

Final Report
for the
Pismo Creek Estuary Enhancement Project



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Prepared for
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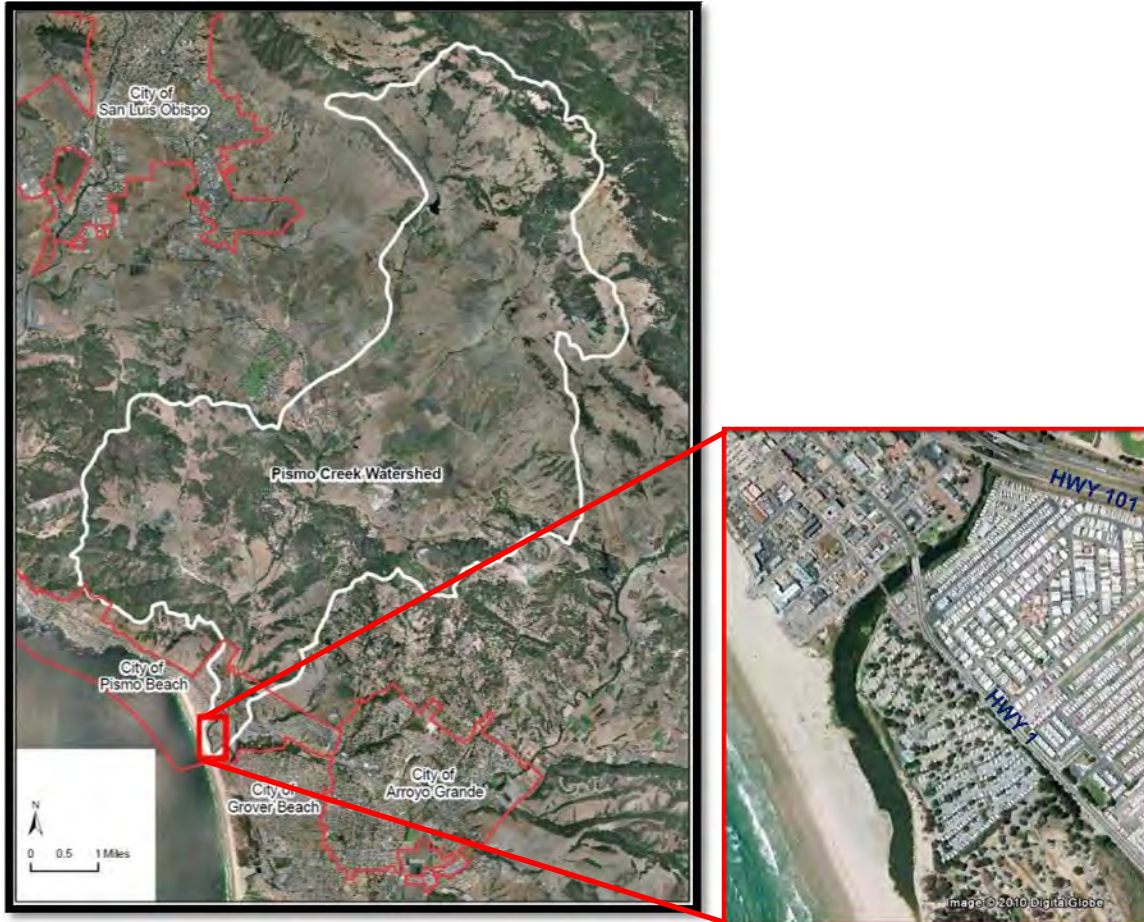
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INTRODUCTION

The Pismo Creek Estuary Enhancement Project (Project), located in Pismo Beach, CA, extends downstream from the Highway 101 overpass to the Estuary mouth at the Pacific Ocean (Figure 1).

Figure 1. Vicinity Map



The Pismo Creek Estuary (Estuary) is at the bottom of a 37 square mile watershed, and is impacted by upstream and adjacent land use. The Pismo Creek Watershed Management Plan (CCSE, 2009) identified critical issues facing the watershed including water quantity, water quality, fish passage, erosion and sedimentation, and flood management, all of which relate to or affect the Estuary. One recommendation of the Watershed Management Plan was restoring wetland function to the estuary and improving estuary circulation in addition to upstream and upslope efforts.

The purpose of this project was to investigate the critical issues affecting the Estuary and to consider alternatives for improvement that would be supported by stakeholders. The project was funded by California Department of Parks and Recreation, Oceano Dunes District (State Parks).

The Project resulted in:

1. an existing conditions report to support future construction design and permitting,
2. a water quality evaluation report to describe the water quality status of the Estuary,
3. conceptual designs for barrier dune and creek bank enhancements,
4. a conceptual design and draft permit applications for a seasonal, pedestrian bridge,
5. low impact development concepts for water quality improvements and
6. key stakeholders and permit agency representatives engaged in concept development.

These outcomes are intended to support future estuary planning efforts.

This report describes the stakeholder process, alternatives analysis, recommended concepts and next steps towards implementation. The water quality report and draft permits for the pedestrian bridge are stand alone documents and are not included.

EXISTING CONDITIONS

The collection and review of existing data was an important step in defining physical and biological factors affecting water quality in the Estuary as well as opportunities and constraints in the development of enhancement projects. The Existing Conditions Report (Appendix A) includes a history of the Estuary area, and descriptions of land use, water quality, infrastructure, biological surveys and other physical and biological conditions. The report also provides a foundation for the collection of additional information and research significant to future planning and implementation efforts.

