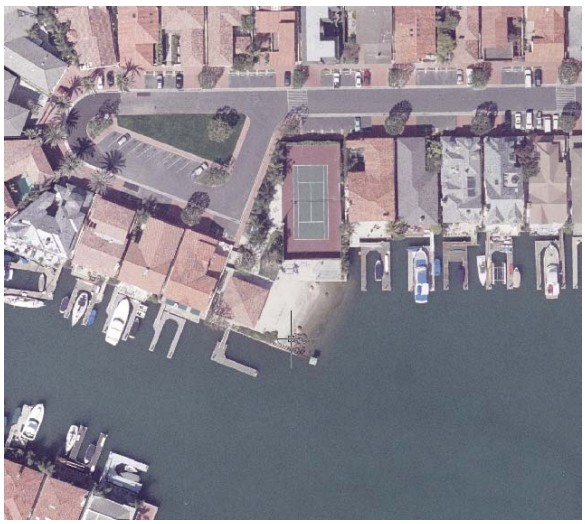

Figure 19. Beach at Linda Isle

Beacon Bay

This beach is inaccessible to the public by land. This beach could accept hundreds of cubic yards of sand without negatively impacting navigation or boat slips.

Figure 20. Beach at Beacon Bay

North Bay Front

1,500 cubic yards was replenished on Ruby Beach on the North Bay Front as part of a 2007 dredging effort that removed a total of 7,000 cubic yards from Channel Reef docks. This beach could receive additional sand at specific locations.

Figure 21. Beach at Ruby Street, North Bay Front, St. Looking West

South Bay Front

South Bay Front stretch along the south and west sides of Balboa Island. A 2002 economic study concluded that if beach widths were doubled to an average of thirty feet, the average increase in attendance would be between 7% and 9% (King & Symes, 2002). Also, any significant increase in beach width would cause a negative impact to navigation in the boat slips. There are however erosion hot spots, such as west of Ruby St. that would benefit from replenishment.

Figure 22. Beach at Ruby Street, South Bay Front, Looking East and West

E. Bay Avenue

The beaches along E. Bay Avenue consist of mainly street ends as shown in Figure 23 below and beaches fronting private homes. The street ends are bound on both sides by sand retention groins which serve to separate sand from the nearby boat slips. Most of the beaches along E. Bay Ave. are at capacity. Minor replenishment projects of tens of cubic yards may be acceptable.

Figure 23. Typical Street End Beach Along E. Bay Avenue

Promontory Bay

The beach at Promontory Bay is just south of Bayside Drive and east of Harbor Island Road. There is a sign indicating that it is a private beach. This beach is excluded from replenishment under the RGP. Replenishment can be permitted with additional sediment testing and acquisition of an amendment to the RGP. The beach currently is at capacity. Sand replenishment beyond a few cubic yards would likely overspill the sand retention groin shown in Figure 24.

Figure 24. Beach at Promontory Bay

Bayside Cove

The beach at Bayside Cove is inaccessible to the public by land or water. From the aerial photographs it appears that additional sand could be placed without impacting boat slips.

Figure 25. Beach at Bayside Cove

East Bay Front

The beach along East Bay Front is variable in width and underlies many boat dock ramps. Any beach replenishment would have to be of small quantities at specific locations. The proximity of boat slips would be a limiting factor to replenishment.

Figure 26. East Bay Front

Harbor Patrol

The beach near the Harbor Patrol office in Corona del Mar is sometimes called Interceptor Beach. This name describes its function, which is to intercept, or trap, migrating sand, keeping it from penetrating farther into the harbor and boat slips (Brodeur, 2007). By design, this beach would not be a receiver of replenishment sand, rather a source.

Figure 27. Harbor Patrol Beach

M Street

A public beach is located at M Street and Channel Road on the tip of the Balboa Peninsula. This beach has a flat sandy platform maintained by a concrete, shore parallel retaining wall. On the bay side of the wall is a low sandy beach accessed by concrete steps. The bay side beach is submerged at high tide as shown in the figure below. Some capacity for additional sand exists, but is limited by the nearby boat slips and eelgrass.

