San Luis Obispo County
Flood Control and
Water Conservation District

Cayucos Drainage and Flood Control Study

FINAL REPORT

JANUARY 2004

RMC
Raines, Melton & Carella, Inc.
Consulting Engineers/Project Managers
In Association with:
Essex Environmental & Questa Engineering Corp

San Luis Obispo County
Flood Control and
Water Conservation District

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EXECUTIVE SUMMARY

This report is a summary of findings, conclusions and recommendations of the Drainage and Flood Control Study conducted for the Community of Cayucos. This report was prepared under the direction of the County of San Luis Obispo Public Works Department.

In response to questions raised by several citizens who experienced flood damage to their homes and businesses during the unusually heavy rainfall period of March 2001, the County Board of Supervisors approved funding for Drainage and Flood Control Studies for the communities of Cambria, Cayucos, Nipomo, Oceano, San Miguel, and Santa Margarita. The goals of the studies were intended to quantify the extent of drainage and flooding problems of each of these communities, to generate recommendations for solutions for the drainage problems, to identify environmental permitting requirements, to provide planning level cost estimates, and to outline a plan for funding and implementation of the proposed solutions. This study was funded through the General Flood Control District Budget.

Overview of Responsibility

The responsibilities for drainage are administered through the San Luis Obispo County Flood Control and Water Conservation District (District). The District is the designated County agency responsible for managing, planning, and maintaining drainage and flood control facilities in unincorporated public areas where no other agency has assumed an active role in such activities. The District has a regional role in the County and can work with individual cities or communities when requested. The District uses its general funding to identify water related issues, to determine solutions to those problems and to help local areas implement recommended solutions. The District is not, however, responsible for paying for community-specific mitigation improvements. The specific property owners that benefit from these solutions must agree to pay for the construction and future maintenance of them. This policy (Resolution 68-223) was formally established by the Board of Supervisors in 1968. The policy was adopted because there is not sufficient funding available for the District to fund construction and operation of facilities. This approach provides the best leveraging of the funds that are available.

The District is restricted in the way it can fund needed projects or increase revenues for existing operations. It is generally limited to an assessment district procedure for obtaining financing for the construction of new projects. Due to the changes enacted with the passage of Proposition 218, the District must now have all new benefit assessments and increases to existing benefit assessments for maintenance and operations approved through an election of affected property owners.

Existing Drainage Problems

The combination of the area's steep topography, lack of underground drainage facilities, and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. The most serious flooding in the community takes place in the floodplain of Cayucos Creek west of Highway 1, bounded by the mobile home park on the north and Cayucos Drive on the south. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creek due to high water levels.

A number of nuisance drainage and flooding problems occur throughout Cayucos due to the topography and the lack of a consistent, organized network of drainage facilities within the community. Drainage from a number of uphill lots flows along the edge of street pavement and drains onto lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance.

Proposed Projects

The major constraint identified in local flooding issues was the lack of suitable conveyance facilities for storm water runoff. In most areas, storm water flows as surface runoff in streets, ditches, and backyard areas. Stormwater conveyance is widely varied, due to changes in roadway slope and cross section, the presence or lack of curb and gutters, and the presence or lack of existing culverts and drainage channels. Most drainage issues were the result of upstream concentrated flows entering downstream lots due to a lack of storm drain facilities to keep runoff away from private residences.

The proposed solution to the problems is the construction of a number of small project alternatives, or groups of smaller projects, to resolve the flooding problems. Several potential projects have been developed to address drainage and flooding issues, and are shown by drainage zone on Figures 8 through 14 in Appendix A. A combination of the projects will be required to eliminate all of the drainage problems for the community. However, the intent is that each alternative will work independently to solve localized problems.

ZONE 3 IMPROVEMENTS

The most serious flooding in the community takes place in Zone 3 at the merging floodplains of Cayucos and Little Cayucos Creek west of Highway 1. Drainage from a tributary to Cayucos Creek flows into this area and has also caused flooding. To reduce the flooding in this area, a new storm drain pipeline could be constructed to convey the Cayucos Creek tributary flows directly to the creek, rather than flowing in the roadside channels and as overland flow across the floodplain area. Constructing the diversion pipeline to route tributary flow away from the local drainage system to Cayucos Creek would reduce the 10-year storm runoff by approximately 83 percent. This project would reduce flood flows in the B Street area and protect the neighborhood from more frequent rain events, but would not protect homes and businesses from larger storm events which cause overtopping of the Cayucos Creek banks. A levee and pump station would be required to protect the B Street area against flooding in these conditions. If the pump station is not constructed, then flooding would continue in the B and Ash Street area for storms greater than a 10-year event.

ZONES 5 THROUGH 21

A number of nuisance drainage and flooding problems occur within the drainage zones due to the topography, the lack of an underground storm drain system, and the lack of a consistent, organized network of curbs and gutters within the community. An underground storm drain conveyance system would reduce the amount of overland flow runoff in downstream areas, consequently reducing the flooding problems created with overland flow.

The development of a consistent curb and gutter network could also reduce nuisance flooding. However, drainage problems also exist where curbs are present and the topography provides conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance. On streets where curbs are currently established, curbs and gutters should be required for infill development to create a continuous system and to prevent flow onto properties.

Table ES-1 summarizes the proposed alternatives by zone and also provides estimated costs and implementation timeframe.

Table ES-1: Summary of Alternatives

DRAINAGE ZONE [1]	PROJECT	PROBLEM AREA	PROPOSED MITIGATION	COST [2]	APPROXIMATE IMPLEMENTATION TIME FRAME [3]
3	Diversion Pipeline	B and Ash Street	Construct diversion pipeline to route Cayucos Creek tributary flow directly to creek.	$420,000	6 years
3	Levee and Pump Station	B and Ash Street	Construct a levee to contain 100-year flood flows and pump station to convey local runoff into creek.	$1,880,000	7 to 8 years
5	Storm Drain and Inlets	Ocean Ave. and Pacific Ave.	Construct storm drain to relieve flooding at intersection of Ocean and Pacific Ave.	$117,000	3 to 4 years
8	Storm Drain and Inlets	6th St. and 8th St. from St. Mary's Ave. to Pacific Ave.	Construct storm drain to relieve flooding originating in Park Ave. and Saint Mary's.	$1,127,000	3 to 4 years
9	Storm Drain and Inlet	10th St. from Cass Ave. to Pacific Ave.	Construct storm drain to relieve flooding experienced on 10th St.	$148,000	3 to 4 years
10	Storm Drain and Inlets	13th St. from Cass Ave. to Pacific Ave.	Construct storm drain to relieve flooding experienced on 13th St	$192,000	3 to 4 years
11	Storm Drain and Inlets	Pacific Ave. from 15th to 17th St.	Construct storm drain to reduce overland flow in Pacific Ave.	$152,000	3 to 4 years
12	Storm Drain, Inlets and Private Easement	Circle Dr. and Cass St.	Construct storm drain to eliminate sump at low point on Circle Dr.	$83,000	3 to 4 years
15	Storm Drain and Inlets	Stuart Ave. from Richard Ave. to ditch	Construct storm drain to relieve flooding and overland flow on Stuart Ave.	$192,000	3 to 4 years
16	Storm Drain, Inlets and Outfalls	Hacienda Dr.	Construct storm drains in two areas of Hacienda Dr. to relieve drainage along Ocean Ave. and Cerro Gordo Ave, and also east side of Hacienda Dr.	$407,000	3 to 4 years
19	Storm Drain, Inlets and Easement	Gilbert Ave., Shearer Ave. and Mayer St.	Construct two new storm drains to relieve flooding caused by hillside runoff on Gilbert and Shearer Ave. Reduce flooding on Mayer from flows across Highway 1.	$273,000	3 to 4 years
21	Storm Drain, Inlets and Easement	Between Gilbert and Ocean Ave.	Construct a storm drain to convey runoff generated from the hillside east of Gilbert.	$263,000	3 to 4 years

Notes:
1. See Figures 8 through 14 for delineation of drainage zone and proposed alternatives.
2. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative and Environmental, and a 20% Contingency. Typical estimates used for County Overhead & Support Costs for Construction Project Planning. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Percentages provided by County (Typical to all estimates in this report).
3. See Tables 6-2 and 6-4 for detailed milestone durations.

ADDITIONAL RECOMMENDATIONS

FEMA Community Rating System

Cayucos should participate in the Community Rating System (CRS). The CRS gives credit points for any of several designated activities within four distinct categories (Public Outreach, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness). As points are accumulated, a community will receive one class reduction starting at class 9 all the way down to class 1. Each class translates to an additional reduction in insurance premiums of five percent for flood insurance policies within the special flood hazard area of that community.

Maintenance on Existing Facilities

Existing natural or fabricated drainage channels should be kept free of obstructions such as fallen trees, debris, and sedimentation to maintain capacity in the drainage system. Primary responsibility for this maintenance should rest with the owners of the property through which the drainage channels pass since the County is not responsible for maintaining facilities on private property. If the drainage channels pass through public property, such as County roads, then the County's maintenance department would be responsible for removing impediments. The District should continue to provide leadership, advice and encouragement to property owners and local agencies to assume these responsibilities.

Elevation Requirements and Mountable Berms

Homes located below street grade and whose driveways slope down away from the road may experience flooding in the garage or home. This is because without an adequate curb/berm, the driveway may act to convey runoff from the street above to lower elevations and sometimes into the garage or home. It is recommended that Cayucos and the County Planning Department mandate that the floor and garage elevation for all new home construction be one foot greater than the adjoining street grade. Driveways should slope down away from the home, towards the road. It is also recommended that Cayucos mandate the installation of a County standard mountable berm for all driveways/accesses to structures which are below the edge of pavement.

Formation of a Drainage Facility Maintenance Department

It is recommended that a facility maintenance district be formed to better maintain the drainage infrastructure in Cayucos. Responsibilities of the new maintenance district would include: (1) being the contact point for all resident complaints regarding drainage infrastructure in the community; (2) keeping an organized database of all new drainage infrastructure in the community including the size and capacity of culverts and storm drains, even if this infrastructure is installed by private property owners; (3) keeping a regular maintenance schedule that may involve multiple maintenance visits where needed; and (4) responding to drainage infrastructure repairs as needed. Having a localized facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the community.

Consolidate Urban Services

Consolidate urban services and facilities in Cayucos into a single comprehensive service district as recommended in the Estero Area Plan (updated November 2002). If the community, County and LAFCo work to consolidate services, then drainage should be included in the charter of this new district.

Neighbor Coordination

Many reported problems were caused by residents blocking historical drainage courses or removing drainage lines that conveyed runoff from higher elevations to lower elevations. These drain lines were installed by

private residences in order to move water from the street or their property to public right of way. Filling in or removing drain lines causes runoff to pond in the back or side yards of the upstream properties. Neighbors should organize to ensure that storm runoff flows unimpeded to public right of way. Filling in drainage courses or removing drain pipes is discouraged by the District.

Implementation Strategy

The most effective approach to improving drainage and flooding problems in each community is to identify the problems, develop solutions, and then create a local entity to implement the solutions. The role of the District is to assist the community in determining the improvements necessary to reduce flooding, and then to assist them in implementing programs to improve protection.

The District will continue to use its general funds only to provide programming and project initiation services so that communities can better understand the drainage problems they are facing, and determine how those problems should be solved. The proposed projects for Cayucos totaled approximately $5.25 million. If the lead agency in Cayucos established a funding source, approximately $370,000 per year would have to be generated by the community in order to build all the projects and pay off a municipal bond[1].

Community Financial Support

If the residents benefiting from these projects calculate that their average annual damages due to flooding are less than the assessment or fee necessary to mitigate the flooding, then the community might conclude that risking flood damages is economically beneficial. In other words, the benefits gained are less than the cost of the project. A discussion of flood protection benefits versus project costs should be conducted with the community in order to measure the interest in implementing a project. The discussion would explore whether the community is willing to financially support a project if the costs exceeded the benefits.

Implementation Steps

It is recommended that the following implementation steps, in general, be followed for the Zone 3 diversion pipeline and the levee/pump station system improvements. It is assumed that a community supported agency/zone would serve as the lead agency and assume control of the project at completion. A lead agency in Cayucos has not been designated.

- Fund and complete a Basis of Design Report[2] within 15 months of start (12 months for the diversion pipeline only)
- Initiate coordination with Caltrans regarding a cooperative agreement for the diversion pipeline improvements
- Conduct benefit assessment proceeding for the properties that benefit from the improvements
- Design project, prepare environmental documents and resource agency permits
- Advertise for construction
- Construct project

Storm Drain Improvements in other Zones

The phasing of storm drain projects would depend on the residents' desire to implement projects within each zone. Each proposed alternative works independently to solve localized problems within a specific zone. Therefore, neighbors within a drainage zone can organize to implement a project that benefits their area. The implementation steps outlined above for Zone 3 would generally be followed for the storm drain projects. The

[1] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years.
[2] The Basis of Design Report would include a description of the existing problem, proposed alternatives, recommended project, preliminary alignments, potential environmental impacts, and cost estimates.

exceptions include the level of CEQA documentation required for storm drain projects will not be as rigorous. The majority of projects qualify for Class 1 CEQA categorical exemption because the alternatives consist of minor alterations to existing public facilities and do not have the potential to affect sensitive resources. A major difference from a funding perspective is that storm drains would likely be funded via a property based user fee (in lieu of an assessment) because the homes within a drainage zone contribute runoff conveyed in the storm drain and should therefore contribute a *pro rata* share of the costs. The duration to design and permit a storm drain project should be less than the Zone 3 improvements.

SCHEDULE FOR IMPROVEMENTS

The estimated duration for Zone 3 improvements is approximately seven to eight years. The duration reduces to six years if only the diversion pipeline is implemented. The duration includes time for identifying a lead agency and developing community support. The average duration for a storm drain project in the other zones is approximately three to four years, depending on the length of pipeline, level of CEQA documentation, permitting requirements and environmental mitigation requirements. Chapter 6, "Implementation Strategy" includes more detail regarding task durations.

ACKNOWLEDGEMENT

The San Luis Obispo County Flood Control and Water Conservation District, Community of Cayucos Drainage and Flood Control Study 2003 represents a collaborative effort between San Luis Obispo County, the Community of Cayucos, Raines, Melton & Carella, Inc., Questa Engineering Corporation and Essex Environmental. We would like to acknowledge and thank the following key personnel from the County and the Cayucos Citizen's Advisory Council whose invaluable knowledge, experience, and contributions were instrumental in the preparation of this report.

Arly Robinson – Cayucos Citizen's Advisory Council Member
Ralph Wessel - Cayucos Citizen's Advisory Council Member
Noel King – Public Works Director
Glen Priddy – Deputy Director Engineering Services
George Gibson – Design Engineer Public Works
Dean Benedix – Project Manager Public Works
Paavo Ogren – Deputy Public Works Director

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES AND FIGURES

ABBREVIATIONS

CEQA	California Environmental Policy Act
CDFG	California Department of Fish and Game
Caltrans	California Department of Transportation
CCC	California Coastal Commission
CCI	Construction Cost Index
CCRWQCB	Central Coast Regional Water Quality Control Board
CDBG	Community Development Block Grants
cfs	Cubic Feet per Second
Corps	U.S. Army Corps of Engineers
County	San Luis Obispo County
CSD	Community Services District
CZLUO	San Luis Obispo County Coastal Zone Land Use Ordinance
District	San Luis Obispo County Flood Control and Water Conservation District
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
FH	Flood Hazard
FIRM	Flood Insurance Rate Maps
FMP	Floodplain Management Plan
ft	feet
LAFCo	Local Agency Formation Commission
LF	linear feet
NEPA	National Environmental Policy Act
ND	Negative Declaration
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OCSD	Cayucos Community Services District
OES	Office of Emergency Services
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board
SLOCAPCD	San Luis Obispo County Air Pollution Control District
TM	Technical Memorandum
USFWS	United States Fish and Wildlife Service

CHAPTER 1 INTRODUCTION

Chapter Synopsis: This chapter presents the purposes, objectives, and scope for the Drainage and Flood Control Study, followed by the methodology used to achieve those purposes and objectives.

The community of Cayucos (Cayucos) is located on the central coast of California, situated 20 miles north-west of San Luis Obispo along Highway 1, and is bordered by the Pacific Ocean to the west, and surrounded by open space and grazing areas to the north and east. Figure 1-1 shows the location of Cayucos with respect to surrounding communities. Most of Cayucos is generally located within the coastal storm water subbasins that drain directly to the Pacific Ocean. The coastal subbasins have a total area less than 1 square mile. The community is also located at the outlet of four creeks that extend inland and have a total watershed area of about 38 square miles.

Figure 1-1: Community of Cayucos Location[3]

Approximately 3,800 residents live in Cayucos[4]. As shown in Figure 1-2 (Figure 2 in Appendix A provides a large scale aerial map of Cayucos), Highway 1 is the principal transportation corridor in Cayucos. The regional state highway extends on a south-east to north-west alignment from its junction with Highway 101 in the City of San Luis Obispo. Cayucos is divided into separate neighborhoods by Highway 1 and several drainage courses.

The community lies on the coastal terrace, closely bordered by steep hillsides. The regional topography of the area is very steep just east and north of Cayucos, transitioning to more gently sloping ground near the coast.

[3] Map is excerpted from Microsoft Streets and Trips
[4] Personal communication with Cayucos Chamber of Commerce. Based on year 2000 census.

Ocean Avenue is the primary street arterial in Cayucos. This alignment includes North Ocean Avenue through the main developed northwestern part of Cayucos and South Ocean Avenue, which provides access to residential areas in the southeastern part of the community.

The residential areas of Cayucos are all well-defined by previous subdivisions. There are no major land areas within the community that could be used for large subdivision development. The source of future growth will be construction on "in-fill" lots in existing subdivisions. Many homes in Cayucos are used on weekends only or on a seasonal basis. It is projected that seasonal use will decline and many of these homes will become permanent residences. The need for infrastructure improvements, such as drainage facilities, will change as this shift occurs.

Figure 1-2: Community of Cayucos Detail Layout[3]

1.1 Project Understanding

There are two categories of flooding and drainage problems in Cayucos; 1) localized drainage problems and 2) major creek flooding problems. The combination of the area's steep topography, lack of underground drainage facilities, and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. Lack of storm drain inlets has caused drainage and flooding problems in some intersections. Damage to personal property has also occurred during large storm events.

Runoff from uphill lots flows along the edge of street pavement and drains onto lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface.

Cayucos contains four major tributaries that convey flow originating from the Santa Lucia Range east of Highway 1 to the Pacific Ocean, including Cayucos, Little Cayucos, Old and Willow Creek. The most serious flooding in the community takes place in the floodplain of Cayucos Creek west of Highway 1, bounded by the mobile home park on the north and Cayucos Drive on the south. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creek due to high water levels.

1.2 Objectives and Scope

This report has been prepared for the San Luis Obispo County Flood Control and Water Conservation District on behalf of the Community of Cayucos. The main objective of the Drainage and Flood Control Study is to identify and present conceptual improvements needed to minimize or eliminate the localized flooding problems, and to convey the collected runoff from the developed areas to a disposal point. It serves as a guide for long range planning for improvements to ensure that the community has reliable drainage infrastructure in the future. This report documents the existing conditions, examines potential improvements, identifies environmental permitting requirements, and recommends a funding strategy to pay for the improvements.

1.3 Methodology

In order to accomplish the goals of the Study, the methodology shown in Figure 1 of Appendix A was used. As shown in the figure, community involvement in the study was imperative to gain a local understanding of the flooding problems. Each community was represented by an Advisory Committee and this Advisory Committee also identified a sub-committee to work directly with the study team throughout the duration of the project. The sub-committee also reviewed technical documents and provided comments to the study team. The Cayucos Citizen's Advisory Council (Cayucos CAC) represented the community of Cayucos. Members Arly Robinson and Ralph Wessel worked directly with the study team for the duration of the project. The study team requested input and endorsement from the Advisory Committee at the following milestones:

- Initiation of Study and Community Questionnaire
- Approach to Conducting Engineering Analysis
- Proposed Alternatives for Mitigating Flooding
- Review of Draft Report
- Endorsement of Final Report

1.3.1 Community Involvement

In order to gain the local knowledge of existing flooding problems, a questionnaire was mailed to the residences of Cayucos. The questionnaire requested information on existing flooding problems, location of flooding, frequency of occurrence, and observed causes. Over 130 responses were received from Cayucos residences. A summary of the responses and comments received is included in Appendix C. In order to protect the privacy of the respondents, personal information (names and phone numbers) is not included in the summary. A sample of the questionnaire is also included in Appendix C.

1.4 Existing Information

When available, existing information was used to assist in the engineering and environmental analysis. A list of references is provided in this report. Previous to this study, no engineering analysis quantifying the existing drainage and flooding problems had been conducted for the entire community of Cayucos, however, a report did exist for the area north of Cayucos Drive. Resident observations and documentation were available and provided valuable information on the location and severity of historic flooding problems.

1.5 Report Content

The structure of the Drainage and Flood Control Study is outlined below.

- CHAPTER 1 – Introduction (this introduction)
- CHAPTER 2 – County Policies, (presents an overview of the drainage and flood control responsibilities in the County of San Luis Obispo).
- CHAPTER 3 – Engineering Analysis and Alternatives Development, (discusses the existing drainage and flooding problems in Cayucos and presents alternatives that will mitigate the problems).
- CHAPTER 4 – Environmental Feasibility Analysis, (discusses the environmental permitting and regulatory requirements for the proposed alternatives).
- CHAPTER 5 – Funding Alternatives, (provides a summary of funding options, including criteria for qualifying projects, available funds, and cost sharing formulas).

- CHAPTER 6 – IMPLEMENTATION STRATEGY, (This chapter consists of an implementation plan of the recommended improvements developed to reduce nuisance flooding and provide flood protection).

In addition to the six chapters, there are also eight appendices attached to the end of the report. The appendices are:

APPENDIX A – Figures

APPENDIX B – Photographs

APPENDIX C – Community Questionnaire and Responses

APPENDIX D – Resolution Establishing Policy

APPENDIX E – Engineering Analysis Technical Memorandum

APPENDIX F – Environmental Analysis Technical Memorandum

APPENDIX G – Funding Assistance Technical Memorandum

APPENDIX H – Response to Comments

CHAPTER 2 COUNTY POLICIES

Chapter Synopsis: This chapter presents an overview of the drainage and flood control responsibilities in the County of San Luis Obispo, as carried out by the San Luis Obispo County Flood Control and Water Conservation District.

2.1 Overview of Responsibilities

The drainage and flood control responsibilities of the County are determined by State and County statutes and by County policy. The responsibilities for drainage are administered through the Road Division of the County Public Works Department and the San Luis Obispo County Flood Control and Water Conservation District (District). The District is the designated County agency responsible for managing, planning, and maintaining drainage and flood control facilities in unincorporated public areas where no other agency has assumed an active role in such activities. The District has a regional role in the County and can work with individual cities or communities when requested. The sections below describe the limits of the jurisdiction of road maintenance and improvement, Road Fund administration, and how the District is administered to best leverage its powers by creating Zones of Benefit to oversee specific projects.

2.1.1 FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2.1.1.1 History

The San Luis Obispo County Flood Control and Water Conservation District was established in 1945. The powers of the District include flood control, water supply, water conservation, water quality protection and the ability to study all aspects of water resources. The District also has power to form zones of benefit within its boundary to implement water resource projects.

The District is a special district that is governed by the County Board of Supervisors. The boundaries of the District are the same as the County boundaries, and the staff of the District is the same as the staff of the County. The District also includes all of the territory within the County's seven incorporated cities. The District's budget is separate and distinct from all other County budgets. It has its own funding sources, and its own expenditure plan.

2.1.1.2 Policy Direction: Resolution Number 68-223

The District is available to help communities deal with flood waters and to conserve, study and develop water supplies. The District uses its general fund to identify water related issues, to determine solutions to those problems and to help those local areas implement recommended solutions. The District is not, however, responsible for paying for community-specific mitigation improvements. The specific property owners that benefit from these solutions must agree to pay for the construction and future maintenance of them. This policy (Resolution 68-223) was formally established by the Board of Supervisors in 1968, and was reviewed and reconfirmed in April 2001. The documentation of the policy is included in Appendix D of this report.

The policy was adopted because there is not sufficient funding available for the District to fund construction and operation of facilities. This approach provides the best leveraging of the funds that are available on a county-wide basis.

2.1.1.3 Funding Sources

The primary funding source for the District, which is the entire County, is a pre-Proposition 13 general property tax allocation, which provides approximately $550,000 per year in revenue. In addition, the District receives about $130,000 per year in interest income from current resources. Reserves from the County's General Fund,

which is separate from District fund, are normally not used for the construction of projects protecting private property, unless there is a significant general or roadway benefit.

2.1.1.4 Countywide Activities

The District provides funding for flood control programming and planning of localized drainage issues.

2.1.2 County Standards for Control of Drainage (Coastal Zone)

The County's planning department establishes the land use policies and drainage ordinances for the County (the District has no land use ordinances). Section 23.05.040 et. seq., of the San Luis Obispo County Coastal Zone Land Use Ordinance (CZLUO) contains the County's standards for the control of drainage and drainage facilities. These standards aim to minimize the harmful effects of storm water runoff and to protect neighboring and downstream properties from drainage problems resulting from new development. They include:

- Requirements pertaining to the drainage and construction of drainage systems
- Requirements pertaining to the maintenance of offsite natural drainage patterns
- Requirements pertaining to the location of development in the coastal area
- Restrictions on development in areas subject to flood hazards

Conditions of development in flood hazard areas must, at a minimum, enforce the current Federal flood plain management regulations as defined in the National Flood Insurance Program. Projects that may be subject to or cause flood hazards are required to prepare a drainage plan, subject to approval by the County Engineer.

In addition, Section 23.07.060 of the County's CZLUO contains development standards for areas with the Flood Hazard (FH) designation. The standards state that drainage plans for development in FH areas must include a normal depth analysis that determines whether the proposed development is in the floodway or the flood fringe. In addition, development in FH areas would be subject to construction practices that would not limit floodway capacity or increase flood heights above an allowable limit.

2.1.3 The Road Fund

The County provides some limited drainage improvements as a function of its road maintenance responsibilities. The Road Fund is a separate, distinct legal account and budget, from the District. It has numerous State statutes (primarily the Streets and Highways Code) that dictate how Road Fund monies may legally be expended. The Road Fund program operates the County Maintained Road System and is funded through a combination of restricted revenue sources that are primarily derived through taxes on gasoline that are apportioned to cities and counties by the State, as well as contributions from the County General Fund. These funding sources can only be spent on solving problems that directly relate to County maintained roads.

As a function of operating the road system, the drainage issues related to the road system are addressed when such drainage work protects the County maintained road system in a cost beneficial way, or is directly related to County road improvement projects and is necessary to prevent property damage. This includes directing the flow of streams across the roads through culverts and bridges.

A specific drainage related project completed in Cayucos through the Road Fund includes:

- Upgraded the old style concrete inlets into culverts with newer and more efficient styles

In addition to the above Road Fund financed drainage improvement, the following drainage project is currently planned for the future.

- Install culvert liners in two culverts on Old Creek road near Highway 1

2.1.4 Other Agencies with Drainage Responsibilities

2.1.4.1 Community Service Districts

Community Service Districts (CSD's) are locally controlled special districts that can also provide drainage and flood control services. There are two special districts serving Cayucos. County Waterworks District No. 8 provides water to a portion of the area. Sewer service is provided through the Cayucos Sanitary District formed in 1942. No special district provides drainage service in Cayucos.

2.1.4.2 County Service Areas

County Service Areas (CSA's) can focus the powers of the County to provide specific services to specific areas, including drainage and flood control services. These special districts are governed by the County Board of Supervisors and receive their funding through the collection of voter approved service charges or benefit assessments from the residents or property owners of the specific area served. There are a number of County service areas serving Cayucos. County Service Area No. 10 provides recreation, park maintenance, and highway lighting. County Service Area No. 15 provides ambulance services. County Waterworks District No. 8 provides water to a portion of the area.

2.1.4.3 Cities

Individual cities within the County exercise control over drainage issues within their city limits.

2.1.4.4 U.S. Corps of Engineers

At the Federal level, the U.S. Army Corps of Engineers (Corps) provides flood protection throughout the nation, however, the Corps has done very little work in San Luis Obispo County and operates no facilities here.

2.1.4.5 California Department of Water Resources

The Sate of California also administers some flood control and drainage programs via the State Department of Water Resources' (DWR) flood control division. DWR has little presence in the County, and mainly gets involved in a consulting role during flood emergencies.

2.1.4.6 Caltrans

The California Department of Transportation (Caltrans) operates drainage facilities that are associated with the State Highway System.

2.2 Flood Control Zone

The District has the power to form Zones of Benefit to implement and operate facilities. Each Zone must have its own funding source.

2.3 Funding Issues

The District is restricted in the way it can fund needed projects or increase revenues for existing operations. It is generally limited to a zone of benefit or an assessment district procedure for obtaining financing for the construction of new projects.

Due to the changes enacted with the passage of Proposition 218, the District must now also have all new benefit assessments, and increases to existing benefit assessments for maintenance and operations, approved through an election of affected property owners.

The District provides a means of funding studies that define problems and recommend technical solutions to those problems. The critical next steps of constructing and maintaining drainage facilities can normally only be completed with local benefiting property owners being willing to vote to assess themselves for these costs.

Chapter 5 discusses in greater detail the alternative methods for potentially funding the construction of community-specific flood control and drainage projects.

2.4 Maintenance Responsibilities

Survey respondents reported that many of the existing creek channels are filled with sediment and vegetation. Field investigations indicate that some of the drainage ditches were partially filled with excessive vegetal growth. Under maintained facilities reduce their design capacity and inhibit their ability to convey runoff. However, in Cayucos, the District does not possess flood control or drainage easements for any of the creeks. Under these circumstances, the owner whose parcel line extends into the creek bank is responsible for maintaining the channel's capacity. If a property owner does not maintain the conveyance facilities, then these structures will go unattended because the District is not responsible for maintaining facilities on private property or on property within the jurisdiction of other public agencies (e.g. Caltrans and Highway 1).

CHAPTER 3 ENGINEERING ANALYSIS AND ALTERNATIVES DEVELOPMENT

Chapter Synopsis: This chapter discusses the existing drainage and flooding problems in Cayucos and presents alternatives that can mitigate the problems. The chapter also presents the estimated cost for planning, designing and constructing the proposed capital projects. An engineering technical memorandum was prepared for this study and is included in Appendix E. The technical memorandum provides greater detail on the engineering methodology, analysis and alternatives. Some items in this chapter were modified since the completion of the technical memorandum.

3.1 Overview of Proposed Project

The proposed solution to the problems is the construction of a number of small project alternatives, or groups of smaller projects, to resolve the flooding problems. For Cayucos, up to 12 individual or groups of projects have been investigated to address the drainage and flooding problems in Cayucos, and are shown by drainage zone on Figures 8 through 14 in Appendix A. The proposed projects can either be implemented individually to solve isolated problems, or combined to develop a comprehensive solution for improved drainage throughout the entire community. However, the intent is that each alternative will work independently to solve localized problems. The benefit to this approach is that neighborhood groups could organize to implement a project in their section of town and not be impeded by the lack of action of others. Although an extensive storm drain system could be constructed to provide conveyance of all storm water runoff, the project would be very expensive. If all the projects proposed in this report were implemented, the estimated project costs would be $3.4 million. If the 100-year flood protection project on Cayucos Creek were implemented, the project costs would increase by approximately $1.9 million. Table 3-13 breaks down the individual project costs.

The highest priority projects in terms of potential residential and commercial flood damages are the 10-year and 100-year level of protection for Zone 3 from Cayucos Creek and its tributary. These two projects would protect Hardie Park, the community pool, businesses, private residences, and the planned downtown enhancement area. The remaining projects and their priority for implementation are dependent upon the needs of the individual residents and their desire to reduce damages and/or nuisance flooding problems caused by inadequate or non-existent drainage facilities. A general summary of projects and recommendations for improving flood protection and stormwater drainage is provided below.

- If 100-year protection of the B Street area in Zone 3 is desired, review and/or update the Cayucos and Little Cayucos Creek flood insurance studies to identify levee heights and 100-year flood elevations to determine whether flood protection projects can be implemented to reduce flooding. Review of the studies could also examine the impacts of continuing sedimentation in the Ocean Avenue crossing at Little Cayucos Creek. **Discuss flood protection benefits compared to the project costs (and property assessment) with the community. Support for the project may not exist if damages due to flooding are less than the assessment to pay for the project.**
- Develop a selection process for prioritizing storm drain improvements and identifying the sources of funding for the improvements.
- Consider forming a special assessment district to fund drainage system improvements or amend the charter of one of the existing service areas or districts to include drainage responsibilities.
- Continue implementing the District curb and gutter policy, however, provide a drainage outlet in the sag to prevent water ponding.
- Obtain long-term permit for stream maintenance of District controlled right of way along streams.
- Establish maintenance responsibility for flood prone areas on private property.

- Contact Caltrans to discuss locations where additional maintenance work is necessary at existing Caltrans culvert crossings.

3.2 Engineering Methodology

The purpose of the engineering analysis was to examine the existing drainage conditions of Cayucos, identify problematic areas and issues, and prioritize and categorize the problems. The engineering analysis also developed conceptual solutions to the identified drainage and flood control problems. This chapter includes a description of existing drainage conditions, a discussion of the methodology used to evaluate drainage problems, and identification of a series of alternative projects to mitigate the drainage problems. The proposed projects can either be implemented individually to solve isolated problems, or combined to develop a comprehensive solution for improved drainage throughout the entire community. This report also includes methods to reduce the flooding created during the 100-year events on Cayucos Creek, since this impacts community flooding, particularly in the Ash Street and Birch Street areas north of Cayucos Drive.

The approach for studying Cayucos was to divide the community into drainage basins. The study team utilized existing topographic maps to delineate existing sub-basins. The known problem areas were assessed using a combination of resident accounts and field investigations. Drainage in Cayucos was divided into 21 different drainage zones (Zones 1 through 21) based on drainage patterns and location of storm drain outfalls within the community. The 21 drainage zones and existing drainage infrastructure are shown in Figure 2 of Appendix A. The coastal watersheds were subdivided into smaller subwatersheds based on storm water outfalls located along roadways paralleling the coast.

Initial concepts for mitigating existing flooding problems included the development of a gutter and storm drain system. Also considered was the construction of a levee system to solve the 100-year flood events on Cayucos Creek.

3.3 Existing Drainage and Flooding Problems

The lack of underground drainage facilities and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. The most serious flooding in the community takes place in the floodplain of Cayucos Creek west of Highway 1, bounded by the mobile home park on the north and Cayucos Drive on the south. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creek due to high water levels.

Drainage problems within the community were identified by:

- Reviewing community responses to questionnaires
- Conducting community outreach discussions with local residents and County staff
- Conducting field mapping of curbs, gutters, and storm drain facilities
- Reviewing Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for the Cayucos Community

3.3.1 Regional Hydrology

Most of Cayucos is generally located within the coastal storm water subbasins that drain directly to the Pacific Ocean. The coastal storm water subbasins can be delineated based upon the storm water discharge location at the beach. The coastal subbasins have a total area less than 1 square mile. The community is also located at the outlet of four creeks that extend inland and have a total watershed area of about 38 square miles. The watershed areas that drain through Cayucos are shown on Figure 3 of Appendix A.

The major creek channels within Cayucos include Cayucos Creek and Little Cayucos Creek in the northern portion of the community, and Old Creek and Willow Creek in the southern portion of the community. Watershed areas for each of these creeks are listed on Figure 3 of Appendix A. The Old Creek flow rate through the community is controlled by Whale Rock Dam, which provides water supplies to the City of San Luis Obispo, Cayucos, and other agencies.

3.3.2 Overview of Cayucos Drainage Issues

In the early stages of urbanization of the community, storm water conveyance and flood control infrastructure were not incorporated into the community. There are several reasons for this, including:

- The high infiltration rate of the underlying Cayucos sands was sufficient to allow storm water to seep into the soil with little runoff, creating a lack of problems and a perceived lack of need.
- No regulatory requirement to provide drainage improvements, since the development was pre-subdivision Map Act requirements.
- Cayucos' topography, proximity to the ocean and four creeks rendered a perception that a formal storm drain system was unnecessary because the natural physical characteristics of the community were sufficient for conveying storm runoff to the ocean.

During this early period, the curb, gutter, and drainage improvements were not required for development, resulting in no upfront drainage infrastructure cost by the property owners. With an increase in urbanization came an increase in impervious surfaces and runoff, but a resulting decrease in pervious surfaces available to absorb the urban runoff.

The combination of the area's steep topography, lack of underground drainage facilities, and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. Lack of storm drain inlets has caused drainage and flooding problems at road intersections. Damage to personal property has also occurred during large storm events. Reported areas of localized flooding and/or drainage problems based on community questionnaires completed by area residents in 2002 are shown in Figure 4 of Appendix A.

The most serious flooding in the community takes place in the floodplain of Cayucos Creek west of Highway 1, bounded by the mobile home park on the north and Cayucos Drive on the south, as shown on Figure 5 of Appendix A. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creek due to high water levels. Drainage from a tributary to Cayucos Creek flows into this area and has caused flooding. Extensive flood damage occurred to Hardie Park and the adjacent pool along B Street during storm events in 1998. Buildings and homes along Ash Street were also flooded. Photograph 1 in Appendix B shows local flooding limits during a storm in April 2001. The downtown area of Cayucos is within the floodplain of the Cayucos and Little Cayucos Creeks. A draft of the Cayucos Downtown Enhancement Design Plan is currently being prepared by the County. This plan will require infrastructure to provide drainage capacity and prevent flooding of the redeveloped area.

A number of nuisance drainage and flooding problems occur in Cayucos due to the topography and the lack of a consistent, organized network of drainage facilities within the community. Drainage from a number of uphill lots flows along the edge of street pavement and drains onto lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance.

3.3.3 FEMA Flood Hazard Zones

In addition to localized flooding and drainage problems, portions of Cayucos have been classified by the Federal Emergency Management Agency (FEMA) as being located within 100-year flood hazard zones. The FEMA

floodplain delineations are shown in Figure 6 of Appendix A. These flood zones include areas near Cayucos Creek and Little Cayucos Creek, and along Willow Creek. The 100-year flood zone on Old Creek is completely within the channel banks due to peak flow attenuation upstream at Whale Rock Dam. However, in the event of the failure of the dam, extensive areas of urban development near the channel, including Highway 1, would be subject to inundation and damage.

The 100-year flood hazard zone for Cayucos Creek includes portions of Cayucos Creek Road east of Highway 1, and portions of Birch Avenue, B Street and Ash Street west of Highway 1. As shown on Figure 7 of Appendix A, this flood hazard zone corresponds to the flooding limits observed in 1998. Flow passes Ocean Boulevard without overtopping the roadway, but floods the parking lot areas southeast of Ocean Boulevard before discharging to Estero Bay.

The 100-year Little Cayucos Creek flows are attenuated by the State Highway 1 culvert, causing a large flooding area upstream of Highway 1. Downstream of Highway 1, the reduced peak flows allow Little Cayucos Creek to be generally retained within its banks until it nears Ocean Boulevard. At Ocean Boulevard, the flooding limits extend northwesterly along Ocean Boulevard past the D Street intersection. This flooding zone includes the planned Downtown Enhancement Area. The flooding downstream of Ocean Boulevard includes D Street and a portion of Ocean Front. Citizens in the community have reported that sediment deposition has occurred along Little Cayucos Creek between Highway 1 and Ocean Avenue, with estimates of up to a four feet increase in sediment depth over the last five years.

The 100-year flooding along Willow Creek is limited to a small area between Cypress Mountain and Hacienda Drives upstream of the State Highway 1. Upstream of this area, the creek generally remains within its banks.

It should be noted that the 100-year flooding evaluation and recommendations for solutions to the 100-year flooding problems in the FEMA designated zones were generally not the purpose of this study. They are presented here to show the relative context of the local drainage issues with the larger flood issues concerning Cayucos and Little Cayucos Creeks and Willow Creek. However, since the Cayucos Creek 100-year flooding has a significant impact on many structures in the community, conceptual improvements were developed to mitigate the 100-year flood in the B Street area along the creek.

3.4 Drainage and Flood Control Analysis

3.4.1 Local Drainage Patterns

Drainage in Cayucos was divided into 21 different drainage zones that are shown in Figure 2 of Appendix A. The coastal watersheds shown on Figure 3 of Appendix A were subdivided into smaller subwatersheds based on storm water outfalls located along roadways paralleling the coast. A general description of the watersheds is provided below:

- The four largest zones are Zones 2, 4, 14, and 16, corresponding to the Cayucos, Little Cayucos, Old Creek, and Willow Creek watersheds, respectively.
- Zone 3 is a tributary watershed to Cayucos Creek, but has been subdivided into a separate zone due to the flooding that occurs as the tributary crosses Highway 1 into the low land near the elementary school, Birch and Ash Street.
- The remaining Zones 1, 5 through 13, 15, and 17 through 21 are much smaller, and discharge storm water runoff directly to Estero Bay either through storm water outfalls or overland flow.

Since the general topography of Cayucos slopes towards the ocean, storm runoff that does not enter one of the creeks or infiltrate into the soil, is discharged via storm water outfalls or overland flow. A majority of the runoff from the smaller coastal watershed zones discussed above is eventually conveyed to the storm water outfalls

located along Pacific Avenue and Studio Drive. Storm water outfalls are generally located along the public access locations to the beachside areas.

3.4.2 EXISTING DRAINAGE FACILITIES

3.4.2.1 Caltrans Culverts

Caltrans maintains a number of Highway 1 culverts that drain runoff from Highway 1 and convey runoff from the watersheds east of Highway 1. The locations of the culvert crossings on Highway 1 are shown on Figure 2 of Appendix A. A partial list of Caltrans facilities is summarized below:

- Zone 3 - 42-inch reinforced concrete pipe for Cayucos Creek tributary watershed. Outlet is at the elementary school playing field near B Street
- Zone 4 - Double 72-inch corrugated metal pipe on Little Cayucos Creek
- Zone 7 - 42-inch corrugated metal pipe between Park Street and 4th Street
- Zone 8 – Double 18-inch corrugated metal pipe between 7th and 8th Street
- Zone 15 - 36-inch reinforced concrete pipe south of Obispo Avenue
- Zone 16 - 10-foot by 10-foot concrete box culvert on Willow Creek, south of Old Creek Road;
- Zone 19 – Culvert between Thatcher and Mayer

3.4.2.2 Drop Inlets and Storm Drain Outfalls

There are a number of drop inlets and storm drain outfalls that collect water along Pacific Avenue and Studio Drive. The storm drains are generally located in public beach access right of ways to the ocean. The locations of the storm water outfalls are shown in Figure 2 of Appendix A. Photograph 2 in Appendix B shows a typical storm drain outfall to the ocean.

3.4.2.3 Storm Drain Pipelines and Drainage Ditches

There are a few large storm drain pipelines and drainage ditches in Cayucos. These were identified and mapped during the field reconnaissance. It is possible that some private storm drains were not located; therefore, this list is not intended to be a comprehensive inventory of all facilities. The drain locations are shown on Figure 2 of Appendix A.

- B Street Drain – This drain starts downstream of the Caltrans 48-inch culvert at the elementary school, and includes a series of culverts and drainage ditches conveying flow through the school yard, adjacent to Hardie Park, along B Street and open drainage channels, eventually discharging to Cayucos Creek via a 48-inch polyethelene corrugated pipe. Photograph 3 through Photograph 7 in Appendix B show the existing facilities that drain the Cayucos Creek tributary watershed.
- 3rd Street Drain – This drain starts downstream of the Caltrans culvert between Park Street and 4th Street. This storm drain conveys flow west from Park Avenue to the ocean, collecting local runoff at inlets and open channel segments of the drain. The storm drain is constructed under a church, behind a grocery store located at Park Street and Ocean Avenue, under a community park at 3rd Street west of Ocean Avenue, and eventually discharges to a heavily vegetated open channel near the ocean. Photograph 8 through Photograph 10 in Appendix B show the various points of the storm drain.

3.4.3 DRAINAGE AND FLOODING ISSUES

There are six categories of drainage problems in Cayucos that need to be addressed:

- Construction of segmented curbs/berms and gutters
- Flooding near Cayucos Creek and Little Cayucos Creek
- Local Drainage and Flooding Problems

- Recurring Flooding Problems
- Hillside Runoff and Sedimentation
- Maintenance of Drainage Facilities

3.4.3.1 Segmented Curbs/Berms and Gutters

San Luis Obispo County Land Use Ordinance 22.54.030 requires the installation of concrete curb, gutters, and sidewalks along the entire street frontage of the site under permit, and also along the street frontage of any adjoining lots in the same ownership as the site, for any projects in the following land use categories:

- New residential subdivisions, pursuant to Title 21 of the SLO County Code
- Residential multifamily land use category, remodeling improvements that are valued at 25 percent or greater than the current property value
- New residential multifamily categories within an urban reserve line
- All commercial, office and professional categories within an urban reserve line
- All industrial categories within an urban reserve line.

Curbs and gutters are not required on new residential single family lot construction (infill lots), residential rural and suburban categories, agricultural, open space and park & recreation land use areas within an Urban Reserve Line. Curb, gutter and/or sidewalk improvement requirements may be waived, modified or delayed as follows:

- Incompatible Grade. In the opinion of the County Engineer, the finish grades of the project site and adjoining street are incompatible for the purpose of accommodating the improvements.
- Incompatible Development. Based upon the land use designations, existing land uses in the site vicinity, and existing and projected needs for drainage and traffic control, that such improvements would be incompatible with the ultimate development of the area.
- Premature Development. 1) The proposed use of a site is an interim use, 2) the project is part of a phased development and upon completion of all phases, the entire extent of improvements will be constructed, and 3) delaying the improvements would better support the orderly development of the area.

