San Luis Obispo County
Flood Control and
Water Conservation District

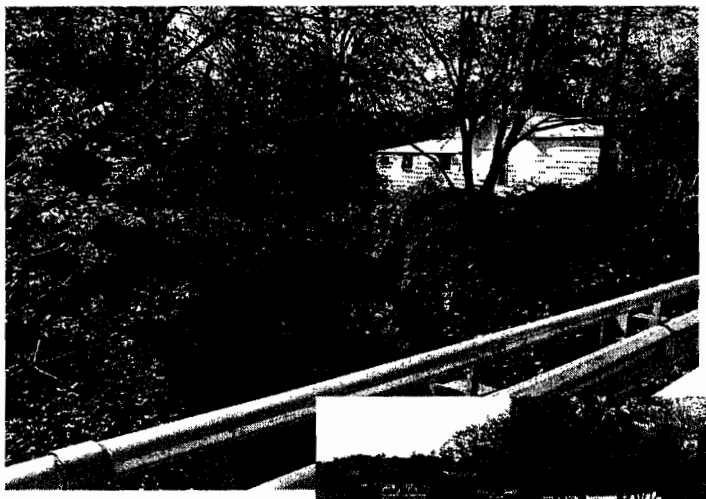
FEBRUARY 2004

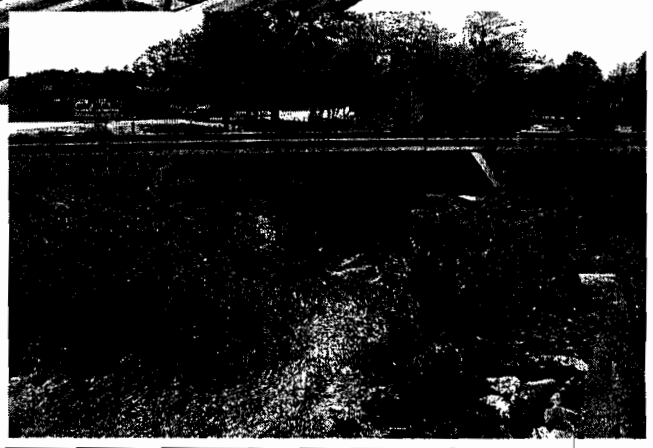
Santa Margarita Drainage and Flood Control Study

FINAL REPORT

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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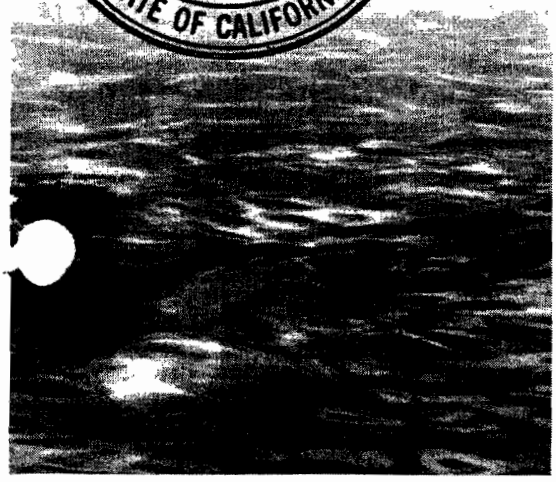

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EXECUTIVE SUMMARY

This report is a summary of findings, conclusions and recommendations of the Drainage and Flood Control Study conducted for the Community of Santa Margarita. 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 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. 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

Flooding problems in Santa Margarita are caused by a number of items. Inadequate channel and bridge capacities, lost and restricted floodplain area due to development, lack of flood protected homes, inadequate or non-existent local drainage facilities, and high peak runoff all contribute to the areas high occurrence of flooding. There are two categories of flooding problems in Santa Margarita: 1) major creek flooding and 2) localized street and property flooding. The major flooding problems in Santa Margarita are caused by a combination of inadequate culverts and bridges, and inadequate channel capacity in Yerba Buena Creek. When the creek's flow exceeds the capacity of the channel and bridge/culvert crossings, water overtops the banks and floods adjacent low topographic areas of Santa Margarita.

The second category of flooding, localized street and nuisance flooding, is caused by the lack of sufficient capacity in the local drainage ditches, driveway culverts, and storm drains. These facilities are often under maintained and filled with sediment or other debris. These factors prevent the local drainage system from adequately conveying urban runoff to Yerba Buena and Santa Margarita Creeks. The lack of gutters and underground storm drains, undersized and under maintained drainage facilities, and location of homes below the

street grade have resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways.

Proposed Projects

The proposed solution to the drainage and flooding problems in Santa Margarita is to develop a regional project that reduces the peak flow in Yerba Buena Creek, and also to improve the localized drainage facilities within the community. Along with the structural improvements, routine vegetative maintenance and sediment removal should be conducted in the creek to maintain the capacity of the channel. The recommended projects include:

- Project 3: Two off-channel detention basins in parallel
- Project 5: Vegetation management
- Project 6: Levee along south side of town
- Project 7: Storm drain diversion to north of town
- Project 8: Improvements to existing drainage system

Four alternative projects were analyzed to reduce the regional flooding caused by flood flows overtopping the creek's banks. Of these four alternative projects, Project 3 provides the greatest reduction in peak flow and improves the level of protection within Santa Margarita from less than a 10-year flood to a 25-year flood level. Project 3 consists of two detention basins that temporarily store water and discharge runoff back into the creek after flood flows have receded. It should be noted that this project does not meet the current County design standard requiring a watershed of this size to pass 100-year storm flows with freeboard (design standards based on watershed size are discussed in Section 3.3.5).

Projects 3 could potentially impact jurisdictional water and sensitive species habitat. However, the disturbance to the creek and riparian habitat would be limited to the areas where the lateral weirs and outfalls are located. The area of disturbance would be minimal, but the resource agencies will likely require mitigation to offset any loss of riparian habitat caused by the installation of an overflow weir and outfall. The other major issue with the lateral weir operation is the potential for fish to become stranded in the detention basin if they are caught in the overflow. Design features on the lateral weir will likely be required to eliminate or limit the potential for fish stranding in the detention basins. The resource agencies may also decrease the frequency in which the lateral weir operates. Instead of diverting flows greater than the 2-year event, the weir may be designed to only divert flows greater than a 10-year event. The loss of habitat and potential impact to fisheries present permitting challenges and increase the level of complexity that must be addressed during the environmental documentation and permitting phase, and with the appropriate design features, these impacts can be reduced to a less than significant level. Constant communication with the resource agencies during the design and permitting phase will be necessary to ensure that their concerns are addressed and that appropriate features required by the permits are designed into the project.

Project 5, vegetation management, should be included with any project that is implemented. In addition to insufficient capacity of the channel and bridge crossings, potential for flooding is intensified by willow and brush growth which has nearly clogged some of the crossings. Regular maintenance is needed to maintain maximum capacity of the channel. If uncontrolled vegetal growth continues, then the community can expect more frequent flooding during moderate storm events.

Local drainage problems and nuisance flooding will continue if the existing drainage system is not improved to meet current minimum County standards. Projects 6, 7 and 8 could all be implemented to improve local drainage. Project 6 includes the construction of an earth levee along the southern lot boundaries on K Street. The south side levee will protect homes from overland flow that breaks out of Yerba Buena Creek in the Miller Flat area. The levee would extend from Maria Avenue to Margarita Avenue and would divert flow along an overland flow path into Yerba Buena Creek.

An improved conveyance system is also needed to positively convey stormwater from residential areas to the creek. Project 7 utilizes the levee and ditch system developed in Project 6, but instead of discharging the flow into Yerba Buena Creek, a new 42-inch underground storm drain would be constructed, starting at the discharge point of the levee drainage ditch. The storm drain alignment would begin in Margarita Avenue and eventually discharge to Yerba Buena Creek at H Street. The proposed storm drain collects local runoff generated from streets and homes, and bypasses the undersized culverts at I Street and Highway 58.

To reduce localized flooding and properly convey stormwater runoff to the creeks, the County's Department of Public Works should work with CSA 23 to develop a standard drainage ditch and culvert design that meets County standards for minor waterways (designed for an average recurrence interval of 10-years). The community should then implement Project 8. Project 8 includes improvements to existing roadside ditches and driveway culverts. Without adopted standards for and community wide installation of improved drainage facilities, local flooding will not be significantly reduced.

The total for the five recommended projects (Projects 3, 5, 6, 7 and 8) described above is approximately $6.2 million. **Drainage improvements proposed as part of the Santa Margarita Enhancement Plan (i.e. those on Highway 58 in the Caltrans right-of-way not otherwise detailed) are not included in this report or cost estimates.** The CSA 23 Advisory Group provided verbal comments to the project team during the Engineering Technical Memorandum review process. The advisory group indicated support for only two of the proposed projects; Project 5 Vegetative Management, and Project 6 South Side Levee.

Table ES-1 summarizes the proposed alternatives and also provides estimated costs and implementation timeframe. The reader should note that Projects 1 through 4 mitigate against regional flooding and prevent overtopping of the creek's banks. Projects 1 through 3 are similar alternatives solving the same problem, they are not cumulative projects. Projects 5 through 8 increase creek conveyance or improve local drainage.

Table ES-1: Summary of Alternatives

PROJECT	PROBLEM AREA	PROPOSED MITIGATION	COST [1]	APPROXIMATE IMPLEMENTATION TIME FRAME [3]
1	Yerba Buena Creek	Detention basin with western bypass	$2,645,000 [2]	4.5 to 6 years
2	Yerba Buena Creek	Single off-channel detention basin with diversion facility and outflow structure	$2,139,000 [2]	4.5 to 6 years
3	**Yerba Buena Creek**	**Dual off-channel detention basins with diversion facility and outflow structure**	**$2,015,000 [2, 4]**	**4.5 to 6 years**
4	Yerba Buena Creek	Channel widening with bridge replacement	$9,369,000 [2]	4.5 to 6 years
5	**Yerba Buena Creek**	**Vegetation maintenance**	**$432,000 [4]**	**4 years**
6	**Local**	**South side levee**	**$231,000 [4]**	**4 years**
7	**Local**	**Storm drain**	**$2,724,000 [4]**	**4 years**
8	**Local**	**Drainage ditch and culvert improvements**	**$771,000 [4]**	**3 years**

Notes:
1: ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 40% for Administrative and Environmental, and a 20% Contingency. Typical estimates used for County Overhead & Support Costs for Construction Project Planning. Use 80% cumulative markup on construction costs for Coastal Zone Projects. Percentages provided by County (Typical to all estimates in this report).
2: Does not include land acquisition costs.
3: See Table 6-1 and 6-3 for detailed milestone durations. If a lead agency is in place, then decrease the duration by approximately 9 to 12 months.
4: The recommended projects include Projects 3, 5, 6, 7 and 8.

SANTA MARGARITA RANCH INVOLVEMENT

The Santa Margarita Ranch (the Ranch) property is critical to mitigation of the regional flooding problems and the development of a regional solution. Proposed projects rely on the acquisition of property or drainage easements from the owner of the Ranch, therefore their cooperation is imperative to the success of these projects. In addition to property for a detention basin, land will likely be necessary for environmental mitigation to offset project impacts to wetlands and riparian habitat.

ADDITIONAL RECOMMENDATIONS

FEMA Community Rating System

Santa Margarita 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.

New Development Investigate Drainage Flow Pattern

The County's Department of Planning and Building should require that all proposed developments that contribute runoff to Yerba Buena Creek investigate the drainage flow pattern from the lot to the discharge point

at the creek. If the investigation concludes that the proposed development is contributing to an existing problem, then on-site mitigation with a detention basin or equivalent facility should be required.

Develop Enforceable Drainage Standards

In order to reduce localized flooding and properly convey stormwater runoff from streets and homes to the creeks, the County's Department of Public Works should work with CSA 23 to develop a standard drainage ditch and culvert design that meets County standards for minor waterways (designed for an average recurrence interval of 10-years). The County's Department of Planning and Building can also work with CSA 23 to develop enforceable standards for the following:

- Front yard ditch size and configuration
- Driveway culvert minimum size and installation standards
- Community supported alternative for mountable asphalt dikes
- Community supported drainage plan for the downtown commercial area to be implemented with the Santa Margarita Enhancement Plan

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. For homes outside the floodplain, it is recommended that Santa Margarita and the County Planning Department mandate that the finish 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 Santa Margarita mandate the installation of a County standard mountable berm (or acceptable alternative) for all driveways/accesses to structures which are below the edge of pavement.

Minimize Storm Runoff from Homes

By diverting stormwater from impervious areas such as roofs, walkways and driveways, and reusing whenever possible, runoff that flows to streets can be greatly reduced. This can be achieved by directing rain gutter downspouts to landscaped areas, swales or infiltration basins on private property where water can percolate into the ground. *The reader should recognize that these homes are connected to septic tanks for wastewater disposal and have limited available land. There are some physical limitations which preclude applying the recommendations presented in this report to every lot in Santa Margarita. The potential impacts to a septic system should be evaluated prior to implementing these suggestions.*

Improve Drainage Systems as the Community Develops

Drainage improvements should be planned with any proposed development. Regardless of whether drainage problems exist prior to development, mitigation should be planned so as not to increase the severity or frequency of problems. Such mitigation could include on-site detention of runoff, thereby preventing the increase of runoff onto lower lying properties.

It is recommended that development fees collected for Santa Margarita be used to fund drainage improvements for areas that will be most impacted by future development. These areas are typically the topographic low points within a drainage sub-basin. If new development can not retain runoff on site, then it should be responsible for funding the necessary improvements to convey increased runoff.

In conjunction with planning drainage improvements with future development, critical lots that are at risk to flood damages due to their location should be identified. These lots should dedicate drainage easements on their property or design sufficient conveyance facilities as not to impede the flow of storm water.

Maintenance on Existing Facilities

Existing natural or constructed 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 is responsible for removing impediments. The 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

It is recommended that a facility maintenance district be formed to better maintain the drainage infrastructure in Santa Margarita. 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.

Implementation Strategy

The most effective approach for 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 Santa Margarita totaled approximately $6.2 million. If the lead agency in Santa Margarita established a funding source, approximately $440,000 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 residences 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.

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

IMPLEMENTATION STEPS

Project 3: Off-Channel Detention Basins in Parallel (Request Corps Involvement)

The regional solution for increasing the level of protection in Santa Margarita includes the construction of two off-channel detention basins. The U.S. Army Corps of Engineers (Corps) is available to assist local communities with solving and funding flood protection projects. Through the Corps' Flood Hazard Mitigation and Riverine Ecosystem Restoration Program or Section 205 of the Continuing Authorities Program, the Corps is authorized to assist local communities, such as Santa Margarita, with planning, designing and constructing a flood protection project.

CSA 23 with assistance from the District, should request that the Corps conduct a reconnaissance analysis of the Yerba Buena Creek flooding to determine if Federal interest exists in mitigating the community's flooding problem. The reconnaissance phase is the first step in the Corps' project development process. The reconnaissance phase is paid for by the Corps and no sponsor (CSA 23 or District) funds are required. The primary purpose of the reconnaissance phase is to determine if there is Federal interest in proceeding with the second, or feasibility phase. If the Corps determines that the economic benefits to solving the flooding problem warrants Federal involvement, then the community will be expected to sign a Feasibility Cost Sharing Agreement (FCSA) and send a letter to the Corps attesting to the local sponsor's ability to financially support a portion of the study costs. As explained in the local funding section, an established local funding source will help the community leverage outside funding. The reconnaissance phase typically requires 12 months to complete.

If the Corps' reconnaissance analysis determines that there is no Federal interest in the project, then CSA 23 would need to implement the project. The following implementation steps, in general, should be followed for a selected project(s). It is assumed that CSA 23 will serve as the lead agency and assume control of the project at completion.

- Fund and complete a Basis of Design Report[2] within 12 to 18 months of start (depends on complexity of project)
- Conduct benefit assessment or property based fee proceedings
- Design project, prepare environmental documents and resource agency permits
- Advertise for construction
- Construct project

The phasing of projects would depend on the residents' desire to implement projects within their neighborhood. At a minimum Project 5, Yerba Buena Creek Vegetation Management, should be implemented to improve and maintain the conveyance capacity of the channel. The primary difference in the implementation steps for each project involves the complexity and the level of CEQA documentation required for the detention basins, creek maintenance and storm drain project. The majority of projects qualify for a Negative Declaration or Mitigated Negative Declaration because each has the potential to affect sensitive resources. The drainage and culvert improvements should qualify for a categorical exemption, but if a new outfall is constructed on Yerba Buena Creek, then a Negative Declaration or Mitigated Negative Declaration may be required. Any work within a creek bank will require environmental permitting through the resource agencies, as detailed in Chapter 4 of this report.

[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.

SCHEDULE FOR IMPROVEMENTS

The average duration for a storm drain project is approximately four to six years, depending on the 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 Santa Margarita Drainage and Flood Control Study 2003 represents a collaborative effort between San Luis Obispo County, the Community of Santa Margarita, Raines, Melton & Carella, Inc., Questa Engineering Corporation and Essex Environmental. We would like to acknowledge and thank the following key personnel from the County, the Santa Margarita County Service Area 23 (CSA 23), and the Drainage Mitigation Committee of CSA 23 whose invaluable knowledge, experience, and contributions were instrumental in the preparation of this report.

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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
cfs	Cubic Feet per Second
Corps	U.S. Army Corps of Engineers
County	San Luis Obispo County
CSA	County Service Area
CSA 23	Santa Margarita County Service Area 23
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
FAA	Federal Aviation Administration
ft	feet
LAFCo	Local Agency Formation Commission
LF	linear feet
NCAC	North Coast Advisory Council
NEPA	National Environmental Policy Act
ND	Negative Declaration
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
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 Santa Margarita (Santa Margarita) is located in central San Luis Obispo County, approximately 10 miles north of the City of San Luis Obispo. The community is bordered to the west by the Santa Lucia Mountains and to the southeast by La Panza Range. It is located in the upper portion of the Salinas River watershed, partly in the floodplains of Yerba Buena and Santa Margarita Creeks, which flow from the Santa Lucia coastal range.

Figure 1-1: Community of Santa Margarita Location

Approximately 1,300[3] residents live in Santa Margarita, and enjoy the historical and rural character of the town. As shown in Figure 2 in Appendix A, Highway 58 is the principal transportation corridor in Santa Margarita. The state highway extends on an east-west alignment from its junction with Highway 101. The community is surrounded by the Santa Margarita Ranch.

Santa Margarita is less than one mile long and a half-mile wide. Residential development is located within a grid of 25-foot wide lots, and in larger parcels in the Residential Suburban zone at the west and east ends of the community. A four-block section of El Camino Real is designated as the Central Business District, between Yerba Buena and Pinal Avenues.

Santa Margarita is projected to grow to approximately 1,700 people at buildout (by year 2015). An additional 400 residents and approximately 160 dwelling units will be added to the community between now and buildout[4]. These figures do not include development of the Santa Margarita Ranch.

1.1 Project Understanding

The setting of Santa Margarita within a floodplain means that most of the town is subject to flooding. From its inception, the community has been subject to inundation from Yerba Buena Creek. Resident accounts and news articles document a long history of flooding in the community. The major flooding problems in Santa Margarita are caused by a combination of inadequate culverts and bridges, and inadequate channel capacity in Yerba Buena Creek. When the creek's flow exceeds the capacity of the channel and bridge/culvert crossings, water overtops the banks and floods adjacent low topographic areas of Santa Margarita. Yerba Buena Creek lacks sufficient capacity to meet the County's standard for major and secondary waterways, and in some reaches lacks sufficient capacity to meet the County's standard for minor waterways (capacity to convey a 10-year design storm). **According to current County standard, Yerba Buena Creek qualifies as a major waterway and should have sufficient capacity to convey a 100-year flood event with freeboard**.

[3] October 9, 2001 Santa Margarita Design Plan population estimated at 1,266. Assumed 3% growth over last two years.
[4] Projections based on the 1993 Final Program EIR for the Salinas River Area Plan. The Utilities Division of the Public Works Department in 2003 determined that there were 30 buildable residential lots and 19 commercial buildable lots. This was based on Assessor's parcel rolls listed as "vacant" properties. This community is nearly fully "built out".

The second category of flooding, localized street and nuisance flooding, is caused by the lack of sufficient capacity in the local drainage ditches, driveway culverts, and storm drains. These facilities are often under maintained and filled with sediment or other debris.

This report will focus on the localized drainage and flooding problems experienced throughout Santa Margarita and on reducing the peak flood event to a level that can be passed through the existing creek without causing flood damage.

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 Santa Margarita. 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 Santa Margarita County Service Area 23 Advisory Group (CSA 23 Advisory Group) represented the community of Santa Margarita. The Drainage Mitigation Committee was assigned the responsibility to represent the community and work with the study team throughout the duration of the study. The committee was made up of Council members John Wilkens, Melody Kreimes, and Jim Ahern. The study team requested input and endorsement from the NCAC 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

In order to gain the local knowledge of existing flooding problems, a questionnaire was mailed to the residences of Santa Margarita. The questionnaire requested information on existing flooding problems, location of flooding, frequency of occurrence, and observed causes. Approximately 60 responses were received from Santa Margarita 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, a few analyses and reports had been prepared on the flooding problems associated with Yerba Buena Creek. However, little information existed on the local drainage problems that are common throughout the community. 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 Santa Margarita 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 seven 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 – Comments and 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 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 study and develop water supplies and conservation opportunities. 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

The County's planning department establishes the land use policies and drainage ordinances for the County (the District has no land use ordinances). 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. Section 22.05.040 et. seq. of the County's Land Use Ordinance outlines the standards for the control of drainage and drainage facilities. These standards include:

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

Conditions of development in flood hazard areas must, at a minimum, enforce the current Federal floodplain 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. Santa Margarita is also subject to flood hazard combining designations. The combining designation is a special land use category which requires detailed project review to minimize the adverse impacts associated with flood hazards.

In addition, the County's land use ordinances contain 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.

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. No special district provides drainage service in Santa Margarita.

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.

Santa Margarita County Service Area 23 (CSA 23) serves Santa Margarita and funds energy costs for street lights, and provides water and drainage services. The drainage and flood control services presently covered by CSA 23 are very limited, due to the lack of funding. CSA 23 collects approximately $2,000 to $3,000 per year for its services. Revenue collected by CSA 23 currently covers operating costs and debt service. The water system within the service area is in need of costly capital improvements that could impact customer water rates. Gaining approval from the community to fund flood control and potable water system improvements will be a difficult task.

In March 2000, Santa Margarita residents overwhelmingly rejected a special property tax (Measure D-00) to provide funding for drainage services to control flooding in CSA 23. The measure gained support from only 34 percent of voters. Measure D-00 would have imposed a $50 tax on each parcel in CSA 23, raising approximately $25,000 in the first year.

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. Caltrans is responsible for maintaining the facilities in Highway 58 right of way, including culverts, ditches and other drainage facilities through the Santa Margarita community.

2.1.4.7 Union Pacific Railroad

Union Pacific Railroad (UPRR) has drainage facilities within its right-of-way (ROW) and is responsible for maintaining the drainage infrastructure within its ROW.

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 storm drain facilities are filled with sediment and vegetation. Field investigations indicate that some of the drainage ditches, roadside swales and culverts were partially filled with excessive sediment and vegetal growth. Under maintained facilities reduce their design capacity and inhibit their ability to convey runoff. However, in Santa Margarita, 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 drainage channel 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 58, and UPRR).

2.5 Private Residence Opportunities

In some cases, the residents or groups of residents can accelerate the installation of road or storm drain improvements by paying the County Engineering Department to install an identified improvement. Current County policy requires the benefited party to pay for the necessary improvements.

CHAPTER 3 ENGINEERING ANALYSIS AND ALTERNATIVES DEVELOPMENT

Chapter Synopsis: This chapter discusses the existing drainage and flooding problems in Santa Margarita 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 Recommended Projects

Much of Santa Margarita is located within a 100-year flood hazard zone. This area has been identified by FEMA as subject to flooding during a 100-year rainfall event. The lower lying areas near Yerba Buena Creek are also subject to flooding from more frequent (less intense) rainfall events due to insufficient capacity in the creek's bridges/culverts, and inadequate or non-existent local drainage facilities to convey urban runoff from homes and streets to the creek.

The major flooding problems in Santa Margarita result from flood flows breaking out of Yerba Buena Creek within the urban limits of the community, primarily between J Street and Highway 58. The majority of culverts and bridges in Santa Margarita do not meet the minimum County standard for major or secondary waterways. The culverts, bridges and channel are generally not sufficient to pass the 10-year flow rate. If the channel, culverts and bridges were designed per the County's standard for Major and Secondary waterways, then the threat and frequency of flooding from large storms would be reduced because the facilities would have sufficient capacity to convey the peak storms.

The proposed solution to the drainage and flooding problems in Santa Margarita is to develop a regional project that reduces the peak flow in Yerba Buena Creek, and also to improve the localized drainage facilities within the community. Along with the structural improvements, routine vegetative maintenance and sediment removal should be conducted in the creek to maintain the capacity of the channel. The recommended projects include:

- Project 3: Two off-channel detention basins in parallel
- Project 5: Vegetation management
- Project 6: Levee along south side of town
- Project 7: Storm drain diversion to north of town
- Project 8: Improvements to existing drainage system

Four alternative projects were analyzed to reduce the regional flooding caused by flood flows overtopping the creek's banks. Of these four alternative projects, Project 3 provides the greatest reduction in peak flow and improves the level of protection within Santa Margarita from less than a 10-year flood to a 25-year flood level. Project 3 consists of two detention basins that temporarily store water and discharge runoff back into the creek after flood flows have receded. It should be noted that this project does not meet the current County design standard requiring a watershed of this size to pass 100-year storm flows with freeboard (design standards based on watershed size are discussed in Section 3.3.5).

Project 5, vegetation management, should be included with any project that is implemented. In addition to insufficient capacity of the channel and bridge crossings, potential for flooding is intensified by willow and brush growth which has nearly clogged some of the crossings. Regular maintenance is needed to maintain

maximum capacity of the channel. If uncontrolled vegetal growth continues, then the community can expect more frequent flooding during moderate storm events.

Local drainage problems and nuisance flooding will continue if the existing drainage system is not improved to meet current County standards. Projects 6, 7 and 8 could all be implemented to improve local drainage. Project 6 includes the construction of an earth levee along the southern lot boundaries on K Street. The south side levee will protect homes from overland flow that breaks out of Yerba Buena Creek in the Miller Flat area. The levee would extend from Maria Avenue to Margarita Avenue and would divert flow along an overland flow path into Yerba Buena Creek.

An improved conveyance system is also needed to positively convey stormwater from residential areas to the creek. Project 7 utilizes the levee and ditch system developed in Project 6, but instead of discharging the flow into Yerba Buena Creek, a new 42-inch underground storm drain would be constructed, starting at the discharge point of the levee drainage ditch. The storm drain alignment would begin in Margarita Avenue and eventually discharge to Yerba Buena Creek at H Street. The proposed storm drain collects local runoff generated from streets and homes, and bypasses the undersized culverts at I Street and Highway 58.

To reduce localized flooding and properly convey stormwater runoff to the creeks, the County's Department of Public Works should work with CSA 23 to develop a standard drainage ditch and culvert design that meets County standards for minor waterways (designed for an average recurrence interval of 10-years). The community should then implement Project 8. Project 8 includes improvements to existing roadside ditches and driveway culverts. Without adopted standards for and community wide installation of improved drainage facilities, local flooding will not be significantly reduced.

The total for the five proposed projects is approximately $6.2 million. Table 3-14 breaks down the project costs. The CSA 23 Advisory Group provided verbal comments to the project team. The advisory group indicated support for only two of the proposed projects; Project 5 Vegetation Management, and Project 6 South Side Levee. Chapter 6 discusses the implementation strategy for planning, designing, constructing and phasing the recommended projects.

The Santa Margarita Ranch (the Ranch) property is critical to mitigation of the regional flooding problems and the development of a regional solution. Proposed projects rely on the acquisition of property or drainage easements from the owner of the Ranch, therefore their cooperation is imperative to the success of these projects.

The proposed projects and their priority for implementation are dependent upon the needs of the community and the desire to reduce damages and/or nuisance flooding problems caused by inadequate or non-existent drainage facilities. In addition to the proposed projects, a general summary of recommendations for improving flood protection and stormwater drainage is provided below.

- At a minimum, the community should begin the documentation and environmental permit process for conducting annual maintenance of Yerba Buena Creek. This project should be implemented regardless of the direction pursued for the other proposed projects.
- Begin discussions with the Ranch to explore regional solutions that benefit the community and the Ranch.
- Develop enforceable drainage standards.
- Form a maintenance district and establish maintenance responsibility for flood prone areas on private property.
- Modify Santa Margarita Residential Design Plan requirements to implement on-site retention of stormwater runoff. All new homes should be constructed with the street level floor 1-foot higher than the adjacent road grade elevation. All new driveways should slope towards the road.

3.2 Engineering Methodology

The purpose of the engineering analysis was to examine existing drainage conditions for Santa Margarita, identify problematic areas and issues, and also to prioritize and categorize the problems. This analysis also developed conceptual projects to mitigate 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 an identification of alternative and/or complementary projects to mitigate the drainage problems. The proposed projects are organized into two groups. The first group of projects mitigates flooding caused by insufficient channel capacity in Yerba Buena Creek. The second group of projects mitigates localized flooding due to inadequate or absent roadside ditches, culverts and storm drains.