Figure 28. Beach at M Street

Carnation Cove

Carnation Cove has an erosive beach (Miller, 2007). The beach is inaccessible to the public by land. Comparing the 2001 and 2006 aerial photographs showed the beach increased from no beach in 2001 to a 10 foot wide dry beach in 2006.

Figure 29. Carnation Cove

China Cove

The beach at China Cove is erosive (Miller, 2007). Between the 2001 and 2006 aerial photographs, the beach width eroded by approximately 20 feet. Since then, this beach received about 985 cubic yards of replenishment in the summer of 2007 under the RGP. The purpose of the replenishment project was to provide additional dry beach for recreation and to help protect the bulkhead and exposed piles within China Cove. The replenishment source was 500 feet north of China Cove. The beach has since returned to a narrow, eroded condition as shown in the photos below.

Figure 30. China Cove

Pirate's Cove

Pirate's cove has a popular beach due to the easy access and plentiful parking. Of all the beaches in the Lower Bay, this beach is the most exposed to open ocean swell. The beach is consistently narrow as observed in the 2001 and 2006 photos as well as the recent site visit. It is likely that any replenishment to this beach would erode quickly, migrating further into the bay.

Figure 31. Pirate's Cove

2.2 Beach Usage

Little information is available on beach usage. The only beach attendance estimates available within the Lower Bay were for the south shore of Balboa Island with annual attendance of between 10,000 and 15,000 people (King & Symes, 2002). The study finds that Balboa Island's beaches were less crowded in 2002 than in the 1960s and 1970s. The study concluded that if the beach width along Balboa Island's South Bay Front were doubled to an average of thirty feet, attendance would increase by 7% to 9%.

Since there is only one public boat launch ramp at Newport Dunes in Newport Bay, many of the beaches in the Lower Bay allow hand launching of kayaks and other human powered boats to relieve the demand. These boat launch areas are in high demand and should be maintained as sandy beaches.

2.3 Beach Replenishment and Erosion Rate

No quantitative studies of shoreline erosion rates were available within the Lower Bay. There are however anecdotal observations of significant erosion at China Cove, Carnation Cove, and Balboa Island. Observations of a replenishment project with subsequent erosion at Balboa Island are reproduced here:

"In 1970-1971, 4,210 cubic yards of sand were removed from an area near Promontory Bay and placed on Balboa Island from the north side of the island starting at Sapphire Street and extending around the east end of the island to the south side ending at Coral Street. The southwest side of the island between Emerald Avenue and Turquoise Avenue also received sand. City employees familiar with this project report that the sand did not remain on the beach very long. They felt the slope on which sand was placed was too steep. Wave action flattened the slope and caused sand to fill underneath the boat slips (Moffatt & Nichol, Engineers, 1982)."

Aerial photographs taken in 2001 and 2006 were available from the City of Newport Beach. Shoreline positions were evaluated from these photographs to determine changes in beach width during this time. In most cases no significant change in beach width was observed. This does not necessarily mean that beaches in the Lower Bay are stable, only accretion or erosion was too small to be observed in the photos. This type of analysis is typically useful for large shoreline changes greater than 50 feet, whereas changes in the Lower Bay are on the order of less than ten feet. Due to the small changes observed, additional shoreline change analysis is not warranted.

3.0 BEACH REPLENISHMENT CONSTRAINTS

There are many constraints on how, when, what, and where replenishment is allowed. This section provides an overview of relevant government regulations and practical implementation of those regulations on beach replenishment projects for Newport Bay. In addition, others environmental and practical constraints such as impacts to docks, navigation, and constructability are also discussed.

3.1 Regulatory Environment

Successful implementation of a beach replenishment project requires knowledge of the regulatory environment as well as an understanding of the physical, biological, and chemical characteristics of the receiver and borrow sites. The California Coastal Sediment Management Workgroup has been working on simplifying and summarizing beach replenishment regulations over the past few years. They have developed the following key references to assist in understanding the process:

> *California Coastal Sediment Master Plan Status Report*, California Coastal Sediment Management Workgroup. 2006.
>
> *Sand Compatibility and Opportunistic Use Program*. (Moffatt & Nichol. 2006). Prepared for SANDAG and the California Coastal Sediments Management Workgroup.
>
> California Coastal Sediment Master Plan Policies, Procedures, and Regulations Analysis, Beach Restoration Regulatory Guide, Final. (Everest. 2006). Prepared for California State Coastal Conservancy and Coastal Sediment Management Workgroup.