Key findings on the physical conditions of the Estuary include:

- Adjacent development and infrastructure constrains the physical space for enhancements
- The project area is in the 100 year floodplain, and FEMA estimated the 100-year flow to be 14,700cfs although flow estimates vary widely
- Total Maximum Daily Load (TMDL) for chloride, E.coli, fecal coliform, dissolved oxygen, and sodium is recommended by the Regional Water Quality Control Board (RWQCB) for Pismo Creek
- Rain event sampling produced positives for human, dog and cow sources of bacteria at the Cypress Bridge, but Assembly Bill 411 exceedance levels for recreational contact of bacteria only occurred during summer months (Kitts et al, 2010)

Key biological findings include the following:

- Plant communities in the project area are Pioneer Dune and Beach, Estuarine, Freshwater Marsh and Coastal Salt Marsh
- Sensitive plant species identified or potentially in the area are Surf Thistle, Blochman's leaf daisy, and Beach Spectaclepod
- Sensitive wildlife species identified or potentially in the area are Western Snowy Plover, California red-legged frog, Western pond turtle, Steelhead trout, Tidewater goby, Sandy beach tiger beetle

PARTNERSHIPS BUILT

Stakeholder collaboration was an important part of this project, and will be the foundation for future project planning and implementation in the Estuary. The team successfully developed relationships with stakeholders including landowners in the immediate vicinity of the Estuary, the City of Pismo Beach, other interested parties and regulatory agencies. Stakeholders provided input into the project assumptions, existing condition findings and concept recommendations. To engage stakeholders, Central Coast Salmon Enhancement (CCSE) conducted the following steps:

- Identified APN numbers of adjacent landowners and prepared/sent an introductory letter requesting participation
- Contacted landowners by phone to follow up on invitation
- Met with landowners as requested prior to first stakeholder meeting
- Conducted five stakeholder meetings over the course of one year (August 2010, November 2010, January 2011, February 2011 and May 2011)
- Prepared an article for the City of Pismo Beach Newsletter (Clam Chronicle)
- Continued stakeholder communication through minutes, phone calls, meetings and email communication throughout the course of the contract
- Met with City of Pismo Beach Planning and Public Works staff as needed/requested
- Presented progress to City of Pismo Beach Council members

Figure 2. Photo of Stakeholder Meeting



In general, the strategy used to engage landowners included the following elements.

- Identification of specific landowner needs
- Education about other estuary projects in California that bore a resemblance to the situation in the Pismo Creek Estuary
- Envisioning alternatives in order to meet landowner needs while addressing water quality improvements, flood protection and habitat enhancements
- Refining envisioned alternatives to concept stage ensuring that landowners were in agreement with concepts relating to their properties

Topics for meetings were established based on this strategy. Meetings were held over the dinner hour and food/beverage was provided.

The shared stakeholder vision for enhancement of the Pismo Creek Estuary included:

- A clean, healthy and attractive estuary for residents and visitors
- Vegetated stream banks that maintain views of the lagoon and ocean
- Enhanced flood and storm surge protection
- Public access along the length of the creek
- Protection of existing private and public infrastructure
- Protection and enhancement of the barrier dune
- Improved access to the beach from the barrier dune
- A high quality of water in the estuary
- A watershed perspective that looks for solutions at the source
- Improved flushing flows through the estuary

In addition to engaging stakeholders, the following permitting agencies were invited to participate in a project meeting: California Coastal Commission, U.S. Army Corps of Engineers (ACOE), U.S. Fish and Wildlife Service (USFWS), NOAA, National Marine Fisheries Service (NOAA Fisheries), California Department of Fish and Game (CDFG), Regional Water Quality Control Board (RWQCB) and the City of Pismo Beach (City). The meeting detailed project alternatives and solicited agency comments in order to gain insight into which alternatives had more or less traction for permitting and how to adjust the alternatives to attain greater support. The benefit of assembling all agencies at an on-site meeting was a great deal of interaction and synergy in understanding potentially competing agency requirements.

Outreach materials and the stakeholder contact list are provided in Appendix B. Meeting minutes are provided in Appendix C.

As recommended concepts continue being refined and future planning and implementation work unfolds, individual landowners and the City of Pismo Beach need to be kept in the loop to ensure they continue to understand and support the detailed engineering, potential costs and partnering elements for permitting and financing of project elements. In order to maintain the relationships established, useful strategies include emails, phone calls and meetings to individual landowners in addition to regular updates to the City Council. Also, involvement in the City of Pismo Beach quarterly Water Quality

Improvement meetings will provide articulation between the continuing estuary restoration planning effort and the City in regards to water quality projects.

PROJECT COMPONENTS

The project components were developed through pre-project discussions, an analysis of existing conditions and stakeholder input. Components requested by the project funder, State Parks, include:

1. barrier dune stabilization,
2. alternatives to pedestrian beach access, and
3. creek bank stabilization and habitat enhancement.

Components suggested by stakeholders include:

4. estuary water level management ,
5. and low impact development in the estuary tributary area.

All of the components were reviewed by the stakeholder group.

This section provides background on each concept and a discussion of the alternatives that were analyzed. It also provides a recommendation based on the results of the analysis and a list of next steps required to advance each concept. Design memos produced for each recommended concept provide detailed information to move the concept into further refinement and complete engineer designs.