In general, the lack of curb and gutter does not cause problems for every residence. It is primarily a problem for residences along the roadway where large amounts of overland flow are passing along the street. The curb and gutter would provide a path and prevent it from entering the yards. However, if curbs were present in these areas it would move the flooding to the driveways, which would require a rolled asphalt section. In Cayucos, drainage problems were observed where curb and gutter was installed, but no drainage outlet was provided in the sag.

3.4.3.2 Flooding near Cayucos Creek and Little Cayucos Creek

The relatively flat floodplain area where Cayucos and Little Cayucos Creek discharge into Estero Bay has areas designated as FEMA 100-year flood hazard zones. These areas include municipal buildings, businesses, residences, and the proposed Downtown Enhancement area. In both creeks, the water surface elevation of the creek will rise above the channel banks at peak flow conditions, and flood a portion of the surrounding area. Since the focus of this study was the County design standards for the shorter 10-year return period, the analysis and reduction of the 100-year flooding area was generally not included in this study. However, since the Cayucos Creek 100-year flooding has a significant impact on many structures in the community, conceptual improvements were developed to mitigate the 100-year flood in the B Street area along the creek.

The flooding and sediment deposition problems created by the Cayucos Creek tributary that discharges into the 100-year floodplain were considered to contribute to local flooding in smaller storm events. The discharge of the existing Highway 1 culvert currently carries peak flow and sediments into the commercial and public areas.

A study by Fred H. Schott (1998) identified the 100-year peak flow from the watershed west of Highway 1 to be about 100 cfs, compared with the 20 cfs total discharge from local areas west of the highway. If this discharge were diverted directly to the creek via a culvert, the existing channel and culvert system (shown in Photographs 3 through 7 of Appendix B) would convey only local runoff, reducing flooding conditions during smaller storms. Since this area is lower than the 100-year water surface elevation in Cayucos Creek, peak flows in the creek would continue to overtop the banks and cause flooding in large storm events.

Tidal flows and rising flood waters will also enter the existing discharge culvert and flow backwards through the culvert, since there is no flapgate on the discharge. This could increase the flooding in the floodplain area along B and Birch Streets. A flapgate would allow flow in one direction, preventing the flow from flowing backwards through the culvert.

3.4.3.3 Local Drainage and Flooding Problems

These problems include storm water runoff from uphill areas entering lower yards and residences during peak rainfall periods and the localized ponding of storm water near intersections and in yards. The community lacks a consistent, organized network of curbs, gutters, and drain inlets, which has resulted in a number of nuisance drainage and flooding problems within the drainage zones. Drainage from a number of uphill lots flows along the edge of the street and drains off the edge of the pavement through the lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance. In some cases, a small rolled asphalt section has been place along the driveway entrance, which prevents runoff from entering the driveway. In other cases, residents have constructed trench drains across their driveway to prevent runoff from entering their garages and residences.

3.4.3.4 Recurring Flooding Problems

Recurring flooding problems have been reported at the following locations:

- Property on Ash Street between B Street and Cayucos Drive. This location may be eligible for Federal grant funding under the Federal Mitigation Assistance grant program. A detailed discussion of alternative funding mechanisms is presented in Chapter 5 of this report.
- Property on Gilbert Avenue, between Day Street and Chaney Avenue. Storm drain project proposed for Zone 21 in Section 3.5.11 should mitigate flooding reported at this property.
- Property on Saint Mary Avenue between 6th and 8th Streets. Storm drain project proposed for Zone 8 in Section 3.5.3 would divert runoff currently flowing through private.

3.4.3.5 Hillside Runoff and Sedimentation

Some survey respondents identified hillside runoff and sedimentation as a major problem in Cayucos. During storms, hillside runoff scours the surface and carries sediment to lower lying areas. Homes that back up onto hillsides receive this runoff. If the owner has not constructed a barrier or erosion protection measure, then the sediment concentrated runoff will deposit onto the property and create a nuisance problem.

3.4.3.6 Maintenance of Drainage Facilities

Survey respondents reported that many of the existing drop inlets and culverts are filled with sediment and debris. Under maintained facilities reduce their design capacity and inhibit their ability to convey runoff. Field investigations indicate that some of the culverts and drainage ditches were partially filled with sediment and excessive vegetal growth. However, in many instances it was difficult to determine whether the culverts were located in public right of way or on private property. The District is not responsible for maintaining facilities on private property.

3.5 Proposed Capital Improvement Projects

The major constraint identified in local flooding issues was the lack of suitable conveyance facilities for storm water runoff. In most areas, storm water flows as surface flow in streets, ditches, and backyard areas. Stormwater conveyance is widely varied, due to changes in roadway slope and cross section, the presence or lack of curb and gutters, and the presence or lack of existing culverts and drainage channels. Most drainage issues were the result of upstream concentrated flows entering downstream lots due to a reduction in conveyance capacity or the lack of storm drain facilities to convey flow. Other drainage issues were a result of standing water after a rainfall, which could be resolved by providing drain inlets and underground piping to an outlet area.

The proposed projects and alignments presented in this report for mitigation of drainage and flooding issues in Cayucos were established using best engineering judgment and available information. The final projects may vary from what is presented in this report as a project becomes more defined.

The proposed solution to the problems is the construction of a number of small project alternatives, or groups of smaller projects, to resolve the flooding problems. Several potential projects have been developed to address drainage and flooding issues, and are shown by drainage zone on Figures 8 through 14 in Appendix A. A combination of the projects will be required to eliminate all of the drainage problems for the community. However, the intent is that each alternative will work independently to solve localized problems. The benefit to this approach is that neighborhood groups could organize to implement a project in their section of town and not be impeded by the lack of action of others. Although an extensive storm drain system could be constructed to provide conveyance of all storm water runoff, the project would be very expensive. The project alternatives are described in the following sections based on the numerical order of the drainage zones.

The proposed culverts discussed in this section are intended for planning level purposes only. Detailed calculation of pipeline diameter would require a design level topographic survey of the proposed alignments and detailed analysis of the peak flow rates of each subwatershed. If a proposed project proceeds toward implementation, it is recommended that the lead agency collect this information.

3.5.1 ZONE 3 IMPROVEMENTS

The Zone 3 improvements include projects to reduce flooding in the 10-year event and additional conceptual projects to reduce the flooding in the 100-year event.

3.5.1.1 10-year Event Project

For flood reduction in a 10-year event, a storm drain pipeline could be constructed to convey the Cayucos Creek tributary flow directly to Cayucos Creek as shown on Figure 8 in Appendix A. This would reduce the potential for flooding in B Street, Ash Street and Cayucos Creek Road area. Based on flow calculations by Fred Schott (1998), approximately 83 percent of the storm runoff that flows through the channels along B Street originate east of Highway 1. This runoff currently flows from a Highway 1 Caltrans 48-inch culvert and exits at grade onto the surface of the elementary school playing field. It enters a junction structure to a pair of storm drain pipelines beneath the field, then through a series of open channels along B Street, eventually discharging to Cayucos Creek via a 48-inch (estimated) corrugated polyethelene culvert. The proposed pipeline would be constructed between the outlet of the culvert passing under Highway 1 and the creek, and would bypass approximately 69 cfs to the creek instead of the existing drainage facilities along B Street. A pressurized storm drain line may be possible, due to the high water surface elevation upstream of Highway 1. This may allow the pipeline to be reduced in size compared with a gravity flow storm drain.

The proposed drainage pipeline would not be capable of draining the area west of Highway 1. That area would include only 14 cfs local drainage and would be drained by the existing culvert and channel system as shown in Figure 8 of Appendix A (and Photographs 3 through 7 in Appendix B). The existing culvert discharging into

Cayucos Creek near the Ocean Avenue crossing may require the installation of a flap gate to prevent backflow of Cayucos Creek into the local channel system.

Benefits and Constraints

This improvement would prevent the Cayucos Creek tributary watershed from draining through the community down B Street, and would reduce peak flow to about 17 percent of the current 10-year flow. This improvement would also divert the sediment load from east of the highway, reducing maintenance excavation of sediments from the drainage channels along B Street.

Cost

The breakdown of costs is shown in Table 3-1. The total cost for this alternative is approximately $420,000.

Table 3-1: Zone 3 Improvements Estimated Cost

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($) [1]
Diversion Drain Pipeline	600 LF	225 per foot	135,000
Inlet Structure	1	25,000 each	25,000
New Outfall to Creek	1	50,000 each	50,000
		Subtotal	**210,000**
Engineering/Design [2]		20 percent of subtotal	42,000
Administrative/Environmental [2]		60 percent of subtotal	126,000
Contingency [2]		20 percent of subtotal	42,000
		Total	**420,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.5.1.2 100-year Event Project

For flood reduction in a 100-year event, a levee or berm could be constructed to prevent the high water surface elevations in Cayucos Creek from flooding the B Street area. As shown on Figure 9, this levee would be in addition to the pressure pipeline discussed in Section 3.5.1.1 above. The length of the levee is estimated to be approximately 1,300 feet, and would extend between Ocean Avenue and a point upstream of the Highway 1 crossing. The height is assumed to be 8 feet, with side slopes of 2:1 and a five foot wide path at the top. The levee would require about 6 cy of fill per lineal foot. The actual length and height of the levee would be determined during the design phase.

The levee system would require a pump station to discharge local flow into the creek, due to the water surface difference during peak creek flows. Lower flows may be discharged without pumping if a flap gate is installed to prevent backflow of Cayucos Creek into the local channel system during high flows. The pump station would be designed to discharge the 100-year peak flow of about 21 cfs from the local flow area.

Benefits and Constraints

This improvement would prevent the flooding of the community in the B Street area during the 100-year flood. Constructing a levee and pump station is very expensive and may not be justified to mitigate flooding of recreational facilities, a business and one residential dwelling unit. The environmental permit process may also be very extensive if work is conducted within the creek's bank, as described in Chapter 4 of this report.

Flood protection projects that protect against damages caused by a 100-year flood event on Cayucos Creek could be co-sponsored by the U.S. Army Corps of Engineers (Corps). Gaining Corps involvement would provide for partial Federal funding of the planning, design and construction, however, the local community would still be expected to provide funding as the local sponsor. The funding analysis, discussed in Chapter 5 of this report, describes the requirements for obtaining Federal funding of flood protection projects.

Alternative Costs

The breakdown of costs is shown in Table 3-2. The total cost for this alternative is approximately $1,880,000.

Table 3-2: Zone 3 100-Year Flooding Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Diversion Drain Pipeline	1	210,000 (see Table 3-1)	210,000
Levee/Berm	1,300 feet	100 per foot	130,000
Pump Station	1	600,000 each	600,000
		Subtotal	**940,000**
Engineering/Design		20 percent of subtotal	188,000
Administrative/Environmental		60 percent of subtotal	564,000
Contingency		20 percent of subtotal	188,000
		Total	**1,880,000**

Notes:
1. See notes from Table 3-1.

3.5.2 Zone 5 Storm Drain Pipeline and Inlets

The poor drainage at the southeast corner of Ocean and Pacific occurs at a fully improved (curb and gutter) section and the reported problems indicate that this section should have been designed initially with a culvert. A storm drain pipeline is proposed in Ocean Avenue from Pacific Avenue to the existing storm drain just south of F Street, as shown on Figure 10 of Appendix A. This storm drain would collect runoff from the Pacific Avenue intersection and drain it westerly to the Zone 5 system and outfall. This improvement could also reduce the flooding currently experienced in Zone 6 by reducing the tributary flows to that outfall. This project would include installing drop inlets at the Pacific Avenue intersection and a storm drain pipeline to move storm water north to the open channel at the north outlet.

Benefits and Constraints

The advantages include improving the drainage in the Pacific Avenue and South Ocean Avenue intersection. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater at the intersection of Pacific and Ocean. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design.

Alternative Costs

The breakdown of costs is shown in Table 3-3. The total cost for this alternative is approximately $117,000.

Table 3-3: Zone 5 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Storm Drain Pipeline	310 LF	175 per foot	54,000
Levee/Berm	4	1,000 each	4,000
		Subtotal	**58,000**
Engineering/Design		20 percent of subtotal	12,000
Administrative/Environmental		60 percent of subtotal	35,000
Contingency		20 percent of subtotal	12,000
		Total	**117,000**

Notes:
1. See notes in Table 3-1.

3.5.3 Zone 8 Storm Drain Pipelines and Inlets

Due to the size of this subwatershed, it is proposed that two storm drain pipelines be constructed to convey flow from the upper watershed to the existing outfall locations. The two drain systems are shown on Figure 11 of Appendix A. One storm drain would be constructed along Sixth Street from St. Marys Avenue to the drain inlets along Pacific Avenue. The storm drain could be extended north along St. Marys Avenue to collect a portion of the runoff that currently flows down a concrete flume located within a private easement between Fifth and Sixth Street. It could also pick up drainage from Park Avenue that discharges from an existing storm drain onto St. Marys Avenue.

The second storm drain in Zone 8 would be constructed along Eighth Street from St. Marys Avenue to the drain inlets and outfall at Pacific Avenue between Seventh and Eighth Street. The storm drain could be extended farther east along Eighth Street within the County right of way, to collect drainage from Park Avenue and runoff from the east side of Highway 1. An easement through private property may be required to connect to the Caltrans culvert discharge. The storm drain could also be extended south (about 400 feet from Eighth Street) along St. Marys to intercept an existing storm drain from Park Avenue to St. Marys Avenue. These two storm drains would reduce the flooding currently experienced in Zone 8 by conveying the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. This project would include installing drop inlets at the intersections to reduce the downstream overland flow in the streets.

Benefits and Constraints

The advantages include improving the drainage in the Zone 8 area. However, by improving the drainage in this area, it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater along St. Marys. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements. The outfall capacities should be verified during predesign of the facilities to ensure that flows do not escape the drain inlets at the lower elevations near the outfall. Extending the storm drain to connect with the Caltrans culvert will require acquisition of an easement along private lot side yards.

Alternative Costs

The breakdown of costs is shown in Table 3-4. The total cost for this alternative is approximately $1,127,000.

Table 3-4: Zone 8 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
6th Street Pipeline	1,150 LF	175 per foot	201,000
Inlet Structure	7	1,000 each	6,000
8th Street Pipeline	2,000	175	350,000
Inlet Structure	6	1000 each	6,000
		Subtotal	**563,000**
Engineering/Design		20 percent of subtotal	113,000
Administrative/Environmental		60 percent of subtotal	338,000
Contingency		20 percent of subtotal	113,000
		Total	**1,127,000**

Notes:
1. See notes in Table 3-1.

3.5.4 Zone 9 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed in Tenth Street from Cass Avenue to the drain inlets along Pacific Avenue as shown on Figure 11 in Appendix A. This area currently has no curbs and gutters. The storm drain would reduce the flooding currently experienced in Zone 9 along Tenth Street by conveying the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. This project would include installing drop inlets at the intersection of Tenth and Cass to collect flows accumulating there, as reported by residents.

Benefits and Constraints

The advantages include improving the drainage in the Cass Avenue and Tenth Street intersection. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-5. The total cost for this alternative is approximately $148,000.

Table 3-5: Zone 9 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
10th Street Pipeline	410 LF	175 per foot	72,000
Inlet Structure	2	1,000 each	2,000
		Subtotal	**74,000**
Engineering/Design		20 percent of subtotal	15,000
Administrative/Environmental		60 percent of subtotal	44,000
Contingency		20 percent of subtotal	15,000
		Total	**148,000**

Notes:
1. See notes in Table 3-1.

3.5.5 Zone 10 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed along 13th Street from Cass Avenue to Pacific Avenue, and then north along Pacific Avenue to the drain inlets at 12th Street as shown on Figure 12 in Appendix A. This storm drain would reduce the flooding currently experienced in Zone 10 by conveying the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. This project would include installing drop inlets at the intersection of 13th Street and Cass Avenue and at 13th Street and Pacific Avenue to collect flows accumulating there as reported by residents.

Benefits and Constraints

The advantages include improving the drainage along 13th Street at Cass Avenue and the Pacific Avenue intersections. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-6. The total cost for this alternative is approximately $192,000.

Table 3-6: Zone 10 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
13th Street Pipeline	525 LF	175 per foot	92,000
Inlet Structure	4	1,000 each	4,000
		Subtotal	**96,000**
Engineering/Design		20 percent of subtotal	19,000
Administrative/Environmental		60 percent of subtotal	58,000
Contingency		20 percent of subtotal	19,000
		Total	**192,000**

Notes:
1. See notes in Table 3-1.

3.5.6 Zone 11 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed along Pacific Avenue between 15th and 17th Streets as shown on Figure 12 in Appendix A to convey storm water runoff that collects along the roadside in these areas. Drain inlets would be constructed at the 15th and 17th Street intersections to convey the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. The runoff would discharge into the existing drain inlet and outfall at 16th Street.

Benefits and Constraints

The advantages include improving the drainage along Pacific Avenue in this area. However, by improving the drainage in this area it may cause a slight increase in the peak flows at the outfall, since there is no longer flooding and pooling of stormwater to reduce flows into the outfall. In all cases, flooding should be reduced. The outfall capacity should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-7. The total cost for this alternative is approximately $152,000.

Table 3-7: Zone 11 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Pacific Avenue Pipeline	410 LF	175 per foot	72,000
Inlet Structure	4	1,000 each	4,000
		Subtotal	**76,000**
Engineering/Design		20 percent of subtotal	15,000
Administrative/Environmental		60 percent of subtotal	46,000
Contingency		20 percent of subtotal	15,000
		Total	**152,000**

Notes:
1. See notes in Table 3-1.

3.5.7 Zone 12 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed along a private easement at 2000 Circle Drive and 1999 Cass Street as shown on Figure 12 in Appendix A. A local sump area occurs near the front of 2000 Circle Drive, causing drainage from the Circle Drive area to pool there. This drainage currently overtops the curb or flows into the driveway and flows through the side yard to Cass Street. This drainage should be collected in a drop inlet and conveyed in a drainage pipe to Cass Street for discharge. Flow would continue as overland flow westward along 19th or 20th Streets as in the current condition.

Benefits and Constraints

The advantages include preventing residential flooding at 2000 Circle Drive. A drainage easement would be required to construct the drain pipeline through the property. By improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-8. The total cost for this alternative is approximately $83,000.

Table 3-8: Zone 12 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Circle Drive Drain Pipeline	200 LF	175 per foot	35,000
Inlet Structure	2	1,000 each	2,000
Easement Acquisition	1,000 ft^2	5 per ft^2	5,000
		Subtotal	**42,000**
Engineering/Design		20 percent of subtotal	8,000
Administrative/Environmental		60 percent of subtotal	25,000
Contingency		20 percent of subtotal	8,000
		Total	**83,000**

Notes:
1. See notes in Table 3-1.

3.5.8 Zone 15 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed in Stuart Avenue from Richard Avenue to the existing storm drain ditch just west of Ocean Street, as shown on Figure 13 in Appendix A. This storm drain would include installation of drop inlets at the intersections to collect runoff from Richard, Santa Barbara, and Orville Avenues.

Benefits and Constraints

The advantages include improving the drainage in the Zone 15 area by conveying runoff through buried pipes instead of via overland flow along the streets. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-9. The total cost for this alternative is approximately $192,000.

Table 3-9: Zone 15 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Stuart Street Pipeline	500 LF	175 per foot	88,000
Inlet Structure	8	1,000 each	8,000
		Subtotal	**96,000**
Engineering/Design		20 percent of subtotal	19,000
Administrative/Environmental		60 percent of subtotal	58,000
Contingency		20 percent of subtotal	19,000
		Total	**192,000**

Notes:
1. See notes in Table 3-1.

3.5.9 Zone 16 Storm Drain Pipeline and Inlets

Storm drain improvements are proposed in two areas along Hacienda Drive as shown on Figure 13 in Appendix A. The existing drain along Ocean Avenue at Hacienda does not provide adequate drainage from the Cerro Gordo Avenue area and from the hillside south of Hacienda Drive. Before development, runoff from the hillside south of Hacienda Drive would travel through existing swales from the hillside to Willow Creek. Many homes have been constructed along the creek, which have altered the drainage into the creek. Some swales, although altered by paving or landscaping, have been retained between houses. In other areas, drain pipelines have been installed from the southern edge of Hacienda to the creek. Drainage improvements include drop inlets and drain pipes along the southern edge of the road to collect and convey runoff to existing creek outfalls. Runoff from the Cerro Gordo Avenue area is conveyed west, via overland flow, to the existing drain at Ocean Avenue. The runoff from the hillside for areas east of the Cerro Gordo area should be conveyed to the existing private storm drain pipeline outfall at 464 Hacienda. The existing outfall capacity is not known and would need to be verified during predesign of the improvements. The cost for a new outfall is included in the cost estimate. An easement through the property would be required for the acquisition and or replacement of the existing pipe.

Benefits and Constraints

The advantages include improving the drainage in the Hacienda Drive area. However, by improving the drainage in this area it may cause a slight increase in the peak flows at the downstream outfalls. This flow increase is not expected to cause downstream flooding, but the capacity of the two existing outfalls and impact of the flow change should be verified during design of the improvements. An easement would be required at the existing outfall location near 464 Hacienda.

Alternative Costs

The breakdown of costs is shown in Table 3-10. The total cost for this alternative is approximately $407,000.

Table 3-10: Zone 16 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Cerro Gordo/ Hacienda Ave. Pipeline	500 LF	175 per foot	88,000
Inlet Structure	3	1,000 each	3,000
Hacienda Ave Pipeline	500 LF	175 per foot	88,000
Inlet Structure	3	1,000 each	3,000
Outfall Pipeline	100 LF	175 per foot	18,000
Easement Acquisition	500 ft^2	5 per ft^2	3,000
		Subtotal	**203,000**
Engineering/Design		20 percent of subtotal	41,000
Administrative/Environmental		60 percent of subtotal	122,000
Contingency		20 percent of subtotal	41,000
		Total	**407,000**

Notes:
1. See notes in Table 3-1.

3.5.10 Zone 19 Storm Drain Pipeline and Inlets

Two new storm drain pipelines are proposed for Zone 19 as shown on Figure 14 in Appendix A. A new storm drain pipeline is proposed along private property between Gilbert and Shearer Avenues to convey the peak runoff originating on the hillside east of Gilbert. The new pipeline would be constructed in an easement between the streets and would connect to the existing storm drain system at Shearer. The pipeline would carry discharge from the three existing 12-inch diameter culverts crossing Gilbert. Drop inlets would be constructed at Shearer to collect runoff flows from the north and south along Shearer Avenue. Flows would continue westward and cross Highway 1 in an existing drain culvert, discharging into the ditch and onto Mayer Street on the west side of the highway. Due to the large flows conveyed from Zone 19 along Mayer, a new storm drain is also proposed there. A junction structure and easement through private property may be required adjacent to Highway 1 where the existing culvert discharges the Zone 19 flows conveyed from the east side of the highway. The new storm drain pipeline would convey the runoff along Mayer to the existing drain inlets along Studio Drive.

Benefits and Constraints

The advantages include improving the conveyance of runoff from the hills east of Gilbert. Since the runoff will be carried in a pipeline, it will not enter the existing culvert inlet at Shearer, reducing the ponding and flooding that currently occurs there. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-11. The total cost for this alternative is approximately $273,000.

Table 3-11: Zone 19 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Gilbert Drain Pipeline	500 LF	175 per foot	88,000
Inlet Structure	1	1,000 each	1,000
Mayer Ave Pipeline	200 LF	175 per foot	35,000
Junction Structure	1	3,000 each	3,000
Easement Acquisition	2000 ft^2	5 per ft^2	10,000
		Subtotal	**137,000**
Engineering/Design		20 percent of subtotal	27,000
Administrative/Environmental		60 percent of subtotal	82,000
Contingency		20 percent of subtotal	27,000
		Total	**273,000**

Notes:
1. See notes in Table 3-1.

3.5.11 Zone 21 Storm Drain Pipeline and Inlets

A new storm drain pipeline is proposed between Gilbert and Ocean Avenues as shown on Figure 14 in Appendix A to convey the peak runoff originating on the hillside east of Gilbert. The runoff from this area currently passes along surface drain channels in private easements between houses, and along the street right of way. The storm drain pipeline would collect these flows and convey them below the ground surface to discharge on the west side of Ocean Avenue. The portion of the pipeline between Gilbert and Davies would be along private property between houses, and would require an easement. The remainder of the pipeline would be constructed in the street right of way along Davies and Haines Avenue. Drop inlets would be constructed at Davies, Shearer and Ocean Avenues to collect runoff flows from the north along these streets. The pipeline would connect to the existing culvert crossing Ocean Boulevard.

Benefits and Constraints

The advantages include improving the conveyance of runoff from the hills east of Gilbert. Since the runoff will be carried in a pipeline, it will not be carried along the streets as sheetflow, reducing the ponding and flooding that currently occurs due to the runoff. It is anticipated that collection of flows along Haines will reduce the runoff currently carried to Chaney and causing flooding there. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Alternative Costs

The breakdown of costs is shown in Table 3-12. The total cost for this alternative is approximately $263,000.

Table 3-12: Zone 21 Improvements Estimated Cost [1]

ITEM	QUANTITY	UNIT COST ($)	TOTAL ($)
Davies/Haines Street Pipeline	700 LF	175 per foot	123,000
Inlet Structure	6	1,000 each	6,000
Easement Acquisition	500 ft^2	5 per ft^2	2,500
		Subtotal	**132,000**
Engineering/Design		20 percent of subtotal	26,000
Administrative/Environmental		60 percent of subtotal	79,000
Contingency		20 percent of subtotal	26,000
		Total	**263,000**

Notes:
1. See notes in Table 3-1.

3.5.12 Summary of Costs

Table 3-13 is a summary table of the costs for proposed projects in each of the drainage zones. If all the proposed alternatives were implemented to meet the 10-year flood protection standards, the total cost is approximately $3.4 million. The additional cost for providing 100-year flood protection for the area near B Street at Cayucos Creek is about $1.9 million.

Table 3-13: Cayucos Drainage Improvements Summary Cost Table

DRAINAGE ZONE	TOTAL ($)
3: 10-year flood protection	$420,000
3: 100-year flood protection	$1,880,000
5	$117,000
8	$1,127,000
9	$148,000
10	$192,000
11	$152,000
12	$83,000
15	$192,000
16	$407,000
19	$273,000
21	$263,000
Total Cost (excluding 100-year flood protection project)	**$3,374,000**
Total Cost (including 100-year flood protection project)	**$5,254,000**

3.5.13 Proposed Projects

The most serious flooding in the community takes place in Zone 3 at the merging floodplains of Cayucos and Little Cayucos Creek west of Highway 1. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creeks due to high water levels. Drainage from a tributary to Cayucos Creek flows into this area and can also cause flooding. To reduce the flooding in this area,

a new storm drain pipeline could be constructed to convey the Cayucos Creek tributary flows directly to the creek, rather than flowing in the channels and as overland flow across the floodplain area. This would reduce flood flows in the B Street area by 85 percent and prevent local flooding caused by the tributary flows, but would not change the floodplain for the larger storm events which cause overtopping of the Cayucos Creek banks. A levee and pump station would be required to protect the B Street area against flooding in these conditions.

A number of nuisance drainage and flooding problems occur within the drainage zones due to the topography, the lack of an underground storm drain system, and the lack of a consistent, organized network of curbs and gutters within the community. An underground storm drain conveyance system would reduce the amount of overland flow runoff in downstream areas, consequently reducing the flooding problems created with overland flow.

The development of a consistent curb and gutter network could also reduce nuisance flooding. On streets where curbs are currently established, curbs and gutters should be required for infill development to create a continuous system and to prevent flow onto properties. Rolled asphalt sections may also be required along driveways, where garages and driveways are lower than the roadway.

Each alternative will work independently to solve localized drainage problems. Residences within one of the drainage zones described above could organize to implement a project in their section of town and not be impeded by the lack of action of others. The highest priority projects in terms of potential residential and commercial flood damages are the 10-year and 100-year level of protection for Zone 3. The remaining projects and their priority for implementation are dependent upon the needs of the individual residents and their desire to reduce damages and/or nuisance flooding problems caused by inadequate drainage facilities.

Chapter 6 discusses the implementation strategy for planning, designing, constructing and phasing the recommended project.

3.6 Hillside Runoff and Sedimentation

Reserves from the County's General Fund are normally not used for the construction of projects protecting private property, unless there is a significant general or roadway benefit. In some cases, the reported residential drainage problems in the Cayucos area included sedimentation or mud occurring from hillside runoff. Where sediments and runoff leave one private property to enter another, as occurs in residential back yard areas from the adjacent upslope hillside, the District has no jurisdiction. Hillside runoff and sedimentation onto private properties along Richard Avenue and Hacienda Drive should be addressed by the individual property owner, and not the District. However, District staff is available to consult with the property owners, provide information on common drainage law, and provide basic information on conveying runoff from their property onto public right of way.

3.7 Additional Recommendations

All the natural drainage channels that convey flow from east to west experience some sediment deposition and vegetal growth. Existing natural or fabricated drainage channels should be kept free of obstructions such as fallen trees, debris, and sedimentation to maintain capacity in the drainage system. Primary responsibility for this maintenance should rest with the owners of the property through which the drainage channels pass since the County is not responsible for maintaining facilities on private property. If the drainage channels pass through public property, such as County roads, then the County's maintenance department would be responsible for removing impediments. The District should continue to provide leadership, advice and encouragement to property owners and local agencies to assume these responsibilities.

3.7.1 Participate in FEMA's Community Rating System Program

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) was implemented in 1990 by FEMA as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. Communities must individually apply for participation in the CRS program to receive insurance premium reductions. The CRS gives credit points for any of several designated activities within four distinct categories (Public Outreach, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness). Each CRS listed activity is worth a specified number of points. When all of a community's activities are verified, the achieved points are calculated and adjusted as necessary, according to the rules of the CRS. For each 500 points that can be verified, a community will receive one class reduction starting at class 9 all the way down to class 1. Each class translates to an additional reduction in insurance premiums of five percent for flood insurance policies within the special flood hazard area of that community. This is a voluntary program for communities.

All CRS participants must achieve a class of at least 9, which means they have accumulated a minimum of 500 points, and are therefore entitled to a five percent reduction in premiums. The maximum reduction in insurance premiums a community can receive would be 45 percent, if they achieved a class 1 rating. There are many things that each community can do to better prepare for and manage floods, accrue points in the CRS, further reduce flood insurance premiums, and prepare and protect its citizens from the damaging effects of floods.

All cities and towns should join CRS because of the economic benefits to the members of the community, and because it will heighten the flood hazard awareness and promote good floodplain management activities within the community. There are also proposals linking State and Federal programs to communities that engage in active floodplain management within the CRS program. It is also possible that more programs, either flood damage prevention or post-flood assistance, may be linked to participation in the CRS in the future.

The City of San Luis Obispo participates in the CRS and receives a ten percent discount for the Special Flood Hazard Area (SFHA) and a five percent discount for non-SFHA. The neighboring counties to San Luis Obispo County that participate in the CRS program include Santa Barbara, Monterey and Kern Counties. Monterey County currently receives a 20 percent discount for SFHA. Ventura and Kings County do not participate in the CRS program.

Reference the FEMA website at http://www.fema.gov/nfip/crs.shtm for documents on the CRS and for information on applying for the CRS.

3.7.2 Formation of a Drainage Facility Maintenance Department

Many of the drainage/flooding problems in Cayucos are exacerbated by inadequate maintenance of drainage facilities. Currently, the maintenance of drainage infrastructure located within public right of way for unincorporated communities in the County, including Cayucos, is the responsibility of the County Public Works Department. The limited availability of County staff and the large area of responsibility make it difficult for maintenance workers to become familiar with all drainage issues in the community. This means that the maintenance of some culverts and ditches are sometimes overlooked and, therefore, these culverts and ditches may end up becoming clogged during the rainy season. It is recommended that a facility maintenance district be formed to better maintain the drainage infrastructure in Cayucos. Responsibilities of the new maintenance district would include: (1) being the contact point for all resident complaints regarding drainage infrastructure in the community; (2) keeping an organized database of all new drainage infrastructure in the community including the size and capacity of culverts and storm drains, even if this infrastructure is installed by private property owners; (3) keeping a regular maintenance schedule that may involve multiple maintenance visits where needed; and (4) responding to drainage infrastructure repairs as needed. Having a localized facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the community.

3.7.3 Elevation Requirements and Mountable Berms

The location of a home is a key factor in the resulting drainage problems that are likely to be inflicted on it. Homes located below street grade and whose driveways slope down away from the road may experience flooding in the garage or home. This is because without an adequate curb/berm, the driveway may act to convey runoff from the street above to lower elevations and sometimes into the garage or home. **It is recommended that Cayucos and the County Planning Department mandate that the floor and garage elevation for all new home construction be one foot greater than the adjoining street grade. Driveways should slope down away from the home, towards the road. It is also recommended that Cayucos mandate the installation of a County standard mountable berm for all driveways/accesses to structures which are below the edge of pavement.**

3.7.4 Rolled Asphalt Berms

Rolled asphalt berm structures were found in isolated locations in Cayucos. While it would be incorrect to label such structures as curbs and gutters, berms can often be an effective means of containing runoff within the roadway and preventing it from flowing onto private property. However, the berms observed throughout the community were of varying heights, sometimes only 2-3 inches in height. These lower berms may do little to prevent localized flooding problems during large magnitude storm events.

It is recommended that rolled asphalt berms (Cal Trans Type E4 mountable berm with backsloped choker at a minimum of 6-inch above the gutter flowline) be used where berms are needed to control roadside runoff. Installation of rolled asphalt berms would cost a property owner approximately $20 per foot or approximately $1,000[5] for the County to install the berms in front of a 50-foot wide parcel. Resident complaints indicate many drainage problems within Cayucos could be resolved with the construction of berms to control water within the street right of way. However, it is important to note that there is a limit to the extent which berms can be installed without the eventual installation of a catchment and underground storm drain system. This is because berms restrict runoff to streets, reducing the amount of runoff that is infiltrated on private property, thus increasing the total volume of runoff. Berms have a finite capacity and once this capacity is reached, runoff will overtop the berms and flow onto private property. Catchments prevent overtopping of the berms. At the downstream end of a watershed, this volume can be quite substantial. Therefore, an underground storm drain system, an expensive improvement, is often necessary at the end of the drainage path.

Additionally, the piecemeal installation of berms can result in creating or exacerbating drainage problems at nearby properties. While the property owner that installs the berm may benefit, berms cause runoff to concentrate and can kick water off to neighboring and/or downstream properties.

3.7.5 Consolidate Urban Services

Consolidate urban services and facilities in Cayucos into a single comprehensive service district as recommended in the Estero Area Plan (updated November 2002). If the community, County and LAFCo work to consolidate services, then drainage should be included in the charter of this new district. This new district could serve as the lead agency in implementing the recommended alternatives in this report.

3.7.6 Neighbor Coordination

Many reported problems were caused by residents blocking historical drainage courses or removing drainage lines that conveyed runoff from higher elevations to lower elevations. These drain lines were installed by private residences in order to move water from the street or their property to public right of way. Filling in or removing drain lines causes runoff to pond in the back or side yards of the upstream properties. If drainage lines convey large amounts of street runoff (e.g. if the property is located at a low point in the street and the drain line is the only outlet), then the County or District would coordinate with the neighbors to reach resolution and

[5] Includes design, administrative, environmental and contingency.

restore the drain pipe. If a private drain line functions only to convey runoff from private property, then the County or District would not serve a mediator. The responsibility would fall on the neighbors to resolve the problem. Filling in drainage courses or removing drain pipes is discouraged by the District.

3.7.7 Hillside Runoff and Sedimentation

Reserves from the County's General Fund are normally not used for the construction of projects protecting private property, unless there is a significant general or roadway benefit. In some cases, the reported residential drainage problems in Cayucos included sedimentation or mud occurring from hillside runoff. Where sediment and runoff leave one private property to enter another, as occurs in residential back yard areas from the adjacent upslope hillside, the District has no jurisdiction. Hillside runoff and sedimentation onto private properties should be addressed by the individual property owner, and not the District. However, District staff is available to consult with the property owners, provide information on common drainage law, and provide basic information on conveying runoff from their property onto public right of way.

3.8 Summary of Recommendations

- If 100-year protection of the B Street area in Zone 3 is desired, review and/or update the Cayucos and Little Cayucos Creek flood insurance studies to identify levee heights and 100-year flood elevations to determine whether flood protection projects can be implemented to reduce flooding. Review of the studies could also examine the impacts of continuing sedimentation in the Ocean Avenue crossing at Little Cayucos Creek. **Discuss flood protection benefits compared to the project costs (and property assessment) with the community. Support for the project may not exist if damages due to flooding are less than the assessment to pay for the project.**
- Develop a selection process for prioritizing storm drain improvements and identifying the sources of funding for the improvements.
- Consider forming a special assessment district to fund drainage system improvements or amend the charter of one of the existing service areas or districts to include drainage responsibilities.
- Participate in FEMA's Community Rating System.
- Continue implementing the District curb and gutter policy, however, provide a drainage outlet in the sag to prevent water ponding.
- Obtain long-term permit for stream maintenance of District controlled right of way along streams.
- Establish maintenance responsibility and entity for flood prone areas on private property.
- Contact Caltrans to discuss locations where additional maintenance work is necessary at existing Caltrans culvert crossings

3.9 Cost Estimates

Project cost estimates have been provided in this report. More detail on the unit cost and quantity calculations are provided in Appendix E, Engineering Technical Memorandum. These cost estimates are preliminary and subject to revision based on more definition and detail of the recommended project. Construction cost adjustments for inflation will be required if the projects are implemented years from now.

CHAPTER 4 ENVIRONMENTAL FEASIBILITY ANALYSIS

Chapter Synopsis: This chapter discusses the environmental permitting and regulatory requirements for the proposed alternatives. An environmental technical memorandum was prepared for this study and is included in Appendix F. The technical memorandum will provide greater detail on the environmental methodology, analysis and alternatives.

4.1 Environmental Analysis Objective

The study investigated the potential environmental impacts, and also state and federal resource agency permit requirements. The objective was to conduct a "fatal flaw" preliminary environmental feasibility analysis on the proposed drainage and/or flood control mitigation alternatives described in Chapter 3. This analysis assessed the environmental impacts and constraints associated with the proposed alternatives. Each proposed alternative was examined for biological resources, cultural resources, water quality, and land use constraints likely to be present in each given area. Specifically the investigation included:

- Determination of whether project can be permitted
- Outline of the types of probable mitigation measures
- Outline of additional studies required for the next phase of implementation
- Determination of the level of California Environmental Quality Act (CEQA) documentation necessary (e.g. EIR, Negative Declaration, Categorical Exemption) for each alternative
- Identification of the applicable environmental regulatory requirements of jurisdictional agencies (e.g. U.S. Army Corps of Engineers, California Department of Fish and Game, Regional Water Quality Control Board)
- Outline of regulatory permitting requirements and approximate schedule for obtaining permits

4.1.1 Environmental Analysis Methodology

Project alternatives were analyzed for environmental constraints that would prevent agency approval, increase costs (particularly for mitigation), or delay the project schedule. Existing documentation relative to each resource topic (e.g., biological resources, cultural resources, water quality, and land use) was examined to help determine the likelihood of constraints.

4.1.2 Biological Resources

A reconnaissance level site assessment was conducted on June 30, 2003 to investigate biological resources in the project area. The assessment area included the proposed project sites and bordering areas. Each site was generally assessed for its potential to support sensitive biological and botanical resources. Information from the California Natural Diversity Database was combined with recent experience on other projects in the area to determine the potential for sensitive species and their habitat in the project areas.

4.1.3 Cultural Resources

Data on file in the San Luis Obispo County Department of Planning and Building was used to determine if cultural resources have been identified in each project area. No standard record searches or site visits were conducted.

4.1.4 Land Use

The *San Luis Obispo General Plan, Estero Area Plan Update,* and *North Coast Planning Area Land Use Element and Local Coastal Plan* were reviewed to determine whether the proposed alternatives were

consistent with local policies. A Geographic Information System was used to examine the presence of prime farmland and farmland of local or state importance in the project area.

4.2 Environmental Analysis Results

4.2.1 Environmental Constraints

Table 4-1 summarizes the environmental constraints that may be encountered for each project alternative. Based on this preliminary analysis, major environmental constraints include diversion of jurisdictional waters (Zone 3 alternative) and potential impacts to endangered/threatened species habitat (Zone 3 and Zone 16 alternatives).

4.2.2 Permit Requirements

An assessment of the state and federal environmental permits that may be necessary for each project alternative is provided in Table 4-2. An estimate of the timeframe typically required to obtain each type of permit is summarized in Table 4-3. Based on the level of research performed for this analysis, most project alternatives would be possible to permit if mitigation measures are implemented to avoid environmental constraints. The Corps, Coastal Commission, and USFWS may not approve the alternative for Zone 3 due to potential impacts to jurisdictional waters and sensitive species habitat.

4.2.3 Potential Mitigation

Potential impacts to environmental resources may result from the proposed project alternatives. Those impacts may require implementation of mitigation measures to protect sensitive, threatened or endangered species and cultural resources. Table 4-4 summarizes the potential mitigation measures for each alternative.

Table 4-4: Potential Mitigation Requirements

ALTERNATIVE	POTENTIAL MITIGATION
Zone 3 and Zone 16 Improvements (work within the creek bank)	• Preconstruction surveys for sensitive species • Construction monitoring where sensitive species habitat is found • Erosion and sediment control measures during construction • Record search for cultural resources; surface surveys during ground disturbance depending on results of record search; identify exclusion zones for cultural resources; Recovery and treatment could be required depending on findings.

4.2.4 Additional Studies and Surveys

The following studies/surveys will need to be performed in order to begin the permitting phase of the project:

- Habitat assessments
- Sensitive species surveys
- Cultural resource record searches

Table 4-1: Environmental Constraints

ALTERNATIVES	BIOLOGICAL	CULTURAL RESOURCES [6]	LAND USE
Zone 3			
Install a pressurized storm drain pipeline running parallel to Highway 1 that would bypass existing drainage facilities. The pipeline would divert the Cayucos Creek tributary and convey flow directly to Cayucos Creek. The pipeline would require a new outfall in the bank of Cayucos Creek. The existing drainage channel downstream of the pipeline would only collect local drainage and the existing culvert discharging into Cayucos Creek may require the installation of a flap gate to prevent backflow into the local channel system.	Diversion of tributary and construction of new outfall in creek bank may affect endangered/threatened species habitat, including steelhead, tidewater goby, and California red-legged frog (CRLF). Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, nesting birds in riparian zones, pallid bat, and sensitive plants. If endangered/threatened species habitat is determined to be present in the existing drainage channel downstream from the pipeline, approval from USFWS and NMFS may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	None	Diversion of the tributary may conflict with Policy 23 of the Policies For Environmentally Sensitive Habitats from the Coastal Plan Policies. Unless there are no other feasible methods for protecting existing structures in the floodplain, the Coastal Commission may not approve this alternative.
Construct a levee or berm and pump station along Cayucos Creek. The levee or berm would be approximately 8-feet high and 1,300-feet long and extend between Ocean Avenue and a point upstream of the Highway 1 crossing. The levee system would require a pump station to discharge local flow into creek. The pump station would be located near the existing culvert discharging into Cayucos Creek near Ocean Avenue and would require construction of a new outlet into Cayucos Creek. The pump station would require approximately one acre of disturbance during construction	Construction of levee or berm and pump station along Cayucos Creek may affect endangered/threatened species habitat, including steelhead, tidewater goby, and CRLF. Other sensitive species the may also be affected include: southwestern pond turtle, two-striped garter snake, nesting birds in riparian zones, pallid bat, and sensitive plants. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	None	None
Zone 5, 8, 9, 10, 11, and 15			
Install drop inlets and storm drain pipelines, ranging in length from approximately 310-feet to 2,000-feet, along existing roads within the public right-of-way. Drains will connect to existing outlets, which do not require improvements.	None	None	None
Zone 12, 19, & 21			
Install drop inlets and storm drain pipelines ranging from approximately 200-feet to 700-feet along existing roads within the public right-of-way and between houses on private land. Drains will connect to existing outlets, which do not require improvements.	None	None	None

[6] Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building. No standard record searches or site visits were conducted.