The study team utilized existing topographic maps to delineate drainage zones and to identify storm water runoff flow paths. The known problem areas were assessed using a combination of resident accounts and field investigations.

3.3 Existing Drainage and Flooding Problems

Flooding problems in Santa Margarita are caused by a number of items and all contribute to a high occurrence of flooding:

- Existing culverts and bridges not designed to current County standards
- Insufficient creek conveyance capacity
- Heavily vegetated channels and ditches
- Lost and restricted floodplain area due to development
- Lack of flood protected homes
- Inadequate or non-existent local drainage facilities
- High peak runoff

Relocating all homes and businesses from the floodplain is an improbable and very costly option. Floodproofing all existing homes within the floodplain by raising their finish floor elevation is also an option that could be explored by individual home owners. Protecting homes against floods by managing peak runoff during high intensity storms and improving the local drainage system are the focus of the proposed projects in this report.

There are two categories of flooding problems in Santa Margarita: 1) major creek flooding and 2) localized street and property flooding. The major flooding problems in Santa Margarita are caused by a combination of inadequate culverts and bridges, and inadequate channel capacity in Yerba Buena Creek. When the creek's flow exceeds the capacity of the channel and bridge/culvert crossings, water overtops the banks and floods adjacent low topographic areas of Santa Margarita. Yerba Buena Creek traverses primarily through private property and, therefore, is not maintained by the County. Individual property owners are responsible for maintenance of the channel on their property. Residents are liable for problems caused by urban dumping in creeks on their property and any creek encroachment that causes flooding. Awareness of local creek issues should be raised to encourage better habits and creek management by the property owners.

During very large storm events (e.g. 100-year[5] storm), flooding of up to one foot could occur in the lower lying areas between Estrada Avenue and Margarita Avenue south of Highway 58, and between Pinal Avenue and the creek north of Highway 58. Figure 1 of engineering technical memorandum in Appendix E shows the boundaries of the 100-year and 500-year floodplain. The creek can not contain the 100-year flood because the capacity of the Yerba Buena Creek between Highway 58 and I Street is less than the peak discharge of a 10-year

[5] Also called a 1% flood, a storm event which has a one-percent chance of occurring during any given year

flood. The capacity of the creek increases upstream of I Street, but never becomes greater than the peak discharge of between a 25- and 50-year flood.

The second category of flooding, localized street and nuisance flooding, is caused by the lack of existing drainage infrastructure and lack of sufficient capacity in the local drainage ditches, driveway culverts, and storm drains. These facilities are often under maintained and filled with sediment or other debris. These factors prevent the local drainage system from adequately conveying urban runoff to Yerba Buena and Santa Margarita Creeks. The lack of gutters and underground storm drains, undersized and under maintained drainage facilities, and location of homes below the street grade has resulted in localized poor drainage and/or flooding around some residences, buildings, and roadways.

Local areas experiencing recurring flooding problems include:

- West end of H Street, approximately 200 feet south of the box culvert crossing at the railroad. Two homes report of recurring flooding and property damage. This area was the historical drainage course of the west branch of Yerba Buena Creek.
- Corner of Wilhelmina Avenue and I Street. Four homes report of flooding and property damage. Based on the topography, this area receives runoff from the upslope area to the south.
- Corner of K Street and Maria Avenue. Two homes report of repeated flooding and damage. Runoff that breaks out of Yerba Buena Creek flows overland towards Santa Margarita and reaches homes along K Street.

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 Santa Margarita

3.3.1 Regional Hydrology

Santa Margarita is bordered to the west by the Santa Lucia Mountains and to the southeast by La Panza Range. Runoff from these mountains flows north through the level floodplain area on which the community is situated. The surface hydrology in Santa Margarita is dominated by Yerba Buena and Santa Margarita creeks.

Yerba Buena Creek, a tributary to Santa Margarita Creek, drains approximately 5.3 square miles. Yerba Buena Creek originates in shallow foothills located approximately 2.5 miles southeast of the community, meanders through the low-lying plain known as Miller Flat, and joins Santa Margarita Creek 3 miles north of the community. Flooding along Yerba Buena Creek has had adverse effects on the community. Generally, the flooding is the result of insufficient capacity within the channel, culverts and bridges.

Santa Margarita Creek is formed roughly 2.75 miles southwest of Santa Margarita in Los Padres National Forest. The creek winds in a generally northerly direction until its confluence with the Salinas River, about 3.75 miles north of the community. Major tributaries to Santa Margarita Creek include Yerba Buena, Tassajara, and Trout creeks. At its confluence with the Salinas River, Santa Margarita Creek drains an area of 37.4 square miles.

3.3.2 FEMA Flood Hazard Zones

The Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Map (FIRM) indicates that a significant portion of Santa Margarita lies within the 100-year flood zones of Yerba Buena and Santa Margarita creeks. The FEMA flood zones for the community are illustrated in Figure 1 of Appendix E.

The County has adopted standards to protect against flood damage to homes located within the 100-year floodplain. The flood damage protection standards are included in the County's Land Use Ordinance (22.07.060 et seq). The general criteria applicable to residential development are:

- Structures shall not be built in the "floodway." The floodway is defined as the portion of the floodplain necessary to convey the 100-year flood if the channel is improved to County criteria.
- Finish floor elevations of residences shall be (at least) one foot over the level of the 100-year flood elevation.

Many homes located within the 100-year floodplain were built prior to adoption of this ordinance. These homes are most susceptible to flooding because they were typically built at grade and are often located below the adjoining street grade.

3.3.3 Topography

Santa Margarita is relatively flat and generally slopes from the south-west to the north-east. There is a change in elevation of about 20 feet from the south to north of town. The lowest elevation in the community is near the intersection of Pinal Avenue and F Street. There are a few higher elevation points near J Street and Maria Avenue, Yerba Buena Avenue and I Street, and Wilhelmina Avenue and I Street. Two culverts under the railroad and Yerba Buena Creek are the only drainage courses that convey flow from the south of town to the north. Storm drains and roadside drainage ditches convey runoff to Yerba Buena Creek for the portion of town located north of the railroad.

3.3.4 No Drainage Provisions During Early Development

When Santa Margarita's lots were first auctioned in 1889 and the town was formed, development did not include storm water conveyance or flood control infrastructure. There was no regulatory requirement to provide drainage improvements, since the development was pre-subdivision Map Act requirements. Also, Santa Margarita's proximity to existing creeks likely rendered a perception that a formal drainage system was unnecessary because the natural physical characteristics of the community were sufficient for conveying storm runoff away from town.

During this early period, 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, and also a decrease in pervious surfaces available to absorb the urban runoff. Development also resulted in the construction of bridge and culvert crossings over Yerba Buena Creek that are now the cause of flow constriction in the channel.

3.3.5 Existing Drainage Facilities

3.3.5.1 Local Drainage Facilities (Minor Waterways[6])

The majority of drainage facilities consist of roadside ditches or drainage swales, with inconsistent placement of culverts at street intersections and driveways. There are a few large culverts and storm drain pipelines under the railroad, El Camino Real, I Street, and Estrada Avenue. The existing storm drain facilities are shown in Figure

[6] County Waterway Definitions/Criteria – Minor Waterways have a drainage area of less than one square mile and shall be designed for an average recurrence interval of 10 years with freeboard.

2 of Appendix A. These were identified and mapped during the field reconnaissance. It is possible that some private storm drains were not located; therefore, the structures identified in the figure are not intended to be a comprehensive inventory of all facilities.

With the exception of a few storm drains, culverts, and drainage ditches, there appears to be little continuity or synergism between the dispersed drainage facilities in Santa Margarita. As runoff gathers, concentrates and discharges from one facility (say a storm drain), if no facility is constructed downstream to capture this flow, then roads and homes in the runoff's path could be damaged during large storms.

3.3.5.2 Yerba Buena Creek and Crossings (Major and Secondary Waterways[7])

The major flooding problems in Santa Margarita are caused by flood flows overtopping the banks of Yerba Buena Creek. Flood waters from Yerba Buena Creek cause much of the town to flood. Between I Street and Highway 58, the capacity of the channels and culverts is less than the peak discharge of a 10-year flood. Near I Street, the channel capacity increases to that of a 10-year flood. Upstream of Encina Avenue, the capacity of the channel increases to a capacity sufficient to carry more than the 25-year storm. Since the limiting factors are the culverts downstream of I Street, the creek drainage system in Santa Margarita lacks the capacity to pass a 10-year storm. **According to current County standard, Yerba Buena Creek qualifies as a major waterway and should have sufficient capacity to convey a 100-year flood event with freeboard**.

The drainage facilities on Yerba Buena Creek that are inadequate to handle the 10-year flood include:

- I Street bridge
- H Street culvert
- Union Pacific Railroad main line trestle (see Photograph 1 of Appendix B)
- Trestle under the spur track
- Highway 58 culvert (see Photograph 2 of Appendix B

If the channels and culverts were designed per the current County standard for Major and Secondary waterways, then the threat and frequency of flooding from large storms would be reduced because the facilities would have sufficient capacity to convey the peak storms. Based on current County standards and the drainage area for the respective creek crossings, Table 3-1 summarizes the design standard for the culvert crossings on Yerba Buena Creek. All but the Encina Avenue culvert should be designed to convey the 100-year flow. As discussed above, the capacity for these culverts can barely pass the 10-year flood event.

Table 3-1: County Design Standards for Major and Secondary Creek Crossings

CROSSING	DIMENSIONS [1]	DRAINAGE AREA (mi^2)	WATERWAY TYPE	DESIGN STANDARD
Encina Culvert	Box culvert; h=6', w=30'	Greater than 1, less than 4	Secondary	25-year
I Street Bridge	Box culvert (3 barrels); h=5.5', w=6'	Greater than 4	Major	100-year
H Street Culvert	Bridge; h=7', w=30'	Greater than 4	Major	100-year
Railroad Bridge	Box culvert (3 barrels); h=5', w=8'	Greater than 4	Major	100-year
Highway 58 Bridge	Box culvert (2 barrels); h=6', w=12'	Greater than 4	Major	100-year

Notes:
1. h=height and w=width

[7] Major Waterways have a drainage area of over four square miles and shall be designed for an average recurrence interval of 100-years, with freeboard. Secondary Waterways have a drainage area of between one and four square miles and shall be designed for an average recurrence interval of 25 years with freeboard.

It should be emphasized that the railroad and Highway 58 culvert crossings are not under the control of the County. UPRR owns the railroad culvert and Highway 58 is under Caltrans jurisdiction. Unless the capacity of these culverts is increased, this bottleneck will continue to result in regional flooding, consistent with that shown on the FEMA floodplain map in Appendix E.

Table 3-2 summarizes the approximate existing flow capacity of Yerba Buena Creek at various crossings in the channel and also breaks down the estimated peak discharge flow rate at different return frequencies. As shown in the table, the existing capacity of facilities between I Street and Highway 58 is less than a 10-year flood. According to current County standards, Yerba Buena Creek is considered a major waterway (has a drainage area of over four square miles) and the bridges/culverts should have the capacity to convey a 100-year flood.

Table 3-2: Yerba Buena Creek Capacity vs. Peak Discharge in cubic feet per second (cfs) at Selected Crossings [8]

LOCATION	CAPACITY	100-YEAR	50-YEAR	10-YEAR	2-YEAR
Miller Flat Channel	2,000	2,310	2,060	1,050	340
Encina Culvert	1,700	2,570	2,290	1,180	390
I Street Bridge	700	2,990	2,660	1,400	480
H Street Culvert	700	2,990	2,660	1,400	480
Railroad Bridge	700	2,990	2,660	1,400	480
Highway 58 Bridge	700	2,990	2,660	1,400	480

Other creek related flooding occurs south of Santa Margarita where storm water runoff overtops the creek's bank and sheet flows towards town and floods homes located along K Street. Residents report of backyards and property damage occurring during large storms. Also, the potential for flooding of septic tanks and leach lines raises health concerns.

3.3.5.3 Waiver of County Standard for Yerba Buena Creek

By definition of the current County standard, Yerba Buena Creek is a major waterway and should have sufficient capacity to convey a 100-year flood without overtopping the creek's banks. However, upstream of Highway 58, the creek generally only has sufficient capacity to convey the 10-year flood event, or less. The following sections will show that very costly improvements are necessary to reduce the peak flood to a 25-year storm event. Project 4, the costliest of the proposed projects, would increase the level of protection to a 100-year event, but it also requires significant land acquisition from adjacent properties.

The current County standard for Yerba Buena Creek may not be realistic or applicable considering the land constraints, cost to replace and upgrade existing culverts/bridges, and the natural floodplain patterns of the watershed. Projects that are implemented to reduce the frequency of flooding should have the goal of maximizing the level of flood protection within the community. Assigning quantitative goals to the project, like provide 100-year level of protection or meet current County standards, may not be achievable or realistic when considering the constraints. If the goal for the proposed projects was to provide 100-year level of flood protection, then the community should be willing to fund a very costly project, relocate residences or acquire large amounts of property from private owners, and endure a complex and lengthy permit process.

For this reason, the proposed alternatives for the regional solution investigated various options for maximizing the level of protection in the community. One alternative (Project 4) analyzed the requirements to build and fund a project that provides 100-year level of protection.

[8] Flood Control and Drainage Investigation of the Santa Margarita Ranch and Surrounding Area, Schaaf and Wheeler, 1987

3.3.6 Homes Below Road Grade

Homes that are down-slope of a road and whose driveways slope down away from the road experience flooding because runoff will typically flow through driveways and into garages. Homes subject to concentrated flow often take measures to manage storm runoff from their roof gutters, install drains in the driveway to divert flow, and install rock lined ditches to direct runoff to street right of way. Some people also use sandbags to redirect water around their home.

In summary, a combination of the area's relatively flat topography, lack of adequate drainage facilities, insufficient conveyance capacity in Yerba Buena Creek, and location of some homes at or below the street grade has resulted in moderate to severe flooding, and also localized poor drainage. The lack of a consistent, organized network of drainage facilities within the community causes storm runoff to pond at "choke" points (e.g. undersized culvert).

3.4 Engineering Analysis Overview

3.4.1 Local Drainage Patterns

For this study, drainage in Santa Margarita was divided into seven drainage zones (1 through 7) as shown in Figure 3 of Appendix A.

Table 3-3: Summary of Existing Infrastructure and Drainage Pattern by Zone

ZONE	INFRASTRUCTURE
1	Runoff in Zone 1 originates south of Santa Margarita, in the foothills of the Santa Lucia Mountain Range. This drainage channel is referred to as the West Branch of Yerba Buena Creek. Historically, instead of being channeled to the open field north of I Street, the drainage course flowed diagonally to the existing culvert under the railroad tracks, as shown in Figure 2 of Appendix A. The runoff now concentrates in a wide grassy swale that discharges to a 42-inch corrugated metal pipe (CMP) beneath I Street. A large depression on the north side of I Street causes runoff to pool, sometimes resulting in localized flooding problems during large storm events. Runoff continues in a generally northeast direction along the railroad tracks, to a concrete box culvert beneath the tracks at Yerba Buena Avenue. Runoff from Zone 1 is discharged into Zone 2 on the north side of the railroad tracks.
2	A box culvert conveys flow from Zone 1 beneath the railroad tracks. The culvert runs parallel to El Camino Real (Highway 58) between Yerba Buena Avenue and Murphy Avenue, and conveys runoff east to a grassy swale on the north side of Highway 58, at the junction of Murphy Avenue and Highway 58. Runoff continues in a generally northeast direction to the intermittent stream at Margarita Avenue and F Street. The intermittent stream flows northeast and joins with Yerba Buena Creek approximately 2,000 feet downstream.
3	Runoff in Zone 3 originates near Miller Flat and is carried in a generally northern direction through the central portion of the community within a series of roadside drainage ditches. Ultimately, runoff in Zone 3 is conveyed either to Yerba Buena Creek or to the culvert beneath the railroad tracks at Encina Street, where it flows into Zone 4.
4	Zone 4 conveys discharge from Zone 3, as well as runoff generated along Highway 58. An existing storm drain that runs parallel to Highway 58, starting at Encina Avenue, conveys runoff east and discharges to Yerba Buena Creek upstream of the highway box culvert.
5	Zone 5 is comprised of runoff from north of Highway 58 and east of Margarita Avenue. Runoff in this zone is typically carried within a series of roadside ditches to Yerba Buena Creek at F Street. F Street, near Yerba Buena Creek, represents the topographic low point in Santa Margarita.
6	Zone 6 carries flows east of Encina Avenue and south of the railroad tracks in an eastern direction to Yerba Buena Creek. Runoff is conveyed in existing roadside drainage ditches in H Street and discharges to Yerba Buena Creek.
7	Zone 7 is located at the eastern edge of the community. Steep gradients in Zone 7 allow runoff to flow west to several points of discharge along Yerba Buena Creek. There are few reported drainage problems within Zone 7.

3.4.2 PROBLEM IDENTIFICATION

3.4.2.1 Yerba Buena Creek

Yerba Buena Creek drains approximately 5.2 square miles at its confluence with Santa Margarita Creek, just upstream of the Garden Farms area. The area drained immediately north of Santa Margarita is approximately 4.9 square miles. The FEMA floodplain map shows that a major portion of the community is within the 100-year floodplain and could be inundated during a 100-year flood. The creek's channel and the numerous bridge/culvert crossings all have inadequate capacity to convey the 100-year flood. The channel capacity downstream of I Street is approximately 700 cubic feet per second (cfs) and the 100-year flood flow is approximately 2,990 cfs. Between I Street and Highway 58, the capacity of the channels and culverts is less than the peak discharge of a 10-year flood.

In addition to insufficient capacity of the channel and bridge crossings, potential for flooding is intensified by willow and brush growth which has nearly clogged some of the crossings. Regular maintenance is needed to maximize the capacity of the channel. If uncontrolled vegetal growth continues, then the community can expect more frequent flooding during moderate storm events. Photograph 3 in Appendix B shows an example of excessive vegetal growth in Yerba Buena Creek.

Yerba Buena Creek constitutes the major flood problem in Santa Margarita. The channel, bridge and culvert capacities are such that flooding, to some degree, can be expected at frequent storm events which are considered fairly common.

Previously Proposed Projects

In 1966, an investigation by the District and the Upper Salinas Soil Conservation District investigated potential flood protection projects on Yerba Buena Creek. The projects analyzed included a flood control dam in the upper watershed (on Santa Margarita Ranch), storm drains, diversion channels, channel modification, and land treatment. The flood control dam option was abandoned because the benefit to cost ratio was less than one and was therefore deemed economically unjustifiable on the basis of its flood control merits. The channel modification, in 1966, was calculated to be more economical (channel modification assumed no bridge replacement). The report recommended the formation of a flood control district zone, a county service area, or a community services district in order to have the powers necessary to finance, construct, as well as operate and maintain the proposed project. The report also outlined several available methods for financing the construction of the proposed project. The proposed channel modifications were not pursued because of funding issues.

Recently, a proposal to install a detention basin in the upper watershed just south of the community was investigated. This proposed facility was originally conceptualized as a dam constructed across Yerba Buena Creek to intercept and divert creek overflow to a basin. Due to lack of funding, Santa Margarita Ranch private property ownerships and planned development complexities, known endangered species and related permit requirements, this concept was abandoned.

Other solutions to the problem, such as channel vegetation management and bridge replacement have been put forth. Vegetative management can reduce channel roughness and increase conveyance capacity. However, the gains in channel hydraulic capacity are overshadowed by the constraints of the bridge crossings. Further, Yerba Buena Creek has significant riparian habitat. Any vegetative management plan would have to undergo a lengthy environmental review process and be permitted by State and Federal regulatory agencies. The problem of flooding from Yerba Buena Creek has been analyzed numerous times, however, proposed projects have never been implemented.

3.4.2.2 Local Drainage and Flooding Problems

As shown in Figure 2 of Appendix A, a majority of the community lacks a consistent, organized network of roadside drainage ditches, culverts and storm drains. The existing roadside ditches and driveway culverts are inadequate to convey flow and are not regularly maintained. It appears that there were no standard design criteria for sizing the drainage ditches and culverts that were installed. Photograph 5 in Appendix B shows an example of a street with a consistent network of roadside drainage ditches and driveway culverts.

The commercial area on El Camino Real, between Yerba Buena Avenue and Pinal Avenue, has a fairly consistent curb and gutter system that conveys flow to drop inlets at Murphy Avenue and Encina Avenue. From the drop inlets, flow is routed through storm drains, drainage ditches and culverts prior to discharge to Yerba Buena Creek.

The residential area is less developed in terms of drainage facilities. The community street drainage infrastructure is sized only to handle small recurrent runoff events. During severe downpours or significant runoff from upslope watersheds, the roadside ditches are overwhelmed and shallow flooding occurs. The worst flooding occurs along the south side community, located in Zone 3. Runoff from a small watershed of approximately 30 acres south of K Street combines with small overflows from Yerba Buena Creek and causes a significant amount of overland flow to enter properties along K and J Streets. This runoff overwhelms the existing drainage infrastructure and causes flooding of low-lying areas. The flooding inundates several garages and some homes. Along with the significant flooding in the southern portions of the community, areas of small localized flooding occur throughout the community.

3.4.3 Maintenance of Drainage Facilities

Survey respondents reported that many of the drainage ditches 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.

3.4.4 Curbs 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.

The **Santa Margarita Design Plan** document encourages and includes a conceptual plan for curb and gutter along Highway 58, along with other pedestrian-oriented improvements such as pathways and street trees. The **Santa Margarita Enhancement Plan** developed preliminary designs for curbs and gutters between Wilhelmina Avenue and Estrada Avenue on Highway 58. The enhancement plan identifies locations where "major existing drainage facilities conflict with proposed curb, gutter, sidewalk, asphalt pavement, surface utilities, building structures, etc."

Curbs and gutters currently exist in certain reaches of the commercial area along Highway 58. However, drainage throughout the rest of the community consists of roadsides ditches. Santa Margarita has shown an interest in retaining its rural character, and waivers of curb and gutter have been granted for multi-family projects. **The character and level of development of the rural residential community is such that the retrofitted installation of a community supported integrated system of curbs and gutters is extremely unlikely.**

3.4.5 Land Use Changes

The forecast increase in urbanization that will occur under buildout scenarios will result in a modest increase in population and in the number of dwelling units. Forecast development will also change the hydrologic character of Santa Margarita. These changes will result in the increase of impervious surfaces and limit the soils ability to absorb rainfall, thereby increasing the amount of surface runoff. However, because Santa Margarita is largely developed, stormwater runoff is not expected to substantially increase.

Most home owners collect and convey storm runoff from their property to the street right of way. If the street does not have underground drainage facilities or roadside drainage swales, then the runoff will tend to flow down slope and collect in road sags or properties sitting below the road grade. If drainage provisions are not constructed along with new development, then the current storm runoff path may be altered, potentially damaging areas not currently flooding.

3.5 Proposed Capital Improvement Projects

The proposed projects discussed in this section are intended for planning level purposes only. Detailed calculation of pipeline diameters 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 invest the resources to perform the detailed engineering.

3.5.1 Yerba Buena Creek Improvements

The major flooding problem is associated with the lack of capacity in Yerba Buena Creek. Typical solutions include modification to the channel to increase capacity, storage of flood water in the upper watershed to reduce the peak discharge into the community, or diversion of the floodwater to bypass the community. To address flooding caused by overtopping of the creek's banks, four alternative projects were investigated as possible solutions to the problems. The four projects include:

- Western Bypass with an Off-Channel Detention Basin
- Two Off-Channel Detention Basins in Parallel

- Single Off-Channel Detention Basin
- Channel Improvements

As stated in Section 3.3.5.3, the current County standard for Yerba Buena Creek may not be realistic. The following projects had the goal of maximizing the level of flood protection within the community, not necessarily providing 100-year level of protection. Meeting current County standards may not be achievable or realistic when considering the constraints discussed below.

3.5.1.1 Off-Channel Detention Basins

The goal behind detention basins is to store the peak flood flow and prevent downstream flooding, and to release the water back into the channel at a lower metered rate. In order to reduce flows in the creek to the capacity of the existing culverts and bridges that cross Yerba Buena Creek, large amounts of runoff must be diverted from the channel and stored in a basin. Three of the four proposed projects involve the construction of off-channel impoundments to temporarily detain storm water to reduce peak discharges.

To reduce the peak discharge from a creek, a diversion structure or lateral weir is constructed along a creek's bank. When flow in a creek is at flood stage, water begins to overtop the lateral weir and flow into a diversion channel that routes the runoff to the detention basin. The basin(s) store the water for a certain time and release the runoff back into the creek after the peak flows have passed.

Off-channel basins have numerous benefits and a lesser degree of environmental impacts than on-channel basins or dams. The diversion structure or lateral weir is designed to function so that no flow would be diverted from the channel until a minimum of 2-year flow recurrence is exceeded. From a geomorphic perspective, the 2-year flows are very important to a creek's physical processes. They represent bank full flow conditions and are responsible for 80 to 90 percent of the sediment transport of the system. The diversion structure is typically designed to reduce the geomorphic impacts by maintaining a creek's sediment transport character while reducing high flood flows. Thus geomorphic impacts such as channel incision and increased erosion are avoided. Also less sediment builds up in the basin, thus reducing overall maintenance costs during the life of the structure. The off channel basins are also favorable from a fish passage standpoint, since the basins only function during high flow events.

The criteria for sizing the detention basin(s) for the proposed projects were to reduce the peak flow as much as feasibly possible considering land availability constraints and limitations of the diversion facility. The goal was also to keep the proposed detention basin out of the State's Division of Safety of Dams jurisdiction. Diverting sufficient water to reduce the 100-year peak flow to the minimum culvert capacity in Yerba Buena Creek (700 cfs) was deemed unlikely due to the detention basin capacity requirements, land constraints, and diversion facility length requirements.

3.5.1.2 Division Safety of Dams Jurisdiction

One consideration with the installation of a detention basin is the increase in regulatory requirements if the basin falls within the jurisdiction of the California Department of Water Resources, Division of Safety of Dams (DSOD). Dams under jurisdiction are artificial barriers, together with appurtenant works, which are 25 feet or more in height or have an impounding capacity of 50 acre-feet or more. Any artificial barrier not in excess of 6 feet in height, regardless of storage capacity, or that has a storage capacity not in excess of 15 acre-feet, regardless of height, is not considered jurisdictional[9]. Jurisdictional dams have to be monitored closely and are substantially more costly to construct, maintain and operate.

[9] Division of Safety of Dams Website, http://damsafety.water.ca.gov/about.htm

3.5.1.3 Proposed Projects and Improvements to Creek Crossings

The proposed regional detention basins in the upper watershed south of town could decrease the peak discharge in Yerba Buena Creek. A comprehensive project that stores peak runoff in the upper watershed, conducts regular maintenance on the channel to remove vegetation and sediment, and improves the conveyance capacity of the local drainage ditches could increase flood protection to a 25-year flood level, up from its current level of less than a 10-year flood event.

The recommended storm water management approach is to develop enough storage to substantially reduce peak discharges in the creek, but keep any proposed detention basins below jurisdictional size. Also, any flood control facility must have as minimal an impact on the environment and not significantly alter the balance of sediment transport in the creek.

The proposed projects and alignments presented in this report for mitigation of drainage and flooding issues in Santa Margarita 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.

3.5.1.4 Project 1: Western Bypass with an Off-Channel Detention Basin

The goal of this project is to reduce flows in Yerba Buena Creek such that the existing channel and bridges flood less frequently, resulting in a greater level of flood protection in the community. The proposed project is to divert peak flows from Yerba Buena Creek during flood stage into the diversion channel, and route the runoff to a 48 acre-foot off-channel detention basin. The basin would encompass a plan footprint of approximately 10 acres. The detention basin would be located on Santa Margarita Ranch. Figure 4 of Appendix A shows a graphical presentation of this alternative.

Stored water that does not percolate into the ground would be discharged from the detention basin at a lower rate. An existing channel that conveys flow for the western branch of Yerba Buena Creek would be used as the discharge channel. The channel would convey flow through the western side of the community and discharge to Santa Margarita Creek. To convey flow from the detention basin to the railroad, the existing channel may need to be improved (shown as the Western Bypass Diversion channel in Figure 4 of Appendix A). The size (cross sectional area) of the channel depends on the flow rate discharged from the detention basin. For the purposes of estimating costs, it was assumed that the discharge rate was 500 cfs and that channel excavation and berm construction would be necessary to construct the diversion channel. The bypass channel would be approximately 15 feet wide and the depth would be approximately 7 feet. To convey flow from the railroad to Santa Margarita Creek, two 60-inch storm drains would be constructed from the railroad, across Highway 58 and run in Maria Avenue until reaching the creek. Bore and jack construction would be used to install the two pipelines underneath the railroad and the highway, as not to disrupt freight and vehicle traffic.

Optional Alignment
An alternative to conveying flow in an open channel between I Street and the railroad, is to route the flow within two 60-inch storm drains in Maria Avenue. As shown in Figure 2 of Appendix A, the storm drain crosses Highway 58 at the same point as the proposed alignment. The benefit to this alignment is that an open channel is susceptible to erosion and vegetal growth, both of which tend to change the channel carrying capacity. Conveying flow in a storm drain reduces erosion and conveys flow more efficiently. The primary drawback is that this option costs approximately $826,000 more than the proposed Western Bypass due to the additional storm drain installation costs.