Component 1 - Barrier Dune Stabilization

Pismo Beach has a set of barrier dunes extending south from the Pismo Creek Estuary (Figure 4). Over the last 30 years, erosion has narrowed the barrier dunes between the Estuary and the adjacent RV Resort. This erosion is caused by several sources (Figure 3).

Figure 3. Illustration of Causes of Erosion



Constant, small-scale erosion is caused by wind and wind-waves in the Estuary. This erosion is exacerbated by pedestrian traffic over the dunes. The Estuary limits direct access to the beach, forcing pedestrians to walk south along the dune face and around the lagoon to access the beach. This traffic inhibits the ability of natural vegetation to stabilize the dune and causes general sloughing of sand along the length of the dunes.

Large event erosion can be caused by wave run-up from the ocean and from erosive, high-velocity stormwater flows from the creek. During the large storm events of 1986 and 1997, wave action in combination with creek flow caused major slides and subsequent soil loss of the dunes. The ongoing effects of offshore winds and foredune creation push the creek flow south; parallel with the dune and beach, causing erosion of the toe of the dune.

Additionally, these erosion sources damage the dune from different directions. Some attack the dune from the front, while others run parallel to the dune face. The combination of different erosion sources coming from different directions requires multiple protection measures working together to stop the erosion.

The goals of this portion of the project were to protect the Pismo Coast Village RV Resort from large storm waves, improve dune and estuary habitat, and halt the encroachment of dune sands into the Pismo Coast Village RV Resort. The stakeholders agreed that it was important to accomplish these goals while maintaining public access and protecting the scenic nature of the area.

Figure 4. Barrier Dune Concept Location



Alternatives Analysis

Options investigated to enhance the barrier dune were initially driven by a review of dune encroachment completed by a Department of Conservation (DOC), Geologist in 2007. The initial concepts brought to the stakeholders included:

1. vegetative stabilization with no foot traffic,
2. vegetative stabilization with limited foot traffic,
3. rapid sand replenishment after storm damage,
4. large rock stabilization of barrier dune toe,
5. timber bulkhead wall stabilization of barrier toe, and
6. excavation of Estuary outlet directly to the Ocean.

The initial recommendation focused on a rock or timber structure to protect the toe of the dune (Appendix E). The structure would integrate a designated pedestrian stairway over the dune. With limited pedestrian access and a stable dune toe, revegetation efforts would be more successful. A planting palette for revegetation is provided in Appendix D. Interpretive signs could further support limited access to the dunes by educating visitors and thereby encouraging compliance.

The other options of vegetation alone (with or without foot traffic) would not adequately meet the project goals of long term protection of the dune toe.

A rapid sand replenishment program would be used in combination with the concept after significant storm damage to the barrier dune (Appendix F). Such a program could not be a stand-alone project because it would not address chronic erosion.

Overall, stakeholders liked each of the initial recommendations as they would protect private properties and potentially add aesthetic value to the area. Adjacent landowners were particularly supportive of the idea to excavate an outlet for the Estuary directly to the Ocean to both improve water quality and remove creek flows from the dune toe.

Based on the permit agency feedback described in the next section, a new set of alternatives was investigated in an attempt to produce a concept that could be more easily permitted. Techniques considered were live plantings, branch box breakwaters, willow mattresses and staking, rock and vegetation stream barbs, and geotubes. The following three alternatives were developed with a combination of these techniques and are outlined in the Design Memo (Attachment F);

Option 1: Live vegetation only

Option 2: Soft wooden structures combined with live vegetation

Option 3: Hard rock structures with geotextile fabric and live plantings

Recommended Concept

The barrier dune should be stabilized using a combination of structural and vegetative techniques that fit in the regulatory environment and meet the project goals. Due to the different erosion forces acting on the barrier dunes and the uncertainty of the regulatory agencies' perspectives, all three concept options are proposed to allow landowners flexibility in choosing next planning steps beyond the scope of this project. These include, Option 1: Vegetation Planting Only, Option 2: Soft Structures and Option 3: Hard Structures. Each of these are detailed in the attached Design Memo (Appendix F).

These three options provided in the second round of alternatives analysis have been briefly discussed with permitting agencies. To refine the recommended concept, continued collaboration with agency staff will be required. The proposed options provide different levels of protection and different costs. They are not intended to stop erosion of the dune completely. They are intended to reduce the erosion and define the limits of its progress. If the landowners choose to move forward with any of these options, a rapid sand replenishment program would also be required to maintain the dune (Appendix F).