The following summary of beach replenishment regulations is paraphrased from Everest (2006). Depending on the specific nature of the project, implementing a beach replenishment project requires compliance with various regulations at the federal, state, and local levels of government. The most relevant federal, state and local regulations are summarized in Table 2, along with corresponding regulatory requirements and agencies responsible for administering each regulation.

Table 2. Relevant Regulations Affecting Beach Replenishment Projects

Policy/Regulation	Requirement	Permitting/Approval/ Responsible Agency
Federal		
National Environmental Policy Act	Compliance	Lead Federal Agency
Coastal Zone Management Act	Coastal Consistency Determination (CCD)	California Coastal Commission
Rivers and Harbors Act	Section 10 Permit	US Army Corps of Engineers
Clean Air Act	Title V Operating Permit	California Air Resources Board (see below under State)
Clean Water Act (CWA)	Section 401 Certification or Waiver (401 Permit)	Regional Water Quality Control Boards+
Clean Water Act	Section 402 National Pollution Discharge Elimination System (NPDES) Permit	Regional Water Quality Control Boards+
Clean Water Act	Section 404 Permit (404 Permit)	US Army Corps of Engineers
Endangered Species Act*	Section 7 Consultation	U.S. Fish and Wildlife Service
National Historic Preservation Act*	Section 106 Approval	State Historic Preservation Officer
Fish and Wildlife Coordination Act*	Coordination Act Report (CAR)	US Army Corps of Engineers
Magnuson-Stevens Fishery Conservation & Management Act*	Assessment of Impacts to Essential Fish Habitat	National Marine Fisheries Service
State		
California Environmental Quality Act (CEQA)	Compliance	Lead CEQA Agency
California Coastal Act	Coastal Development Permit (CDP)	California Coastal Commission
Porter-Cologne Water Quality Control Act	Compliance Permits under Clean Water Act Sections 401, 402, and 404	State Water Resources Control Board Regional Water Quality Control Boards
California State Lands Public Resources Code	Lease Agreement for Utilization of Sovereign Lands	California State Lands Commission
California Public Resources Code Section 1600	Streambed Alteration Agreement (SAA)	California Department of Fish and Game
California Endangered Species Act	Section 2081(b) Incidental Take Permit (State) Section 2081.1 Consistency Determination (State and Federal)	California Department of Fish and Game
Water Quality Control Plans California Ocean Plan	Consistency Compliance	Regional Water Quality Control Boards+

Table 2. Relevant Regulations Affecting Beach Replenishment Projects

Policy/Regulation	Requirement	Permitting/Approval/ Responsible Agency
Clean Air Act	Title V Operating Permit	Air Pollution Control Districts and Air Quality Management Districts
Local		
City Municipal Code, Title 17	Title 17, 17.55 Dredging Permit	Newport Beach Harbor Resources Division
Harbor Permit Policy	RGP Permit	Newport Beach Harbor Resources Division

* Review and compliance is usually triggered through the initial Clean Water Act Section 404 permitting process by the USACE.

\+ The SWRCB has lead responsibility when a project involves jurisdiction by more than one RWQCB.

In general, the regulatory compliance process consists of three phases: (i) environmental review; (ii) permitting; and (iii) compliance review. Environmental review is typically done first since the information contained in the environmental review documentation is used by the regulatory and resource agencies to process permits and agreements. Once the environmental review process is complete, or in some cases near completion, then the permitting phase begins.

The environmental review process consists of NEPA and CEQA compliance, including other environmental laws. To streamline the environmental review process and as encouraged by CEQA, NEPA and CEQA documents should be prepared concurrently. The major differences between NEPA and CEQA are summarized in Everest (2006).

