MEETING NOTICE
AND AGENDA

SHORELINE PRESERVATION WORKING GROUP
The Shoreline Preservation Working Group may take action on any item appearing on this agenda.

Thursday, December 4, 2008
11:30 a.m. to 1:30 p.m.

PLEASE NOTE THE TIME CHANGE - THE MEETING WILL BE TWO HOURS.

SANDAG, 7th Floor Conference Room
401 B Street, Suite 800
San Diego, CA 92101-4231

Staff Contact: Shelby Tucker
(619) 699-1916
stu@sandag.org

AGENDA HIGHLIGHTS
• COASTAL REGIONAL SEDIMENT MANAGEMENT PLAN
• REGIONAL BEACH SAND PROJECT II
• MARINE LIFE PROTECTION ACT INITIATIVE
• PROPOSITION 84 FUNDING REQUEST

SANDAG offices are accessible by public transit.
Phone 1-800-COMMUTE or see www.sdcommute.com for route information.

In compliance with the Americans with Disabilities Act (ADA), SANDAG will accommodate persons who require assistance in order to participate in SANDAG meetings. If such assistance is required, please contact SANDAG at (619) 699-1900 at least 72 hours in advance of the meeting.

To request this document or related reports in an alternative format, please call (619) 699-1900, (619) 699-1904 (TTY), or fax (619) 699-1905.
1. WELCOME AND INTRODUCTIONS

2. PUBLIC COMMENTS/COMMUNICATIONS

Members of the public will have the opportunity to address the Shoreline Preservation Working Group (SPWG) during this time.

3. SUMMARY OF THE OCTOBER 2, 2008, MEETING

The October 2, 2008, meeting summary is attached for Working Group review and approval.

4. REGIONAL SHORELINE MANAGEMENT PROGRAM GUIDING PRINCIPLES

Previously the Working Group agendas included a set of Guiding Principles that helped lead discussions and actions. SANDAG staff would like the Working Group to reconsider and amend, if needed, these Guiding Principles for inclusion on future agendas.

5. COASTAL REGIONAL SEDIMENT MANAGEMENT PLAN

Chris Webb, from Moffatt & Nichol, will provide the Working Group with an overview of the Draft Coastal Regional Sediment Management Plan (Plan). A copy of the Plan’s Executive Summary is attached. SANDAG staff is requesting that the Working Group review and comment on the draft Plan. All comments on the Plan should be received by Shelby Tucker no later than Friday, January 16, 2008. A copy of the Plan can be found at www.sandag.org/shoreline, starting December 15, 2008.

6. REGIONAL BEACH SAND PROJECT II

   a. Chris Webb, Moffatt & Nichol, and Dave Schug, URS, will provide information on the completion of the offshore sand surveys and vibracore work that occurred during October and November as part of the RBSP II preliminary planning activities. Additionally, the consultant team will explain what is needed for the completion of the preliminary design.

   b. SANDAG staff will discuss with the Working Group the next steps related to implementation of the RBSP II. Staff has attached information related to the required matching funds and draft Memorandum of Understanding between SANDAG and the Coastal Cities.
+7. MARINE LIFE PROTECTION ACT INITIATIVE

SANDAG staff will provide an update on the status of MLPA initiative efforts and existing efforts undertaken by SANDAG and regional stakeholders to ensure beach replenishment issues are considered. A draft letter outlining regional concerns is attached for Working Group review. Comments should be received prior to December 12, 2008. Additionally, it is our understanding that the MLPA Stakeholder meeting will be held in San Diego, January 13-14, 2009. All are encouraged to attend; SANDAG staff will send information as soon as it is available.

+8. PROPOSITION 84 FUNDING REQUEST

Based on discussions with staff from the Ocean Protection Council (OPC) and California Coastal Conservancy (Conservancy), a draft scope of work has been prepared and submitted for their consideration for potential allocation of Proposition 84 funds. This is an information item but if any member of the Working Group has comments or concerns regarding the draft scope, please forward them to SANDAG staff as soon as possible. A copy of the draft scope of work is attached.

9. LEGISLATIVE UPDATE

Steve Aceti, from CalCoast, will discuss the status of state and federal legislation related to shoreline management.

+10. 2009 SHORELINE PRESERVATION WORKING GROUP MEETING SCHEDULE

Please find attached a list of Working Group meeting dates for calendar year 2009

11. ADJOURNMENT AND NEXT MEETING

The next regularly scheduled Working Group meeting is Thursday, February 5, 2008, from 11:30 a.m. to 1 p.m.

+ next to an item indicates an attachment
SUMMARY OF THE OCTOBER 2, 2008, MEETING

Members in Attendance:
Jim Bond, City of Encinitas, Vice Chair
Teresa Barth, City of Encinitas (Alt.)
Lorie Bragg, City of Imperial Beach (Alt.)
Carrie Downey, City of Coronado
Joe Kellejian, City of Solana Beach
Jerry Kern, City of Oceanside
Pam Slater-Price, County of San Diego

Advisory Members in Attendance:
Steve Aceti, California Coastal Coalition
Loni Adams, California Department of Fish and Game
August Felando, California Lobster and Trap Fisherman’s Association
Marco Gonzalez, Surfrider
Bob Hoffman, National Marine Fisheries Service (NMFS)
Lee McEachern, California Coastal Commission
Michelle Okihiro, Scripps Institute of Oceanography
Kim Sterrett, California Department of Boating and Waterways

Staff Subgroup
Ray Duncan, City of Oceanside
Don Hadley, City of Oceanside
Steven Jantz, City of Carlsbad
Y. Sachiko Kohatsu, County of San Diego
Leslea Myerhoff, City of Solana Beach
Greg Wade, City of Imperial Beach
Kathy Weldon, City of Encinitas

Others:
Bud Carroll, City of Carlsbad Beach Committee
Bob Crane, Seacoast Preservation Association
Anne-Lise Lindquist, Moffatt & Nichol
Scott Nightingale, City of Oceanside
Kelly Sayce, Strategic Ocean Solutions
Sue Steele, California Coastal Coalition
Frank Quan, City of Oceanside
Julie Wang, EDAW
Chris Webb, Moffatt & Nichol
Rob Rundle, SANDAG
Keith Greer, SANDAG
Shelby Tucker, SANDAG
Marina Som, SANDAG
1. **Welcome and Introductions**

Vice Chair, Jim Bond, City of Encinitas, called the meeting to order at 11:35 a.m. and introductions were made. He noted that Ann Kulchin was unable to attend.

2. **Public Comment/Communications**

Joe Kellejian, City of Solana Beach, announced the importance of coastal cities and coastal counties to participate in the League of Cities Coastal Issues Group. Mr. Kellejian recommended that cities absent from the group should seek representation. Agreeing, Mr. Bond stated that it’s a worthwhile experience for all coastal cities and the county to get involved in the group because the coastal quality is the economic engine for the region. He said that activities affecting the shoreline have far-reaching effects on the region as a whole.

3. **Agenda Item #3, Summary of the June 12, 2008, Meeting**

Upon motion from Pam Slater-Price, County of San Diego, and seconded by Mr. Kellejian, the Working Group approved the June 12, 2008, meeting minutes unanimously.

4. **Agenda Item #4, Marine Life Protection Act Implementation**

Kelly Sayce, from Strategic Ocean Solutions, gave a presentation on the Marine Life Protection Act (MLPA). Ms. Sayce was hired as a consultant for the education and outreach component of the MLPA Initiative (MLPA-I). Ms. Sayce’s presentation provided the Working Group with information on the MLPA-I efforts to implement marine protected areas (MPAs) along the coast of California.

The MLPA was signed into California State law in 1999. It was designed to assemble a network of MPAs, which included state marine conservation areas, state marine parks, and state marine preserves throughout the State’s 1100 mile coast. Early efforts to implement the MLPA failed due to lack of funding, support, and ambiguity in the implementation process. Due to this failure, the MLPA-I was formed in 2004 to better implement the MLPA through a transparent, stakeholder-driven process. The MLPA-I created a public-private partnership consisting of: initiative institutional partners, such as the California Department of Fish and Game (CDFG), California Resources Agency, and Resources Legacy Fund Foundation; institutional groups; stakeholders; and the general public.

The MLPA-I has taken on a regional, adaptive approach to implementation to ensure the connectivity of MPAs. The plan calls for progressive implementation of MPAs through five phases along the coast of California: North Coast, North Central Coast, San Francisco, Central Coast, and South Coast. The North Coast process has been completed. The second phase, North Central Coast process, is still under review by the CDFG and is open to public comments. The South Coast process is underway and expected to be completed by November 2009. This process is expected to be more successful than the prior two phases. After the completion of the South Coast phase, the MPA implementation process will move northward to the Central Coast and San Francisco Bay.

Bob Hoffman, NMFS, asked who is on the Regional Stakeholder’s Group. Ms. Sayce said that there are 57 people on it; half of those are primary members and half are alternates. Group members consist of a wide range of people across all stakeholder lines. A list of Stakeholder Group members is available online or will be made available, by Ms. Sayce, upon request. SANDAG staff provided a list to members of the Working Group and interested parties through email.
Steve Aceti, California Coastal Coalition, said that a list of all MLPA-I stakeholders will be sent out in a press release and included on the California Coastal Coalition list serve at the request of Melissa Miller-Henson, Program Manager for the MPLA-I. Mr. Aceti also informed the group that Ms. Miller-Henson has tentatively agreed to give a luncheon keynote presentation on October 22, 2008, in Long Beach, CA, if travel fund permits, to address the concerns of coastal cities over the effect of the MPLA-I on beach restoration projects in the region.

Ms. Sayce said, in regard to beach nourishment concerns, there is a Science Advisory Team sub-work team that will address this issue directly. She also said that it would be unproblematic for her or Craig Shuman to return within 3 or 4 months to update the working group on the progress of the MLPA-I. Additionally, she solicited any additional beach nourishment data that would assist the Science Advisory Team in making recommendations to the Regional Stakeholders Group.

Pam Slater-Price asked if possible conflicts between the beach nourishment program and MLPA-I are due to sand replenishment or is it because of berms and barriers that coastal cities are concerned about. Ms. Sayce said that she does not know the answer to this question, but from what she was told by Ms. Miller-Henson, the concerns of coastal cities were regarding whether current beach nourishment review processes would be permitted once an MPA is designated in a sand nourishment area. Ms. Sayce anticipates that those review processes will be permitted in conservation areas and park areas, but the status of those review processes in no take zones and preserved areas are unknown at this time. Questions regarding review processes in MPAs were taken to the CDFG for evaluation. Ms. Sayce said that she does not know if those distinctions exist with the berms.

Mr. Aceti responded that concerns from coastal cities were over how MPA will effect the placement of sand onshore and where sand can be obtained offshore and onshore. He had suggested that the MLPA-I should be placed on the agenda of the Coastal Sediment Management Work Group to ensure that they are not working across purposes.

Ms. Slater-Price added that this type of marine protection program is what is needed in the long run, but the question remains as to how to ensure that beach nourishment does not conflict with state MPA. Overall, she believes that marine protection is beneficial because the ocean is at risk and anything that can be done should be done to help preserve it. She would also like to find out where the friction points exist.

Kim Sterrett, California Department of Boating and Waterways (DBW), asked how the success of the MLPA-I is being measured. Ms. Sayce answered that it is currently being measured by the level of opposition and a variety of different factors. She said that the success she is speaking of has nothing to do with the success of the MPAs and the effectiveness of the MPAs; rather, it has more to do with the success of engaging stakeholder involvement in the process.

Jerry Kern, City of Oceanside, asked how sport and commercial fishermen are participating in the process. Ms. Sayce said that they both are distinct parties and user groups. Both groups have had active involvement in the process. But, as an outreach coordinator, she said that commercial fishermen are an underrepresented group. She has made a concerted effort to engage their involvement. Ms. Sayce said that commercial fishermen have some misconception and fear that their voices are not being heard, but she feels that outreach has done a moderately good job at engaging their involvement. Tribal interests are another area that she is outreaching to. She is trying to do as much preemptive, proactive outreaching as possible to engage the involvement of all interest groups.
August Felando, of the California Lobster and Trap Fisherman’s Association, said that as a general comment, Ms. Sayce is correct about commercial fishermen. His concern, however, is on how the MPA boundaries are being established. There is a great deal of controversy and concern over the survival and recognition of commercial fishermen. Mr. Felando said that commercial fishing in San Diego is a near shore operation; therefore, the MPA lines would have a tremendous impact on the operation. He mentioned commercial fishermen were the primary data contributor in the early stages of the research process, and apprehension exists whether this data will be used to establish MPAs in areas of best catch. He is pleased that this issue was raised at this meeting.

Mr. Felando also raised the subject of MPAs in federal waters. He said that it was announced by the President that recreational fishing will not be impacted in federally-designated MPAs because of amendments in statutes. But, in this case, they are dealing with state activity and CDFG. Ms. Sayce said, to clarify, that the MPAs for this program will be implemented three miles off the coast or within or surrounding islands in State waters.

Mr. Aceti said that last April the California Coastal Coalition premiered a short documentary on the MLPA-I process in the Central Coast, which is a good informational source. Ms. Sayce said that she would make this documentary available by request. Additionally, Mr. Aceti said the South Coast Region is the first study region where sand replenishment is an issue and it is new ground for the MLPA-I process, thus it is really important for SANDAG, the coastal cities, and the County of San Diego to be involved.