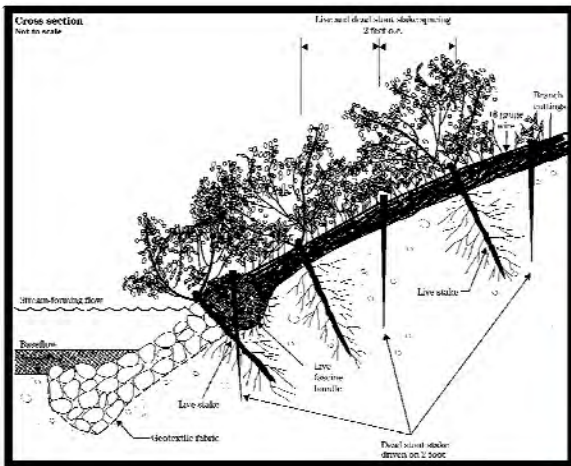
Figure 5. Photos of Dune Stabilization Techniques for Recommended Concept



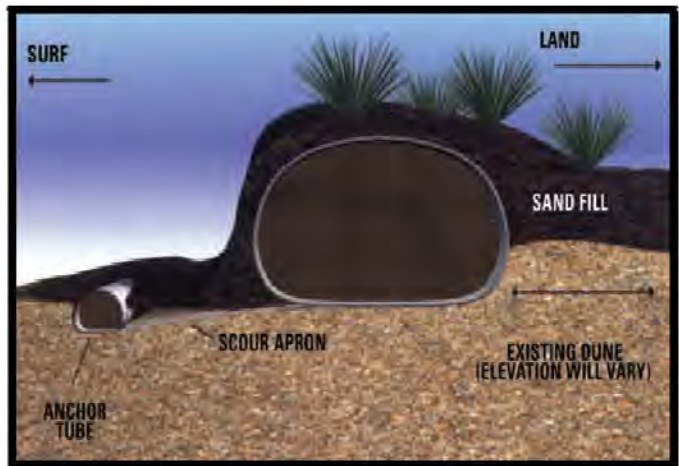
Branch box breakwaters, Option 2



Stream barbs, Option 3



Live stake and brush mattress, Options 2 & 3



Geotube, Option 3

Permit Agency Feedback and Recommendations

Feedback from permitting agencies raised several concerns on the ability to permit the first round of barrier dune alternatives. The highest level of concern was raised by the Coastal Commission staff member. In general, the Coastal Commission does not permit hard structures on beaches unless significant infrastructure will be impacted. Due to the limited infrastructure immediately behind the dune, and the high level of mobility of people and RVs for evacuation, it was recommended that planned retreat be investigated. In addition, “soft techniques” like bioengineering with emphasis on habitat enhancement would be encouraged by the Coastal Commission. The U.S. Fish and Wildlife Service staff member also preferred a concept with a greater focus on habitat enhancement.

Based on this feedback, new alternatives were analyzed with a renewed emphasis on habitat enhancement. The revised alternatives proposed as the recommended options have been briefly

discussed with permitting agencies. The general consensus is that these options would be acceptable with respect to habitat and aesthetics, however more detailed conversations should be undertaken.

Next Steps

Due to the broadness of the recommended concept, several opportunities for next steps exist. Prior to engineer design or permit approval, property owners could limit pedestrian access to the dune with rope fence in an effort to promote growth of natural dune vegetation. This should reduce the rate of erosion caused by the wind.

The landowners could choose to implement the recommended concept, Option 1: Vegetation Only, which is preferred or accepted by all of the permit agencies. Although, this option is likely to be permitted, it may not be adequate to protect the dune from large event erosion. The landowners then run the risk of having the reestablished vegetation washed away in a large storm.

To implement the recommended concepts, Options 2: Soft structure or Option 3: Hard structure, further collaboration between landowners and permit agencies, especially the Coastal Commission staff, is required. These options meet the identified goals and stakeholder needs, but may be more difficult to permit. In this scenario, discussions should emphasize dune habitat preservation rather than shoreline protection, and the viability of managed retreat with the location of Highway 1.

Alternatively, the landowners could choose to prepare plans for Options 2 or 3 and submit them to the permit agencies without further consultation. Due to the uncertainty of Coastal Commission decisions, the outcome of this approach is unknown.

Component 2 - Estuary Water Level Management

The physical and biological processes driving the Pismo Estuary are not well studied, limiting the understanding of what options are available to improve water quality. Based on water quality data collected over 12 months, the Estuary is impacted by fecal coliform, dissolved oxygen, phosphorous and temperature.

The Estuary annually experiences algal blooms leading to low dissolved oxygen and odors associated with decomposition. To reduce the occurrence of these conditions and remove creek flow from the toe of the barrier dune, stakeholders suggested excavation of the Estuary to the Ocean as had been done on occasion historically.

This suggestion was reframed as a weir structure to manage Estuary water level and flows. The management of water levels in the Estuary with a weir structure would hold water at an engineered level possibly leading to deeper water, and allow the option of flushing stagnant water. This alternative could also remove the need for a pedestrian bridge and ongoing barrier dune stabilization by removing the Estuary from the toe of the barrier dune.

An existing water level management weir was identified on Soquel Creek in the City of Capitola. A management plan for the Soquel Creek weir was written in 1990 and updated in 2004. The strength of this management plan is its basis on scientific investigation.

Based on the permit agency response, this alternative was not refined for this project. Additional assessments through future funding may produce data that could be used to support or refute further concept development.

Permit Agency Feedback and Recommendations

Permit agency representatives did not seem supportive of estuary breaching or water level management. The USFWS representative was concerned that the weir would effectively remove half of the available tidewater goby habitat. Limiting the migration of steelhead adults and juveniles was also a concern of both USFWS and NOAA representatives. The Corps of Engineers representative voiced concern about the quality of the discharge from the Estuary and the impacts of a weir structure on navigational waters. The Coastal Commission staff member reiterated the Commission's stance on hard structures in the coastal zone, preferring natural or "soft" methods. The use of solar generated water circulators in the middle of the estuary was brought up as a temporary solution for water quality improvements until revegetation was established along Addie Street bank. Agency representatives indicated that the mechanical circulation of water would be reviewed in a permit review process and did not dismiss it. In general, agency representatives were not familiar enough with existing water level management weirs installed on Soquel Creek to discuss the successes and failures of those efforts.