Upon completion of the environmental review process, the project applicant will submit the necessary permit and agreement applications to the appropriate agencies. In order to improve coordination and consistency in resource protection and management, the federal regulatory agencies (USACE) and State (California Coastal Commission, or CCC) typically do not approve their permits until they have seen the final draft responses from the other agencies and worked out any response differences. USACE and the State Water Resources Control Board recently issued Regional General Permit Number 67, designed to streamline the beach replenishment permitting process under the USACE, Los Angeles District (USACE, 2006). This standing permit expired September 25, 2011. Newport Harbor falls under the jurisdiction of the Los Angeles District of the USACE.

Most beach replenishment projects involve the placement of material (i.e., fill) in waters of the U.S; therefore, a Clean Water Act (CWA) Section 404 Permit and RHA Section 10 Permit from the USACE are usually required. A CWA Section 401 Certification from the appropriate Regional or State Water Board is needed for the 404 Permit. The CCC (and possibly a Local Coastal Program) will require either a Coastal Consistency Determination (if it's a federal project) or a Coastal Development Permit. The CDFG and State Land Commission must also issue a Streambed Alteration Agreement and Sovereign Lands Utilization Lease, respectively. Triggers and corresponding processes for each regulation are described in Everest (2006).

Successful processing of all required environmental review documentation and permit information requires close coordination with representatives from the relevant regulatory and resource agencies. Contact information (as of December 2006) for federal, state, and local regulatory and resource agencies is provided in Table 3. Each agency should be contacted early in the regulatory compliance phase to identify the agency staff member(s) that will be responsible for the project.

The permitting process can be an expensive and time consuming portion of any replenishment project. For replenishment projects less than 1000 cubic yards (plus other conditions), the Newport Beach Harbor Resources Division maintains a Regional General Permit #54 (RGP). This greatly simplifies the permitting process, condensing the documentation into a four page Dredging Application (with supporting documents) submitted to the Harbor Resources Division. General information such as locations, project description, quantities, depths, grain sizes, and environmental habitat information are required. The RGP is valid for five years, with the current permit ending on October 4, 2011.

Table 3. Regulatory and Resource Agency Contact Information for Beach Replenishment Projects

Agency	Region/District	Office/Area	Contact	Telephone	E-Mail Address
USCAE	Los Angeles District	Orange County	Cori Farrar	(213) 452-3296	Corice.J.Farrar@usace.army.mil
State Water Resources Control Board	California	State	Bill Orme	(916) 341-5464	BOrme@waterboards.ca.gov
Regional Water Quality Control Board	Region 8, Santa Ana		Jun Martirez	(951) 782-3258	jmartirez@waterboards.ca.gov
California Coastal Commission	South Coast District	Counties: Los Angeles and Orange	Teresa Henry	(562) 590-5071	thenry@coastal.ca.gov
California Department of Fish and Game	South Coast Region	Santa Barbara, Ventura, Los Angeles, Orange and San Diego Counties	SAA Contact	(858) 636-3160	
County	Orange	Watershed & Coastal Resources Division	Susan Brodeur	(714) 834-5486	Susan.brodeur@rdmd.ocgov.com
City	Newport Beach	Harbor Resources Division	Chris Miller	(949) 644-3043	cmiller@city.newport-beach.ca.us

Acronyms:

CWA = Clean Water Act of 1972
NEPA = National Environmental Policy Act of 1969
CZMA = Coastal Zone Management Act of 1972
CCA = California Coastal Act of 1976
CDFG = California Department of Fish and Game
ESA = Endangered Species Act of 1973
RHA = River and Harbor Act of 1899
FWCA = Fish and Wildlife Coordination Act of 1956
MSFCMA = Magnuson-Stevens Fishery Conservation and Management Act of 1996
SAA = Streambed Alteration Agreement

Environmental

Simple rules regulating impacts to eelgrass communities within the Lower Bay have been incorporated into the RGP (Harbor Resources Division). An eelgrass survey of the replenishment area is required as part of the permitting process. If it is found that eelgrass is

present within 15 feet of the replenishment footprint, the project will not be permitted. If it is present within 15 to 30 feet of the replenishment footprint, then pre-and post-monitoring is required by a certified eelgrass diver. Further than 30 feet requires no additional permitting or monitoring.