Reduction in Peak Flow

A hydrologic watershed model was used to estimate the discharge in Yerba Buena Creek at the point of diversion and to evaluate the effects on the peak flow rate reaching Santa Margarita. As the creek crests towards 100-year flood flow, an increasing amount of flow is diverted into the diversion channel by way of the lateral

weir. The model calculated that up to 1,300 cfs of the 100-year flow (2,300 cfs) could be diverted into the detention basin, which would then release flow at a maximum rate of 500 cfs into the proposed bypass channel. The model forecasts that this project could reduce peak flow in Yerba Buena Creek and increase the level of protection in the community.

Table 3-4 breaks down the peak discharges in Yerba Buena Creek at Encina Avenue for existing conditions and with Project 1 in place. If Project 1 was implemented, then the Encina Avenue culvert would have sufficient capacity to convey the 100-year flood. Even though the 100-year flow could be reduced by about 45 percent, the channel and existing culvert capacity is limited from I Street to Highway 58. Flood flows in the creek greater than 700 cfs would continue to overtop the channel and cause flooding in the community.

This analysis provides a preliminary study level estimate in flow reduction. Further design work could improve the effectiveness of the basin and reduce peak flows further. At a minimum, the project will increase flood protection in the community to the 10-year level. This level of protection reduces damage caused by the more frequent, less severe recurrent storms. Overbank flooding will still occur during the 100-year storm but the duration and severity of the flooding will be reduced.

Table 3-4: Comparison of Peak Discharges at Encina Ave. for Existing Conditions and with Project 1 in Place [1]

RECURRENCE INTERVAL	EXISTING CONDITIONS (cfs)	PROJECT 1 (cfs)
2-year	233	233
10-year	916	675
25-year	1522	1022
50-year	2117	1264
100-year	2570	1423

Notes:

1. Capacity of Encina Avenue culvert is 1,700 cfs. The capacity of the I Street culvert is approximately 700 cfs. Capacity referenced from Table D-1 of the Environmental Constraints Analysis prepared by Envicom Corporation for Santa Margarita Ranch, March 1994.

Benefits and Constrains

This alternative upgrades the conventional concept of a standard by-pass channel by employing the utility of an off-channel detention basin so that the diversion channel and/or diversion pipeline can be significantly reduced in size and cost. The constraint of this project is routing flow through the western side of the community to Santa Margarita Creek. When this concept was previously proposed 35 years ago, minimal residential development existed within the by-pass alignment. However, this area now has numerous homes within the flow path. The by-pass alignment crosses through these private properties as well as under the existing railroad right-of-way. There may be some opportunity to utilize an open channel system but long reaches of pipeline will be required to convey runoff through the community. The complexity in the alignment results in increased cost to construct the project and purchase drainage easements.

The proposed detention basin, diversion channel and lateral weir will also have to be constructed within an existing jurisdictional wetland area, complicating the environmental compliance and permitting process. It is likely that the project will be required to mitigate for the impacts of constructing within the channel and creek embankment, further increasing costs. The proposed detention basin is considered non jurisdictional size by DSOD because it is less than 50 acre-feet in capacity and has a dam height less than 25 feet.

Cumulative impacts, such as induced flooding on Santa Margarita Creek, should be analyzed during the design phase and mitigated if necessary. Since peak discharge from Yerba Buena Creek is being stored and released at a lower rate, the diversion structure should not impact the community of Garden Farms, and the cumulative impacts analysis will verify this assumption. The benefits gained in reduced flood damage in the community

may not exceed the cost of the project. Based on the cost, potential environmental impacts, and difficulty in securing drainage easements on private and railroad property, this project should not be considered for implementation.

Project Cost Estimate

The cost estimate for Project 1 is broken down by item in Table 3-4. The total cost for this project is approximately $2.6 million. If the optional storm drain alignment is selected over the proposed alignment, then the cost increases to approximately $3.5 million. **The reader should note that the construction costs do not include the cost of land or easements from the Santa Margarita Ranch**.

Table 3-5: Project 1 Western By-Pass with Off-Channel Detention Basin

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
1	Diversion Structure	1	each	$75,000	$75,000
2	Bypass Cut	4,750	CY	$7	$33,000
3	Impoundment Berm and Levee Fill	9,000	CY	$7	$63,000
4	Detention Basin Inflow Structure	1	each	$45,000	$45,000
5	Detention Basin Outflow Structure	1	each	$45,000	$45,000
6	Erosion Control	15	acres	$1,200	$18,000
7	Overflow Spillway	1	each	$20,000	$20,000
8	Channel Improvements: Outflow to Railroad	2,800	LF	$125	$350,000
9	Hydroseeding	50	acres	$1,000	$50,000
10	78-inch Culvert Replacement: I Street	40	LF	$450	$18,000
11	(2) 60-inch Storm Drains: Railroad to Outfall	1,400	LF	$380	$532,000
12	Bore and Jack at Railroad Crossing	1	each	$40,000	$40,000
13	Railroad Drainage Easement	1,000	SF	$10	$10,000
14	Bore and Jack at Highway 58 Crossing	1	each	$40,000	$40,000
15	Outfall: Santa Margarita Creek	2	each	$15,000	$30,000
16	Wetland/Environmental Mitigation	1	each	$100,000	$100,000
				Subtotal	**$1,469,000**
	Engineering and Design [2]			20 percent of subtotal	$294,000
	Administrative and Environmental [2]			40 percent of subtotal	$588,000
	Contingency [2]			20 percent of subtotal	$294,000
				Total [3]	**$2,645,000**

OPTIONAL ALIGNMENT					
	Subtotal for Items 1-16 from above				**1,469,000**
1	(2) 60-inch Storm Drains: I Street to Outfall	2,800	LF	$380	$1,064,000
2	Drainage Easement thru Private Property	16,500	SF	$5	$83,000
3	Less Channel Improvements: I Street to Railroad	1,100	LF	$125	($138,000)
4	Less (2) 48-inch Storm Drains: Railroad to Outfall	1,400	LF	$380	($532,000)
5	Less 78-inch Culvert Replacement: I Street	40	LF	$450	($18,000)
					$459,000
				Subtotal	**$1,928,000**
	Engineering and Design [2]			20 percent of subtotal	$386,000
	Administrative and Environmental [2]			40 percent of subtotal	$771,000
	Contingency [2]			20 percent of subtotal	$386,000
				Total [3]	**$3,471,000**

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, 40% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 80% cumulative markup on construction costs. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).
3. Does not include Santa Margarita Ranch land acquisition costs (Typical for Projects 1 through 3)

3.5.1.5 Project 2: Single Off-Channel Detention Basin

This project is similar to Project 1 in that it proposes the use of an off-channel detention basin located on Santa Margarita Ranch, as shown on Figure 5 of Appendix A. However, instead of a western bypass to convey flow to Santa Margarita Creek, this project would store water in the detention basin as the peak flood flows passed. Once the flood flows receded, the basin's outlet structure would begin releasing runoff into Yerba Buena Creek at a rate that would not exceed the creek's capacity. The required storage volume of the basin is approximately 110 acre-feet, so it falls within the jurisdictional size of DSOD. The proposed site would require excavation to lower the basin invert elevation and attain the needed storage capacity. Depending on the amount of excavation, the plan footprint of the basin ranges between 15 and 20 acres. Excess dirt would either need to be hauled away or disposed of at a nearby site. For this project, it is assumed that land is available to dispose the excavated material in the area shown on the figure. The cost of the project will depend on the soil disposal technique. If the soil has to be hauled away, the cost of the basin could be substantially more.

Reduction in Peak Flow

The hydrologic watershed model used to estimate the discharge in Yerba Buena Creek indicates that reductions in peak discharge were achievable. As with Project 1, as the creek crests towards 100-year flood flow, an increasing amount of flow is diverted into the diversion channel. The model calculated that up to 1,150 cfs of the 100-year flow could be diverted into the detention basin, which would then be stored until flood flows receded. The model forecasts that this project could reduce peak flow in Yerba Buena Creek and increase the level of protection in the community. Table 3-6 breaks down the peak discharges in Yerba Buena Creek at Encina Avenue for existing conditions and with Project 2 in place. If Project 2 was implemented, then the Encina Avenue culvert would have sufficient capacity to convey the 100-year flood. However, even though the 100-year flow could be reduced by about 45 percent, the channel capacity is limited by the culverts from I Street to Highway 58. Additionally, flood flows in the creek greater than 700 cfs could overtop the channel and cause flooding in the community.

Further design work could improve the effectiveness of the basin and reduce peak flows further. At a minimum, the project will increase flood protection in the community to the 10-year level. This level of protection reduces damage caused by the more frequent, less severe recurrent storms. Overbank flooding will still occur during the 100-year storm but the duration and severity of the flooding will be reduced.

Table 3-6: Comparison of 100-year Flood Flows at Encina Ave. for Existing Conditions and with Project 2 in Place

RECURRENCE INTERVAL	EXISTING CONDITIONS (cfs)	PROJECT 2 (cfs)
2-year	233	233
10-year	916	675
25-year	1522	1022
50-year	2117	1264
100-year	2570	1423

Benefits and Constraints

As with Project 1, the benefits to this project is that the level of flood protection for the community is improved. Project 2 avoids the western bypass and eliminates potential utility conflicts associated with the bypass channel and proposed pipeline alignments under the railroad and Highway 58. Impacts to private property on the south-western portion of the community would also be avoided. It also has the advantage of minimizing impacts to the creek banks by creating a single diversion structure (Project 3 proposes two diversion structures).

The proposed diversion channel and lateral weir will also have to be constructed within an existing jurisdictional wetland area, complicating the environmental compliance and permitting process. It is likely that the project

will be required to mitigate for the impacts of constructing within the creek embankment, further increasing costs. The proposed detention basin is considered jurisdictional size by DSOD because it is greater than 50 acre-feet in capacity. During construction of the State Water Project pipeline south of town, Native American artifacts were recovered during construction. This project would likely require mitigation during excavation to preserve artifacts recovered during construction. State Historic Preservation Office regulations are discussed in more detail in Chapter 4, Environmental Analysis.

The benefits gained in reduced flood damage in the community may not exceed the cost of the project. This project should be considered as a possible alternative for reducing peak flows in Yerba Buena Creek.

Project Cost Estimate

The cost estimate for Project 2 is broken down by item in Table 3-7. The total cost for this project is approximately $2.1 million. **The reader should note that the construction costs do not include the cost of land or easements from the Santa Margarita Ranch**.

Table 3-7: Project 2 Single Off-Channel Detention Basin

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
1	Diversion Structure	1	each	$75,000	$75,000
2	Bypass Cut (includes nearby disposal)	8,500	CY	$7	$60,000
3	Basin Excavation (includes neaby disposal)	61,500	CY	$7	$431,000
4	Impoundment Berm and Levee Fill	35,300	CY	$7	$247,000
5	Hydroseeding	110	acres	$1,000	$110,000
6	Detention Basin Inflow Structure	1	each	$45,000	$45,000
7	Detention Basin Outflow Structure	1	each	$45,000	$45,000
8	Overflow Spillway	1	each	$20,000	$20,000
9	Channel Improvements at Diversion and Inlet Point	2	each	$12,000	$24,000
10	Erosion Control	26	acres	$1,200	$31,000
11	Wetland/Environmental Mitigation	1	each	$100,000	$100,000
				Subtotal	**$1,188,000**
	Engineering and Design [2]		20 percent of subtotal		$238,000
	Administrative and Environmental [2]		40 percent of subtotal		$475,000
	Contingency [2]		20 percent of subtotal		$238,000
				Total [3]	**$2,139,000**

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, 40% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 80% cumulative markup on construction costs. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).
3. Does not include Santa Margarita Ranch land acquisition costs (Typical for Projects 1 through 3)

3.5.1.6 Project 3: Off-Channel Detention Basins in Parallel

Project 3 expands on the detention basin concept developed in Project 2. Project 2 would detain excess runoff in a series of two off-channel basins that would work in parallel, as shown in Figure 6 in Appendix A. The plan is to divert water out of Yerba Buena Creek, store it temporarily within one of two detention basins and release it slowly back into Yerba Buena Creek, reducing the peak flow in the creek that flows through town. As stated for Project 2, the criteria for sizing the detention basins were to reduce the flow as much as feasibly possible considering land availability constraints and limitations of the diversion facility.

This project uses two off-channel detention basins to provide enough storage and time delay to significantly reduce peak flows. These basins are referred to as the upper and lower basins in Figure 6 of Appendix A. The upper basin has an embankment height of 12 feet but has a storage capacity of 49 acre-feet. The lower basin stores approximately 70 acre-feet but has an embankment that is only 6 feet high. The total acreage required for both basins is approximately 25 acres. Increased storage volume for the lower basin is accomplished by excavation. The proposed lower detention basin is considered jurisdictional size because it is more than 50 acre-feet in capacity.

Flow would be routed to each basin through a series of lateral weirs and diversion channels. The diversion channels and basins would be designed to allow low recurrent flows such as the 2- and 5-year events to pass without water diversion. As flow increases in Yerba Buena Creek, the water surface elevation rises, spills over the lateral weir and into a diversion channel that conveys the runoff to the upper detention basin. Simultaneously, as the upper basin begins to fill, the creek's downstream water surface elevation rises and water begins to fill the lower detention basin in the same manner. An instream hydraulic grade control structure (e.g. v-notch weir) may be necessary to increase the upstream water surface elevation and encourage the creek flow to spill over the lateral weir into the diversion channel. The stored water would either percolate into the groundwater or be slowly released to Yerba Buena Creek after the peak flow has passed. The release rate would be less than the maximum capacity of the culvert crossings on Yerba Buena Creek.

This project presents great hydraulic complexity regarding size of the diversion facilities, capacity of the detention basins, timing of release into the creek following the peak flows and optimum location of the diversion/outlet facilities. The configuration of facilities shown provides a conceptual view into the operation of the system. If this project is implemented, the development of a physical model to analyze the hydraulics and operations of the system should be considered. A more detailed hydraulic analysis may indicate that the configuration of the diversion facility and outlet structures should be modified, or that the optimum configuration is a single diversion facility diverting flow to the upper detention basin, which would subsequently divert overflow to the lower detention basin (eliminating the need for a second diversion facility). These variations to the general concept of a two detention basin system should be explored during the design phase.

Reduction in Peak Flow

The hydrologic watershed model used to estimate the discharge in Yerba Buena Creek indicated that reductions in peak discharge were achievable. As with Project 2, as the creek crests towards 100-year flood flow, an increasing amount of flow is diverted into the diversion channel. The model calculated that a combined flow of 1,560 cfs of the 100-year flow could be diverted into both detention basins, which would then be stored until flood flows receded. The model predicts that this project could reduce peak flow in Yerba Buena Creek and increase the level of protection in the community. Table 3-8 breaks down the peak discharges in Yerba Buena Creek at Encina Avenue for existing conditions and with Project 3 in place. If Project 3 was implemented, then the Encina Avenue culvert would have sufficient capacity to pass the 100-year storm event. However, even though the 100-year flow could be reduced by about 60 percent, the channel capacity and culverts from I Street to Highway 58 can only convey approximately 700 cfs. This would result in approximately 300 cfs overflowing the channel and/or culverts.

For Projects 1 and 2, the model predicts that the level of flood protection in the community would increase to the 10-year level. Using two detention basins, Project 3 can increase the level of flood protection to the 25-year level. This level of protection reduces damage caused by the more frequent, less severe recurrent storms and the more damaging, less frequent storms. Overbank flooding will still occur during the 100-year storm but the duration and severity of the flooding will be reduced. Further design work could improve the effectiveness of the basin and reduce peak flows further.

Table 3-8: Comparison of 100-year Flood Flows at Encina Ave. for Existing Conditions and with Project 3 in Place

RECURRENCE INTERVAL	EXISTING CONDITIONS (cfs)	PROJECT 3 (cfs)
2-year	233	233
10-year	916	551
25-year	1522	729
50-year	2117	906
100-year	2570	1011

Benefits and Constraints

As with Project 1 and 2, the benefit to this project is that the level of flood protection for the community is improved. While the project fails to completely reduce 100-year peak flows to the capacities of the existing bridges within the community, it reduces the occurrence of the overbank flows in the community as well as reduces the extent and depth of flooding during large magnitude rainfall events. The project will provide 25-year flood protection for the community. Project 3 also avoids disruption to the western portion of the community.

This project poses greater impacts to the creek and jurisdictional wetland area than Project 2 because two sets of diversion and outflow structures are proposed. The proposed diversion channels and lateral weirs will have to be constructed within an existing jurisdictional wetland area, complicating the environmental compliance and permitting process. It is likely that the project will be required to mitigate for the impacts of constructing within the creek embankment, further increasing costs. The Lower Detention basin is considered jurisdictional size by DSOD because it is greater than 50 acre-feet in capacity. This project would likely require mitigation during excavation to preserve artifacts recovered during construction.

The benefits gained in reduced flood damage in the community may not exceed the cost of the project. This project should be considered as a possible alternative for reducing peak flows in Yerba Buena Creek.

Project Cost Estimate

The cost estimate for Project 3 is broken down by item in Table 3-9. The total cost for this project is approximately $2.0 million. **The reader should note that the construction costs do not include the cost of land or easements from the Santa Margarita Ranch**.

Table 3-9: Project 3 Off-Channel Detention Basin in Parallel

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
1	Diversion Structure	2	each	$75,000	$150,000
2	Bypass Cut	8,500	CY	$7	$60,000
3	Basin Excavation	30,000	CY	$4	$120,000
4	Impoundment Berm and Levee Fill	38,500	CY	$7	$270,000
5	Hydroseeding	120	acres	$1,000	$120,000
6	Detention Basin Inflow Structure	2	each	$45,000	$90,000
7	Detention Basin Outflow Structure	2	each	$45,000	$90,000
8	Overflow Spillway	2	each	$20,000	$40,000
9	Channel Improvements at each Diverion and Inlet Point	4	each	$12,000	$48,000
10	Erosion Control	26	acres	$1,200	$31,000
11	Wetland/Environmental Mitigation	1	each	$100,000	$100,000
				Subtotal	**$1,119,000**
	Engineering and Design [2]	20 percent of subtotal			$224,000
	Administrative and Environmental [2]	40 percent of subtotal			$448,000
	Contingency [2]	20 percent of subtotal			$224,000
				Total [3]	**$2,015,000**

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, 40% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 80% cumulative markup on construction costs. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).
3. Does not include Santa Margarita Ranch land acquisition costs (Typical for Projects 1 through 3)

3.5.1.7 Comparison of Costs versus Peak Flood Reduction

The first three proposed projects include the use of detention basins to reduce the peak flow in Yerba Buena Creek. Each project achieves a varying level of peak flow reduction; presents variation in technical and implementation complexity; and varies in costs. As summarized in Table 3-10, Project 3 achieves the greatest reduction in peak flow, achieves the highest level of flood protection and has the lowest project costs. Of the three projects using detention basins, Project 3 should be carried forward for further consideration.

Table 3-10: Comparison of Peak Flow at Encina Ave for with/without Project, and Cost for Projects 1 through 3

PROJECT	10-YEAR (cfs)	25-YEAR (cfs)	100-YEAR (cfs)	COST ($)
Existing Conditions	916	1522	2570	-
1	675	1022	1423	2.6
2	675	1022	1423	2.1
3	**551**	**729**	**1011**	**2.0**

3.5.1.8 Project 4: Yerba Buena Creek Channel Widening and Bridge Replacement

The capacity of Yerba Buena Creek can be increased by replacing constricting bridges and widening the cross sectional area available to convey flow. The reach recommended for improvement extends from the southern boundary of town to beyond the railroad tracks. Within this reach of Yerba Buena Creek, the channel cross section varies. The downstream reach near the railroad crossing has a bottom channel width of approximately 25 feet, with 1:1 side slopes. Between H Street and Encina Avenue (creek flows between homes), the bottom channel width narrows to approximately 15 feet (appeared as narrow as 10 feet in some sections), with 1:1 side slopes (or steeper). At Encina Avenue the channel width widens to approximately 25 feet, with 1:1 side slopes. The depth of the channel varies from 6 to 10 feet from the invert to top of bank.[10]

The proposed channel configuration was sized to convey the 100-year flow. The design flows at three different reaches along the creek were as follows:

- 2,300 cfs upstream of Encina Avenue
- 2,570 cfs between Encina Avenue and I Street (see Photograph 4 in Appendix B for Encina Avenue bridge)
- 2,990 cfs downstream of I Street

A cross section with 2:1 side slopes, a bottom width of 20 to 25 feet, a channel slope of 0.3 percent, and a depth of 10 feet (includes 1-foot of freeboard) would convey the maximum design flow of 2,990 cfs at velocities in the 7 to 7.5 foot per second (fps) range. A conceptual cross section of the modified channel is displayed in Figure 7 in Appendix A. In order to achieve this cross section, the creek's banks would be excavated and properties along the creek would be encroached upon. In reaches where the existing creek channel width is most narrow, as much as 15 feet from each property along the creek will be necessary to widen the channel. In reaches where the channel is widest, only 10 feet will be necessary from each property owner to widen the channel. Since the creek runs through private property for a majority of the community, real estate impacts associated with widening the channel are unavoidable. Many homes are located immediately adjacent to the creek. In these locations, it may be necessary to install flood walls in place of widening the channel. A majority of existing vegetation adjacent to or within the creek's bank will likely be removed if the channel is widened. Figure 8 in Appendix A show the approximate limits of the upper and lower boundaries of the channel widening.

The creek also possesses a large amount of vegetal growth that serves as riparian habitat for sensitive species. The key to the project would be to preserve as much of these resources as possible and provide flood protection. In some areas where channel excavation may not be an option, other flood protection alternatives, such as levees and flood walls, could be considered however, the real estate constraint renders most alternatives, except for a floodwall, infeasible.

Benefits and Constraints

Project 4 directly addresses the cause of the flooding problems by proposing the removal of bridges and widening of the channel. Of the four alternative projects proposed to improve the level of flood protection for Yerba Buena Creek, improving the channel reaches within the community is the only alternative that will increase the conveyance capacity to 100-year levels. If this project is implemented, then homes currently within the floodplain could be removed following completion of the project and submission of a Letter of Map Revision (LOMR) to FEMA. 100-year flood flows will be contained within the creek's banks and the only flooding problems in the community would result from localized drainage issues caused by inadequate ditches and culverts.

[10] The dimensions discussed represent what could be measured or estimated from public right-of-way.

Widening the channel and removing riparian habitat will be scrutinized by the resource agencies during the environmental documentation phase and the permit application phase. Yerba Buena Creek is known habitat for sensitive species and California Red-Legged frog were sighted in the creek in the summer of 2002. Conditions of the construction permits will likely require significant amounts of wetland mitigation, increasing the project costs.

This project will also impact private resident properties. The creek's alignment is located primarily on private property, except for the reach that runs along the community park. In order to meet the required dimensions to convey the design flow, drainage easements will either need to be donated by or purchased from the owners. **Right of way acquisition is not factored into the project cost. Up to 30 feet of encroachment (15 feet for permanent channel easements and an additional 15 feet for temporary construction easements) for each parcel is possible.** Sufficient land might not be available to widen the channel and provide setback between homes and the channel. Homes along J Street are located very close to the top of bank.

It should be emphasized that the railroad and Highway 58 culvert crossings are not under the jurisdiction of the County. UPRR owns the railroad culvert and Highway 58 is under Caltrans jurisdiction. Unless the capacity of these culverts is increased, this bottleneck will continue to result in regional flooding.

Although this project could provide 100-year level of flood protection, because of the project costs, lack of available land, and potential environmental impacts, this project should not be carried forward for consideration.

Project Cost Estimate

The cost estimate for Project 4 is broken down by item in Table 3-11. The total cost for this project is approximately $9.4 million. The reader should note that the construction costs do not include the cost of land or easements from private residences living adjacent to the creek.

Table 3-11: Project 4 Channel Modification and Bridge Replacement

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
1	Channel Modification	3,400	LF	$450	$1,530,000
2	Bridge/Culvert Replacement [2] o Encina Ave. o I Street o H Street	3	each	$400,000	$1,200,000
3	Railroad Culvert Replacement [2]	1	each	$900,000	$900,000
4	Highway 58 Culvert Replacement [2]	1	each	$720,000	$720,000
3	Storm Drain Outfall Replacement	15	each	$15,000	$225,000
4	Utility Relocation (water, sewer, gas, fiberoptic)	1	estimate	$500,000	$500,000
5	Railroad Drainage Easement	3,000	SF	$10	$30,000
6	Wetland/Environmental Mitigation	1	each	$100,000	$100,000
				Subtotal	**$5,205,000**
	Engineering and Design [3]			20 percent of subtotal	$1,041,000
	Administrative and Environmental [3]			40 percent of subtotal	$2,082,000
	Contingency [3]			20 percent of subtotal	$1,041,000
				Total [4]	**$9,369,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. County bridges assume 28' wide by 70' long at $200 per square foot for construction. Highway 58 assume 40' wide by 90' long at $200 per square foot. Railroad culvert assume 40' wide by 90' long at $250 per square foot.
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 40% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 80% cumulative markup on construction costs. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).
4. Does not include right-of-way acquisition or temporary construction easement costs

3.5.1.9 Project 5: Vegetation Management

One alternative that will help reduce the impact of flooding from Yerba Buena Creek is vegetative management. Thinning and removing some of the overgrown riparian vegetation will help alleviate the frequency of flooding at lower frequency flood events such as the 5- or 10-year storms. A vegetative management plan could be developed to conduct a onetime channel clearing and then prescribe an on-going (annual or bi-annual) maintenance program. The reach of Yerba Buena Creek recommended for routine maintenance extends from K Street to downstream of Highway 58. The limits are approximately the same as those shown in Figure 8 of Appendix A for Project 4. Approximately 3,000 feet of creek would be maintained every couple of years.

The goal of the program would be to thin the channel vegetation, reduce frictional resistance of the channel, create more flow carrying capacity, and strive to preserve riparian habitat values. The approach is to remove dense undergrowth and trees that increase channel roughness and reduce conveyance capacity in the channel. Sediment removal should also be implemented at locations where deposition has accumulated over the years. Increased sediment accumulation has been observed in Yerba Buena Creek following the Highway 41 fire and persists today.

The vegetative management plan would remove trees and brush in such a way that impacts to the vegetative overstory above the channel are minimized. In some cases, trees may be removed but new ones would be planted outside of the floodway and main flow path. The general concept is to create a tunnel effect and shaded riverine aquatic habitat. Over time, the management program will develop a riparian corridor where flow encounters minimal heavy vegetation resistance but is overshadowed by a tall canopy that provides shade and habitat. A similar vegetative management program has been developed by the City of San Luis Obispo for San Luis Obispo Creek.

Modest gains in flow conveyance can be accomplished which are usually around 10 to 15 percent of the overall channel carrying capacity. Detailed hydraulic modeling would need to be conducted to determine the ultimate effectiveness of this proposed project. The plan would have to be developed in conjunction with State and Federal resource agency approval. As part of the resource agency permit approval process, a California Environmental Quality Act (CEQA) document would be prepared to determine the potential impacts and propose mitigation measures to minimize those impacts. The environmental permitting requirements are discussed in further detail in Chapter 4 of this report.

CSA 23/Cal Poly Student Maintenance Demonstration Project

CSA 23 received a grant in 2002 to demonstrate how the community could institute a creek maintenance program of their own. Resource agency permits were being submitted for approval to conduct the maintenance. Work completed by this demonstration project should assist the community's permit process if it pursues a long-term maintenance program.

Benefits and Constraints

The advantage of this project, if implemented according to the maintenance plan, is that the capacity of the channel will be improved and maintained. Also, a healthy creek habitat will flourish under the creek's overstory. Removing or thinning the vegetation will have modest impacts on the carrying capacity of the channel. Annual maintenance will require private owners to grant drainage easements within the creek for access. The drawback is that the project could take over two years to permit and authorize by the resource agencies. A vegetation management program, in conjunction with a detention basin, will provide significant community flood protection from Yerba Buena Creek.

It is recommended that a vegetative management program be pursued regardless of the "structural" improvements carried forward.

Project Cost Estimate

The cost estimate for Project 5 is broken down by item in Table 3-12. The total cost for this project is approximately $432,000. Following the "first time" vegetative clearing, periodic (annual or bi-annual) maintenance will be necessary to maximize the channel's conveyance capacity. Maintenance includes sediment removal, vegetation removal, weed abatement, and bank stabilization. Annual maintenance is estimated at $15,000.