Mr. Bond added that when this presentation was given at the Coastal Cities Meeting, it was mentioned that the buoys marking the boundary of the preserves where fishing is prohibited are really good fishing areas, thus, there is hope in the feasibility of commercial uses near MPAs. Additionally, Mr. Bond said that there should be a Working Group member in the MLPA-I Stakeholder group to keep the Shoreline Preservation Working Group members informed. Ms. Sayce and Shelby Tucker, SANDAG, said that they will look into this and get the information out to the group.

5. **Agenda Item #5, Encinitas Opportunistic Use Project and Funding Request**

Kathy Weldon, from the City of Encinitas, gave a presentation on the Opportunistic Beach Replenishment Project/Pacific Station Project that will place sand at Batiquitos Lagoon, which has the highest rate of beach erosion in Encinitas.

Pacific Station is a mixed-use development project that has two-levels of underground parking. The project site is located on a bluff between Pacific Coast Highway 101 and E Street in Encinitas. From this project, it is estimated that 51,000 cubic yards of sand will be excavated and approximately 37,100 cubic yards of that sand will be used for beach nourishment. Analysis showed that 80-90 percent of the sand material from the site is compatible for beach placement. The U.S. Army Corps of Engineers (USACE) has set guidelines and approved the Regional General Permit (RGP) 67 for this project. Encinitas has found a willing developer in John DeWald, who has agreed to transport sand for the beach replenishment project.

The sand will be hauled from Pacific Station to a receiving site at Batiquitos Beach. The sand from Pacific Station would be used to reshape the berm and placed on the beach at the surf zone below the mean high tide line. The cost to truck the sand, prepare the receiving site, and traffic control was calculated to total $133,621.
Mr. Bond commented that the funds for this operation would come mostly or totally from the mitigation fund or from seawall construction. Ms. Weldon said that, as mitigation for seawalls along the coastline, the California Coastal Commission (CCC) collects a fee that has been perpetually deposited in SANDAG’s Beach Sand Mitigation Fund. This fund is solely used to implement projects to place sand on the beach. The Pacific Station project has received the approval from the Encinitas’s City Council and it must get the approval from SANDAG in order to go forth to the Regional Planning Commission.

Shelby Tucker said that this is the type of project that the Sand Compatibility and Opportunistic Use Program (SCOUP) is trying to implement and is consistent with the purpose for which funds had been placed in the Beach Sand Mitigation Fund. Ms. Tucker confirmed that this project is consistent with the Shoreline Preservation Strategy, if the group decides to make a recommendation to the Regional Planning Committee. Mr. Bond urged that a recommendation be made.

Mr. Kellejian asked if this is the first involvement of SCOUP in Solana Beach and Encinitas. Ms. Tucker responded that it is not because this effort began prior to the SCOUP program but this is the type of program that SCOUP hopes to implement.

Mr. Kellejian mentioned that the first kind of project like this was the grade separation in Solana Beach, where the under grounding of the railroad moved 55,000 cubic yards of sand onto the beach.

Mr. Aceti said that Mr. DeWald spent between $55,000 to $60,000 out of pocket for sand analysis and testing. He is concerned that because Mr. DeWald has covered this out of pocket expense, other developers would be apprehensive about getting involved in such a project. He questions if the city can pass a resolution to supplement this out of pocket expense. He said that Mr. DeWald has given up the opportunity to sell the material and profit off of it.

Mr. Bond said that the Coastal guidelines and the California Coastal Act do call for the utilization of beach quality material on the beach when possible.

Ms. Slater-Price motioned the recommendation, which was then seconded by Mr. Kellejian. The motion carried unanimously.

6. **Agenda Item #6, Update on Regional Shoreline Management Efforts**

Ms. Tucker informed the group that funding for the Regional Beach Sand Project (RBSP) preliminary planning activities was received from all the coastal cities involved and work has begun on the RBSP II. The offshore investigation field work will begin in October. She reminded the group that the request to obtain additional funding from Proposition 84 was denied by the Ocean Protection Council (OPC) and the Coastal Conservancy. Staff will appeal that decision in November. Concerns were expressed over the use of submerged reefs that were included in the original proposal.

Staff thinks that the proposal to the OPC and Coastal Conservancy can be repackaged to be broader. The new proposal would include numerical and physical models, as well as scientifically backed, detailed data on potential retention structures to aid in the decision-making process of what could potentially be constructed offshore. The Working Group can then decide to go forward with the proposal such that additional funding would be needed from OPC and Coastal Conservancy for construction. Ms. Tucker requested letters of support from working group members and interested parties in attendance. The prior proposal lacked letters of support and Ms. Tucker
said these letters of support will be an important component to show that there is local support for the project. A sample letter was attached to the agenda packet or can be provided electronically.

Carrie Downey, City of Coronado, said that the City of Coronado will submit a letter of support. Mr. Bond said that the City of Encinitas, too, will provide a letter of support.

Marco Gonzales, Surfrider Foundation, said that any retention structure that is not offshore reefs or result in the elimination of any surf resource will face opposition from Surfrider. Ms. Tucker said data from potential sand retention structures are necessary for informational purposes, but no single method has been chosen as a preferred method over another. The working group will ultimately decide if they would want to go forward with a submerged reef or another method as a retention structure.

Mr. Gonzales said any other method beside submerged reef is of concern. Recreationalist groups, for the last 20 years, consistently defeated projects that had not respected this position. Mr. Gonzales said that outreach to recreationalist groups is necessary for the success of this project, and the fact that no letters of support were received from this group attests to the lack of effort in outreach. Early cooperation with recreationalist groups will ensure that this project will not be defeated in its final stages.

Mr. Aceti said that one of the approaches for this meeting is to look at the proposals that were submitted to the USACE approximately six years ago when they were looking to innovate sand retention devices. Those submitted proposals were all sand retention/surf break proposals. He and Ms. Tucker will look into obtaining copies of those proposals from the USACE Los Angeles district office.

Mr. Gonzales said that when the letter of proposal is written, it should be styled to elaborate on what is meant by retention. The word retention is broad and inherently has a negative connotation. He said that the average person in Sacramento might think retention means groins, break waters, or things that have caused problems in the past.

Ms. Tucker said that the prior proposal only focused on reefs. The OPC was concerned that it potentially would not work in the San Diego region; thus, the need for additional data to prove to the OPC/Commission the feasibility of such a project in San Diego. She said that SANDAG has begun the process of obtaining the documents from the USACE to use as background materials.

Mr. Bond, in concurrence with Mr. Gonzales, said that whichever method of sand retention is decided upon; the Surfrider Foundation must be right in the middle and at the table in looking at the feasibility of the project. He urged Ms. Tucker and Mr. Aceti to keep Surfrider involved in the process because their cooperation and collaboration are necessary to move this project forward.

Ms. Tucker also mentioned they were successful in securing $6.5 million from the Department of Boating and Waterways in the approved State Budget for the first phase of the RBSP II, but work needs to be done at staff level to confirm the funding commitments from each of the coastal cities. A 15 percent match by each coastal city is required to accompany the state money to proceed with the next level of the project by December. Ms. Tucker thanked the DBW for their support.
Ms. Slater-Price asked Mr. Gonzales if he implied that the proposal letter needed to be changed before it is sent. Mr. Gonzales said he would like to ensure that the earlier work and ideas are not lost in this process. Surfrider will write a letter of support and will work with Ms. Tucker to ensure this.

Rob Rundle, SANDAG, also updated the group on the Quality of Life Infrastructure Investments. The SANDAG Board has established an Ad Hoc Committee to guide this Quality of Life effort, which includes funding for beach nourishment, habitat preservation, water quality enhancement, and potentially public transit. They are currently discussing what components should be packaged for potential funding. Ms. Tucker will work with the Shoreline Preservation Working Group to narrow what beach nourishment components should be included in the package.

7. **Agenda Item #7, Coastal Regional Sediment Management Plan**

Chris Webb, Moffatt & Nichol, submitted a completed draft of the Coastal Regional Sediment Management Plan (CRSMP) to the working group. The purpose of the CRSMP is to examine the existing set of management practices in the region in order to optimize sand placement strategies to restore beach width. The draft of the CRSMP will be available for public review.

Ms. Tucker said that the draft will be sent to Working Group members for review. The goal is to attain approval by SANDAG in December and have the Regional Planning Committee and Board of Director’s approval in a December-January timeframe.

Mr. Aceti asked if Mr. Webb had met with Camp Pendleton. Mr. Webb’s response was yes, and that Camp Pendleton is an important player in beach sand replenishment. A large amount of sand can be taken from Camp Pendleton and placed in the Oceanside area.

Ms. Tucker said that Camp Pendleton is willing to meet with SANDAG to entertain the idea of utilizing their sand source. Mr. Aceti added that Camp Pendleton should be invited to the Shoreline Preservation Group meeting.

8. **Legislative Update**

Mr. Aceti said that funds from the Kehoe Bill for the Quality of Life Initiative are being monitored in the State Budget. There has not been much accomplishment with the Marine Debris bills because most were held back at the end of the session. Senator Alan Lowenthal is currently working on a state marine debris program. Additionally, he has been involved with the Thank You Oceans Campaign under the California Resources Agency, which is a state public outreach program for marine debris and litter.

9. **Agenda Item #8, Adjourn**

The next meeting is scheduled for December 4, 2008, 11:30 a.m.-1 p.m.

The meeting was adjourned by Mr. Bond at 1:05 p.m.
San Diego Association of Governments

SHORELINE PRESERVATION WORKING GROUP

December 4, 2008

AGENDA ITEM NO.: 4

Action Requested: APPROVE

REGIONAL SHORELINE MANAGEMENT PROGRAM GUIDING PRINCIPLES 3002800

Introduction

Previously the Shoreline Preservation Working Group (Working Group) agendas included a set of Guiding Principles that helped lead discussions and actions. SANDAG staff would like the Working Group to reconsider these Guiding Principles for inclusion on future agendas.

Recommendation

SANDAG staff is recommending that the Working Group agree to the following Guiding Principles in order to help lead discussions related to the Shoreline Management Program, specifically the planning and construction of the Regional Beach Sand Project II (RBSP II).

Guiding Principles:

- commitment to unified approach for local decisions on sand replenishment;
- address local needs and maximize positive regional impacts;
- encourage cooperation and coordination;
- contribute equitable fair share from local participants; and
- promote opportunities for beach sand replenishment.

Discussion

Prior to the implementation of the Regional Beach Sand Project (RBSP) in 2001, the Working Group agreed on a set of Guiding Principles that would be used to guide decision making related to the Shoreline Management Program, specifically project implementation. These Guiding Principles included:

- commitment to unified approach for local decisions on sand replenishment;
- address local needs and maximize positive regional impacts;
- encourage cooperation and coordination; and
- promote opportunities for beach sand replenishment.

The goals of the Working Group have stayed consistent since construction of the RBSP and have lead to the current efforts toward RBSP II. However, one main difference between the 2001 project and the current efforts is the funding source. The RBSP was funded primarily by the U.S. Navy, with additional funding provided by the California Department of Boating and Waterways (DBW); minimal funding was provided by the coastal cities for the monitoring program.
Currently, the RBSP II is funded by DBW with matching funds to come from the coastal cities. Therefore, SANDAG staff is recommending that the Working Group agree to the inclusion of an additional Guiding Principle reflecting that local funding will come through an equitable fair share distribution agreed to by all of the coastal cities. An additional Guiding Principle has been added to the recommendation above: “contribute equitable fair share from local participants.”

Key Staff Contact: Shelby Tucker, (619) 699-1916; stu@sandag.org
COASTAL REGIONAL SEDIMENT MANAGEMENT PLAN 3002800

Introduction

SANDAG staff is requesting that the Shoreline Preservation Working Group review and provide feedback on the draft Coastal Regional Sediment Management Plan (Management Plan). A copy of the draft Management Plan Executive Summary is attached. A copy of the entire draft Management Plan can be found at www.sandag.org/shoreline starting on December 15, 2008. All comments on the draft Management Plan should be received no later than Friday, January 16, 2009.

Background

In December 2006, the California Department of Boating and Waterways (DBW) requested letters of interest from coastal regions throughout the state. SANDAG staff submitted a letter of interest and was chosen, along with three other regions, to prepare a Management Plan for the San Diego region. The award was for $150,000 with a 10 percent in-kind contribution for project management. The Management Plan preparation began in late 2007.

The Management Plan builds upon what has been developed for the California Coastal Sediment Management Master Plan, which has a goal of developing a process that facilitates the management of sand on a regional basis. The Regional Management Plan is a guidance and policy document that will discuss how management of sediment targeted at coastal erosion can be implemented in an expeditious, cost-effective, and resource-protective manner throughout the San Diego region. The sediment sources identified as part of the Regional Management Plan can be placed on regional beaches under the SCOUP and regional projects.

The Final Management Plan is currently scheduled for action to be taken on its adoption at the February 5, 2009, Shoreline Preservation Working Group meeting and February Regional Planning Committee and Board of Director meetings.

Key Staff Contact: Shelby Tucker, (619) 699-1916; stu@sandag.org
EXECUTIVE SUMMARY

SAN DIEGO COASTAL REGIONAL SEDIMENT MANAGEMENT PLAN

This San Diego Coastal Regional Sediment Management (CRSM) Plan is presented to the public and decision-makers to inform the region of solutions to existing sediment management problems along the coast. Insufficient coastal sediment (sand) exists along the San Diego County shoreline, leading to erosion, narrowing of beaches, damage to infrastructure, habitat impacts, and reduced recreational and economic benefits. Historical records indicate that as the region has developed, flood control works, harbors, and urbanization have resulted in a reduction in the supply of sediment to the shore by approximately 400,000 cubic yards of sand per year. SANDAG prepared the Shoreline Preservation Strategy concluding that the region needed approximately 30 million cubic yards of sand for initial restoration, and nearly 400,000 cubic yards per year thereafter for maintenance. This information is used as a guideline for nourishing the region in the CRSM Plan.