An example application of this eelgrass distance rule is shown in Figure 32. This image shows the extent of eelgrass beds (marked in green) overlaid on the beach at South Bay Front, Balboa Island. The eelgrass drawing was provided by the Newport Beach GIS Department. It can be seen that eelgrass has existed right up to the low tide line at this beach. Nevertheless, sand replenishment could still take place on the dry beach as long as the footprint is greater than 15 feet away.

To date, there is no mitigation flexibility in these rules. There has been discussion of developing eelgrass management plan to offset dredging and beach replenishment losses to eelgrass habitats. The eelgrass management plan is currently in the conceptual stage, but would likely ease placement restrictions for beach replenishment if adopted.

A survey for caulerpa taxifolia must be performed covering an area within 30 feet of the replenishment site by a certified caulerpa diver (National Marine Fisheries Service, 2004). Results must be reported to the Harbor Resources Division. While the eelgrass and caulerpa rules have been developed over time for the RGP, it is likely that they would also apply for replenishment projects within the Lower Bay that are not covered under the RGP.

Beach replenishment should not be placed during least tern and snowy plover foraging and nesting seasons, grunion runs, and high beach usage times, which can all differ according to site.

Replenishment rates are restricted to control turbidity levels. Restrictions are also placed on the number of trips per day allowed for transporting source sediment to minimize air quality, noise, public safety, and traffic impacts.

Figure 32. Eelgrass Overlay and Replenishment Footprint on South Bay Front

Sediment Compatibility

In addition to the environmental interpretations of the regulations, rules pertaining to the compatibility of replenishment sources and receiver beaches have been developed specifically for Newport Bay. These rules cover issues associated with grain size compatibility, color, shape, debris, and in place hardness.

The general rule for beach replenishment is that sources must have grain sizes compatible with the receiving beaches. Since beaches in the Lower Bay have sand sized grains a simple rule was developed for use under the RGP. It states that the replenishment source material must be either greater than 80% sand or at least 75% sand and no more than 10% difference in sand content between source and receiver beach. In addition, one soil sample must be collected at each disposal site and at least one sample per quarter acre must be collected.

The 80% rule may also be applicable for larger projects not covered under the RGP. For projects not covered under the RGP and having replenishment sources with 80% sand or less, the source may still be beach suitable if it falls within the grain size envelope of the receiver beach (Moffatt & Nichol, 2006).

It is necessary to know grain sizes of the replenishment sources and receiver beaches for determining grain size compatibility. In support of the most recent (2005) RGP application, 33 sediment samples were collected at potential replenishment sources within Newport Bay (Weston Solutions, Inc., 2005). These locations included both subtidal and intertidal sites near Lido Peninsula, Lido Isle, Bayshore, Linda Isle, Harbor Isle, Balboa Island, Bay Island, and the Balboa Peninsula. It was found that subtidal samples (further from shore) had high percentages of silt and clay and intertidal samples (close to shore) had much higher percentages of ranging from 90.4 to 98.3%. The sediment sample data can be useful for a preliminary analysis if the grain size envelope approach is required.

Grain size data for the many receiver beaches is not yet organized under one report. Many of the beaches have been maintained by individual homeowners or homeowners associations and sampling data may be available from those individuals or groups. While it is beyond the scope of this study, an evolving database of all replenishment sources and receiver beaches would be useful for grain size compatibility analysis within the HAMP.

Similar sediment color is required for aesthetic reasons. Most dredged material is typically suitable for beach replenishment. The darker color of dredged material normally begins to resemble the beach material after exposure to the sun.

Source sediment should have sub-rounded particles, rather than angular or sharp particles. Most dredged material meets this requirement since it is common for naturally transported fluvial material to have rounded particles.

Source sediment should be free of trash and debris. Debris should not pose health or safety hazards, bad odor, or poor visual aspects.

Source sediment should not harden when compacted during beach placement or when exposed to wetting and drying conditions. If this is of concern, then the source material should be placed in the surf zone (Moffatt & Nichol, 2006)

3.2 Impact on Boat Slips

One of the key findings of a 1982 study of beach replenishment on Balboa Island was that locally dredged material when placed on the Balboa Island beaches would quickly result in sedimentation of the nearby boat slips (Moffatt & Nichol, Engineers, 1982). This would result in a hazard to navigation and impact the utility of the slips. Succinctly stated, “A wide beach and boat slips are incompatible uses” (Moffatt & Nichol, Engineers, 1982).