ALTERNATIVES	BIOLOGICAL	CULTURAL RESOURCES [6]	LAND USE
Zone 16			
Install drop inlets and storm drain pipelines along Hacienda Drive. A small section of one storm drain will cross between houses on private land and connect to an existing outlet to Old Creek that will require improvements. The second storm drain stays within the public right-of-way and connects to an existing drainage near Ocean Avenue that does not require improvements.	Improvements to outfall in Willow creek bank may affect threatened species habitat, including steelhead and CRLF. Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, nesting birds in riparian zones, pallid bat, and sensitive plants. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	None	None

Table 4-2: Permit Assessment

ALTERNATIVE	PROJECT DESCRIPTION	CEQA[7] DOCUMENT	SHPO 106[8]	CDFG 1601[9]	CORPS 404 PERMIT[10]	USFWS SECTION 7[11]	NMFS SECTION 7[12]	RWQCB 401[13]	SWRCB GENERAL PERMIT[14]	SWRCB PHASE II SWMP[15]	CCC CDP[16]	APCD ATC/PTO[17]	NOTES
Zone 3													
Install an approximately 600-foot long pressurized storm drain pipeline bypassing existing drainage facilities.	For flooding reduction in a 10-year event; divert the Cayucos Creek tributary and convey flow directly to Cayucos Creek; requires a new outfall in the bank of Cayucos Creek; may require the installation of a flap gate near Ocean Avenue to prevent backflow of Cayucos Creek into existing local channel system downstream of the pipeline.	ND[18] (see notes)	Possibly (see notes)	Yes	Yes	Possibly (see notes)	Possibly (see notes)	Yes	Yes	No	Yes	No	Because project has the potential to affect sensitive species or their habitat, a ND/MND will be required. The Corps will consult with the NMFS and USFWS if threatened/endangered species could be affected by the new outfall construction and/or operation or the creek diversion. A 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will be required for the Corps permit. Depending on the result of a cultural records search, Section 106 consultation may be required.
Construct a levee or berm approximately 8-feet high and 1,300-feet long along Cayucos Creek and pump station near the Ocean Avenue bridge.	For flooding reduction in a 100-year event; levee or berm would extend between Ocean Avenue and a point upstream of the Highway 1 crossing; levee system would require a pump station to discharge local flow into creek through a new outlet into Cayucos Creek; pump station located near the existing culvert discharging into Cayucos Creek near	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Yes	No	Yes	Yes	Because project involves construction of new facilities, a ND/MND will be required. A Corps permit will be required if the new outfall is constructed below OHW. The Corps will consult with the NMFS and USFWS if threatened/endangered species could be affected by outfall construction and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.

[7] California Environmental Quality Act: Required if a state agency has to take action on a project; If the project does not qualify for an exemption, the compliance document is either a Negative Declaration or Mitigated Negative Declaration (ND) or an Environmental Impact Report (EIR)
[8] State Historic Preservation Office – Section 106 (Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building): Required if a project has the potential to impact cultural resources
[9] California Department of Fish and Game – 1601 Streambed Alteration Agreement: Required if a project has the potential to impact sensitive species or their habitat
[10] U.S. Army Corps of Engineers – 404 Permit: Required if a project involves work below the ordinary high water mark
[11] U.S. Fish and Wildlife Service – Section 7 Consultation: Required if a project has the potential to impact sensitive species or their habitat
[12] National Marine Fisheries Service – Section 7 Consultation: Required if a project has the potential to impact sensitive marine and anadromous fish species or their habitat
[13] Regional Water Quality Control Board – 401 Certification: Required if a project has the potential to discharge to surface water, ground water, or other water systems
[14] State Water Resources Control Board – National Pollutant Discharge Elimination System (NPDES) General Construction Permit: Required if a project involves ground disturbance of more than 1 acre
[15] State Water Resources Control Board – Phase II Storm Water Management Plan Revision: Required for potential discharges to surface water, ground water, or other water systems by small municipal separate storm sewer systems not covered by the Phase I program
[16] California Coastal Commission – Coastal Development Permit: Required if a project is located in the Coastal Zone or in streams that feed into the Coastal Zone
[17] San Luis Obispo County Air Pollution Control District – Authority to Construct and Permit to Operate: Required for projects with the potential to emit pollutants
[18] Negative Declaration or Mitigated Negative Declaration: Required if projects with impacts that are less than significant or less than significant with mitigation

ALTERNATIVE	PROJECT DESCRIPTION	CEQA[7] DOCUMENT	SHPO 106[8]	CDFG 1601[9]	CORPS 404 PERMIT[10]	USFWS SECTION 7[11]	NMFS SECTION 7[12]	RWQCB 401[13]	SWRCB GENERAL PERMIT[14]	SWRCB PHASE II SWMP[15]	CCC CDP[16]	APCD ATC/PTO[17]	NOTES
	Ocean Avenue; pump station would require approximately one acre of disturbance during construction.												
Zone 5, 8, 9, 10, 11, and 15													
Install drop inlets and storm drain pipelines ranging from approximately 310-feet to 2,000-feet.	Install drop inlets and storm drains within public right-of-way; drains will connect to existing outlets; no improvements are needed for the outlets.	Exempt (see notes)	No	No	No	No	No	No	No	No	Yes	No	The project qualifies for Class 1 CEQA categorical exemption because the alternative consists of minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Zone 12, 19, and 21													
Install drop inlets and storm drain pipelines ranging from approximately 200-feet to 700-feet long through public and private lands.	Install drop inlets and storm drains within public and between houses on private lands; drains will connect to existing outlets; no improvements are needed for the outlets.	ND (see notes)	No	No	No	No	No	No	No	No	Yes	No	Because project involves construction of new facilities, a ND will be required.
Zone 16													
Install drop inlets and storm drain pipelines through public and private lands.	Install drop inlets and storm drains within public right-of-way and between houses on private lands. Drains will connect to existing outlets. A small section of one storm drain will cross between houses on private land and connect to an existing outfall at Old Creek that will require improvements. The second storm drain will be within the public right-of-way and connect to an existing drainage near Ocean Avenue that does not require improvements.	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	No	No	Yes	No	Because project involves construction of new facilities and has the potential to affect sensitive species or their habitat, a ND/MND will be required. A Corps permit will be required if the new outfall is constructed below OHW. The Corps will consult with the NMFS and USFWS if threatened/endangered species could be affected by outfall construction and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.

Table 4-3: Permitting Timeframe

PERMIT	TYPICAL TIMEFRAME [1] (MONTHS)	NOTES
California Environmental Quality Act (CEQA)		
Exemption	< 1	
Negative Declaration (ND)	6 - 12	
California Department of Fish and Game (CDFG) 1601 Streambed Alteration Agreement	3 - 6	CEQA must be completed before the 1601 Agreement can be issued.
U.S. Army Corps of Engineers (Corps) Section 404		
Nationwide Permit	1 - 3	Section 7 and Section 106 consultations are required to be complete.
Individual Permit	12 - 18	National Environmental Policy Act (NEPA) compliance is required, which can take one year or more.
U. S. Fish and Wildlife Service (USFWS)/ National Marine Fisheries Service (NMFS) Section 7 Consultation		
Informal	1 - 3	
Formal	6 - 12	
State Historic Preservation Office (SHPO) Section 106 Consultation	6 - 12	
Regional Water Quality Control Board (RWQCB) 401 Certification	1 - 3	CEQA must be completed before the 401 Certification can be issued.
State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Construction Permit	< 1	A Storm Water Pollution Prevention Plan (SWPPP) must be prepared prior to construction and implemented during construction.
Coastal Commission Coastal Development Permit	6 - 12	Public controversy could delay this approval. Projects within original Coastal

PERMIT	TYPICAL TIMEFRAME [1] (MONTHS)	NOTES
		Commission jurisdiction require review at the state level. A federal consistency determination, which might further delay approval, is required for projects with federal agency involvement.
Air Pollution Control District (APCD) Permit to Construct/Permit to Operate	1 - 3	

Notes:
1. Timeframes do not include time required to perform pre-applications studies, to prepare required applications, and to complete prerequisite approvals.

CHAPTER 5 FUNDING ALTERNATIVES

Chapter Synopsis: This chapter provides a summary of funding options, including criteria for qualifying projects, available funds, and cost sharing formulas. This chapter also discusses recommended funding sources that match the types of proposed projects. A funding review technical memorandum was prepared for this study and is presented in Appendix G.

5.1 Overview of Funding Responsibilities

The District is the responsible agency for managing, planning, and maintaining historical drainage and flood control facilities in unincorporated areas of the District. It is the District's policy that funding for these services comes from two sources. Planning costs are typically advanced or funded through the District's general flood control fund, with the intentions that the costs are reimbursed by the Assessment District or benefiting zone. However, design and construction costs of drainage and flood control projects are the responsibility of the community or area that benefits from the capital improvement. If budget constraints prevent the District from providing funds to pay for the planning and design, and the local community is unwilling to pay, then the project will not be advanced until funds become available.

In some communities, local agencies (e.g. community services districts) are legally authorized to provide drainage and flood control services by the Local Agency Formation Commission (LAFCo). In these communities, the local agency is responsible for implementing projects and can implement projects with the District. There are several service districts and service areas in Cayucos, however none provides drainage services.

Funds to implement the drainage or flood control projects can be generated through various federal, state, and local sources through grants, cost sharing agreements, taxes, assessments and fees. This chapter provides a summary of funding options, including criteria for qualifying projects, available funds, and cost sharing formula. This chapter also discusses recommended funding sources that match the types of proposed projects.

5.2 Funding Sources

The various funding sources applicable to Cayucos are presented in this section. For more detail on the types of funding programs, reference the technical memorandum included in Appendix G.

5.2.1 Recommended Funding Strategy

While many of the recommended projects may involve the need to leverage funding from outside the local community, the strongest applicants for leveraged funding have an established and effective local funding program.

The sections in this chapter are organized to outline first, the local funding options that the District and lead agency can establish, and second the outside Federal and State funding options that may be accessed to "match" local funding sources and help implement projects. Because the local match is critical to accessing outside funding, it is highly recommended that the District and lead agency[19] in Cayucos begin to establish local funding mechanisms (even if these do not fully fund the recommended projects) in order to be more competitive for outside funds. The recommended local funding mechanisms include 1) grants, 2) taxes, 3) assessments, and 4) fees (property based and development impact). The creation of a local funding source, plus the potential procurement of Federal and State grants, establishes the framework for a comprehensive community funding

[19] A "lead agency" to represent Cayucos and carry out the recommended drainage improvements has not been approved. The lead agency representing the community would assume control of the projects at completion. The lead agency will be responsible for gaining a preliminary level of community support for projects prior to implementing the engineering planning phase.

program. This approach also acknowledges the realistic nature of public projects that no capital improvement of this magnitude can rely solely on grants.

5.2.2 LOCAL FUNDING

As discussed previously, the District is the responsible agency for programming drainage and flood control services. A lead agency would be responsible for the drainage and flood control services and would serve as the applicant and/or responsible agency for administering the funding options discussed in this chapter.

There are several options for providing funds to the communities involved in the Study. The options include grants, taxes, assessments, and fees. Most of the projects proposed in this study will be funded locally. With the exception of the levee project proposed to contain the 100-year flood event on Cayucos Creek, the storm drain projects would most likely be funded by taxes, fees and assessments.

5.2.2.1 Special Taxes

Taxes are the most common means for a government to raise revenue. An existing tax can be raised, or a new tax can be levied on residents in a district to fund flood control projects. By definition, this is a special tax requiring approval from two thirds of the electorate (residents). If approved, the revenue generated would be allocated specifically for drainage and flood control projects in the district. It would be the responsibility of the district to determine where those funds would be spent.

This form of revenue requires all residents to pay the tax regardless of benefits received and the special tax formula does not need to be related to benefits received from the proposed projects. In order to establish the special tax, the District would need to develop and adopt a formula; the board of supervisors would approve placing the tax on the ballot. A special tax is approved by resident registered voters (except in the case of Mello-Roos CFD tax which can be approved by property owners in uninhabited areas). Figure 1 in Appendix G illustrates the special tax adoption process.

5.2.2.2 Benefit Assessments

A benefit assessment is a charge levied on a property to pay for public improvements or services that benefit the property. The difference between an assessment and a tax is that benefit assessment formula must quantify the relationship between the assessment charged and the benefit received by the property (if a property does not benefit, it cannot be assessed). The application of this funding mechanism would likely limit assessments to those properties within the immediate vicinity of constructed improvements.

All new assessments must conform to the requirements of Proposition 218, which was passed in November 1996. Proposition 218 specifically requires that property owners (not registered voters) be allowed to vote on new benefit assessments. New assessments may be approved by a simple majority approval of the property owners, with votes weighted in proportion to the assessment proposed.

In order to implement a new assessment, the lead agency must define those parcels that receive benefit and define the method of assessment in a Basis of Design Report. Figure 2 in Appendix G illustrates the benefit assessment adoption process.

5.2.2.3 Property-Based Fee

A property-based user fee is a charge levied on a property to pay for public improvements or services that are used by that property. The difference between an assessment and a user fee is that assessments rely on a demonstration of special benefit (which can be hard to prove) while user's fees require demonstration of use. In the case of drainage facilities, a user fee allows an agency to collect revenue from properties that contribute runoff into the system but may not flood because of their location.

A user fee can be structured proportionally to the amount each parcel uses the flood control facilities rather than how much each property benefits from the services or improvements provided. This allows program costs to be spread over a larger customer base. For flood control work, user fees are typically related to impervious area on the property, which can be equated to runoff. Like the benefit assessment, a user fee may also be implemented by a 50% vote; however, before the vote may be initiated, a noticed protest hearing must take place and less than 50% written protest must be received.

In order to implement a new user fee, the lead agency must define those parcels that use the various drainage facilities and define its method of calculating a fee proportional to use. Figure 3 in Appendix G illustrates the user fee adoption process.

There is current legislative effort aimed at exempting storm drainage fees from the Proposition 218 balloting test. Should this effort be successful, property based fees could be established with a fee study and protest hearing, as described for the Development Impact Fee below.

5.2.2.4 Development Impact Fee

Government Code Section 66000 et.seq., allows the County to collect development fees to fund the installation of storm drain infrastructure necessary to offset the impacts of development. Development Impact Fees are tied to either General Plans or Capital Improvement Programs approved by the County. As regular updates of the General Plan and/or Capital Improvement Programs, additional storm drain infrastructure is identified to support the new developments and projects. The fees cannot be used to correct existing problems; although they can be used to fund a "fair share" of new projects. The collection of fees in lieu of the installation of curb, gutter and sidewalks in problematic locations must be approved by District Board of Supervisors as a new and separate action.

Development Impact Fees are not subject to vote. They can be approved by a majority of the Board of Supervisors or the Board of Directors after a protest hearing. Figure 4 in Appendix G illustrates the adoption process.

The implementation of a Development Impact Fee in Cayucos may not benefit the community since it is nearly built out. However, redevelopment and larger remodels (improvements that exceed a certain percentage of the current property home value) could provide the nexus for collecting impact fees.

5.2.3 Outside (Leveraged) Funding Sources

Federal and State programs (e.g. cost sharing agreements or grants) provide an opportunity for communities to reduce the total project cost that will be funded through taxes, assessments, and fees. Grant applications often require detailed information regarding the project, the impact on the community and the environment, and project costs. Additionally, grant distributors prefer projects that provide multiple benefits including environmental restoration. Projects compete for existing funds and a majority of applications are not accepted because of this.

Once a grant is appropriated to a project, the recipient is required to complete additional paperwork including invoices, status reports, and project closeout reports. Grant management adds to the overall project costs and not all grant management costs are guaranteed to be recovered (not included as matching funding for project costs).

5.2.3.1 U.S. Army Corps of Engineers: Flood Hazard Mitigation and Riverine Ecosystem Restoration Program

Informally known as "Challenge 21," this watershed-based program focuses on identifying sustainable solutions to flooding problems by examining nonstructural solutions in flood-prone areas, while retaining traditional measures where appropriate. Eligible projects will meet the dual purpose of flood hazard mitigation and riverine ecosystem restoration.

Projects include the relocation of threatened structures, conservation or restoration of wetlands and natural floodwater storage areas, and planning for responses to potential future floods.

The Corps requires that the local sponsor[20] assist in the preparation of the planning, environmental, and design documents to ensure that the communities are involved in the project development and selection process. This requires the local sponsor to have an active role throughout the entire Corps civil works process, which can last up to seven years or more. The local sponsor is also expected to share in the cost of the project planning, design and construction (cost sharing depends on the program, but can be as high as 50 percent of the project). The local sponsor financial contribution can be in the form of in-kind service (e.g. staff time), which would offset the cash contribution requirements, but some of these costs would be in addition to the requirements defined by the Corps process. The local sponsor will incur project costs that are deemed ineligible and cannot be used as part of the local sponsor financial contribution. These costs are typically project management costs incurred for administrative tasks such as management of staff, preparation of invoices, etc. Refer to Appendix G for more detail on local sponsor cost sharing responsibilities for Corps sponsored projects.

The amount of structural and non-structural damage experienced by residences and business in Cayucos may not qualify as a Federal project based on the Corps' benefit to cost ratio formula (the damages must be greater than the project costs). The Corps would make this determination following the completion of an Economic Analysis as part of a Feasibility Study. However, based on the delineation of the FEMA 100-year floodplain, Federal involvement would only be recommended for the proposed levee project along Cayucos Creek.

5.2.3.2 U.S. Army Corps of Engineers: Continuing Authorities Program (CAP)

Congress has provided the Corps with a number of standing authorities to study and build water resources projects for various purposes, and with specified limits on Federal money spent for a project. The benefit with CAP projects is that specific congressional authorization is not needed. However, the requirements of a local sponsor and the economic benefits described above apply to CAP funded projects. The potential CAP funding available for Cayucos or Little Cayucos Creek include:

- Flood Control Projects – Section 205 of the 1948 Flood Control Act (FCA), as amended: Local protection from flooding by the construction or improvement of flood control works such as levees, channels, and dams. Non-structural alternatives are also considered.
- Emergency Streambank and Shoreline Restoration – Section 14, 1946 FCA, as amended: Allows emergency streambank and shoreline protection to prevent damage to public facilities, e.g., roads, bridges, hospitals, schools, and water/sewage treatment plants.
- Snagging and Clearing for Flood Control – Section 208, 1954 FCA, as amended: Local protection from flooding by channel clearing and excavation, with limited embankment construction by use of materials from the clearing operations only.
- Aquatic Ecosystem Restoration – Section 206, Water Resources Development Act (WRDA) of 1996: Carries out aquatic ecosystem restoration projects that will improve the quality of the environment, are in the public interest, and are cost effective.

[20] A local sponsor is typically the local flood control agency or district responsible for providing drainage and flood control. Local sponsors share in the cost for planning, designing and constructing a project with the Corps.

The Federal funding level and the local sponsor (non-Federal) funding requirements are summarized below. Local sponsors are expected to pay for at least 25 percent of the total project costs on Federally sponsored projects.

- Flood Control Projects - Federal share may not exceed $7 million for each project. Required non-Federal match: 50 percent of the cost of the project for structural measures and 35 percent of the cost of the project for nonstructural measures.
- Emergency Streambank and Shoreline Restoration - Federal share may not exceed $1 million for each project. Non-Federal share of total project costs is at least 25 percent.
- Snagging and Clearing for Flood Control – Federal share may not exceed $500,000 for each project. Required 50 percent non-Federal match including all costs in excess of the Federal cost limitation.
- Aquatic Ecosystem Restoration – Federal share is limited to $5 million. The non-Federal share is 35 percent (including studies, plans and specifications, and construction).

5.2.3.3 California Department of Water Resources: Urban Streams Restoration Program

The objectives of this program are to assist communities in reducing damages from streambank, watershed instability and floods while restoring the environmental and aesthetic values of streams, and to encourage stewardship and maintenance of streams by the community. Objectives of the program are met by providing local governments and citizen's groups with small grants and technical assistance for restoration projects, to encourage all segments of local communities to value natural streams as an amenity, and to educate citizens about the value and processes taking place in natural streams.

Grants can fund projects as simple as a volunteer workday to clean up neighborhood steams, or projects as complex as complete restoration of a streams to its original, natural state.

- The Department of Water Resources is in the process of amending the regulations for the program, including raising the grant cap from $200,000 to $1 million
- All potential projects must have two sponsors: a local agency and a community group.

5.2.3.4 State Water Resources Control Board: Proposition 13 Watershed Protection Program

This program provides grants to municipalities, local agencies, or nonprofit organizations to develop local watershed management plans and/or implement projects consistent with watershed plans. Grants may be awarded for projects that implement methods for attaining watershed improvements or for a monitoring program described in a local watershed management plan in an amount not to exceed five million dollars per project. These grants could be used to reduce chronic flooding problems or control water velocity and volume using vegetation management or other nonstructural methods in Cayucos.

5.2.3.5 California Department of Transportation: Cooperative Drainage Projects

The California Department of Transportation (Caltrans) has established a process for cost sharing of drainage projects being implemented by a local agency that will benefit Caltrans facilities. Cost sharing would include the planning, design, and construction of drainage projects. The process for applying for a Cooperative Agreement is detailed in the Cooperative Agreement Manual. The cost to Caltrans is based on the benefit received from the project.

Caltrans has been approached concerning these drainage problems and has acknowledged that it would be willing to cost share in solutions to drainage problems adjacent Highway 1.

5.2.3.6 Governor's Office of Emergency Services: Flood Mitigation Assistance Program

FEMA provides funds on a yearly basis for each of the states to administer Flood Mitigation Assistance (FMA) grants. In California, the Governor's Office of Emergency Services administers these grants. The purpose of these grants is to provide local communities with funds to alleviate reoccurring flooding problems and to reduce claims on the National Flood Insurance Fund (NFIF). There are three types of grants available:

- FMA Planning Grants
- FMA Project Grants
- FMA Technical Assistance Grants

All projects that address flooding issues for areas within a Special Flood Hazard Area (SFHA)[21] are eligible for both FMA Planning and Project grants. In order to receive a FMA Project grant, a Flood Mitigation Plan (FMP) must be completed. A draft FMP has been submitted to the Office of Emergency Services (OES) for review and comment. The County anticipates an approved FMP by the end of calendar year 2004. The FMA Planning Grant can be used to fund the completion of the FMP. Refer to the Funding Assistance Technical Memorandum in Appendix G for more detail on typical grant eligibility and administrative requirements.

5.3 Recommended Funding Strategy

There are several funding opportunities available for the alternatives identified in this report, but the likelihood of receiving enough grant funding for all project costs is unlikely. As stated previously, the local lead agency will need to fund the planning, permitting, environmental compliance, design and construction for all projects.

The lead agency should establish local funding mechanisms (even if these do not fully fund the recommended projects) in order to be more competitive for outside funds. The recommended local funding mechanisms include development impact fees, assessments, cost sharing agreements and grants. The lead agency will be supported by the District in their efforts. Different strategies should be investigated for funding the proposed 100-year levee flood protection project, versus the storm drain projects.

Development Impact Fee

The lead agency should collect development fees on new development, redevelopment and larger remodels to fund the installation of storm drain infrastructure necessary to offset the impacts of development.

Benefit Assessments

A benefit assessment is one possible approach for generating funding for the proposed projects. The proposed 10-year and 100-year improvements in Zone 3 should be funded through a benefit assessment. The proposed pipeline diverting Cayucos Creek tributary flow away from B Street would reduce the potential for flooding in the B Street, Ash Street and Cayucos Creek Road area. One could argue that all residences and business located between Cayucos Drive and B Street would benefit from diverting flow away from the drainage channels in B Street. These parcels would be assessed to pay for the improvements.

The proposed alternative to mitigate 100-year flooding from Cayucos Creek will benefit businesses, community parks, schools, residences and the downtown area of Cayucos. The benefit assessment formula would assume that all property owners and businesses currently within the 100-year floodplain would pay a share of the project.

[21] Any area within the 100-year flood plain as defined by FEMA is within a SFHA.

A benefit assessment is proposed over a property-based fee because an assessment requires a demonstration of special benefit, while user's fees require demonstration of use. It could be demonstrated that the parcels benefit from the improvements.

Special Property Tax

Since the Cayucos Creek 100-year floodplain is fairly small and primarily includes public facilities, a special property tax could be considered to spread the project costs over the entire community. This special tax would require approval from two thirds of the electorate. The lead agency would need to campaign to gather public support and show that providing flood protection on Cayucos Creek benefits the entire community, primarily the downtown area.

Property Based Fee

To fund the construction of storm drain pipelines in the different zones, a property-based user fee may be more appropriate than an assessment fee and would also be easier to prove since a user fee allows an agency to collect revenue from properties that contribute runoff into the system, but may not flood because of their location. The user fee could be structured proportionally to the amount each parcel uses the storm drain facility, rather than how much each property benefits from the services or improvements provided. The user fee could be related to impervious area on the property, which can be equated to runoff. Higher elevation properties east of Ocean Avenue that may not flood would assist in funding the downstream storm drain system.

California Department of Transportation: Cooperative Drainage Projects

Caltrans will cost share projects implemented by a local agency that benefit Caltrans facilities. However, the projects proposed for Cayucos do not mitigate flooding on Highway 1. The argument for involving Caltrans in these projects is that the highway facilities concentrate and discharge runoff directly onto community streets. Caltrans failed to provide drainage facilities that divert runoff away from public streets, and therefore contribute partially to the existing problems in Cayucos. The culvert discharging flow adjacent to the elementary school is a prime example of the problems created by Caltrans' facilities.

U.S. Army Corps of Engineers: "Challenge 21" or CAP Funding

The average annual damages experienced by business and property owners in Cayucos due to flooding from Cayucos Creek will likely preclude Federal participation in this project because the expected damages would not be high enough to warrant Federal economic interest. The lack of a local sponsor to lead the effort to initiate a study with the Corps and the absence of a funding source to pay a share of the study costs provide additional reasons not to pursue Federal involvement.

California Programs: Urban Streams Restoration Program and Proposition 13 Watershed Protection Program

In order to leverage money generated through local assessments and fees, the lead agency should pursue available State programs or grants. The tenuous nature of these grants and programs renders these options as unpredictable. They should be pursued once a project has been defined, an objective has been established, and a lead agency and local community group have been established.

CHAPTER 6 IMPLEMENTATION STRATEGY

Chapter Synopsis: This chapter consists of the implementation strategy for constructing the drainage and flood control improvements. Recommendations are based on the alternatives discussed in Chapter 3. The preferred alternatives were determined by evaluating the different alternatives, ease of construction, easements and right-of-way requirements.

6.1 Local Control versus District Control

The most effective approach to improving drainage and flooding problems in each community is to identify the problems and then create a local entity to implement the solutions to solve those problems. The role of the District is to assist in determining the improvements necessary to reduce flooding, and then to assist the individual communities in implementing programs to improve flood protection.

The District will use its general funds to provide planning and programming assistance, so that local areas of benefit within the County can better understand the significant drainage problems they are facing and determine how those problems should be solved. However, the general property tax allocation provides the District with only about $550,000 per year in revenue. The District does not possess the programs, funds or staffing to address all the on-going flooding and drainage problems in the County.

The recommended projects for Cayucos totaled approximately $5.25 million. If the lead agency in Cayucos established a funding source, approximately $370,000 per year would have to be generated by the community in order to build all the projects and pay off a municipal bond[22].

The success of any project depends on the agreement between the District and the local agency advocating the project. In order for a project to proceed, it must be accomplished in a cooperative manner and must have property owner support.

6.1.1 CAYUCOS DRAINAGE DISTRICT

It is recommended that Cayucos consolidate urban services and facilities into a single comprehensive service district. If the community, County and LAFCo work to consolidate services, then drainage should be included in the charter of this new district. This new district could serve as the lead agency in implementing the recommended alternatives in this report. Otherwise, an existing County service area could assume drainage responsibility in Cayucos. At this point, there is no clear indication of whether a drainage service district would be supported by the community. Home owners must also be willing to fund a significant portion of the required capital costs. The potential for supplemental grant funding could reduce the financial burden on home owners, but grant funding is not guaranteed.

6.2 Zone 3 Improvements

The highest priority projects in terms of potential residential and commercial flood damages are the 10-year and 100-year flood protection projects for Zone 3. These two projects would protect Hardie Park, the community pool, businesses, private residences, and the planned downtown enhancement area from flooding caused by Cayucos Creek and its tributary. In terms of permitting and planning, these projects are also the most complicated.

It is recommended that the diversion pipeline be implemented using funding from a Caltrans Cooperative Agreement, leveraged by a local benefit assessment. It may also be possible to obtain State grant funding to

[22] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years.

assist in paying for the levee and pump station project, however, for the purposes of outlining implementation steps, grant funding is not assumed.

6.2.1 10-YEAR VERSUS 100-YEAR PROJECT

Constructing the diversion pipeline to route tributary flow away from the local drainage system to Cayucos Creek would reduce the 10-year storm runoff by approximately 83 percent. It is expected that the existing drainage system in Zone 3 will have sufficient capacity to convey the 10-year runoff generated west of Highway 1. The estimated project costs for the diversion pipeline is $420,000.

Implementing the 100-year project would require the construction of a levee or berm to contain the 1 percent flood event, and would also call for the construction of a pump station to discharge local flow into the creek. The local flow is the runoff generated in the B Street area but is unable to flow by gravity into the creek due to the high water surface elevation in Cayucos Creek. If the pump station is not constructed, then flooding would continue in the B and Ash Street area for storms greater than a 10-year event. The estimated project costs for the levee and pump station is $1,880,000. The total cost for both projects is approximately $2.3 million.

For the purposes of this discussion, it is assumed that the diversion pipeline is implemented first, then the levee system.

6.2.2 IMPLEMENTATION STEPS

6.2.2.1 Community Designates a Lead Agency

An existing or newly formed group needs to assume the role of lead agency. The lead agency representing the community would assume control of the project at completion. The lead agency will be responsible for gaining a preliminary level of community support for projects prior to implementing the engineering planning phase.

6.2.2.2 Lead Agency Prepares Basis of Design Report

The lead agency would fund and complete a Basis of Design Report within 15 months of start. The Basis of Design Report would include a description of the existing problems, proposed alternatives, recommended project, preliminary alignments, potential environmental impacts, and cost estimates.

Based on the engineering analysis, project cost estimates will be developed to determine the appropriate funding mechanism to construct and maintain the completed project. The cost estimates will continue to be refined and the level of accuracy will improve during the design phase. The Basis of Design Report should provide cost information in sufficient detail to initiate benefit assessment proceedings.

If the lead agency seeks Federal involvement with the Corps for the levee and pump station project, then this phase (referred to as the Feasibility Study Phase in Corps Civil Works process) would last approximately three to four years (if the Corps determines that there is Federal interest in the Reconnaissance Phase). More information on the Corps Civil Works process can be found in the Corps' January 2001, IWR Report No. 96-R-10 (revised) [http://www.iwr.usace.army.mil/iwr/products/reports/reports.htm].

6.2.2.3 Caltrans Cooperative Agreement

Every effort should be made to identify cooperative features as early as possible in the project development stage. Upon conception of a cooperative project, Caltrans and the lead agency should enter into an agreement as soon as possible to outline understandings as to responsibilities for the various phases of project development to be performed. A formal agreement should always be executed prior to incurring any costs for design environmental studies, right-of-way activities, reviews, etc.

Caltrans may request assurance that adequate funding exists prior to entering an agreement. Coordination should begin during the preparation of the Basis of Design Report, however, the agreement will likely not be signed until a benefit assessment is passed or other adequate funding source is identified.

6.2.2.4 Conduct Benefit Assessment Proceedings

The lead agency would conduct a benefit assessment proceeding for the properties that benefit from the improvements. It is assumed that only those properties within the Birch, B and Ash Street area benefits from Highway 1 improvements. The benefit assessment would be in place prior to moving forward with permitting, environmental compliance, and design. Property owner support is imperative to the success of this project. Without this support, the project will not proceed beyond the preparation of a Basis of Design Report.

If approved, the benefit assessments would be used to secure bonds that finance a portion of the project construction. Bonds are typically sold shortly after the project construction bids are received. Under most assessment proceedings, property owners are given the option to either pay-off the principal amount of their assessment prior to bond sale or to finance the assessment over time at the bond rate and term. Currently, rates for municipal bonds are on the order of 5 to 5.5 percent and terms are typically 20 to 25-years.

6.2.2.5 Design Project, Prepare Environmental Documents and Permits

If the community supported the project by approving a benefit assessment, then the lead agency would proceed with designing the project, preparing the appropriate environmental document and securing resource agency permits to construct the project. The duration for the design, environmental documentation, and resource agency permit process is approximately 2.5 years from the approval of a benefit assessment.

6.2.2.6 Advertise for Construction

The lead agency would advertise the project and oversee construction. It is assumed that the diversion pipeline would be constructed in the first phase, the levee and pump station improvements would be constructed in the second phase.

6.2.3 Cost Estimate

The total project cost for the proposed diversion pipeline, levee and pump station is approximately $2.3 million. Table 6-1, below, breaks out this estimate.

Table 6-1: Near Term Project Cost Estimate

ALTERNATIVE	COST ($)
Diversion Pipeline-10 year Event Protection	420,000
Levee and Pump Station Improvements-100 year event protection	1,880,000
Total	**2,300,000**

6.2.3.1 Local Cost Share

This section is included for discussion purposes only and will likely be revised as cost estimates are refined, cost sharing agreements are negotiated, and grants are awarded.

In order to determine the local cost share of the proposed projects, simplifying assumptions regarding Caltrans involvement must be made. Runoff generated from the Cayucos Creek tributary east of Highway 1 is discharged via a Caltrans culvert between Highway 1 and the elementary school. The concentration of runoff is the reason that current drainage channels and culverts along B Street surcharge and flood the surrounding streets. Caltrans should be responsible for conveying runoff from the Highway 1 culvert away from the community and not discharging into local drainage facilities.

Since the diversion pipeline would only convey runoff that originates east of Highway 1 and no runoff would be contributed from local drainage, one could argue that Caltrans should be responsible for 100 percent of the project costs. However, since Caltrans facilities do not currently flood, it is improbable that Caltrans would fund 100 percent of the project. For this discussion, it is assumed that Caltrans would contribute 50 percent of the diversion pipeline costs, or approximately $210,000.

Based on these simplifying assumptions, the local cost share to be funded via a benefit assessment would be $210,000, which equates to approximately $600 per parcel per year[23].

If the residences benefiting from this project calculate that their average annual damages due to flooding are less than the assessment to mitigate the flooding, then the community might conclude that risking flood damages is economically beneficial. In other words, the benefits gained are less than the cost of the project.

The levee and pump station project costs were approximately 4.5 times greater than the diversion pipeline, and the only external funding available to leverage against a local assessment are State programs or Federal cost sharing arrangements. Information on historical damage costs to residents and businesses were not collected for this report. If these damages exceed several thousand dollars on an average annual basis, then constructing a levee and pump station system would economically benefit the community. Otherwise, the average savings from a 100-year flood protection project are less than the annual assessment to pay for the project.

A discussion of flood protection benefits versus project costs should be conducted with the community in order to measure the interest in implementing a project. The discussion would explore whether the community is willing to financially support a project if the costs exceeded the benefits.

6.2.4 Timeframe for Improvement Implementation

Instead of approximating completion dates for the implementation steps, an estimated timeframe for each milestone was developed. In order to establish a completion date, add the cumulative durations to the initiation of the project. The timeframe is shown in Table 6-2. If this project was implemented from initiation to completion without delay, then the diversion pipeline and levee improvements could be completed in approximately seven to eight years. If the Corps planned, designed and constructed the project, the duration would increase to approximately ten years for completion. Implementing the diversion pipeline project only to protect against the more frequent 10-year storm event, the duration would reduce to approximately six years.

[23] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years. Also assumes that approximately 25 parcels in Cayucos would be assessed to pay for the improvements. The number of parcels will vary depending on the defined zone of benefits and how the assessment is conducted.

Table 6-2: Forecast Completion Dates for the Diversion Pipeline, Pump Station and Levee Project

MILESTONE	DURATION
Community Designates Lead Agency Role	9 months
Lead Agency Prepares Basis of Design Report	15 months
Benefit Assessment Election [1]	6 months
Caltrans Cooperative Agreement [1]	6 to 9 months
Design [2]	15 months
CEQA/ Resource Agency Permits [2]	24 months
Approvals and Advertise for Construction	4 months
Construct Diversion Pipeline	9 months
Construct Highway 1 Improvements	12 months
Total	**~ 7 to 8 years**

Notes:
1: Benefit assessment election and Caltrans agreement occur concurrently
2: Design and CEQA occur concurrently

6.3 Storm Drain Projects in All Other Zones

The phasing of storm drain projects would depend on the residents' desire to implement projects within each zone. Each proposed alternative works independently to solve localized problems within a specific zone. Therefore, neighbors within a drainage zone can organize to implement a project that benefits their area in the community. The implementation steps for the projects discussed in Chapter 3 of this report (with the exception of Zone 3), would generally follow the steps outlined below. The exception is the level of CEQA documentation discussed in Chapter 4 of this report. For example, the project proposed for Zone 16 includes retrofitting a creek outfall, which increases the level of CEQA documentation and resource permit approval. The majority of projects qualify for Class 1 CEQA categorical exemption because the alternatives consist of minor alterations to existing public facilities and do not have the potential to affect sensitive resources.

6.3.1 Implementation Steps

The implementation of a storm drain system in Cayucos would be similar to the process described above for the diversion pipeline improvement. The major and, from a funding perspective, most fundamental difference is that a storm drain typically only benefits properties located at a low point on a street where water ponds. However, a property based user fee (in lieu of an assessment) is more appropriate because the homes within a drainage zone contribute runoff conveyed in the storm drain and should therefore contribute a *pro rata* share of the costs.

6.3.1.1 Lead Agency Prepares Basis of Design Report

The lead agency, with support from the residents living within a zone, would fund and complete a Basis of Design Report within 9 months of start. The Basis of Design Report would include a description of the existing problem, proposed alternatives, recommended project, preliminary alignments, potential environmental impacts, and cost estimates.

Based on the engineering analysis, project cost estimates would be developed to determine the appropriate funding mechanism to construct and maintain the completed project. The cost estimates will continue to be refined and the level of accuracy will improve during the design phase. It would also provide sufficient description to conduct a benefit assessment.

6.3.1.2 Conduct Benefit Assessment or Property Based Fee

A property-based user fee may be more appropriate than an assessment fee and would also be easier to prove since, in the case of drainage facilities, a user fee allows an agency to collect revenue from properties that contribute runoff into the system, but may not flood because of their higher elevation location. The user fee

could be structured proportionally to the amount each parcel uses the storm drain and appurtenant facilities, rather than how much each property benefits from the services or improvements provided. The user fee could be related to impervious area on the property, which can be equated to runoff.

If approved, the property-based fee could be used to secure Certificates of Participation ("COPs") that finance a portion of the project construction. COPs are similar to bonds and are typically sold shortly after the project construction bids are received. COPs typically do not provide provisions for principal payoff, hence the property-based fee is set to cover the costs of both principal and interest. Currently rates for COPs are similar to those described for municipal bonds.

6.3.1.3 Design Project, Prepare Environmental Documents and Permits

If the community supported the project by approving a property based fee, then the lead agency would proceed with designing the project, preparing the appropriate environmental document and securing resource agency permits to construct the project. The duration for the design and environmental documentation process is approximately 12 months from the approval of a property based fee. If a project involves construction within a creek bank, then the CEQA and permit process would increase this phase of the project by approximately 6 to 12 months.

6.3.1.4 Advertise for Construction

The lead agency would advertise the project and oversee construction. It is assumed that the duration would be approximately 6 to 12 months, depending on length of pipeline and environmental mitigation requirements.

6.3.2 Cost Estimate

The total project cost for each alternative is broken down in Table 6-3. The local cost share to be funded via a property based fee was not calculated because the number of parcels within each zone contributing runoff to the proposed facilities were not identified. The entire cost would be borne by the property owners.

Table 6-3: Long Term Project Cost Estimate

ALTERNATIVE	COST ($)
5	$117,000
8	$1,127,000
9	$148,000
10	$192,000
11	$152,000
12	$83,000
15	$192,000
16	$407,000
19	$273,000
21	$263,000
Total	**2,954,000**

6.3.2.1 Local Cost Share

The lead agency will identify the drainage and flooding issues, and determine solutions to those problems. The property owners that contribute runoff to the proposed drainage facilities must agree to pay for the construction and future maintenance of them. The property owners assume the financial responsibility by approving the property based fee.

6.3.3 TIMEFRAME FOR IMPROVEMENT IMPLEMENTATION

Instead of approximating completion dates for the implementation steps, an estimated timeframe for each milestone was developed. In order to establish a completion date, add the cumulative durations to the initiation of the project. The timeframe is shown in Table 6-4. If this project was implemented from initiation to completion without delay, then a storm drain system could be completed in approximately three to four years.

Table 6-4: Forecast Completion Dates

MILESTONE	DATE
Lead Agency Prepares Basis of Design Report	9 months
Benefit Assessment or Property Based Fee Election	6 months
Design [1]	12 months
CEQA/ Resource Agency Permits [1]	6 to 12 months
Approvals and Advertise for Construction	4 months
Construct Drainage System [2]	6 to 12 months
Total	**~ 3 to 4 years**

Notes:
1: Design and CEQA occur concurrently. Duration of resource agency permit authorization depends on complexity of project and whether work is done within one of the creek banks.
2: Depends on scope of project, length of pipeline, complexity of construction staging, and environmental mitigation requirements.