Table 3-12: Project 5 Vegetation Management

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
1	Detailed Hydraulic Analysis	1	each	$45,000	$45,000
2	CEQA Documentation	1	each	$25,000	$25,000
3	Biological Investigation/Wetlands Delineation	1	each	$50,000	$50,000
4	Resource Agency Permit Preparation	1	each	$25,000	$25,000
5	Wetland/Environmental Mitigation [2]	1	each	$35,000	$35,000
6	First Time Vegetative Clearing	3,000	LF	$30	$90,000
				Subtotal	**$270,000**
	Engineering and Design [3]			10 percent of subtotal	$27,000
	Administrative and Environmental [3]			30 percent of subtotal	$81,000
	Contingency [3]			20 percent of subtotal	$54,000
				Total	**$432,000**

Notes:

1. Rounded to the nearest thousand. Typical to all estimates in this report.
2. It is assumed that environmental mitigation can be accomplished on the Santa Margarita Ranch property in lieu of acquisition of private property in fee for environmental mitigation.
3. ENR CCI for Los Angeles (February 2003) = 7,566. Includes 20% for Engineering and Design, 40% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 80% cumulative markup on construction costs. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.5.2 Local Flooding Issues

Mitigating flooding problems caused by the lack of capacity in Yerba Buena Creek will correct the less frequent, larger magnitude storms. However, local drainage problems and nuisance flooding will continue because the existing drainage system is inadequate and does not meet current County standards. The following proposed projects address localized flooding problems that are not caused by the creek watersheds surrounding the community. Santa Margarita has a mixed system of local drainage conveyance facilities throughout the community. It includes roadside ditches, culverts and storm drains. The proposed projects involve redirecting flow from surrounding watersheds and installing drainage system improvements and upgrades to rectify flooding problems in town.

3.5.2.1 Project 6: Levee along South Side of Town

A significant flooding problem in the south portion of town occurs along K Street and Murphy Avenue. This flooding is likely from a combination of undersized drainage ditches and runoff from the upstream watershed. Resident anecdotes revealed that during the Highway 41 fire fighting operations, a gap in a berm was cut by the California Department of Forestry and Fire Protection. The berm exists on Santa Margarita Ranch property south of and parallel to K Street. The gap was never filled in and now flooding in the town, especially for homes along K Street, is much worse.

Construction of an earth levee along southern lot boundaries on K Street, in the vicinity of effected homes, would significantly reduce the flooding in this area. Figure 9 in Appendix A shows the location of the proposed

levee. A levee height of 4 feet with 5 foot wide berm and 5:1 side slopes, and an associated drainage ditch running east-west would protect residences against overland flow conveyed by the 30 acre upper watershed area to the south. The levee would extend from Maria Avenue to Margarita Avenue comprising a total length of about 1,500 feet and would divert flow along an overland flow path into Yerba Buena Creek. An outfall from the ditch into the creek would need to be constructed. This levee could be built either on homeowner properties or on an easement purchased from or dedicated by the Santa Margarita Ranch. The State Water Project pipeline runs along this alignment, approximately 30 feet south of the property lines. The cost for this project does not include land acquisition from Santa Margarita Ranch.

This project would likely require mitigation during excavation to preserve artifacts recovered during construction. Many archaeological artifacts exist along this alignment between the Maria Avenue and Margarita Avenue extensions.

Benefits and Constraints

The levee is cost effective and could be designed to be aesthetically unobtrusive with flat slopes and vegetation. It is a simple way to prevent storm water runoff from entering residential property and could be quite effective in reducing shallow flooding in the southern portion of the town.

The diversion berm would route flow via the drainage ditch to the creek near the corner of K and Margarita or upstream of known limited capacity reaches. The 10-year peak discharge in Yerba Buena Creek is listed by FEMA as 830 cfs just south of the town. The 10-year estimated peak flow from the levee channel would increase flow in the Yerba Buena Creek channel by 6 to 10 percent. Since the downstream culverts and bridges between I Street and Highway 58 currently lack capacity to convey the 830 cfs (capacity of I Street culvert is 700 cfs), additional increase in flow would simply overtop the creek's banks. A flood impact analysis was not conducted as part of this study, however, it is unlikely that a 6 to 10 percent increase in flow would raise the water surface elevation outside the creek bank by more than one foot. In order not to increase the flood stage downstream of K Street, succeeding Project 7 recommends a storm drain to divert runoff from the berm drainage ditch to north of town.

A cumulative impacts analysis should be conducted during the design phase to determine whether the community would experience an increase in flood inundation depths along the channel with this project in place. This project could be constructed in conjunction with Project 5, Vegetative Management, to mitigate for the increased flow from the levee's drainage ditch.

3.5.2.2 Project 7: Storm Drain Diversion to North of Town

Even with an improved system of small earthen and grass lined swales, and driveway crossing culverts, without road side asphalt berm or other drainage controls, the "slab on grade" homes, private property and streets will likely continue to flood even with minor storms. An improved conveyance system is needed to positively convey stormwater from the residential areas to the creek. Anything less is marginally effective in a small, densely developed community such as Santa Margarita. The storm drain proposed in this project and the improved drainage ditches proposed in succeeding Project 8 work to that end.

This project utilizes the levee and ditch system developed in Project 6, but instead of discharging the flow into Yerba Buena Creek, upstream of the Encina Avenue culvert, a new 42-inch underground storm drain would be constructed, starting at the downstream end of the drainage ditch running along the levee. The storm drain would run in Margarita Avenue to H Street. The alignment would then turn east until reaching Encina Avenue, where it would turn north and cross under the railroad and Highway 58 until reaching F Street. In order to convey local runoff collected along the pipeline's alignment, the pipeline should be upsized to a 54-inch diameter storm drain after crossing the railroad. The pipeline would then convey flow east and discharge to Santa Margarita Creek, north of town. Drop inlets would be installed at various intersections to collect local

drainage along the alignment. Figure 10 in Appendix A shows the proposed alignment of the storm drain. Design level surveys should be collected during the design phase to optimize the pipeline capacity and alignment.

The objective of routing runoff north of town is to divert flow away from the creek and the lower capacity bridges and culverts between Encina Avenue and Highway 58. This project would basically retain the existing flow pattern of the runoff in the community, with the exception of diverting approximately 100 cfs or more from south of the railroad and discharging the flow back into Yerba Buena Creek, north of town. The project also provides more positive drainage infrastructure to most of the south side of the community.

Benefits and Constraints

In conjunction with the levee and drainage ditch project, the proposed storm drain solves the problem of flooding caused by local watershed runoff. Secondly, with the installation of drop inlets at key intersections in the south side of the community, roadside ditch flow could be intercepted, reducing or eliminating some of the problems with the current roadside ditch system. The disadvantages of this project are the cost of the improvements and potential for silting. During high frequency storms, water that sheet flows across the farmland south of town conveys sediment in suspension. The sediment could deposit at the discharge point and create a maintenance problem. Utility conflicts should also be expected along the alignment, especially at the railroad and Highway 58. The reader should note that the proposed alignment for this project traverses under the existing railroad alignment at Encina Avenue.

3.5.2.3 Project 8: Existing Drainage System Improvements

Localized flooding occurs in areas where the existing roadside ditch infrastructure does not have the capacity to carry runoff that flows through it. This is very prominent in the southern section of the community where runoff from upstream watersheds creates some of the worst flooding. Many of these ditches are not maintained on a consistent basis and their size varies from residential lot to residential lot. Driveway culverts crossing these ditches also vary in size, condition, and hydraulic capacity. In some areas, lack of adequate slope and depth to the ditch causes flooding of nearby structures.

To reduce localized flooding and properly convey stormwater runoff from streets and homes to the creeks, the County's Department of Public Works should work with CSA 23 to develop a standard drainage ditch and culvert design that meets County standards for minor waterways (designed for an average recurrence interval of 10-years). The County's Department of Planning and Building can also work with CSA 23 to develop enforceable standards for the following:

- Front yard ditch size and configuration
- Driveway culvert minimum size and installation standards
- Community supported alternative for mountable asphalt dikes
- Community supported drainage plan for the downtown commercial area to be implemented with the Santa Margarita Enhancement Plan

Without adopted standards for and community wide installation of improved drainage facilities, local flooding will not be significantly reduced.

If the community adopts a standard design, then an assessment of the existing facilities could be completed. Ditches or culverts that do not comply with this standard should be improved or replaced. Along with a standard design, the County could assist in developing a routine maintenance plan to keep sediment and excessive vegetal growth out of the drainage ditches. Continued maintenance of these structures is mandatory to enable them to be functional. The formation of a drainage maintenance district is recommended in Section 3.6 of this chapter.

If a ditch improvement program is implemented and new ditches are installed, expanding the ditch system along I Street, Encina Avneue, and F Street would provide greater drainage capacity to the southern portions of the community, which experiences the greatest amount of flooding. The priority ditches are shown on Figure 10 of Appendix A. Along with the additional ditches, upgrades could be completed to the existing ditches that receive flow from larger watershed areas. Improvements would continue until all ditches in Santa Margarita are upgraded to current County standard.

Improvement to the existing ditch which runs from F Street and Margarita Avenue to the northeast and Yerba Buena Creek is not included in this project. If all the drainage improvements in Projects 6 through 8 are implemented, then this ditch will likely receive less flow because runoff will be routed to the newly installed facilities. However, the ditch will continue to operate and convey flow for its tributary watershed.

Highway 58 Drainage Improvements

Highway 58 has existing curbs and gutters that convey runoff to drop inlets and storm drains near Murphy Avenue and Encina Avenue. However, the curbs are not continuous and a consistent system of curbs and gutters in the downtown district would further enhance conveyance of runoff through town. Drainage in the downtown and commercial area is being addressed as part of the County's Department of Planning and Building Enhancement Plan. **Drainage improvements proposed as part of the Santa Margarita Enhancement Plan (i.e. those on Highway 58 in the Caltrans right-of-way not otherwise detailed) are not included in this report or cost estimates.** Runoff generated along Highway 58 could be routed to the proposed storm drain from Project 7. This would aid in drainage along the commercial district and fit within the overall design plan of the community. The approximate boundaries of the enhancement plan are shown on Figure 10 of Appendix A.

Benefits and Constraints

These projects will be very beneficial to the community. There are few drawbacks with the projects other than the cost. Some homeowners may need to dedicate space and perhaps easements for new roadside ditches. This project could be combined with all other projects to improve drainage and flood protection in the community.

3.5.2.4 Cost Estimate for Projects 6, 7 and 8

Projects 6, 7 and 8 would improve local drainage and mitigate for nuisance flooding problems. The estimates for these three projects are combined to show the relative cost of improving localized flooding problems for the more frequent, low intensity recurring storms, compared to the larger floods discussed in Projects 1 through 4. The costs are broken down in Table 3-13. The total cost for all three projects is approximately $3,725,000. Drainage improvements proposed as part of the Santa Margarita Enhancement Plan (i.e. those on Highway 58 in the Caltrans right-of-way not otherwise detailed) are not included in this report or cost estimates. The total cost for each project (including engineering, administrative, environmental and contingency) is as follows:

- Project 6 - $231,000
- Project 7 – $2,724,000
- Project 8 - $771,000

Table 3-13: Projects 6, 7 and 8 Levee, Storm Drain and Drainage Ditch Improvements

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT COST ($)	TOTAL ($) [1]
Project 6: Southside Levee					
1	Levee	5,600	CY	$7	$39,000
2	Hydroseeding	1	acres	$1,000	$1,000
3	Drainage Ditch	1,500	LF	$15	$23,000
4	Appurtenances	1	estimate	$15,000	$15,000
5	Outfall to Yerba Buena Creek	1	each	$15,000	$15,000
6	Archaeological Investigation/Monitoring	1	each	$35,000	$35,000
				Subtotal	**128,000**
Project 7: Storm Drain					
1	48-inch Storm Drain; ditch to railroad crossing	2,050	LF	$300	$615,000
2	54-inch Storm Drains; railroad crossing to outfall	1,700	LF	$325	$553,000
3	Outfall to Yerba Buena Creek	1	each	$15,000	$15,000
4	Drop Inlets	27	each	$3,500	$95,000
5	Inlet Pipelines	600	LF	$75	$45,000
6	Bore and Jack at Railroad Crossing	1	each	$40,000	$40,000
7	Railroad Drainage Easement	1,000	SF	$10	$10,000
8	Bore and Jack at Highway 58 Crossing	1	each	$40,000	$40,000
15	Utility Relocation (water, sewer, gas)	1	estimate	$100,000	$100,000
				Subtotal	**1,513,000**
Project 8: Existing Drainage System Improvements					
1	New Drainage Ditches	3,900	LF	$45	$176,000
2	Drainage Ditch Rehabilitation	15,640	LF	$15	$235,000
3	Driveway Culvert Replacement	85	each	$200	$17,000
				Subtotal	**$428,000**
				Subtotal for Projects 6, 7 and 8	**2,069,000**
	Engineering and Design [2]			20 percent of subtotal	$414,000
	Administrative and Environmental [2]			40 percent of subtotal	$828,000
	Contingency [2]			20 percent of subtotal	$414,000
				Total	**$3,725,000**

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, 40% for Administrative, Environmental, District Overhead & Support Costs for Construction Project Planning, and a 20% Contingency. Use 80% cumulative markup on construction costs. Land/easement acquisition not included in cost. Percentages provided by District (Typical to all estimates in this report).

3.5.2.5 Summary of Costs

Table 3-14 is a summary table of the costs for all the projects analyzed in Chapter 3. The recommended alternatives include Projects 3, 5, 6, 7 and 8. If only the recommended projects are implemented, the total cost is approximately $6.2 million.

Table 3-14: Santa Margarita Drainage Improvements Summary Cost Table

PROJECT	DESCRIPTION	TOTAL COST [1, 2]
1	Detention Basin with Western Bypass	$2,645,000
2	Single Off-Channel Detention Basin	$2,139,000
3	**Off-Channel Detention Basins in Parallel**	**$2,015,000**
4	Channel Improvements and Bridge Replacement	$9,369,000
5	**Vegetation Management**	**$432,000**
6	**Southside Levee**	**$231,000**
7	**Storm Drain Diversion**	**$2,724,000**
8	**Existing Drainage System Improvements**	**$771,000**

Notes:
1. Excludes optional project costs. Includes contingency, engineering and environmental.
2. Excludes Land acquisition and drainage easement costs from Santa Margarita Ranch

3.5.3 SANTA MARGARITA RANCH INVOLVEMENT

The Santa Margarita Ranch (the Ranch) property is critical to mitigation of the regional flooding problems and the development of a regional solution. Proposed projects rely on the acquisition of property or drainage easements from the owner of the Ranch, therefore their cooperation is imperative to the success of these projects. In addition to property for a detention basin, land will likely be necessary for environmental mitigation to offset project impacts to wetlands and riparian habitat.

As written in the draft Environmental Impact Report prepared for the Ranch's proposed development, the impact of future development on existing flood problems is the primary constraint within the Yerba Buena Creek watershed. This constraint was considered to be severe. The report also concluded that unmitigated development within the Yerba Buena Creek watershed would exacerbate these existing flooding problems. Future Ranch development could include drainage improvements, such as a detention basin, that retain runoff from Ranch development, but also includes supplemental capacity to reduce peak runoff currently reaching Santa Margarita. The community and Ranch owners should discuss possible arrangements that benefit both community and land owner.

3.5.4 RECOMMENDED PROJECTS

The major flooding problems in Santa Margarita are caused by Yerba Buena Creek flood flows overtopping the banks of Yerba Buena Creek. Between I Street and Highway 58, the capacity of the channel and culverts is less than the peak discharge of a 10-year flood. The railroad and Highway 58 culvert crossings are not under the jurisdiction of the County and unless the capacity of these culverts is increased, this bottleneck will continue to result in regional flooding.

Four alternative projects have been proposed to reduce the regional flooding caused by flood flows overtopping the creek's banks. Of these four alternative projects, Project 3 provides the greatest reduction in peak flow and improves the level of protection within Santa Margarita from less than a 10-year flood to a 25-year flood level. Project 3 is also the most economical of the four projects. However, the estimated project costs do not include land acquisition or drainage easements from the Ranch. The other two alternative off-channel detention basin projects improve the level of protection in the community to a 10-year flood level. It should be noted that

alternative Project 4, channel improvement and bridge replacement was the only project proposed to increase the capacity of the channel to convey the 100-year flood flow. However, this project is extremely expensive, has significant environmental impact challenges, and land encroachment on private property would be necessary to widen the channel.

Project 5, vegetation management, should be included with any project that is implemented. In addition to insufficient capacity of the channel and bridge crossings, potential for flooding is intensified by willow and brush growth which has nearly clogged some of the crossings. Regular maintenance is needed to maintain maximum capacity of the creek channel. If uncontrolled vegetal growth continues, then the community can expect more frequent flooding during moderate storm events.

Mitigating flooding problems caused by the lack of capacity in Yerba Buena Creek will correct the less frequent, larger magnitude storms. However, local drainage problems and nuisance flooding will continue because the existing drainage system is inadequate and does not meet current County standards. Projects 6, 7 and 8 could all be implemented to improve local drainage. Project 6, the south side levee, will protect homes from overland flow that breaks out of Yerba Buena Creek in the Miller Flat area.

An improved conveyance system is also needed to positively convey stormwater from the residential areas to the creek. Anything less is marginally effective in a small, densely developed community such as Santa Margarita. The proposed storm drain routes local runoff generated from streets and homes around the culvert constrictions between I Street and Highway 58. Without the storm drain, roadside ditches will convey runoff to a creek that is already flowing full. Runoff will "back-up" in the ditches and pond in lower lying areas until flow in the creek recedes. Project 7 should be implemented as part of the local drainage improvements.

To reduce localized flooding and properly convey stormwater runoff from streets and homes to the creeks, the County's Department of Public Works should work with CSA 23 to develop a standard drainage ditch and culvert design that meets County standards for minor waterways (designed for an average recurrence interval of 10-years). The community should then implement Project 8. Without adopted standards for and community wide installation of improved drainage facilities, local flooding will not be significantly reduced.

The total for the five recommended projects is approximately $6.2 million. The CSA 23 Advisory Group provided verbal comments to the project team indicating support for only two of the proposed projects; Project 5 Vegetative Management, and Project 6 South Side Levee. Chapter 6 discusses the implementation strategy for planning, designing, constructing and phasing the recommended projects.

3.6 Additional Recommendations

3.6.1 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.

3.6.1 Recommended Policy and Standard Changes

A number of suggested modifications to existing policies and procedures have been identified to prevent the aggravation of existing drainage problems or creation of new flood prone areas. These policies range from improving current development review processes to changing existing maintenance procedures within the Santa Margarita Urban Area. The proposed policy modifications are divided into two different types:

- Prevention – Improving the Development Review and Permitting processes
- Enforcement – Providing ordinances or measures to ensure drainage improvements are not changed from the permitted condition and to ensure proper operation and upkeep of existing and future system improvements.

3.6.1.1 Restriction on Building in and Adjacent to Floodplain

The forecast increase in urbanization that will occur under buildout scenarios will change the hydrologic character of Santa Margarita. Currently undeveloped land will be developed with structures and other impervious surfaces. These changes will result in an increase of impervious surfaces and limit the soils ability to absorb rainfall, thereby increasing the amount of surface runoff. However, because Santa Margarita is largely developed, and the forecast buildout could result in the addition of approximately 50 structures (residential and commercial), stormwater runoff is not expected to substantially increase. A very detailed interior drainage analysis of existing and buildout conditions would quantify the forecast increase in stormwater runoff and the potential flooding impacts.

The CSA 23 Drainage Mitigation Committee supports a restriction on building within the 100-year floodplain until flood protection improvements are in place. Even though the County's Land Use Ordinance (22.07.060 et seq) establishes a flood damage prevention standard and requires that finish floor elevation for residential construction be one foot above the 100-year floodplain elevation, the CSA 23 Drainage Mitigation Committee would prefer that no building continue within the floodplain. The concern is that this practice is contributing to flooding of existing homes built prior to this requirement.

Hydraulic analysis indicates that Yerba Buena Creek lacks sufficient capacity, downstream of I Street, to convey 10-year flood flows. The County design and construction standard for stormwater conveyance facilities, such as

gutters and drainage swales, is to convey the 10-year storm. Every additional home and related impervious surface (e.g. driveways and patios), and every paved roadway and sidewalk within the Yerba Buena Creek drainage basin could increase urban runoff conveyed to the creek. Runoff that previously would have infiltrated into the ground could now be conveyed to the creek via local conveyance systems.

As summarized in Section 2.1.2 of this report, the County's land use ordinances require detailed study and project review for proposed development within the floodplain. However, based upon review of County ordinances, there are no provisions requiring detailed analysis of drainage impacts for development located outside the floodplain but that also contribute runoff to flood prone areas. **In lieu of restricting all construction within the floodplain, the County's Department of Planning and Building should require that all proposed developments that contribute runoff to Yerba Buena Creek investigate the drainage flow pattern from the lot to the discharge point.** The conveyance path investigation requirement can be placed in the building or the grading permit. **If the investigation concludes that the proposed development is contributing to an existing problem or creating a flood hazard for lower lying properties, then on-site mitigation with a detention basin or equivalent facility should be required.**

3.6.1.2 Install System Improvements with Increased Development

Drainage improvements should be planned with any proposed development. Regardless of whether drainage problems exist prior to development, mitigation should be planned as not to increase the severity or frequency of problems. Such mitigation could include on-site detention of runoff, thereby preventing the increase of runoff onto lower lying properties.

It is recommended that development fees collected for Santa Margarita be used to fund drainage improvements for areas that will be most impacted by future development. These areas are typically the topographic low points within a drainage sub-basin. If new development can not retain runoff on site, then it should be responsible for funding the necessary improvements to convey increased runoff.

In conjunction with planning drainage improvements with future development, critical lots that are at risk to flood damages due to their location should be identified. These lots should dedicate drainage easements on their property or design sufficient conveyance facilities so as not to impede the flow of storm water.

3.6.1.3 Require Building Setback from Creek Bank

Residential structures in Santa Margarita have encroached upon the creeks' banks. The County's Department of Planning and Building should establish a minimum setback policy so that homes or businesses do not build structures adjacent to or within a creek's flow path. This policy would not only preserve a creek's channel, but it will also protect structures because bank erosion will invariably lead to stability problems and compromise a structures foundation. Since Santa Margarita is essentially built out, this policy change will impact a few undeveloped lots within the commercial district.

3.6.1.4 Develop Enforceable Drainage Standards

As discussed in Project 8, in order to reduce localized flooding and properly convey stormwater runoff from streets and homes to the creeks, the County's Department of Public Works should work with CSA 23 to develop a standard drainage ditch and culvert design that meets County standards for minor waterways (designed for an average recurrence interval of 10-years). The County's Department of Planning and Building can also work with CSA 23 to develop enforceable standards for the following:

- Front yard ditch size and configuration
- Driveway culvert minimum size and installation standards
- Community supported alternative for mountable asphalt dikes
- Community supported drainage plan for the downtown commercial area to be implemented with the Santa Margarita Enhancement Plan

Without adopted standards for and community wide installation of improved drainage facilities, local flooding will not be significantly reduced.

3.6.2 SANTA MARGARITA DESIGN PLAN

3.6.2.1 Streetscape Improvements

El Camino Real/Highway 58

The County Department of Planning and Building adopted the Santa Margarita Design Plan (SMDP). The plan includes recommendations on streetscape improvements on El Camino Real/Highway 58, in particular, the installation of curbs and gutters with driveway cuts and drainage outlets. The SMDP's goal is to control access to properties and separate vehicles from pedestrians, but it also improves the collection and conveyance of street runoff. Projects implemented as part of the SMDP and the Santa Margarita Enhancement Plan for Highway 58 should include drainage improvements and coordinate with the proposed improvements outside of the commercial area. Drainage improvements proposed as part of the SMDP (i.e. those on Highway 58 in the Caltrans right-of-way not otherwise detailed) are not included in this report or cost estimates.

Pedestrian Safety Improvements on Estrada Avenue

The SMDP also identifies pedestrian safety hazards associated with culverts at roadway intersections on Estrada Avenue. At I Street, the distance between the road edge and the top of the culvert opening is too narrow and forces pedestrians to walk in the vehicle travel lane on Estrada Avenue. A similar hazard exists near J Street. The SMDP recommends replacing the roadside ditch between I and J Streets with an underground storm drain and placing a pedestrian pathway above the culvert. The plan recommends extending the culvert at I Street towards Yerba Buena Creek and installing a pedestrian pathway above the extension. If these intersections are improved for pedestrian safety, then the necessary culvert capacity improvements should be implemented with the pedestrian crossing improvements. Detailed surveys collected for the pedestrian improvements could also be used to conduct hydraulic analyses and optimize the culvert design.

Residential Streetscapes

Residential neighborhood streets occur within an 80-foot right-of-way that provides space for drainage ways. The SMDP identifies a dedicated drainage swale adjacent to the street and within the right-of-way. The County's Department of Planning and Building and the Department of Public Works should establish a standard design for a drainage swale to provide sufficient capacity for a 10-year storm (as discussed in section 3.6.2 above). Since the grade and topography in Santa Margarita is fairly consistent, a standard design would be

applicable to the majority of streets in the community. No trees or shrubs should be planted within the drainage swale and parking within a swale should be prohibited. In reaches where street parking is desired, a culvert with the capacity to convey a 10-year storm could be installed in lieu of the drainage swale.

The SMDP recommends that the residential streetscape enhancement plans should be developed to a detailed conceptual level to enable block improvements to be made on the basis of need and acceptance by individual neighbors. If drainage swales are to be designed and constructed to provide the necessary capacity for a particular block's runoff, then a master drainage plan should accompany the streetscape enhancement plan. Combining these two plans (i.e. the SMDP and this study's recommendations) is an effective approach for improving the character of the community and for providing the necessary drainage to mitigate flooding problems. The street and drainage plans can be implemented simultaneously. Taking a comprehensive approach will ensure that all the drainage facilities are continuous and the hydraulics are compatible.

3.6.2.2 Recommendations to the Residential Design Guidelines

It is recommended that the following advisory guidelines be added to the Residential Design Guidelines and that the County's Department of Planning and Building encourage applicants to consider the recommendations to reduce the threat of flooding to residential homes and to improve the drainage of storm runoff in Santa Margarita.

Curb, Gutter and Sidewalk Waivers in the Residential Multi-Family Category

For the Residential Multi-Family Category, the Director of Planning and Building may waive or modify Land Use Ordinance requirements for curb, gutter and sidewalks to be consistent with the concepts in the SMDP. **If waivers are requested, then the applicant should propose an equivalent or better drainage facility in place of the curb and gutter. If on-site retention of stormwater runoff is proposed, then the County should request a dedicated drainage easement on the property to avoid the modification of drainage facilities when ownership changes.** The waiver should also stipulate that if the approved drainage alternative is modified by the owner, then the County can re-build or retrofit to "as built" conditions at the owner's expense.

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. In Santa Margarita, homes constructed at grade or below the road grade are more typical of older homes and homes constructed prior to implementation of the County's flood damage prevention ordinance. Homes constructed within the floodplain are addressed by existing ordinances.

For homes outside the floodplain, it is recommended that Santa Margarita and the County Planning Department mandate that the finish 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 Santa Margarita mandate the installation of a County standard mountable berm (or acceptable alternative) for all driveways/accesses to structures which are below the edge of pavement.

Erosion Control

To control erosion, runoff from impervious surfaces such as roofs, driveways, walks, patios or decks should be collected and retained on-site, or released to the public right-of-way through an effective erosion control device or drainage system approved by the County's Department of Public Works. This requirement also achieves the

goal of reducing urban runoff and the amount of water that flows to the street, and eventually to Yerba Buena Creek. Minimizing storm runoff also prevents erosion of streets and road shoulders because less water flows to the street and directing the runoff through a grassy swale slows water's velocity.

In general, new developments should achieve the following:

- Increase vegetative groundcover, to the maximum extent possible, as a means of reducing stormwater runoff
- Install on-site natural drainage channels or detention basins to retain runoff from impervious surfaces prior to reaching the public right-of-way

All natural drainage should be kept free of obstructions such as branches, trash, and sediment to maintain the drainage capacity of the channel. Maintenance responsibility should rest with the owners of the property through which the drainage channels pass. Suggested specifics for improving drainage and protecting homes from flooding our detailed below.

Divert Runoff to Landscaped Areas

By diverting stormwater from impervious areas such as roofs, walkways and driveways, and reusing whenever possible, runoff that flows to streets can be greatly reduced. This can be achieved by directing rain gutters to landscaped areas, swales or infiltration basins on private property where water can percolate into the ground.

Placing landscaped areas directly below eaves allows roof runoff to percolate into the subsoil. Plants should be sturdy enough and provide a subsurface matrix of roots to tolerate heavy sheet flow runoff and periodic saturation. Landscaped infiltration basins for stormwater retention should have flow directed toward them with curbs, berm, or similar structures, and slightly concave to retain surface water until it infiltrates.

Install Porous Pavers

In place of concrete or asphalt for constructing parking lots, walkways, patios and driveways, consider installing porous pavers and pavement. Porous pavers reduce runoff because they are semi-permeable and infiltrate runoff. Pavers range in cost from $2 to $4 per square foot (material cost only).

The following are encouraged for existing homes and recommended mandates for new home development *(The reader should recognize that these homes are connected to septic tanks for wastewater disposal and have limited available land. There are some physical limitations which preclude applying the recommendations presented in this report to every lot in Santa Margarita. The potential impacts to a septic system should be evaluated prior to implementing these suggestions)***:**

- **For homes not covered under existing County flood damage prevention ordinances, all new homes should have the finish floor elevation built one foot above the adjacent street grade.**
- **Where possible, direct down-spouts and gutters to drain onto the lawn, plant beds or containment areas where rain will soak into the soil rather than run off the yard.**
- **Use mulch, bricks, flagstone, gravel, or other porous surfaces for walkways, patios and driveways.**
- **Decrease soil erosion by planting groundcovers where lawn grass does not thrive, such as under trees or on steep slopes.**
- **Create swales (low areas) or terracing to catch, hold and filter stormwater.**

3.6.3 NON-STRUCTURAL SOLUTIONS

Non-structural solutions are defined as those that reduce or avoid flood damages without significantly altering the flooding or attempting to confine flood flows to the channel. This is accomplished by changing the land use within floodplains or retrofitting existing structures to accommodate potential flood hazard. Typical non-structural solutions are:

- Purchase flood insurance (currently implemented)
- Zoning ordinances and building codes (currently implemented)
- Flood proofing of existing structures to withstand flooding without damage
- Agency purchase of flood prone lands and structures

Flood proofing of existing structures to withstand flooding without damage is the only reasonable option to homeowners currently paying flood insurance to protect their homes. Flood proofing could include raising homes one foot above the 100-year floodplain.