The combined desire for relatively wide beaches and functional boat slips has resulted in the need for near constant beach maintenance. In many cases the maintenance is essentially pushing sand from below the boat slips, uphill to the beach and repeating on a regular basis. In addition, sand retaining groins are prevalent throughout the Lower Bay. Two examples are shown in Figures 33 and 34 below. The groins function to separate the sandy beach from boat slips, reducing the maintenance frequency.

Figure 33. Groin Separating Sandy Beach from Boat Slips at Via Lido Nord

Figure 34. Groin Separating Sandy Beach from Boat Slips on Lido Peninsula

3.3 Construction

Beach replenishment construction within the Lower Bay has been limited to two companies within the past few years. Shellmaker Inc. has been capable of dredging in and around docks as needed with both ocean and beach disposal. Recently, their ocean scow has become disabled so little to no ocean disposal is taking place from the Lower Bay. The second company, Intracoastal Dredging has a small, 6 inch hydraulic dredge operating on a floating platform. The majority of their dewatering and beach shaping has been performed with bobcats and front end loaders. This allows for easy maneuvering between the many docks and structures within the Lower Bay. For the majority of projects within the Lower Bay, construction is limited to these two companies and their equipment. They have an economic advantage over other companies since their mobilization and demobilization costs will be minimal.

There is larger dredging equipment currently operating in the Upper Bay. When that project finishes in 2008, it will likely move out of Newport Bay to other large-scale projects. Re-mobilizing back to Newport Bay would likely be cost prohibitive for future use.

4.0 PRIORITIZING BEACH REPLENISHMENT

The numerous factors both for and against replenishment at the many possible beaches within the Lower Bay make choosing which beach receives sand replenishment difficult. To date, no systematic decision making method is available. To assist in this, two possible decision making tools are presented: 1) a benefit to cost (B/C) ratio analysis which provides one relatively objective dollar value to each possible scenario; and 2) the use of an Alternative Matrix to provide more subjective qualitative rating between different alternatives.

4.1 Benefit Cost Ratio Approach

To help with large scale sand replenishment project decision making, economists and policy-makers typically perform a B/C analysis. This approach has been pursued by the US Army Corps of Engineers with their automated GIS based regional sediment management computer programs for the Ventura and San Diego regions (Everest, 2006 and 2008). Also, the California Department of Boating and Waterways used this approach on a state wide level (King and Douglas, 2003) and the San Diego Association of Governments (SANDAG) used B/C analysis for the San Diego region (SANDAG, 2007).

A B/C analysis examines the ratio of benefits to costs. For example if a replenishment project yields an increase in total economic benefit of $800,000 and costs $200,000, then the B/C ratio is 4 ($800,000/$200,000). If the B/C ratio is greater than one, then the project makes sense in terms of California State policy. As a practical matter, many agencies require a somewhat higher ratio, for example, a B/C ratio greater than two is sometimes required to ensure that the project makes sense given the uncertainties involved. When resources are limited, it is useful to choose projects with the highest B/C ratio.

The approach normally taken to perform a B/C analysis involves 1) development of alternatives, 2) estimates of construction and lifetime costs, 3) estimates of the potential benefits, and 4) review of the B/C ratios for each alternative.

Costs that are typically considered include: studies, engineering, environmental review, permitting, construction, mitigation, maintenance, and monitoring. The evaluation of economic benefits will typically consider the following factors: weather (sunny or cloudy); water quality (recreation experience); beach width and quality (existing beach widths, future widths, sustainability, sand quality), overcrowding (attendance, carrying capacity), beach facilities and services, availability of substitutes and parking (accessibility); storm protection (some agencies do not include this); and environmental benefit (in most cases replenishment is a detriment).

If the B/C approach were pursued for sand replenishment in the Lower Bay, significant gaps in available data would need to be filled such as: receiver beach grain sizes, replenishment source grain sizes, existing beach widths, erosion rates, attendance/popularity, public access status, and amenities of each beach.