REFERENCES

1. San Luis Obispo County Department of Public Works, "San Luis Obispo County Flood Protection and Drainage Policies, Programs, Permitting and Funding," April 17 2001
2. A Fred H. Schott Study of the Cayucos Creek Watershed, 1998
3. Corps' January 2001, IWR Report No. 96-R-10 (revised)
4. Estero Area Plan (updated November 2002)

Appendix A

FIGURES

APPENDIX A

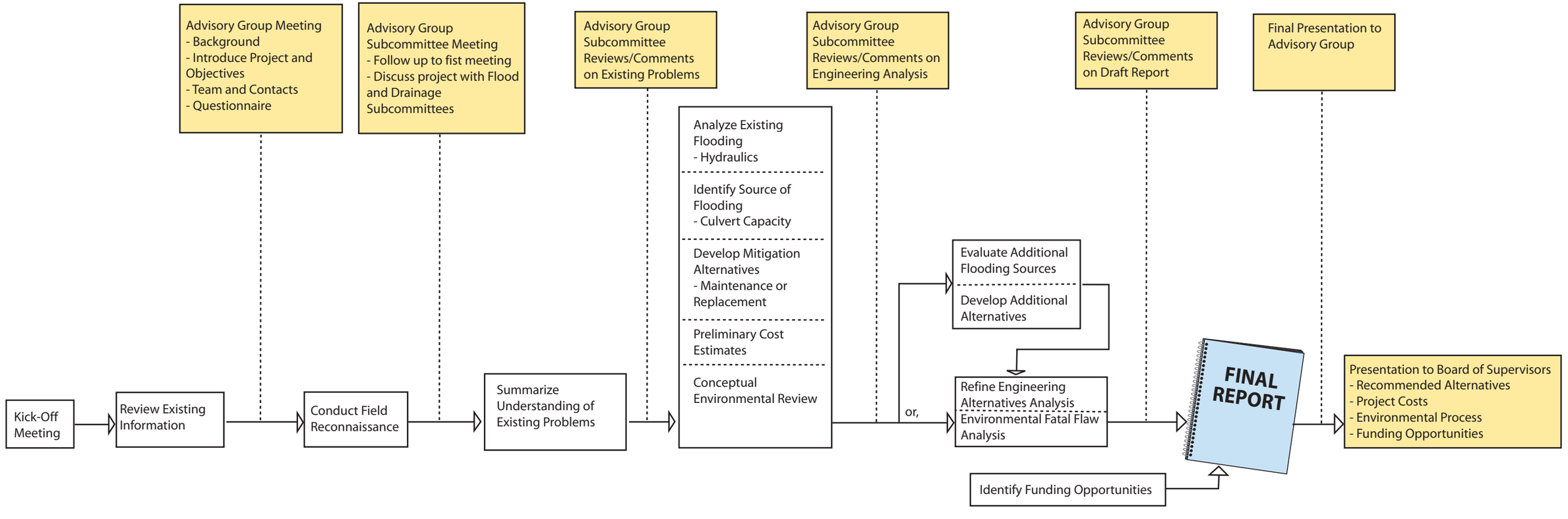
FIGURES

COUNTY OF SAN LUIS OBISPO

Community Drainage and Flood Control Studies

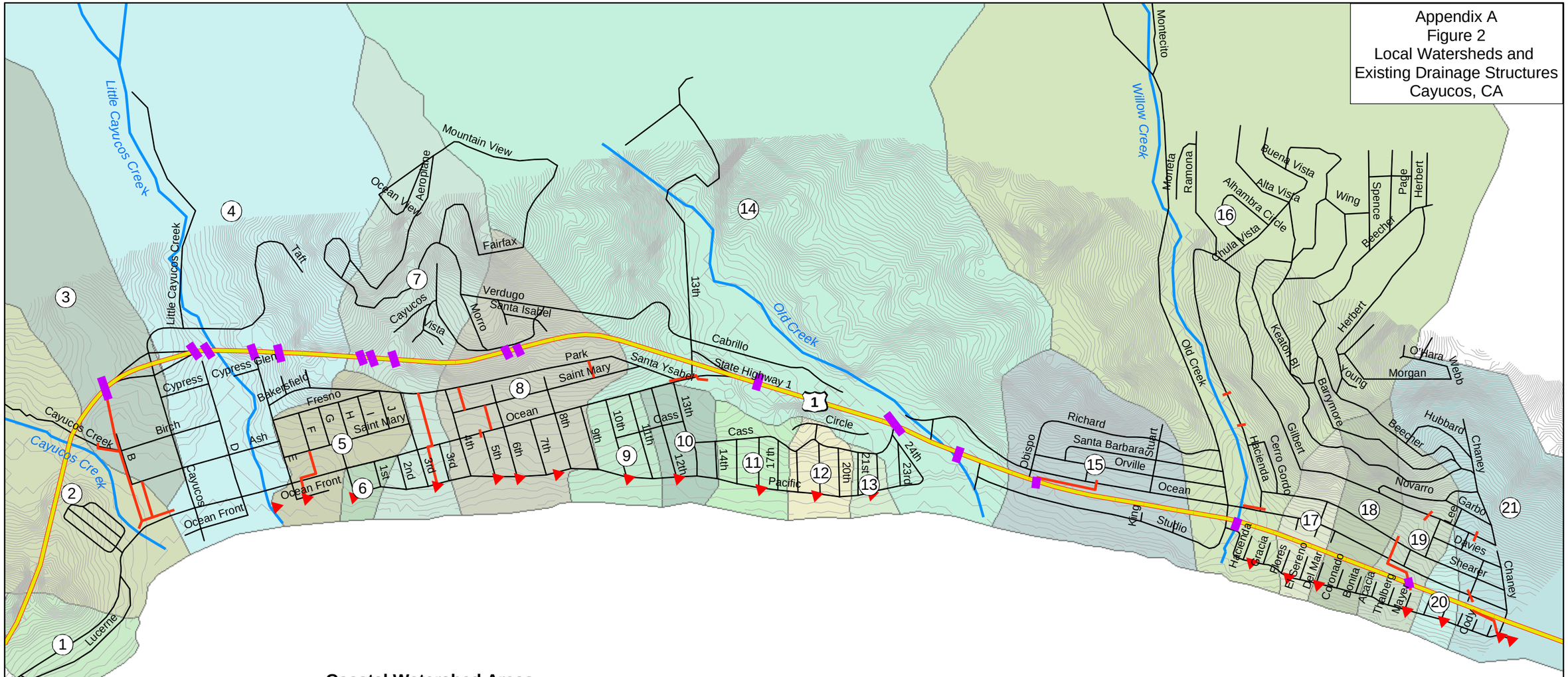
Cambria, Cayucos, Nipomo, Oceano, San Miguel and Santa Margarita

Study Flow Chart



RMC

Appendix A
Figure 2
Local Watersheds and
Existing Drainage Structures
Cayucos, CA



Coastal Watershed Areas

Zone	Area (acres)
1	24
5	31
6	5.5
7	92
8	80
9	17
10	17
11	18
12	13
13	5.7
15	70
17	17
18	26
19	24
20	7.4
21	160

0 0.25 0.5
Miles

N

Legend

- Highway
- Roads
- Contours
- CalTrans Culverts
- Other Culverts and Channels
- Storm Water Outfalls
- Watershed/Zone

RMC

RMC

Appendix A
Figure 3
Cayucos Regional Watersheds
Cayucos, CA

N

1

Whale Rock Reservoir

0 0.5 1 Miles

Legend

Highway
Roads
Streams
Reservoir

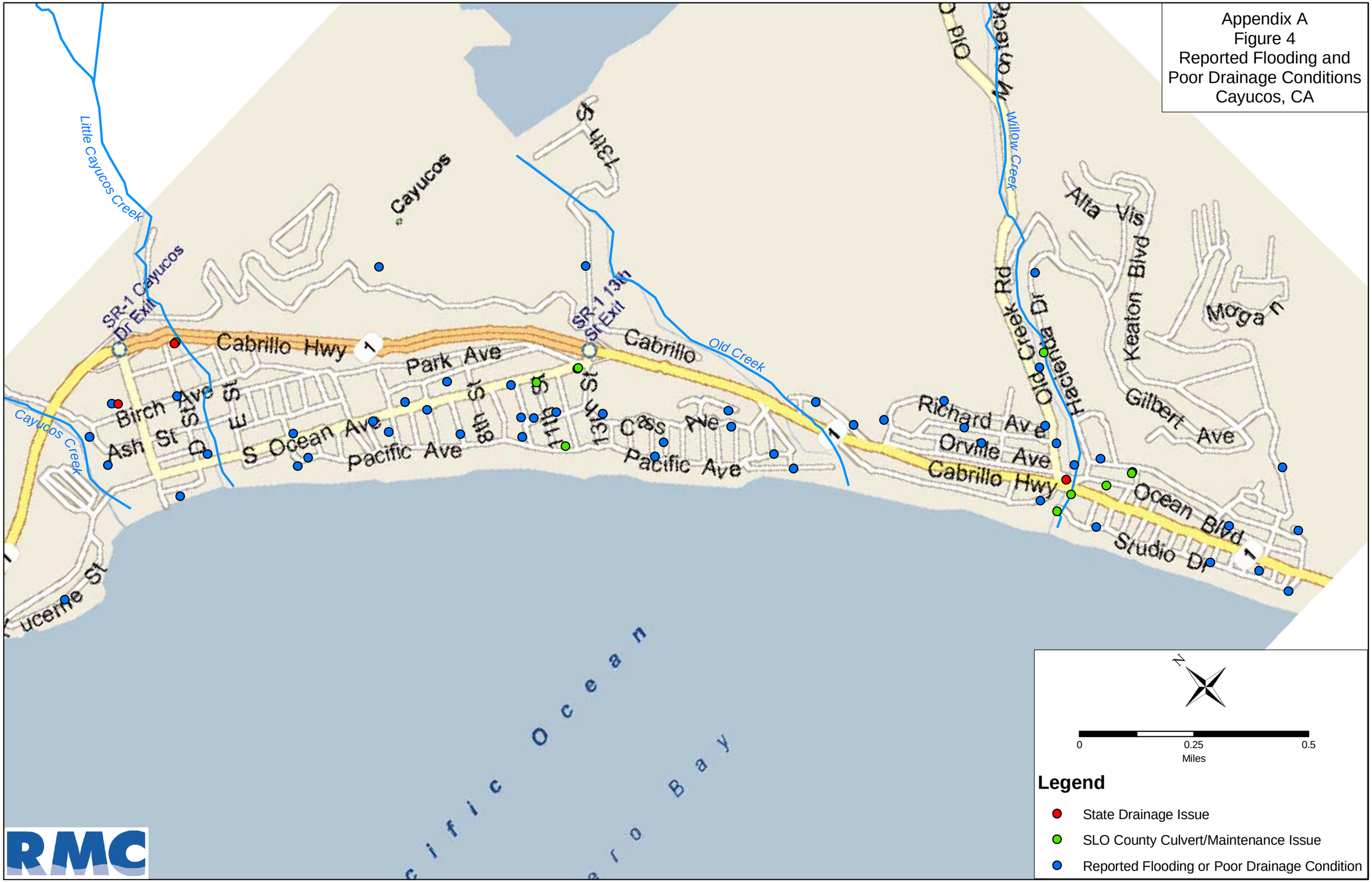
Regional Watersheds

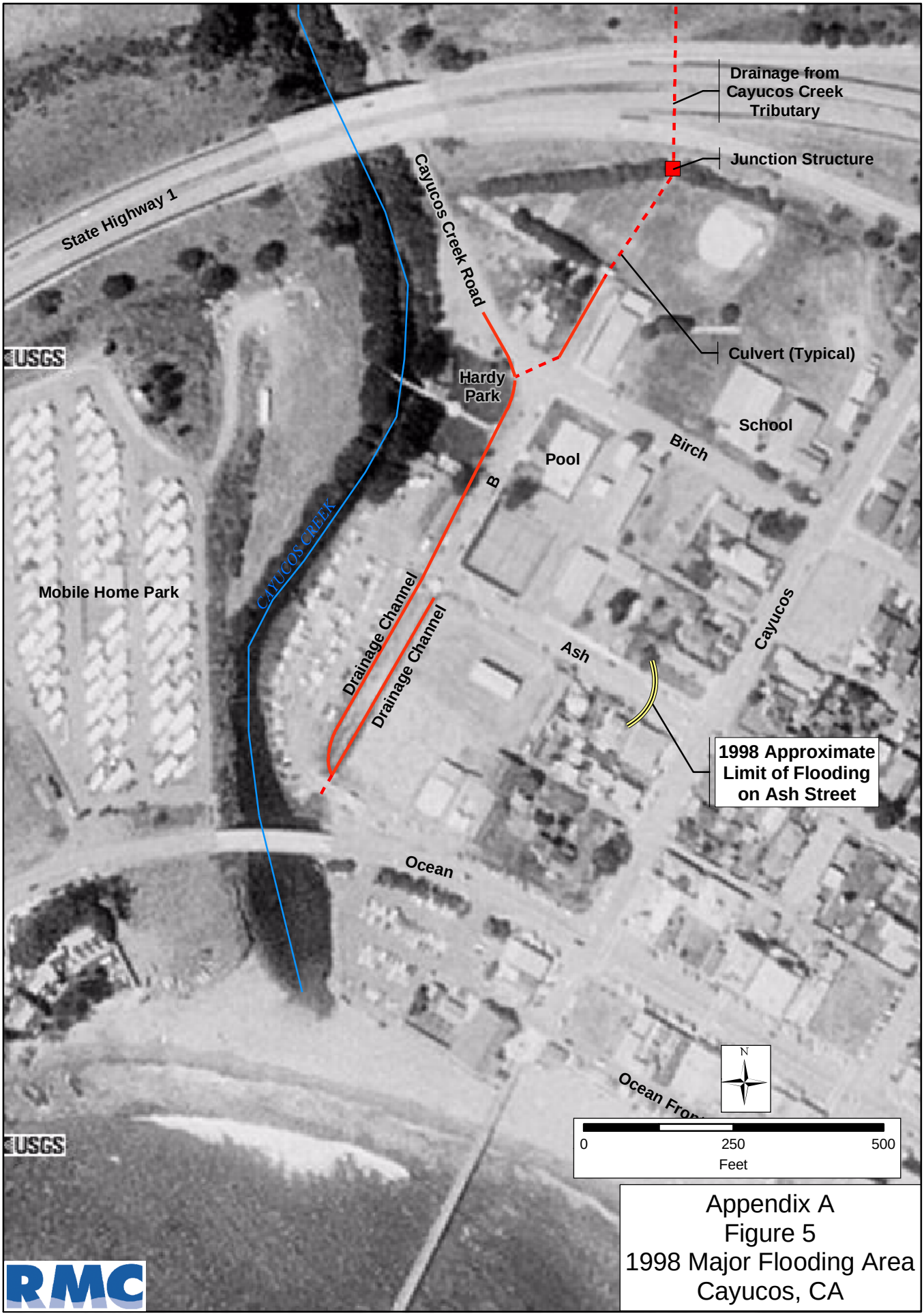
Cayucos Creek
Cayucos Creek Tributary
Little Cayucos Creek
Old Creek
Willow Creek
Coastal

Watershed Areas

Cayucos Creek	6,800 acres
Cayucos Creek Tributary	140 acres
Little Cayucos Creek	1,400 acres
Old Creek	13,000 acres
Willow Creek	2,100 acres
Coastal	610 acres

Appendix A
Figure 4
Reported Flooding and
Poor Drainage Conditions
Cayucos, CA





Appendix A
Figure 5
1998 Major Flooding Area
Cayucos, CA

Appendix A
Figure 6
FEMA Hazard Zones
Cayucos, CA

Cayucos
Little Cayucos Creek
Cayucos Creek
Willow Creek
Old Creek
13th St
SR-1 Cayucos Dr Exit
SR-1 13th St Exit
Cabrillo Hwy
Park Ave
Birch Ave
Ash St
S Ocean Ave
Pacific Ave
Cass Ave
Old Creek Rd
Hacienda Dr
Alta Vis
Keaton Blvd
Gilbert Ave
Richard Ave
Orville Ave
Ocean Blvd
Studio Dr
Lucerne St
Pacific Ocean
Estero Bay

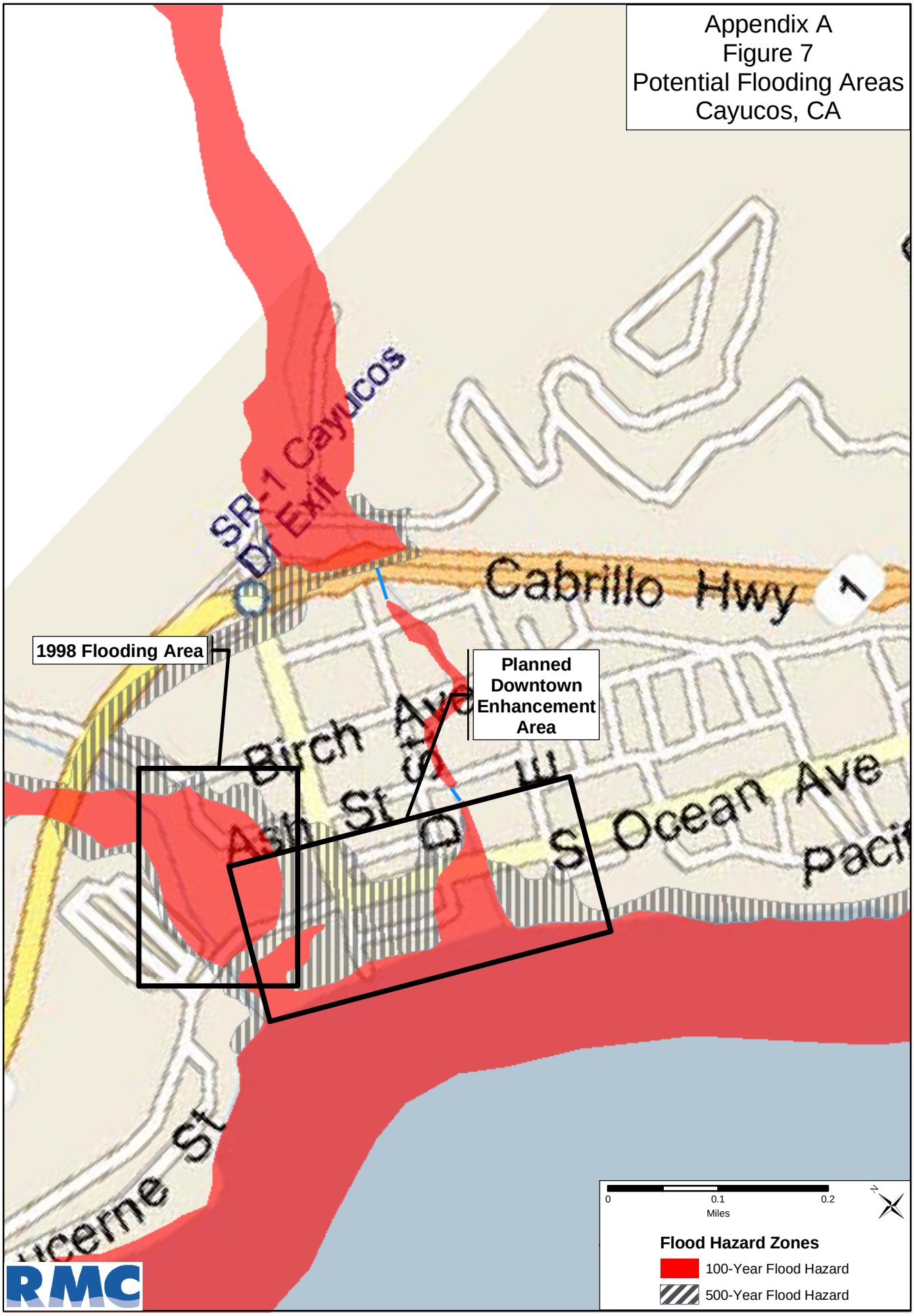
RMC

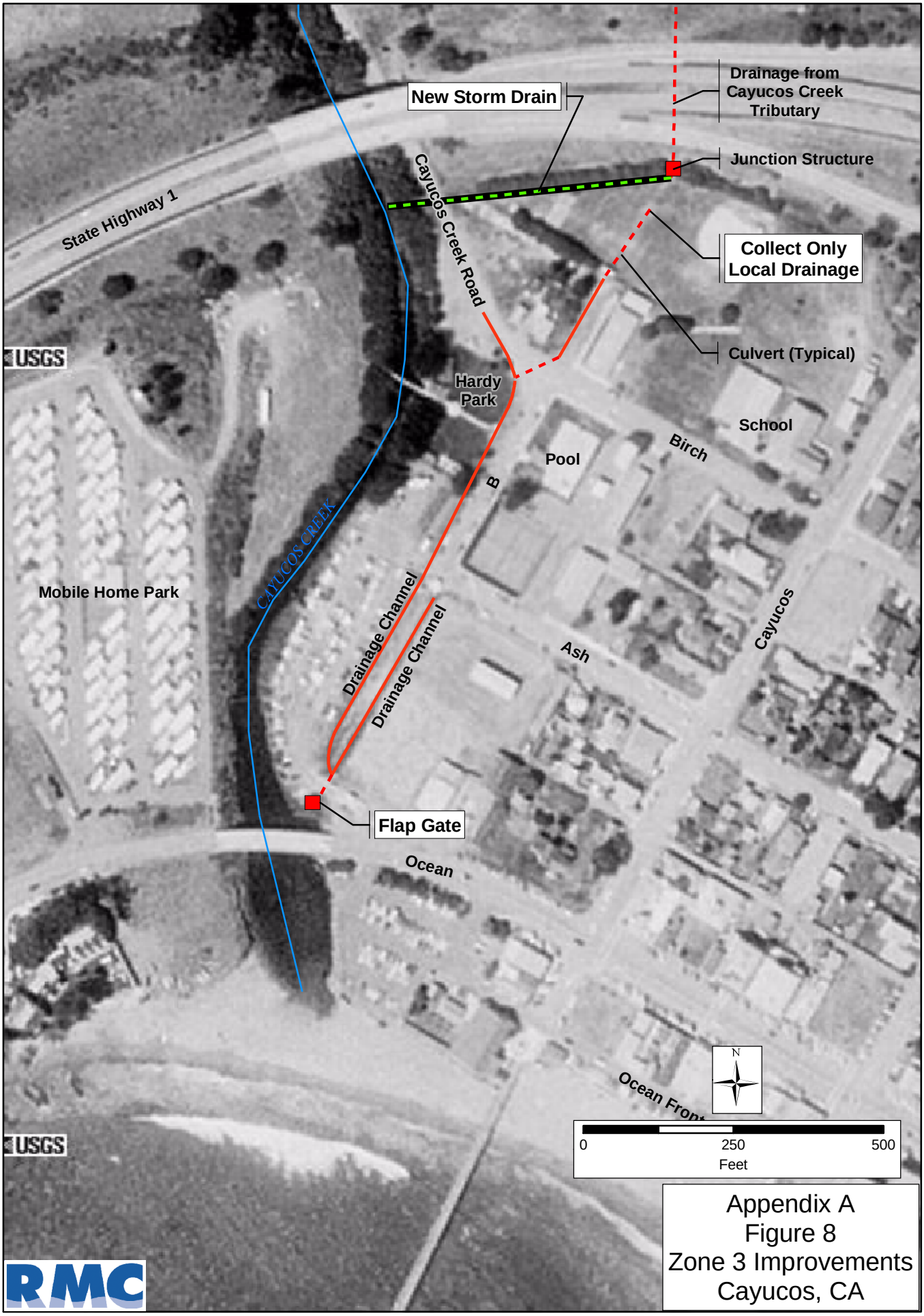
N
0 0.25 0.5
Miles

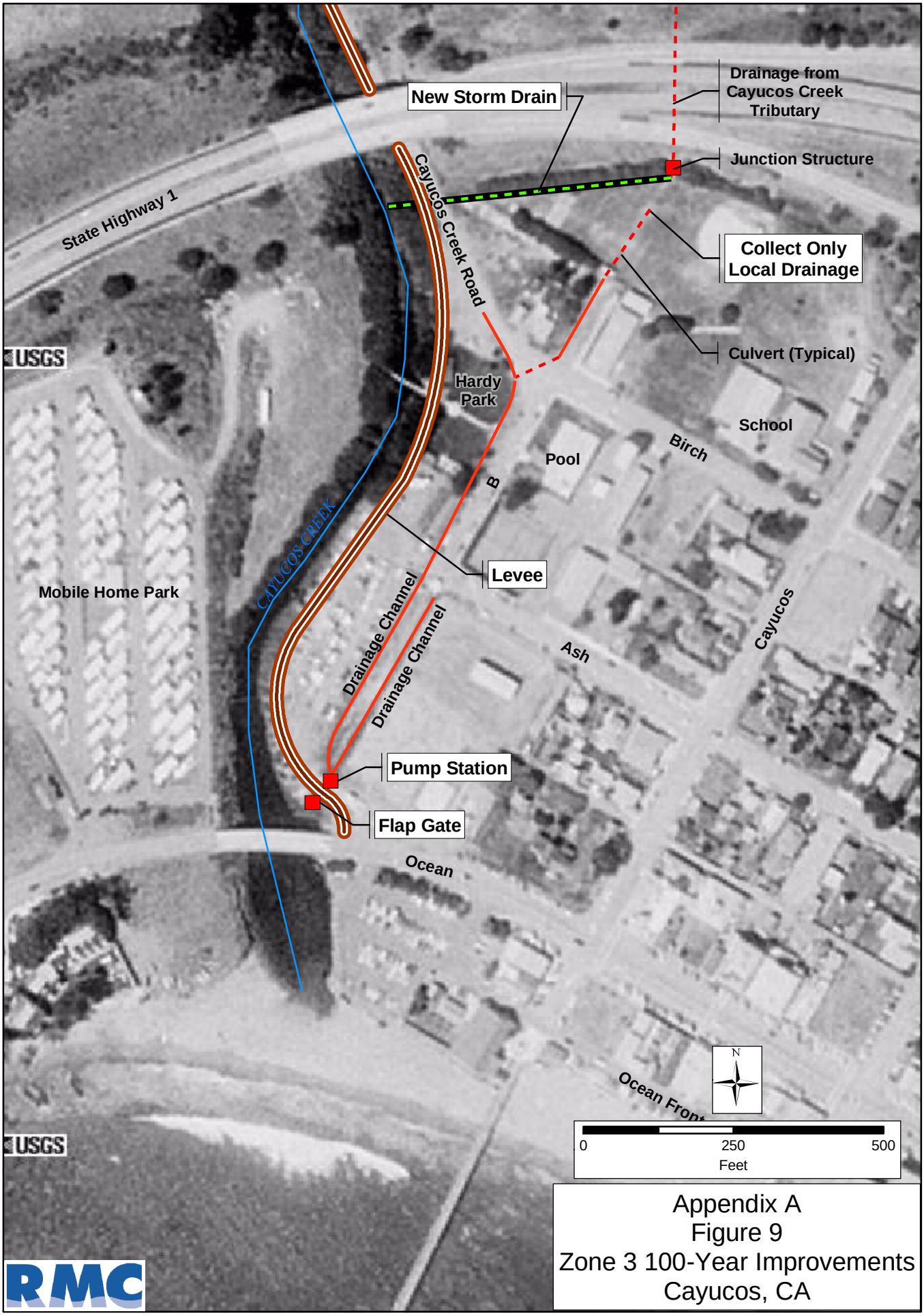
Flood Hazard Zones

100-Year Flood Hazard

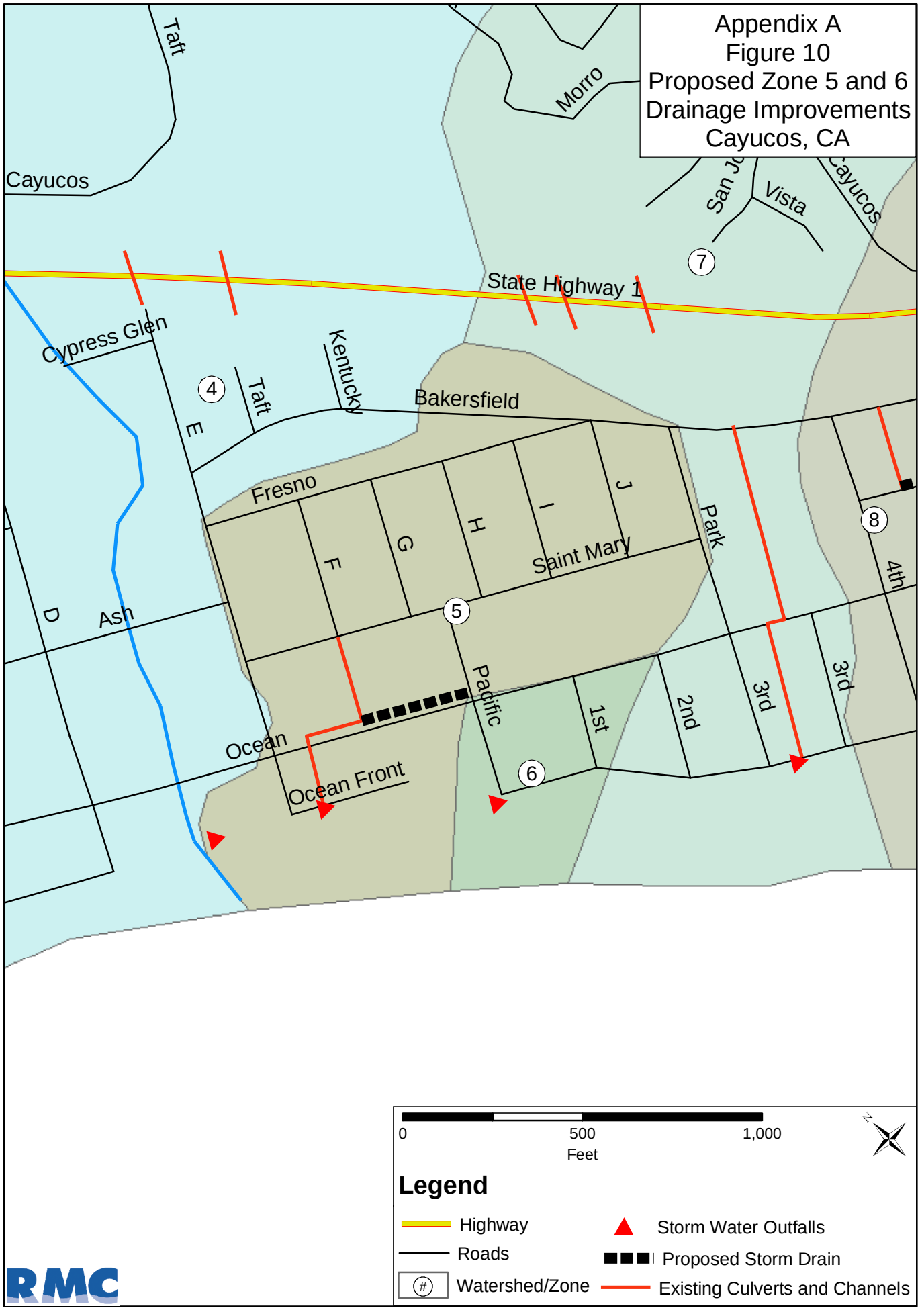
500-Year Flood Hazard

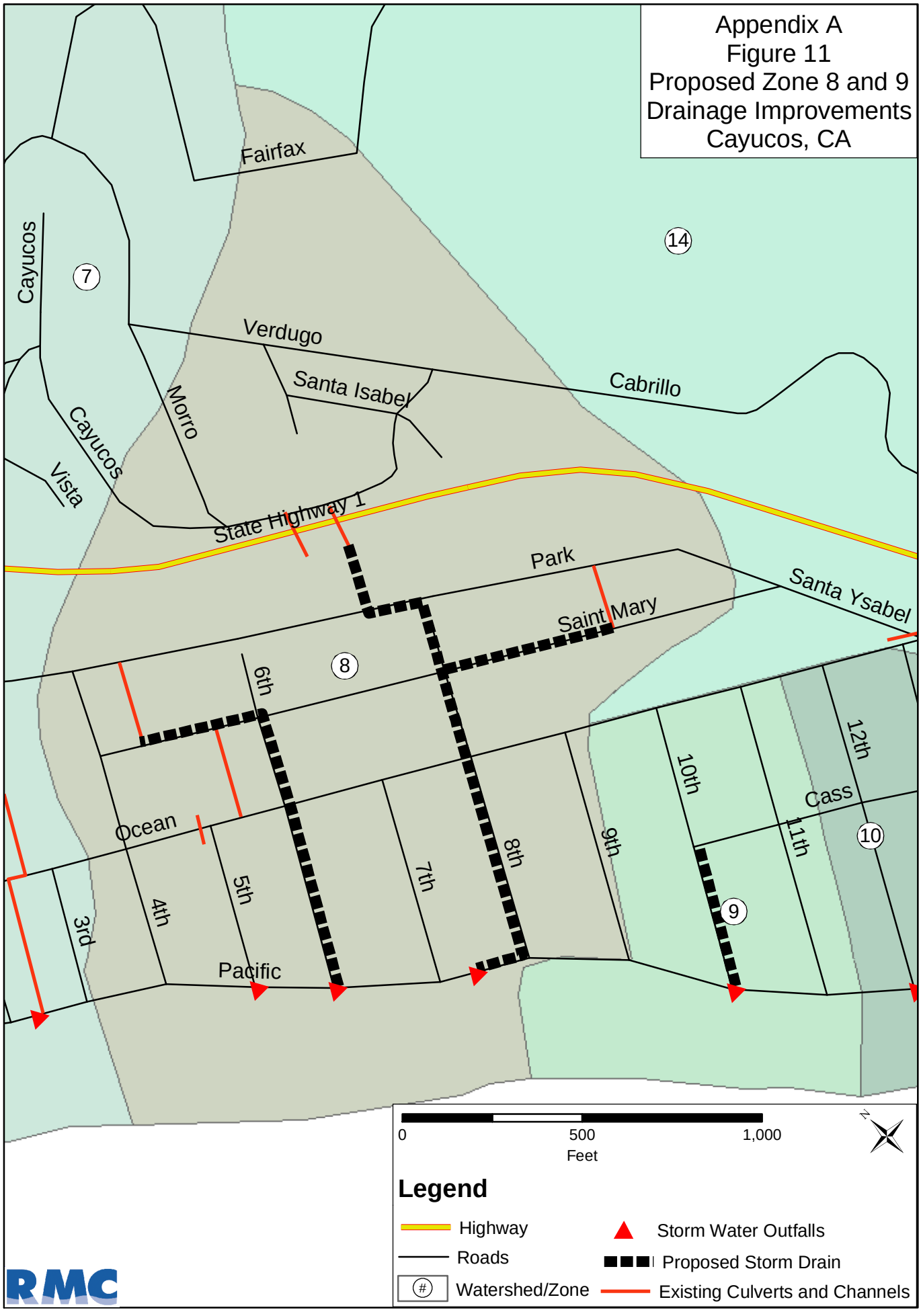

Appendix A
Figure 7
Potential Flooding Areas
Cayucos, CA
SR-1 Cayucos
Dr Exit
Cabrillo Hwy
1
1998 Flooding Area
Planned
Downtown
Enhancement
Area
Birch Ave
Ash St
S Ocean Ave
Pacif
ucerne St
RMC
0
0.1
0.2
Miles
Flood Hazard Zones
100-Year Flood Hazard
500-Year Flood Hazard

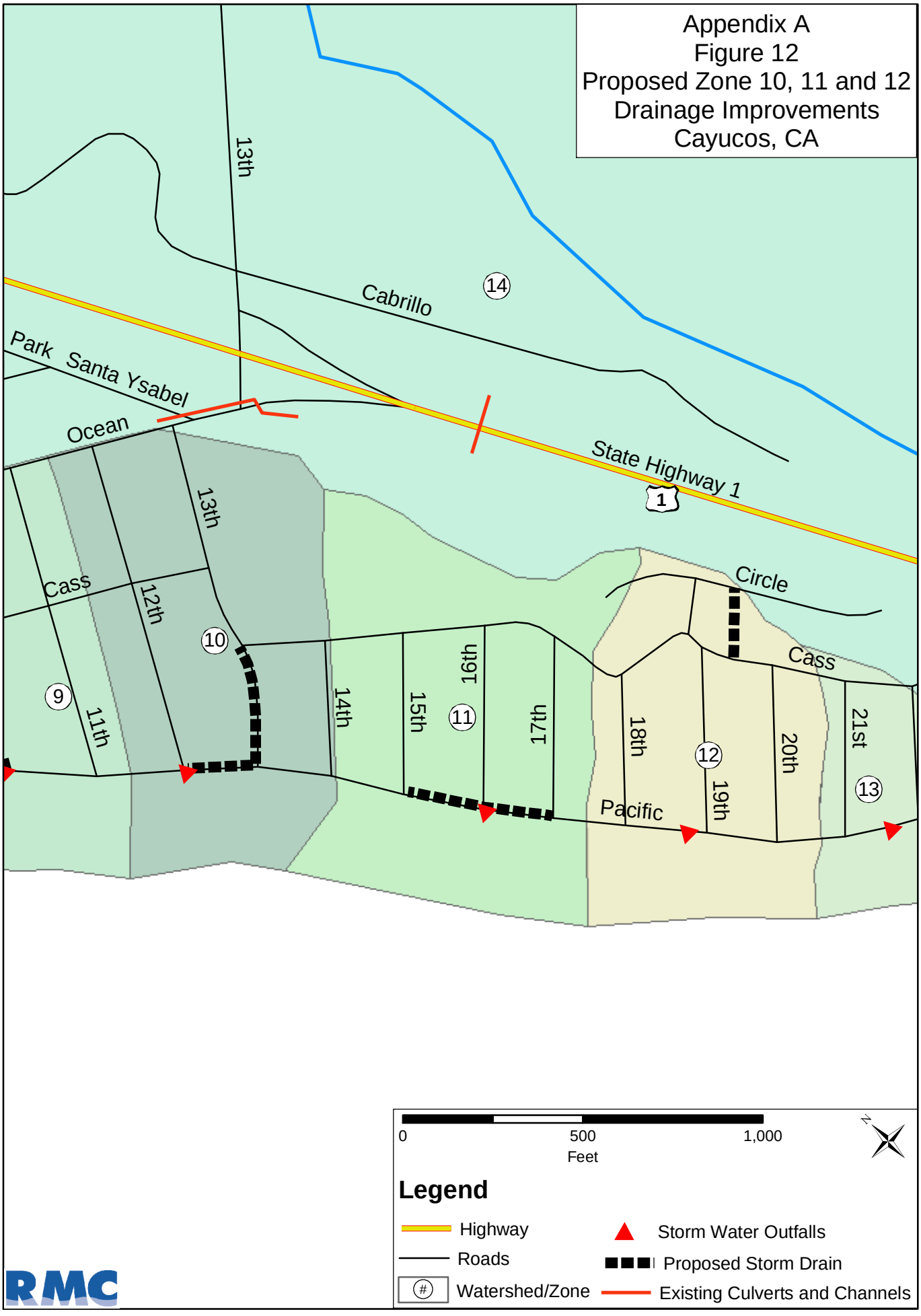

New Storm Drain
Drainage from Cayucos Creek Tributary
Junction Structure
State Highway 1
Cayucos Creek Road
Collect Only Local Drainage
Culvert (Typical)
USGS
Hardy Park
School
Pool
Birch
B
CAYUCOS CREEK
Mobile Home Park
Drainage Channel
Drainage Channel
Ash
Cayucos
Flap Gate
Ocean
N
0
250
500
Feet
USGS
RMC
Appendix A
Figure 8
Zone 3 Improvements
Cayucos, CA

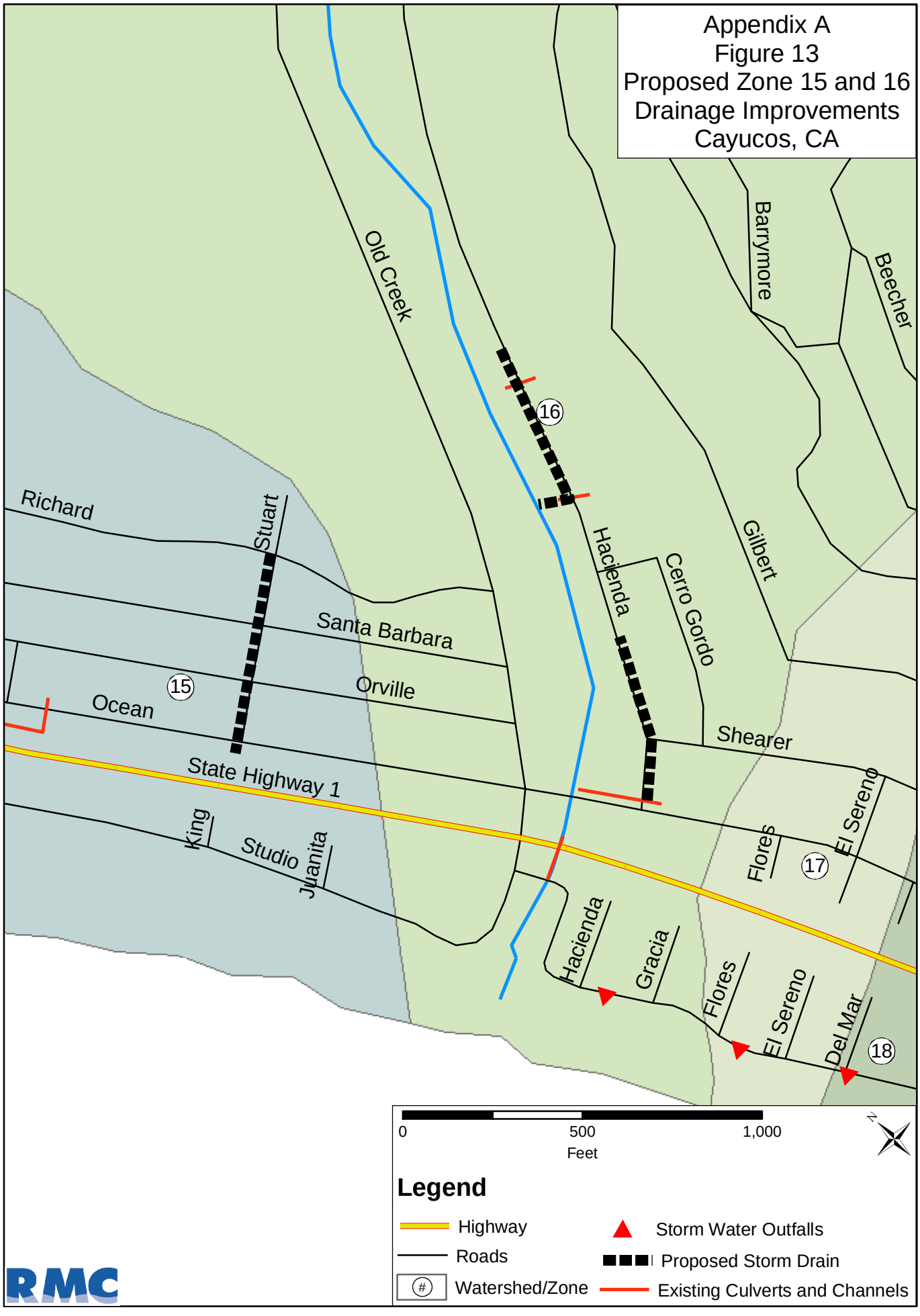


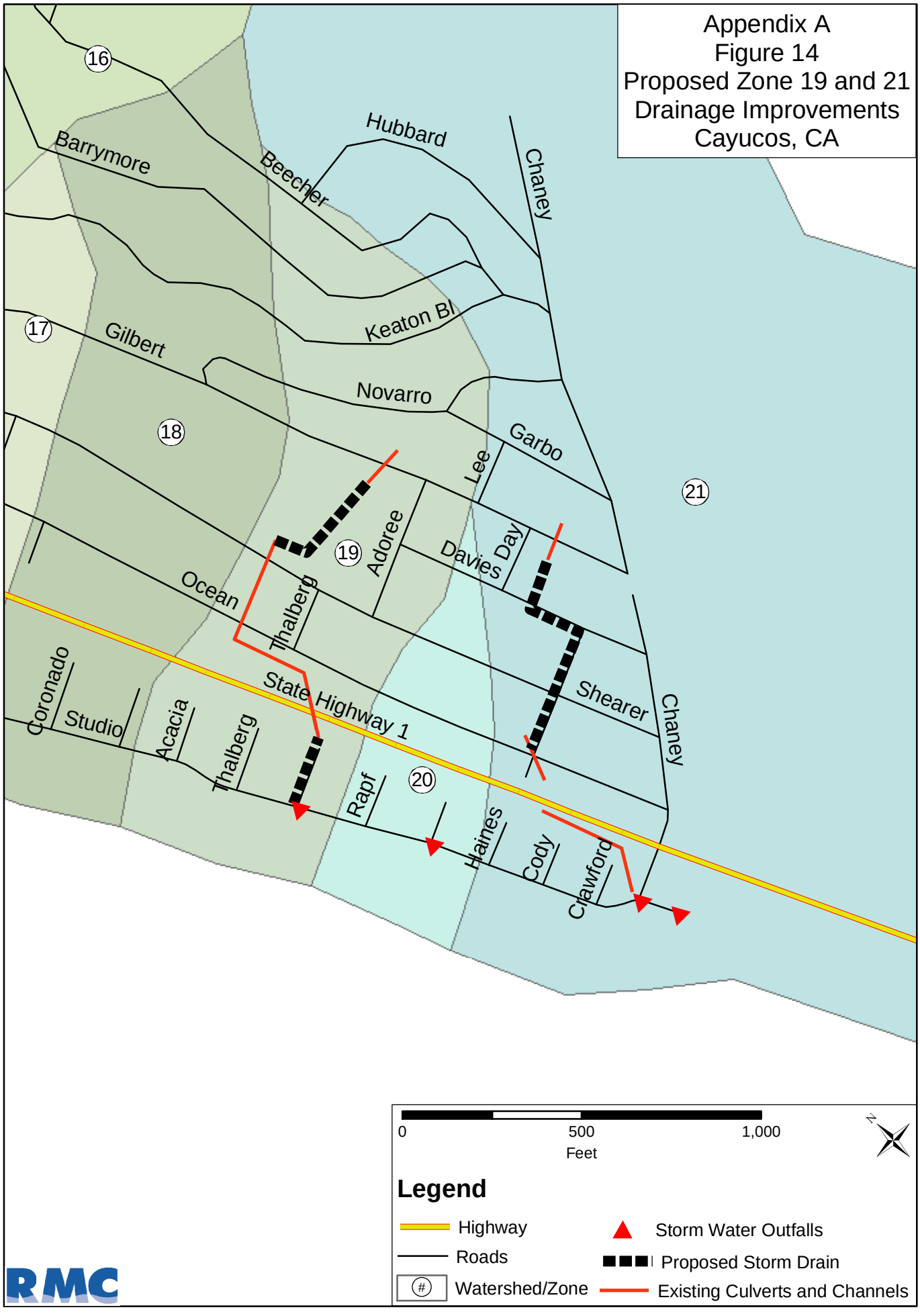
Appendix A
Figure 9
Zone 3 100-Year Improvements
Cayucos, CA


Appendix A
Figure 10
Proposed Zone 5 and 6
Drainage Improvements
Cayucos, CA
Taft
Cayucos
Morro
San Jo
Vista
Cayucos
7
State Highway 1
Cypress Glen
Kentucky
4
Taft
E
Bakersfield
Fresno
F
G
H
I
J
Park
8
4th
Saint Mary
5
D
Ash
Pacific
1st
2nd
3rd
3rd
Ocean
Ocean Front
6
0
500
1,000
Feet
N
Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC


Appendix A
Figure 11
Proposed Zone 8 and 9
Drainage Improvements
Cayucos, CA
Fairfax
Cayucos
7
14
Verdugo
Cabrillo
Santa Isabel
Morro
Cayucos
Vista
State Highway 1
Park
Santa Ysabel
Saint Mary
8
6th
12th
10th
Cass
11th
10
9th
8th
7th
5th
4th
3rd
Ocean
Pacific
9
0
500
1,000
Feet
N
Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC


Appendix A
Figure 12
Proposed Zone 10, 11 and 12
Drainage Improvements
Cayucos, CA
13th
Cabrillo
14
Park
Santa Ysabel
Ocean
State Highway 1
1
13th
Cass
12th
10
9
11th
14th
15th
16th
11
17th
Circle
Cass
18th
12
19th
20th
21st
13
Pacific
0
500
1,000
Feet
Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC


Appendix A
Figure 13
Proposed Zone 15 and 16
Drainage Improvements
Cayucos, CA
Old Creek
Barrymore
Beecher
16
Richard
Stuart
Santa Barbara
Orville
Hacienda
Cerro Gordo
Gilbert
15
Ocean
Shearer
State Highway 1
King
Studio
Juanita
Flores
El Sereno
17
Hacienda
Gracia
Flores
El Sereno
Del Mar
18
0
500
1,000
Feet
N
Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC


Appendix A
Figure 14
Proposed Zone 19 and 21
Drainage Improvements
Cayucos, CA
16
17
18
19
20
21
Barrymore
Beecher
Hubbard
Chaney
Keaton Bl
Gilbert
Novarro
Garbo
Lee
Adoree
Davies Day
Ocean
Thalberg
Shearer
Chaney
Coronado
Studio
Acacia
Thalberg
State Highway 1
Rapf
Haines
Cody
Crawford
0
500
1,000
Feet
N
Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC

Appendix B

PHOTOGRAPHS

APPENDIX B

PHOTOGRAPHS

Photograph 1: Flooding Area along Ash Street north of Cayucos Drive

The photo shows local flooding limits during a storm in April 2001

Photograph 2: Typical Ocean Outfall in Cayucos

Photograph 3: Outlet to the 48-inch Caltrans Culvert at Highway 1

The fence surrounds the perimeter to the elementary school. There are two storm drains that convey flow from this outlet to a series of drainage channels and culverts.

Photograph 4: Drainage Channel downstream of Elementary School

Drainage channel flows between the elementary school and Birch Street

Photograph 5: Lined Open Channel along Hardie Park and B Street

Photograph 6: Open Channel west of Ash Street prior to ocean discharge

Photograph 7: 48-inch corrugated plastic pipe outfall to ocean

Photograph 8: Caltrans culvert between 4th Street and Park Avenue

Photograph 9: Downstream of Caltrans culvert, pipeline continues beneath church

Photograph 10: Outlet at Ocean Avenue prior to entering two culverts that continue to the ocean

Appendix C

COMMUNITY QUESTIONNAIRE AND RESPONSES

APPENDIX C

COMMUNITY QUESTIONNAIRE AND RESPONSES

COMMUNITY DRAINAGE AND FLOOD CONTROL STUDY QUESTIONNAIRE

Cayucos

Why should I complete this questionnaire? We need your help in identifying existing flooding problems in Cayucos. We will use this questionnaire to 1) gather local knowledge of the location and severity of existing drainage and flood problems, and 2) identify likely causes. Your time and effort is appreciated?