Component 3 - Alternatives to Pedestrian Beach Access

The Pismo Creek Estuary limits direct access to the beach from the Pismo Coast Village RV Resort, forcing pedestrians to walk south along the dunes before moving onto the beach. The project goal was to provide access to the beach while reducing or eliminating traffic on the dune.

Alternatives Analysis

Three concepts were initially evaluated. They included:

1. A fixed spanning bridge,
2. A swinging spanning bridge, and
3. A floating bridge.

After initial review, the spanning bridge options were found to be physically impractical and financially cost prohibitive. The floating bridge concept was deemed worthy of further study by the stakeholders. This concept is described in more detail as the recommended concept (below) and in the design memo in Appendix I.

The alternatives analysis for the floating bridge included and evaluation of three anchoring systems. They include:

1. Helical anchors,
2. Driven piles, and
3. Shell foundation

The analysis was performed by Taylor and Syfan Inc. and is included in Appendix H.

The alternatives analysis for the floating, pedestrian bridge also included an evaluation of two different bridge types known as:

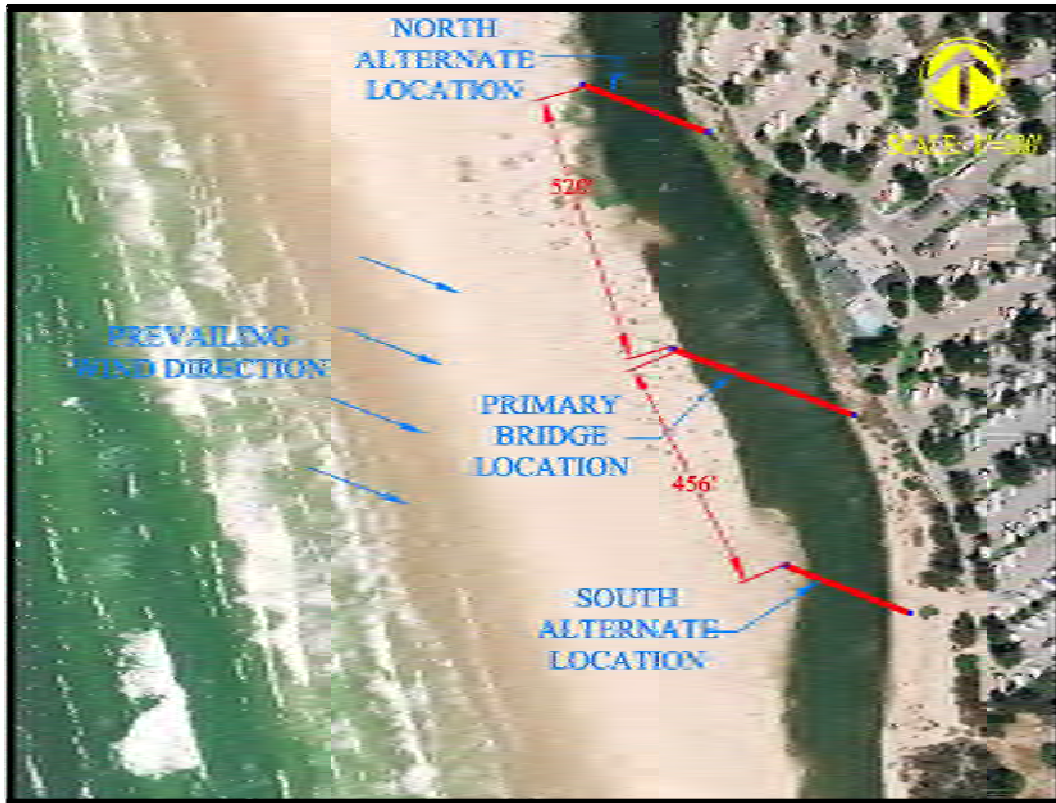
1. Modular Pontoon System, and
2. Modular Deck System

More information about the bridge system can be found in the design memo in Appendix I.

Recommended Concept

The recommended option for this concept is a modular pontoon floating bridge anchored at both ends using helical anchors. The recommended location for the bridge is at the existing stairway entrance from the Pismo Coast Village RV Resort to the State Parks property. Two secondary bridge locations were identified to provide flexibility if western snowy plovers were found nesting in the primary bridge location. (Figure 6) Additional information regarding the recommended concept can be found in the design memo in Appendix I.

Figure 6. Pedestrian Bridge Concept Location



Draft permits have been completed for this project concept, and include the following:

- Coastal Development Permit, California Coastal Commission
- Nationwide Permit, U.S. Army Corps of Engineers
- Streambed Alteration Agreement, California Department of Fish and Game
- Water Quality 401 Certification, Central Coast Regional Water Quality Control Board

There are no permits required through the City of Pismo Beach.

Permit Agency Feedback and Recommendations

Overall, permitting agencies had few concerns about a seasonal, floating pedestrian bridge with abutments outside of active waters provided that they are removed for winter months. CDFG and USFWS representatives wanted to ensure water flow and fish passage under the bridge. USFWS representative preferred abutments and anchors that minimized the area of disturbance. In addition, agencies wanted to ensure a responsible party was identified to manage the installation, removal and maintenance of the temporary bridge. State Parks affirmed their ability and interest in managing the pedestrian bridge as it met the Department's mission. The improved public access to the beach provided by the bridge was looked on favorably by the Coastal Commission staff member.