Chapter 5, Funding Alternatives, discusses the U.S. Army Corps of Engineers Flood Mitigation and Riverine Restoration Program as a possible funding mechanism for mitigating flooding on Yerba Buena Creek. This program emphasizes the use of non-structural approaches to preventing or reducing flood damages in combination with ecosystem restoration. Projects carried out under this Corps funding program may also include structural elements.

3.6.4 FORMATION OF A DRAINAGE FACILITY MAINTENANCE DISTRICT

Many of the drainage/flooding problems in Santa Margarita 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 Santa Margarita, 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 District maintenance workers to repeatedly attend to all County drainage facilities prior to all predicted storms and between successive storm events. This means that the maintenance of some culverts and ditches is not performed in a timely manner and, therefore, these culverts and ditches may end up becoming clogged during periodic storm events.

Yerba Buena Creek traverses primarily through private property and, therefore, is not maintained by the County. Individual property owners are responsible for maintenance of the channel on their property. Residents are liable for problems caused by urban dumping in creeks on their property and any creek encroachment that causes flooding. Awareness of local creek issues should be raised to encourage better habits and creek management by the property owners.

If the community elects not to fund the proposed projects, then at a minimum, the community should finance annual maintenance such as channel clearing, sediment removal and vegetation management. **For this reason, it is recommended that either CSA 23 or a separate facility maintenance district be formed to better maintain the drainage infrastructure in Santa Margarita.** Responsibilities of the new maintenance district would include:

- Being the contact point for all resident complaints regarding drainage infrastructure in the community
- 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
- Keeping a regular maintenance schedule that may involve multiple maintenance visits where needed
- Responding to drainage infrastructure repairs as needed

- Conducting an information campaign for creek ownership responsibilities for maintenance and cleaning

Having a localized facility maintenance district will make it easier to maintain drainage infrastructure as needed throughout the community.

3.6.4.1 Routine Maintenance of Drainage Channels and Culverts

All the natural and constructed drainage channels that convey flow 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 is responsible for removing impediments. The District should continue to provide leadership, advice and encouragement to property owners and local agencies to assume these responsibilities.

3.6.5 Collect Design Level Surveys

It is recommended that during the design phase of the proposed projects, surveys should be collected and detailed hydraulic analyses should be conducted to optimize the capacity of the proposed projects. Detailed surveys will allow the lead agency responsible for implementing the projects to conduct value engineering and determine the most economical solution to the problems.

3.7 Summary of Recommendations

- At a minimum, the community should begin the documentation and environmental permit process for conducting annual maintenance of Yerba Buena Creek. This project should be implemented regardless of the direction pursued for the other proposed projects.
- Begin discussions with the Ranch to explore regional solutions that benefit the community and the Ranch.
- Develop enforceable drainage standards.
- Form a maintenance district and establish maintenance responsibility for flood prone areas on private property.
- Modify Santa Margarita Residential Design Plan requirements to implement on-site retention of stormwater runoff. All new homes should be constructed with the street level floor 1-foot higher than the adjacent road grade elevation. All new driveways should slope towards the road.

3.8 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 assesses 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 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

4.1.2 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.

4.1.3 Biological Resources

A reconnaissance level site assessment was conducted on July 1, 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.

4.1.4 Cultural Resources

Data sources from the San Luis Obispo County Department of Planning and Building records, environmental impact reports (EIRs) conducted for the Santa Margarita Ranch, personal communication with the State Water Project personnel, and correspondence with local archaeologists were used to determine if cultural resources have been identified in each project area. No standard record searches or site visits were conducted.

4.1.5 Land Use

The *San Luis Obispo General Plan, Santa Margarita Community Design Plan,* and *Program EIR for the Salinas River Area 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

4.2.2 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 for all proposed projects, except for Projects 7 and 8, include potential impacts to endangered/threatened species habitat and the potential presence of cultural resources.

4.2.3 Permit Requirements

An assessment of the state and federal environmental permits that may be necessary for each proposed project 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, Projects 6, 7 and 8 would be possible to permit if mitigation measures are implemented to avoid significant environmental impacts.

The U.S. Army Corps of Engineers, U.S. fish and Wildlife Service, and National Marine Fisheries Service will scrutinize Projects 1 through 5 more thoroughly due to potential impacts to jurisdictional waters and sensitive species habitat. Project 4, channel widening and bridge replacement, presents the most difficult challenge from a permitting perspective because of the permanent removal of large amounts of vegetation and sensitive species habitat. Mitigation, such as plantings and increasing wetlands acreage, would likely be required by the resource agencies to offset the loss of riparian habitat, but this will also increase the channel width necessary to convey the 100-year flood event.

Projects 1 through 3, detention basin alternatives, could also potentially impact jurisdictional water and sensitive species habitat. However, the disturbance to the creek and riparian habitat would be limited to the areas where the lateral weirs and outfalls are located. The area of disturbance would be minimal in comparison to Project 4, but the resource agencies will likely require mitigation to offset any loss of riparian habitat caused by the installation of an overflow weir and outfall.

The other major issue with the lateral weir operation is the potential for fish to become stranded in the detention basin if they are caught in the overflow. Design features on the lateral weir will likely be required to eliminate or limit the potential for fish stranding in the detention basins. The resource agencies may also decrease the frequency in which the lateral weir operates. Instead of diverting flows greater than the 2-year event, the weir may be designed to only divert flows greater than a 10-year event.

The loss of habitat and potential impact to fisheries present permitting challenges and increase the level of complexity that must be addressed during the environmental documentation and permitting phase, and with the appropriate design features, these impacts can be reduced to a less than significant level. Constant communication with the resource agencies during the design and permitting phase will be necessary to ensure that their concerns are addressed and that appropriate features required by the permits are designed into the project.

4.2.4 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, water quality (including erosion control), and cultural resources. Table 4-4 summarizes the potential mitigation measures for each proposed project.

Table 4-4: Potential Mitigation Requirements

PROJECT/LOCATION	ALTERNATIVE	POTENTIAL MITIGATION
Project 1: South of community on the Ranch. Bypass would be located on the western side of town. **Project 2:** South of community on the Ranch. **Project 3:** South of community on the Ranch	**Project 1:** Construct off-channel detention basin with bypass channel to discharge overflow runoff to Santa Margarita Creek. **Project 2:** Construct single off-channel detention basin with diversion facility and outflow structure. **Project 3:** Construct two off-channel detention basins with diversion facilities and outflow structures.	• Conduct preconstruction surveys for sensitive species. Monitor during construction in locations with sensitive species habitat and relocation of sensitive species if necessary. • Construct facilities between the months of May and October. • Increase wetlands acreage to mitigate for impacts. • Implement erosion protection and sediment control measures during construction. • Perform record search for cultural resources. Surface surveys, monitoring by qualified archaeologist during ground disturbance, and identifying exclusion zones for cultural resources may be necessary depending on results of record search. Recovery and treatment could be required depending on findings. • Design features into the lateral weir diversion channel to eliminate or limit the potential for fish stranding in the detention basin. • Reduce the frequency in which the weir diverts runoff from the creek.
Project 4: Upstream and downstream limits within limits of developed community.	Replace bridges and widen channel to convey 100-year flood flow	• Conduct preconstruction surveys for sensitive species. Monitor during construction in locations with sensitive species habitat and relocation of sensitive species if necessary. • Construct facilities between the months of May and October. • Increase wetlands acreage to mitigate for impacts. • Implement erosion protection and sediment control measures during construction. • Add plantings to the constructed channel to off-set the loss of riparian habitat.

PROJECT/LOCATION	ALTERNATIVE	POTENTIAL MITIGATION
Project 5: Upstream and downstream limits within limits of developed community.	Remove excessive vegetal growth and sediment accumulation one time. Conduct routine (annual or bi-annual) maintenance in channel.	• Conduct preconstruction surveys for sensitive species. Monitor during construction in locations with sensitive species habitat and relocation of sensitive species if necessary. • Conduct maintenance between the months of May and October. • Increase wetlands acreage to mitigate for impacts. • Implement erosion protection and sediment control measures during construction. • Perform record search for cultural resources. Surface surveys, monitoring by qualified archaeologist during ground disturbance, and identifying exclusion zones for cultural resources may be necessary depending on results of record search. Recovery and treatment could be required depending on findings.
Project 6: South of community on the Ranch.	Construct levee along the southern perimeter of town between Maria Avenue and Margarita Avenue.	• Conduct preconstruction surveys for sensitive species. Monitor during construction in locations with sensitive species habitat and relocation of sensitive species if necessary. • Construct outfall to the creek between the months of May and October. Levee could be constructed any time of year since it is not located within the creek's bank. • Increase wetlands acreage to mitigate for impacts. • Implement erosion protection and sediment control measures during construction. • Perform record search for cultural resources. Surface surveys, monitoring by qualified archaeologist during ground disturbance, and identifying exclusion zones for cultural resources may be necessary depending on results of record search. Recovery and treatment could be required depending on findings.
Project 7: Between north and southern perimeters of town, within public right	Install storm drain, drop inlets, outfall and erosion protection	• Conduct preconstruction surveys for sensitive species. Monitor during

PROJECT/LOCATION	ALTERNATIVE	POTENTIAL MITIGATION
of way.		construction in locations with sensitive species habitat and relocation of sensitive species if necessary. • Construct outfall to the creek between the months of May and October. Pipeline could be constructed any time of year since it is not located within the creek's bank. • Implement erosion protection and sediment control measures during construction.
Project 8: Throughout community	Install or improve drainage ditches and culverts.	• Erosion and sediment control measures during construction

4.2.5 Additional Studies and Surveys

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

- Aquatic, riparian, and wetlands habitat assessments of Yerba Buena Creek and, for Project 1 only, Santa Margarita Creek
- Steelhead and red-legged frog surveys, and other sensitive species surveys
- Cultural resource record searches

Table 4-1: Environmental Constraints

ALTERNATIVES	BIOLOGICAL	CULTURAL RESOURCES [11]	LAND USE
Project 1: Off-Channel Detention Basin with Western Bypass to Santa Margarita Creek			
Divert peak flows from Yerba Buena Creek to an off-channel detention basin. Route flow to Santa Margarita Creek.	Construction of the detention basin and outfalls to Santa Margarita Creek may affect endangered/threatened species habitat, including steelhead, arroyo toad, California red-legged frog (CRLF), and San Joaquin kit fox (SJKF). Other sensitive species that may also be affected include: several rare plants, western spadefoot, southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of the presence of steelhead and CRLF habitat, approval from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	The detention basin and associated construction west of Yerba Buena Creek will result in the loss of farmland of local importance[12].
Project 2 and 3: Detention Basin with Diversion Facilities and Outflow Structure to Yerba Buena Creek			
Divert peak flows from Yerba Buena Creek to an off-channel detention basin. Store runoff temporarily and discharge back to creek after flood flows have receded.	Construction of the detention basin(s) and outfalls to Yerba Buena Creek may affect endangered/threatened species habitat, including steelhead, arroyo toad, California red-legged frog (CRLF), and San Joaquin kit fox (SJKF). Other sensitive species that may also be affected include: several rare plants, western spadefoot, southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of the presence of steelhead and CRLF habitat, approval from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	The upper detention basin and associated construction east of Yerba Buena Creek will result in the loss of farmland of local importance[13]; the lower detention and associated construction west of Yerba Buena Creek will result in the loss of farmland of local potential[10]
Project 4 : Channel Improvements and Bridge Replacement			
Widen the channel and replace existing bridges to provide sufficient capacity to convey 100-year flood flows.	Replacing bridges and box culvert and widening channel may affect endangered/threatened species habitat, including steelhead, arroyo toad, and CRLF. Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of permanent impacts to steelhead and CRLF habitat, the NMFS and the USFWS may not approve this project. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	None
Project 5: Vegetation Management			

[11] 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.
[12] Farmland of Local Potential is a designation that applies to lands having the potential for farmland, which have Prime Farmland or Farmland of Statewide Importance characteristics and are not cultivated
[13] Farmland of Local Importance is a designation that applies to areas of soils that meet all the characteristics of Prime Farmland (farmland with the best combination of physical and chemical features able to sustain long-term agricultural production) or Farmland of Statewide Importance (similar to Prime Farmland, but with minor shortcomings, such as greater slopes or less ability to store soil moisture) with the exception of irrigation

ALTERNATIVES	BIOLOGICAL	CULTURAL RESOURCES [11]	LAND USE
One time removal of excessive vegetal growth and sediment accumulation. Conduct annual or bi-annual maintenance thereafter, following a prescribed and permitted maintenance guideline.	Removing vegetation, sediment and riparian habitat may affect endangered/threatened species habitat, including steelhead, arroyo toad, California red-legged frog (CRLF), and San Joaquin kit fox (SJKF). Other sensitive species that may also be affected include: several rare plants, western spadefoot, southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of the presence of steelhead and CRLF habitat, approval from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	None
Project 6: Southside Levee			
Construct levee and drainage ditch on the southern perimeter of town. Install outfall to discharge runoff from drainage ditch.	The outfall to the creek may affect endangered/threatened species habitat, including steelhead, arroyo toad, and CRLF. Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	The levee and associated construction west of Yerba Buena Creek will result in the loss of farmland of local potential[10]
Project 7: Install Storm Drain			
Install storm drain and drop inlets within existing right of way. Install outfall to Yerba Buena Creek north of community.	Construction of an outfall to Yerba Buena Creek may affect endangered/threatened species habitat, including steelhead, arroyo toad, California red-legged frog (CRLF), and San Joaquin kit fox (SJKF). Other sensitive species that may also be affected include: several rare plants, western spadefoot, southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of the presence of steelhead and CRLF habitat, approval from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	None
Project 8: Install or Improve Drainage Ditch and Culvert System			
Install or improve drainage ditches and culverts per the County standard.	None	None	None

Table 4-2: Permit Assessment

ALTERNATIVE	PROJECT DESCRIPTION	CEQA[14] DOCUMENT	SHPO 106[15]	CDFG 1601[16]	CDFG 2080.1[17]	CORPS 404 PERMIT[18]	USFWS SECTION 7[19]	NMFS SECTION 7[20]	RWQCB 401[21]	SWRCB GENERAL PERMIT[22]	SWRCB PHASE II SWMP[23]	NOTES
Project 1, 2 and 3												
Off-Channel Basin(s). Project 1 includes a bypass.	Construct diversion facility, basin, outflow structure to discharge flow back into creek. Project 1 includes a bypass to discharge to Santa Margarita Creek	ND[24] (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Yes	Yes	Yes	Yes	Yes	No	If potential barriers to steelhead passage resulting from the project cannot be mitigated, an Environmental Impact Report (EIR) may be required. Otherwise, a ND/MND will be required. A 2080.1 Consistency Determination may be required if there is a potential for incidental take of state threatened San Joaquin kit fox. Depending on the results of a cultural resources records search, Section 106 consultation may be required.
Project 4												
Widen channel and increase bridge capacity	Widen existing creek footprint by constructing trapezoidal channel and replacing existing bridges.	ND (see notes)	Possibly (see notes)	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Because the project involves construction of new facilities and sensitive species or cultural resources may be present, a ND/MND will be required. If impacts resulting from the clearing of vegetation and widening of the channel are determined to be potentially significant and cannot be mitigated, an EIR may be required. Depending on the results of a cultural resources records search, Section 106 consultation may be required.
Project 5												
Vegetation management and sediment removal	One time removal of excessive vegetal growth and sediment accumulation. Conduct routine maintenance thereafter.	ND (see notes)	Possibly (see notes)	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Because the project involves possible removal of habitat for sensitive species, and sensitive species or cultural resources may be present, a ND/MND will be required. If impacts resulting from the clearing of vegetation are determined to be potentially significant and cannot be mitigated, an EIR may be required. Depending on the results of a cultural resources records search, Section 106 consultation may be required.

[14] 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)
[15] 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
[16] California Department of Fish and Game – 1601 Streambed Alteration Agreement: Required if a project has the potential to impact sensitive species or their habitat
[17] California Department of Fish and Game – 2080.1 Consistency Determination: Required if a project has the potential for incidental take of state-listed species that are also federally listed (this project would not affect any species listed by the state only, which would require a 2081 Incidental Take Permit)
[18] U.S. Army Corps of Engineers – 404 Permit: Required if a project involves work below the ordinary high water mark
[19] U.S. Fish and Wildlife Service – Section 7 Consultation: Required if a project has the potential to impact sensitive species or their habitat
[20] 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
[21] 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
[22] 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
[23] 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
[24] Negative Declaration or Mitigated Negative Declaration: Required for projects with impacts that are less than significant or less than significant with mitigation

ALTERNATIVE	PROJECT DESCRIPTION	CEQA[14] DOCUMENT	SHPO 106[15]	CDFG 1601[16]	CDFG 2080.1[17]	CORPS 404 PERMIT[18]	USFWS SECTION 7[19]	NMFS SECTION 7[20]	RWQCB 401[21]	SWRCB GENERAL PERMIT[22]	SWRCB PHASE II SWMP[23]	NOTES
Project 6												
Southside levee	Construct an earthen levee and drainage ditch to prevent overland flow from entering community.	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Yes	No	Because there is potential to impact threatened/endangered species, a ND/MND will be required. A 2080.1 Consistency Determination may be required if there is a potential for incidental take of state threatened San Joaquin kit fox. A Corps permit will be required if the construction of the new outfall involves work below the ordinary high water. The Corps will consult with the NMFS and USFWS if threatened/endangered species will be affected. If a Corps permit is required, a RWQCB 401 Certification will also be required. Depending on the results of a cultural records search and Corps involvement, Section 106 consultation may be required.
Project 7 and 8												
Construct storm drain and drainage ditches	Install storm drain, drop inlets, drainage ditches and culverts	ND (see notes)	Possibly (see notes)	Yes	No	Possibly (see notes)	Possibly (see notes)	No	Possibly (see notes)	No	Yes	The drainage ditch and culvert installation project qualifies for Class 1 CEQA categorical exemption because it involves minor alterations to existing public facilities and does not have the potential to affect sensitive resources. For construction of the storm drain outfall, there is potential to impact threatened/endangered species, a ND/MND will be required. A Corps permit will be required if the construction of the new outfall involves work below the ordinary high water. The Corps will consult with the NMFS and USFWS if threatened/endangered species will be affected. If a Corps permit is required, a RWQCB 401 Certification will also be required. Depending on the results of a cultural records search and Corps involvement, 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)/ Mitigated Negative Declaration (MND)	6 - 12	
Environmental Impact Report (EIR)	12 -24	
California Department of Fish and Game (CDFG)		
1601 Streambed Alteration Agreement	3 - 6	CEQA must be completed before the 1601 Agreement can be issued.
2080.1 Consistency Determination	1 – 3	A federal Biological Opinion must be obtained before beginning the 2080.1 Consistency Determination Process.
U.S. Army Corps of Engineers (Corps) Section 404		
Nationwide Permit	1 - 3	Section 7 and Section 106 consultations are 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	6 - 9	CEQA must be completed before the 401 Certification can be issued.

PERMIT	TYPICAL TIMEFRAME [1] (MONTHS)	NOTES
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.

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. Santa Margarita County Service Area 23 serves Santa Margarita and funds energy costs for street lights, and provides water and drainage services. The drainage and flood control services presently covered by CSA 23 are very limited, due to the lack of funding.

Funds to implement 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 Santa Margarita 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 in Santa Margarita 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 of this magnitude can rely solely on grants.

The reader should note that Federally funded projects require a benefit to cost ratio greater than one to gain Federal interest. The projects must also meet guidelines such as river restoration or streambank repair. The proposed Santa Margarita projects may not qualify based on the funding program's criteria, or the economic analysis could reveal that the amount of flood damage experienced by home owners does not warrant Federal interest in a flood control project. The only option would then be to fund the proposed projects entirely using local funds.

5.2.2 LOCAL FUNDING

As discussed previously, the District is the responsible agency for programming drainage and flood control services. A local 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 regional solutions like the proposed detention basins and the channel widening project whose criteria is to contain the 25-year or 100-year flood event on Yerba Buena Creek; the storm drain, levee and drainage ditch 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. Developing a benefit assessment around those properties within the 100-year floodplain may be the only realistic approach to funding regional solutions to increase the level of flood protection in Yerba Buena Creek (proposed Project 3). Santa Margarita residents rejected a special property tax in March 2000 to provide funding for drainage services. The drawback to this approach is that a small

percentage of homeowners is paying for a flood protection project that improves the quality of the entire community.

5.2.2.3 Property-Based Fee

Residents living within the floodplain represent a minority of the population living in Santa Margarita. Therefore, minimal support exists for a community wide assessment or fee to pay for the necessary improvements. In March 2000, Santa Margarita residents overwhelmingly rejected a special property tax (Measure D-00) to provide funding for drainage services to control flooding in CSA 23. The measure gained support from only 34 percent of voters. Measure D-00 would have imposed a $50 tax on each parcel in CSA 23, raising approximately $25,000 in the first year.

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.

A user fee would be more appropriate to fund the local projects (Projects 7 and 8) because all homes generate runoff that is or will be conveyed by the proposed drainage ditches. Also, a large portion of the homes and businesses in Santa Margarita would generate runoff conveyed by the proposed storm drain. Therefore, there is a "use" of the facilities by all home owners and businesses.

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 Santa Margarita 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 to mitigate for existing conditions.

5.2.3 Outside (Leveraged) Funding Sources

The regional solutions proposed to mitigate flooding in Yerba Buena Creek are the types of projects that would qualify for State or Federal funding. 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[25] 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 Santa Margarita 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 Project 3, detention basins in parallel.

[25] 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.

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

The traditional and most common way for the Corps to help a community solve a flood control problem is through individually authorized studies and projects. This approach requires that Congress provide the Corps first with authorization to accomplish a feasibility study and second, a separate authorization to construct or implement a project.

Congress has also 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. This saves development and approval time, and permits quicker responses to smaller, local problems like the Yerba Buena Creek flooding issue. However, the requirements of a local sponsor and the economic benefits described above apply to CAP funded projects. Considering the forecast cost of the proposed detention basin and the extent of flood damage experienced in the community, securing Corps involvement through the Continuing Authorities Program is strategically the most appropriate approach for seeking Federal assistance.

The potential CAP funding available for Yerba Buena 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 detention basins. Non-structural alternatives such as raising homes 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.

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 Department of Water Resources: Flood Protection Corridor Program

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.

Grants can be used for acquiring property or easements in a floodplain, setting back existing levees, preserving or enhancing wildlife values of property through restoration of habitat compatible with seasonal flooding.

5.2.3.5 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 Santa Margarita.

5.2.3.6 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 not been approached concerning these drainage problems, but experience from other projects indicates that it would be willing to cost share in solutions to flooding problems adjacent to Highway 58.

5.2.3.7 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)[26] 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 regional 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. Drainage mitigation fees collected by the County's Planning and Building Department to date should be used to fund the proposed local drainage projects (Projects 7 and 8). Future fees collected for development in Santa Margarita should be used to fund necessary drainage projects identified to support new developments.

Property Based Fee

To fund the construction of roadside drainage ditches and culverts in different parts of the community, and the storm drain pipeline diverting flow to north of the community, 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. For example, higher elevation properties on J Street between Maria and Yerba Buena Avenues that may not flood would assist in funding the downstream storm drain system.

An education/information campaign should be waged prior to initiating a property based fee. In order to avoid a repeat of Measure D-00, the community needs to understand the need to improve local drainage to meet current standards, and how the local projects, along with a regional solution, will improve the level of flood protection within the community. If community support for a property based fee remains below 50%, then an alternative funding mechanism should be pursued.

Benefit Assessments

A benefit assessment is one possible approach for generating funding for the proposed detention basin project. Project 3 will provide homes living in the floodplain with 25-year level of protection. Homes will remain in the floodplain, but the frequency of flooding will be reduced. One could argue that all residences and business

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

would benefit from increasing the level of protection because Highway 58 near Yerba Buena Creek would remain passable. The assessment could be structured such that all parcels in the community receive a minor assessment for the improvements to Highway 58, but the majority of the assessment would be levied against properties within the floodplain.

California Department of Transportation: Cooperative Drainage Projects

Caltrans will cost share projects implemented by a local agency that benefit Caltrans facilities. Since Project 6 will reduce the frequency of flooding on Highway 58, Caltrans will likely cost share the proposed improvements. The cost to Caltrans is based on the benefit received from the project. While it is uncertain the percentage of project cost that could be shared with Caltrans, it is likely that the community could leverage outside funding through a Cooperative Agreement.

U.S. Army Corps of Engineers: Flood Hazard Mitigation and Riverine Ecosystem Restoration Program or Section 205 of the Continuing Authorities Program

CSA 23 with assistance from the District, should request that the Corps conduct a reconnaissance analysis of the Yerba Buena Creek flooding to determine if Federal interest exists in mitigating the community's flooding problem. The reconnaissance phase is the first step in the Corps' project development process. The reconnaissance phase is paid for by the Corps and no sponsor (CSA 23 or District) funds are required. The primary purpose of the reconnaissance phase is to determine if there is Federal interest in proceeding with the second, or feasibility phase. If the Corps determines that the economic benefits to solving the flooding problem warrants Federal involvement, then the community will be expected to sign a Feasibility Cost Sharing Agreement (FCSA) and send a letter to the Corps attesting to the local sponsor's ability to financially support a portion of the study costs. As explained in the local funding section, an established local funding source will help the community leverage outside funding. The reconnaissance phase typically requires 12 months to complete.

California Programs: Urban Streams Restoration Program, Proposition 13 Watershed Protection Program, and the Governor's Office of Emergency Services

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. The Governor's Office of Emergency Services administers the Flood Mitigation Assistance Program. These grants could provide Santa Margarita with funds to alleviate reoccurring flooding problems and to reduce claims on the National Flood Insurance Fund (NFIF).

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 proposed projects discussed in Chapter 3. The proposed projects 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 proposed projects for Santa Margarita total approximately $6.2 million. If the lead agency in Santa Margarita established a funding source, approximately $440,000 per year would have to be generated by the community in order to build all the projects and pay off a municipal bond[27].

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.

6.1.2 CSA 23 Serve as Lead Agency

Santa Margarita County Service Area 23 has authority to provide drainage services. CSA 23 should continue in this role and serve as the lead agency for the proposed projects.

6.2 Recommended Alternative: Project 3 Detention Basins in Parallel

The proposed alternative project that provides the most benefit in terms of flood protection and damage reduction is Project 3, off-channel detention basins in parallel. This project provides the greatest reduction in peak flow and improves the level of protection within Santa Margarita from less than a 10-year flood to a 25-year flood level. This project also protects local businesses, the planned downtown enhancement area, and reduces the frequency of flooding on Highway 58. In terms of permitting and planning, this project is also the most complicated.

6.2.2 Implementation Steps

6.2.2.1 CSA 23 Requests that the Corps Conduct Reconnaissance Analysis

CSA 23, with assistance from the District, should request that the Corps conduct a Section 205 Flood Control Project reconnaissance analysis as part of the Corps' Continuing Authorities Program. The primary purpose of the reconnaissance phase is to determine if there is Federal interest in proceeding with the second, or feasibility phase. The interval between the first request to conduct a reconnaissance phase and initiation of the analysis could span six months to one year. The actual study typically requires one year to

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

complete, so the total duration from initial request to completion could last 18 months to two years. If the study concludes that there is a Federal interest in improving flood protection in Santa Margarita, then the project proceeds to the feasibility study phase. The total duration for a Corps project (includes reconnaissance, feasibility, design and construction) is approximately seven years.

6.2.2.2 Lead Agency Prepares Basis of Design Report

If the Corps' reconnaissance analysis determines that there is no Federal interest in the project, then CSA 23 would need to implement the project. CSA 23, with support from the residents living within the community, would fund and complete a Basis of Design Report within 15 months of start. The Basis of Design Report will 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. The Basis of Design Report should provide cost information in sufficient detail to initiate property based fee or benefit assessment proceedings.

If CSA 23 seeks Federal involvement with the Corps for the detention basin project, then this phase (referred to as the Feasibility Study Phase in Corps Civil Works process) would last approximately two to three 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 CSA 23 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

CSA 23 would conduct a benefit assessment proceeding for the properties that benefit from the improvements. Properties within the 100-year floodplain receive the majority of benefits from the improvements. It is estimated that approximately 180 homes are located within the 100-year floodplain. Residents also benefit from reduced frequency of Highway 58 flooding. 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 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 is approximately 12 months. Accounting for the potential impacts to sensitive species, proposed construction within a creek bank, and issues related to Native American burial sites, preparing the environmental CEQA document and resource agency permits could last 18 to 24 months, and would begin after approval of the assessment fee.