Please complete this questionnaire and return it in the enclosed self addressed envelope, so we can address all your community's problems as comprehensively as possible. A map of your community is on the reverse side of this form. Please use it if it will assist you in locating or describing problems to us. *We will not be able to respond to each person individually submitting a questionnaire, but your response will enable us to evaluate your specific concern, assure we are aware of all drainage problems in your community, and possibly develop specific solutions depending on the location and type of drainage problem which exists.*

Contact Information (optional):

Name:	
Address:	
Phone Number:	
Email:	

Where have you experienced or observed flooding? Please provide the amount of flooding (e.g. a few inches, 1 foot, severe), the location, year and observed damage to homes or property. A map is provided for you to indicate the location. Photographs of the flooding would be very helpful to us.

How often does the flooding you observed occur? Every time it rains, once a year, once every five years, once in my lifetime.

Did you observe likely causes of the flooding, such as clogged culverts under roads, catch basins filled with dirt, no place for water to flow?

Are there any other comments regarding drainage and flooding that you would like to make?

	Property Address	Comment
1	405 Hacienda Drive	Culvert across from home gets filled with mud as wells as the street filling with mud during heavy rains. Hacienda is at the bottom of a hillside. Would like to see increased maintenance of the culvert to keep it clean. Old Creek Road is not a problem.
2	235 Ash Street	Ash Street between B Street and Cayucos Drive floods every time it rains.
3	2000 Circle Drive	This area of Circle Drive has a low spot in front of his driveway. Water drains to his driveway and through his side yard from the street. Has to put sandbags every year in front of driveway to protect home.
4	479 Stuart	No flooding experienced or observed.
5	St. Mary Street (no address given)	Flooding in back of the house due to run-off from Park Ave. Occurs every year when it rains.
6	249 Cayucos Drive	A pool of water about 4 to 5 inches deep collects on the north-east corner of Ocean Ave. and D St. every time it rains. Cayucos Creek overflowed in 1969, 1983 and twice in 1998. Overflows during heavy rains and high tide. Water ponds at the corner of B St. and Ash when the culverts on B St. (near Hardie Park) are filled with trash and sediment.
7	242 Cayucos Drive	A few inches water during heavy storms flows from the alley, under the fence, and ponds on yard. Children's center above Ash St. diverts some of the flow.
8	No Address Provided	Severe flooding in apartment complex on Ocean Ave. near El Sereno Ave.
9	3298 Studio Drive (at Bonita)	Downstairs flooded (below street level). Installed a sump pump to keep dry. Most sever during heavy or prolonged rains. No curb to keep runoff on road.
10	No Address Provided	Runoff from South Cayucos. Creek overtopped bank during El Nino winter.
11	524 S. Ocean Ave.	Every time rainfall is heavy, floods of water from Ocean Ave.-Old Highway 1- comes into our garage. The rainfall runs through our side yard like a little river. Ocean Ave. is sloped towards the house and no curb is present to prevent runoff from entering yard.
12	91 13th Street	A few inches of rain ponds on the oceanside corner of rear of property, during times of heavy rain.
13	349 N. Ocean	No observed flooding.
14	24th and Pacific	Flooding at public parking facility
15	527 St. Mary's	Property has a 20' drainage easement between houses with poorly operating drainage system. Water from Park Ave. apparently drains onto property and through a drain which does not have an outlet.
16		Drainage problem at the Cayucos Cemetery area. New skateboard park proposed at site could flood if constructed.
17	Cerro Gordo St.	Southeast of Old Creek Rd. Stormwater from the hills south and east of this road drains to Cerro Gordo. Recent regarding of Cerro Gordo to drain water to Old Creek Road has caused drainage problems.
18	Reconstruction of Old Creek Rd.	Recent reconstruction of a portion of Old Creek Rd. The remaining street needs to be improved with a channel or increased cross slope to protect the road area and shoulder.
19	41 4th St.	Home owner has a back yard French drain which takes offsite water does not function properly.
20		During high tide, Cayucos and Little Cayucos Creeks flood badly.
21	Northwest corner of D and Ocean St.	Floods every time it rains.
22	Hacienda Dr.	Last house uphill and creekside. A gully 50 feet east of the house has widened 15 feet and deepened 3 feet below the historical depth of the gully. Gully begins uphill in a pasture. Heavy runoff flows along Hacienda Drive and causes erosion.
23	51 Pacific	4 to 6-inches of standing water after a storm. Since repaving Pacific two years ago, water builds up in front of house. A dip that existed in road prior to paving used to drain water from road.

24	30 24th St	Corner of 24th and Pacific becomes heavily flooded every year during the rains. The corner of this intersection has a deep sag without and outlet for the ponded water.
25	1149 Pacific Ave.	Flooding occurs every time it rains in front of house. Ponded water 2 feet wide and 4 inches deep collects. Sag at edge of pavement and unpaved shoulder.
26	479 Stuart	No flooding experienced.
27	3455 S. Ocean Ave. and Cayucos	Flooding every time it rains.
28	2739 Orville Ave.	6 to 8-inches of water ponds during heavy rains and remains for several weeks. No outlet for water.
29	2744	No flooding ever.
30	3285 Shearer Ave.	In 1995 the hillside above property caved in and filled in the streambed. Downstairs was flooded and new carpet ruined. Uphill erosion filled backyard. Hillside runoff will continue to be a problem.
31	2689 Richard Ave.	Runoff from homes on Richard Ave. damages lower roads, especially on steep slopes.
32	3590 Studio	1997, 1998, and 1999 flooding in basement due to runoff. Only a problem during heavy rains. Runoff originates off the hills in the east.
33	Birch, Ash and B Streets	Drainage down Birch St. caused extensive damage in 1998 and 1999. Damage occurred to four classrooms and lower playing field. Happened once in the last five years.
34	266 Old Creek Rd. and 222 Old Creek Rd.	Two feet of flooding in 1992 and 1993. Whenever the culvert under Highway 1 is clogged or when the creek is filled with vegetation.
35	2302 Pacific	Near the tennis courts where the county approved the new houses on Ash St.
36	3220 Shearer Ave.	At 3219 Shearer Ave. water and debris flows into street and floods down slope homes. Lack of culverts causes problems.
37	51 4th St.	Flooding in back yard in 1998, 1999, and 2000 after a heavy rain. Water flows off hills and rooftops into ocean.
38	51 Mannix Ave.	Mannix Ave. is the only unpaved road left off Studio Drive. Dirt erodes and washes away.
39	2285 Cass	None
40	3512 Gilbert Ave.	Across from home, water flows from the gully when it rains. Water flows down from the hill above it. Runoff from hillside flows onto Gilbert Ave.
41	3650 Studio Drive	Up to 6 inches at south end of Studio Drive after a very heavy rain. Highway 1 runoff causes ponding of water. No outlet for runoff and clogged drain at 3680 Studio.
42	173 H St.	Parking lot by pier, lower classrooms, Hardie Park, corner of Birch and D Street floods during heavy rains.
43	15th and 17th St.	No flooding experienced.
44	South section of Richard Ave.	Water drains down peoples' front yards and driveways on rainy days.
45	2685 Ocean Ave.	Between Cayucos cemetery and freeway in the field where the proposed County park would be constructed. Annual flooding of this area.
46	2780 Richard Ave.	No observed flooding.
47	47 10th St.	6 to 7 inches of water ponds underneath home following a heavy rain. The empty lot adjacent to 55 10th St. lacks proper drainage. Water ponds on lot and floods adjacent properties.
48	2920 Studio Dr.	No damage to homes or property, but water sheet flows over road and creates a hazard during heavy storms.
49	40 15th St.	No observed flooding.

50 124 Birch Ave.	A 4 inch drain line lacks sufficient capacity to drain runoff. Pipeline should have been designed with more capacity.
51 2776 Santa Barbara Ave.	Large homes being built on Richard Ave. will drain their runoff onto Santa Barbara.
52 901 Park Ave.	No observed flooding or problems.
53 3408 Shearer	A few inches of flooding during storms in 2001 and 2002. When Shearer was repaved last year, no berm was re-constructed as previously existed. Uphill runoff now flows onto property.
54 2949 Richard Ave.	A few inches of water ponds on Richard Ave. and Old Creek Road following rain events due to inadequate road drainage.
55 3505 Davies Ave.	No observed flooding.
56 1000 Pacific Ave.	North side of 10th St. near corner of Pacific Ave. every time it rains.
57 203 Bakersfield Ave.	Corner of D St. and S. Ocean Ave. Puddles of water collect every year following a storm. Water also ponds between Veterans Hall and Pier Café. Lack of adequate drainage causes problem.
58 South Cayucos and Day Street	Creek flooded during El Nino year.
59 3247 Studio Dr.	Underground spring between two residences continuously flows.
60 524 S. Ocean Ave.	Runoff from Ocean Ave. enters driveway and garage. Street runoff flows along side yard. Ocean Ave. is sloped towards our home.
61 820 Pacific Ave.	No observed flooding.
62 3441 Ocean Ave.	No observed flooding.
63 424 S. Ocean Ave.	No curb exists between street and yard. Street runoff flows onto yard.
64 39 10th St.	Garage flooding during winter of 2001 and 2000, due to water flowing down 10th St. I placed sand bags along street frontage to protect home. Lack of curb/gutters causes problems.
65 332 Old Creek Rd.	Stage was 3 feet above creek bank on Old Creek. Damage caused to yards and homes adjacent to creek. Frequency depends on high tide and intensity of storm.
66 2614 Studio Dr.	No observed flooding.
67 3259 Ocean Blvd.	Approximately 6 inches of ponding on Ocean Blvd. Runoff from Shearer Ave. causes problems. New homes under construction on Shearer will increase problem.
68 1125 Cass Ave.	Backyard flooded in the winter rains of 1997. Typically, back yard ponds with water following a storm.
69 416 Old Creek Rd.	Debris in creek caused water to back up and flood rear unit in March 1995.
70 31 7th St.	No observed flooding.
71 2705 Orville	Increased residential development has caused an increase in runoff onto Orville.
72 2747 Ocean Blvd.	Increased residential development increased runoff from up the hill. Road runoff enters property.
73 3298 Studio Dr.	Downstairs flooded (below street level) approximately 1 foot. No curb to prevent water from running off the street.
74 405 Hacienda	Clogged culvert on Hacienda prevents runoff from draining off road.
75 60 5th St.	Low point of neighborhood with an inadequate drain pipe to convey runoff. Pipe surchargers and water flows over street.
76 3312 Shearer	At 3299 Shearer, gutter was filled with gravel. Culvert north of property was removed. Increased maintenance needed.

77 3336 Shearer	Hillside runoff is severe. Culverts on Shearer have been clogged. Causes water to flow on street and onto property.
78 399 E St.	Little Cayucos Creek, sediment has accumulated and vegetation is growing downstream of Highway 1. Will reduce creek capacity. Creek maintenance is necessary.
79 176 J St.	Backyard floods due to runoff from neighboring homes. Runoff from the hillside also enters yard.
80 2377 Pacific Ave.	Water ponds 4 to 6 inches deep at intersection of Pacific Ave. and 24th St. No drainage culvert to convey water exists.
81 2767 Santa Barbara	Runoff from Richard Ave. runs through my property. No curb to stop water. Runoff from Richards is causing problems on Santa Barbara.
82 3291 Shearer	Flooding used to occur, but put in drainage system, now problem has stopped.
83 3086 Studio Dr.	Culvert under Highway 1 at Studio Drive occasionally has debris built up. Drain line off Studio Drive was damaged and never repaired by the County.
84 405 Hacienda	Culvert flooding
85 59 Gracia St.	No observed flooding.
86 64 Gracia St.	Culvert on the west side of Highway 1, south of Old Creek Rd. floods and over flows on the vacant lot on Gracia. Empty lot ponds with 6 to 10 inches of water.
87 474 Stuart	Hillside runoff dumps sediment on Hacienda.
88 21 7th St.	7th St. runoff enters yard. Lack of adequate curbs allows water to enter property.
89 1099 S. Ocean Ave.	Culvert to the north of property is clogged with dirt. Maintenance is needed to clear flow path. Causes water ponding. No property damage experienced.
90 1900 Pacific Ave.	Ash and B St. area floods during very heavy rains.
91 1625 Cass Ave.	Corner of 13th and Cass Ave. floods every time it rains.
92 3200 Shearer Ave.	Corner of El Sereno and Shearer. Runoff from Shearer Ave. drained into property and garage. Runoff from hillside difficult to manage. Inadequate hillside runoff is cause of problem.
93 1617 Pacific Ave.	Street in front of house floods.
94 2712 Santa Barbara	Shallow flooding across from house. No damage, just dirt and debris left behind. All road should be crowned to prevent homes at the bottom of hills from receiving all the runoff from up the hill.
95 1999 Cass	Flooding started after increased development from up the hill. A drain pipe on Circle Drive was removed after homes were built.
96 Shearer Ave. near Sereno	6 inches of water ponds at intersection, every time it rains.
97 41 4th St.	Water upstream drains into back yard. Installed a French drain, but not enough capacity to manage large storms.
98 61 Mannix St.	Runoff from Highway 1 floods backyard. Existing French drain runs under house. Culvert from Highway 1 discharges onto dirt street.
99 193 J St.	No observed flooding.
100 580 St. Mary St.	No observed flooding.
101 2774 Studio Dr.	No observed flooding.
102 2610 Richard Ave.	No observed flooding.
103 2773 Orville Ave.	Garage floods during periods of heavy rain.

104 1535 Cass Ave.	Hillside runoff above the mobile home park drains onto property.
105 177 F St.	Northeast corner at intersection of Pacific and Ocean Ave. next to motel floods. No drainage to convey water away from intersection.
106 12 St. Mary	Water runs down drainage swale from the hills above through this lot.
107 652 St. Mary	No observed flooding.
108 399 Chaney	Street erosion and pavement undercutting causing problems on Gilbert, Haines, and Davies. County allowed paving of Gilbert with no drainage.
109 176 Ocean Front	Northeast corner of Ocean Ave. and D St. floods every rain event.
110 Ocean Ave. near Laundromat Ocean Ave. near Veteran's Hall 24th St. and Pacific Ave. parking lot	Water ponds every time it rains.
111 497 Hacienda Dr.	Annual flooding of a few inches, depending on rain intensity. Severe flooding in 1995. Approximately 1 foot of water inundated front and back of house. Culverts not maintained properly.
112 3588 Shearer	No observed flooding.
113 35 11th St.	Flooding on Cass between 10th and 11th St., and 11th between Cass and Pacific (north side). Our property is flooded every time it rains. Water flows under the house and into the backyard.
114 1285 S. Ocean	No observed flooding. The culvert that runs toward the ocean across our property is now clogged from the road work that was done on Santa Isabela at 13th. No problems caused yet, but very likely in the future.
115 217 Obispo Ave.	Rapid development uphill has caused an increase in drainage related problems. Runoff from Richard Ave. runs down Obispo and onto my property.
116 235 Ash Ave.	18 inches of flooding through the property due to Cayucos Creek overflowing. Flooding occurs every 4 to 5 years.
117 440 Chaney Ave.	Highway 1 in front of Chevron Facilities floods every year.
118 Gilbert and Adoree	Recent development concentrates runoff onto Adoree.
119 201 Saint Mary	No observed flooding.
120 699 Saint Mary Ave.	Flooding which occurs when rain water drains from Park Avenue, which runs parallel, and up the hill from, Saint Mary Avenue. After the water runs down the hill from the drain on Park Avenue and floods neighbors house, it continues into our backyard and floods our house as well. Since the house above us was built and the drain installed, we catch the majority of the Park Avenue runoff because it runs down the pipe which ends just above our neighbors backyard.
121 97 10th St.	Between 9th and 10th Streets, on the ocean side of Ocean Ave., during El Nino year. Water flows onto property from Ocean Ave. There are no culverts to convey the runoff.
122 45 17th St.	Approximately 3 to 4 inches of flooding on property every heavy rain.
123 3198 South Ocean Ave.	Culvert flooding.
124 2611 Ocean Ave.	Basement and dining room flooding experienced. Happens once a year or during every extremely heavy rain. Property is located at the bottom of a slope.
125 Ocean Ave. near El Sereno Ave.	Severe flooding at apartment complex.
126 Old Creek Rd.	Flooding behind homes adjacent to creek.
127 Pacific Ave. at Ocean Ave. Pacific Ave. at 13th St. Most intersections with Pacific Ave.	Water ponds at intersections with nearly every rain.
128 Richard Ave.	4 inches of water flows on street every time it rains. Inadequate drainage on Richard Ave.

129 St. Mary St.	Runoff from Park Ave. flows to back of house.
130 Studio Dr.	No observed flooding.
131 Ocean Ave. near cemetery	Hillside runoff ponds on Ocean Ave. near cemetery.
132 2702 Santa Barbara	Water ponds at cemetery. Road and fields flood.
133 349 N. Ocean	No observed flooding.

Appendix D

RESOLUTION ESTABLISHING POLICY

APPENDIX D

RESOLUTION ESTABLISHING POLICY

BEFORE THE BOARD OF SUPERVISORS

of the

SAN LUIS OBISPO COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

Monday May 20, 1968

PRESENT: Supervisors M. Roland Gates, Elston L. Kidwell, Fred C. Kimball, Lyle F. Carpenter, and Chairman Hans Heilmann

ABSENT: None

Resolution No. 68-223

RESOLUTION ESTABLISHING POLICY OF THE SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT RELATING TO THE APPORTIONMENT OF LOCAL COSTS OF PLANNING, DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE OF DRAINAGE AND FLOOD CONTROL FACILITIES

The following resolution is now offered and read:

WHEREAS, the San Luis Obispo County Water Resources Advisory Committee has proposed the adoption of a policy relating to the apportionment of local costs of planning, design, construction, operation and maintenance of drainage and flood control facilities by letter dated May 8, 1968.

NOW, THEREFORE, BE IT RESOLVED AND ORDERED by the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District, State of California, that the following shall be the policy of the San Luis Obispo County Flood Control and Water Conservation District relating to the apportionment of local costs of planning, design, construction, operation and maintenance of drainage and flood control facilities until further notice:

1. The San Luis Obispo County Flood Control and Water Conservation District shall maintain surveillance of water problems throughout the County and advise the landowners of present or potential drainage problems in the areas where found. Where remedial action is deemed necessary, the Board of Supervisors shall call an informal hearing for the purpose of informing property owners in the areas causing the problem and in the areas of damage or potential damage.

2. If a program of correction is indicated, the Board of Supervisors shall provide assistance in the formation of a suitable zone of the County Flood Control District. Once a zone has been formed, it shall bear the cost of the planning, design, construction, financing and maintenance of drainage facilities. If the zone is formed, the cost of formation of the zone should be reimbursed from the initial budget of the zone. If the zone formation proposal is rejected, or otherwise abandoned, then the cost of the zone formation proceedings should be absorbed by the County Flood Control District.

3. Applications for the formation of a drainage district or zone should be discussed with the County Hydraulic Engineer so that the applicants will have available to them all current and pertinent information for their guidance.

4. Provision should be made for reimbursement to a developer, or his successors in interest, of his costs of off-site drainage facilities in excess of his pro-rata share, as determined by the County of San Luis Obispo, when adjoining properties develop and require the use of facilities financed by said developer. The period of eligibility for reimbursement should be flexible and based on the size of a project. It is anticipated that the normal period of reimbursement would be from five to ten years and in no event would it exceed 20 years.

5. The Board of Supervisors shall maintain a revised project priority list, giving preference to those projects approved by the people within the areas affected, in the order of approval.

6. Local costs of drainage projects should be spread within the area of benefit in accordance with benefits received, insofar as possible. Where pay-as-you-go financing or general obligation bond financing is contemplated, the total assessed valuation is an equitable basis for spreading project costs under the assumption that benefits are in accordance with assessed valuation. Where assessment bond proceedings are contemplated, and only in such cases, land area, front or abutting footage, number of developable sites, as well as assessed valuation, shall be used as bases of spreading costs among beneficiaries, either separately or in combination. In such instances the proper basis of assessment spread should be determined primarily from engineering considerations.

On motion of Supervisor Kidwell, seconded by Supervisor Carpenter, and on the following roll call vote, to-wit:

AYES: Supervisors Kidwell, Carpenter, Gates, Kimball, Chairman Heil
NOES: None
ABSENT: None

the foregoing resolution is hereby adopted.

Chairman of the Board of Supervisors

ATTEST:

Clerk of said Board of Supervisors

SLO CO FC & WCD
m

STATE OF CALIFORNIA, }
County of San Luis Obispo, } ss.

I, RUTH WARNKEN, County Clerk and ex-officio Clerk of the Board of Supervisors of the San Luis Obispo County Flood Control and Water Conservation District, do hereby certify the foregoing to be a full, true and correct copy of an order made by the Board of Supervisors, as the same appears spread upon their minute book.

WITNESS my hand and the seal of said Board of Supervisors, affixed this 23rd day of May, 1968.

RUTH WARNKEN
County Clerk and Ex-Officio Clerk of the Board of Supervisors

[SEAL]

By _____ Deputy Clerk.

Appendix E

ENGINEERING ANALYSIS TECHNICAL MEMORANDUM

APPENDIX E

ENGINEERING TECHNICAL MEMORANDUM

DRAFT Technical Memorandum

Raines, Melton & Carella, Inc.
Consulting Engineers/Project Managers

San Luis Obispo County
Community Drainage and Flood Control Studies

Task: **Task 5.2 – Cayucos Engineering Analysis**

To: Mr. Dean Benedix, Project Manager, San Luis Obispo County

Prepared by: Dr. Jeff Lewandowski, P.E.

Reviewed by: Jose Gutierrez, P.E.

Date: April 25, 2003

File: 34-9.B.5.2

1 Executive Summary

This technical memorandum includes a review of existing drainage conditions within the unincorporated community of Cayucos and a discussion of proposed alternative projects to address identified drainage problems. A vicinity map for the community of Cayucos (Cayucos) is shown on Figure 1. There are four primary drainage problem areas identified through the community survey and site inspection:

1) flooding along Cayucos and Little Cayucos Creek;
2) storm water runoff from uphill areas entering lower yards and residences during peak rainfall periods;
3) general drainage problems such as localized ponding of storm water near intersections after a rain event; and
4) hillside runoff and sedimentation around Richard Avenue and Hacienda Drive.

Local drainage patterns were reviewed and identified by a field inspection. The Cayucos study area is divided into 21 separate drainage zones, based on the field inspection of topography and storm drains in the community. The boundaries of the 21 drainage zones are shown in Figure 5. The drainage zones were defined by the watershed area discharging to the individual storm water outfalls at the coastal access areas. Existing drainage infrastructure in each zone was identified and mapped. County policies are briefly described and discussed with regard to their impact and current effectiveness for managing storm runoff.

To protect residential and business property from 10-year rain events, potential drainage projects within the community were identified in 11 of the 21 drainage zones. These projects range in cost from $83,000 to $1,127,000. The implementation of all the drainage projects will cost approximately $3,369,000. For flooding reduction in a 100-year event, a levee or berm could be constructed to prevent the high water surface elevations in Cayucos Creek from flooding the B Street area. The levee system would require a pump station to discharge local flow into the creek, due to the water surface difference during peak creek flows.

Currently, drainage facilities in public right of way are maintained by the County Public Works Department. In addition to the site-specific solutions, it is recommended that a community

facility maintenance district be formed to properly maintain drainage infrastructure in Cayucos. In efforts to solve drainage problems, many private property owners have constructed or installed drainage infrastructure on their own. Because this infrastructure was resident installed, it may be overlooked by County Public Works employees during annual maintenance procedures. The lack of a cohesive drainage network in the community makes the regular maintenance of existing drainage infrastructure necessary but very difficult to complete through County efforts alone. As a result, many of the localized drainage problems are caused by infrequently maintained or deteriorated infrastructure.

2 Introduction

San Luis Obispo County Flood Control & Water Conservation District (the "District") has contracted with Raines, Melton, & Carella, Inc. ("RMC") to prepare six community drainage and flood control studies (the "Study"). The communities involved in the Study are Cambria, Cayucos, Nipomo, Oceano, San Miguel, and Santa Margarita. The problems in these communities include inadequate local drainage systems, under maintained creeks and drainage facilities, and inadequate conveyance capacity in creeks. This technical memorandum outlines the existing drainage and flood control issues in the community of Cayucos and develops project alternatives to mitigate these problems. Also included in the analysis are cost estimates for each of the alternatives.

Technical Memorandum Objective

The purpose of the drainage and flood control study is to examine the existing drainage conditions of Cayucos, identify problematic areas and issues, and prioritize and categorize the problems. This study also develops conceptual solutions to the identified drainage and flood control problems. This memorandum includes a description of existing drainage conditions, a discussion of the methodology used to evaluate drainage problems, and the identification of a series of alternative projects to mitigate the drainage problems. The proposed projects can either be implemented individually to solve isolated problems, or combined to develop a comprehensive solution for improved drainage throughout the entire community. This report also includes methods to reduce the flooding created during the 100-year events on Cayucos Creek, since this impacts community flooding, particularly in the Ash Street and Birch Street areas north of Cayucos Drive.

3 Overview of Cayucos Drainage Issues

In the early stages of urbanization of the community, storm water conveyance and flood control infrastructure was not incorporated into the community. There are several reasons for this, including:

- The high infiltration rate of the underlying Cayucos sands was sufficient to allow storm water to seep into the soil with little runoff, creating a lack of problems and a perceived lack of need.
- No regulatory requirement to provide drainage improvements, since the development was pre-subdivision Map Act requirements.
- Cayucos' topography, proximity to the ocean and four creeks rendered a perception that a formal storm drain system was unnecessary because the natural physical characteristics of the community were sufficient for conveying storm runoff to the ocean.

During this early period, the curb, gutter, and drainage improvements were not required for development, resulting in no upfront drainage infrastructure cost by the property owners. With an increase in urbanization came an increase in impervious surfaces and runoff, with a decrease in pervious surfaces available to absorb the urban runoff.

The combination of the area's steep topography, lack of underground drainage facilities, and location of residential parcels below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways. Lack of storm drain inlets has caused drainage and flooding problems in some intersections. Damage to personal property has also occurred during large storm events. Reported areas of localized flooding and/or drainage problems based on community questionnaires completed by area residents in 2002 are shown in Figure 2.

The most serious flooding in the community takes place in the floodplain of Cayucos Creek west of Highway 1, bounded by the mobile home park on the north and Cayucos Drive on the south, as shown on Figure 3. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creek due to high water levels. Drainage from a tributary to Cayucos Creek flows into this area and has caused flooding. Extensive flood damage occurred to Hardie Park and the adjacent pool along B Street during storm events in 1998. Buildings and homes along Ash Street were also flooded. The photo at right shows local flooding limits during a storm in April 2001.

A number of nuisance drainage and flooding problems occur in Cayucos due to the topography and the lack of a consistent, organized network of curbs and gutters within the community. Drainage from a number of uphill lots flows along the edge of street pavement and drains onto lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance.

The downtown area of Cayucos is within the floodplain of the Cayucos and Little Cayucos Creeks. A draft of the Cayucos Downtown Enhancement Design Plan is currently being reviewed by the County. This plan will require infrastructure to provide drainage capacity from the redevelopment area.

4 Hydrologic Setting

Topography and Climate

Cayucos is located along the coastal area of San Luis Obispo County. Cayucos is bordered by the Pacific Ocean to the west, and is surrounded by open space and grazing areas to the north and east. The regional topography of the area is very steep just east and north of Cayucos, transitioning to more gently sloping ground near the coast. The floodplain areas of Cayucos and Little Cayucos Creek north of E Street are relatively flat and have elevations between 5 and 10 feet above mean sea level, the lowest developed elevations in the community. In other areas of the community, the land near the beach is set on coastal bluffs. The bluff elevations can range from 10 to 20 feet above mean sea level in the Lucerne Street area in the northern portion of the community and along Studio Drive in the southern part of the community.

The marine environment heavily influences the coastal climate of Cayucos. Temperatures in this area are mild year-round, with minimum average temperatures of 42 degrees Fahrenheit in January and maximum average temperatures of 79 degrees Fahrenheit in September. Average annual rainfall, occurring primarily between December and March, is approximately 16 inches. The warmest months are August through October and are typically characterized by dense morning fog followed by afternoon sunshine.

Regional Hydrology

Most of Cayucos is generally located within the coastal storm water subbasins that drain directly to the Pacific Ocean. The coastal storm water subbasins can be delineated based upon the storm water discharge location at the beach. The coastal subbasins have a total area less than 1 square mile. The community is also located at the outlet of four creeks that extend inland and have a total watershed area of about 38 square miles. The watershed areas that drain through Cayucos are shown on Figure 4.

The major creek channels within Cayucos include Cayucos Creek and Little Cayucos Creek in the northern portion of the community, and Old Creek and Willow Creek in the southern portion of the community. Watershed areas for each of these creeks are listed on Figure 4. The Old Creek flow rate through the community is controlled by Whale Rock Dam, which provides water supplies to the City of San Luis Obispo, Cayucos, and other agencies.

Flood Hazard Zones

In addition to localized flooding and drainage problems, portions of Cayucos have been classified by the Federal Emergency Management Agency (FEMA) as being located within 100-year flood hazard zones. The FEMA floodplain delineations are shown in Figure 5. These flood zones include areas near Cayucos Creek and Little Cayucos Creek, and along Willow Creek. The 100-year flood zone on Old Creek is completely within the channel banks due to peak flow attenuation upstream at Whale Rock Dam. However, in the event of the failure of the dam, extensive areas of urban development near the channel, including Highway 1, would be subject to inundation and damage.

The 100-year flood hazard zone for Cayucos Creek includes portions of Cayucos Creek Road east of Highway 1, and portions of Birch Avenue, B Street and Ash Street west of Highway 1. As shown on Figure 6, this flood hazard zone corresponds to the flooding limits observed in

1998. Flow passes Ocean Boulevard without overtopping the roadway, but floods the parking lot areas southeast of Ocean Boulevard before discharging to Estero Bay.

The 100-year Little Cayucos Creek flows are attenuated by the State Highway 1 culvert, causing a large flooding area upstream of Highway 1. Downstream of Highway 1, the reduced peak flows allow Little Cayucos Creek to be generally retained within its banks until it nears Ocean Boulevard. At Ocean Boulevard, the flooding limits extend northwesterly along Ocean Boulevard past the D Street intersection. This flooding zone includes the planned Downtown Enhancement Area. The flooding downstream of Ocean Boulevard includes D Street and a portion of Ocean Front. Citizens in the community have reported that sediment deposition has occurred along Little Cayucos Creek between Highway 1 and Ocean Avenue, with estimates of up to a four feet increase in sediment depth over the last five years.

The 100-year flooding along Willow Creek is limited to a small area between Cypress Mountain and Hacienda Drives upstream of the State Highway 1. Upstream of this area, the creek generally remains within its banks.

It should be noted that the 100-year flooding evaluation and recommendations for solutions to the 100-year flooding problems in the FEMA designated zones were generally not the purpose of this study. They are presented here to show the relative context of the local drainage issues with the larger flood issues concerning Cayucos and Little Cayucos Creeks and Willow Creek. However, since the Cayucos Creek 100-year flooding has a significant impact on many structures in the community, conceptual improvements were developed to mitigate the 100-year flood in the B Street area along the creek.

Local Drainage Patterns

Drainage in Cayucos was divided into 21 different drainage zones (Zones 1 through 21) based on drainage patterns and location of storm drain outfalls within the community. The 21 drainage zones and existing drainage infrastructure are shown in Figure 7. The coastal watersheds shown on Figure 4 were subdivided into smaller subwatersheds based on storm water outfalls located along roadways paralleling the coast. The four largest zones are Zones 2, 4, 14, and 16, corresponding to the Cayucos, Little Cayucos, Old Creek, and Willow Creek watersheds, respectively. Zone 3 is a tributary watershed to Cayucos Creek, but has been subdivided into a separate zone due to the flooding that occurs as the tributary crosses Highway 1 into the low land near the elementary school, Birch and Ash Street. The remaining Zones 1, 5 through 13, 15, and 17 through 21 are much smaller, and discharge storm water runoff directly to Estero Bay either through storm water outfalls or overland flow.

Since the general topography of Cayucos slopes towards the ocean, storm runoff that does not enter one of the creeks or infiltrate into the soil, is discharged via storm water outfalls or overland flow. A majority of the runoff from the smaller coastal watershed zones discussed above is eventually conveyed to the storm water outfalls located along Pacific Avenue and Studio Drive. Storm water outfalls are generally located along the public access locations to the beachside areas. In most cases, drain inlets are located on both the east and west edges of Pacific Avenue and Studio Drive, with a buried pipeline connecting the two inlets. This allows flow to cross the roadway without flooding the eastern side of the street. The buried pipeline continues under the coastal access area and discharges to a freefall condition about 3 to 5 feet below the top of the bluff. The pipeline invert ranges from beach level in the northern areas of the community to about 15 feet above the beach in the southern areas of the community. Photographs 1 and 2 in Appendix A show typical configurations of drop inlets, storm drain alignments and discharge outfall along the coastal bluffs.

Runoff generally flows from east to west in the coastal watersheds, although the roadside gutters and swales at intersecting north-south streets can carry the flow numerous blocks to the north or south before the runoff is carried west across the road at an intersection, drain inlet, or low point in the roadway. Near the four large creeks, runoff tends to be directed either north or south toward the creek channels. In some cases, drain inlets and pipelines to the creek have been constructed at intersections near the creeks. This allows positive drainage in small storms, but also can provide a location for flooding if the creek water surface elevation reaches flood stage and backflows along these drain pipelines.

Existing Drainage Facilities

Caltrans Culverts

Caltrans built and maintains a number of Highway 1 culverts that drain runoff from Highway 1 and convey runoff from the watersheds east of Highway 1. The locations of the culvert crossings on Highway 1 are shown on Figure 7. A partial list of Caltrans facilities is summarized below:

- Zone 19 – Culvert between Thatcher and Mayer
- Zone 16 - 10-foot by 10-foot concrete box culvert on Willow Creek, south of Old Creek Road;
- Zone 15 - 36-inch reinforced concrete pipe south of Obispo Avenue;
- Zone 8 – Double 18-inch corrugated metal pipe between 7th and 8th Street;
- Zone 7 - 42-inch corrugated metal pipe between Park Street and 4th Street;
- Zone 4 - Double 72-inch corrugated metal pipe on Little Cayucos Creek;
- Zone 3 - 42-inch reinforced concrete pipe for Cayucos Creek tributary watershed. Outlet is at the elementary school playing field near B Street (see Photograph 3 of Appendix A)

Drop Inlets and Storm Drain Outfalls

There are a number of drop inlets and storm drain outfalls that collect water along Pacific Avenue and Studio Drive. The storm drains are generally located in public beach access right of ways to the ocean. The locations of the storm water outfalls are shown in Figure 7.

Storm Drain Pipelines and Drainage Ditches

There are a few large storm drain pipelines and drainage ditches in Cayucos. These were identified and mapped during the field reconnaissance. It is possible that some private storm drains were not located; therefore, this list is not intended to be a comprehensive inventory of all facilities. The drain locations are shown on Figure 7.

- B Street Drain – This drain starts downstream of the Caltrans 48-inch culvert at the elementary school, and includes a series of culverts and drainage ditches conveying flow through the school yard, adjacent to Hardie Park, along B Street and open drainage channels, eventually discharging to Cayucos Creek via a 60-inch polyethelene corrugated pipe. Photographs 4 through 7 in Appendix A show the existing facilities that drain the Cayucos Creek tributary watershed.
- 3rd Street Drain – This drain starts downstream of the Caltrans culvert between Park Street and 4th Street. This storm drain conveys flow west from Park Avenue to the ocean, collecting local runoff at inlets and open channel segments of the drain. The storm drain is constructed under a church, behind a grocery store located at Park Street

and Ocean Avenue, under a community park at 3rd Street west of Ocean Avenue, and eventually discharges to a heavily vegetated open channel near the ocean. Photographs 8 through 11 in Appendix A show the various points of the storm drain.

5 Drainage and Flooding Issues

District Curb and Gutter Land Use Ordinance

San Luis Obispo County Land Use Ordinance 22.54.030 requires the installation of concrete curb, gutters, and sidewalks along the entire street frontage of the site under permit, and also along the street frontage of any adjoining lots in the same ownership as the site, for any projects in the following land use categories:

- New residential subdivisions, pursuant to Title 21 of the SLO County Code
- Residential multifamily land use category, remodeling improvements that are valued at 25 percent or greater than the current property value
- New residential multifamily categories within an urban reserve line
- All commercial, office and professional categories within an urban reserve line
- All industrial categories within an urban reserve line.

Curbs and gutters are not required on new residential single family lot construction (infill lots), residential rural and suburban categories, agricultural, open space and park & recreation land use areas within an Urban Reserve Line. Curb, gutter and/or sidewalk improvement requirements may be waived, modified or delayed as follows:

- Incompatible Grade. In the opinion of the County Engineer, the finish grades of the project site and adjoining street are incompatible for the purpose of accommodating the improvements.
- Incompatible Development. Based upon the land use designations, existing land uses in the site vicinity, and existing and projected needs for drainage and traffic control, that such improvements would be incompatible with the ultimate development of the area.
- Premature Development. 1) The proposed use of a site is an interim use, 2) the project is part of a phased development and upon completion of all phases, the entire extent of improvements will be constructed, and 3) delaying the improvements would better support the orderly development of the area.
- Segmented curbs and gutters have caused isolated flooding problems. In the long term, the required installation of curbs and gutters will improve local drainage since the end result will be a continuous system that collects and conveys runoff in an efficient manner. However, in the short term, the inconsistent placement of curbs and gutters in Cayucos has led to the concentration of street runoff in areas that do not have curbs or gutters and generally represent local low spots within a neighborhood block.

In general, the lack of curb and gutter does not cause problems for every residence. It is primarily a problem for residences along the roadway where large amounts of overland flow are passing along the street. The curb and gutter would provide a path and prevent it from entering the yards. However, if curbs were present in these areas it would move the flooding to the driveways, which would require a rolled asphalt section. In Cayucos, drainage problems were observed where curb and gutter was installed, but no drainage outlet was provided in the sag.

Flooding near Cayucos Creek and Little Cayucos Creek

The relatively flat floodplain area where Cayucos and Little Cayucos Creek discharge into Estero Bay has areas designated as FEMA 100-year flood hazard zones. These areas include municipal buildings, businesses, residences, and the proposed Downtown Enhancement area. In both creeks, the water surface elevation of the creek will rise above the channel banks at peak flow conditions, and flood a portion of the surrounding area. Since the focus of this study was the County design standards for the shorter 10-year return period, the analysis and reduction of the 100-year flooding area was generally not included in this study. However, since the Cayucos Creek 100-year flooding has a significant impact on many structures in the community, conceptual improvements were developed to mitigate the 100-year flood in the B Street area along the creek.

The flooding and sediment deposition problems created by the Cayucos Creek tributary that discharges into the 100-year floodplain were considered to contribute to local flooding in smaller storm events. The discharge of the existing Highway 1 culvert currently carries peak flow and sediments into the commercial and public areas. A study by Fred H. Schott (1998) identified the 100-year peak flow from the watershed west of Highway 1 to be about 100 cfs, compared with the 20 cfs total discharge from local areas west of the highway. If this discharge were diverted directly to the creek via a culvert, the existing channel and culvert system (shown in Photographs 4 through 7 of Appendix A) would convey only local runoff, reducing flooding conditions during smaller storms. Since this area is lower than the 100-year water surface elevation in Cayucos Creek, peak flows along the creek would continue to overtop the banks and cause flooding in large storm events.

Tidal flows and rising flood waters will also enter the existing discharge culvert and flow backwards through the culvert, since there is no flapgate on the discharge. This could increase the flooding in the floodplain area along B and Birch Streets. A flapgate would allow flow in one direction, preventing the flow from flowing backwards through the culvert.

Local Drainage and Flooding Problems

These problems include storm water runoff from uphill areas entering lower yards and residences during peak rainfall periods and the localized ponding of storm water near intersections and in yards after rainfall. The community lacks a consistent, organized network of curbs, gutters, and drain inlets, which has resulted in a number of nuisance drainage and flooding problems within the drainage zones. Drainage from a number of uphill lots flows along the edge of the street and drains off the edge of the pavement through the lower lots, creating flooding and erosion problems. However, drainage problems also exist where curbs are present, but the topography creates conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance. In some cases, a small rolled asphalt section has been place along the driveway entrance, which prevents runoff from entering the driveway. In other cases, residents have constructed trench drains across their driveway to prevent runoff from entering their garages and residences.

The locations where street drainage entered driveways were observed on both north-south and east-west roadways. For example, some residences on the west side of the street are lower than the roadway on Park Avenue between Sixth Street and Santa Ysabel Drive. Although the curb and gutter areas of this street provide flow conveyance along the street, the driveway entrances on the west side of the road provide a location where flow can enter the driveway and flood the residence. Further downstream on Fifth Street, which is east-west oriented, there are

no curb and gutters. In some cases the original west to east downward slope of the lot has been altered to create a level grade for construction of the residence. Since the road slope follows the original slope of the ground, the eastern sides of the lots are lower than the roadway, and water flows off the edge of the pavement into the yards or into driveways that are lower than the street level.

Recurring Flooding Problems

Recurring flooding problems have been reported for one property on Ash Street between B Street and Cayucos Drive. This location may be eligible for Federal grant funding under the Federal Mitigation Assistance grant program. A detailed discussion of alternative funding mechanisms was completed as a separate task to this study. The final report will include an implementation strategy for planning, designing, permitting and funding the proposed projects in the study. A second property reporting recurring flooding problems is on Gilbert Avenue, between Day Street and Chaney Avenue.

Hillside Runoff and Sedimentation

Some survey respondents identified hillside runoff and sedimentation as a major problem in Cayucos. During storms, hillside runoff scours the surface and carries sediment to lower lying areas. Homes that back up onto hillsides receive this runoff. If the owner has not constructed a barrier or erosion protection measure, then the sediment concentrated runoff will deposit onto the property and create a nuisance problem. There have been no reports of damage to residences due to hillside runoff.

Maintenance of Drainage Facilities

Survey respondents reported that many of the existing drop inlets and culverts are filled with sediment and debris. Under maintained facilities reduce their design capacity and inhibit their ability to convey runoff. Field investigations indicate that some of the culverts and drainage ditches were partially filled with sediment and excessive vegetal growth. However, in many instances it was difficult to determine whether the culverts were located in public right of way or on private property. The District is not responsible for maintaining facilities on private property.

6 Drainage and Flood Control Analysis

Flooding and Drainage Problem Identification

Drainage problems within the community of Cayucos were identified by:

1) Distribution of a community drainage and flood control questionnaire to Cayucos residents;
2) Community outreach discussions with local residents and government officials;
3) Review of existing County files indicating reported drainage problem locations;
4) Field mapping of drainage based on visual observation of the slope of roads, curbs, gutters, storm drain inlets and outlets, and outfall locations; and

5) Review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for Cayucos.

The general background information and a summary of flooding problems were included in Sections 4 and 5.

The community was divided into 21 drainage zones (Zones 1 through 21). The delineation of the drainage zones made it possible to better understand the relationship between community drainage problems and to develop conceptual solutions for these problems. The zones are generally laid out to correspond with the tributary area to each of the storm water outfalls at the coast shown in Figure 7.

The major constraint identified in local flooding issues was the lack of suitable conveyance capacity for the storm water runoff. In most areas, storm water runoff flows as surface flow in streets, ditches, and backyard areas. The storm water runoff rate increases nearer to the coast due to the increased storm water tributary area. However, the conveyance capacity is widely varied, due to changes in roadway slope and cross section, the presence or lack of curb and gutters, and the presence or lack of existing culverts and drainage channels. Most drainage issues were the result of upstream concentrated flows entering downstream lots due to a reduction in conveyance capacity or the lack of a storm water outlet or outfall. Other drainage issues were a result of standing water after a rainfall, which could be resolved by providing drain inlets and underground piping to a lower outlet area.

Analysis of Flood Flow Rates

The Rational Method was used to estimate approximate peak discharges at the outfalls for each of the drainage zones in the community. The peak discharge computed by the Rational Method is a function of total area, rainfall intensity, topography, soil characteristics, and land use within the drainage zone. Each subwatershed has a different size, slope, and runoff characteristic. However, for these peak discharge calculations, an identical rainfall intensity and runoff coefficient C was assumed for all the areas, to provide a general estimate of peak flows. The design flows will be calculated when the projects are identified and the watershed areas are defined. A runoff coefficient C value of 0.5 was assumed as a general composite condition for all surfaces. Rainfall intensities of 1 in/hour and 1.5 in/hour were assumed for the 10-year and 100-year rainfall rates. These rainfall rates will need to be changed for design to correspond to the different time of concentration for each of the watersheds. The calculated peak discharges were used primarily to compare peak flows for the different drainage zones. These discharges are suitable for planning level design, but are not meant for detailed design of facilities.

The Rational Method calculations were limited to the small coastal subwatershed, since peak flow rates for the larger creeks were identified in the FEMA Flood Insurance Study. The results of the Rational Method calculations and a comparison with the peak flows for the four larger creeks are presented in Table 1.