Based on this feedback, the initial concept was refined to clearly define abutment locations, installation/removal timing, area of disturbance and type of anchor for the seasonal pedestrian bridge.

Next Steps

The recommended concept is well developed, and will not need additional design.

Additional planning and coordination will be required to finalize the construction permits. To facilitate the permit agency process, it is recommended that a CEQA initial study and impact determination be undertaken. Based on the existing conditions report and cursory review, it is thought the project would require a Mitigated Negative Declaration. It is also recommended that State Parks enter into an agreement with the City of Pismo Beach to have a consolidated permit for coastal review. If a consolidated permit is pursued, a letter of agreement would be developed that identifies the Coastal Commission as the sole reviewer, and the City forfeits its ability to appeal the project through the Local Coastal Plan.

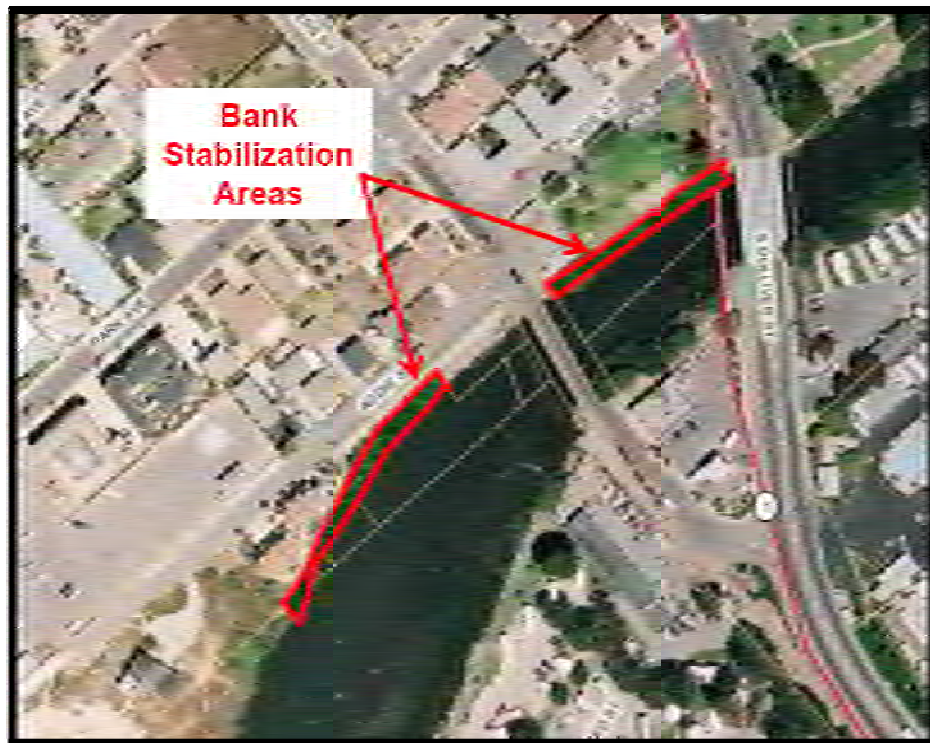
After all permits are submitted and approved, State Parks will be able to develop an operations and maintenance plan and implement the project.

Component 4 - Creek Bank Stabilization and Habitat Improvement

The Pismo Creek banks from Highway 101 downstream to the Pacific Ocean are protected with a mix of rip-rap, broken up concrete and mature willows. Anecdotally, there is a substantial amount of rock buried along the creek banks to maintain the creek mouth at its location. The riparian area primarily consists of vegetation on the sides of the Estuary channel with little to no extension beyond the top of

bank. In addition, the land adjacent to the Estuary is largely dominated by commercial and residential development with the exception of two 1-acre parks.

Figure 7. Creek Bank Concept Location



Project goals included improving creek bank stability, enhancing the riparian habitat, improving water quality and improving the aesthetics and visitor appeal of the Estuary.