6.2.2.6 Construction

CSA 23 would advertise the project and oversee construction. It is assumed that the duration would be approximately 12 to 18 months, depending on environmental mitigation requirements. Conditions of the resource agency permits may only allow construction within the creek bank between the months of April to October.

6.2.3 Cost Estimate

The total cost for Project 3 is approximately $2.0 million (excludes land acquisition costs from the Ranch).

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 from Highway 58 contributes a minimal amount of flow to Yerba Buena Creek. However, the highway culvert represents one of the primary constrictions in the channel, and the highway stands to benefit from the proposed upstream improvements. For this discussion, it is assumed that Caltrans would contribute 20 percent of the detention basin costs, or approximately $400,000. Based on these simplifying assumptions, and assuming that 180 homes are located within the floodplain, the local cost share to be funded via a benefit assessment would be $1,600,000, which equates to approximately $630 per parcel per year[28].

If the Corps implements this project, then the community would pay between 35 to 50 percent of the project costs, depending on the project objectives. This equates to $700,000 to $1,000,000, which is approximately $275 to $400 per parcel per year[27]. There is a definite cost savings benefit to include the Corps as the Federal sponsor.

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 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 6-1. If this project was implemented from initiation to completion without delay, then the regional detention basin and appurtenant facilities could be completed in approximately 4.5 to 6 years. A typical Corps project could be completed in 7 years.

[28] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years. Also assumes that approximately 25 parcels in Santa Margarita 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 6-1: Forecast Durations for Major Tasks

MILESTONE	DURATION
Lead Agency Prepares Basis of Design Report	15 months
Benefit Assessment Election	6 months
Caltrans Cooperative Agreement [1]	6 months
Design [1]	12 months
CEQA/ Resource Agency Permits [1, 2]	18 to 24 months
Approvals and Advertise for Construction	4 months
Construct Drainage Improvements [3]	12 to 18 months
Total	**~ 4.5 to 6 years**

Notes:
1: Design, CEQA and Caltrans Cooperative Agreement occur concurrently
2: Duration for CEQA and Resource Agency Permits depends on the complexity and presence of sensitive species and their habitat
3: Depends on scope of project, complexity of construction staging, and environmental mitigation requirements.

6.3 Recommended Projects 5, 6, 7 and 8

Project 5 should be implemented regardless of the direction the community selects for implementation of the other projects. Projects 6, 7 and 8 could all be implemented to improve local drainage. The implementation steps for each project would be similar, with the primary difference being the method of funding for each project. The phasing of Projects 6, 7 and 8 would depend on the residents' desire to implement projects within their neighborhood. Project 6 works independently of 7 and 8, however, the proposed storm drain for Project 7 would improve the collection and conveyance of drainage ditch runoff and the proposed levee runoff. For the purposes of this summary, it is assumed that all projects are implemented.

The other exception to the implementation steps is the level of CEQA documentation discussed in Chapter 4 of this report. For example, the proposed levee and storm drain projects include excavation of possible Native American burial sites and the construction of a new creek outfall, which increases the level of CEQA documentation and resource permit approval. Project 8 qualifies 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.

6.3.2 Implementation Steps

The implementation of these four projects 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 creek channel maintenance, drainage ditches, and the storm drain would likely be funded using a property based fee. 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 creek, and should therefore contribute a *pro rata* share of the costs. The south side levee benefits properties located on the southern perimeter of the community and would likely pay for the project through an assessment.

6.3.2.1 Lead Agency Prepares Basis of Design Report

CSA 23, with support from the residents living within the community, would fund and complete a Basis of Design Report. The Basis of Design Report could be completed within 12 months of start for each project. If all four projects are included as one report, then an additional 6 to 9 months should be added to the schedule. 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. The Basis of Design Report should provide cost information in sufficient detail to initiate property based fee or benefit assessment proceedings.

6.3.2.2 Conduct Benefit Assessment Proceedings or Property Based Fee

A property-based user fee may be more appropriate than an assessment fee for Projects 5, 7 and 8, 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 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.

CSA 23 would conduct a benefit assessment proceeding for the properties that benefit from the levee improvements for Project 7. Properties along the southern perimeter receive the majority of benefits from the improvements. It is estimated that approximately 100 homes would benefit from the levee. 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.

6.3.2.3 Design Project, Prepare Environmental Documents and Permits

If the community supported the project by approving a property based fee or 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 is approximately 12 months. Accounting for the potential impacts to sensitive species, proposed construction within a creek bank, and issues related to Native American burial sites, preparing the environmental CEQA document and resource agency permits could last 18 to 24 months, and would begin after approval of the property based fee or benefit assessment. If the drainage ditches are implemented as a stand alone project, then the design and CEQA could be completed within 1 year.

6.3.2.4 Construction

CSA 23 would advertise the project and oversee construction. It is assumed that the duration would be approximately 12 months, depending on environmental mitigation requirements. Conditions of the resource agency permits may only allow construction within the creek bank between the months of April to October.

6.3.3 COST ESTIMATE

The total cost for Projects 5, 6, 7 and 8 is broken down in Table 6-2.

Table 6-2: Local Project Cost Estimate

PROJEC	COST ($)
5	432,000
6	231,000
7	2,724,000
8	771,000
Total	**4,158,000**

6.3.3.1 Local Cost Share

This section is included for discussion purposes only and will likely be revised as cost estimates are refined.

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 was not identified. The entire cost would be borne by the property owners.

For Project 6, local cost share to be funded via a benefit assessment would be $231,000, which equates to approximately $165 per parcel per year[29]. The assessment on individual properties assumes that 100 homes benefit from this 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.

[29] Assumes a municipal bond rate of 5 percent, paid off over a period of 25 years. Also assumes that approximately 25 parcels in Santa Margarita 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.

6.3.4 TIMEFRAME FOR 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 6-3. If this project was implemented from initiation to completion without delay, then the regional detention basin and appurtenant facilities could be completed in approximately 4 to 5.5 years.

Table 6-3: Forecast Durations for Major Tasks

MILESTONE	DURATION
Lead Agency Prepares Basis of Design Report	12 to 18 months
Benefit Assessment or Property Based Fee Election	6 months
Design [1]	9 to 12 months
CEQA/ Resource Agency Permits [1, 2]	12 to 24 months
Approvals and Advertise for Construction	4 months
Construct Drainage Improvements [3]	12 months
Total	**~ 4 to 5.5 years**

Notes:
1: Design, CEQA and Caltrans Cooperative Agreement occur concurrently
2: Duration for CEQA and Resource Agency Permits depends on the complexity and presence of sensitive species and their habitat
3: 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. Land Use Ordinance, Title 22 of the County Code, January 1, 2003
3. Yerba Buena Creek Drainage Investigation, San Luis Obispo Flood Control District, 1966
4. Corps of Engineers Partnership Kit, 2000
5. Santa Margarita Enhancement Plan, San Luis Obispo County, Department of Planning and Building, 2003
6. Santa Margarita Design Plan, San Luis Obispo County, Department of Planning and Building, 2003
7. Final Program EIR for the Draft Salinas River Area Plan, June 1993
8. Flood Control and Drainage Investigation of the Santa Margarita Ranch, Schaaf & Wheeler, July 1, 1987
9. Santa Margarita Ranch, Program EIR, Appendix C, Draft Constraints Analysis, March 1994

Appendix A

FIGURES

APPENDIX A

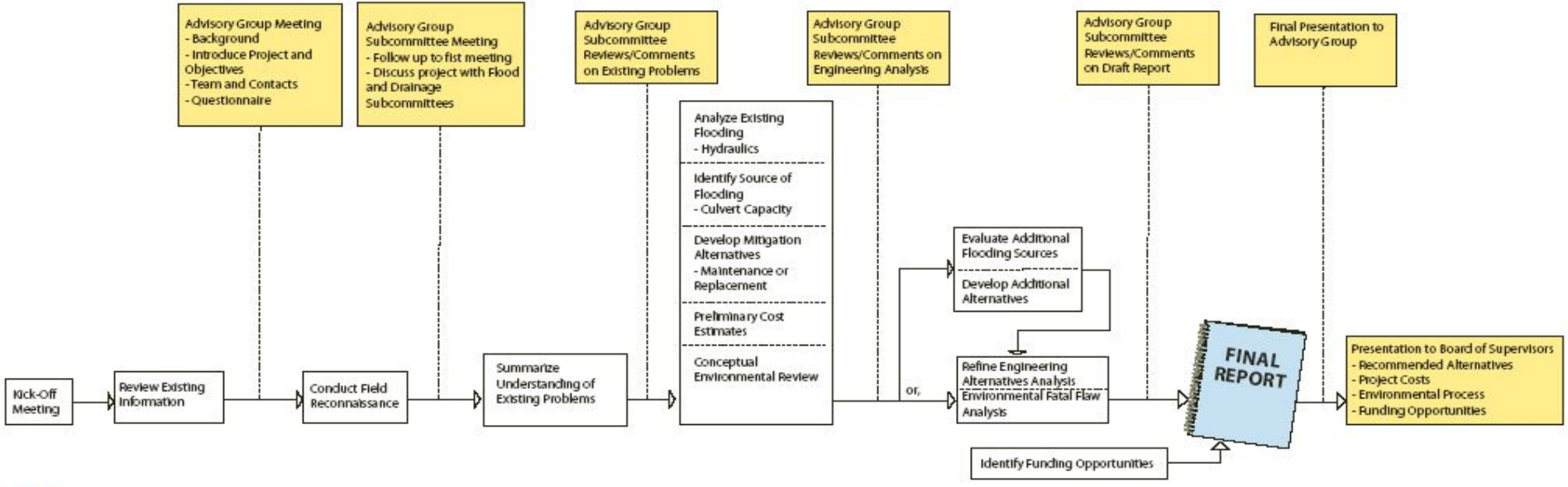
FIGURES

COUNTY OF SAN LUIS OBISPO

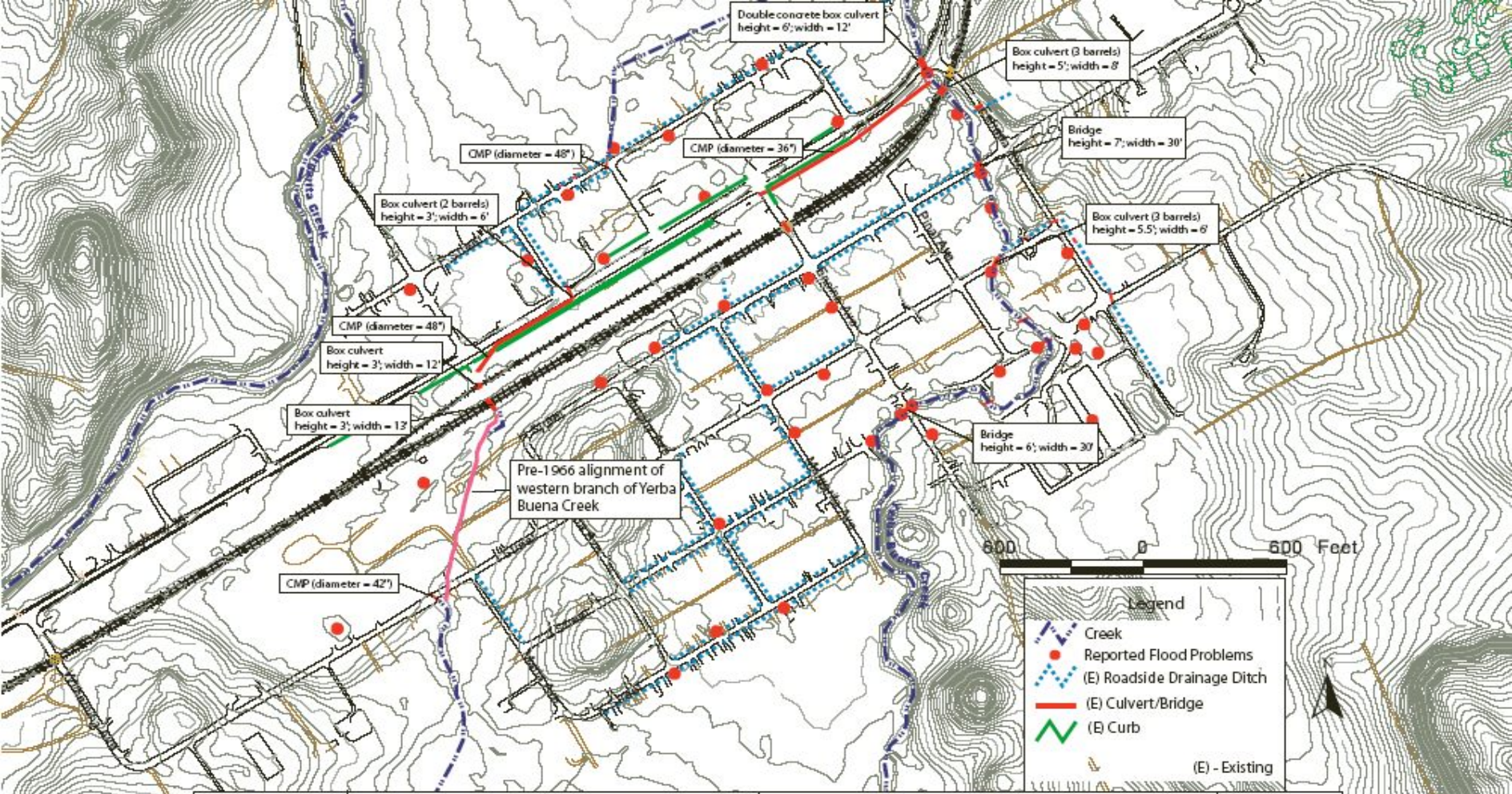
Community Drainage and Flood Control Studies

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

Study Flow Chart



RMC



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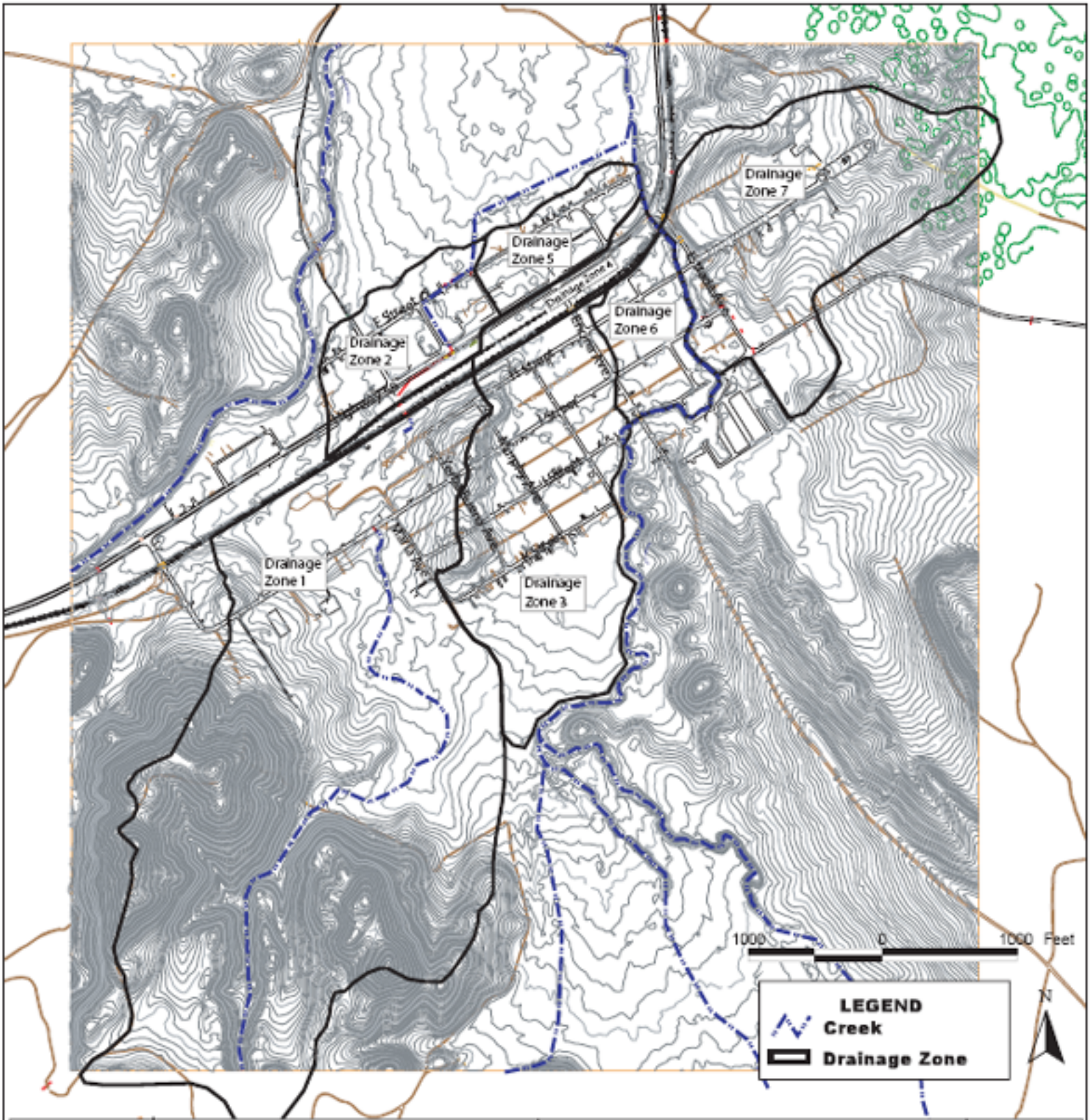
SLO H&H
Project No.:
210176
Date:
May 2003
Path:
Z:\2001\210176

QUESTA ENGINEERING CORP.
Civil Environmental & Water Resources
P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807
Modified by RMC, November 2003

Santa Margarita
Drainage and Flood Control Study

Existing Drainage Facilities & Areas of Reported Flooding

Appendix A
Figure
2



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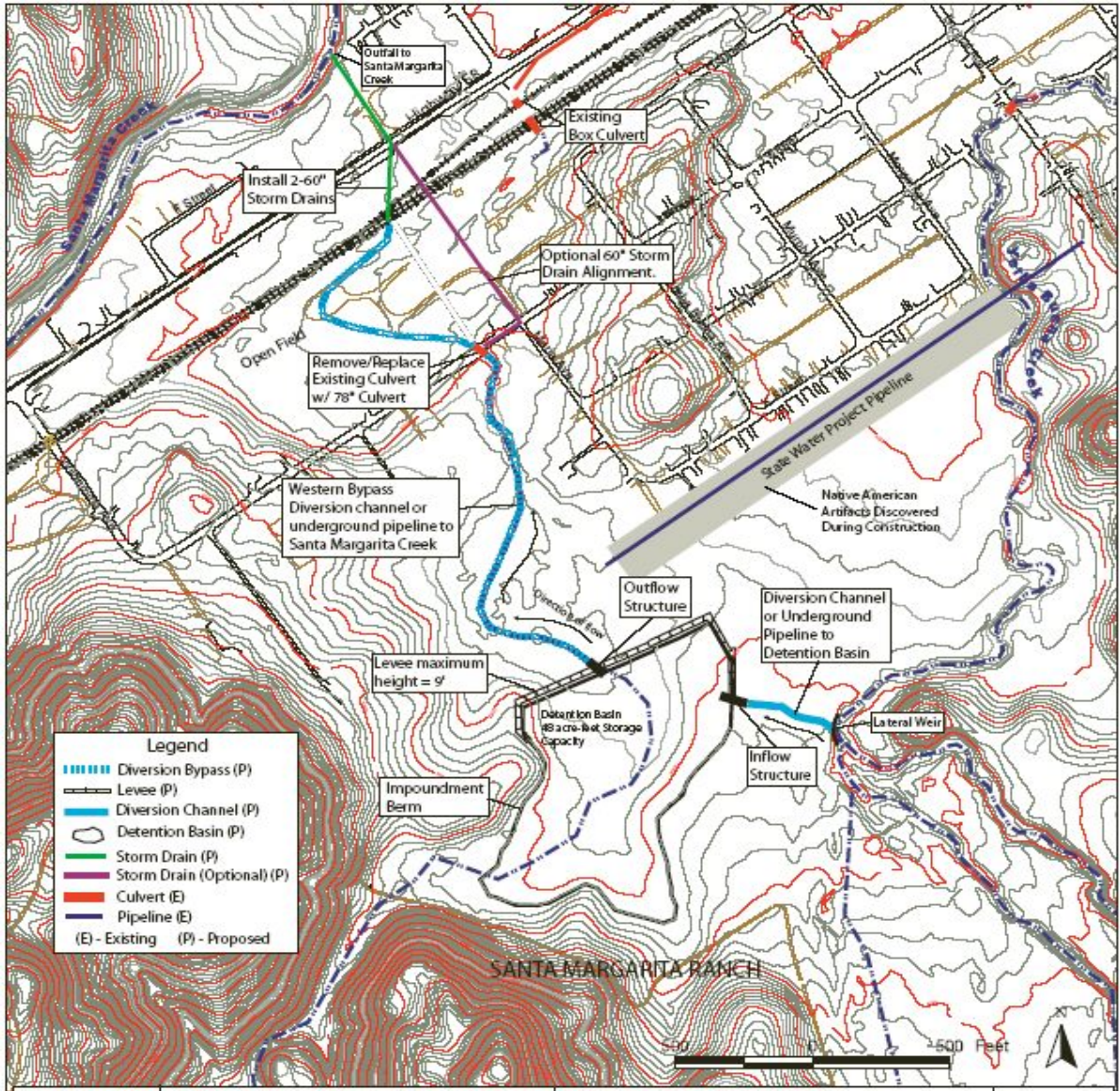

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Project No.: 210176
Date: May 2003
Path: Z:\2001\210176

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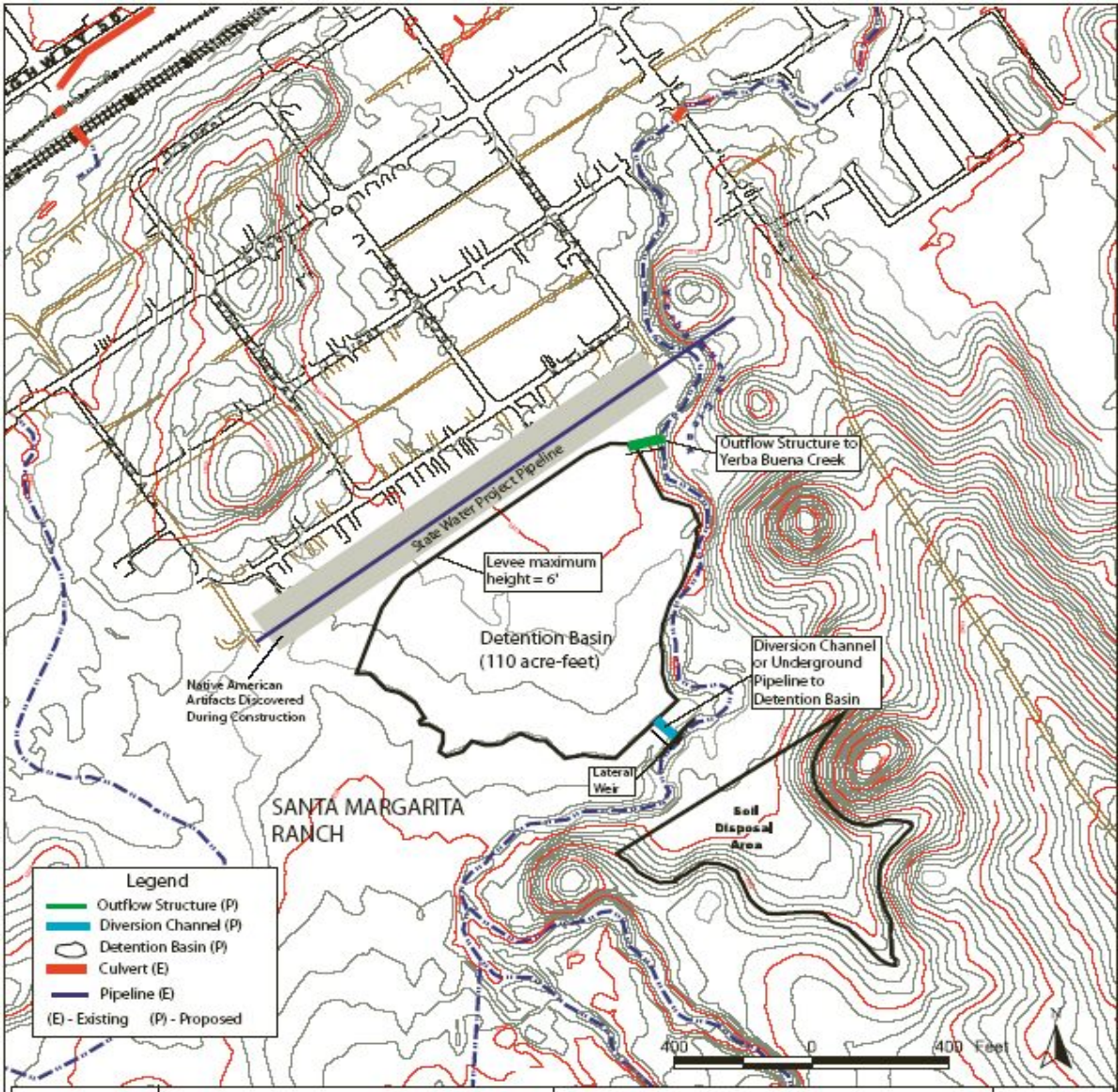
Santa Margarita
Drainage and Flood Control Study
Project 1
Western Bypass to Santa Margarita Creek with Offline Detention Basin

Appendix A
Figure
4



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Project No.: 210176
Date: May 2003
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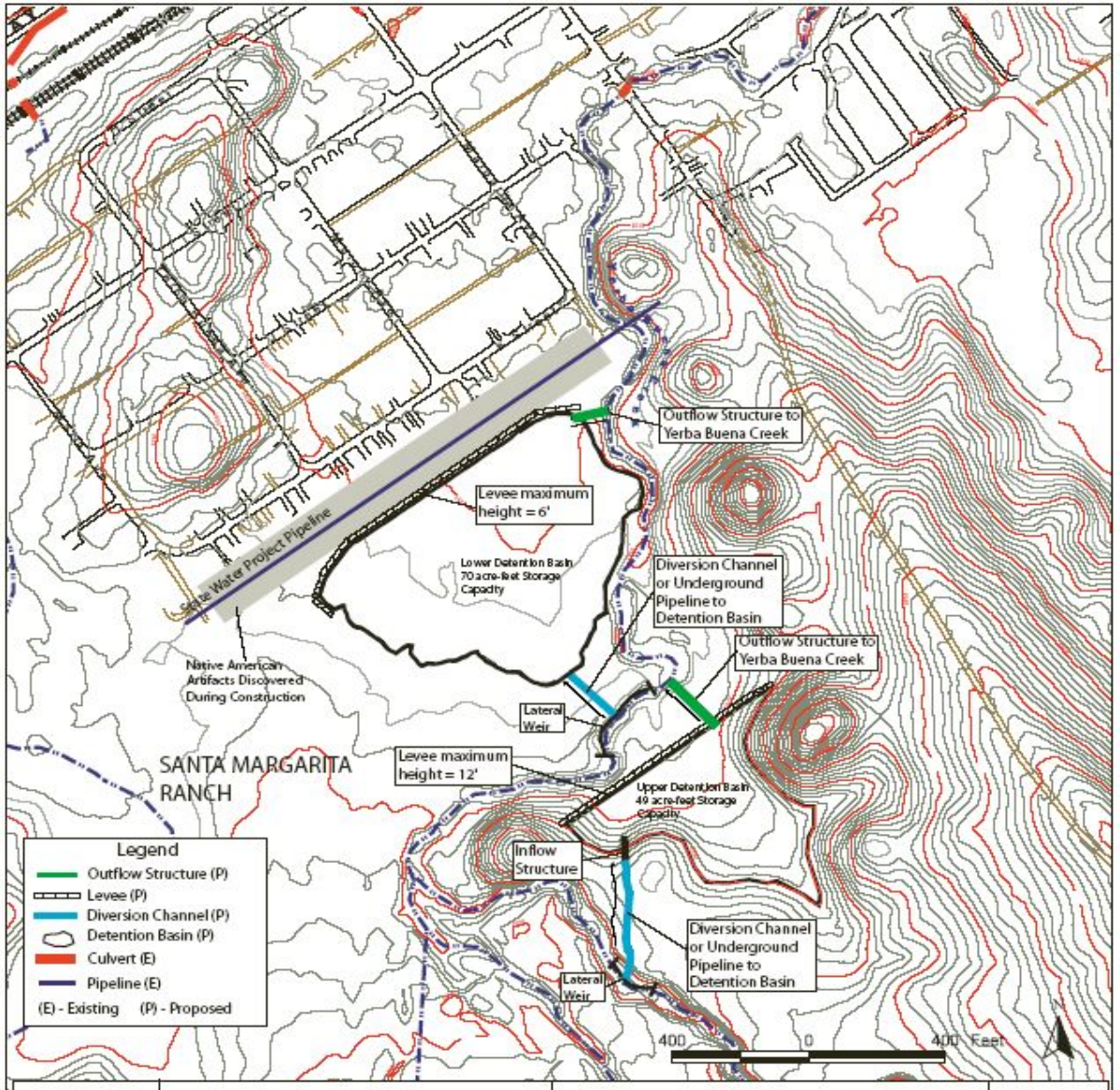
Santa Margarita
Drainage and Flood Control Study
Project 2
Single Off-Channel Excavated Detention Basin