Table 1. Watershed Peak Flows [1]

Drainage Zone	Area (Acres)	Peak Flow Rate (cfs)		Drainage Zone	Area (Acres)	Peak Flow Rate (cfs)	
		10-Year	100-Year			10-Year	100-Year
1	24	12	18	12	13	6.5	9.8
2	6,800[2]	1,500	7,000	13	5.7	2.9	4.3
3	140	70	105	14	13,000	NA[3]	NA[3]
4	1,400[2]	360	1,700	15	70	35	53
5	31	16	23	16	2,100[2]	490	2,200
6	5.5	2.8	4.1	17	17	8.5	13
7	92	46	69	18	26	13	20
8	80	40	60	19	24	12	18
9	17	8.5	13	20	7.4	3.7	5.6
10	17	8.5	13	21	160	80	120
11	18	9	14				

[1] County standards mandate that minor drainage facilities be designed for the 10-year design level. The 100-year flows are shown for comparison purposes only

[2] Flow rates from FEMA Flood Insurance Study

[3] Flow releases are determined by Whale Rock Reservoir operations, and were not calculated by the Rational Method

7 Potential Project Alternatives and Combinations

One of the comments received from the residents during a public meeting was a request to develop a number of small project alternatives, or groups of smaller projects, to resolve the flooding problems if possible. Several potential projects have been developed to address the flooding areas and issues and are shown by Drainage Zone on Figures 8 through 14. A combination of the projects will be required to eliminate all of the drainage problems for the community. Although an extensive storm drain system could be constructed to provide conveyance of all storm water runoff, the project would be very expensive. The project alternatives are described in the following sections based on the numerical order of the drainage zones.

The proposed culverts discussed in this section are intended for planning level purposes only. Detailed calculation of pipeline diameter would require a design level topographic survey of the proposed alignments and detailed analysis of the peak flow rates of each subwatershed. If a proposed project proceeds toward implementation, it is recommended that the lead agency collect this information.

Zone 3 Improvements

The Zone 3 improvements include projects to reduce flooding in the 10-year event and additional conceptual projects to reduce the flooding in the 100-year event.

For flooding reduction in a 10-year event, a storm drain pipeline could be constructed to convey the Cayucos Creek tributary flow directly to Cayucos Creek as shown on Figure 8. This would reduce the potential for flooding in the Birch Street and Cayucos Creek Road area. Based on flow calculations by Fred Schott (1998), the total 10-year runoff from the area is 83 cfs, with 69 cfs originating from east of Highway 1. This runoff currently flows from a Highway 1 Caltrans 48-inch culvert and exits at grade onto the surface of the elementary school playing field. It enters a junction structure to a pair of storm drain pipeline beneath the field, then through a series of open channels along B Street, eventually discharging to Cayucos Creek via a 48-inch (estimated) corrugated polyethelene culvert. The proposed pipeline would be constructed between the outlet of the culvert passing under Highway 1 and the creek, and would bypass 69 cfs to the creek instead of the existing drainage facilities along B Street. A pressurized storm drain line may be possible, due to the high water surface elevation upstream of Highway 1. This may allow the pipeline to be reduced in size compared with a gravity flow storm drain.

The proposed drainage pipeline would not be capable of draining the area west of Highway 1. That area would include only 14 cfs local drainage and would be drained by the existing culvert and channel system as shown in Figure 8. The existing culvert discharging into Cayucos Creek near the Ocean Avenue crossing may require the installation of a flap gate to prevent backflow of Cayucos Creek into the local channel system.

Benefits and Constraints

This improvement would prevent the Cayucos Creek tributary watershed from draining through the community down B Street, and would reduce peak flow to about 17 percent of the current 10-year flow. This improvement would also divert the sediment load from east of the highway, reducing maintenance excavation of sediments from the drainage channels along B Street.

Cost

The breakdown of costs is shown in Table 2. The total cost for this alternative is approximately $420,000.

Table 2. Zone 3 Improvements Estimated Cost

Item	Quantity	Cost [1]	Total
Diversion Drain Pipeline	600 LF	$225/LF	$135,000
Inlet Structure	1	Lump Sum	$25,000
New Outfall to Creek	1	Lump Sum	$50,000
		Subtotal	**$210,000**
		Engineering/Design (20%)	$42,000
		Administrative/Environmental (60%)	$126,000
		Contingency (20%)	$42,000
		Total	**$420,000**

1. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 60% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 100% cumulative markup on construction costs for Coastal Zone Projects. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

For flooding reduction in a 100-year event, a levee or berm could be constructed to prevent the high water surface elevations in Cayucos Creek from flooding the B Street area. As shown on Figure 9, this levee would be in addition to the pressure pipeline to convey the Cayucos Creek

tributary flow directly to Cayucos Creek. The length of the levee is estimated to be approximately 1,300 feet, and would extend between Ocean Avenue and a point upstream of the Highway 1 crossing. The height is assumed to be 8 feet, with side slopes of 2:1 and a five foot wide path at the top. The levee would require about 6 cy of fill per lineal foot. The actual length and height of the levee would be determined during the design phase.

The levee system would require a pump station to discharge local flow into the creek, due to the water surface difference during peak creek flows. Lower flows may be discharged without pumping if a flap gate is installed to prevent backflow of Cayucos Creek into the local channel system during high flows. The pump station would be designed to discharge the 100-year peak flow of about 21 cfs from the local flow area.

Benefits and Constraints

This improvement would prevent the flooding of the community in the B Street area during the 100-year flood. Constructing a levee and pump station is very expensive and may not be justified to mitigate flooding of recreational facilities, a business and one residential dwelling unit. The environmental permit process may also be very extensive if work is conducted within the creek's bank. An environmental analysis will be conducted under separate task of this project.

Flood protection projects that protect against damages caused by a 100-year flood event on Cayucos Creek could be co-sponsored by the U.S. Army Corps of Engineers (Corps). Gaining Corps involvement would provide for partial Federal funding of the planning, design and construction, however, the local community would still be expected to provide funding as the local sponsor. The funding analysis, completed as a separate task of this project, describes the requirements for obtaining Federal funding of flood protection projects. The final report will also discuss various implementation and funding strategies to pay for the recommended projects.

Cost

The breakdown of costs is shown in Table 3. The total cost for this alternative is approximately $1,980,000.

Table 3. Zone 3 100-Year Flooding Improvements Estimated Cost

Item	Quantity	Cost [1]	Total
Diversion Drain Pipeline Improvements	1	$210,000	$210,000
Levee/Berm	1,300	$100/ LF	$130,000
Pump Station	1	Lump Sum	$600,000
		Subtotal	**$940,000**
		Engineering/Design (20%)	$188,000
		Administrative/Environmental (60%)	$564,000
		Contingency (20%)	$188,000
		Total	**$1,880,000**

1. See cost estimate notes on Table 2

Zone 5 Storm Drain Pipeline and Inlets

The poor drainage at the southeast corner of Ocean and Pacific occurs at a fully improved (curb and gutter) section and the reported problems indicate that this section should have been designed initially with a culvert. A storm drain pipeline is proposed in Ocean Avenue from Pacific Avenue to the existing storm drain just south of F Street, as shown on Figure 10. This storm drain would collect runoff from the Pacific Avenue intersection and drain it westerly to the Zone 5 system and outfall. This improvement could also reduce the flooding currently experienced in Zone 6 by reducing the tributary flows to that outfall. This project would include installing drop inlets at the Pacific Avenue intersection and a storm drain pipeline to move storm water north to the open channel at the north outlet.

Benefits and Constraints

The advantages include improving the drainage in the Pacific Avenue and South Ocean Avenue intersection. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 4. The total cost for this alternative is approximately $117,000.

Table 4. Zone 5 Improvements Estimated Cost

Item	Quantity	Cost[1]	Total
Storm Drain Pipeline	310 LF	$175/LF	$54,000
Drop Inlet Structure	4	$1000 each	$4,000
		Subtotal	**$58,000**
		Engineering/Design (20%)	$12,000
		Administrative/Environmental (60%)	$35,000
		Contingency (20%)	$12,000
		Total	**$117,000**

1. See cost estimate notes on Table 2

Zone 8 Storm Drain Pipelines and Inlets

Due to the size of this subwatershed, it is proposed that two storm drain pipelines be constructed to convey flow from the upper watershed to the existing outfall locations. The two drain systems are shown on Figure 11. One storm drain would be constructed along Sixth Street from St. Marys Avenue to the drain inlets along Pacific Avenue. The storm drain could be extended north along St. Marys Avenue to collect a portion of the runoff that currently flows down a concrete flume located within a private easement between Fifth and Sixth Street. It could also pick up drainage from Park Avenue that discharges from an existing storm drain onto St. Marys Avenue.

The second storm drain in Zone 8 would be constructed along Eighth Street from St. Marys Avenue to the drain inlets and outfall at Pacific Avenue between Seventh and Eighth Street. The storm drain could be extended farther east along Eighth Street within the County right of

way, to collect drainage from Park Avenue and runoff from the east side of Highway 1. An easement through private property may be required to connect to the Caltrans culvert discharge. The storm drain could also be extended south (about 400 feet from Eighth Street) along St. Marys to intercept an existing storm drain from Park Avenue to St. Marys Avenue. These two storm drains would reduce the flooding currently experienced in Zone 8 by conveying the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. This project would include installing drop inlets at the intersections to reduce the downstream overland flow in the streets.

Benefits and Constraints

The advantages include improving the drainage in the Zone 8 area. However, by improving the drainage in this area, it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater along St. Marys to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements. The outfall capacities should be verified during predesign of the facilities to ensure that flows do not escape the drain inlets at the lower elevations near the outfall. Extending the storm drain to connect with the Caltrans culvert will require acquisition of an easement along private lot side yards.

Cost

The breakdown of costs is shown in Table 5. The total cost for this alternative is approximately $1,127,000.

Table 5. Zone 8 Improvements Estimated Cost

Item	Quantity	Cost	Total
Sixth Street Storm Drain Pipeline	1150 LF	$175/LF	$201,000
Eighth Street Storm Drain Pipeline	2000 LF	$175/LF	$350,000
Drop Inlet Structure	12	$1000 each	$12,000
		Subtotal	**$563,000**
		Engineering/Design (20%)	$113,000
		Administrative/Environmental (60%)	$338,000
		Contingency (20%)	$113,000
		Total	**$1,127,000**

1. See cost estimate notes on Table 2

Zone 9 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed in Tenth Street from Cass Avenue to the drain inlets along Pacific Avenue as shown on Figure 11. This area currently has no curbs and gutters. The storm drain would reduce the flooding currently experienced in Zone 9 along Tenth Street by conveying the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. This project would include installing drop inlets at the intersection of Tenth and Cass to collect flows accumulating there, as reported by residents.

Benefits and Constraints

The advantages include improving the drainage in the Cass Avenue and Tenth Street intersection. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 6. The total cost for this alternative is approximately $148,000.

Table 6. Zone 9 Improvements Estimated Cost

Item	Quantity	Cost	Total
Tenth Street Storm Drain Pipeline	410 LF	$175/LF	$72,000
Drop Inlet Structure	2	$1000 Each	$2,000
		Subtotal	**$74,000**
		Engineering/Design (20%)	$15,000
		Administrative/Environmental (60%)	$44,000
		Contingency (20%)	$15,000
		Total	**$148,000**

1. See cost estimate notes on Table 2

Zone 10 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed along 13th Street from Cass Avenue to Pacific Avenue, and then north along Pacific Avenue to the drain inlets at 12th Street as shown on Figure 12. This storm drain would reduce the flooding currently experienced in Zone 10 by conveying the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. This project would include installing drop inlets at the intersection of 13th Street and Cass Avenue and at 13th Street and Pacific Avenue to collect flows accumulating there as reported by residents.

Benefits and Constraints

The advantages include improving the drainage along 13th Street at Cass Avenue and the Pacific Avenue intersections. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 7. The total cost for this alternative is approximately $192,000.

Table 7. Zone 10 Improvements Estimated Cost

Item	Quantity	Cost	Total
13th Street and Pacific Avenue Storm Drain Pipeline	525 LF	$175/LF	$92,0000
Drop Inlet Structure	4	$1000 Each	$4,000
		Subtotal	**$96,000**
		Engineering/Design (20%)	$19,000
		Administrative/Environmental (60%)	$58,000
		Contingency (20%)	$19,000
		Total	**$192,000**

1. See cost estimate notes on Table 2

Zone 11 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed along Pacific Avenue between 15th and 17th Streets as shown on Figure 12 to convey storm water runoff that collects along the roadside in these areas. Drain inlets would be constructed at the 15th and 17th Street intersections to convey the peak flows below the ground surface, reducing the overland flow and nuisance flooding caused by these flows. The runoff would discharge into the existing drain inlet and outfall at 16th Street.

Benefits and Constraints

The advantages include improving the drainage along Pacific Avenue in this area. However, by improving the drainage in this area it may cause a slight increase in the peak flows at the outfall, since there is no longer flooding and pooling of stormwater to reduce flows into the outfall. In all cases, flooding should be reduced. The outfall capacity should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 8. The total cost for this alternative is approximately $152,000.

Table 8. Zone 11 Improvements Estimated Cost

Item	Quantity	Cost	Total
Pacific Avenue Storm Drain Pipeline	410 LF	$175/LF	$72,000
Drop Inlet Structure	4	$1000 each	$4,000
		Subtotal	**$76,000**
		Engineering/Design (20%)	$15,000
		Administrative/Environmental (60%)	$46,000
		Contingency (20%)	$15,000
		Total	**$152,000**

1. See cost estimate notes on Table 2

Zone 12 Storm Drain Pipelines and Inlets

A storm drain pipeline is proposed along a private easement at 2000 Circle Drive and 1999 Cass Street as shown on Figure 12. A local sump area occurs near the front of 2000 Circle Drive, causing drainage from the Circle Drive area to pool there. This drainage currently overtops the curb or flows into the driveway and flows through the side yard to Cass Street. This drainage should be collected in a drop inlet and conveyed in a drainage pipe to Cass Street for discharge. Flow would continue as overland flow westward along 19th or 20th Streets as in the current condition.

Benefits and Constraints

The advantages include preventing the residential flooding to the 2000 Circle Drive residence. A drainage easement would be required to construct the drain pipeline through the property. By improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 9. The total cost for this alternative is approximately $83,000.

Table 9. Zone 12 Improvements Estimated Cost

Item	Quantity	Cost	Total
Circle Drive to Cass Street Storm Drain Pipeline	200 LF	$175/LF	$35,0000
Drop Inlet Structure	2	$1000 Each	$2,000
Easement Acquisition	1000 SF	$5/SF	$5,000
		Subtotal	**$41,000**
		Engineering/Design (20%)	$8,000
		Administrative/Environmental (60%)	$25,000
		Contingency (20%)	$8,000
		Total	**$83,000**

1. See cost estimate notes on Table 2

Zone 15 Storm Drain Pipeline and Inlets

A storm drain pipeline is proposed in Stuart Avenue from Richard Avenue to the existing storm drain ditch just west of Ocean Street, as shown on Figure 13. This storm drain would include installation of drop inlets at the intersections to collect runoff from Richard, Santa Barbara, and Orville Avenues.

Benefits and Constraints

The advantages include improving the drainage in the Zone 15 area by conveying runoff through buried pipes instead of via overland flow along the streets. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer pooling of stormwater to reduce flows into the downstream area. This flow increase is

not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 10. The total cost for this alternative is approximately $192,000.

Table 10. Zone 15 Improvements Estimated Cost

Item	Quantity	Cost[1]	Total
Storm Drain Pipeline	500 LF	$175/LF	$88,000
Drop Inlet Structure	8	$1000 each	$8,000
		Subtotal	**$96,000**
		Engineering/Design (20%)	$19,000
		Administrative/Environmental (60%)	$58,000
		Contingency (20%)	$19,000
		Total	**$192,000**

1. See cost estimate notes on Table 2

Zone 16 Storm Drain Pipeline and Inlets

Storm drain improvements are proposed in two areas along Hacienda Drive as shown on Figure 13. The existing drain along Ocean Avenue at Hacienda does not provide adequate drainage from the Cerro Gordo Avenue area and from the hillside south of Hacienda Drive. Before development, runoff from the hillside south of Hacienda Drive would travel through existing swales from the hillside to Willow Creek. Many homes have been constructed along the creek, which have altered the drainage into the creek. Some swales, although altered by paving or landscaping, have been retained between houses. In other areas, drain pipelines have been installed from the southern edge of Hacienda to the creek. Drainage improvements include drop inlets and drain pipes along the southern edge of the road to collect and convey runoff to existing creek outfalls. Runoff from the Cerro Gordo Avenue area is conveyed west, via overland flow, to the existing drain at Ocean Avenue. The runoff from the hillside for areas east of the Cerro Gordo area should be conveyed to the existing private storm drain pipeline outfall at 464 Hacienda. The existing outfall capacity is not known and would need to be verified during predesign of the improvements. The cost for a new outfall is included in the cost estimate. An easement through the property would be required for the acquisition and or replacement of the existing pipe.

Benefits and Constraints

The advantages include improving the drainage in the Hacienda Drive area. However, by improving the drainage in this area it may cause a slight increase in the peak flows at the downstream outfalls. This flow increase is not expected to cause downstream flooding, but the capacity of the two existing outfalls and impact of the flow change should be verified during design of the improvements. An easement would be required at the existing outfall location near 464 Hacienda.

Cost

The breakdown of costs is shown in Table 11. The total cost for this alternative is approximately $402,500.

Table 11. Zone 16 Improvements Estimated Cost

Item	Quantity	Cost[1]	Total
Hacienda/Cerro Gordo Storm Drain Pipeline	500 LF	$175/LF	$88,000
Drop Inlet Structure	3	$1000 each	$3,000
Hacienda Storm Drain Pipeline	500 LF	$175/LF	$88,000
New Drain Outfall	100 LF	$175/LF	$17,000
Drop Inlet Structure	3	$1000 each	$3,000
Easement Acquisition	500 SF	$5/SF	$2,500
		Subtotal	**$201,500**
		Engineering/Design (20%)	$40,000
		Administrative/Environmental (60%)	$121,000
		Contingency (20%)	$40,000
		Total	**$402,500**

1. See cost estimate notes on Table 2

Zone 19 Storm Drain Pipeline and Inlets

Two new storm drain pipelines are proposed for Zone 19 as shown on Figure 14. A new storm drain pipeline is proposed along private property between Gilbert and Shearer Avenues to convey the peak runoff originating on the hillside east of Gilbert. The new pipeline would be constructed in an easement between the streets and would connect to the existing storm drain system at Shearer. The pipeline would carry discharge from the three existing 12-inch diameter culverts crossing Gilbert. Drop inlets would be constructed at Shearer to collect runoff flows from the north and south along Shearer Avenue. Flows would continue westward and cross Highway 1 in an existing drain culvert, discharging into the ditch and onto Mayer Street on the west side of the highway. Due to the large flows conveyed from Zone 19 along Mayer, a new storm drain is also proposed there. A junction structure and easement through private property may be required adjacent to Highway 1 where the existing culvert discharges the Zone 19 flows conveyed from the east side of the highway. The new storm drain pipeline would convey the runoff along Mayer to the existing drain inlets along Studio Drive.

Benefits and Constraints

The advantages include improving the conveyance of runoff from the hills east of Gilbert. Since the runoff will be carried in a pipeline, it will not enter the existing culvert inlet at Shearer, reducing the ponding and flooding that currently occurs there. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 12. The total cost for this alternative is approximately $273,000.

Table 12. Zone 19 Improvements Estimated Cost

Item	Quantity	Cost[1]	Total
Gilbert Storm Drain Pipeline	500 LF	$175/LF	$88,000
Drop Inlet Structure	1	$1000 each	$1,000
Mayer Storm Drain Pipeline	200 LF	$175/LF	$35,000
Junction Structure	1	$3000 each	$5,000
Easement Acquisition	2000 SF	$5/SF	$10,000
		Subtotal	**$137,000**
		Engineering/Design (20%)	$27,000
		Administrative/Environmental (60%)	$82,000
		Contingency (20%)	$27,000
		Total	**$273,000**

700 See cost estimate notes on Table 2

Zone 21 Storm Drain Pipeline and Inlets

A new storm drain pipeline is proposed between Gilbert and Ocean Avenues as shown on Figure 14 to convey the peak runoff originating on the hillside east of Gilbert. The runoff from this area currently passes along surface drain channels in private easements between houses, and along the street right of way. The storm drain pipeline would collect these flows and convey them below the ground surface to discharge on the west side of Ocean Avenue. The portion of the pipeline between Gilbert and Davies would be along private property between houses, and would require an easement. The remainder of the pipeline would be constructed in the street right of way along Davies and Haines Avenue. Drop inlets would be constructed at Davies, Shearer and Ocean Avenues to collect runoff flows from the north along these streets. The pipeline would connect to the existing culvert crossing Ocean Boulevard.

Benefits and Constraints

The advantages include improving the conveyance of runoff from the hills east of Gilbert. Since the runoff will be carried in a pipeline, it will not be carried along the streets as sheetflow, reducing the ponding and flooding that currently occurs due to the runoff. It is anticipated that collection of flows along Haines will reduce the runoff currently carried to Chaney and causing flooding there. However, by improving the drainage in this area it may cause a slight increase in the peak flows downstream, since there is no longer flooding and pooling of stormwater to reduce flows into the downstream area. This flow increase is not expected to cause downstream flooding, but the impact of the flow change should be verified during design of the improvements.

Cost

The breakdown of costs is shown in Table 13. The total cost for this alternative is approximately $262,500.

Table 13. Zone 21 Improvements Estimated Cost

Item	Quantity	Cost[1]	Total
Storm Drain Pipeline	700 LF	$175/LF	$123,000
Drop Inlet Structure	6	$1000 each	$6,000
Easement Acquisition	500 SF	$5/SF	$2,500
		Subtotal	**$131,500**
		Engineering/Design (20%)	$26,000
		Administrative/Environmental (60%)	$79,000
		Contingency (20%)	$26,000
		Total	**$262,500**

1. See cost estimate notes on Table 2

Hillside Runoff and Sedimentation

Reserves from the County's General Fund are normally not used for the construction of projects protecting private property, unless there is a significant general or roadway benefit. In some cases, the reported residential drainage problems in the Cayucos area included sedimentation or mud occurring from hillside runoff. Where sediments and runoff leave one private property to enter another, as occurs in residential back yard areas from the adjacent upslope hillside, the District has no jurisdiction. Hillside runoff and sedimentation onto private properties along Richard Avenue and Hacienda Drive should be addressed by the individual property owner, and not the District. However, District staff is available to consult with the property owners, provide information on common drainage law, and provide basic information on conveying runoff from their property onto public right of way.

Additional Recommendations

All the natural drainage channels that convey flow from east to west experience some sediment deposition and vegetal growth. Existing natural or fabricated drainage channels should be kept free of obstructions such as fallen trees, debris, and sedimentation to maintain capacity in the drainage system. Primary responsibility for this maintenance should rest with the owners of the property through which the drainage channels pass since the County is not responsible for maintaining facilities on private property. If the drainage channels pass through public property, such as County roads, then the County's maintenance department would be responsible for removing impediments. The San Luis Obispo County Flood Control and Water Conservation District should continue to provide leadership, advice and encouragement to property owners and local agencies to assume these responsibilities.

Formation of a Drainage Facility Maintenance Department

Many of the drainage/flooding problems in Cayucos are exacerbated by inadequate maintenance of drainage facilities. Currently, the maintenance of drainage infrastructure located within public right of way for unincorporated communities in the County, including Cayucos, is the responsibility of the County Public Works Department. The limited availability of County staff and the large area of responsibility make it difficult for maintenance workers to become familiar

with all drainage issues in the community. This means that the maintenance of some culverts and ditches are sometimes overlooked and, therefore, these culverts and ditches may end up becoming clogged during the rainy season. It is recommended that a facility maintenance district be formed to better maintain the drainage infrastructure in Cayucos. Responsibilities of the new maintenance district would include: (1) being the contact point for all resident complaints regarding drainage infrastructure in the community; (2) keeping an organized database of all new drainage infrastructure in the community including the size and capacity of culverts and storm drains, even if this infrastructure is installed by private property owners; (3) keeping a regular maintenance schedule that may involve multiple maintenance visits where needed; and (4) responding to drainage infrastructure repairs as needed. Having a localized facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the community.

Summary of Costs

Table 9 is a summary table of the costs for proposed projects in each of the drainage zones. If all the proposed alternatives were implemented to meet the 10-year flood protection standards, the total cost is approximately $3.4 million. The additional cost for providing 100-year flood protection for the area near B Street at Cayucos Creek is about $1.9 million.

Table 9. Cayucos Drainage Improvements Summary Cost Table

Drainage Zone	Estimated Construction Cost
3	$420,000
5	$117,000
8	$1,127,000
9	$148,000
10	$192,000
11	$152,000
12	$83,000
15	$192,000
16	$402,500
19	$273,000
21	$262,500
Total Cost	$3,369,000
Additional Cost for 100-year Flood Protection of B Street Area	$1,880,000

1. See cost estimate notes on Table 2

Other Items to Consider

Existing utilities (water, gas, sewer, electrical) in Cayucos do not follow a consistent alignment. If a project proceeds to the design phase, additional effort should be invested in the thorough investigation of utilities.

Conclusion and Recommendations

This technical memorandum is intended to summarize the causes of the flooding and to identify potential alternatives to reduce and provide a reasonable level of mitigation for the identified problems. Many of the alternatives need further investigation and discussion with the community, the District, and affected agencies.

The most serious flooding in the community takes place in Zone 3 at the merging floodplains of Cayucos and Little Cayucos Creek west of Highway 1. Extensive flooding occurs due to flows from the creek overtopping the banks, and the inability of the local drainage to enter the creeks due to high water levels. Drainage from a tributary to Cayucos Creek flows into this area and can also cause flooding. Extensive flood damage occurred to Hardie Park, the adjacent pool, and businesses and residences in this area during storm events in 1998. To reduce the flooding in this area, a new storm drain pipeline could be constructed to convey the Cayucos Creek tributary flows directly to the creek, rather than flowing in the channels and as overland flow across the floodplain area. This would reduce flood flows in the B Street area by 85 percent. This would prevent local flooding caused by the tributary flows, but would not change the floodplain for the larger storm events which cause overtopping of the Cayucos Creek banks. A levee and pump station would be required to protect the B Street area against flooding in these conditions.

A number of nuisance drainage and flooding problems occur within the drainage zones due to the topography, the lack of an underground storm drain system, and the lack of a consistent, organized network of curbs and gutters within the community. Drainage from a number of uphill lots flows along the edge of the street and drains off the edge of the pavement through the lower lots, creating flooding and erosion problems. These problems can increase in downstream areas due to the additional amount of runoff in the lower watershed areas. An underground storm drain conveyance system would reduce the amount of overland flow runoff in downstream areas, consequently reducing the flooding problems created with overland flow.

The development of a consistent curb and gutter network could also reduce nuisance flooding. However, drainage problems also exist where curbs are present and the topography provides conditions where lots adjacent to the roadway are much lower than the roadway surface. This allows street drainage flowing at the curbside to enter the residential lots at the lowered curb section along the driveway entrance. Curbs and gutters should be required for infill development where gutters are currently established and required to prevent flow onto the property. Rolled asphalt sections may also be required along driveways, where garages and driveways are lower than the roadway.

The following recommendations are made:

1) If 100-year protection of the B Street area in Zone 3 is desired, review and/or update the Cayucos and Little Cayucos Creek flood insurance studies to identify levee heights and 100-year flood elevations to determine whether flood protection projects can be implemented to reduce flooding. Review of the studies could also examine the impacts of continuing sedimentation in the Ocean Avenue crossing at Little Cayucos Creek.

2) Consider forming a special assessment district to fund drainage system improvements.
3) Develop a selection process for prioritizing storm drain improvements and identifying the sources of funding for the improvements.
4) Continue implementing the District curb and gutter policy, however, provide a drainage outlet in the sag to prevent water ponding.
5) Obtain long-term permit for stream maintenance of District controlled right of way along streams
6) Establish maintenance responsibility and entity for flood prone areas
7) Contact Caltrans to discuss locations where additional maintenance work is necessary at existing Caltrans culvert crossings

Appendix **A**
Photographs

Photograph 1: Typical drop inlet and storm drain alignment at coastal access.

Photograph 2: Typical storm drain discharge outfall at beach

Photograph 3: Caltrans 42-inch culvert outlet near elementary school – Zone 3

Photograph 4: Zone 3 Drainage channel adjacent to Hardie Park – looking downstream

Photograph 5: Drainage ditch along north side of B Street, looking downstream

Photograph 6: Southern drainage channel downstream of B Street, looking upstream

Photograph 7: Zone 3 48-inch corrugated plastic pipe discharge near Ocean Avenue

Photograph 8: 30-inch reinforced concrete pipe culvert at Park Avenue upstream of Third Street drain

Photograph 9: Third Street Drain - pipeline alignment under church

Photograph 10: Third Street storm drain outlet at Ocean Avenue

Photograph 11: Third Street drain – discharge channel to ocean


Figure 1
Vicinity Map
Cayucos, CA
Highway
Road
20-Foot Contour
0
0.25
0.5
Miles
N
100
1
SAN LUIS OBISPO COUNTY
46
101
41
Community of Cayucos
Miles
0
10
20
RMC

Figure 2
Reported Flooding and
Poor Drainage Conditions
Cayucos, CA

Little Cayucos Creek
Cayucos
13th St
SR-1 Cayucos Dr Exit
SR-1 13th St Exit
Cabrillo Hwy
1
Park Ave
Birch St
Ash St
Ocean Ave
Pacific Ave
Cass Ave
Old Creek
Willow Creek
Old Creek Rd
Hacienda Dr
Alta Vis
Keaton Blvd
Morgan
Gilbert Ave
Richard Ave
Orville Ave
Ocean Blvd
Studio Dr
Lucerne St
Cayucos Creek
Pacific Ocean
Morro Bay

N
0
0.25
0.5
Miles

Legend

- State Drainage Issue
- SLO County Culvert/Maintenance Issue
- Reported Flooding or Poor Drainage Condition

RMC

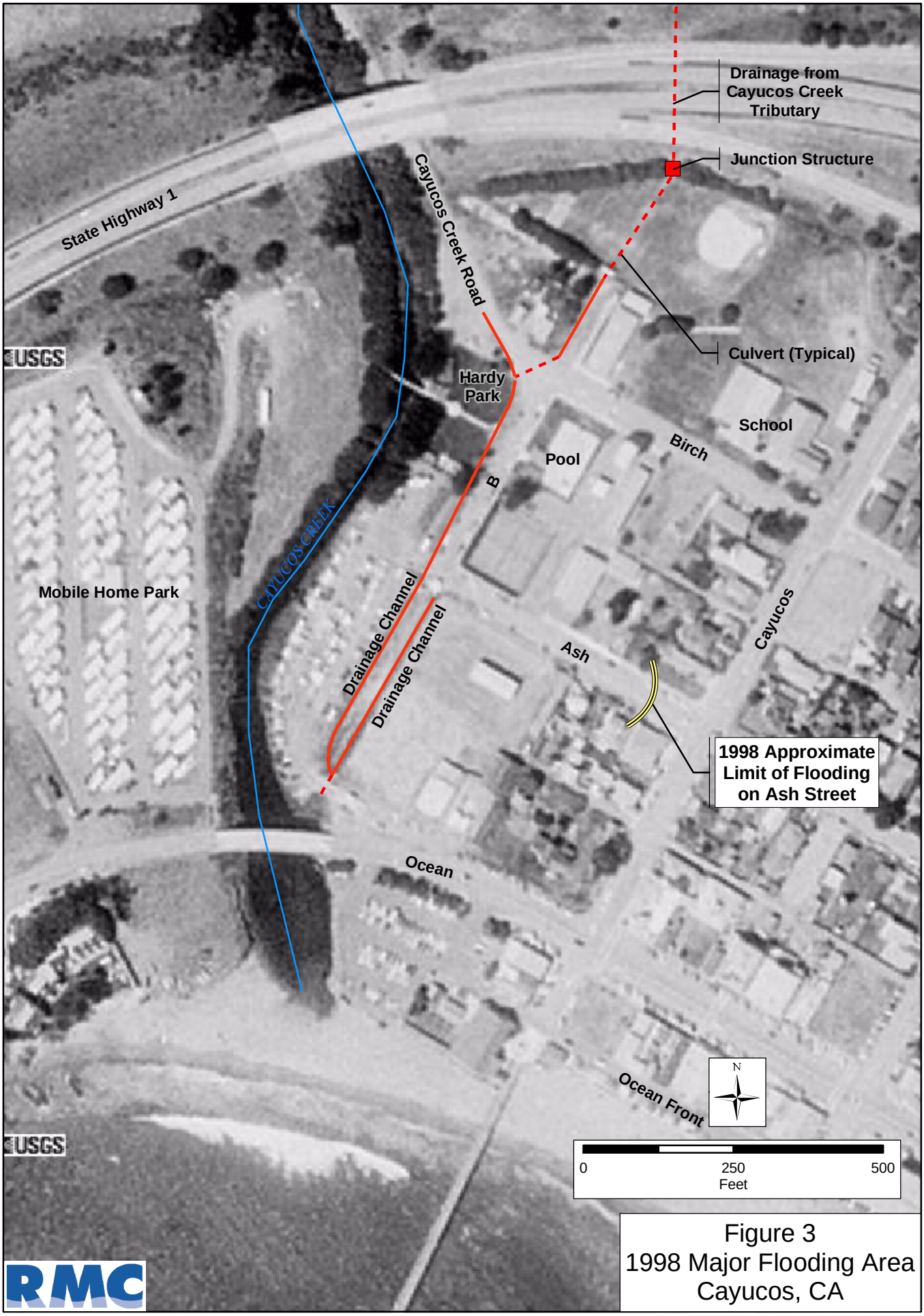


Figure 3
1998 Major Flooding Area
Cayucos, CA

Figure 4
Cayucos Regional Watersheds
Cayucos, CA

N

0 0.5 1 Miles

Whale Rock Reservoir

1

Legend

- Highway
- Roads
- Streams
- Reservoir

Regional Watersheds

- Cayucos Creek
- Cayucos Creek Tributary
- Little Cayucos Creek
- Old Creek
- Willow Creek
- Coastal

Watershed Areas

Cayucos Creek	6,800 acres
Cayucos Creek Tributary	140 acres
Little Cayucos Creek	1,400 acres
Old Creek	13,000 acres
Willow Creek	2,100 acres
Coastal	610 acres

Figure 5
FEMA Hazard Zones
Cayucos, CA

Little Cayucos Creek
Cayucos
13th St
SR-1 Cayucos Exit
SR-1 13th St Exit
Old Creek
Willow Creek
Cabrillo Hwy
Park Ave
Birch Ave
Ash St
S Ocean Ave
Pacific Ave
8th St
11th St
13th St
Cass Ave
Cabrillo
Old Creek Rd
Hacienda Dr
Alta Vis
Keaton Blvd
Morgan
Gilbert Ave
Richard Ave
Orville Ave
Cabrillo Hwy
Ocean Blvd
Studio Dr
Lucerne St
Cayucos Creek
Pacific Ocean
Estero Bay

N
0
0.25
0.5
Miles

Flood Hazard Zones
100-Year Flood Hazard
500-Year Flood Hazard

RMC

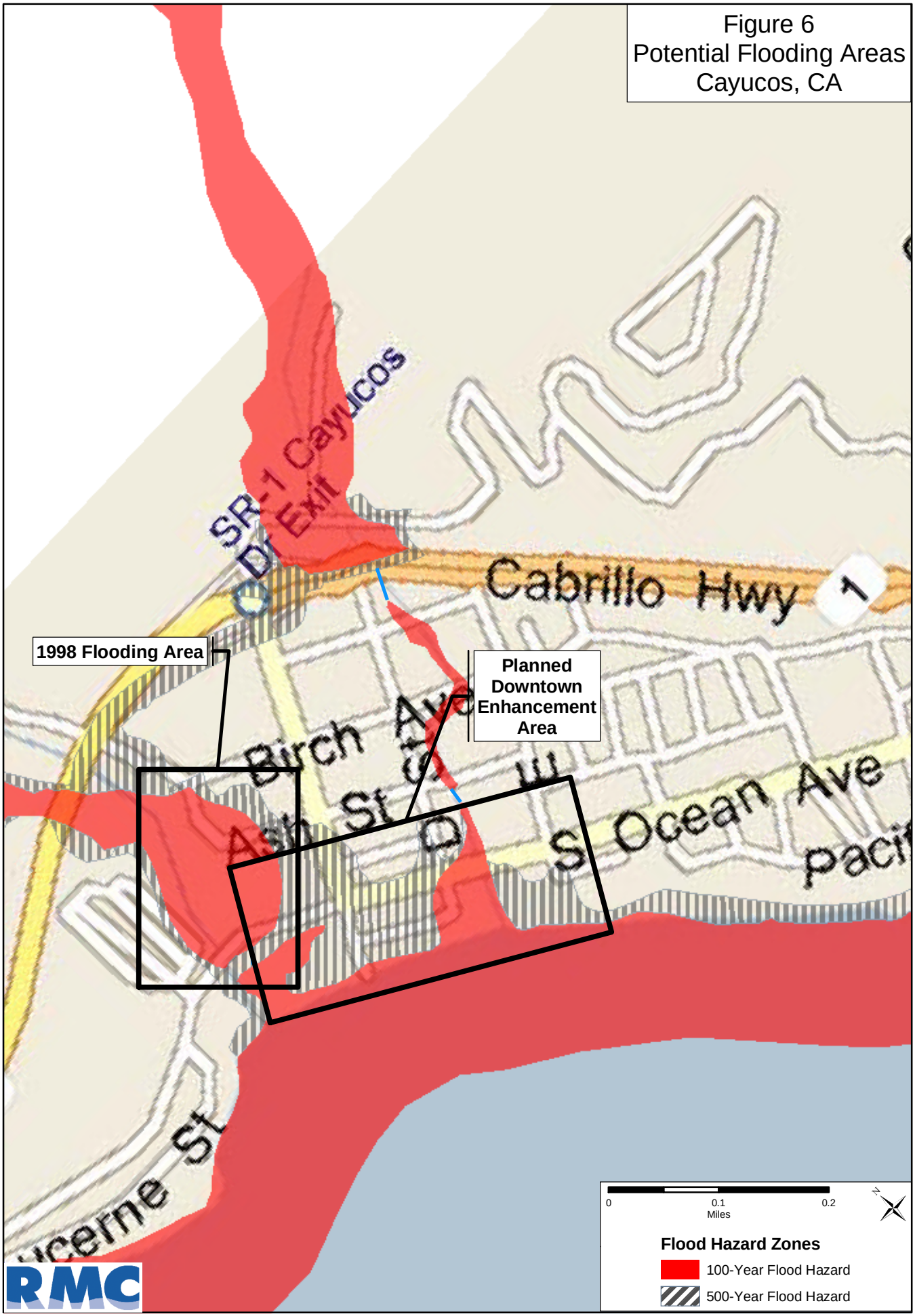


Figure 6
Potential Flooding Areas
Cayucos, CA
SR-1 Cayucos
Dr Exit
Cabrillo Hwy
1
1998 Flooding Area
Planned
Downtown
Enhancement
Area
Birch Ave
Ash St
S Ocean Ave
Pacific
Lucerne St
0
0.1
0.2
Miles
N
Flood Hazard Zones
100-Year Flood Hazard
500-Year Flood Hazard
RMC

Figure 7
Local Watersheds and Existing Drainage Structures
Cayucos, CA

Coastal Watershed Areas

Zone	Area (acres)
1	24
5	31
6	5.5
7	92
8	80
9	17
10	17
11	18
12	13
13	5.7
15	70
17	17
18	26
19	24
20	7.4
21	160

0 0.25 0.5
Miles

N

Legend

- Highway
- Roads
- Contours
- CalTrans Culverts
- Other Culverts and Channels
- Storm Water Outfalls
- (#) Watershed/Zone