Restoration of the region’s beaches would require a long-term sustained effort. Two approaches are presented for consideration. One scenario considers nourishment only, and assumes sand sources consist of both opportunistic sand and offshore sand. The other scenario considers nourishment and sediment management devices with the goal of retaining more sand over time. This second scenario assumes sand from the two possible sources of opportunistic programs and from offshore dredging.

Management scenario one envisions placement of approximately 1,000,000 cubic yards of sand per year on the region’s beaches to counteract effects of reduced natural sand supplies (400,000 cubic yards per year), and to progress toward achieving the 30 million cubic yard goal in 50 years (600,000 cubic yards per year). This scenario assumes that all opportunistic beach fill programs are active to the maximum extent each year and contribute approximately 800,000 cubic yards of sand to the region. The balance of 200,000 cubic yards of sand per year would be provided by larger-scale nourishment programs of SANDAG, the U.S. Army Corps of Engineers, or both. These larger-scale projects would occur on a less frequent basis such as every 5 to 10 years and consist of between 1,000,000 and 2,000,000 cubic yards of sand, respectively.

Management scenario two envisions placement of sediment management devices within the region, pre-filling with an appropriate quantity of sand (to be determined), and nourishment with approximately 500,000 cubic yards of sand per year. It is likely this approach would lead to reduced costs over time and accomplishment of the 30 million cubic yard goal potentially quicker than management scenario one. Sediment management devices are assumed to reduce the need for nourishment by 50 percent, and this assumption requires verification in a future study. Scenario two assumes that sand losses are significantly reduced or eliminated, and nearly the entire annual nourishment volume of 500,000 cubic yards per year goes toward meeting the 30 million cubic yard regional target. Together with the sand volume placed as pre-fill and the positive effects of retention, this annual nourishment rate should also result in 30 million cubic yards of sand placed over 50 years or less. This rate of sand accumulation throughout the region with sediment management devices in place requires verification in a future study.
Scenario two also assumes that all opportunistic beach fill programs are active to the maximum extent each year and can contribute approximately 800,000 cubic yards of sand per year. Alternatively, sand could be provided from nourishment by SANDAG and/or the U.S. Army Corps of Engineers every 5 to 10 years consisting of between 2,500,000 and 5,000,000 cubic yards of sand per project.

Other elements of the plan include project economics, governance, monitoring, filling of data gaps, and next steps. Each consideration is summarized below.

Project economics are favorable with a benefit-to-cost ratio higher than 1.0 for use of offshore sand, and not favorable with a benefit-to-cost ratio lower than 1.0 for opportunistic sand. Projects should focus on using offshore sand until a cost reduction for use of terrestrial sand can be realized. Sand retention reduces long-term costs compared to non-retention by approximately 25 percent.

Governance measures available to implement the CRSM Plan include: 1) integrating the plan into CEQA, the California Coastal Act, Local Coastal Programs, Local Zoning Ordinances, General Plans, and local permit processing; 2) reducing developer fees with compliance; and 3) setting up “Sediment Sheds/Littoral Cell” Planning entity to coordinate activities with watershed and other groups.

Monitoring and reporting extending from present SANDAG efforts will be required for biology, beach profiles, and lagoon shoaling to verify effects and potential impacts to refine the CRSM Plan. Results will be incorporated into the plan to optimize it and improve its effectiveness.

Data gaps exist that need to be filled with regard to the: 1) effectiveness of sediment management devices, and sand pre-fill requirements with retention; 2) source and receiver site sediment data; 3) quantified environmental benefits of projects; and 4) verification of coastal and habitat models, and longshore sediment transport estimates.

Next steps include short- and long-term actions to initiate plan recommendations. Examples include:

- Conduct a railroad study feasibility of installing off-loading sites;
- Develop a regional sediment monitoring program to better evaluate projects;
- Link watershed and sediment management planning, and coordinate with watershed managers to manage coastal sediment;
- Establish at least one umbrella “sediment shed” authority to manage regional coastal sediment from watersheds to littoral cells;
- Prepare a programmatic CEQA/NEPA document;
- Establish a Regional General Permit for the CRSM Plan;
- Install any needed infrastructure to implement the Plan;
- Create a secure funding stream; and
- Implement pilot projects to inform and update the CRSM Plan.
Introduction

SANDAG must determine which coastal cities will provide matching funds in support of the planning and construction of the second Regional Beach Sand Project (RBSP II). The coastal cities provided funding to support preliminary planning efforts, which included an investigation of offshore resources and preliminary engineering/design. This work began in September 2008 and will continue through spring 2009. For subsequent phases of the project to begin in 2009 and beyond, the 15 percent match to funding provided by the California Department of Boating and Waterways (DBW) must now be identified.

A breakdown of costs for each coastal city is included in Attachment 1 as well as a draft Memorandum of Understanding (MOU) (Attachment 2) that will need to be signed to memorialize the funding contribution from the participating coastal cities. The current draft MOU covers matching funds for the first installment of DBW money. If necessary, it is possible to match DBW money by task per fiscal year. This would enable coastal cities to match each task as the project progresses.

Background

The 2001 RBSP was a pilot project that has demonstrated the feasibility of beach replenishment in the San Diego region. The shoreline and biological monitoring results for the RBSP confirmed the project’s objectives of replenishing the region’s beaches without negatively impacting the environment. An added benefit to the project was realized through the findings of a habitat study commissioned by the City of Encinitas. The study found that the RBSP actually had a positive impact on biological resources by providing additional beach habitat for grunion, invertebrates, and nesting and foraging shorebirds.

In October 2008, SANDAG began the preliminary planning activities associated with rebuilding the RBSP, RBSP II. These activities include the investigation of offshore sand sources and preliminary engineering/design. Recently, SANDAG received funding from DBW that would fund a portion of the RBSP II. These funds come from the Public Beach Restoration Fund and require a 15 percent match from the local entity. There have been efforts undertaken by local jurisdictions, such as the City of Encinitas and most recently the City of Solana Beach, to dedicate funding for beach nourishment. SANDAG is currently working with the Cities of Solana Beach and Encinitas as well as the other coastal cities to secure matching funds. Once funds are secured, work on the environmental phase of the project will begin.
Additionally, SANDAG would like to explore the use of sediment management devices, such as an artificial submerged reef, which would influence the frequency of beach sand nourishment. The RBSP II looks to advance the science associated with retaining sand and initiate additional work to determine if sediment management devices are appropriate for implementation in the San Diego region. The Regional Beach Sand Retention Strategy, prepared in 2001, will be used as a baseline for determining the potential types and locations of sediment management devices.

Building sediment management devices will require the region to address additional environmental issues that were not analyzed as part of the RBSP. Additional analysis specific to retention could include the probability of success, environmental consequences such as downcoast impacts, impacts on surfing and living resources, upfront and down-the-road costs, aesthetics, construction disruptions, legal considerations, and political feasibility. The goal is to facilitate the placement of sediment and retain it in order to reduce the sediment deficit, restore the natural processes, and maintain healthy beaches in perpetuity.

Item 8 of this agenda discusses current efforts underway to secure funding for research related to regional sediment management devices.

Key Staff Contact: Shelby Tucker, (619) 699-1916; stu@sandag.org
COST BREAKDOWN BY CITY FOR RBSP II

Per Fiscal Year to Match Each Increment of State Funds (FY 2009, 2010, and 2011):

<table>
<thead>
<tr>
<th>Jurisdictions</th>
<th>60% Sand</th>
<th>10% Miles Restored</th>
<th>30% Population</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside</td>
<td>$138,449</td>
<td>$18,517</td>
<td>$35,749</td>
<td>$192,715</td>
</tr>
<tr>
<td>Carlsbad</td>
<td>$126,877</td>
<td>$20,446</td>
<td>$19,941</td>
<td>$167,264</td>
</tr>
<tr>
<td>Encinitas</td>
<td>$149,952</td>
<td>$25,405</td>
<td>$12,054</td>
<td>$187,411</td>
</tr>
<tr>
<td>Solana Beach</td>
<td>$46,150</td>
<td>$12,513</td>
<td>$2,721</td>
<td>$61,384</td>
</tr>
<tr>
<td>Del Mar</td>
<td>$59,306</td>
<td>$12,904</td>
<td>$930</td>
<td>$73,139</td>
</tr>
<tr>
<td>San Diego</td>
<td>$128,530</td>
<td>$14,580</td>
<td>$267,392</td>
<td>$410,502</td>
</tr>
<tr>
<td>Imperial Beach</td>
<td>$39,537</td>
<td>$10,435</td>
<td>$5,614</td>
<td>$55,586</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$688,800</strong></td>
<td><strong>$114,800</strong></td>
<td><strong>$344,400</strong></td>
<td><strong>$1,148,000</strong></td>
</tr>
</tbody>
</table>

Total Project (over the life of the project which includes a match of three increments of $6.5 million from DBW):

<table>
<thead>
<tr>
<th>Jurisdictions</th>
<th>60% Sand</th>
<th>10% Miles Restored</th>
<th>30% Population</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside</td>
<td>$415,346</td>
<td>$55,552</td>
<td>$107,246</td>
<td>$578,144</td>
</tr>
<tr>
<td>Carlsbad</td>
<td>$380,631</td>
<td>$61,338</td>
<td>$59,822</td>
<td>$501,791</td>
</tr>
<tr>
<td>Encinitas</td>
<td>$449,855</td>
<td>$76,216</td>
<td>$36,162</td>
<td>$562,233</td>
</tr>
<tr>
<td>Solana Beach</td>
<td>$138,449</td>
<td>$37,540</td>
<td>$8,162</td>
<td>$184,151</td>
</tr>
<tr>
<td>Del Mar</td>
<td>$177,917</td>
<td>$38,711</td>
<td>$2,790</td>
<td>$219,417</td>
</tr>
<tr>
<td>San Diego</td>
<td>$385,590</td>
<td>$43,739</td>
<td>$802,176</td>
<td>$1,231,506</td>
</tr>
<tr>
<td>Imperial Beach</td>
<td>$118,611</td>
<td>$31,306</td>
<td>$16,841</td>
<td>$166,758</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$2,066,400</strong></td>
<td><strong>$344,400</strong></td>
<td><strong>$1,033,200</strong></td>
<td><strong>$3,444,000</strong></td>
</tr>
</tbody>
</table>

City and State contributions by City for total project:

<table>
<thead>
<tr>
<th>Jurisdictions</th>
<th>Total match from each city (15%)</th>
<th>Total state payment for each city (85%)</th>
<th>Total Project Cost Per City (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside</td>
<td>$578,144</td>
<td>$3,276,151</td>
<td>$3,854,295</td>
</tr>
<tr>
<td>Carlsbad</td>
<td>$501,791</td>
<td>$2,843,481</td>
<td>$3,345,272</td>
</tr>
<tr>
<td>Encinitas</td>
<td>$562,233</td>
<td>$3,185,987</td>
<td>$3,748,220</td>
</tr>
<tr>
<td>Solana Beach</td>
<td>$184,151</td>
<td>$1,043,521</td>
<td>$1,227,671</td>
</tr>
<tr>
<td>Del Mar</td>
<td>$219,417</td>
<td>$1,243,364</td>
<td>$1,462,782</td>
</tr>
<tr>
<td>San Diego</td>
<td>$1,231,506</td>
<td>$6,978,531</td>
<td>$8,210,037</td>
</tr>
<tr>
<td>Imperial Beach</td>
<td>$166,758</td>
<td>$944,965</td>
<td>$1,111,723</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$3,444,000</strong></td>
<td><strong>$19,516,000</strong></td>
<td><strong>$22,960,000</strong></td>
</tr>
</tbody>
</table>
Each jurisdiction’s contribution toward DBW match by task and estimated date when SANDAG must receive funds:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside</td>
<td>$13,058</td>
<td>$9,141</td>
<td>$26,118</td>
<td>$22,199</td>
<td>$12,537</td>
<td>$28,883</td>
<td>$424,984</td>
<td>$41,261</td>
<td>$578,181</td>
</tr>
<tr>
<td>Carlsbad</td>
<td>$11,335</td>
<td>$7,934</td>
<td>$22,668</td>
<td>$19,268</td>
<td>$10,880</td>
<td>$25,068</td>
<td>$368,858</td>
<td>$35,811</td>
<td>$501,822</td>
</tr>
<tr>
<td>Encinitas</td>
<td>$12,699</td>
<td>$8,890</td>
<td>$25,399</td>
<td>$21,588</td>
<td>$12,191</td>
<td>$28,087</td>
<td>$413,289</td>
<td>$40,125</td>
<td>$562,269</td>
</tr>
<tr>
<td>Solana Beach</td>
<td>$4,159</td>
<td>$2,911</td>
<td>$8,319</td>
<td>$7,071</td>
<td>$3,993</td>
<td>$9,200</td>
<td>$135,366</td>
<td>$13,142</td>
<td>$184,162</td>
</tr>
<tr>
<td>Del Mar</td>
<td>$4,956</td>
<td>$3,469</td>
<td>$9,913</td>
<td>$8,425</td>
<td>$4,758</td>
<td>$10,961</td>
<td>$161,290</td>
<td>$15,660</td>
<td>$219,431</td>
</tr>
<tr>
<td>San Diego</td>
<td>$27,817</td>
<td>$19,471</td>
<td>$55,632</td>
<td>$47,287</td>
<td>$26,704</td>
<td>$61,523</td>
<td>$905,261</td>
<td>$87,889</td>
<td>$1,231,584</td>
</tr>
<tr>
<td>Imperial Beach</td>
<td>$3,767</td>
<td>$2,637</td>
<td>$7,533</td>
<td>$6,404</td>
<td>$3,616</td>
<td>$8,331</td>
<td>$122,581</td>
<td>$11,901</td>
<td>$166,769</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$77,791</strong></td>
<td><strong>$54,453</strong></td>
<td><strong>$155,582</strong></td>
<td><strong>$132,242</strong></td>
<td><strong>$74,678</strong></td>
<td><strong>$172,053</strong></td>
<td><strong>$2,531,630</strong></td>
<td><strong>$245,789</strong></td>
<td><strong>$3,444,219</strong></td>
</tr>
</tbody>
</table>

Matching Funds Needed By:
- **FY 2008/2009**
- **FY 2009/2010**
- **FY 2009/2010**
- **FY 2009/2010**
- **Unknown at this time**
- **FY 2010/2011**
- **FY 2010/2011**
- **Unknown at this time**
- **Project completed by Dec. 2012**
MEMORANDUM OF UNDERSTANDING
BETWEEN SAN DIEGO ASSOCIATION OF GOVERNMENTS
AND SAN DIEGO REGION’S COASTAL JURISDICTIONS
REGARDING REGIONAL BEACH SAND REPLENISHMENT PROJECT II

This Memorandum of Understanding ("MOU") is made and entered into effective as of this Insert Text day of Month, Year, by and between the San Diego Association of Governments ("SANDAG") and the City of Carlsbad, City of Del Mar, City of Encinitas, City of Imperial Beach, City of Oceanside, City of San Diego, and City of Solana Beach ("Coastal Cities").