The B/C analysis, while providing objective information, is also very data intensive and likely over burdensome for small scale sand replenishment projects such as proposed for the Lower Bay. A more effort-appropriate approach is the less data intensive, more qualitative “Alternative Matrix”.

4.2 Alternative Matrix

An Alternative Matrix was developed for this report (Table 4) to qualitatively rank beaches for their replenishment capacity and need. To do this, the beach names were listed on the left column with each beach having qualitative values for various criteria. The criteria include: access & popularity, sand capacity, constructability, and eelgrass. Values for each criteria range from 1 to 3 with 1 being poor performance and 3 being good performance within that criteria. Also, each criteria are weighted from 1 to 3 based on their level of importance, with 3 being most important. For example, access & popularity is very important so that criteria receives a weight of 3, while constructability is least important receiving a weight of 1. Each beach and criteria combination has a subtotal calculated as the criteria value times the importance weighting. On the right hand side of the table the sub-totals are added together and ranked. The beaches that would benefit the most from replenishment have the highest total and the best rank (1 being best).

The best ranking beaches in the Alternative Matrix are (from west to east): Marina Park, Edgewater/Montero, and China Cove, all having an equal rank of 1. The next best ranked beaches are Pirate's Cove (ranked 2), Lake St, 10th St, and M St. (ranked 3).

The Alternative Matrix could be improved by refinement and/or addition of the following data: estimates of replenishment capacity at each beach (± 100%), public access status of each beach, a database of grain sizes and their compatibility to potential sediment sources.

Table 4. Beach Replenishment Alternative Matrix

Number	Beach Name	Access & Popularity	Importance x 3	Sand Capacity & Erosion	Importance x 3	Constructability	Importance x 1	Eelgrass	Importance x 2	Total	Rank
		value	subtotal	value	subtotal	value	subtotal	value	subtotal		
1	Channel Place Park	3	9	1	3	2	2	3	6	20	6
2	Balboa Coves	1	3	1	3	1	1	3	6	13	12
3	Lake St.	3	9	2	6	2	2	3	6	23	3
4	Newport Island Park	3	9	1	3	2	2	3	6	20	6
5	Lido Park	2	6	1	3	1	1	3	6	16	9
6	Lido Peninsula	2	6	1	3	2	2	3	6	17	8
7	Marina Park	3	9	3	9	2	2	3	6	26	1
8	15th St	3	9	1	3	2	2	3	6	20	6
9	Via Lido Nord	2	6	3	9	1	1	3	6	22	4
10	Via Lido Soud	1	3	1	3	1	1	3	6	13	12
11	10th St	3	9	2	6	2	2	3	6	23	3
12	Crestview	1	3	1	3	2	2	3	6	14	11
13	Bayshore	1	3	1	3	2	2	1	2	10	13
14	Bay Island West	1	3	1	3	1	1	3	6	13	12
15	Edgewater/Montero	3	9	3	9	2	2	3	6	26	1
16	Bay Island East	1	3	2	6	1	1	2	4	14	11
17	PCH Bridge	1	3	2	6	2	2	3	6	17	8
18	Linda Isle	1	3	1	3	1	1	3	6	13	12
19	Beacon Bay	1	3	2	6	2	2	2	4	15	10
20	North Bay Front	3	9	2	6	2	2	2	4	21	5
21	South Bay Front	3	9	2	6	2	2	2	4	21	5
22	E Bay Ave	3	9	1	3	2	2	2	4	18	7
23	Promontory Bay	1	3	1	3	2	2	3	6	14	11
24	Bayside Cove	1	3	2	6	1	1	3	6	16	9
25	East Bay Front	3	9	2	6	2	2	2	4	21	5
26	Harbor Patrol	3	9	1	3	2	2	1	2	16	9

Table 4. Beach Replenishment Alternative Matrix

Number	Beach Name	Access & Popularity	Importance x 3	Sand Capacity & Erosion	Importance x 3	Constructability	Importance x 1	Eelgrass	Importance x 2	Total	Rank
		value	subtotal	value	subtotal	value	subtotal	value	subtotal		
27	M St	3	9	2	6	2	2	3	6	23	3
28	Carnation Cove	1	3	3	9	2	2	3	6	20	6
29	China Cove	3	9	3	9	2	2	3	6	26	1
30	Pirate's Cove	3	9	3	9	1	1	3	6	25	2

Notes on the Alternative Matrix:

Access & Popularity indicate the recreational need of each beach. This includes public access by land to the beach, recreation on the dry beach (such as lounging and exercise), in the water (such as swimming), and boat launching of hand carried craft. Beaches that are not accessible by the public would receive a criteria value of 1. Beaches that are popular and easy to access would receive a value of 3.