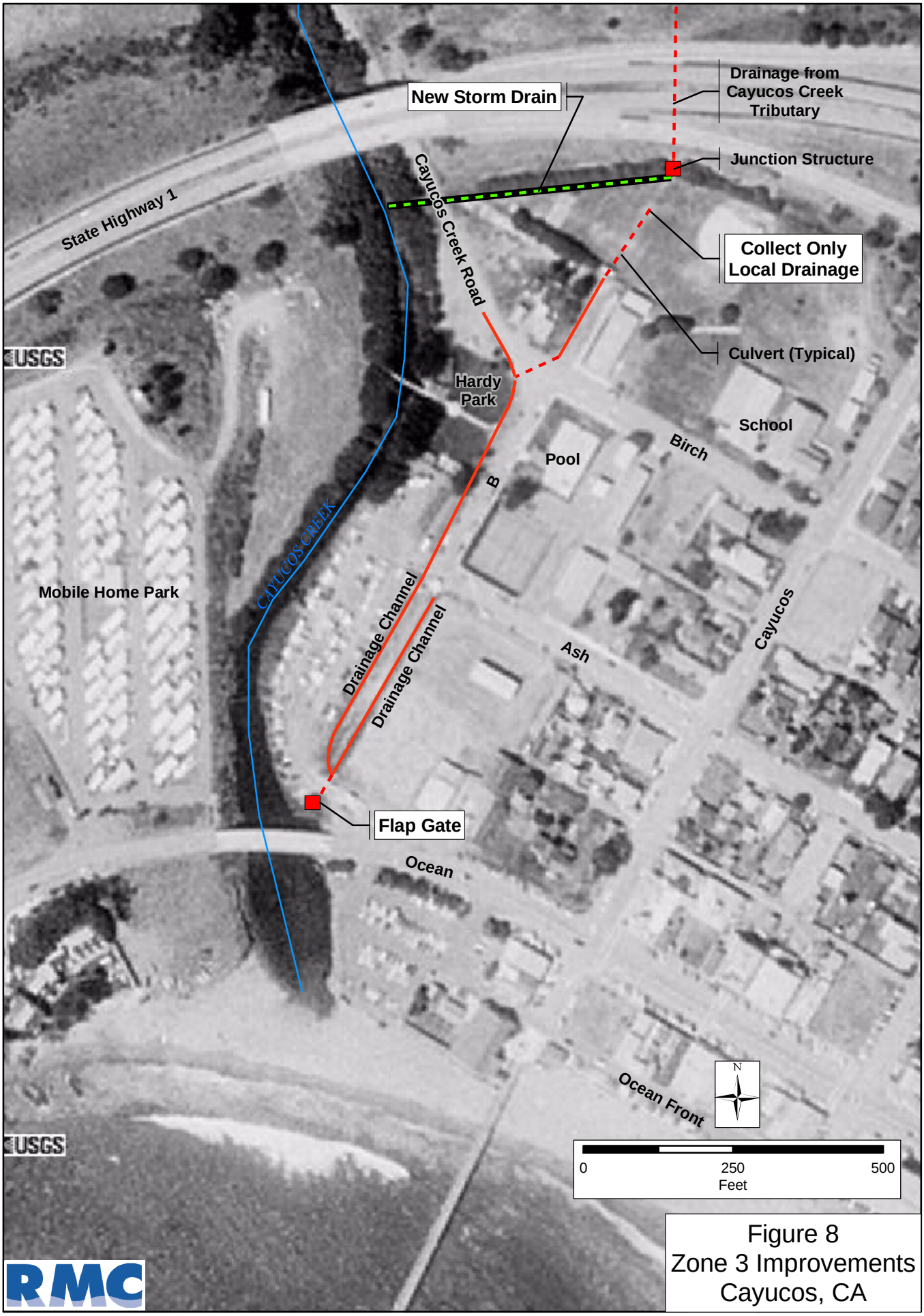


Figure 8
Zone 3 Improvements
Cayucos, CA

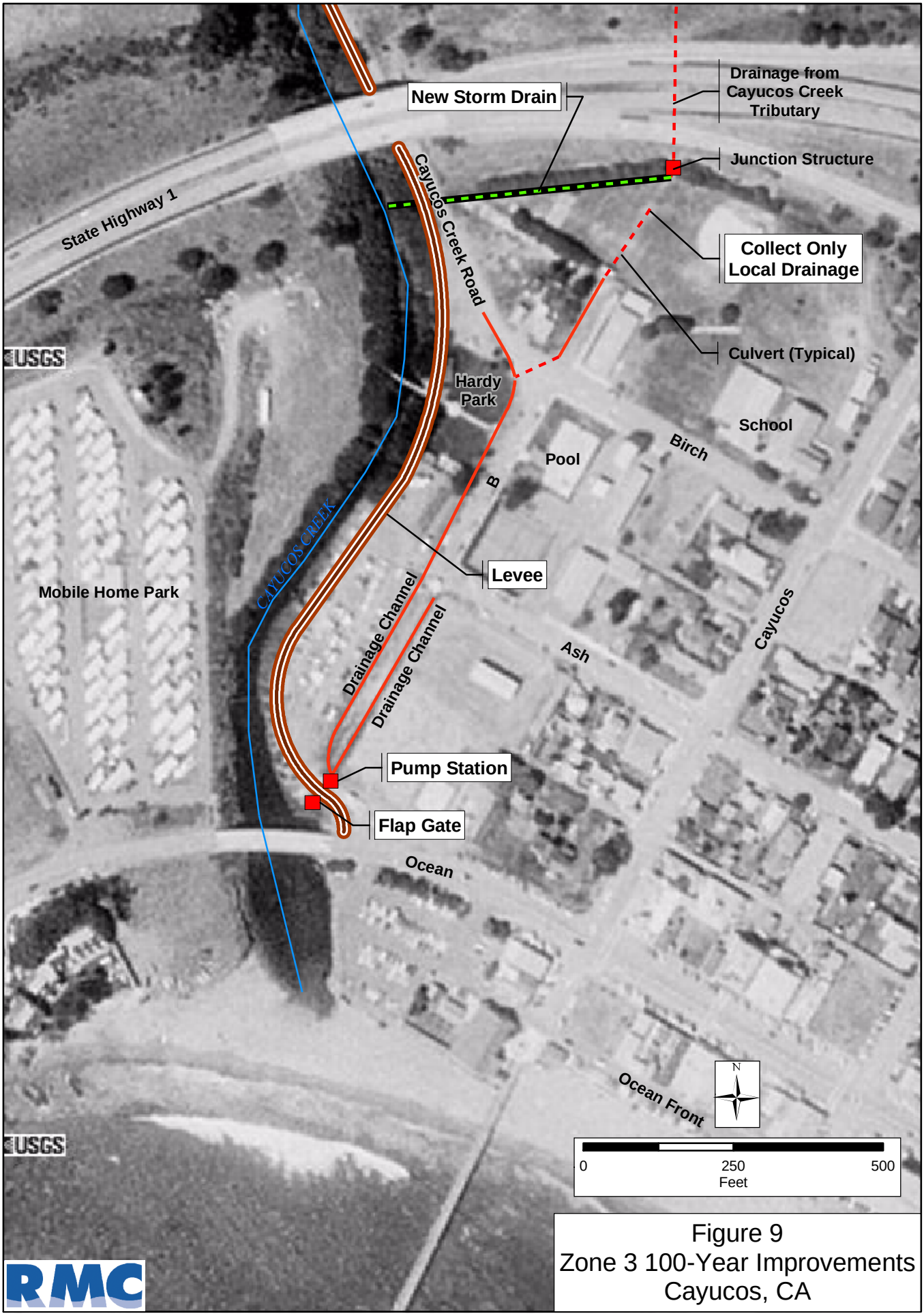


Figure 9
Zone 3 100-Year Improvements
Cayucos, CA

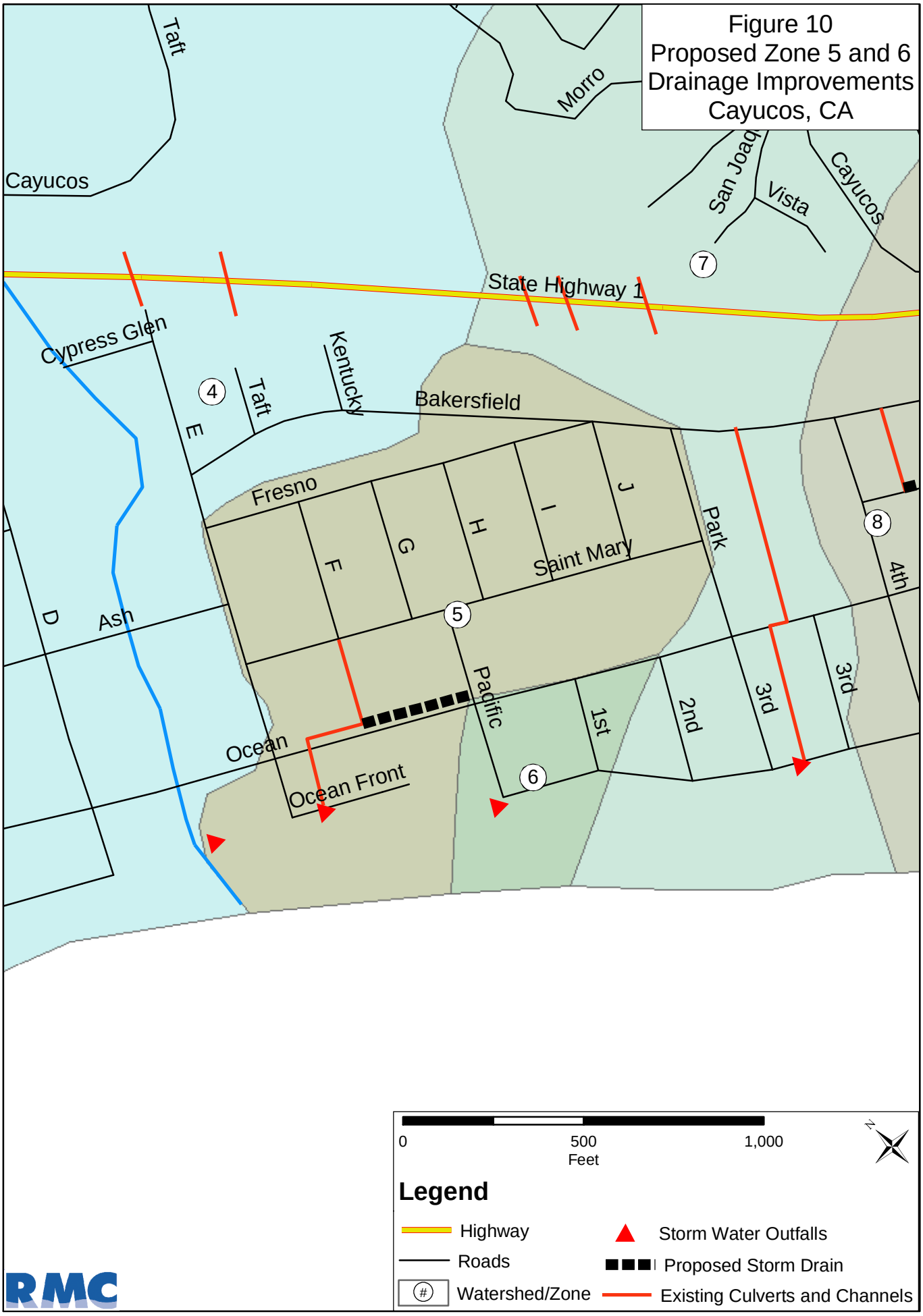


Figure 10
Proposed Zone 5 and 6
Drainage Improvements
Cayucos, CA
Taft
Cayucos
Morro
San Joaq
Vista
Cayucos
7
State Highway 1
Cypress Glen
Kentucky
4
Taft
E
Bakersfield
Fresno
F
G
H
I
J
Park
8
4th
Saint Mary
5
D
Ash
Pacific
1st
2nd
3rd
3rd
Ocean
Ocean Front
6
0
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Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC

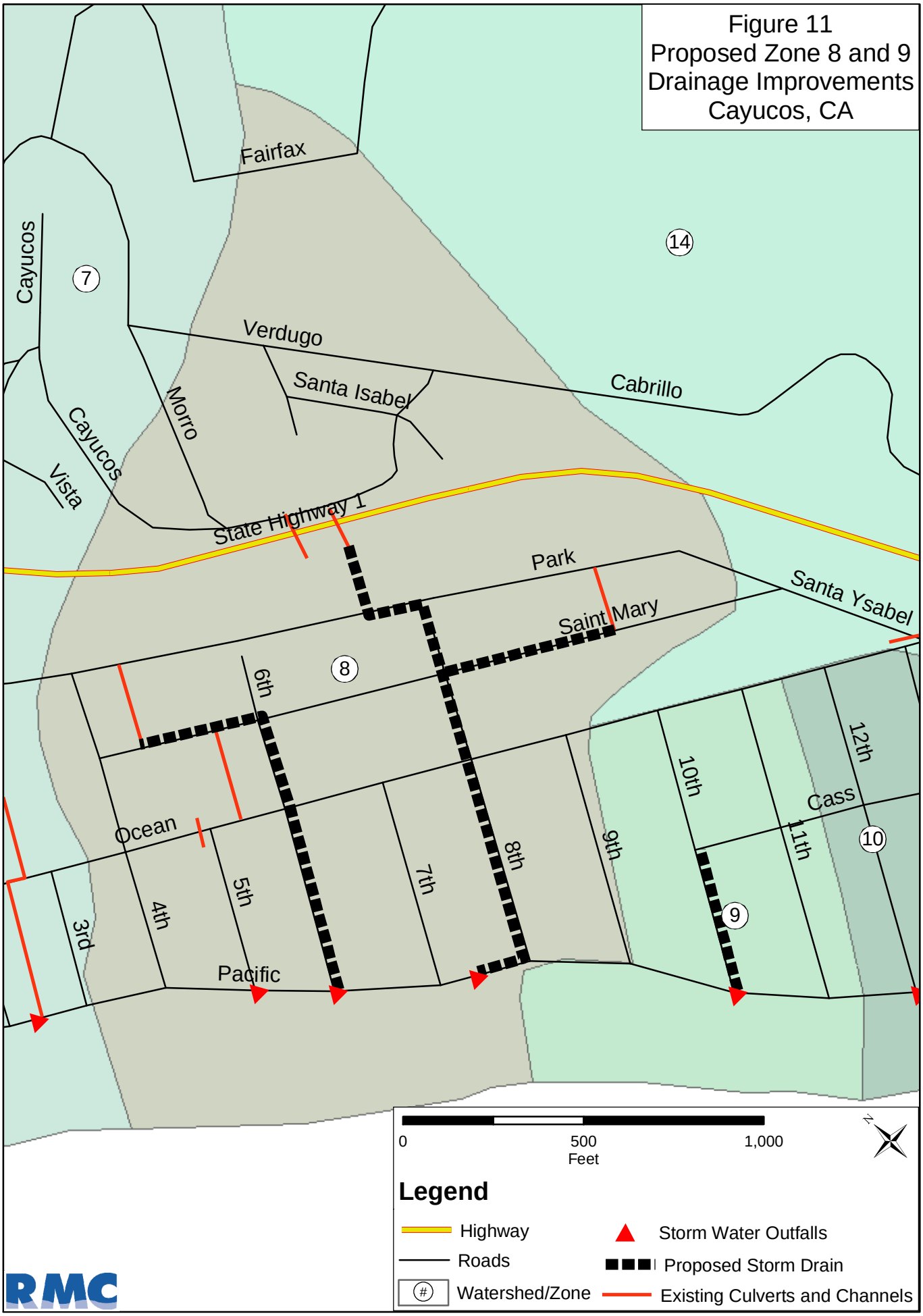
Figure 11
Proposed Zone 8 and 9
Drainage Improvements
Cayucos, CA
Fairfax
Cayucos
7
14
Verdugo
Santa Isabel
Cabrillo
Morro
Cayucos
Vista
State Highway 1
Park
Santa Ysabel
Saint Mary
8
6th
Ocean
3rd
4th
5th
7th
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10th
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Cass
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Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC

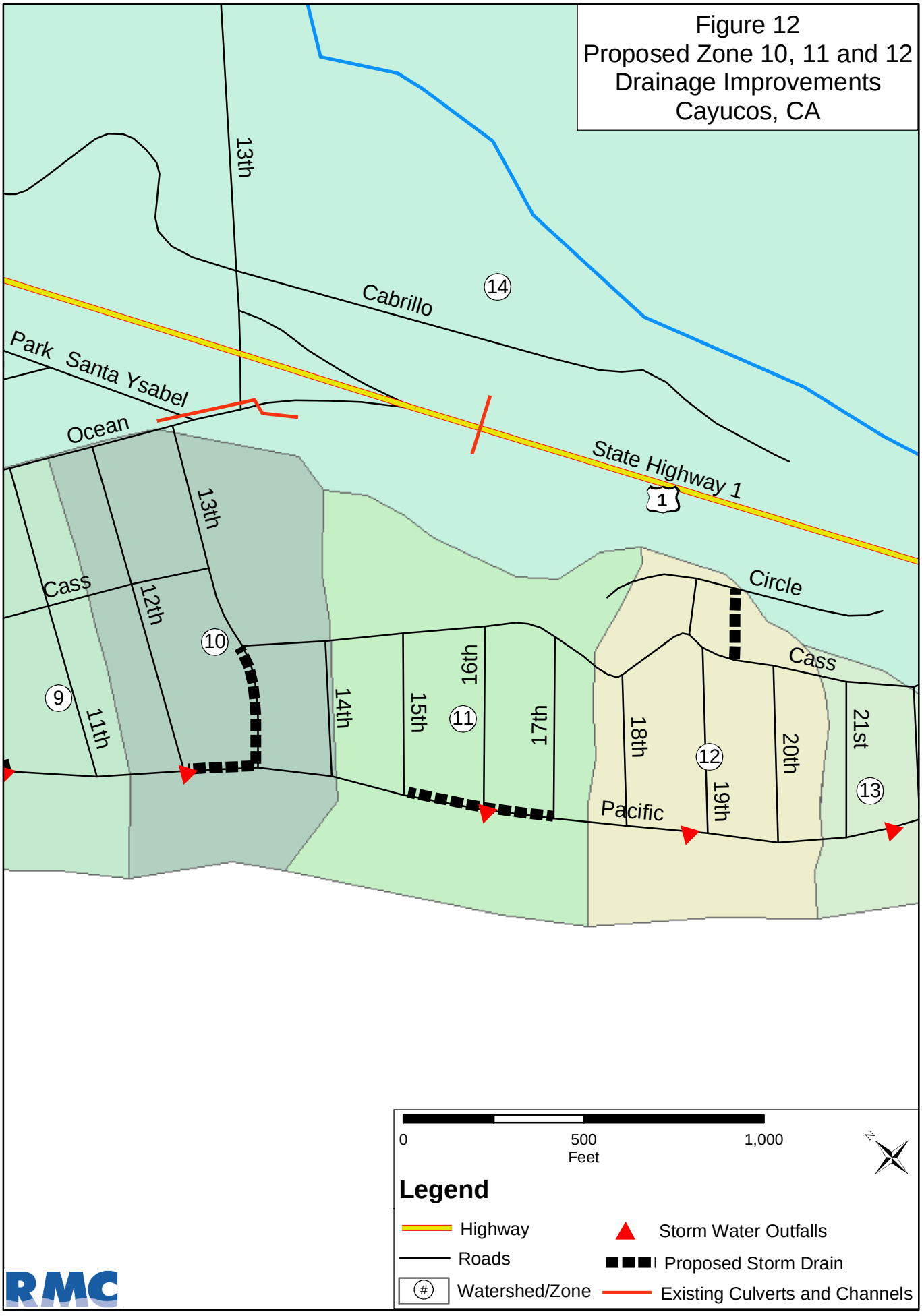
Figure 12
Proposed Zone 10, 11 and 12
Drainage Improvements
Cayucos, CA
13th
Cabrillo
14
Park
Santa Ysabel
Ocean
State Highway 1
1
13th
Cass
12th
10
9
11th
14th
15th
11
16th
17th
Circle
Cass
18th
12
19th
20th
21st
13
Pacific
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Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC

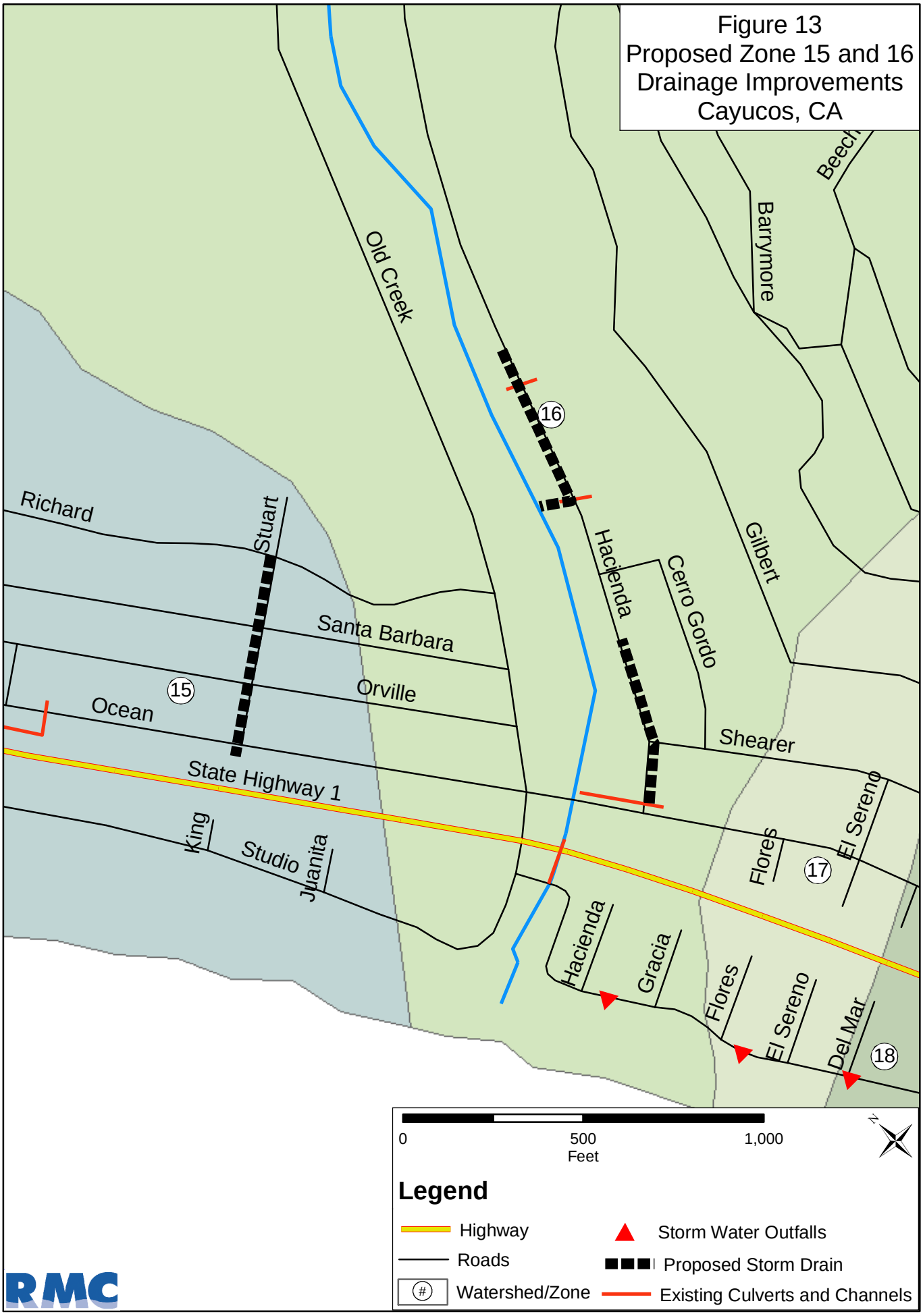
Figure 13
Proposed Zone 15 and 16
Drainage Improvements
Cayucos, CA
Old Creek
Barrymore
Beech
16
Richard
Stuart
Santa Barbara
Orville
Ocean
15
Hacienda
Cerro Gordo
Gilbert
Shearer
State Highway 1
King
Studio
Juanita
Flores
El Sereno
17
Hacienda
Gracia
Flores
El Sereno
Del Mar
18
0
500
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Feet
N
Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC

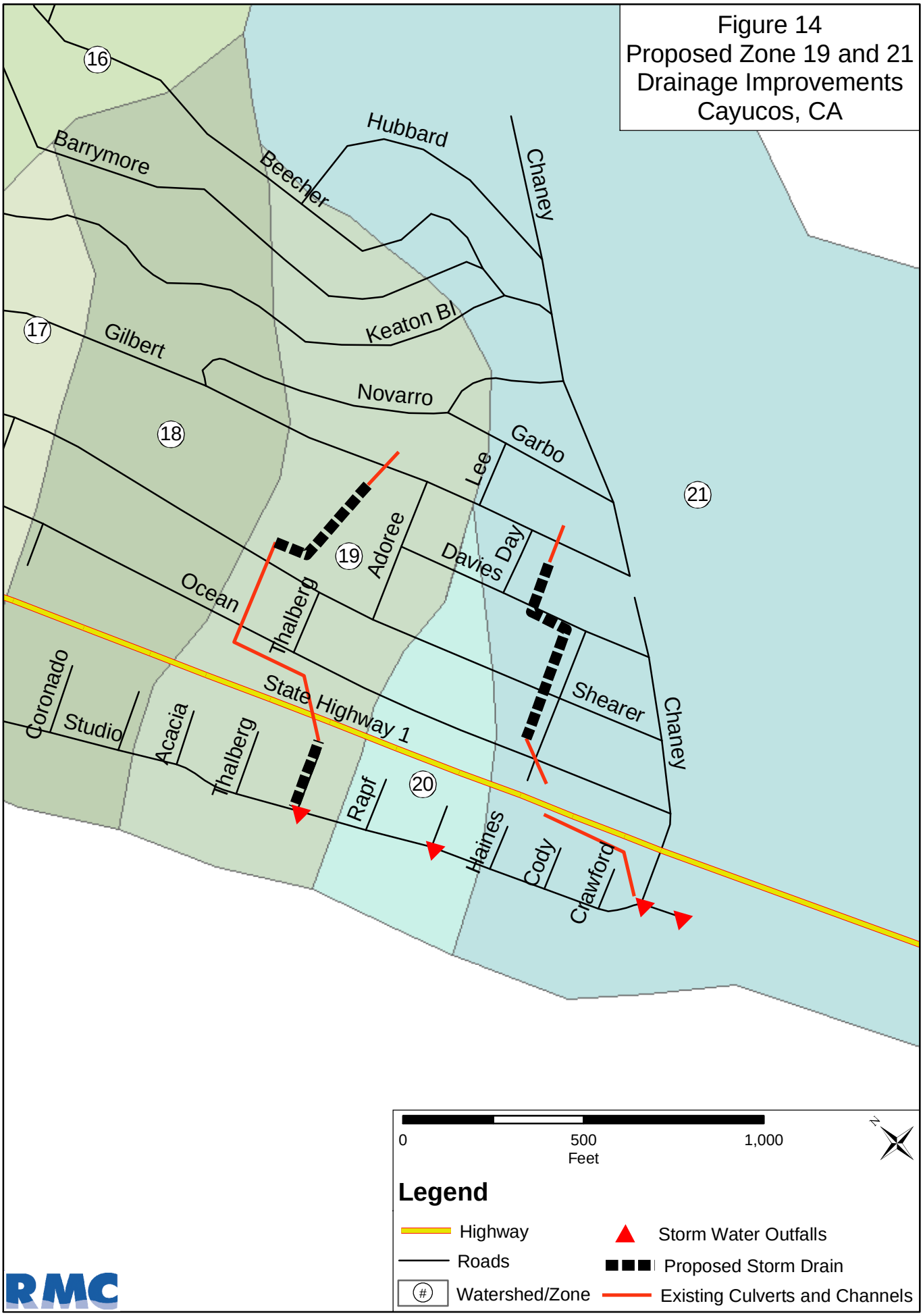
Figure 14
Proposed Zone 19 and 21
Drainage Improvements
Cayucos, CA
16
17
18
19
20
21
Barrymore
Beecher
Hubbard
Chaney
Keaton Bl
Gilbert
Novarro
Garbo
Lee
Adoree
Davies Day
Ocean
Thalberg
State Highway 1
Shearer
Chaney
Coronado
Studio
Acacia
Thalberg
Rapf
Haines
Cody
Crawford
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Legend
Highway
Roads
Watershed/Zone
Storm Water Outfalls
Proposed Storm Drain
Existing Culverts and Channels
RMC

Appendix F

ENVIROMENTAL TECHNICAL MEMORANDUM

APPENDIX F

ENVIRONMENTAL TECHNICAL MEMORANDUM

DRAFT

Cayucos
Community Drainage and Flood Control Project
Environmental Constraints Analysis

August 2003

Prepared for:
Raines, Melton, & Carella, Inc.
2001 North Main Street
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Prepared by:
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Half Moon Bay, California 94019

Essex Environmental
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INTRODUCTION

In April 2003, a drainage and flood control study examined the existing drainage conditions of the Cayucos community, identified problematic areas and issues, and developed conceptual solutions to the identified drainage and flood control issues. This environmental constraints analysis assesses the environmental impacts and constraints associated with the proposed solutions to the drainage problems in the community of Cayucos. Each proposed solution was examined for the biological resources, cultural resources, and land use constraints likely to be present in each given area.

PROJECT DESCRIPTION

To address the different flooding issues in the community of Cayucos, several site-specific solutions have been proposed. The project alternatives have been organized by watershed zone and grouped by project activities:

1) Zone 3
2) Zones 5, 8, 9, 10, 11, and 15
3) Zones 12, 19, and 21
4) Zone 16

Zone 3

- For flooding reduction in a 10-year event, work in this zone includes installing an approximately 600-foot-long pressurized storm drain pipeline running parallel to Highway 1 that would bypass existing drainage facilities. The pipeline would divert the Cayucos Creek tributary and convey flow directly to Cayucos Creek. The pipeline would require a new outfall in the bank of Cayucos Creek. The existing drainage channel downstream of the pipeline would only collect local drainage and the existing culvert discharging into Cayucos Creek may require the installation of a flap gate to prevent backflow into the local channel system.

- For flooding reduction in a 100-year event, work in this zone includes constructing a levee or berm and pump station along Cayucos Creek. The levee or berm would be approximately 8-feet high and 1,300-feet long and extend between Ocean Avenue and a point upstream of the Highway 1 crossing. The levee system would require a pump station to discharge local flow into creek. The pump station would require approximately 1-acre of disturbance during construction and would be located near the existing culvert discharging into Cayucos Creek near Ocean Avenue. The pump station would require the construction of a new outlet into Cayucos Creek.

Zones 5, 8, 9, 10, 11, and 15

- Work in these zones includes installing 34 drop inlets and 7 storm drain pipelines ranging from approximately 310-feet to 2,000-feet long along existing roads within the public right-of-way. Drains will connect to existing outlets, which do not require improvements.

Zones 12, 19, and 21

- Work in these zones includes installing nine drop inlets and four storm drain pipelines ranging from approximately 200-feet to 700-feet long along existing roads within the public right-of-way and between houses on private land. Drains will connect to existing outlets, which do not require improvements.

Zone 16

- Work in this zone includes installing six drop inlets and two 500-foot long storm drain pipelines along Hacienda Drive. A small section of one storm drain will cross between houses on private land and connect to an existing outlet to Old Creek that will require improvements. The second storm drain stays within the public right-of-way and connects to an existing drainage near Ocean Avenue that does not require improvements.

METHODS

Project alternatives were analyzed for environmental constraints that would prevent agency approval, increase costs (particularly for mitigation), or delay the project schedule. Existing documentation relative to each resource topic (e.g., biological resources, cultural resources, and land use) was examined to help determine the likelihood of constraints. Minor impacts discovered during the analysis are not included in this report because they can be avoided or minimized by using best management practices or by following engineering or design standards.

Biological Resources

Essex performed a site assessment with Raines, Melton, & Carella, Inc. (RMC) on July 1, 2003, to conduct a reconnaissance level review of biological resources in the project area. The assessment area included the proposed project sites and bordering areas. Each site was generally assessed for its potential to support sensitive biological and botanical resources. Information from the California Natural Diversity Database was combined with recent experience on other projects in the area to determine the potential for sensitive species and their habitat in the project areas.

Cultural Resources

Data on file in the San Luis Obispo County Department of Planning and Building was used to determine if cultural resources have been identified in each project area. No standard record searches or site visits were conducted.

Land Use

The San Luis Obispo General Plan, Estero Area Plan Update, and North Coast Planning Area Land Use Element and Local Coastal Plan were reviewed to determine if the project was consistent with local policies. A Geographic Information System was used to examine the presence of prime farmland and farmland of local or state importance in the project area.

RESULTS

Environmental Constraints

Table 1 summarizes the environmental constraints that may be encountered for each project alternative. Based on this preliminary analysis, major environmental constraints include diversion of jurisdictional waters (Zone 3 alternative) and potential impacts to endangered/threatened species habitat (Zone 3 and Zone 16 alternatives).

Permit Assessment

An assessment of the state and federal environmental permits that may be necessary for each project alternative is provided in Table 2. An estimate of the timeframe typically required to obtain each type of permit is summarized in Table 3. Based on the level of research performed for this analysis, most project alternatives would be possible to permit if mitigation measures are implemented to avoid environmental constraints. The Corps, Coastal Commission, and USFWS may not approve the alternative for Zone 3 due to potential impacts to jurisdictional waters and sensitive species habitat.

Potential Mitigation

Potential impacts to environmental resources may result from the proposed project alternatives. Those impacts may require implementation of mitigation measures to protect sensitive, threatened, or endangered species and cultural resources. Mitigation measures could include:

- Conducting preconstruction surveys for sensitive species for project alternatives in Zone 3 and Zone 16
    - Monitoring during construction in locations where sensitive species habitat is found
- Implementing erosion and sediment control measures during construction for project alternatives in Zone 3 and Zone 16
- Record search for cultural resources. Surface surveys, monitoring by qualified archeologist during ground disturbance, and identifying exclusion zones for cultural resources may be necessary depending on results of the record search. Recovery and treatment could be required depending on findings.

Additional Studies/Surveys

The following studies/surveys will need to be performed in order to begin the permitting phase of the project:

- Habitat assessments
- Sensitive species surveys
- Cultural resource record searches

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Table 1: Cayucos Environmental Constraints

Alternatives	Biological	Cultural Resources[1]	Land Use
Zone 3			
Install an approximately 600-foot long pressurized storm drain pipeline running parallel to Highway 1 that would bypass existing drainage facilities. The pipeline would divert the Cayucos Creek tributary and convey flow directly to Cayucos Creek. The pipeline would require a new outfall in the bank of Cayucos Creek. The existing drainage channel downstream of the pipeline would only collect local drainage and the existing culvert discharging into Cayucos Creek may require the installation of a flap gate to prevent backflow into the local channel system.	Diversion of tributary and construction of new outfall in creek bank may affect endangered/threatened species habitat, including steelhead, tidewater goby, and California red-legged frog (CRLF). Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, nesting birds in riparian zones, pallid bat, and sensitive plants. If endangered/threatened species habitat is determined to be present in the existing drainage channel downstream from the pipeline, approval from USFWS and NMFS may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	None	Diversion of the tributary may conflict with Policy 23 of the Policies For Environmentally Sensitive Habitats from the Coastal Plan Policies. Unless there are no other feasible methods for protecting existing structures in the floodplain, the Coastal Commission may not approve this alternative.
Construct a levee or berm and pump station along Cayucos Creek. The levee or berm would be approximately 8-feet high and 1,300-feet long and extend between Ocean Avenue and a point upstream of the Highway 1 crossing. The levee system would require a pump station to discharge local flow into creek. The pump station would be located near the existing culvert discharging into Cayucos Creek near Ocean Avenue and would require construction of a new outlet into Cayucos Creek. The pump station would require approximately one acre of disturbance during construction	Construction of levee or berm and pump station along Cayucos Creek may affect endangered/threatened species habitat, including steelhead, tidewater goby, and CRLF. Other sensitive species the may also be affected include: southwestern pond turtle, two-striped garter snake, nesting birds in riparian zones, pallid bat, and sensitive plants. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	None	None
Zone 5, 8, 9, 10, 11, & 15			
Install 34 drop inlets and 7 storm drain pipelines ranging from approximately 310-feet to 2,000-feet along existing roads within the public right-of-way. Drains will connect to existing outlets, which do not require improvements.	None	None	None
Zone 12, 19, & 21			
Install nine drop inlets and four storm drain pipelines ranging from approximately 200-feet to 700-feet along existing roads within the public right-of-way and between houses on private land. Drains will connect to existing outlets, which do not require improvements.	None	None	None

[1] Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building. No standard record searches or site visits were conducted.

Alternatives	Biological	Cultural Resources[1]	Land Use
Zone 16			
Installing six drop inlets and two 500-foot long storm drain pipelines along Hacienda Drive. A small section of one storm drain will cross between houses on private land and connect to an existing outlet to Old Creek that will require improvements. The second storm drain stays within the public right-of-way and connects to an existing drainage near Ocean Avenue that does not require improvements.	Improvements to outfall in Willow creek bank may affect threatened species habitat, including steelhead and CRLF. Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, nesting birds in riparian zones, pallid bat, and sensitive plants. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	None	None

Table 2: Cayucos Permit Assessment

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	Corps 404 Permit[4]	USFWS Section 7[5]	NMFS Section 7[6]	RWQCB 401[7]	SWRCB General Permit[8]	SWRCB Phase II SWMP[9]	CCC CDP[10]	APCD ATC/PTO[11]	Notes
Zone 3													
Install an approximately 600-foot long pressurized storm drain pipeline bypassing existing drainage facilities	For flooding reduction in a 10-year event; divert the Cayucos Creek tributary and convey flow directly to Cayucos Creek; requires a new outfall in the bank of Cayucos Creek; may require the installation of a flap gate near Ocean Avenue to prevent backflow of Cayucos Creek into existing local channel system downstream of the pipeline.	ND[12] (see notes)	Possibly (see notes)	Yes	Yes	Possibly (see notes)	Possibly (see notes)	Yes	Yes	No	Yes	No	Because project has the potential to affect sensitive species or their habitat, a ND/MND will be required. The Corps will consult with the NMFS and USFWS if threatened/endangered species could be affected by the new outfall construction and/or operation or the creek diversion. A 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will be required for the Corps permit. Depending on the result of a cultural records search, Section 106 consultation may be required.

[1] California Environmental Quality Act: Required if a state agency has to take action on a project; If the project does not qualify for an exemption, the compliance document is either a Negative Declaration or Mitigated Negative Declaration (ND) or an Environmental Impact Report (EIR)

[2] State Historic Preservation Office – Section 106 (Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building): Required if a project has the potential to impact cultural resources

[3] California Department of Fish and Game – 1601 Streambed Alteration Agreement: Required if a project has the potential to impact sensitive species or their habitat

[4] U.S. Army Corps of Engineers – 404 Permit: Required if a project involves work below the ordinary high water mark

[5] U.S. Fish and Wildlife Service – Section 7 Consultation: Required if a project has the potential to impact sensitive species or their habitat

[6] National Marine Fisheries Service – Section 7 Consultation: Required if a project has the potential to impact sensitive marine and anadromous fish species or their habitat

[7] Regional Water Quality Control Board – 401 Certification: Required if a project has the potential to discharge to surface water, ground water, or other water systems

[8] State Water Resources Control Board – National Pollutant Discharge Elimination System (NPDES) General Construction Permit: Required if a project involves ground disturbance of more than 1 acre

[9] State Water Resources Control Board – Phase II Storm Water Management Plan Revision: Required for potential discharges to surface water, ground water, or other water systems by small municipal separate storm sewer systems not covered by the Phase I program; small municipal separate storm sewer systems that are not in urban clusters, do not discharge to a sensitive stream or waterbody, or do not have a high population density or high growth rate are not covered by the Phase II program; since Cayucos does not meet these criterion, they do not need to comply with the Phase II program.

[10] California Coastal Commission – Coastal Development Permit: Required if a project is located in the Coastal Zone or in streams that feed into the Coastal Zone

[11] San Luis Obispo County Air Pollution Control District – Authority to Construct and Permit to Operate: Required for projects with the potential to emit pollutants

[12] Negative Declaration or Mitigated Negative Declaration: Required if projects with impacts that are less than significant or less than significant with mitigation

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	Corps 404 Permit[4]	USFWS Section 7[5]	NMFS Section 7[6]	RWQCB 401[7]	SWRCB General Permit[8]	SWRCB Phase II SWMP[9]	CCC CDP[10]	APCD ATC/PTO[11]	Notes
Construct a levee or berm approximately 8-feet high and 1,300-feet long along Cayucos Creek and pump station near the Ocean Avenue bridge.	For flooding reduction in a 100-year event; levee or berm would extend between Ocean Avenue and a point upstream of the Highway 1 crossing; levee system would require a pump station to discharge local flow into creek through a new outlet into Cayucos Creek; pump station located near the existing culvert discharging into Cayucos Creek near Ocean Avenue; pump station would require approximately one acre of disturbance during construction	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Yes	No	Yes	Yes	Because project involves construction of new facilities, a ND/MND will be required. A Corps permit will be required if the new outfall is constructed below OHW. The Corps will consult with the NMFS and USFWS if threatened/endangered species could be affected by outfall construction and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.
Zone 5, 8, 9, 10, 11, & 15													
Install 34 drop inlets and 7 storm drain pipelines ranging from approximately 310-feet to 2,000-feet.	Install drop inlets and storm drains within public right-of-way; drains will connect to existing outlets; no improvements are needed for the outlets.	Exempt (see notes)	No	No	No	No	No	No	No	No	Yes	No	The project qualifies for Class 1 CEQA categorical exemption because the alternative consists of minor alterations to existing public facilities and does not have the potential to affect sensitive resources.
Zone 12, 19, & 21													
Install nine drop inlets and four storm drain pipelines ranging from approximately 200-feet to 700-feet long through public and private lands.	Install drop inlets and storm drains within public and between houses on private lands; drains will connect to existing outlets; no improvements are needed for the outlets.	ND (see notes)	No	No	No	No	No	No	No	No	Yes	No	Because project involves construction of new facilities, a ND will be required.

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	Corps 404 Permit[4]	USFWS Section 7[5]	NMFS Section 7[6]	RWQCB 401[7]	SWRCB General Permit[8]	SWRCB Phase II SWMP[9]	CCC CDP[10]	APCD ATC/PTO[11]	Notes
Zone 16													
Install six drop inlets and two 500-foot long storm drain pipelines through public and private lands.	Install drop inlets and storm drains within public right-of-way and between houses on private lands. Drains will connect to existing outlets. A small section of one storm drain will cross between houses on private land and connect to an existing outlet to Old Creek that will require improvements. The second storm drain will be within the public right-of-way and connect to an existing drainage near Ocean Avenue that does not require improvements.	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	No	No	Yes	No	Because project involves construction of new facilities and has the potential to affect sensitive species or their habitat, a ND/MND will be required. A Corps permit will be required if the new outfall is constructed below OHW. The Corps will consult with the NMFS and USFWS if threatened/endangered species could be affected by outfall construction and/or operation. If a Corps permit is required, a 401 Certification from the RWQCB and a Federal Consistency Determination from the Coastal Commission Consistency Office will also be required. Depending on the result of a cultural records search, Section 106 consultation may be required.

Table 3: Cayucos Permitting Timeframes

Permit	Typical Timeframe* (months)	Notes
California Environmental Quality Act (CEQA)		
Exemption	< 1	
Negative Declaration/Mitigated Negative Declaration	6 - 12	
California Department of Fish and Game (CDFG) 1601 Streambed Alteration Agreement	3 - 6	CEQA must be completed before the 1601 Agreement can be issued.
U.S. Army Corps of Engineers (Corps) Section 404		
Nationwide Permit	1 - 3	Requires Section 7 and Section 106 consultations to be complete.
Individual Permit	12 - 18	National Environmental Policy Act (NEPA) compliance is required, which can take one year or more.
U. S. Fish and Wildlife Service (USFWS)/ National Marine Fisheries Service (NMFS) Section 7 Consultation		
Informal	1 - 3	
Formal	6 - 12	
State Historic Preservation Office (SHPO) Section 106 Consultation	6 - 12	
Regional Water Quality Control Board (RWQCB) 401 Certification	1 - 3	CEQA must be completed before the 401 Certification can be issued.
State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System	< 1	A Storm Water Pollution Prevention Plan (SWPPP) must be prepared prior to construction and implemented

Permit	Typical Timeframe* (months)	Notes
(NPDES) General Construction Permit		during construction.
Coastal Commission Coastal Development Permit	6 - 12	Public controversy could delay this approval. Projects within appealable Coastal Commission jurisdiction require review at the state level. A federal consistency determination, which might further delay approval, is required for projects with federal agency involvement.
Air Pollution Control District (APCD) Permit to Construct/Permit to Operate	1 - 3	

* Timeframes do not include time required to perform pre-applications studies, to prepare required applications, and to complete prerequisite approvals.

Appendix G

FUNDING ASSISTANCE REVIEW TECHNICAL MEMORANDUM

APPENDIX G

FUNDING TECHNICAL MEMORANDUM

Technical Memorandum

Raines, Melton & Carella, Inc.
Consulting Engineers/Project Managers

San Luis Obispo County
Community Drainage and Flood Control Studies

Task: **Task 8 – Funding Assistance Review**

To: Mr. Dean Benedix, Project Manager, San Luis Obispo County

Prepared by: Jeffrey Tarantino, P.E.

Reviewed by: Lou Carella, P.E., Mary Grace Pawson, P.E.

Date: July 30, 2003

File: 34-9.B.8

1 Introduction

The San Luis Obispo County Flood Control and Water Conservation District ("District") has contracted with Raines, Melton, & Carella, Inc. ("RMC") to prepare six community drainage and flood control studies (the "Study"). The communities involved in the Study are Cambria, Cayucos, Nipomo, Oceano, San Miguel, and Santa Margarita. The problems in these communities include inadequate local drainage systems, unmaintained creeks, and inadequate conveyance capacity in creeks. Technical Memoranda detailing the problems for each of the communities and possible solutions are being completed as a separate task of this scope of work. This memorandum outlines funding source options and requirements for possible solutions to the six community drainage and flood problems.

The District is the designated County agency responsible for managing, planning, and maintaining drainage and flood control facilities in unincorporated public areas where no other agency has assumed an active role in such activities. The District is not responsible for funding the design and construction of private property benefiting from drainage and flood control improvements. Exceptions to this exist in established Community Services Districts (CSD's) where the CSD's may be specifically designated as authorized agencies responsible for or authorized to perform these as well as other services. Design and construction of drainage and flood control improvements is the responsibility of the local lead agency or sponsoring entity which implements the improvements on behalf of the property owners who benefit from the improvements. This policy is consistent with State subdivision development law, which requires the benefiting properties to finance property improvements.

Funding of management, planning, design, construction and maintaining drainage and flood control facilities in unincorporated areas comes from four primary sources:

- Local Community Funding: The property owners benefiting from the improvements are responsible for funding or obtaining funding for the implementation of the improvements. They are also responsible for funding annual maintenance of the system if the facilities primarily serve private property. The District Board's policy does not provide for the use of general flood control revenue, collected from all County properties, to be used to construct improvements that mainly benefit individual property owners.

- Supplemental Grant Program: Numerous Federal, State & Private grant programs exist which provide partial funding for drainage improvements, flood control and related watershed, stream and shore protection. It is the goal of these grant programs to provide supplemental funding for a community or agency for flood protection, flood mitigation and resource conservation and enhancement programs. Grant funding, if available, or establishment of loans through bonds sold through the formation of assessment districts, are examples of potential supplemental funding for implementation of drainage and flood control improvements. These programs are uniquely focused, have stringent qualifying regulations, specific procedural processing and monitoring requirements. These programs usually require a significant community funding or matching contribution.
- General Flood Control Fund Revenue: It is the District Board's adopted policy that general flood control revenue funding be used only for management, planning and non-roadway related maintenance services for drainage and flood control facilities. General flood control revenue is generated from County property taxes collected from all property in the County. This policy does not provide for the use of these funds for construction of new drainage or flood control improvements since this revenue is limited and is to be spent to benefit County areas at large.
- Road Fund Revenue: The use of Road fund revenue is restricted to roadway servicing maintenance and improvements, including drainage and flood control maintenance and roadway related improvements necessary to maintain the integrity and safety of the County road system. County Road funds are severely limited and inadequate relative to the needs of the expansive County maintained road system.

The realities of the overwhelming need for multi-million dollar funding for drainage and flood control facilities throughout the County and limited revenue sources pose a challenge to Communities to locally determine the desire and importance of the implementation of drainage infrastructure. For this reason, it is the policy of the District to encourage a local entity to serve as the lead agency (e.g. a CSD) to provide an implementation strategy and financing mechanism that is supported by the Community or area of benefit. If there is no local agency available or agreeable to assist in project implementation, the District is available to provide planning and management services for supporting community groups. However, if a community is unwilling to pay for the benefiting infrastructure, the project will not advance until funding is secured.

1.1 Technical Memorandum Objectives

The purpose of this technical memorandum (the "TM") is to provide a summary of various funding options for the projects developed as part of the Study. The selection of funding alternatives presented in this TM is based on the general types of drainage and flood mitigation projects proposed for the six communities, and is not project specific. The basic problems experienced and potential solutions for the six communities are summarized in Table 1 and fall into two categories; 1) local drainage, and 2) creek conveyance capacity.

Table 1 - Summary of Problems and Solutions

Problem	Alternative Solution
Inadequate Local Drainage	• Curb and Gutter • Percolation Basins • Storm Drain System
Overtopping of Creek Banks	• Larger Culverts • Improve Channels • Levees • Floodwalls • Vegetation Management • Increase Maintenance • Retention Basins

1.2 Recommended Funding Strategy

A community or area consensus must be established as an advocate for the installation of new drainage and flood control facilities. A local lead agency (e.g. CSD) or other sponsoring agency should be utilized to promote and sponsor the project on behalf of the supporting community. The County Flood Control District staff is available to assist if the local community supports the implementation but no local agency or sponsor is available or supportive of a project. Included in the community consensus must be the commitment to fund a significant portion of the initial costs of implementing and constructing the project. It should be recognized that the strongest applicants for leveraged grant or other supplemental funding have an established and effective local funding program. It is recognized that nearly all of the recommended project may need to seek and obtain leveraged supplemental funding from outside the local community. Additionally, the community or area must be committed to fund annual maintenance of the facilities to the extent they provide a benefit to private property. A commitment to maintenance is one way a local community can demonstrate a supportive and effective program to a potential grant program source.

After establishment of a supportive community and lead agency, the lead agency should apply for supplemental grant, loan and/or cost sharing funds through available programs outlined herein. The implementation of a project will depend on the success and continued support of the community and the success of the grant application process.