RECITALS

The following recitals are a substantive part of this Agreement:

WHEREAS, in 1996, SANDAG adopted the Shoreline Preservation Strategy (Strategy) that outlines an extensive beach building and maintenance program for the critical shoreline erosion areas in the region, containing a comprehensive set of recommendations on the beach building program and on financing and implementation; and

WHEREAS, in 2001, SANDAG successfully implemented a Regional Beach Sand Project (RBSP) that placed 2.1 million cubic yards of sand on 12 beaches in the San Diego region; and

WHEREAS, in 2004, SANDAG adopted the Regional Comprehensive Plan (RCP), which is a strategic land use planning framework for the San Diego region through 2030 that supports the continued implementation of the Strategy, outlining the preservation and enhancement of the region’s beaches and nearshore areas as environmental and recreational resources that must be protected; and

WHEREAS, the San Diego region is committed to implementing the Strategy and RCP; and

WHEREAS, the region’s Coastal Cities, including the City of Coronado, have expressed an interest and desire to implement another such project, the Regional Beach Sand Project II (the “Project”) on a regional basis, as economies of scale and efficiencies would likely result in a more productive and successful project; and

WHEREAS, a number of benefits, including recreational, economic, and public safety enhancements, protection of infrastructure, and increases in habitat would occur as the result of beach nourishment; and

WHEREAS, in September 2008, SANDAG received a grant for Project funding from the California Department of Boating and Waterways (DBW) for $6.5 million for the first year of Project implementation in the San Diego region; and
WHEREAS, SANDAG expects to receive additional funds for fiscal years 2010 and 2011 in the amount of $6.5 million for each fiscal year for Project implementation; and

WHEREAS, the DBW funding requires a 15 percent local match to be paid by the San Diego region for all current and future funds received; and

WHEREAS, the Coastal Cities will enter into an MOU reflecting their commitment to provide the 15 percent match for each installment of funding from DBW; and

WHEREAS, the SANDAG Board of Directors decided that the allocation of funds among the Coastal Cities for the planning and construction of the Project be based upon a methodology that includes weights for three factors; and

WHEREAS, the Project methodology to allocate the 15 percent match required by DBW among the Coastal Cities includes 60 percent amount of sand received, 10 percent miles of coastline restored, and 30 percent population; and

WHEREAS, SANDAG requires a funding commitment from each Coastal City prior to work continuing on the Project; and

WHEREAS, the total estimated Project cost of approximately $22.9 million included $500,000 in preliminary planning activities, which has been paid by the Coastal Cities and the City of Coronado; and

WHEREAS, the preliminary planning activities, which began in September 2008, included an investigation of offshore sand sources and preliminary project design for the preparation of the Project; and

WHEREAS, this MOU is intended to commit the parties to working on the Project beyond the stage of preliminary planning activities; and

WHEREAS, the Coastal Cities agree to pay their proportional share of the Project prior to the beginning of each phase of the Project; and

WHEREAS, the Project will be implemented based upon the following Guiding Principles approved by the Shoreline Preservation Working Group:

- commitment to unified approach for local decisions on sand replenishment,
- address local needs and maximize positive regional impacts,
- encourage cooperation and coordination, and
- promote opportunities for beach sand replenishment; and

WHEREAS, the parties wish to memorialize their agreement in this MOU to carry out the purposes set forth above;
AGREEMENT

NOW THEREFORE, in consideration of the mutual promises set forth herein, the parties agree as follows:

SANDAG AGREES:

1. Manage the Project in coordination with the Coastal Cities through the Shoreline Preservation Working Group; and involve the Coastal Cities in the implementation of all phases of the Project.

2. The SANDAG Project Manager will invoice the Coastal Cities a minimum of 30 days prior to the start date of each phase of the Project to ensure prompt payment by all parties.

3. The proportional share provided by each Coastal City shall be expended by SANDAG solely for the Project. Any funds not used will be kept by SANDAG in an interest-bearing account with interest credited to each Coastal City prorated to reflect its contribution to the Project as compared to other Coastal Cities’ contributions until the completion of the Project. Unused funds will be returned to each City on a similarly pro-rated basis.

4. Neither Coastal City nor any officer thereof is responsible for any damage or liability occurring by reason of anything done or omitted to be done by SANDAG under or in connection with any work, authority, or jurisdiction delegated to SANDAG under this MOU. It is understood and agreed that, pursuant to Government Code Section 895.4, SANDAG shall fully defend, indemnify, and save harmless the Coastal Cities, all officers and employees from all claims, suits, or actions of every name, kind, and description brought for or on account of injury (as defined in Government Code Section 810.8) occurring by reason of anything done or omitted to be done by SANDAG under or in connection with any work, authority, or jurisdiction delegated to SANDAG under this MOU.

COASTAL CITIES AGREE:

1. Each has approved their appropriation outlined in the chart below, being its proportional share of the required DBW 15 percent match for FY 2009, which funds will be paid to SANDAG prior to the start date of each phase of the Project.

<table>
<thead>
<tr>
<th>Jurisdictions</th>
<th>60% Sand</th>
<th>10% Miles Restored</th>
<th>30% Population</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oceanside</td>
<td>$138,449</td>
<td>$18,517</td>
<td>$35,749</td>
<td>$192,715</td>
</tr>
<tr>
<td>Carlsbad</td>
<td>$126,877</td>
<td>$20,446</td>
<td>$19,941</td>
<td>$167,264</td>
</tr>
<tr>
<td>Encinitas</td>
<td>$149,952</td>
<td>$25,405</td>
<td>$12,054</td>
<td>$187,411</td>
</tr>
<tr>
<td>Solana Beach</td>
<td>$46,150</td>
<td>$12,513</td>
<td>$2,721</td>
<td>$61,384</td>
</tr>
<tr>
<td>Del Mar</td>
<td>$59,306</td>
<td>$12,904</td>
<td>$930</td>
<td>$73,139</td>
</tr>
<tr>
<td>San Diego</td>
<td>$128,530</td>
<td>$14,580</td>
<td>$267,392</td>
<td>$410,502</td>
</tr>
<tr>
<td>Imperial Beach</td>
<td>$39,537</td>
<td>$10,435</td>
<td>$5,614</td>
<td>$55,586</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$688,800</strong></td>
<td><strong>$114,800</strong></td>
<td><strong>$344,400</strong></td>
<td><strong>$1,148,000</strong></td>
</tr>
</tbody>
</table>
2. The Coastal Cities understand that SANDAG would not proceed with the Project without the assurances set forth in this MOU, reflecting the Coastal Cities’ approvals of their respective appropriations, the aggregate of which will fund the Project.

3. Neither SANDAG nor any officer thereof is responsible for any damage or liability occurring by reason of anything done or omitted to be done by the Coastal Cities under or in connection with any work, authority, or jurisdiction delegated to the Coastal Cities under this MOU. It is understood and agreed that, pursuant to Government Code Section 895.4, the Coastal Cities shall fully defend, indemnify, and save harmless SANDAG, all officers and employees from all claims, suits, or actions of every name, kind, and description brought for or on account of injury (as defined in Government Code Section 810.8) occurring by reason of anything done or omitted to be done by the Coastal Cities under or in connection with any work, authority, or jurisdiction delegated to the Coastal Cities under this MOU.

THE PARTIES MUTUALLY AGREE:

1. That all obligations of SANDAG under the terms of this MOU are subject to the appropriation of the required resources by SANDAG, and the Coastal Cities, and the approval of the SANDAG Board of Directors.

2. Any notice required or permitted under this MOU may be personally served on the other party, by the party giving notice, or may be served by certified mail, return receipt requested, to the following addresses:

   For SANDAG: 401 B Street, Suite 800, San Diego, CA 92101, Attn: Shelby Tucker
   For Name_Of_Other_Party: Address1, Address2, Attn: Name

3. That unless it is amended by the parties in writing, this MOU shall terminate on Insert_Date, or on such earlier or later date as the parties may agree to in writing. Or this MOU shall continue in effect unless and until a party to the MOU gives 60 (sixty) days written notice of its desire to withdraw from the MOU. If such notice is given, the MOU shall continue to be binding on those parties who have not formally withdrawn.

4. The indemnification provisions of this MOU shall survive termination of the MOU.

5. This MOU shall be interpreted in accordance with the laws of the State of California. If any action is brought to interpret or enforce any term of this MOU, the action shall be brought in a state or federal court situated in the County of San Diego, State of California.

6. All terms, conditions, and provisions hereof shall inure to and shall bind each of the parties hereto, and each of their respective heirs, executors, administrators, successors, and assigns.

7. For purposes of this MOU, the relationship of the parties is that of independent entities and not as agents of each other or as joint venturers or partners. The parties shall maintain sole and exclusive control over their personnel, agents, consultants, and operations.
8. No alteration or variation of the terms of this MOU shall be valid unless made in writing and signed by the parties hereto, and no oral understanding or agreement not incorporated herein shall be binding on any of the parties hereto.

9. Nothing in the provisions of this MOU is intended to create duties or obligations to or rights in third parties to this MOU or affect the legal liability of the parties to this MOU to third parties.

10. This MOU may be executed in any number of identical counterparts, each of which shall be deemed to be an original, and all of which together shall be deemed to be one and the same instrument when each party has signed one such counterpart.

IN WITNESS WHEREOF, the Parties hereto have executed this MOU effective on the day and year first above written.

SAN DIEGO ASSOCIATION OF GOVERNMENTS

GARY L. GALLEGOS
Executive Director

APPROVED AS TO FORM:

Office of General Counsel

FULLNAME_OF_OTHER_PARTY

FULLNAME_OF_PERSON_SIGNING
Title

APPROVED AS TO FORM:

Legal Counsel
Mr. Ken Wiseman  
Executive Director  
MLPA Initiative  
c/o California Resources Agency  
1416 Ninth Street, Suite 1311  
Sacramento, CA  95814

Dear Mr. Wiseman:

SUBJECT: MLPA Initiative and Shoreline Management Efforts in the San Diego region

The San Diego Association of Governments (SANDAG) urges all decision makers involved in the Marine Life Protection Act (MLPA) Initiative to consider issues related to beach replenishment and restoration when designating marine protected areas in the San Diego region. We ask that you allow us to provide substantive input through meaningful participation to ensure these local and regional efforts can continue in the future.

In July 1993, SANDAG adopted a long-term vision, known as the “Shoreline Preservation Strategy for the San Diego Region” (Strategy), for restoring the region’s beaches. The Strategy proposes an extensive beach building and maintenance program for the critical shoreline erosion areas in the region that includes sand nourishment, sediment management devices, and policies and regulations regarding the use of the shoreline and its development.

Since the adoption of the Strategy, SANDAG has been working to implement a shoreline management program focused on restoration and maintenance, primarily through beach replenishment. Expansion of existing MPAs in the region could negatively impact the goals and objectives set forth in the Strategy, limiting the types of restoration and maintenance activities allowed to occur in the future.

Additionally, SANDAG is concerned about the perception that beach replenishment may be harmful to our coastal environments. In 2001, SANDAG successfully implemented the Regional Beach Sand Project (RBSP), which restored 12 beaches from Oceanside to Imperial Beach. The RBSP monitoring program, which was a requirement of permitting agencies, determined there were no long-term biological impacts associated with the project. Furthermore, a study completed by the City of Encinitas found the RBSP actually had a positive impact on biological resources by providing additional beach habitat for grunion, invertebrates, and nesting and foraging shorebirds.
The San Diego region has worked hard to implement projects designed to protect and enhance our coastline. Through our Shoreline Preservation Working Group, we work closely with all the coastal cities and stakeholders to ensure environmentally responsible decisions are made by our policy makers. These stakeholders include state and federal agencies, such as the California Department of Fish and Game and National Marine Fisheries Service. This collaboration is imperative to ensure a successful CEQA/NEPA process.