Appendix A
Figure
5



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Project No.: 210176
Date: May 2003
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Civil Environmental & Water Resources
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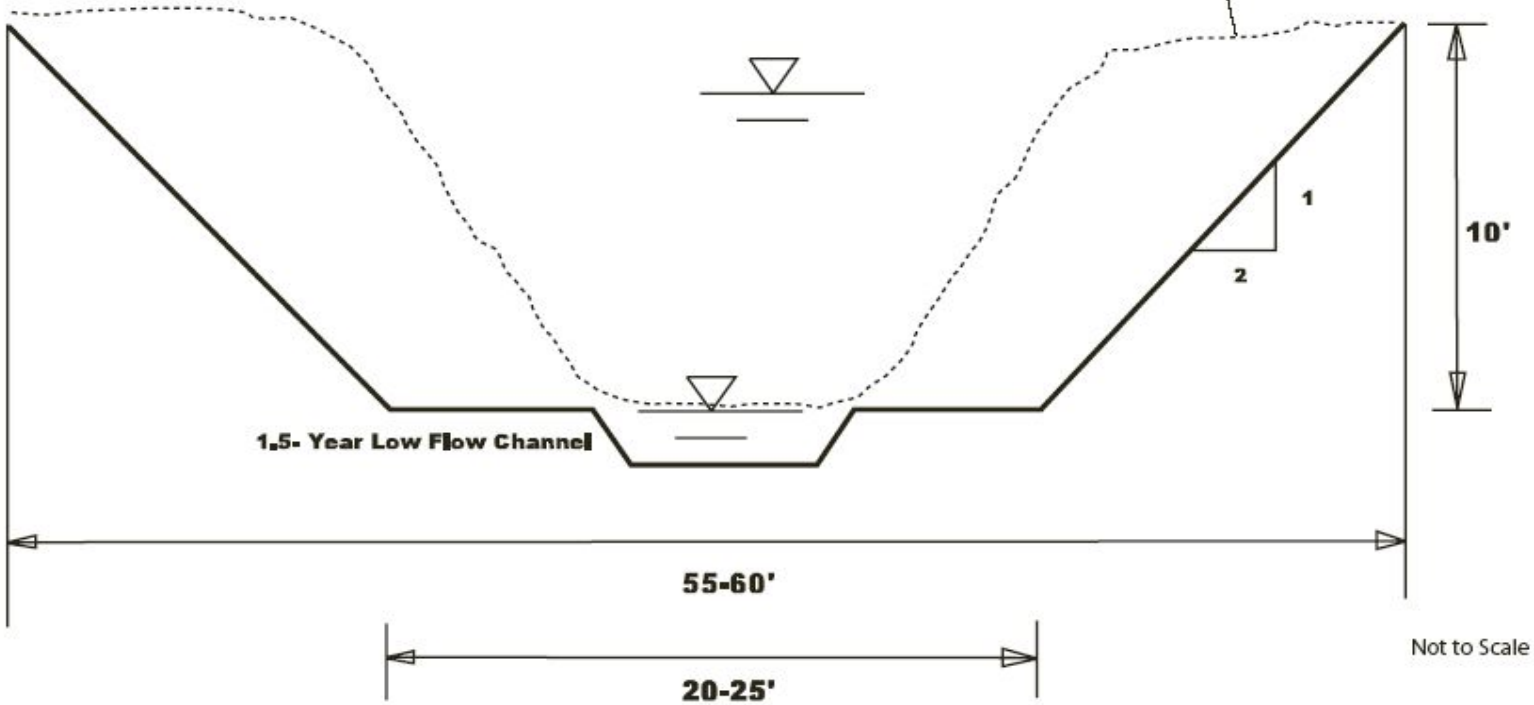
Santa Margarita
Drainage and Flood Control Study
Project 3
Yerba Buena Creek Detention Basins in Parallel

Appendix A
Figure
6

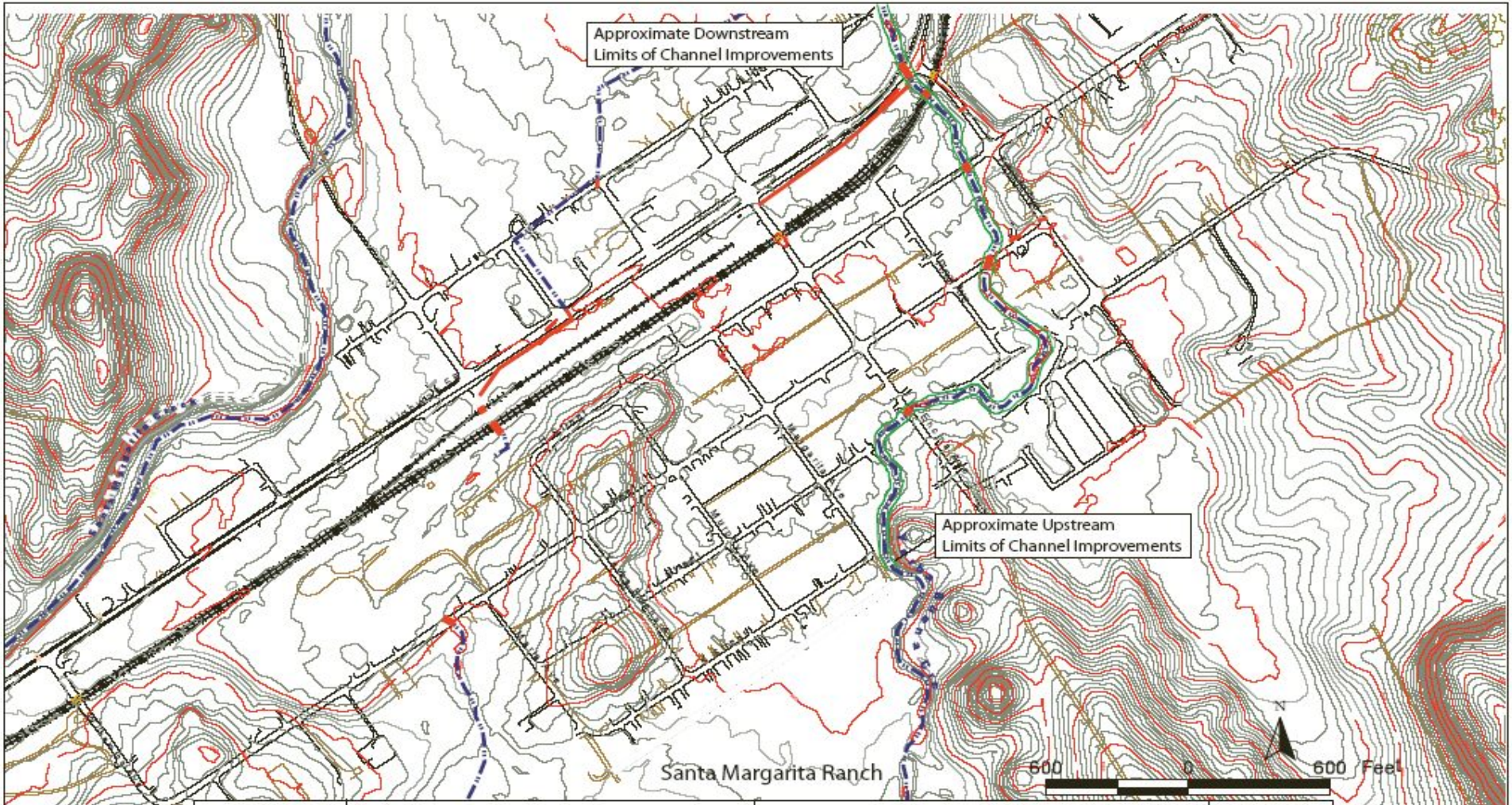
100-Year Design Flow Parameters
Q = 2,570 cfs
Depth = 9 feet (10 feet with freeboard)
V = 7 fps
slope = 0.3 %

Existing channel cross section area varies depending on location.
Downstream channel near railroad, crossing approximately 25 feet wide.
Upstream near J Street and K Street, channel width reduces to approximately 15 feet.



Not to Scale

Project Name: SLO H&H Project No.: 210176 Date: May 2003 Path: Z:\2001\210176	QUESTA ENGINEERING CORP Civil Environmental & Water Resources PO Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807 Modified by RMC, November 2003	Santa Margarita Drainage and Flood Control Study Project 4 Channel Modification Typical Cross Section	Appendix A Figure 7



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Project No.:
210176
Date:
May 2003
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Environmental
& Water Resources
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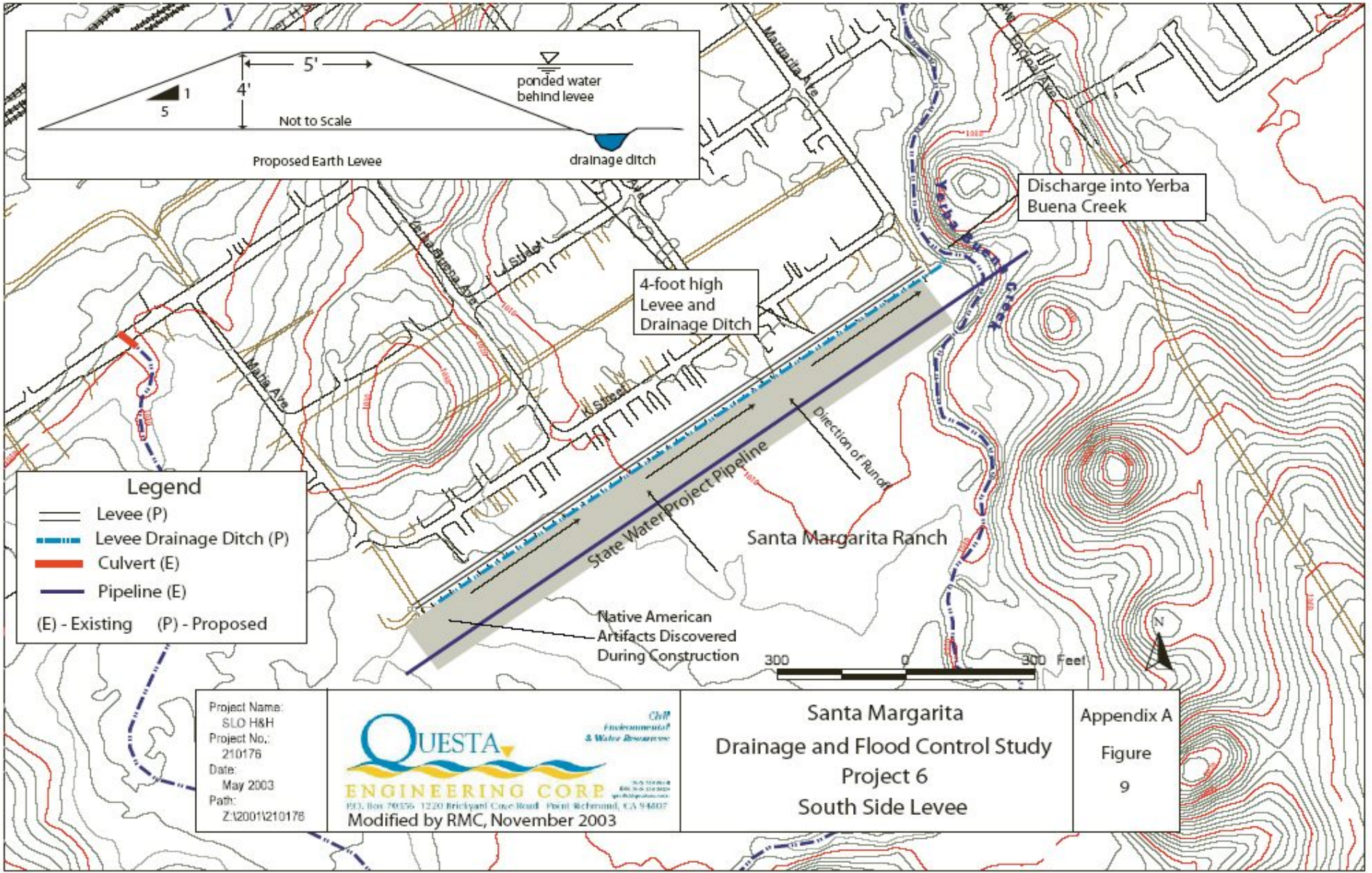
Santa Margarita
Drainage and Flood Control Study
Project 4 - Plan View
Channel Improvements and Bridge Replacement

Appendix A
Figure
8


5'
4'
1
5
ponded water
behind levee
Not to Scale
Proposed Earth Levee
drainage ditch
Discharge into Yerba
Buena Creek
4-foot high
Levee and
Drainage Ditch
Direction of Runoff
State Water Project Pipeline
Santa Margarita Ranch
Native American
Artifacts Discovered
During Construction
Legend
Levee (P)
Levee Drainage Ditch (P)
Culvert (E)
Pipeline (E)
(E) - Existing (P) - Proposed
300 0 300 Feet
N
Project Name:
SLO H&H
Project No.:
210176
Date:
May 2003
Path:
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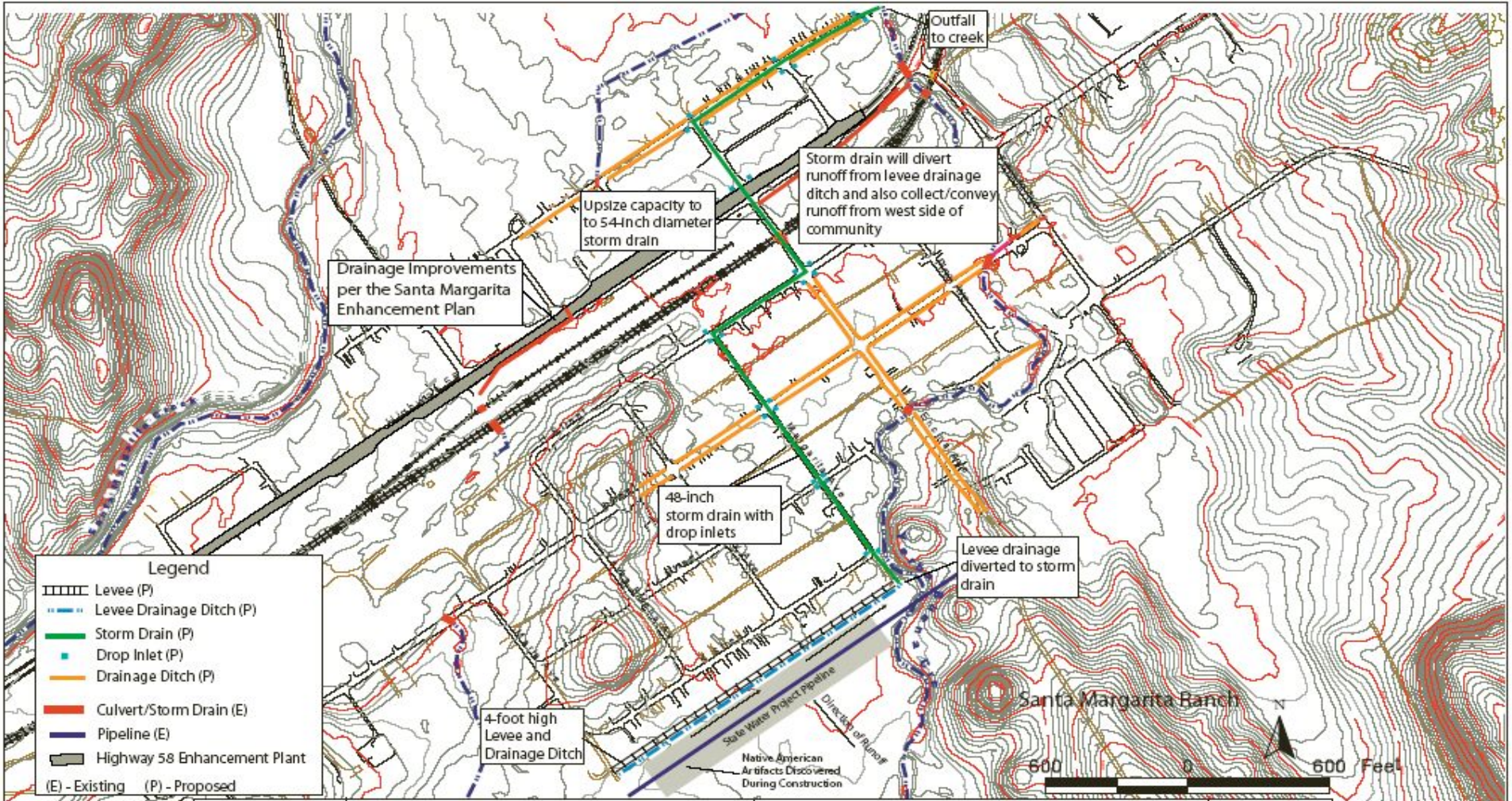
QUESTA
ENGINEERING CORP
Civil
Environmental
& Water Resources
Modified by RMC, November 2003
Santa Margarita
Drainage and Flood Control Study
Project 6
South Side Levee
Appendix A
Figure
9



Project Name: SLO H&H
Project No.: 210176
Date: May 2003
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Civil, Environmental & Water Resources
P.O. Box 70356, 1220 Brickyard Cove Road, Point Richmond, CA 94807

Modified by RMC, November 2003

Santa Margarita
Drainage and Flood Control Study
Project 7 and 8
Underground Storm Drain with Ditch Improvements

Appendix A
Figure
10

Appendix B

PHOTOGRAPHS

APPENDIX B

PHOTOGRAPHS

Photograph 1: Culvert crossing at UPRR

Photograph 2: Culvert crossing at Highway 58

Photograph 3: Excessive Vegetal Growth downstream of I Street Culvert Crossing

Photograph 4: Encina Avenue Bridge

Photograph 5: Roadside drainage swales and driveway culverts

Appendix C

COMMUNITY QUESTIONNAIRE AND RESPONSES

APPENDIX C

COMMUNITY QUESTIONNAIRE AND RESPONSES

COMMUNITY DRAINAGE AND FLOOD CONTROL STUDY QUESTIONNAIRE

Santa Margarita

Why should I complete this questionnaire? We need your help in identifying existing flooding problems in Santa Margarita. 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?

Santa Margarita Resident Identified Drainage Problems and Locations

	Property Address	Comment
	Maintenance Problems	Identified by Residents
1	Margarita St. & El Camino Real	Obstruction in drainage facility.
2	2128 G St.	Ditches around house need cleaning.
3	22175 F St.	Ditches across from house need cleaning.
4	9712 Pinal – Space A-9	Clogged ditch near home.
5	22371 I St.	Clogged, shallow culverts are everywhere.
6	2206 J St.	Creek in front of J Street needs to be cleaned out.
7	2308 I St.	There were ditches at Ranch/town juncture at K & F Streets.
8	22116 I St.	Bridge at I St clogged.
9	2204 G St.	Clogged drain near Pintor's gas station.
10	H & Margarita	Channels need cleaning, widening & grading; County installed 15" vs. 18" culvert.
11	22545 K St.	Clean out creek.
12	2325 J St.	Clean out creek.
13	9690 Encina	Clogged ditch southeast of bridge on Encina.
14	22110 I St.	Unmaintained culvert near home.
15	22510 K St.	Clogged culverts near home and on I St.
16	J St.	22325 J St. clogged culvert.
17	Near Park	Flooding near park is a safety concern – possible contamination and children play in it.
18	22122 I St.	Lack of streambed maintenance.
19	9602 Encina	Vegetation in creek is worse than ever before.
20	Culvert near El Camino Real	Culvert near El Camino Real and Highway 58 too high to drain creek near park, causing park and surroundings to flood.
21	22506 K St.	Culverts clogged. Flooding in March 1995 flooded garage and our neighbor's home.
	Drainage and Flooding Problems	
22	9700 Murphy Ave.	Several homes flooded at Murphy and J Streets
23	No Address Provided	6-inches of flooding through yard and home.
24	No Address Provided	Storm water entered home.
25	No Address Provided	4-inches of flooding in home.
26	No Address Provided	Home floods frequently. 6 to 8 times since 1983.
27	2200 El Camino Real	7" to 8" in building during 100-year storm.
28	2308 I St.	House flooding 5 times.

29 22460 K St.	4” of water inside house.
30 22555 K St.	Flooded twice in 15 years. Several inches of water in house.
31 2525 K St.	During heavy storms, farm land south of town floods and runoff flows onto property bordering K St. Up to 2 feet of runoff flowed through back yard. Water entered home, destroying carpet and furniture. Creek obstructions prevent conveyance of runoff.
32 22254 F St.	Flooding at corner of Margarita Ave. and F St. Runoff floods yards, streets and some homes. Up to 10” of flooding. Roadside ditches need to be cleaned and deepened.
33 22305 H St. B	House near corner of Encina and H St., partially flooded with a couple of inches in February 1998. The southwest end of the alley between H & I always floods.
34 No Address Provided.	Home on J St., between Murphy and Yerba Buena Ave. flooded garage and yard with about 1 foot of water in 1998. Home on raised foundation, so it survived.
35 22110 F St.	March 5, 2001, Trout Creek next to our property, overflowed into our yard and garage. Happened once in the last 3 years. Maintenance and increase in channel capacity needed. When creek overflows, it runs down F St, flooding every house on the north side for about 100 yards.
36 22111 I St.	Flooding of yard and driveway at I Street and Yerba Buena Ave.
37 22155 I St.	1 foot of flooding, twice in the last 5 years. House next door was flooded and my house was within inches of flooding.
38 No Address	Flooding of Highway 58 and railroad area between Murphy and Margarita.
39 1918 J St.	Corner of Estrada and Highway 58, flooding of up to 1 foot occurs approximately every three years. Creek crossing at Highway 58 filled with debris.
40 22232 F St.	Flooding between Encina and Pinal on the west side (ranch side) of the street. 4” of flooding in my garage. Neighbors house was damaged.

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

for

Santa Margarita, San Luis Obispo County, California

Prepared by:

Questa Engineering Corp.
1220 Brickyard Cove Road
suite 206
Richmond, CA 94807

May 19, 2003

DRAFT TECHNICAL MEMORANDUM
San Luis Obispo County Hydrology and Hydraulics Study
SANTA MARGARITA COMMUNITY

EXECUTIVE SUMMARY

This report summarizes the existing drainage conditions, discusses the nature of drainage/flooding problems, and identifies 9 potential projects to mitigate the problems within the Santa Margarita Community. Generally, drainage/flooding problems in the Santa Margarita Community are the result of inadequate channel and culvert capacity in Yerba Buena Creek, the accumulation of sediment and debris in roadside drainage ditches, and run off from higher elevation properties along the southern border of the community. During large storm events, storm water ponds in low lying areas of the community, flooding roadways and sometimes causing damage to homes and private property.

The flooding problems can be divided in two general categories. The first problem category is related to Yerba Buena Creek capacity and is addressed by Projects 1, 2, 3, 4 and 5. Project 1 bypasses and detains a portion of Yerba Buena Creek flow, Project 2 increases creek capacity by opening up the channel cross section, Project 3 detains runoff in a series of two basins, Project 4 examines the effectiveness of a single off channel detention basin, and Project 5 discusses vegetation management in Yerba Buena Creek. The second problem category is associated with drainage in town and can be rectified by construction of a levee. Project 6 and 7 both involve capturing runoff from the upstream watershed and conveying it to Yerba Buena Creek. Project 8A and 8B involve detailed evaluation and rehabilitation to the existing drainage systems within the community. Project 8A examines the roadside ditch system within the residential areas of the community. Project 8B involves a subterranean storm system for the commercial areas.

The preliminary costs for the proposed projects are shown below:

Summary Cost Table

Project 1. Western By-Pass	$ 1,606,982
Project 2. Yerba Buena Creek Channel Modification	$ 4,800,750
Project 3. Detention Basins in Series	$ 1,436,895
Project 4. Single Off-channel Excavated Detention Basin	$ 1,387,870
Project 5. Vegetative Management	$ 354,750
Project 6. South Side Levee	$ 152,116
Project 7. South Side Levee and Culvert	$ 840,316
Project 8A. Road Drainage Ditch Rehabilitation	$ 790,135
Project 8B. Commercial District Subterranean Stormdrain Line	$ 684,500

INTRODUCTION

The purpose of the drainage and flood control study is to examine the existing drainage conditions of the Santa Margarita Community, identify and report problematic areas and issues, present conceptual solutions to the identified drainage and flood control problems, and provide a discussion of the methodology used to evaluate drainage problems. The discussion is based on: review of available drainage reports for the Santa Margarita Community; review of Community Drainage and Flood Control Study Questionnaires; coordination with San Luis Obispo County Planning and Public Works Departments; review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs); and field mapping and project alternative development conducted by Questa Engineering Corporation.

ENVIRONMENTAL SETTING

Climate and Topography

The community of Santa Margarita is situated in central San Luis Obispo County, within the Coast Range Geomorphic Province of California. The Coast Range Geomorphic Province is characterized by a series of northwest-trending valleys and mountain ridges that run parallel to the coast. The community is bordered to the west by the Santa Lucia Mountains and to the southeast by La Panza Range. Runoff from these mountains flows north through the level floodplain area on which the community is situated, to the Salinas River. Mean elevation in the center of the community is approximately 1,000 feet above mean sea level (MSL).

The climate of the Santa Margarita Community is mild, with average temperatures ranging from a low of 42 degrees Fahrenheit in winter months to 79 degrees Fahrenheit during summer. The region's rainy season, typically extends from November to March. Average annual precipitation in the region is approximately 28 inches.

Surface Geology and Soils

Geology and soil characteristics can have a significant influence on local drainage patterns. In the lower areas of the community, surface geology is dominated by Holocene alluvial deposits of Yerba Buena and Santa Margarita creeks. Late Miocene and Pliocene marine sediment of the Santa Margarita Formation is found along the eastern edge of the community[1].

The relevant characteristics of Santa Margarita soils are listed in **Table 1**.

[1] Dibblee, Jr. T.W. 1974. Geologic Map of the San Luis Obispo 15-Minute Quadrangle, California.

TABLE 1:
RELEVANT CHARACTERISTICS OF SANTA MARGARITA SOILS

ID	Soil Series	Texture	Runoff Characteristics	Permeability
101	Aquolis	clay loam	slow	slow to very slow
129	Diablo	clay	medium	slow
130	Diablo and Cibo	clay	medium	slow
135 & 138	Elder	sandy loam	slow	moderately rapid
193	Psamments and Fluvents	sand and loamy sand	-	-
208	Still	gravelly loam	medium	moderately slow
212	Suey	silt loam	slow to medium	moderate

Source: U.S. Dept. of Agriculture, Soil Conservation Service, 1984. Soil Survey of San Luis Obispo County, California - Coastal Part.

Surface Hydrology

The surface hydrology in Santa Margarita is dominated by Yerba Buena and Santa Margarita creeks. Yerba Buena Creek, a tributary to Santa Margarita Creek, drains approximately 5.3 square miles. Yerba Buena Creek originates in shallow foothills located approximately 2.5 miles southeast of the community, meanders through the low-lying plain known as Miller Flat, and joins Santa Margarita Creek 3 miles north of the community. Flooding along Yerba Buena Creek has had adverse effects on the Santa Margarita Community. Generally, the flooding is the result of insufficient capacity within the channel.

Santa Margarita Creek is formed roughly 2.75 miles southwest of Santa Margarita in Los Padres National Forest. The creek winds in a generally northerly direction until its confluence with the Salinas River, about 3.75 miles north of the community. Major tributaries to Santa Margarita Creek include Yerba Buena, Tassajera, and Trout creeks. At its confluence with the Salinas River, Santa Margarita Creek drains an area of 37.4 square miles.

FEMA Flood Zones

The Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Map (FIRM) indicates that a significant portion of the Santa Margarita Community lies within the 100-year flood zones of Yerba Buena and Santa Margarita creeks. The FEMA flood zones for the community are illustrated in **Figure 1**. Previously calculated 100-year flows at critical locations along the creeks are depicted in **Tables 2 and 3**.

Table 2 Peak Flow Santa Margarita Creek [1]

Location	Drainage Area (sq mi)	100-year Flow (cfs)	Capacity (cfs)
Btwn HWY 101 and NW portion of Santa Margarita	11.8	5,200	5,200

Table 3. Peak Flow on Yerba Buena Creek

Location	Drainage Area (sq mi)	100-year Flow (cfs)	Capacity (cfs)
Channel through Miller Flat	3.4	2,310	2,000
Encina Culvert/Channel	4.2	2,570	1,700
I Street Bridge/Channel	4.9	2,990	700
H Street	4.9	2,990	700
Railroad Bridge / Channel	4.9	2,990	700
HWY 58 Bridge	4.9	2,990	700
Btwn HWY 58 and Santa Margarita Creek	4.9	2,990	800

1. Flood Control and Drainage Investigation of the Santa Margarita Ranch and Surrounding Area, Schaaf & Wheeler, 1987

Local Drainage Patterns

Drainage in the Santa Margarita Community was divided into seven drainage zones (Zones A1, A2, B1, B2, C, D, and E). Drainage zones and existing drainage infrastructure are shown in **Figures 2 and 3**.