This TM is organized to outline first, the local funding options that the lead agency can establish, and second the outside Federal and State funding options that may be accessed to "match" local funding sources and help implement projects. Because the local match is critical to accessing outside funding, it is highly recommended that the lead agency begin to establish local funding mechanisms (even if these do not fully fund the recommended projects) in order to be more competitive for outside funds. The recommended local funding mechanisms include 1) grants, 2) taxes, 3) assessments, and 4) fees (property based and development impact). The creation of a local funding source, plus the potential procurement of Federal and State grants, establishes the framework for a comprehensive community funding program. This approach

also acknowledges the realistic nature of public projects that no capital improvement can rely solely on grants.

2 Local Funding

It must be recognized by communities needing and desiring drainage and flood control improvements that the area property owners obtain a significant benefit from the installation of these improvements. This benefit is partially demonstrated in the increased overall property value where drainage improvements have been installed. Likewise, in areas of flooding or areas where drainage infrastructure does not exist, the lack of this benefit is observed in reduced property value. Therefore, significant or majority funding from the property owners benefiting from the improvements is the primary funding source of such projects.

As previously discussed, the lead agency or sponsoring entity is the responsible agency for programming new drainage and flood control improvements where there is community support and potential funding resources. Existing CSD's could be responsible for drainage and flood control project implementation. However, the original LAFCo designated services of the CSD must include these powers. If these powers are not currently included within the CSD's current charter service designations, they can only be included by holding an election. It is assumed that the lead agency is the applicant and/or responsible agency for administering the funding options discussed in this section.

The lead agency has several options for acquiring funds for the community or area involved in the study. The primary avenues for collection of property owner revenue are taxes, assessments, and fees. Each of these is detailed in the following subsections.

2.1 Special Taxes

Taxes are the most common means for a government to raise revenue. An existing tax can be raised, or a new tax can be levied on residents in an area to fund flood control projects. By definition, this is a special tax requiring approval from two thirds of the electorate (residents). If approved, the revenue generated would be allocated specifically for drainage and flood control projects anywhere in the proposed improvement boundary. It would be the responsibility of the lead agency to determine where those funds would be spent.

This form of revenue requires all residents to pay the tax regardless of benefits received and the special tax formula does not need to be related to benefits received from the proposed projects. In order to establish the special tax, the lead agency would need to develop and adopt a formula; the Board of Supervisors approves placing the tax on the ballot. A special tax is approved by resident registered voters (except in the case of Mello-Roos CFD tax which can be approved by property owners in uninhabited areas). Figure 1 illustrates the special tax adoption process.

2.2 Benefit Assessments

A benefit assessment is a charge levied on a property to pay for public improvements or services that benefit the property. The difference between an assessment and a tax is that benefit assessment formula must quantify the relationship between the assessment charged and the benefit received by the property (if a property does not benefit, it cannot be assessed).

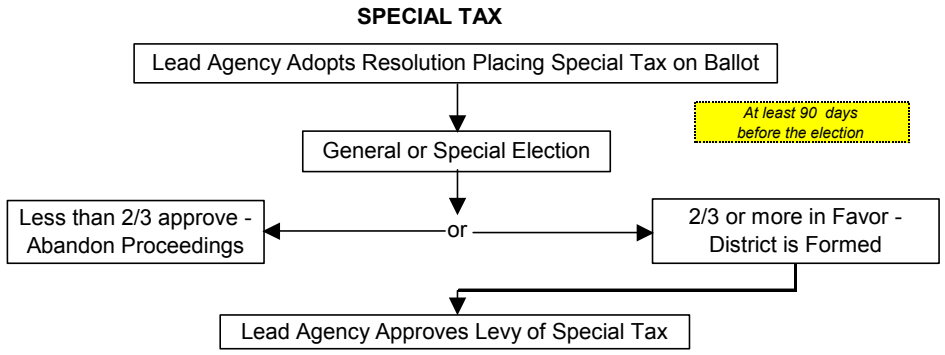

Figure 1 – Special Tax Adoption Process

All new assessments must conform to the requirements of Proposition 218, which was passed in November 1996. Proposition 218 specifically requires that property owners (not registered voters) be allowed to vote on new benefit assessments. New assessments may be approved by a simple majority approval of the property owners, with votes weighted in proportion to the assessment proposed.

In order to implement a new assessment, the lead agency must define those parcels that receive benefit and define the method of assessment in an Engineer's Report. Figure 2 illustrates the benefit assessment adoption process.

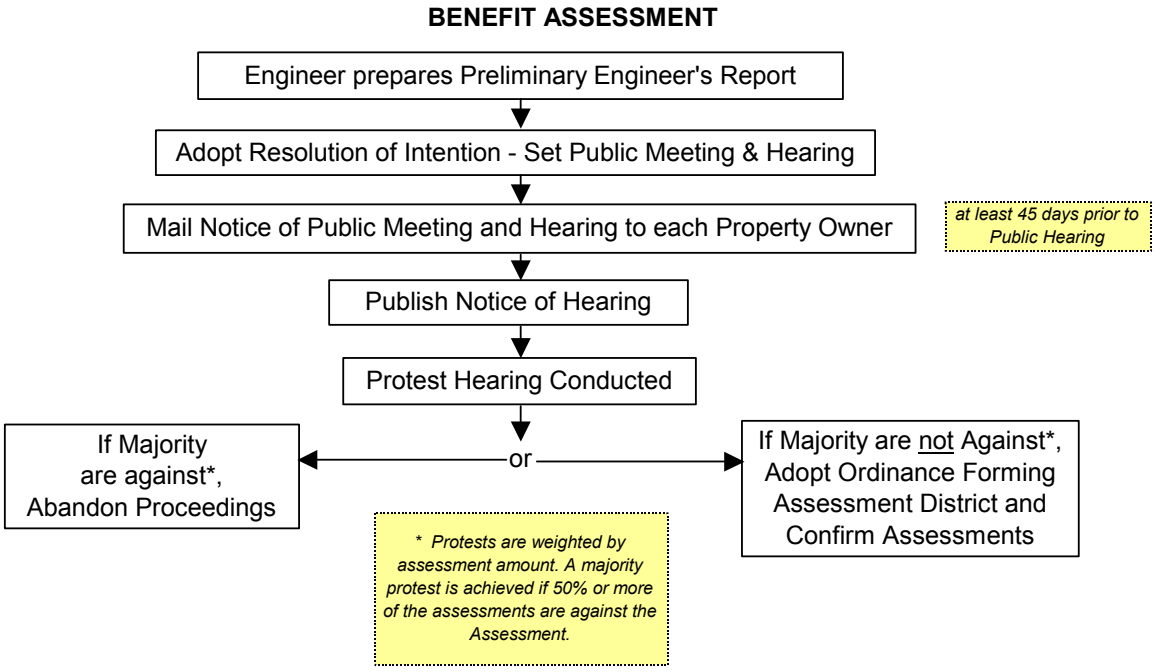

Figure 2 – Benefit Assessment Adoption Process

2.3 Property-Based Fee

A property-based user fee is a charge levied on a property to pay for public improvements or services that are used by that property. The difference between an assessment and a user fee is that assessments rely on a demonstration of special benefit (which can be hard to prove) while user's fees require demonstration of use. In the case of drainage facilities, a user fee allows a lead agency to collect revenue from properties that contribute runoff into the system but may not flood because of their location.

A user fee can be structured proportionally to the amount each parcel uses the flood control facilities rather than how much each property benefits from the services or improvements provided. This allows program costs to be spread over a larger customer base. For flood control work, user fees are typically related to impervious area on the property, which can be equated to runoff. Like the benefit assessment, a user fee may also be implemented by a 50% vote; however, before the vote may be initiated, a noticed protest hearing must take place and less than 50% written protest must be received.

In order to implement a new user fee, the lead agency must define those parcels that use the various drainage facilities and define its method of calculating a fee proportional to use. Figure 3 illustrates the user fee adoption process.

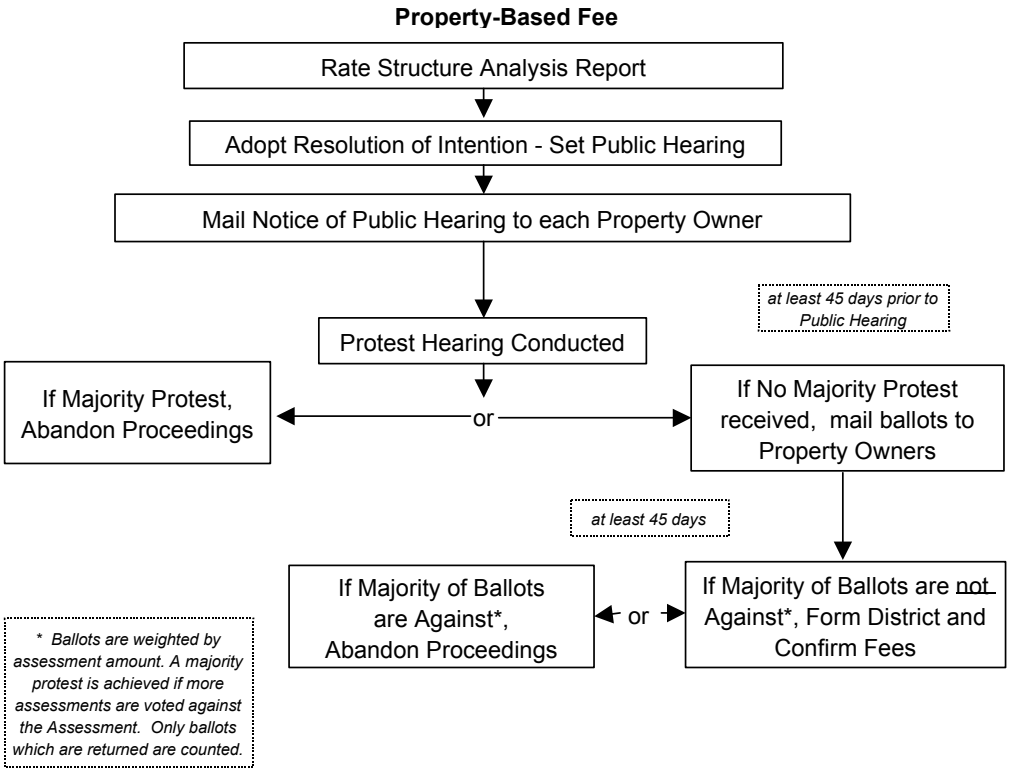

Figure 3 – Property Based Fee Adoption Process

2.4 Development Impact Fee

Government Code Section 66000 et.seq., allows the County or District to collect development fees to fund the installation of storm drain infrastructure necessary to offset the impacts of development. Development Impact Fees are tied to either General Plans or Capital Improvement Programs approved by the County or District. As regular updates of the General Plan and/or Capital Improvement Programs are prepared, additional storm drain infrastructure is identified to support the new developments and projects. The fees cannot be used to correct existing problems; although they can be used to fund a "fair share" of new projects.

Development Impact Fees are not subject to vote. They can be approved by a majority of the County Board of Supervisors or the Flood Control and Water Conservation District Board of Directors after a protest hearing. Figure 4 illustrates the adoption process.

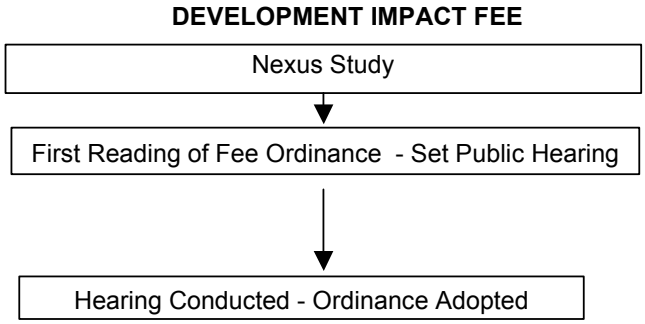

Figure 4 – Development Impact Fee Adoption Process

The County/District should implement Development Impact Fees in all the communities. The communities of Nipomo, San Miguel, and Santa Margarita would benefit from the collection of impact fees as their general plans indicate continued growth of residential and commercial properties. Cambria, Cayucos and Oceano appear built out, however, redevelopment and larger remodels (improvements that exceed a certain percentage of the current property home value) could provide the nexus for collecting impact fees.

3 Outside (Leveraged) Funding Sources from the Federal Analysis

The US Army Corps of Engineers (Corps) developed the Final Funding Program Analysis Report (FPAR) for the San Luis Obispo Creek Watershed (Report) in October 2001. The purpose of the FPAR was to inform the District of monies that might be available to fund a variety of watershed protection projects. The funding sources identified in the FPAR are included in the funding review as part of this TM. In order to not duplicate efforts, the funding sources identified in the FPAR are incorporated as part of this TM and select sections from the FPAR are included in Appendix B.

3.1 Applicable Funding Sources

Although all the funding sources identified in the FPAR relate to watershed protection, only a small number of those sources apply to the types of projects proposed by this Study. Table 2 identifies applicable funding sources described in the FPAR.

Table 2 – Applicable Funding Sources from Funding Program Analysis Report

Agency	Funding Source	Description
US Army Corps of Engineers	Flood Hazard Mitigation and Riverine Ecosystem Restoration Program	Watershed-based program focusing on providing flood protection through non-structural measures when possible
US Army Corps of Engineers	Emergency Streambank and Shoreline Erosion Protection	Allows emergency streambank and shoreline protection to prevent damage to public facilities
US Army Corps of Engineers	Section 205 Flood Control Project	Local protection from flooding by the construction of flood control works such as levees, channels, and dams.
US Army Corps of Engineers	Section 206 Aquatic Ecosystem Restoration	Carries out aquatic ecosystem restoration projects that will improve the quality of the environments.
US Army Corps of Engineers	Section 208 Snagging and Clearing	Local protection from flooding by channel clearing and excavation.
California Department of Water Resources	Urban Streams Restoration Program	Reduce damages from streambank and watershed instability and floods while restoring the environmental and aesthetic values of streams.
State Water Resources Control Board	Nonpoint Source Implementation Grant Program	Reduce erosion in channels to improve water quality through nonpoint source questions
State Water Resources Control Board	Proposition 13 Watershed Protection Program	Develop local watershed management plans and/or implement projects consistent with watershed plans

Notes:

Projects authorized under the US Army Corps of Engineers Continuing Authorities Program (CAP). The CAP provides the Corps with authority to implement small water resources projects without specific congressional authorization

3.2 Additional Requirements for Corps Funding

The Corps requires that the local sponsor[1] assist in the preparation of the planning, environmental, and design documents to ensure that the communities are involved in the project development and selection process. This requires the local sponsor to have an active role throughout the entire Corps civil works process, which can last up to seven years or more. The local sponsor is also expected to share in the cost of the project planning, design and construction (cost sharing depends on the program, but can be as high as 50 percent of the project). The local sponsor financial contribution can be in the form of in-kind service (e.g. staff time), which would offset the cash contribution requirements, but some of these costs would be in addition to the requirements defined by the Corps process. The local sponsor will incur

[1] A local sponsor is typically the local flood control agency or district responsible for programming drainage and flood control services. Local sponsors share in the cost for planning, designing and constructing a project with the Corps.

project costs that are deemed ineligible and cannot be used as part of the local sponsor financial contribution. These costs are typically project management costs incurred for administrative tasks such as management of staff, preparation of invoices, etc.

3.3 Grants

The County's planning department administers Community Development Block Grants (CDBG) on a yearly basis. This program is funded by the US Department of Housing and Urban Development (HUD) and targets low to moderate-income communities. The funding for CDBG is guaranteed each year but the level of funding varies. A detailed description of the program is included in Appendix A.

4 Additional Outside Funding Sources available through the State

In addition to the sources of funding identified in the FPAR, the State of California (State) provides funding for flood protection and erosion control projects. The California Department of Water Resources (DWR), through the Flood Protection Corridor Program (FPCP), funds watershed protection projects that have agriculture and/or wildlife benefits. For those projects that impact the California Department of Transportation (Caltrans) facilities, a standard cooperative agreement exists that can be used to share drainage project costs. The Governor's Office of Emergency Services (OES) administers grants that fund flood protection projects through the Federal Emergency Management Agency's (FEMA) Flood Mitigation Assistance (FMA) program. The State Water Resources Control Board (SWRCB) provides low interest loans for projects that address non-point source pollution through the State Revolving Fund (SRF) loans. Specifically, communities that must meet National Pollutant Discharge Elimination System (NPDES) Phase II requirements are eligible for the SRF loans. The state funding sources are summarized in Table 3 and detailed in Appendix A.

Table 3 – Additional Funding Sources

Agency	Funding Source
California Department of Water Resources	Flood Protection Corridor Program
California Department of Transportation	Cooperative Drainage Projects
Governor's Office of Emergency Services	Flood Mitigation Assistance Program
State Water Resources Control Board	State Revolving Fund Loan

The District is currently applying for assistance from FEMA through the FMA program. The District has submitted a Floodplain Management Plan (FMP) to the State of California Office of Emergency Services for approval. The FMP identifies several repetitive loss structures throughout the County to be removed from identified floodplains. As described in Appendix A, an approved FMP is required prior to applying for funds from the FMA for implementation of the proposed project. The District should continue its efforts to have the FMP approved and apply for FMA project funds to implement the proposed projects.

4.1 Typical Grant Requirements

Grants provide an opportunity for communities to reduce the total project cost that will be funded through taxes, assessments, and fees. Grant applications often require detailed information

regarding the project, the impact on the community and the environment, and project costs. Additionally, grant distributors prefer projects that provide multiple benefits including environmental restoration. Projects compete for existing funds and a majority of applications are not accepted because of this.

Once a grant is appropriated to a project, the recipient is required to complete additional paperwork including invoices, status reports, and project closeout reports. All these costs are not included as part of the grant and are the responsibility of the recipient. The costs are considered ineligible costs, not included as matching funding for project costs. These costs and application costs can be significant and need to be accounted for when preparing project budgets.

5 Additional Outside Funding Sources available through Private Sources

The FPAR identified several funding sources available through private sources. However, these programs provide funds for projects whose scope of work include environmental restoration, creation of open space, and wildlife habitat improvement projects. Projects that will be identified in the Study may not provide enough of these benefits and therefore private funding sources were removed from further consideration. In addition, the focus of these private sources is to provide funds for non-profit and tax exempt groups.

Additional private sources other than those identified in the FPAR are available for similar projects. A listing of these sources can be found on the California Watershed Database website. The website address is http://watershed.ecst.csuchico.edu/new_spin/spinmain.asp. This website provides a search engine for users to locate funding sources based on the project scope of work.

6 Funding Strategy

There are several funding opportunities available for the projects identified in the Study but the likelihood of receiving enough grant funding for all project costs is unlikely. As stated previously, the lead agency will need to fund the planning of the projects, but it is the responsibility of the community to provide permitting, environmental compliance, design and construction funding. The following case studies present example projects using a combination of funding for a sample project.

6.1 Case Study #1 – Isolated Drainage Project

For an isolated drainage project that eliminates localized ponding or street flooding through the construction of curbs and gutter, drop inlets and culverts, the benefit assessment is a logical choice. A typical funding strategy using a benefit assessment would be as follows:

- The Engineer's Report for the project would be completed by the lead agency within 3 months of start. Programming costs would be funded through the lead agency.
- Concurrently with completing the Engineer's Report, the lead agency would conduct a benefit assessment proceeding for the properties that benefit from the improvements. The benefit assessment would be in place prior to moving forward with permitting, environmental compliance, and design. The lead agency can use the assessment to secure bonds to fund construction.

- Appropriate environmental documentation is completed concurrently with the design within 9 months of start.
- Lead agency advertises project and oversees construction. Duration of the construction would be based on the magnitude of the scope, but most likely would be less than one year.
- The lead agency would continue collecting assessments on the properties until the bonds are paid off.

The total time required to complete a project under this scenario is a minimum of two years.

6.2 Case Study #2 – Comprehensive Drainage Project

For a project that includes the construction of storm drain infrastructure such as curbs and gutters, drop inlets, and storm sewer pipelines, a typical funding strategy using a benefit assessment, and if appropriate, CDBG funds would be as follows:

- An Engineer's Report for the project completed by the lead agency within 6 months of start. Programming costs would be funded through the lead agency.
- Concurrently with completing the Engineer's Report, the lead agency would conduct a benefit assessment proceeding for the properties that benefit from the improvements. The benefit assessment would be in place prior to moving forward with permitting, environmental compliance, and design. The lead agency can use the assessment to secure bonds to fund construction.
- Appropriate environmental documentation is completed concurrently with design within 12 months of start.
- Community can apply for CDBG funds, for low-income communities only, following the establishment of the user fees. Funds are distributed in August of each year and applications are typically due October of the previous year.
- Lead agency advertises project and oversees construction. Duration of the construction would be based on the magnitude of the scope and could vary between one and three years.
- The lead agency would continue collecting property based fees until the bonds are paid off.

The total time required to complete a project under this scenario is a minimum of three years.

6.3 Case Study #3 – Channel Improvements

For a project that includes work within an existing channel, a typical funding strategy using a Corps CAP agreement would be as follows:

- The lead agency, on behalf of a majority of its constituents, sends a letter to the Corps to request a CAP project.
- Corps completes a reconnaissance report to identify the problem and determine Federal interest in a project within 1 year of authorization. The benefiting constituents are not required to cost share in the preparation of the study but will be required to participate in the development through public meetings, coordination meetings with Corps staff, and review of the reconnaissance report.

- Corps completes a feasibility report and environmental document within 3 years of approval of the reconnaissance report. The benefiting constituents are required to pay for 50 percent of the total project costs as well as participate in the completion of both documents.
- Corps completes final design within 3 years of approval of the feasibility report and environmental document. The benefiting constituents are responsible for 25 percent of the project costs.
- The lead agency creates a benefit assessment district concurrently with the completion of final design. The lead agency can use the assessment to secure bonds to fund the benefiting constituents portion of the cost.
- Corps advertises and administers construction contract with construction completed between one and three years after start depending on the magnitude of the projects. The benefiting constituents are responsible for 35 percent of the construction costs.

The total time required to complete a project under this scenario is a minimum of seven years.

6.4 Case Study #4 – Drainage Facility Across Public Highway

For a project that includes construction of drainage facilities across a public highway such as Highway 1, a typical funding strategy using a property-based fee and cost sharing with Caltrans would be as follows:

- An Engineer's Report for the project would be completed by the lead agency within 6 months of start. Caltrans will require a review period for the design, which will impact the duration of the design schedule. Programming costs would be funded through the lead agency.
- Concurrently with completing the planning, the lead agency implements a property-based fee. The fee would be in place prior to proceeding with environmental documentation and design. The lead agency can use the property-based fee to secure bonds to fund construction.
- Lead agency submits a cost share agreement to Caltrans concurrently with completing design. Approval of the cost share agreement can take up to 12 months depending on the project.
- Lead agency advertises project and oversee construction. Duration of the construction would be based on the magnitude of the scope and could vary between one and three years.

The total time required to complete a project under this scenario is a minimum of three years.

7 Community Funding

Each community participating in the Study likely qualifies for one or more funding sources identified. The various funding sources identified for projects are presented in Table 4. A matrix identifying each community's problems and likely funding sources is included in

Table 5. A more detailed analysis of potential funding for each of the communities will be included with the individual community implementation strategy report that will be prepared under separate task of the agreement.

8 Conclusion/Recommendation

The study being prepared under separate task of the agreement with RMC will provide the lead agency, sponsoring agency, benefiting constituents, and/or the District with a summary of existing problems in the six communities as well as recommended solutions. This TM summarizes the various funding sources available to these entities, and the communities to implement those projects. Although several grant and cost sharing opportunities exist with various federal and state agencies, significant work is required by the lead agency and/or local sponsor to complete applications and participate in the process. In other words, these funding sources are not "free money."

Because of the effort required to apply for monies that are not guaranteed, it is recommended that the following two local funding mechanisms for projects be implemented:

- The County implement a development impact fee structure that will help assure that all new development pays fairly for its impacts.
- Subject to demonstrated community support, the lead agency should move forward with a property based fee program that assures that all users of existing drainage systems will contribute to upgrade and maintenance. Because the property based fee requires voter approval, it is recommended that the lead agency does not move forward with an election until a petition signed by more than 50% of property owners is brought to the lead agency.

Detailed recommendations for each of the communities will be included with the Study. This TM only summarizes the various sources of funding unless the funding mechanism can be implemented without a specific project scope.

The District and lead agency should continue to aggressively pursue the funding sources listed in this TM and new funding sources that may become available where communities commit themselves to support of a project. Monies received through grants and cost share can be used to offset costs born by the communities.

Table 4 – Summary of Funding Sources

Number	Agency	Funding Source
1	Community Services Districts, San Luis Obispo County Flood Control and Water Conservation District, other lead agency	Special Property Tax
2	Community Services Districts, San Luis Obispo County Flood Control and Water Conservation District, other lead agency	Benefit Assessment
3	Community Services Districts, San Luis Obispo County Flood Control and Water Conservation District, other lead agency	Property Fee
4	County of San Luis Obispo and/or San Luis Obispo County Flood Control and Water Conservation District	Development Fee
5	County of San Luis Obispo	Community Development Block Grants
6	US Army Corps of Engineers	Flood Hazard Mitigation and Riverine Ecosystem Restoration Program
7	US Army Corps of Engineers	Emergency Streambank and Shoreline Erosion Protection
8	US Army Corps of Engineers	Section 205 Flood Control Project
9	US Army Corps of Engineers	Section 206 Aquatic Ecosystem Restoration
10	US Army Corps of Engineers	Section 208 Snagging and Clearing
11	California Department of Water Resources	Urban Streams Restoration Program
12	California Department of Water Resources	Flood Protection Corridor Program
13	California Department of Transportation	Cooperative Agreement
14	State Water Resources Control Board	Nonpoint Source Implementation Grant Program
15	State Water Resources Control Board	Proposition 13 Watershed Protection Program
16	State Water Resources Control Board	State Revolving Fund Loan
17	Governor's Office of Emergency Services	FEMA Flood Mitigation Assistance Program

Community	Problems	Funding Sources from Table 4															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Cambria	1. Local Drainage	L	H	M	H												H	M
Cayucos	1. Overtopping of Cayucos Creek	L	H	M	H		L	L	L	L	L	L			L	L		M
	2. Local Drainage	L	H	M	H													M
Nipomo	1. Old Town Nipomo in Floodplain	L	H	M	H	M	L	L	L	L	L	L	L		L	L		M
	Local Drainage	L	H	M	H												H	M
Oceano	1. Local Drainage	L	H	M	H	M	L							M			H	M
San Miguel	1. Local Drainage	L	H	M	H	M	L											M
Santa Margarita	1. Overtopping of Santa Margarita and Yerba Buena Creek	L	H	M	H		L	L	L	L	L	L	L	L	L	L		M
	2. Local Drainage	L	H	M	H													M

Legend

H - High opportunity for success
M - Moderate opportunity for success
L - Low opportunity for success

Notes

1. Where no opportunity for success designation is listed, it is not considered likely that the listed funding option would be applicable

Table 5 – Summary of Funding Options

Appendix A
Potential Grant and Loan Programs

(1) Community Development Block Grants

Overview

The County's planning department administers Community Development Block Grants (CDBG) on a yearly basis. This program is funded by the US Department of Housing and Urban Development (HUD) and targets low to moderate income communities. The funding for CDBG is guaranteed each year but the level of funding varies.

CDBG funds can be used for any community development activity such as acquisition of real property, affordable housing activities, construction or rehabilitation of public facilities and improvements, clearance and demolition of buildings, provision of certain types of public services, relocation payments and assistance, removal of architectural barriers, housing rehabilitation, special economic development activities, planning studies and grant administration. A community must meet one of the three national objectives to be eligible for the funding:

- 51% or more of the community households must have incomes below 80% of the County median; or
- The project must aid in the prevention or elimination of slums or blight; or
- The project must address urgent needs that pose a serious, immediate threat to the public health or welfare.

Application Deadline(s)

October of each year

Assistance Provided

The CDBG funds can be used for planning, design, or construction of a project, however, the County planning department's preference is that a project have plans and specifications completed prior to paying out funds. The County is required to report on spending of CDBG funds on an annual basis and therefore most projects that receive CDBG funds are construction projects because funds are more likely to be expended within a year of appropriation. Applications are ranked based on the following criteria:

- Consistency with federal regulations and laws
- Community support
- Seriousness of community development need proposed to be addressed by project
- Degree to which project benefits low-income and very low-income families or persons
- Feasibility of the project to be completed as budgeted within 18 months of appropriation
- Cost effectiveness of funds requested and leveraging of other funds
- Organization's experience or knowledge regarding CDBG requirements

Funding Level	There is no cap on grant application but the County is allocated approximately $500,000 on an average year from HUD for projects similar to those identified in the study. While matching funds are not required; the County and HUD looks most favorably on projects with a matching fund component.	
Legislative Authority	Title I of the Housing and Community Development Act of 1974, Public Law 93-383, as amended	
Contacts	Address:	County of San Luis Obispo Department of Planning and Building County Government Center San Luis Obispo, CA 93408
	Telephone:	(805) 781-5787
	Internet:	http://www.co.slo.ca.us

(2) Flood Protection Corridor Program

Overview

The Flood Protection Corridor Program (FPCP) was established when California voters passed Proposition 13, the "Safe Drinking Water, Watershed Protection and Flood Protection Act" in March of 2000. The FPCP authorized bond sales of $70 million for primarily nonstructural flood management projects that include wildlife habitat enhancement and/or agricultural land preservation. Of the $70 million, approximately $5 million will go to educational programs and administrative costs. Another $5 million was earmarked by the Legislation for the City of Santee, leaving approximately $60 million for flood corridor protection projects throughout the state.

Application Deadline(s)

February of each year

Assistance Provided

The Flood Protection Corridor Program grant can be used for projects that include:

- Non-structural flood damage reduction projects within flood corridors,
- Acquisition of real property or easements in a floodplain,
- Setting back existing flood control levees or strengthening or modifying existing levees in conjunction with levee setbacks,
- Preserving or enhancing flood-compatible agricultural use of the real property,
- Preserving or enhancing wildlife values of the real property through restoration of habitat compatible with seasonal flooding,
- Repairing breaches in the flood control systems, water diversion facilities, or flood control facilities damaged by a project developed pursuant to Chapter 5, Article 2.5 of the Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act of 2000,
- Establishing a trust fund for up to 20 percent of the money paid for acquisition for the purpose of generating interest to maintain the acquired lands,
- Paying the costs associated with the administration of the projects.

The project location must also be located at least partially in:

- A FEMA Special Flood Hazard Area (SFHA), or
- An area that would be inundated if the project were completed and an adjacent FEMA SFHA were inundated, or
- A FEMA SFHA, which is determined by using the detailed methods identified in FEMA Publication 37, published in January 1995, titled “Flood Insurance Study Guidelines and Specifications for Study Contractors”, or

- A floodplain designated by The Reclamation Board under Water Code Section 8402(f) *[Title 23, California Code of Regulations, Division 2, Section 497.5(a)],* or a
- Locally designated Flood Hazard Area, with credible hydrologic data to support designation of at least one in 100 annual probability of flood risk. This is applicable to locations without levees, or where existing levees can be set back, breached, or removed. In the latter case, levee setbacks, removal, or breaching to allow inundation of the floodplain should be part of the project.

Funding Level

A grant cap of $5 million per project has been established, however, exceptional projects requesting funding greater than the established cap will be considered on a case-by-case basis.

Legislative Authority

Division 26, Section 79000 Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act

Contacts

Address: Flood Protection Corridor Program
Department of Water Resources, Division of Flood Management
1416 Ninth Street, Room 1641
Sacramento, CA 95814
Telephone: (916) 654-3620
Internet: http://www.dfm.water.ca.gov/fpcp/

(3) Cooperative Agreement

Overview

The California Department of Transportation (Caltrans) has established a process for cost sharing of drainage projects being implemented by a local agency that will benefit Caltrans facilities.

Application Deadline(s)

None

Assistance Provided

Caltrans has established a process for cost sharing of planning, design, and construction of drainage projects. The process for applying for a Cooperative Agreement is detailed in the Cooperative Agreement Manual.

Funding Level

The cost to Caltrans is based on the benefit received from the project.

Legislative Authority

Streets and Highways Code Sections 114 and 130

Contacts

Address: California Department of Transportation, District 5
50 Higuera Street
San Luis Obispo, CA 93401-5415
Telephone: (805) 549-3111
Internet: http://www.dot.ca.gov/hq/oppd/coop/cooptoc.html

(4) Flood Mitigation Assistance

Overview

FEMA provides funds on a yearly basis for each of the states to administer FMA grants. In California, the Governor's Office of Emergency Services administers these grants. The purpose of these grants is to provide local communities with funds to alleviate reoccurring flooding problems and to reduce claims on the National Flood Insurance Fund (NFIF). There are three types of grants available:

- FMA Planning Grants
- FMA Project Grants
- FMA Technical Assistance Grants

All projects that address flooding issues for areas within a Special Flood Hazard Area (SFHA)[2] are eligible for both FMA Planning and Project grants. In order to receive a FMA Project grant to implement a project to reduce flood losses, a Flood Mitigation Plan (FMP) must be completed by the lead agency and approved by FEMA. The FMA Planning Grant can be used to fund the completion of the FMP.

Application Deadline(s)

None

Assistance Provided

Prior to proceeding with a FMA Project Grant application, the grant applicant must document the flooding problem with the FMP. In addition to describing the flooding problem, the following information is included in the FMP:

- Public involvement
- Coordination with other agencies or organizations
- Flood hazard area inventory
- Review of possible mitigation actions
- State or local adoption following a public hearing
- Actions necessary to implement plan

Following the approval of the FMP, the grant applicant can apply for a FMA Project Grant. This grant is used to implement the specific project identified in the FMP including property acquisition, modification of existing culverts/bridges, elevation of National Flood Insurance Program (NFIP) insured structures, or relocation of NFIP insured structures.

The project must also meet five basic requirements to receive funding:

- Be cost effective – Project costs cannot exceed expected benefits
- Conform with applicable Federal, State, and Executive Orders
- Be technically feasible

[2] Any area within the 100-year flood plain as defined by FEMA is within a SFHA.

- Conform with the FMP
- Be located physically in a participating NFIP community that is not on probation, or benefit such a community directly by reducing future flood damages

Funding Level

- The applicant is responsible for 25% of the costs associated with each grant. The applicant can utilize in-kind services to fund half the applicant's fiscal responsibility. Examples of in-kind services include County staff time, volunteer work, donated supplies, and donated equipment.
- An applicant may receive only one FMA Planning Grant for a maximum of $50,000 in any given five year period.
- An applicant may receive multiple FMA Project Grants but the maximum total of all grants cannot exceed $3.3 million over a five-year period. The $3.3 million value includes monies received from a FMA Planning Grant.

Legislative Authority National Flood Insurance Reform Act of 1994 (NFIRA), Sections 1366 and 1367 (42 U.S.C. 4101)

Contacts

Address:	Governor's Office of Emergency Services P.O. Box 419047 Rancho Cordova, CA 95741-9047
Telephone:	(916) 845-8150
Internet:	http://www.oes.ca.gov http://www.fema.gov/fima/planfma.shtm (Copy of FEMA's Flood Mitigation Assistance Guidance)

(5) SWRCB Revolving Loan Program

Overview

Low interest loans to address water quality problems associated with discharges from wastewater and water reclamation facilities, as well as from nonpoint source discharges and for estuary enhancement.

Application Deadline(s)

Final adoption of State priority list for next State fiscal year in June

Assistance Provided

The purpose of the loan is to assist agencies and local communities meet water quality standards set forth by the Federal Clean Water Act. The loan is for projects associated with discharge from wastewater and water reclamation facilities, as well as from nonpoint sources to conform with NPDES requirements.

Funding Level

The interest rate on an SRF loan is 50% of the interest rate on the most recently sold general obligation bond. The maximum amortization period is 20 years. Loans may cover up to 100% of the cost of planning, design, and construction of NPS pollution control structures and 100% of NPS pollution control programs. The borrower will begin making annual repayments of principal and interest one year after the first disbursement of loan funds.

Legislative Authority

Federal Clean Water Act

Contacts

Address: State Water Resources Control Board
Division of Financial Assistance
1001 I Street, 16th Floor
Sacramento, CA 95814
Contact: Jeff Albrecht

Telephone: (916) 341-5717

Internet: http://www.swrcb.ca.gov/funding/

Appendix B

Excerpts from the San Luis Obispo Creek Watershed, San Luis Obispo County, California, Final Funding Program Analysis Report Prepared by the US Army Corps of Engineers, Los Angeles District October 2001

(1) Continuing Authorities Programs

Overview

Congress has provided the Corps with a number of standing authorities to study and build water resources projects for various purposes, and with specified limits on Federal money spent for a project.

Application Deadline(s)

Specific congressional authorization is not needed

Assistance Provided

- Flood Control Projects – Local protection from flooding by the construction or improvement of flood control works such as levees, channels, and dams. Non-structural alternatives are also considered
- Emergency Streambank and shoreline Erosion – Allows emergency streambank and shoreline protection to prevent damage to public facilities, e.g., roads, bridges, hospitals, schools, and water/sewage treatment plants
- Snagging and Clearing for Flood Control – Local protection from flooding by channel clearing and excavation, with limited embankment construction by use of materials from the clearing operations only.
- Aquatic Ecosystem Restoration – Carries out aquatic ecosystem restoration projects that will improve the quality of the environment, are in the public interest, and are cost effective

Funding Level

- Flood Control Projects - Federal share may not exceed $7 million for each project. Required non-Federal match: 50 percent of the cost of the project for structural measures and 35 percent of the cost of the project for nonstructural measures.
- Emergency Streambank and Shoreline Restoration - Federal share may not exceed $1 million for each project. Non-Federal share of total project costs is at least 25 percent.
- Snagging and Clearing for Flood Control – Federal share may not exceed $500,000 for each project. Required 50 percent non-Federal match including all costs in excess of the Federal cost limitation.
- Aquatic Ecosystem Restoration – Federal share is limited to $5 million. The non-Federal share is 35 percent (including studies, plans and specifications, and construction).

Legislative Authority

- Flood Control Projects – Section 205 of the 1948 Flood Control Act (FCA), as amended
- Emergency Streambank and Shoreline Restoration – Section 14, 1946 FCA, as amended
- Snagging and Clearing for Flood Control – Section 208, 1954 FCA, as amended
- Aquatic Ecosystem Restoration – Section 206, Water Resources Development Act (WRDA) of 1996

Contacts

Address:	US Army Engineer District, Los Angeles PO Box 2711 Los Angeles, CA 90053-2325
Telephone:	(213) 452-5300
Internet:	http://www.spl.usace.army.mil/

(2) Flood Hazard Mitigation and Riverine Restoration Program

Overview Informally known as "Challenge 21," this watershed-based program focuses on identifying sustainable solution to flooding problems by examining nonstructural solutions in flood-prone areas, while retaining traditional measures where appropriate. Eligible projects will meet the dual purpose of flood hazard mitigation and riverine ecosystem restoration.

Application Deadline(s) Undetermined

Assistance Provided Projects include the relocation of threatened structures, conservation or restoration of wetlands and natural floodwater storage areas, and planning for responses to potential future floods.

Funding Level The non-Federal sponsor is required to provide 50 percent for the studies and 35% for project implementation, up to a maximum Federal allocation of $300 million.

- FY2003 through FY2005 - $50 million for each FY

Legislative Authority Section 212 WRDA 1999

Contacts

Address: US Army Engineer District, Los Angeles
PO Box 2711
Los Angeles, CA 90053-2325
Telephone: (213) 452-5300
Internet: http://www.spl.usace.army.mil/

(3) Urban Streams Restoration Program – Proposition 13

Overview

The objectives of this program is to assist communities in reducing damages from streambank and watershed instability and floods while restoring the environmental and aesthetic values of streams, and to encourage stewardship and maintenance of streams by the community. Objectives of the program are met by providing local governments and citizen's groups with small grants and technical assistance for restoration projects, to encourage all segments of local communities to value natural streams as an amenity, and to educate citizens about the value and processes taking place in natural streams.

Application Deadline(s)

To Be Determined

Assistance Provided

This program supports actions that:

- Prevent property damage caused by flooding and bank erosion
- Restore the natural value of streams; and
- Promote community stewardship

Funding Level

Grants can fund projects as simple as a volunteer workday to clean up neighborhood steams, or projects as complex as complete restoration of a streams to its original, natural state.

- The Department is in the process of amending the regulations for the program, including raising the grant cap from $200,000 to $1 million
- All potential projects must have two sponsors: a local agency and a community group.

Legislative Authority

- Stream Restoration and Flood Control Act of 1984
- Costa-Machado Water Bond Act of 2000

Contacts

Address: California Department of Water Resources
Urban Streams Restoration program
Attn: Earle Cummings
PO Box 942836
Sacramento, CA 94236-0001
Telephone: (916) 327-1656
Internet: http://wwwdpla.water.ca.gov/environment/habitat/stream/

(4) Proposition 13 Watershed Protection Program

Overview

This program provides grants to municipalities, local agencies, or nonprofit organizations to develop local watershed management plans and/or implement projects consistent with watershed plans.

Application Deadline(s)

To Be Determined

Assistance Provided

Grants may be awarded for projects that implement methods for attaining watershed improvements or for a monitoring program described in a local watershed management plan in an amount not to exceed five million dollars ($5,000,000) per project. At least 85 percent of the total amount in the sub account shall be used for capital outlay projects.

Eligible projects under this article may do any of the following:

- Reduce chronic flooding problems or control water velocity and volume using vegetation management or other nonstructural methods.
- Protect and enhance greenbelts and riparian and wetlands habitats.
- Restore or improve habitat for aquatic or terrestrial species.
- Monitor the water quality conditions and assess the environmental health of the watershed.
- Use geographic information systems to display and manage the environmental data describing the watershed.
- Prevent watershed soil erosion and sedimentation of surface waters.
- Support beneficial groundwater recharge capabilities.
- Otherwise reduce the discharge of pollutants to state waters from storm water or nonpoint sources.

Funding Level

Minimum request of $50,000 and maximum of $5 million

Legislative Authority

Costa-Machado Water Act of 2000

Contacts

Address: Proposition 13 Grant Program – Phase II
Attn: Bill Campbell, Chief
Watershed Project Support Section
Division of Water Quality
State Water Resources Control Board
1001 I Street, 15th Floor
Sacramento, CA 95814

Telephone: (916) 341-5250

Internet: http://www.swrcb.ca.gov/prop13/index.html

(5) Nonpoint Source Pollution Control Program

Overview

The purpose of the NPS Pollution Control Program is "to provide grant funding for projects that protect the beneficial uses of water throughout the State through the control of nonpoint source pollution."

Application Deadline(s)

To Be Determined

Assistance Provided

Grants shall only be awarded for any of the following projects:

- A project that is consistent with local watershed management plans that are developed under subdivision (d) of Section 79080 and with regional water quality control plans.
- A broad-based nonpoint source project, including a project identified in the board's "Initiatives in NPS Management," dated September 1995, and nonpoint source technical advisory committee reports.
- A project that is consistent with the "Integrated Plan for Implementation of the Watershed Management Initiative" prepared by the board and the regional boards.
- A project that implements management measures and practices or other needed projects identified by the board pursuant to its nonpoint source pollution control program's 15-year implementation strategy and five-year implementation plan that meets the requirements of Section 6217(g) of the federal Coastal Zone Act Reauthorization Amendments of 1990.
- The projects funded from the sub account shall demonstrate a capability of sustaining water quality benefits for a period of 20 years. Projects shall have defined water quality or beneficial use goals.

Funding Level

Minimum request of $50,000 and maximum of $5 million

Legislative Authority

Costa-Machado Water Act of 2000

Contacts

Address: Proposition 13 Grant Program – Phase II
Attn: Bill Campbell, Chief
Watershed Project Support Section
Division of Water Quality
State Water Resources Control Board
1001 I Street, 15th Floor
Sacramento, CA 95814
Telephone: (916) 341-5250
Internet: http://www.swrcb.ca.gov/prop13/index.html

Appendix H

REVIEW COMMENTS AND RESPONSE TO COMMENTS

APPENDIX H

RESPONSE TO COMMENTS

Comment 1: It would be useful to have an explanation of each dot on Figures 2 and 6.

Response 1: Dots are shown on report Figure 4 to illustrate the location of State, San Luis Obispo County culvert or maintenance issue, and reported flooding or poor drainage conditions.

Comment 2: It would be very useful if we could have a copy of the original comments from the citizens and other resources.

Response 2: A complete set of the community questionnaire and responses was copied and provided to the Cayucos Citizens Advisory Council.

Comment 3: Flooding of Cayucos Creek at B and Ash Street area is caused by Caltrans eliminating a historic drainage channel just west of Cayucos Creek drainage with the installation of Highway 1.

Response 3: The existing problem assessment and proposed project to mitigate flooding from a 10 and 100-year storm event are discussed in Sections 3.4.3.2 and 3.5.1. Caltrans participation in partially funding the proposed improvements is discussed in Sections 5.2.3.5 and 6.2. Please refer to these sections for more detailed discussion on the proposed improvements and implementation strategy for involving Caltrans.

Comment 4: I wish to clarify that contrary to the statement in Section 3.4.3.5, there have been reports of residential damage (due to flooding). Damage has been experienced at 701 Saint Mary Avenue.

Response 4: Property on Saint Mary Avenue included in Section 3.4.3.4 as a location with recurring flooding problems. The proposed storm drain project for Zone 8 described in Section 3.5.3 of the report would divert storm runoff away from private properties on Saint Mary Avenue and convey the flow within public right-of-way. No additional projects necessary to address this flooding issue.