Our goals are not much different than the MLPA Initiative. It is our desire to continue to implement a shoreline management program that protects and enhances the habitat, economic, recreation, and property/infrastructure protection benefits of our region’s beaches. This includes ensuring that our projects do not negatively impact offshore and nearshore resources. We believe that beach replenishment is a way to reach this goal and expect that a redesign of the MPAs will not negatively impact these regional and local efforts.

SANDAG looks forward to opportunities to work with the South Coast Regional Stakeholder Group and Science Advisory Team. There is information generated by the MLPA Initiative that can be useful to SANDAG in our shoreline management efforts, such as the marine and offshore mapping efforts. Additionally, there is information generated by SANDAG that may be of use to the Stakeholder Group and Science Advisory Team, such as the findings from our monitoring program. SANDAG staff is willing to provide any information or support that may be useful to the Stakeholder Group and Science Advisory Team, including giving presentations on the RBSP and other efforts.

Attached is a white paper that will provide background on the RBSP, efforts to rebuild the RBSP, and other shoreline preservation projects. For more information on the SANDAG Shoreline Management Program, please contact Shelby Tucker at (619) 699-1916 or stu@sandag.org. Information also can be found on the SANDAG Web site at www.sandag.org/shoreline.

Sincerely,

GARY L. GALLEGOS
Executive Director

GLG/STU/cda

Attachment
REGIONAL SHORELINE MANAGEMENT AND BEACH SAND REPLENISHMENT
IN THE SAN DIEGO REGION
WHITE PAPER

INTRODUCTION

In July 1993, SANDAG adopted a long-term vision, known as the “Shoreline Preservation Strategy for the San Diego Region” (Strategy), for restoring the region’s beaches. The Strategy proposes an extensive beach building and maintenance program for the critical shoreline erosion areas in the region that includes sand nourishment, sediment management devices, and policies and regulations regarding the use of the shoreline and its development.

The Strategy sets out regional objectives, policies, and recommendations for implementing a coordinated list of solutions for each of the region’s shoreline problem areas. To realize these objectives, coordination among the region’s jurisdictions is necessary. The coastal cities and other regional stakeholders have been working through the SANDAG Shoreline Preservation Working Group (Working Group), providing guidance on regional solutions to coastal erosion problems. Collaboration has resulted in a preferred approach to a regionwide problem, regional beach replenishment, and has led to more efficient implementation.

Another important issue guiding the Strategy is the long-term and ongoing commitment required to accomplish the objectives. Stewardship of the shoreline will involve a number of coordinated actions taking place over years, if not decades. In the summer of 2004, SANDAG adopted the Regional Comprehensive Plan (RCP), which is the strategic overall planning framework for the San Diego region through 2030. The RCP supports the continued implementation of the Strategy, outlining the preservation and enhancement of the region’s beaches and nearshore areas as environmental and recreational resources that must be protected.

DISCUSSION

Regional Beach Sand Project

In September 2001, SANDAG completed construction of the Regional Beach Sand Project (RBSP), which dredged 2.1 million cubic yards of clean, beach-quality sand from offshore and placed it at 12 eroded beaches from Imperial Beach to Oceanside. The RBSP was a first-of-its-kind regional pilot sand restoration project for the West Coast of the United States. The $17.5 million project was funded by the U.S. Navy and California Department of Boating and Waterways (DBW). The region’s coastal cities provided funds for the regional monitoring program as well as invaluable support and coordination in obtaining funding for the project.

The main objective of the RBSP was to place sand on the region’s eroding beaches to start the process of restoring this priceless centerpiece of our environment and economy. An equally important objective for the project was to demonstrate that cost-effective beach restoration technology could be successfully implemented in the San Diego region.

Monitoring Program

Through the financial support of the region’s coastal cities, SANDAG has been monitoring the coastline through the Regional Shoreline Monitoring Program since 1996. The monitoring results
were utilized to plan and implement the RBSP. To meet RBSP permitting requirements, a biological monitoring component was added to the program. The shoreline and biological monitoring data were required to determine how long the sand would benefit the coastline and what impacts it would have on nearshore resources.

**Shoreline Monitoring**

The shoreline monitoring program includes surveying the beach and lagoon entrances twice annually to document changes in the region’s coastline. These efforts will continue to measure changes in the shore zone, monitor how sand moves along the shoreline, and how nourishment activities affect the environment. The monitoring program is important to implement the Strategy and to provide consistent and reliable data that can be used to design and implement future replenishment efforts.

**Biological Monitoring**

The biological monitoring program was initiated to determine the eventual impact of the RBSP sand nourishment to marine resources. A guiding principle of the RBSP was to build a project that would not result in significant negative impacts to the environment. Most of the monitoring sites were in the vicinity of where beach sand was placed. These monitoring locations were sampled in the spring and fall of each year. During the four-year monitoring period, it was determined that there were no long-term biological impacts associated with the RBSP.

Mitigation funds were set aside in the project budget to address any significant environmental impacts that might be identified by project monitoring. Mitigation included paying the costs of keeping lagoon mouths open, dredging sediment from lagoons, and restoring reef habitat if long-term significant impacts on nearshore reef habitat occurred. In 2006, SANDAG made its final payment for lagoon mitigation and was not required to expend funds to create offshore reef habitat.

**Efforts to Rebuild the RBSP**

The 2001 RBSP was a pilot project that has demonstrated the feasibility of beach replenishment in the San Diego region. The shoreline and biological monitoring results for the RBSP confirmed the project’s objectives of replenishing the region’s beaches without negatively impacting the environment. An added benefit to the project was realized through the findings of a habitat study commissioned by the City of Encinitas. The study found that the RBSP actually had a positive impact on biological resources by providing additional beach habitat for grunion, invertebrates, and nesting and foraging shorebirds.

In October 2008, SANDAG began the preliminary planning activities associated with rebuilding the RBSP, RBSP II. These activities include the investigation of offshore sand sources and preliminary engineering/design. Recently, SANDAG received funding from DBW that would fund a portion of the RBSP II. These funds come from the Public Beach Restoration Fund and require a 15 percent match from the local entity. There have been efforts undertaken by local jurisdictions, such as the City of Encinitas and most recently the City of Solana Beach, to dedicate funding for beach nourishment. SANDAG is currently working with the Cities of Solana Beach and Encinitas as well as the other coastal cities to secure matching funds. Once funds are secured, work on the environmental phase of the project should begin in spring 2008.
Additionally, SANDAG would like to explore the use of sediment management devices, such as an artificial submerged reef, which would influence the frequency of beach sand nourishment. The RBSP II looks to advance the science associated with retaining sand and initiate additional work to determine if sediment management devices are appropriate for implementation in the San Diego region. The Regional Beach Sand Retention Strategy, prepared in 2001, will be used as a baseline for determining the types and locations of sediment management devices.

Building sediment management devices will require the region to address additional environmental issues that were not analyzed as part of the RBSP. Additional analysis specific to retention could include the probability of success, environmental consequences such as downcoast impacts, impacts on surfing and living resources, upfront and down-the-road costs, aesthetics, construction disruptions, legal considerations, and political feasibility. The goal is to facilitate the placement of sediment and retain it in order to reduce the sediment deficit, restore the natural processes, and maintain healthy beaches in perpetuity.

**Other Shoreline Management Efforts**

The Strategy places an emphasis on beach replenishment to preserve and enhance the environmental quality, recreational capacity, economic prosperity, and property and infrastructure protection benefits of the region’s shoreline. While the RBSP was a large-scale project implemented to meet these objectives, continued maintenance of the region’s shoreline will be required.

SANDAG is working with local cities to develop small-scale opportunistic sand programs that place compatible excess sandy material from sources such as development projects and detention basins on regional beaches. SANDAG has been working through a grant from DBW on a pilot program called the Sand Compatibility and Opportunistic Use Program (SCOUP), which is a mechanism for coastal jurisdictions to place small quantities of suitable sand material on beaches when it becomes available. The Cities of Carlsbad, Coronado, Encinitas, Imperial Beach, Oceanside, and Solana Beach currently have opportunistic sand programs.

Recently, SANDAG received another grant from DBW to develop a pilot Coastal Regional Sediment Management Plan (Regional Management Plan) for the San Diego region. The Regional Management Plan builds upon what has been developed for the California Coastal Sediment Management Master Plan, which has a goal of developing a process that facilitates the management of sand on a regional basis. The Regional Management Plan is a guidance and policy document that will discuss how management of sediment targeted at coastal erosion can be implemented in an expeditious, cost-effective, and resource-protective manner throughout the San Diego region. The sediment sources identified as part of the Regional Management Plan can be placed on regional beaches under the SCOUP and regional projects. The draft Regional Management Plan will be available in December 2008.

**Conclusions and Next Steps**

Based upon an understanding of the results of the first RBSP and the economic value of the region’s coastline, SANDAG recognizes the importance of healthy beaches in the region and is committed to identifying regional funding and implementing ongoing large and small-scale beach replenishment activities. Over the past several months, SANDAG has been considering long-term regional funding strategies for beach sand replenishment as well as other regional infrastructure areas. The quality of life funding efforts would create a funding strategy that supports shoreline management through beach replenishment and the potential placement of appropriate sediment management devices. These discussions and efforts will continue over the next couple of years.
PROPOSITION 84 FUNDING REQUEST 3002800

Introduction

In August 2008, the SANDAG request for funds in support of the planning and construction of up to three artificial submerged reefs was denied. In November, SANDAG revised the funding request to include a preliminary phase of research, primarily detailed numerical and physical modeling that will test the performance of reefs in the region in comparison to other types of sediment management devices. This is research only, no decision has been made regarding the type of sediment management device or placement.

The attached scope of work was submitted to the State for their consideration. The goal is for the proposed scope to go through peer review in December 2008 and to the Board of the Ocean Protection Council in February 2009. If successful, the scope also will need approval from the California Coastal Conservancy (Conservancy). The Conservancy meeting would likely occur in March or April 2009.

Background

The Conservancy’s primary concern regarding the original proposal for funding was the ability of offshore reefs to effectively retain sand. The Conservancy also stated a desire to await the outcome of the U.S. Army Corps of Engineers (ACOE) 227 project in Ventura County, and cited concerns regarding sea level rise. While SANDAG shares the Conservancy’s trepidation related to the effectiveness of this emerging sand retention technology, SANDAG believes the concerns related to sea level rise are unwarranted with regard to this project and that waiting for the ACOE 227 findings would critically delay the region’s shoreline management objectives.

At the November meeting, SANDAG staff provided responses to the Conservancy’s concerns related to these issues and discussed with them the potential for funding research related to the performance of regional sediment management devices.

The project proposal submitted in April 2008 was prepared using the findings of the San Diego Regional Beach Sand Retention Strategy (Retention Strategy) and recent relevant studies, which recommended that additional work be completed prior to final decisions being made on long-term implementation. Since offshore reefs were considered appropriate for certain locations, reefs were initially the focus of this pilot study as a way to expand the knowledge and understanding of these types of sediment management devices. However, to alleviate the Conservancy’s concerns related to the effectiveness of sediment management devices, SANDAG proposed an expanded planning phase of the project that will include various types of structures to optimize the design and, therefore, maximize the probability of success.
SANDAG proposed the following modified three phase approach, which is laid out in more detail in the attached scope of work. First, SANDAG will review all retention options in detail, including submerged reefs and other sediment management devices, such as artificial headlands, groins, naturalized breakwaters, and modified piers. The consultant team would develop rigorous empirical relationships to estimate the amount of “new” beach that would be retained in the region, referenced to the size and cost of all types of sediment management devices (based on their function, for example, sediment-blocking, wave-blocking and diffraction, wave dissipation and refraction, and combinations thereof).

This would be an expansion of, and more detailed analysis of, the southern California natural and artificial beach retention structures study already completed on behalf of the Conservancy by the SANDAG sand retention consultant, Everts Coastal. An extension of that work would be to do a field study of natural reefs (rocky stream deltas which are excellent beach retainers and outstanding surf sites). It is understood that if a design cannot meet the conditions of natural structures, it is not likely to be successful.

Second, this work would build on the existing San Diego Regional Beach Sand Retention Strategy (Retention Strategy), prepared in 2001, by using numerical and physical models to refine the various favored sand retention concepts identified in the strategy. These models would aid in gauging the effectiveness of all concepts, including submerged reefs. This would include more detailed analyses of the most promising sediment management devices at each site.

Numerical models, similar to those being used by SANDAG consultants in Solana Beach and Oceanside, would support the functional design of the structures and help define other benefits and impacts. The physical model, conducted in a state-of-the-art wave tank, would further verify whether the design is adequate to achieve the stated goals. Construction of the pilot project would not commence until the best tools available suggest a high probability of success. As we know from the experience at Pratt’s reef, project design is extremely important. There must be sufficient funding to ensure the size and shape of the reefs are appropriate to achieve the goals of the project.

Third, based on technical pros and cons and local needs, the local community, along with all funding sources, would determine if a sediment management device is desirable and, if so, select the type that is most in line with community desires and overall budget. This work would include the preliminary engineering phase of the project.