Alternatives Analysis

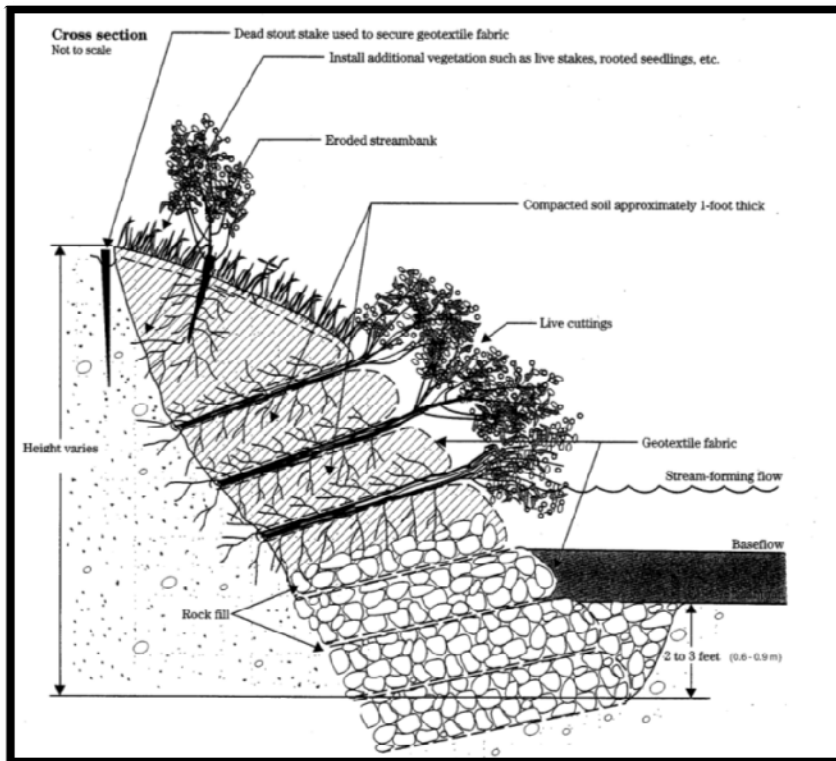
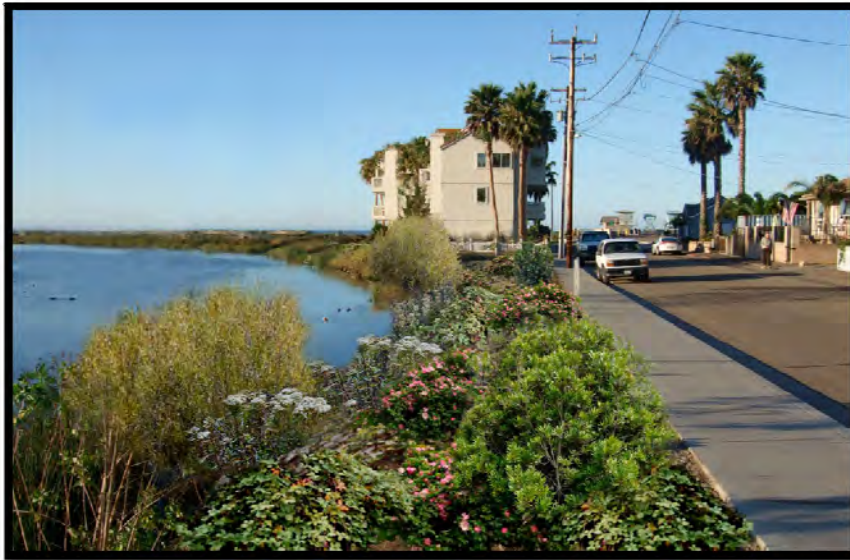
Options investigated included vegetation only and vegetation plus geotechnical fabric. The velocity and shear forces generated by the creek make bank stabilization with only vegetation ineffective at protecting the surrounding infrastructure. The northern creek bank is denuded of mature vegetation and would benefit from improved stabilization. Some sections of the creek bank, particularly adjacent to the Pismo Creek RV Park had shear forces that required the use of rock rip-rap to maintain bank stability precluding the use of vegetation. Other section of the creek bank had established willow already effectively protecting the bank. Based on landowner needs and an engineer assessment, a section of creek bank adjacent to Addie Street was recommended in the initial concept to be appropriate for revegetation and “soft” bank stabilization techniques (Figure 8). For this draft concept along Addie Street, stakeholders voiced the need to preserve the existing viewshed for homes along Addie Street to the Estuary and Ocean.

Recommended Concept

The recommended concept for streambank stabilization is to use Vegetated Geogrid. Vegetation alone is inadequate to protect the bank from erosion. Rock riprap or other hard armor options do not meet

the project goals of increasing habitat and improving aesthetics. The Vegetated Geogrid solution is a compromise that can meet the all the project goals. Rock will be required at the toe of the slope. The height of the rock will be determined based on shear forces and velocities calculated as part of the final design. The Geogrid itself provides additional stability which will allow the designer to minimize the amount of rock and maximize the amount of vegetation. A Design Memo (Appendix J) provides additional design information. A planting palette is provided in Appendix D.

Figure 8. Rendering of Creek Bank Recommended Concept



Permit Agency Feedback and Recommendations

All of the permit agencies supported the concept of improving habitat along the bank using a re-vegetation approach as long as City infrastructure was protected. USFWS staff suggested bendway weirs in areas of high shear forces to protect the bank. The options of geotechnical fabric and vegetation or rock and vegetation were favorable to existing conditions and would be an effective means to achieve project objectives. The Coastal Commission staff representative thought additional consideration should be given to whether the existing rip-rap was permitted or not, as this would change how the Commission viewed the project. If the rip-rap was not permitted, the project description would need to clearly identify the major infrastructure that it would be protecting.

Next Steps

The next steps for this concept are to finalize the locations of stabilization, prepare final designs, prepare permit documents and acquire funding. Follow up conversations are required with adjacent landowners to gain and ensure their support.

The Coastal San Luis Resource Conservation District has applied for grant funding to proceed with final design through the CDFG Fisheries Restoration Grant Program. This will include creek cross sections along the bank, hydraulic and hydrologic analysis, plan preparation and construction cost estimates. When the final design is complete, additional funding will need to be secured for implementation.

Component 5 - Low Impact Development in the Tributary Area

Water quality in the Estuary is impacted by the 37 square miles of watershed upstream as well as the adjacent land use. For the scope of this project, only the land adjacent to the Estuary and connected through surface flow or the storm drain system was considered (Figure 9).