Sand Capacity & Erosion indicate the need of each beach for additional sand. Many beaches are already at capacity, not requiring additional sand. These would receive a criteria value of 1. Others are highly erosive and require significant replenishment. Beaches that require the most replenishment would receive a criteria value of 3.

Constructability This category describes how difficult it would be to construct beach replenishment. The criteria values range from 1 to 3, with 3 being the easiest, and 1 being most difficult. Easy constructability would be a beach easily accessed by land and water. Difficult constructability would be a beach with narrow streets and blocked beach access making land transport of sand difficult to impossible. All but one of the beaches are accessible by water.

Eelgrass This criteria generally reflects the ease of permitting. Of the permitting issues, eelgrass proximity is the most constraining. Beaches are rated with a scale from 1 to 3 with 3 being easy and 1 being difficult permitting. An easy permitting means that eelgrass is greater than 30 feet away and the replenishment could be applied for under the RGP. Difficult permitting means eelgrass is within 15 feet and the replenishment could not use the RGP. Other regulatory and environmental considerations include temporary impact to water quality and grain size compatibility requirements. These other considerations, however, are approximately equal for all beaches being considered and are not reflected in the 1 to 3 scale.

Total Beaches with the highest total are most promising for replenishment.

Rank Beaches are ranked from 1 to 13 with 1 being the most promising and 13 being the least favorable beach for replenishment. Some beaches are tied for rank.

5.0 FINDINGS AND RECOMMENDATIONS

There are over 30 beaches within Lower Newport Bay with varying uses and needs. Several issues have prevented efficient management of beach replenishment projects.

- There is no management system in place to characterize and prioritize dredged material for beneficial uses such as beach replenishment.

- There is no management system is in place to prioritize selection of beaches for replenishment.

- Eelgrass habitat restrictions: The proximity of eelgrass beds can limit the opportunities to replenish the beaches. Currently, beach replenishment cannot be conducted in areas where eelgrass is found within 15 feet of the replenishment footprint. If eelgrass is found within 15 to 30 feet of the replenishment footprint, then pre-and post-monitoring surveys are required.

- Components of the RGP restrict the application of dredged material on beaches. Under the RGP, only small volumes (<1000cy) of dredged material from the Lower Bay can be beneficially used to nourish compatible beaches. Larger replenishments require a separate and costly permit.

The City will benefit from developing a centralized management program to manage future dredging and beach replenishment projects. An Alternative Matrix has been developed that the City can use in the future to rank the varying uses, needs, and constraints of the beaches to decide on which beach would most benefit from replenishment. It is recommended that the City to fill the data gaps listed earlier to improve the Alternative Matrix which can easily be modified as more information becomes available or when priorities and opportunities change.

Based on existing available data, the Alternative Matrix shows that Marina Park, Edgewater/Montero, and China Cove (Figure 35) all rank very high for beach replenishment since these beaches all have a recreational need, can accept significant quantities of sand, are easily constructed, and are far enough from eelgrass to be permitted. Pirate's Cove, Lake St, 10th St., and M St. also rank well for beach replenishment.

Figure 35. Priority Beach Replenishment Locations

In addition to continue to improve the Alternative Matrix, the following recommendations are made for improving the effectiveness of future beach replenishment program:

- Develop eelgrass management plan and determine if these banks can be used for beach replenishment. This would significantly reduce restrictions on beach replenishment placement locations.

- Modify the RGP to simplify and streamline the special conditions and increase the 1,000 cubic yard quantity limit. This would allow the resumption of maintenance dredging and beach replenishment by individual homeowners and homeowners associations.

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