Key Staff Contact: Shelby Tucker, (619) 699-1916; stu@sandag.org

---

PROPOSED SCOPE OF WORK
TO DETERMINE THE FEASIBILITY
OF USING SEDIMENT
MANAGEMENT DEVICES IN THE
SAN DIEGO REGION

Prepared for:
The Ocean Protection Council
and
California State Coastal Conservancy
1330 Broadway Avenue, 13th Floor
Oakland, CA 94612-2530

Prepared by:
SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA 9201-4231

In Association With The Consulting Team of
MOFFATT & NICHOL
Everts Coastal
Coastal Frontiers Corporation
and
Everest International Consultants

November 24, 2008
LIST OF FIGURES

Figure 1 – Fillet Upcoast (North) of Agua Hedionda Lagoon North Jetty

Figure 2 – Fillet Upcoast (North) of Mission Bay Channel North Jetty

Figure 3 – Salient (Beach at Lower Left) Shoreward of Table Top Reef in Solana Beach (Lower Right)

Figure 4 – Littoral Cells Within the San Diego Region

Figure 5 – Sequence of Preliminary Engineering Tasks for Sediment Management Devices

Figure 6 – The Proposed GENESIS Modeling Grid for North County

Figure 7 – Three-Dimensional Moveable-Bed Study at Oregon State University

Figure 8 – Submerged Offshore Breakwaters

Figure 9 – Testing Submerged Offshore Breakwaters
1.0 INTRODUCTION

1.1 Study Overview and Objectives

This scope of work is proposed by the San Diego Association of Governments (SANDAG) to assess the potential of employing sand retention within the San Diego region to offset sand loss and beach erosion. Sand retention measures are referred to as “sediment management devices” throughout this scope. SANDAG intends to implement sediment management devices to optimize their current beach nourishment program, which envisions a new project every 5 to 10 years. The first project was successfully constructed in 2001 and is planned for reconstruction in 2011 or 2012. Retention is planned for inclusion in the next project if it proves to be more effective at producing project success than nourishment with no retention.

The San Diego region’s shorelines are faced with ongoing erosion resulting from an annual sediment deficit on the order of 60,000 cubic yards in North County to approximately 50,000 cubic yards in the South County. SANDAG has identified beach erosion as a significant problem impacting the quality of life in the region, and has committed to addressing the problem through beach nourishment. Incorporation of sediment management devices as part of future beach nourishment can improve project economics by reducing the rate of sand loss. These measures bring the added ecosystem benefit of providing hard-bottom habitat, and can add the recreational benefit of augmented surfing opportunities at their locations.

The primary objective of this study is to quantify the sand retention characteristics of these measures, and their ability to counteract erosion and reduce the impacts of sea level rise. The resulting economic benefits garnered through reducing the life cycle costs of beach nourishment will be evaluated. Ancillary benefits including increased hard-bottom area and improved surfing will also be quantified.

1.2 Sand Retention as a Shoreline Preservation Strategy

Sand retention is the beneficial effect of physically retaining a sand beach in the influence area of a structure at the coast. Two physical forms of sand retention include:

- **fillets** just updrift of groins or jetties (linear rubblemound structures perpendicular to shore) shown in Figures 1 and 2; and

- **salients** located in the wave shadow, or lee, of offshore reefs or breakwaters shown in Figure 3.

SANDAG analyzed the coastal erosion problem in the region and prepared the *Shoreline Preservation Strategy* (SPS) in response in 1993. The SPS identified beach nourishment as the primary means to offset erosion and recommended a pilot project to demonstrate
its efficacy. Systematic baseline monitoring of beaches was also initiated as a result of the SPS, with excellent data sets from 1996 through the present.

In 2001, SANDAG implemented the Regional Beach Sand Project (RBSP), during which a total of 2.1 million cubic yards of sand was placed throughout the region. After five years of monitoring, results showed that the nourishment significantly widened certain beaches and benefited the region overall. Receiver sites responded differently to nourishment with some retaining sand for longer periods than others. Dispersion of the sand was significant after five years with most sites reverting back to pre-project widths.

Concurrent with the RBSP, SANDAG initiated a study of incorporating sediment management devices to supplement beach nourishment. Completed in 2002 by Moffatt & Nichol, the *Regional Sand Retention Strategy* analyzed the performance of existing sand retention features in the region and elsewhere, and estimated the benefits to costs of implementing certain measures in the San Diego region. The study demonstrated that beach nourishment could be more cost-effective if the nourishment was supplemented with sediment management devices, e.g. submerged reefs, groins, and/or breakwaters.

SANDAG has recently initiated a second RBSP (II) to continue actively managing their coastal beach resources. As part of that effort, the region seeks to integrate sediment management devices into the next project if it can be determined to be cost effective, with acceptable levels of environmental impact.

![Image](image-url)

**Figure 1** – Fillet Upcoast (North) of Agua Hedionda Lagoon North Jetty
Figure 2 – Fillet Upcoast (North) of Mission Bay Channel North Jetty

Figure 3 – Salient (Small Beach at Lower Left) Shoreward of Table Top Reef in Solana Beach (Dark Area in Water at Lower Right)
2.0 ASSESSMENT OF EXISTING COASTAL PROCESSES AND AVAILABLE DATA FOR MODELING

Coastal processes determine the existing patterns of sediment transport, erosion, and deposition along the coast. As such, they are important to understand for formulation of conceptual sediment management devices. A brief description of the region's coastal processes is provided for context in considering the proposed scope of work.

2.1 General

The San Diego region is characterized by an emerging shoreline, with reaches of narrow beaches fronting coastal bluffs of marine terraces. This pattern is interrupted by six short reaches where lagoons carve through the coastal bluffs.

From a sediment management standpoint, the coast can be separated into distinct geographic areas called littoral cells. Littoral cells are the areas within which sediment moves along the coast, and they are bordered by impassable physical boundaries on their updrift and downdrift ends. The littoral cells within San Diego County are shown in Figure 4. Littoral cells included in this work are the Oceanside Cell to the north and the Silver Strand Cell to the south, both experience severe sediment deficits.

2.2 Longshore Sediment Transport

The SPS (1993) and the Coast of California Storm and Tidal Wave Study (CCSTWS) prepared by U.S. Army Corps of Engineers (1990 and 1991) present in-depth analyses and data of coastal processes within the region. Patsch and Griggs (2006) present overview information of sediment budgets within this region as well as the entire California coast.

Coastal processes within the Oceanside Littoral Cell are summarized as wave-driven longshore sediment transport in a net direction to the south, with significant seasonal and cyclical reversals. The average gross longshore sediment transport rate is approximately 1,000,000 cubic yards per year, with the average net being much smaller than the gross at between 0 and 550,000 cubic yards per year. The gross rate varies by 50% and the net rate can completely reverse depending on climate.

Sediment transport conditions within the Silver Strand Littoral Cell are net northward because approaching wave crests refract (bend) around the large bathymetric irregularities of Point Loma and the Tijuana River delta, and approach the South County shore at an angle more from the southwest than west/northwest thereby driving currents in a net direction northward. Gross sediment transport at South County is 740,000 cubic yards per year and net longshore sediment transport is to the north from between 120,000 and 200,000 cubic yards per year (Patsch and Griggs 2006).
2.3 Waves

Ocean waves off the coast of Southern California are the primary drivers of currents that transport sediment along the shore. This coast is exposed to significant wave energy on a seasonal basis. Seasonal variations in wave type result in seasonal reversals in the longshore sediment transport direction. Waves in this region are described below.

- Northern hemisphere swell represents the category of the most severe waves reaching the California Coast. Significant wave heights reach 10 feet, with wave periods ranging from 12 to 18 seconds. This swell type represents winter swell and it generates the maximum sediment transport rate in the region. Winter conditions also result in sand bar formation in the nearshore and narrower beaches seasonally.

- Tropical storms develop off the west coast of Mexico during the summer and early fall. The resulting swell rarely exceeds 6 feet. This swell type typically generates a much lower sediment transport rate in the region compared to winter waves.

- Southern hemisphere swell is generated by winds associated with storms in the South Pacific. Typical southern hemisphere swell rarely exceeds 4 feet in height in deep water, but with periods ranging up to 18 to 21 seconds, they can break at over twice that height. This swell type represents summer swell and generates less sediment transport in the region than winter swell. Summer conditions result in beach-building and seasonally wider beaches.

- Sea is the term applied to steep, short-period waves which are typically generated from the diurnal sea breezes. Wave heights are usually between 2 and 5 feet with an average period of 7 to 9 seconds. These sea conditions transport less sediment than swell conditions.
2.4 Beach Widths and Sand Volumes

SANDAG has monitored this coast since 1996 with seasonal beach profiling at nearly every beach. Data indicate beach widths vary seasonally, but trend toward narrowing over time. The exception to this trend occurred after the 2001 replenishment project where beaches widened and remained wider for four years, then narrowed to their pre-
project condition. Sand volumes varied directly with beach widths and increased during the early 2000’s and have decreased since 2005.

2.5 Sediment Budget

The sediment budget is a concept that quantifies the relative balance of sediment inputs to and outputs from the littoral cell. The sediment budget indicates if the cell is losing sand, gaining sand, or is in equilibrium. A negative balance in a cell indicates it is losing sand and the beaches are likely narrowing as a general trend, while a positive balance indicates beaches are gaining sand and generally widening. The following sediment budget conditions have been documented within the San Diego Region:

- The southern Oceanside Littoral Cell is characterized by a deficit of nearly 60,000 cubic yards of sand per year (Patsch and Griggs 2006); and
- At South County, the deficits in the Silver Strand Littoral Cell range from 65,000 cubic yards per year at the Tijuana River Delta compartment to 40,000 cubic yards per year at the Strand compartment (Patsch and Griggs 2006).
3.0 SPECIFIC WORK TASKS

Benefits of artificially enlarging a beach include (1) the reduction of the incidence and intensity of wave attack and the consequent erosion of adjacent property and infrastructure; and (2) the improvement of an important regional amenity for improved recreation, habitat, and economics. Our approach to quantify these benefits is described in detail in this section.

Only two strategies, each of which has many variations, are available to artificially enhance and maintain wider beaches. The first involves the placement of beachfill alone. A second strategy is the combination of beachfill and one or more fixed sediment management devices. The goal of this study is to determine whether the second strategy can be more effective than the first for any or all of the potential beach nourishment receiver sites in San Diego County.

The study process is typified by completing empirical studies followed by concept design. The concept design is then tested with numerical models, and confirmed with physical models. The concept design is modified based on the numerical results, with a feedback loop between the concept design and the numerical simulation. Multiple iterations may be necessary. The concept is then re-assessed and confirmed with the numerical model. The process is shown in Figure 5 and fully described in this section.

3.1 Task 1 - Evaluate The Functional Effects Of Sediment Management Devices

The objectives of this task are to:

1. Estimate the effectiveness of all types of sediment management devices at appropriate receiver sites in both North and South County San Diego (ten possible sites of SANDAG’s RBSP are assumed for purposes of this scope, with Mission Beach and one as yet undetermined North County beach assumed to not be included);

2. Rank their feasibility based on the size of “new” beach they will likely retain versus the size (cost) of the structure and its potential adverse impacts; and

3. Provide a first-cut concept of the optimal dimensions, configuration, and location of the more promising structures.

Structure types, based on function, are sediment-blocking (generic groins), wave-blocking and diffraction (generic offshore breakwaters), wave dissipation and refraction (generic artificial reefs), and combinations thereof.
3.1.1 Subtask 1.1 - Expand on the prototype California State Coastal Conservancy empirical relationships between structure characteristics and beach response (both positive and adverse).

The team will combine structure-retained beach performance and local conditions by incorporating detailed wave conditions, sediment availability, and local topography and bathymetry into the relationships. Combining processes with performance will be accomplished in a series of tasks listed below.

![Figure 5 – Sequence of Preliminary Engineering Tasks for Sediment Management Devices](image-url)
1. Relating local wave climates and sediment source fluxes to the shapes and sizes
   of the structure-retained beaches defined in the California State Coastal
   Conservancy (CSCC) report (2002) using available wave data;

2. Bathymetric surveying (where existing data are not sufficient) to define the three-
   dimensional shape, size, and surface roughness of at least two representative
   rocky stream deltas, probably those at San Onofre and Topanga, and the
   bathymetry of the upcoast and downcoast regions affected by groins, probably at
   Oceanside (north harbor breakwater), Ventura and Imperial Beach;

3. Incorporating the latest process research results into further strengthening the
   CSCC empirical relationships, and

4. Acquiring more aerial photos for analysis where the CSCC (2002) effort indicated
   a need if the relationships are to include process data. These empirical
   relationships, now related to wave climate and sediment availability, can be
   applied to beach evaluations anywhere in California using definitive local wave
   data (available all along the California coast and funded by the State Department
   of Boating and Waterways).

### 3.1.2 Subtask 1.2 – Identify the Most Feasible Devices and Concept Design
Parameters

Relationships developed in subtask 1.1 will be applied at ten possible receiver sites to
identify the most feasible devices and appropriate design parameters. The data of
local waves, sediment, and geomorphology will also be incorporated into the
analyses. Estimates will be made of the optimum size, configuration, and location of
the different types of structures as a function of the size of beach they retain. The goal
will be to identify the more effective and long-lasting enhanced beaches as a function
of structure type (and adverse impacts on other beaches, if applicable). The
strengthened empirical relationships will also serve as a check on subsequent physical
and numerical modeling. If a design cannot meet the conditions of natural structures it
is not likely to be successful.