Low impact development (LID) is a method of maintaining the natural hydrologic cycle in the built environment. It aims to maintain or create natural hydrologic processes on the land through the use of policies and best management practices (BMPs). LID BMPs can reduce the alteration of hydrologic patterns (hydromodification) and water quality impacts associated with urban development. LID is the primary tool for addressing hydromodification problems associated with land development. The RWQCB and all Cities in the County are starting to recommend LID implementation on new and re-development projects in order to comply with the State's hydromodification requirements. Best management practices such as vegetated bioretention cells have been shown to slow stormwater and filter pollutants. Low impact development clearly meets project goals of water quality improvement and restoration of natural hydrologic processes, and was suggested by stakeholders as an alternative to investigate.

The goals of this concept were:

1. Identify the area tributary to the estuary in which LID BMPs should be used,
2. Identify specific BMPs that can address water quality concerns in the Estuary, and
3. Identify specific locations on public and private property that could be improved with LID BMPs.

Figure 9. Low Impact Development Tributary Area



Recommended Concept

The LID concept designates the approximate tributary area for stormwater draining directly to the Estuary and potentially carrying pollutants. Willing properties within the zone would be identified to implement Best Management Practices (BMPs) such as storm drain filters, filter strips, vegetated swales, storm drain disconnection and rain water catchment.

In an effort to define the tributary area to the Estuary, the City was consulted for a storm drain map. However the City does not have a comprehensive storm drain map at this time. The approximate tributary area for this concept was estimated by a ground survey, and anecdotal information from the City engineer. The largest drainage area contains the RV parks to the south of the Estuary. The north side of the Estuary has a smaller drainage area. In addition, Caltrans manages four road overflow ditches adjacent to the Highway 1 bridge that drain a portion of the highway.

The Design Memo (Appendix K) identifies several locations within this tributary area where LID BMPs could be implemented. It also identifies the specific BMPs that would be applicable at each location. LID BMPs should be designed to treat the First Flush and dry weather flows at a minimum. The First Flush is the first 0.5 to 1.5 inches of rain. Dry weather flows are water discharges not related to rain events such as over-watering of lawns, car washing, or cleaning of driveways with a hose. These sources are generally the most polluted runoff. Treating the first flush provided the largest benefit for the least effort and expense.

The alternative to LID is status quo stormwater management which does not address pollutant loading to the Estuary. Stakeholders liked the idea of LID because it could result in water quality improvements.

Permit Agency Feedback and Recommendations

The implementation of LID would primarily fall under the City's jurisdiction with the potential for input by the Coastal Commission and Caltrans. The City representative noted that the soils or lack thereof in the project area do not allow for infiltration and there is a high water table, therefore any low impact development should focus on water treatment. Where infiltration is impractical, BMPs should be designed to improve water quality through contact with soil, vegetation and microbes prior to discharging into the Estuary.

Next Steps

Potential next steps for the LID component include:

1. Developing educational materials and communicating with individual land owners about LID,
2. Coordinating with Caltrans to implement LID projects within their right-of-way,
3. Assisting the City with developing LID implementation policies for new and re-development projects, and
4. Implementing an LID demonstration project.

The tributary area in question is almost completely developed. LID implementation driven solely by new and re-development will be a slow process because there are limited opportunities for new or re-development in this area. Special consideration should be given to developing an incentive program that could be used to assist property owners with implementation of voluntary LID projects.

FUNDING

Identification and procurement of funding will be integral to moving the recommended concepts into design and implementation. The strategy employed to seek and apply for funding included the following elements:

- Research similar estuary enhancement projects and identify secured funding sources
- Compile existing knowledge of local, regional, state and federal sources
- Track funding sources on matrix (Appendix L)
- Indicate in funding inquiries that project is recommended in Pismo Creek Watershed Management Plan, a stakeholder driven, voluntary plan finalized in 2009

Two funding sources were pursued during the contract period:

- Fisheries Restoration Grant Program, California Department of Fish and Game—a bank stabilization and enhancement planning grant was submitted for the amount of \$52,837. If funded the project will allow for development of 100% specified plans for redevelopment of creek bank on Addie Street side of estuary to include vegetation.

- Urban Greening Planning Grant, Strategic Growth Council, State of California Prop 84—a planning grant was contemplated with the select partners of CCSE, CSLRCD and the City of Pismo Beach. It was agreed that the project direction was not developed enough to pursue the grant opportunity before the State Parks contract ended. Further concept development will be pursued during the CIAP time-line of spring 2011 through spring 2012.

In addition, inquiries were made regarding the National Coastal Wetlands Conservation Grant Program, a federal program sponsored by the U.S. Department of the Interior Fish and Wildlife Service, Wildlife and Sport Fish Restoration Program (WSFR) and Fisheries and Habitat Conservation Program (FHC). Eligible applicants are any State agency or State agencies designated by the Governor of a coastal State. An application for this program would therefore need to be included in a state agency's request. Inquiries were routed to our local assembly representative and no response has been received. This will also be pursued during the CIAP time-line.

Coastal Impact Assistance Program (CIAP) funds, applied for prior to this project's State Parks funded contract, will permit the continuation of the planning process. The CIAP funds will provide for additional assessments, continued stakeholder coordination, and development of an Estuary Management Plan. The scope of work will better inform estuary restoration goals and objectives.