The effect of sea level rise with respect to the structures will be a factor since
submerged structures and those that are overtopped lose effectiveness as sea level
rises. All retention options will be reviewed in detail with respect to performance
impacts caused by sea level rise, including submerged reefs and other sediment
management devices, such as artificial headlands, groins, naturalized breakwaters,
and modified piers.

The product of this task will be a list of all structures at ten receiver sites and a
quantitative ranking of those with greatest feasibility considering the size of beach
they are likely to retain as a function of structure size, and potential habitat constraints. A first estimate of the dimensions, configuration and location in the
littoral zone, of the more promising structures will also be included.
3.2 Task 2 – Prepare Concept Engineering Design

Task 2 is to prepare concept design of several potential sediment management devices within the region. It consists of two subtasks described below.

3.2.1 Subtask 2.1 – Meet with Stakeholders and Permit/Resource Agencies to Identify the Most Appropriate Sites for Sediment Management Devices

The SANDAG project team will meet with local stakeholders and permit and resource agency staff to identify the most suitable sites for sediment management devices from various standpoints. This effort may require one meeting with each group (two meetings total) to be able to devote sufficient time to discussion of the special interests of the groups. Site selection will lead into concept design. It is assumed that up to eight sites may be selected for sediment management devices.

3.2.2 Subtask 2.2 – Concept Design of Sediment Management Devices

Sediment management devices will be conceptually designed at up to eight sites total, located in both North and South County. These devices may include the range of possibilities, including relatively new concept of a submerged/emergent nearshore reef (desired by stakeholders), groins (also desired by one City), and possibly other concepts to be determined. The concept design will show and explain the footprint of the structure, its length, width, elevation, orientation to shore, and composition. Concept design will consist of dimensioned plans of each device on a bathymetric base map, typical cross-sections, and matrices of construction cost estimates based on quantities and unit costs. A report will also be provided presenting all the data and the basis of the designs.

Designs will be done mainly to accomplish sand retention without causing adverse impacts downcoast or adjacent to the site, but to also achieve the additional goals of habitat creation and improvement to surfing. Potential habitat considerations will be considered, such as direct impacts of installing a structure and indirect impacts of causing burial of existing habitat by sand from retention effects. Also important will be the new area of hard-bottom habitat created by the structures, and the material used for the construction. Solid material such as rock is anticipated to provide greatest hard-bottom habitat benefits plus increased structural stability during storm waves. Concepts will be designed to be environmentally sensitive, and will be those most likely to be approved by permit and resource agencies in the long-term.

Deliverables: Draft and Final Concept Designs, and Reports of the Basis for the Designs.
3.3 Task 3 – Numerical and Physical Modeling of Selected Concept Designs

The concept design is tested with numerical models, and confirmed with physical models as described below.

3.3.1 Subtask 3.1 – Numerical Modeling

Numerical models would support the functional design of the structures and help define other benefits and impacts. A significant amount of numerical modeling was completed as part of the 2001 Regional Beach Sand Project (RBSP) implemented by SANDAG. This modeling effort included one-line shoreline evolution modeling with GENESIS, and wave modeling using the RCPWAVE coastal model. Past modeling analyzed nourishment only with no retention. Since this project is focused on results of sand retention, additional modeling is required to optimize the concept design of sediment management devices developed in Task 2.

Specifically, the engineer will use two models for different purposes. The one-dimensional (1D) GENESIS model will be used to assess the long-term shoreline response over a large-scale from the effects of structures. The multi-dimensional Delft3D Morphological modeling system will then be applied to assess short-term two-dimensional wave, hydrodynamic, sediment transport, and morphological change patterns over small-scales in the vicinity of the structures. Although both models have limitations, the GENESIS and Delft3D model are the best numerical tools to analyze and optimize the functionally-based design of structures based on the engineer’s judgment. Specific details for numerical modeling are as described below.

Task 3.1A - GENESIS Modeling – Large-Scale Regional Modeling

The Genesis model has recently been modified to include a detached breakwater component, more rigorous longshore transport methods, and improved wave transformation alternatives. These improvements are combined in a new version of GENESIS called GENESIS-T. A description of GENESIS is included as Attachment A.

The original GENESIS model previously developed by the engineer in 1999 for the 2001 RBSP will be augmented to assess concepts using the newest available GENESIS model. Input and boundary conditions (e.g., wave climate) and model calibration parameters (e.g., sediment transport coefficients) will be based on the existing GENESIS model, and updated as needed from additional calibration. Additional calibration will be done for results of the 2001 RBSP to improve model performance.

The required model input will include:

- Nearshore wave climate at the site;
- Position of existing shoreline structures relative to an established baseline;
Historical shoreline position relative to an established baseline, for dates coinciding with the available nearshore wave time series; and

Existing shoreline position relative to the established baseline computed from the survey transect data.

The GENESIS model will be calibrated using the wave data, shoreline structure positions, and SANDAG’s historical shoreline position data.

GENESIS simulations will be performed for two iterations of design optimization based on the results. Results will be specified for 2-year intervals out to a 10-year post-construction horizon, and then at years, 20 and 50 after implementation. The grid to be used is initially proposed to be at a spacing of 375 feet in order to resolve sufficient detail to discern effects of the structures, but finer grid spacing may be needed depending on the detail required. For example, the grid for North County San Diego will be subdivided into two grids extending from Oceanside Harbor to Del Mar, and the from Del Mar to Point La Jolla with overlap. Two grids provides for greater resolution in grid spacing. If finer grids are needed, then the grid spacing at specific areas of interest may need to be smaller. The grid locations are shown in Figure 6 as utilized from previous SANDAG modeling.

South County will be modeled similarly with GENESIS and a grid that includes all of Imperial Beach and coastal areas from the international border to the Silver Strand State Beach area for a distance of eight miles total.

Task 3.1B Delft3D Modeling – Small-Scale, Site-Specific Modeling

The engineer will develop a local, high-resolution, hydrodynamic, sediment transport, and morphological model of the immediate project vicinity using the Delft3D modeling system. The smaller-scale modeling will address a total of four sites with one device per site, representing four different types of devices. The model will include more detailed local existing features (structures and bathymetry).

This model will be applied around the sediment management devices because the sediment transport patterns around structures are multi-dimensional and GENESIS is a one-dimensional (1D) model. The GENESIS model will determine the macro-scale behavior that can be used as input to the Delft3D morphological model. A multi-dimensional morphological model is needed to gain a better understanding of the sediment movements in the immediate vicinity of the structures. Given the public scrutiny that this model will receive, it was also deemed prudent to include this level of modeling so SANDAG would have more confidence in any finalized solution that is selected and ultimately constructed.

Wave propagation from deepwater will be performed using the RCPWAVE model. Input wave conditions will be based on measured data at the Oceanside and Del Mar
gages administered by the California Data Information Program (CDIP). A local, high-resolution wave model will be driven with available nearshore wave climate (statistics and time series) data from the RCPWAVE refraction model. It should be understood that since the refracted wave dataset has not been calibrated to measured data at the site, the accuracy of the sediment transport and morphological modeling study will be limited by the quality of these data.

Hydrodynamic and wave results will be used as input to a detailed, two-dimensional, sediment transport model over a similar or finer grid. The model will be used to investigate sediment transport patterns (including long-shore transport distributed across the profile) and morphological changes for one average wave and one higher-than-average wave energy condition. Assessment of model accuracy will be based on realistic flow, sediment transport, and morphological change patterns, not on specific comparisons with any available shoreline or bathymetry data. The model will also be used to assess potential long term scour at the tip of the structures based on a schematic representation of the typical wave climate and tides.

Other potentially relevant coastal processes such as macro-scale disruptions in the sediment supply that might have some effect on existing conditions will not be simulated by the model. However, model results will be used to establish cause-and-effect relationships with regards to the existing erosion and to assist in the design of any proposed structural modifications. Relevant sediment parameters (e.g., grain size) will be based on local sediment characteristics. Delft3D simulations will be performed for two iterations of design optimization.

Deliverables: Draft and Final Reports summarizing model development and results for the empirically-based and optimized designs. The report will include GENESIS results including estimates of shoreline position and volumetric sediment changes in 2 year increments up to 10-years following project construction, and then at years 20 and 50 after construction. Detailed Delft3D model results to be provided will include a plan view graphic and a time series of figures depicting wave, hydrodynamic, sediment transport, and morphological development patterns.
3.3.2 Subtask 3.2 – Physical Modeling

A physical model study will be conducted to better understand the effectiveness of the sand retention concepts developed through the empirical and numerical model studies. A three-dimensional moveable-bed study will be used to quantify the shoreline response to candidate sand retention structures. In the case of an offshore reef-like option, the model also will provide a qualitative indication of wave breaking characteristics and surf quality.

The primary objective of the three-dimensional movable-bed physical model will be to confirm the performance of the concept design options and to optimize variables which may include minor changes to structure dimensions, elevation, and/or orientation. Sea level rise will also be assessed in the laboratory. In order to limit the scope and associated expense for this effort, the physical model will not be used to test fundamentally different concepts than those developed using the empirical study and the numerical modeling. The associated cost estimate shall be based on the projected maximum duration of the testing program.
The modeling will be conducted at a laboratory facility to be selected by the project team based on the facility capabilities, layout/construction efficiency, availability, and the resulting cost. It should be noted, that only three to four suitable wave basins exist in North America. The project team has extensive physical modeling experience, and has conducted studies at several of these facilities. Figures 7, 8 and 9 show a similar moveable bed study conducted by Coastal Frontiers for the City of Long Beach at Oregon State University.

Figure 7 - Three-Dimensional Moveable-Bed Study at Oregon State University

Figure 8 - Submerged Offshore Breakwaters

Figure 9 - Testing Submerged Offshore Breakwaters
The project team will oversee all aspects of model development, construction, and operation. The model will reproduce the general bathymetric characteristics of the project region. It is anticipated that model scale will be between 1:30 to 1:60. In the case of the Oregon State University wave basin, this would result in an alongshore model length of between 2,500 to 5,000 feet in prototype. Depending upon the lab facility selected and the desired model domain, it also may be necessary to utilize a distorted scale in which the horizontal scale and vertical scale are different.

The physical model will be used to provide information regarding the following aspects of the design under a range of wave conditions and water levels representative of normal and design storm conditions:

- Nearshore wave and circulation patterns;
- Beach morphology changes; and
- Shoreline response over time.

Wave conditions for the physical model will replicate both average wave conditions and large storms. An appropriate rate of sea level rise will also be incorporated into environmental conditions to be simulated. Several projections of the sea level rise rate exist that can be applied, including one recent study specific to the San Diego Region (San Diego Foundation 2008). The wave climate offshore of the San Diego region is a complex mixture of locally generated wind waves and swell from both northern and southern hemisphere. Wave characteristics vary significantly on both seasonally and inter-annually. Representative nearshore wave conditions at the project site will be developed using measured wave data from the CDIP and extreme wave hindcasts generated as part of the Coast of California Storm and Tidal Waves Study for the San Diego Region. The objective is not to reproduce past wave events, but to statistically characterize the wave climate in terms of wave height, period, direction, and spectral shape.

The model testing will commence by running a predefined series of wave conditions on an unprotected beach (i.e., no retention structure present). The objective of this simulation is to reproduce a sediment transport regime and erosional conditions similar to that which exists at the project site. The outcome of these tests will serve as a baseline by which to assess the relative effectiveness of the sand retention options.

Following the testing of the unprotected beach, the initial bathymetry will be reconstructed and the first sand retention option will be installed. To provide a direct comparison of results, the same sequence of wave conditions will be used for the simulation. Following this test, a second sand retention option, or an optimization of the first option will be installed and tested using the same sequence of waves. The number of options tested will be dictated by the budget for this task. It is anticipated
that the baseline condition and two to three retention options could be tested in a	hree-week period.

As indicated above, the primary objective of the three-dimensional moveable-bed study is to assess the shoreline response to the sand retention options over time with sea level rise. A secondary objective is to assess wave breaking characteristics and surf quality for any reef-like options designed to provide bathymetry suitable for surfing. If the preferred sand retention concept meets the performance objectives and is recommended for installation, it is likely that the subsequent final design stage for construction will include a large scale two-dimensional model required to determine the stability of the structure under severe wave conditions.

Deliverables: Draft and Final Reports of Physical Modeling Results. The report will include a detailed account of the physical modeling activities, including a description of the tested concepts, a review of model development and implementation, a summary of the oceanographic conditions, and a discussion of the results. A detailed assessment of the shoreline changes will be included based on both quantitative measurements and on-site observations. In the case of submerged reef-like structures, a qualitative evaluation of wave breaking characteristics and surf quality also will be provided.

3.4 Task 4 – Perform Economic Analyses

Economic analyses will be conducted on sediment management devices to identify if they are a cost-effective strategy for the region. Previous economic analyses for sand management devices were performed by M&N in 2000 for the San Diego Regional Beach Sand Strategy. That document serves as the starting point for updated cost/benefit analyses for this effort. Updates will be made with results of the 2001 RBSP, recent economic analyses of the region completed by Dr. Phil King for SANDAG (2007), and current costs for marine construction.

Economic analyses will provide data of benefits versus costs of: 1) nourishment only without use of sediment management devices, and 2) nourishment with use of sediment management devices, assuming at least three different concepts. Pre-filling with sand will be assumed for each sand retention alternative. The long-term costs over 50 years versus the area of beach provided by the projects will be compared for both scenarios. Costs will include construction costs and maintenance. Benefits will be based on square feet of dry beach area retained at each receiving beach.

Spreadsheets will be submitted showing the calculations of costs and benefits, and summaries of the data for easy reference. Assumptions will be specified.

3.5 Task 5 – Reporting
Reports of all activities will be prepared and submitted to SANDAG and the State as Draft copies. Comments will be addressed and revised reports will be submitted as Final versions within 30 days after receiving comments. Both electronic and hardcopy reports will be provided.

3.6 Task 6 – Meetings
SANDAG’s consultants will attend a total of up to six meetings with the State and others, as needed, to complete all aspects of the work, to coordinate reviews, and to report progress. Meetings are assumed to be located in Southern California.

3.7 Task 7 – Project Management
Project management of the budget, schedule, files and deliverables progress will be ongoing throughout the project period by the project manager.

3.8 Task 8 – Quality Control
Quality control will be implemented by independent technical reviewers of the consulting team to assure the highest quality deliverables are available for the public.
4.0 ESTIMATED FEE AND SCHEDULE OF WORK

4.1 Estimated Fee to Perform This Scope of Work

The estimated fee to perform this work is $869,797, with the fee broken down by task in Table 1 below.

Table 1 – Estimated Fee

<table>
<thead>
<tr>
<th>Number</th>
<th>Task</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Functional Assessment</td>
<td>$110,180</td>
</tr>
<tr>
<td>2</td>
<td>Concept Engineering Design</td>
<td>$100,375</td>
</tr>
<tr>
<td>3</td>
<td>Conduct Modeling</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Numerical</td>
<td></td>
</tr>
<tr>
<td>3.1A</td>
<td>Delft</td>
<td>$171,800</td>
</tr>
<tr>
<td>3.1B</td>
<td>GENESIS-T</td>
<td>$156,860</td>
</tr>
<tr>
<td>3.2</td>
<td>Physical</td>
<td>$218,352</td>
</tr>
<tr>
<td>4</td>
<td>Economic Analysis</td>
<td>$13,030</td>
</tr>
<tr>
<td>5</td>
<td>Reporting</td>
<td>$53,940</td>
</tr>
<tr>
<td>6</td>
<td>Meetings</td>
<td>$26,950</td>
</tr>
<tr>
<td>7</td>
<td>Management</td>
<td>$7,880</td>
</tr>
<tr>
<td>8</td>
<td>Quality Control</td>
<td>$9,600</td>
</tr>
<tr>
<td></td>
<td>Reimbursable Expenses</td>
<td>$830</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>$869,797</td>
</tr>
</tbody>
</table>

4.2 Schedule to Perform This Scope of Work

The proposed work will be completed within twelve months from Notice-to-Proceed. The schedule could possibly extend to eighteen months if certain tasks require more time than anticipated or review periods extend beyond the two weeks as is presently assumed.
5.0 REFERENCES


ATTACHMENT A – DESCRIPTION OF THE GENESIS MODEL

GENESIS Model Description
The project will be modeled using the Shoreline Modeling System (SMS), which was developed by the U.S. Army Corps of Engineers (USACE) Coastal Engineering Research Center (CERC). The SMS uses a numerical model called the “Generalized Model for Simulating Shoreline Change (GENESIS),” as a base program for shoreline movement along with twenty additional support and input/output programs. GENESIS is based on methods presented in the Shore Protection Manual (USACE 1984). The SMS is a widely used modeling suite for the development of long term, design-level shoreline evolution simulations.

The model was also used by the San Diego Association of Governments (SANDAG) for the 2001 Regional Beach Sand Project to quantify potential project impacts. GENESIS was also recently used to analyze a large-scale coastal development project in Southern California at Bolsa Chica in Orange County. The Bolsa Chica Steering Committee (including representatives of U.S. Army Corps of Engineers) has demonstrated that GENESIS results are suitably accurate for these analyses (Moffatt & Nichol Engineers 1999). GENESIS has been previously used to simulate shoreline changes anticipated from other proposed projects in Southern California by Gravens (1990 and 1991) and Moffatt & Nichol Engineers (Goleta Beach in 2007/2008), and projects at the East Coast of the U.S. by Moffatt & Nichol (Coney Island, New York in 2004 and Norfolk, Virginia in 2005).

Numerical modeling of shoreline morphology is inherently imprecise because of the complexity of coastal processes. Although coastal processes are becoming increasingly better understood, no comprehensive numerical model exists that accounts for the natural processes of coupled longshore and cross-shore sediment transport. GENESIS models only longshore sediment transport and assumes that cross-shore sediment movement is mainly seasonal and averages out over the long-term. GENESIS is intended to provide a generalized long-term trend in shoreline response from a specific action or actions. The results should be relied upon for anticipating general areas of accretion or erosion at orders of magnitude over large-scales (trends over 100’ of feet), rather than in predicting very precise site-specific increments of shoreline movement over very small scales (exact predictions over 10’ of feet). It generally indicates whether erosion, accretion, or no effect will occur from an action.

GENESIS is a one-line numerical model that calculates longshore sediment transport and shoreline change as a result of sediment inputs and outflows, and differences in nearshore wave breaking over space and time. GENESIS transforms wave data from a specified source at a nearshore reference depth to the breaking point and calculates the resulting sediment transport. Gradients in this sediment transport cause changes in shoreline position. The twenty additional programs within the SMS suite are used to format the required input data and to present the results. In addition, there are programs for wave
transformation, shoreline rotation/translation, and potential sediment transport estimates. The capabilities and limitations of the SMS are presented in Tables A1 and A2, respectively. More detailed descriptions of the models in the SMS are provided in the Users Manual (Gravens 1992). This work will utilize the latest release of the model, GENESIS-T.

Table A1 - Shoreline Modeling System Capabilities

<table>
<thead>
<tr>
<th>Capability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beach nourishment modeling</td>
<td></td>
</tr>
<tr>
<td>Inclusion of shoreline structures such as seawalls, groins, jetties and detached breakwaters</td>
<td></td>
</tr>
<tr>
<td>Wave transmission by both shore perpendicular and shore parallel structures</td>
<td></td>
</tr>
<tr>
<td>Variable boundary condition types</td>
<td></td>
</tr>
<tr>
<td>Wave propagation over an arbitrary bathymetry, including shoaling, refraction and diffraction</td>
<td></td>
</tr>
<tr>
<td>Sediment transport due to oblique wave incidence</td>
<td></td>
</tr>
<tr>
<td>Wave data can include offshore and nearshore components</td>
<td></td>
</tr>
<tr>
<td>Algorithms for wave diffraction and different procedures for computing the cumulative effect of multiple wave energy sources impacting a given shoreline reach</td>
<td></td>
</tr>
<tr>
<td>Simulation of longshore sediment transport gradients in both time and space as a function of variable wave breaking</td>
<td></td>
</tr>
<tr>
<td>Shoaling, refraction and diffraction of waves due to shoreline structures</td>
<td></td>
</tr>
<tr>
<td>Sand bypassing system simulations</td>
<td></td>
</tr>
<tr>
<td>A moving shoreline position boundary condition</td>
<td></td>
</tr>
<tr>
<td>Modeling of waves of arbitrary height, period and direction, including bi-modal waves</td>
<td></td>
</tr>
<tr>
<td>Simulation of longshore wave height gradients</td>
<td></td>
</tr>
<tr>
<td>Simplification of long-term wave records into finite period and directional bands</td>
<td></td>
</tr>
<tr>
<td>Capability to simulate mechanical sand bypassing operations within the model domain</td>
<td></td>
</tr>
</tbody>
</table>
**Table A2 - Shoreline Modeling System Limitations**

- A maximum of 200 alongshore nodes are available for shoreline modeling.
- No cross-shore sediment transport is addressed as seasonal changes are assumed to average out over long time frames or are dominated by more rapid changes associated with new projects.
- No scour modeling at structures.
- Limited to linear variability of the offshore boundary wave transformation coefficients in the RCPWAVE model.
- Calculations are based on linear wave theory.
- No direct tide level change capability.
- The location of offshore sandbars and their effects on wave breaking characteristics cannot be predicted.
- The model cannot include variations in sediment grain size or distribution.
- A maximum of 75 offshore nodes are available for wave modeling.
- No modeling of shoreline changes within inlets.
- No modeling of effects of wind-generated currents or aeolian (wind) transport of sediment.
- No modeling of wave reflection or dissipation at structures.
- There are limits on structure placement, orientation, and shape.
- Longshore sediment transport distribution is assumed uniform and bar effects are not included.
- No second order transport effects due to wave-wave and/or wave-current interactions are considered.
- Bathymetric variations shoreward of the reference depth are not included.
ATTACHMENT B – DESCRIPTION OF THE DELFT 3-D MODEL

DELFT3D MODELING SYSTEM

Delft3D is an integrated surface water modeling system developed by WL | Delft Hydraulics in the Netherlands. The system is based on a flexible framework which simulates two (either in the horizontal or a vertical plane) and three-dimensional flow, waves, water quality, ecology, sediment transport and bottom morphology and is capable of handling the interactions between those processes. The package gives direct access to state-of-the-art process knowledge, accumulated and developed at one of the world’s oldest and most renowned hydraulic institutes. Delft3D consists of a number of well tested and validated modules, which are linked to and integrated with one-another. These modules are:

Hydrodynamics Module (Delft3D-FLOW)

This module simulates non-steady flows in relatively shallow water. It incorporates the effects of tides, winds, air pressure, density (due to salinity and temperature) differences, waves, turbulence, and drying and flooding of tidal flats. The output of the module is used in all the other modules of Delft3D.

Wave Module (Delft3D-WAVE)

Computes the non-steady propagation of short-crested waves over an uneven bottom, considering wind action, energy dissipation due to bottom friction, wave breaking, refraction (due to bottom topography, water levels, and flow fields), shoaling, and directional spreading. The module includes the second generation, quasi-stationary HISWA model and the third generation, spectral model SWAN.

Sediment Transport Module (Delft3D-SED)

The SED module simulates the transport, erosion and settling of cohesive and non-cohesive, organic or inorganic, suspended or bed sediments. It includes several
standard transport formulae and considers different particulate fractions independently. The effect of changes in bottom topography is neglected, so that only short term transport can be assessed.

**Morphodynamic Module (Delft3D-MOR)**

Delft3D-MOR is a the first and most advanced of a new generation of models that compute morphological bottom changes due to sediment transport gradients and user defined, time dependent boundary conditions. Both wind and waves act as driving forces and a number of transport formulae are built in. An essential feature of this module is the dynamic feedback with the Delft3D-FLOW and WAVE modules, which allow the flows and waves to adjust themselves to the local bathymetry and allows for forecasts on any time scale. For over 30 years WL | Delft Hydraulics has been in the forefront of these types of combined morphological simulation techniques.

M&N has developed several morphological numerical models of the inlets and coastal areas using the Delft3D platform. At inlets, the models are able to track the evolution of the complex ebb shoal behavior at the mouth of the inlet, providing a tool to predict erosion and accretion of the bar, as well as predicting the shoaling rate in the navigation channels. Simulations can be run to predict future sedimentation and erosion patterns for time scales from months to years. The models can be used to investigate sediment pathways in and around the inlets, identify existing sediment sources and sinks, assess impacts on adjacent shorelines, and screen various structural and management alternatives for the inlets.

**Water Quality Module (Delft3D-WAQ)**

This module simulates the far and mid-field water and sediment quality due to a variety of transport and water quality processes. To accommodate these, it includes several advection diffusion solvers and an extensive library of standardized process formulations with the user-selected substances.

**Particle Tracking Module (Delft3D-PART)**

This short-term, near-field water quality module estimates the dynamic, spatial (on a sub-grid scale) concentration distribution of individual particles by following their
tracks in time. The waste substances may be conservative or subject to a process of simple, first order decay. The module is also used for near-field fate simulations of dredging spillage.

**Ecological Module (Delft3D-ECO)**

A variety of algae growth and nutrient dynamics modules have been included in the Delft3D system. These include modules describing the governing processes of biotic and abiotic ecosystems and interaction between these have been inserted into the process library, all of which are relevant to the study of eutrophication phenomena. Delft3D includes all algae-connected water quality processes considered in the Delft3D-WAQ module plus a variety of more detailed processes.
MEMBER AGENCIES
Cities of
Carlsbad
Chula Vista
Coronado
Del Mar
El Cajon
Encinitas
Escondido
Imperial Beach
La Mesa
Lemon Grove
National City
Oceanside
Poway
San Diego
San Marcos
Santee
Solana Beach
Vista
and
County of San Diego

ADVISORY MEMBERS
Imperial County
California Department of Transportation
Metropolitan Transit System
North County Transit District
United States Department of Defense
San Diego Unified Port District
San Diego County Water Authority
Southern California Tribal Chairmen’s Association
Mexico

December 4, 2008

TO: Shoreline Preservation Working Group

FROM: Shelby Tucker, SANDAG Staff

SUBJECT: 2009 Meeting Schedule

The Shoreline Preservation Working Group (SPWG) generally meets the first Thursday of every other month at 11:30 a.m. in SANDAG’s 7th Floor Conference Room. The meeting schedule for 2009 is listed below. Please note that meetings are subject to change and notification will be provided to all members and interested parties. Cancellation notices also are posted on the Web site, www.sandag.org.

2009 SPWG Meetings:

- February 5
- April 2
- June 4
- August 6
- October 1
- December 3

Please feel free to contact me at (619) 699-1916 or stu@sandag.org if you have questions regarding the meeting schedule or if you would like to suggest a topic for discussion at a future meeting.

STU/cda