Description of Existing Drainage Infrastructure

Runoff in Zone A1 originates south of the Community, in the foothills of the Santa Lucia Mountain Range. The runoff concentrates in a wide grassy swale that discharges to a 42 inch corrugated metal pipe (CMP) beneath I Street. A large depression on the north side of I Street causes runoff to pool, sometimes resulting in localized flooding problems during large storm events. Runoff continues in a generally northeast direction, to a concrete box culvert beneath the railroad tracks at Yerba Buena Avenue.

Runoff from Zone A1 is discharged into Zone A2 on the north side of the railroad tracks. A box culvert carries flows from beneath the railroad tracks east along Highway 58 to a grassy field at the junction of Murphy Avenue and Highway 58. Runoff continues in a generally northeast direction to the intermittent stream at Margarita Avenue and F Street. The intermittent stream flows northeast and joins with Yerba Buena Creek approximately 2000 feet downstream.

Runoff in Zone B1 originates near Miller Flat and is carried in a generally northern direction through the central portion of the community within a series of roadside drainage ditches.

Ultimately, runoff in Zone B1 is conveyed beneath the railroad tracks within a concrete culvert at Encina Street.

Zone B2 conveys discharge from Zone B1 as well as runoff generated along Highway 58. An existing storm drain that runs parallel to Highway 58 starting at Encina Avenue conveys runoff east and discharges to Yerba Buena Creek upstream of the highway box culvert.

Zone C is comprised of runoff from north of Highway 58 and east of Margarita Avenue. Runoff in this zone is typically carried within a series of roadside ditches to Yerba Buena Creek at F Street.

Zone D carries flows east of Encina Avenue and south of the railroad tracks in an eastern direction to Yerba Buena Creek. Runoff is conveyed in existing roadside drainage ditches in H Street and discharges to Yerba Buena Creek.

Zone E is located at the eastern edge of the community. Steep gradients in Zone E allow runoff to flow west to several points of discharge along Yerba Buena Creek. There are few reported drainage problems within Zone E.

These drainage zones were used to calculate flows of drainage structures in town as discussed in the Methodology Section.

EXISTING REGULATIONS AND DESIGN PLANS

San Luis Obispo County Curb and Gutter 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 remodeling improvements that are valued at 25 percent or greater than the current property home value
- New residential multifamily and single family categories within an urban reserve line
- All commercial and 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.

The San Margarita Community has shown an interest in retaining its rural character and therefore the application of curbs and gutters may not be desired.

The Santa Margarita Design Plan indicates that the downtown or commercial districts should have curbs and gutters. Some curb and gutters exist in some parts of the commercial area along Highway 58. The drainage throughout the rest of the community consists of roadsides ditches.

OVERVIEW OF DRAINAGE AND FLOODING ISSUES

Historically, Santa Margarita has had flooding problems. There are two main flooding problems in the community that can be addressed separately.

The first problem is flooding from large magnitude storm flows in Yerba Buena Creek.
The channel and its bridges through town are sized to carry flows that are not much larger than the 10-year event. Heavy vegetation, sediment deposition, and land constraints along the Creek alignment inhibit its conveyance capacity and cause flooding as shown in **Figure 1**. Historically, proposed solutions to this problem have been approached in two ways either by-passing the flows around the town or creating a detention basin on the Santa Margarita Ranch. Approximately 35 years ago, the concept of capturing and by-passing high flows around the community into Santa Margarita Creek was examined. Recently, a proposal to install a detention basin in the upper watershed just south of the community was investigated. This proposed facility was originally conceptualized as a dam constructed across the Yerba Buena Creek channel to intercept and divert creek flow to a basin. Due to environmental and other concerns, this concept was abandoned. Other solutions to the problem such as channel vegetation management and bridge replacement have been put forth. Vegetative management can reduce channel roughness and increase conveyance capacity. However, the gains in channel hydraulic capacity would be overshadowed by the constraints of the bridge crossings. Further, Yerba Buena Creek has significant riparian habitat. Any vegetative management plan would have to undergo a lengthy environmental review process and be permitted by State and Federal regulatory agencies. In short the problem of the flooding from Yerba Buena Creek has been analyzed numerous times, however, significant issues associated with the problem of flooding from Yerba Buena Creek remain unresolved.

Localized flooding throughout the community during large storms is the second major drainage issue in the community. The smaller more localized watersheds draining into the community drainage infrastructure generally cause this flooding. The community street side drainage infrastructure is sized only to handle small recurrent runoff events. During severe downpours or

significant runoff from upslope watersheds, these facilities are overwhelmed and shallow flooding occurs.

The worst flooding occurs along the south side community, located in Zone B1. Runoff from a small watershed of approximately 30 acres south of K Street combines with small overflows from Yerba Creek and causes a significant amount of overland flow to enter properties along K and J streets. This runoff into the community overwhelms the existing drainage infrastructure and causes flooding of low-lying areas. The flooding inundates several garages and has threatened to enter first floors of some houses. Along with the significant flooding in southern portions of the community, areas of small localized flooding occur throughout the community. The local community drainage system in Santa Margarita consists of a series of roadside ditches and driveway culverts, which are inadequate in conveying the flow. The ditches have been maintained sporadically, and it appears that sizes and carrying capacities have not been standardized.

SOLUTIONS TO DRAINAGE AND FLOODING ISSUES

Problem 1. – Flooding From Yerba Buena Creek

One of the main problems with the Yerba Creek channel is the hydraulic constraint presented by the bridges on the creek. The existing bridges in town have very limited capacity. In order to address flooding from the creek, four proposed alternative solutions to the problem have been developed. The four alternatives include:

- Yerba Buena Creek Western Bypass with an Offline Detention Basin
- Yerba Buena Creek Channel Improvements
- Off Channel Detention Basins in Parallel
- Single Off Channel Detention Basin

In order to reduce flows in the creek to the capacity of the existing culverts and bridges that cross Yerba Buena Creek, the peak flows must be diverted from the channel. These reductions create the need to temporarily store large amounts of runoff. Three of the four alternatives involve the construction of impoundments to temporarily detain storm water to reduce peak discharges. One primary consideration with the installation of a detention basin is the increase in regulatory requirements if the size of the basin places it under the jurisdiction of the California Department of Water Resources, Division of Safety of Dams (DSOD). Dams under jurisdiction are artificial barriers, together with appurtenant works, which are 25 feet or more in height or have an impounding capacity of 50 acre-feet or more. Any artificial barrier not in excess of 6 feet in height, regardless of storage capacity, or that has a storage capacity not in excess of 15 acre-feet, regardless of height, is not considered jurisdictional[2]. Jurisdictional dams have to be monitored closely and are substantially more costly to construct, maintain and operate. A recommended storm water management program is to develop enough storage to substantially reduce peak discharges in the creek but keep any proposed structures below jurisdictional size for simplicity

[2] Division of Safety of Dams Website, http://damsafety.water.ca.gov/about.htm

and ease of operation. Also, any flood control facility must have a minimum impact on the environment and not significantly alter the balance of sediment transport in the creek.

Three of these projects propose off-channel detention basins. Off-channel detention basins are structures which are not located on the creek channel itself. They are located away from the channel. A diversion structure, constructed along the banks of the creek, diverts flood flows into these structures. These structures detain the water for a certain amount of time and release the water back into the channel at a lower metered rate. These types of basins reduce the peak discharge caused by large magnitude storms.

Off channel basins have numerous benefits along with a lesser degree of environmental impacts than on-channel basins or dams. The system is designed to function so that no flow would be diverted from the channel until a minimum of 2-year flow recurrence is exceeded. From a geomorphic perspective, the 2-year flows are very important. They represent bank full flow and are responsible for 80 to 90 percent of the sediment transport of the system. The diversion is designed to reduce the geomorphic impacts by maintaining basic sediment transport levels while providing reduction in high flood flows. Thus geomorphic impacts such as channel incision and increased erosion are avoided. Also less sediment builds up in the basin thus reducing overall maintenance costs during the life of the structure. The off channel basins are also favorable from a fish passage standpoint. The basins only function during high flow events, fish can freely pass upstream and downstream, minimizing fisheries impacts.

In order to analyze these detention basins and structures, a hydrologic model of the watershed was developed. Modeling methodology is detailed in Appendix A of this Technical Memorandum. The model was developed to predict the rate of flow with respect to time within the watershed. Predicting the flow rate during a storm enables an estimation of required storage volume, since time multiplied by the rate of diversion equals the amount of volume runoff, which needs to be stored. The model also quantifies the timing at which water is released back into the system and therefore can predict peak discharges and the impact of the proposed detention basin on flows in the creek.

Project 1 – Yerba Buena Creek Western Bypass with an Offline Detention Basin

This alternative, displayed on **Figure 4,** routes high flows from Yerba Buena Creek into an off-channel detention basin. This detention basin meters flow out to an existing channel which travels through the community and discharges to Santa Margarita Creek. The aim is to reduce flows in Yerba Buena Creek such that the existing drainage channel and bridges flood less frequently resulting in a greater level of flood protection to the community. The capacity of the I Street culvert is approximately 700 cfs[3]. Flood flows in Yerba Buena Creek greater than 700 cfs could overtop the channel and cause flooding in the community.

The hydrologic watershed model was used to estimate the discharge in Yerba Buena Creek at the point of diversion and to evaluate the effects on the peak value of diverting flow into a detention basin and then into Santa Margarita Creek.

[3] Capacity referenced from Table D-1 of the Environmental Constraints Analysis prepred by Envicom Corporation for Santa Margarita Ranch, March 1994.

The criteria for sizing the detention basin were to reduce the flow as much as feasibly possible considering land availability constraints and limitations of the diversion facility. A secondary goal was also to keep the proposed detention basin out of the State's DOSD jurisdiction.

As the river crests towards 100-year flow, an increasing amount of flow is diverted into the diversion channel by way of a lateral weir. Up to 1,300 cfs of the 100-year flow (2,300 cfs) would be diverted into the detention basin, which would release flow at a maximum rate of 500 cfs into the proposed bypass channel that flows from the outlet structure to the railroad. This channel would traverse the southwestern side of the community. Two 48-inch underground pipes would convey the runoff from the railroad, through the residential and commercial areas of the community. The proposed facilities and alignments are shown on Figure 4. This diversion reduces peak flow in Yerba Buena Creek through town. **Table 4** compares pre and post project peak discharges in Yerba Buena Creek.

Optional Alignment
An alternative to conveying flow in an open channel between I Street and the railroad is to route the flow within two 48-inch storm drains in Maria Avenue. As shown in the figure, the storm drain crosses Highway 58 at the same point as the proposed alignment. The benefit to this alignment is that an open channel is susceptible to erosion and vegetal growth, both of which tend to change the channel carrying capacity. Conveying flow in a storm drain reduces erosion and conveys flow more efficiently. The primary drawback is that this project cost approximately $626,000 more than the proposed Western Bypass due to the additional storm drain installation costs.

Table 4. Comparison of Peak Flows with Project 1 at Encina Avenue

Recurrence Interval	Existing Conditions Peak (cfs)	Project 1 Peak (cfs)
2-year	233	233
10-year	916	675
25-year	1522	1022
50-year	2117	1264
100-year	2570	1423

The reader should note that even though the peak flow would be reduced, the channel capacity is limited by the culverts from I Street to Highway 58. The table represents a preliminary study level estimation in flow reduction. Further design work could improve the effectiveness of the basin. At a minimum, the project will increase flood protection in the community to the 25-year level. This level of protection reduces damage caused by the more frequent, less severe recurrent storms. Overbank flooding will still occur during the 100-year storm but the duration and severity of the flooding will be reduced.

Project 1. Western By-Pass

Item	Quantity	Unit Cost	Unit Price	Cost
Diversion Structure	1	LS	$ 75,000	$ 75,000
Bypass Cut	4720	CY	$ 7.00	$ 33,040
Impoundment Berm Fill	9014	CY	$ 7.00	$ 63,099
Detention Basin Outflow Structure	1	LS	$ 45,000	$ 45,000
Overflow spillway	1	LS	$ 20,000	$ 20,000
Channel Improvements	1500	L.F.	$ 125	$ 187,500
Pipe Lines (2 x 48")	1200	L.F.	$ 300	$ 360,000
Bore and Jack RR Crossing	1	L.S.	$ 35,000	$ 35,000
New Creek Outfall	1	L.S.	$ 15,000	$ 15,000
Wetland Mitigation	1	L.S.	$ 35,000	$ 35,000
			Subtotal	$ 868,639
Contingency			25%	$ 217,160
Design			20%	$ 173,728
Environmental /Administration			40%	$ 347,456
			Total	**$ 1,606,982**

Project 1. Pros and Cons. This alternative upgrades the conventional concept of the by-pass by using an off-channel detention basin so that the diversion channel and/or diversion pipe can be significantly reduced in size and cost. The significant project constraint is routing flow through the western side of the community to Santa Margarita Creek. When this alternative was previously proposed, minimal residential development existed within the by-pass channel area. However, this side of the community now has numerous homes within the flow path. The by-pass alignment crosses through these private properties as well as under the existing railroad right-of-way. There may be some opportunity to utilize an open channel system but long sections of pipe may be required to move the water through the community under existing roadways, which will significantly increase the cost. The proposed detention basin, diversion channel and lateral weir will also have to be constructed within an existing jurisdictional wetland area, complicating the environmental compliance and permitting process. It is likely that the project will be required to mitigate for the impacts of constructing within the channel and creek embankment, further increasing costs. The proposed detention basin is considered non jurisdictional size because it is less than 50 acre-feet in capacity and has a dam height less than 25 feet.

A positive aspect of the project is that the detention basin could be designed such that it stored water that could be used for irrigation and/or the creation of wetland habitat. Diverting the flow

will require permitting, and the effects (e.g. induced flooding) on Santa Margarita Creek would have to be evaluated and possibly mitigated.

The benefits gained in reducing flood damage in the community may not exceed the cost of the project. Based on the cost, potential environmental impacts, and problems with easements on private property, this proposed project may be difficult to implement.

Project 2 – Yerba Buena Creek Channel Improvements

The capacity of Yerba Buena Creek can be increased by replacing constricting bridges and widening the cross sectional area available to convey flow. The reach recommended for upgrade extends from the southern boundary of town and beyond the railroad tracks. Manning's equation was used to size a channel with adequate dimensions to carry the 100-year flow (2,990 cfs). A cross section with 2:1 side slopes, a bottom width of 20 to 25 feet, a channel slope of 0.3 percent, and a depth of 10 feet (includes 1-foot of freeboard) would convey the design flow at velocities in the 7 to 7.5 foot per second (fps) range. A conceptual cross section of the modified channel is displayed in **Figure 5**. In order to achieve this cross section, the creek's banks would be excavated and properties along the creek would be encroached upon. Since the creek runs through private property for a majority of the community, real estate impacts associated with widening the channel are unavoidable.

The creek also possesses a large amount of vegetal growth that serves as riparian habitat for sensitive species. The key to the project would be to preserve as much of these resources as possible and provide flood protection. In some areas where channel excavation may not be an option, other flood protection alternatives, such as levees and flood walls, could be considered, however, the real estate constraint render most alternatives, except for a floodwall, infeasible.

Project Cost

Project 2. Creek Channel Modification

Item	Quantity	Unit Cost	Unit Price	Cost
Channel Work	3400	LF	$ 450	$ 1,530,000
Bridge/Culvert Replacements - Encina Ave. - I Street - H Street - Railroad - Highway 58	5	each	$ 200,000	$ 1,000,000
Mitigation/Environmental	1	LS	$ 65,000	$ 65,000
			Subtotal	$ 2,595,000
Contingency			25%	$ 648,750
Design			20%	$ 519,000
Environmental /Administration			40%	$ 1,038,000

			Total	**$ 4,800,750**

Pro and Cons

This project would provide an effective solution, which directly addresses the cause of the flooding problem. Trash and debris, which does not belong in the creek, would be removed, and the creek's aesthetic and ecological value would be restored. Disadvantages include a high construction cost, on-going maintenance, a considerable degree of environmental impact, limited right-of-way, extensive and costly permitting and mitigation requirements.

Project 3 – Off channel Detention Basins in Parallel

Project 3 revisits the detention basin concept. It proposes to detain excess runoff in a series of two off channel basins that will work in parallel. The concept is shown in **Figure 6.** The plan is to divert water out of Yerba Buena Creek, store it temporarily within one of two detention basins and release it slowly back into Yerba Buena Creek, reducing the peak flow in the creek as it flows through the town. As stated for Project 1, the criteria for sizing the detention basins were to reduce the flow as much as feasibly possible considering land availability constraints and limitations of the diversion facility. A secondary goal was also to keep the proposed detention basins out of the State's Division of Safety of Dams jurisdiction.

The concept is to use two off-line detention basins to provide enough storage and time delay to significantly reduce peak flows. Two structures are proposed so that State dam safety jurisdictional requirements need not be implemented. These basins are referred to as the upper and lower basins. The upper basin has an embankment height of 12 feet but has a storage capacity of 49 acre-feet. The lower basin stores approximately 70 acre-feet but has an embankment that is only 6 feet high. Increased storage volume for the lower basin is accomplished by excavation. The proposed lower detention basin is considered jurisdictional size because it is more than 50 acre-feet in capacity.

Flow would be routed to each basin through a series of lateral weirs and diversion channels. The diversion channels and basins would be designed to allow low recurrent flows such as the 2- and 5-year events to pass without water diversion. As flow increases in Yerba Buena Creek, the water surface elevation rises, spills over the lateral weir and into a diversion channel that conveys the runoff to the upper detention basin. Simultaneously, as the upper basin begins to fill, the creek's downstream water surface elevation rises and water begins to fill the lower detention basin in the same manner. Both of the basins divert significant portions of the peak flow. **Table 5** below shows the potential reduction in peak flows of the proposed project. It should be noted that more detailed design could improve the performance of the basin. These flow numbers should be considered preliminary, but they provide a conceptual understanding of the amount of reduction that could be attained.

Table 5. Impact of Project 3 on Peak Flows

Recurrence Interval	Existing Conditions Peak (cfs)	Post Project 3 Peak (cfs)

2-year	233	233
10-year	916	551
25-year	1522	729
50-year	2117	906
100-year	2570	1011

Project Cost

Project 3. Detention Basins in Series

Item	Quantity	Unit Cost	Unit Price	Cost
Diversion Structure	2	Each	$ 75,000	$ 150,000
Bypass Cut	8500	CY	$ 5.00	$ 42,500
Basin Excavation	30000	CY	$ 4.00	$ 120,000
Berm Fill	38500	CY	$ 8.00	$ 308,000
Detention Basin Outflow Structure	2	LS	$ 35,000	$ 70,000
Emergency Spillways	2	Each	$ 2,000	$ 4,000
Channel Improvements	1	LS	$ 45,000	$ 45,000
Erosion Control	6	AC	$ 1,200	$ 7,200
Environmental Mitigation	1	LS	$ 30,000	$ 30,000
			Subtotal	$ 776,700
Contingency			25%	$ 194,175
Design			20%	$ 155,340
Environmental / Administration			40%	$ 310,680
			Total	**$ 1,436,895**

Pro and Cons

While the project fails to completely reduce 100-year peak flows to the capacities of the existing bridges within the community, it reduces the occurrence of the overbank flows in the community as well as reduces the extent and depth of flooding during large magnitude rainfall events. The project will provide 35- to 50-year flood protection for the community. The offline design of the project also reduces impacts to the riparian ecosystem and does not interfere with natural sediment transport. Construction of the lower basin will eliminate or severely reduce runoff issues associated with the south portion of the town. The majority of the construction would be completed outside of regulatory jurisdictional areas, thus, permitting and the extensive need for mitigation would be reduced. The reservoir could also be managed so that water could be impounded and used for agricultural operations and/or wetland habitat creation. The project has a low construction cost than Projects 1 and 2.

The drawbacks are that the proposed project does not eliminate 100-year flooding completely in the community and even with its modest cost, its overall benefit in reducing flood damage may not warrant the expense. Also, the lower detention basin would fall within the jurisdiction of the DSOD. Mitigation will likely be required during excavation to preserve Native American artifacts recovered during construction.

Project 4 – Single off channel Detention Basin

This project is similar to Project 1 and 3 in that it proposes the use of an off-channel detention basin. However, this project proposes a single off channel detention basin and diversion

structure. This basin is shown in **Figure 7.** The storage volume of the basin is approximately 110 acre-feet, so it falls within the jurisdiction size of the DSOD. The basin would be excavated to lower the basin invert elevation and attain the needed storage capacity. Excess dirt would either need to be hauled away or disposed of at a nearby site. For this memorandum we have shown a potential disposal immediately to the south. The cost of the project will depend greatly on the soil disposal technique. If the soil has to be hauled away, the cost of the basin could be substantially more.

Table 6 below shows the potential reduction in peak flows of the proposed project. It should be noted that more detailed design could improve the performance of the basin. These flow numbers should be considered preliminary, but they provide a conceptual understanding of the amount of reduction that could be attained.

Table 6. Peak flows at Encina Avenue with Project 4

Recurrence Interval	Existing Conditions Peak (cfs)	Post Project 4 Peak (cfs)
2-year	233	233
10-year	916	675
25-year	1522	1022
50-year	2117	1264
100-year	2570	1423

Project Cost

Project 4. Single Excavated Detention Basin

Item	Quantity	Unit Cost	Unit Price	Cost
Diversion Structure	1	Each	$ 75,000	$ 75,000
Basin excavation/Bypass Cut*	70000	CY	$ 6.50	$ 455,000
Berm Fill	13000	CY	$ 8.00	$ 104,000
Detention Basin Outflow Structure	1	LS	$ 35,000	$ 35,000
Emergency Spillways	1	Each	$ 20,000	$ 20,000
Erosion Control	26	Ac	$ 1,200	$ 31,200
Environmental Mitigation	1	LS	$ 30,000	$ 30,000
			Subtotal	$ 750,200
Contingency			25%	$ 187,550
Design			20%	$ 150,040
Environmental /Administration			40%	$ 300,080
			Total	**$ 1,387,870**

* includes nearby disposal

Pro and Cons

This project has the advantage of concentrating the storm water detention into one facility. It also has the advantage of minimizing impacts to the creek banks by creating a single diversion structure. Its disadvantage is that it is slightly less effective at reducing flows than the basins in parallel (Project 3). However, if this project is chosen for more follow up refinement, additional design work could achieve further reductions in peak flow. Since this proposed basin has a storage capacity greater than 50 acre-feet, it falls within the jurisdiction of the DSOD. Mitigation will likely be required during excavation to preserve Native American artifacts recovered during construction.

Project 5. Vegetation Management in Yerba Buena Creek

One alternative that will help reduce the impact of flooding from Yerba Buena Creek is vegetative management. Thinning and removing some of the overgrown riparian vegetation will help alleviate the frequency of flooding at lower frequency flow events such as 5- and 10-year events. A vegetative management plan could be developed to conduct a onetime channel clearing and then prescribe an on-going (annual or bi-annual) maintenance program. The reach of Yerba Buena Creek recommended for routine maintenance extends from downstream of Highway 58 to K Street. Approximately 3,000 feet of creek would be maintained every couple of years.

The goal of the program would be to thin the channel vegetation, reduce frictional resistance of the channel, create more flow carrying capacity, at the same time, strive to preserve riparian habitat values. The approach is to remove dense undergrowth and trees that present significant flow restriction in the channel. Selected trees and brush removed in such a way that significant impacts to the vegetative overstory above the channel are not impacted. In some cases, trees may be removed but new ones would be planted outside of the floodway and main flow path. The general concept is to create a tunnel effect. Over time the management program will develop a riparian corridor where flow encounters minimal heavy vegetation resistance but is overshadowed by a tall canopy that provides shade and habitat. A similar vegetative management program has been developed by the City of San Luis Obispo for San Luis Obispo Creek.

Modest gains in flow conveyance can be accomplished which are usually around 10 to 15 percent of the overall channel carrying capacity. Detailed hydraulic modeling would need to be under taken to determine the ultimate effectiveness of this proposed project. The plan would have to be developed in conjunction with State and Federal agencies. Extensive environmental analysis would need to be conducted and California Environmental Quality Act (CEQA) compliance assured.

Project Costs

Project 5. Vegetative Management

Item	Quantity	Unit Cost	Unit Price	Cost
Hydraulic Study	1	Each	$ 45,000	$ 45,000
Environmental Coordination	1	LS	$ 25,000.00	$ 25,000
Vegetative Clearing (1st Time)	1	LS	$ 65,000.00	$ 65,000
Environmental Mitigation	1	LS	$ 15,000	$ 15,000
Yearly Maintenance	10	EACH	$ 6,500	$ 65,000
			Subtotal	$ 215,000
Contingency			25%	$ 53,750
Engineering/Permitting /Administration			40%	$ 86,000
			Total	**$ 354,750**

Pro and Cons

The advantages of this project are difficult to predict at this point. Obviously, certain sections of the creek channel through the community have extensive under growth and some channel clearing and clean up is needed. Removing or thinning the vegetation will have modest impacts on the carrying capacity of the channel. The project could take over a year to permit and authorize by the resource agencies. However, in the long term, this project completed in conjunction with some of the other projects could have significant impacts on reducing the flood occurrence within the community. A vegetation management program in conjunction with a detention basin scenario will provide significant community flood reduction from Yerba Buena Creek.

Problem 2. – Localized Flooding Issues

The following proposed projects address localized flooding problems that are not caused by the smaller watersheds surrounding the community. Santa Margarita has a mixed system of local drainage conveyance facilities throughout the community. It includes roadside ditches as well as some subterranean drainage systems. The proposed projects involve redirecting flow from surrounding watersheds and installing drainage system improvements and upgrades to rectify flooding problems in town.

Project 6 – Levee along south side of Town

A significant flooding problem in the south portion of town occurs along K Street and Murphy Avenue. This flooding, as stated before, is likely from a combination of undersized drainage ditches and run-off from the upstream watershed. Construction of an earth levee along southern lot boundaries on K Street in the vicinity of effected homes would significantly reduce the flooding in this area. **Figure 8** shows the location of the proposed levee. A levee height of 4 feet and an associated drainage ditch running east-west would protect residences against overland flow conveyed by the 30 acre upper watershed area to the south. The levee would extend from Maria Avenue to Margarita Avenue comprising a total length of about 1,500 feet and would divert flow along an overland flow path into Yerba Buena Creek. This levee could be built either on homeowner properties or on an easement purchased from or dedicated by the Santa Margarita Ranch.

Project Cost

Project 6. South Side Levee

Item	Quantity	Unit Cost	Unit Price	Cost
Levee	2889	CY	$ 10.00	$ 28,890
Ditch	2889	L.F.	$ 15.00	$ 43,335
Outfall	1	L.S.	$ 10,000.00	$ 10,000
			Subtotal	$ 82,225
Contingency			25%	$ 20,556
Design			20%	$ 16,445
Environmental /Administration			40%	$ 32,890
			Total	**$ 152,116**

Pros and Cons

The levee is cost effective and could be designed to be aesthetically unobtrusive with flat slopes and vegetation. It is a simple way to prevent storm water runoff from entering residential property and could be quite effective in reducing shallow flooding in the southern portion of the town.

The project would represent a slight redirection of flow into Yerba Buena Creek. The normal runoff flow pattern through the community directs flow along Murphy Avenue and Margarita Avenue, it then travels eastward and enters the creek near H Street. This flow does not reach the Encina Avenue railroad culvert.

The diversion berm would route flow via the drainage ditch to the creek near the corner of K and Margarita or upstream of known limited capacity reaches. The 10-year peak discharge in Yerba Buena Creek is listed by FEMA as 830 cfs just south of the town. The 10-year estimated peak flow from the levee channel would increase flow in the Yerba Buena Creek channel by 6 to 10 percent. A complete project evaluation on the channel hydraulics would need to be completed to determine the cumulative impacts of this alternative and whether the community would experience an increase in flood inundation depths along the channel. This project could be constructed in conjunction with Project 5, Vegetative Management, to mitigate the increased flow above Encina Avenue.

Project 7 – Levee and Underground Pipe System South Side of Town

This project utilizes a levee and ditch similar to Project 6 but instead of discharging the flow into Yerba Buena Creek, upstream of the Encina culvert, a new 42-inch subterranean pipe system would start at the downstream end of the drainage ditch running along the levee. The storm drain would run in Margarita Ave to H Street. The alignment would then turn east until Encina Ave, where it would turn north and cross under the railroad and Highway 58 until reaching F Street. The pipeline should be upsized to 48-inch diameter after crossing the railroad. The pipeline would then convey flow east and discharge to Santa Margarita Creek, north of town. Drop inlets would be installed at various intersections to collect local drainage along the alignment **(see Figure 9)**.

The objective of routing runoff north of town is that flow is diverted away from the creek and the lower capacity bridges and culverts between Encina Avenue and Highway 58. This project would basically retain the existing flow pattern of the runoff in the community, with the exception of diverting approximately 100 cfs or more from Santa Margarita Creek and discharging the flow back into the creek, north of town. The project also provides more positive drainage infrastructure to most of the south side of the community.

Project Cost

Project 7. South Side Levee and Culvert

Item	**Quantity**	**Unit Cost**	**Unit Price**	**Cost**
Levee	2900	CY	$7.00	$20,000
Drainage Ditch	1500	LF	$15.00	$23,000
42-inch Storm Drain; ditch to railroad crossing	2050	LF	$300.00	$615,000
48-inch Storm Drain; railroad crossing to outfall	1700	LF	$300.00	$510,000
Outfall to Yerba Buena Creek	1	each	$15,000.00	$15,000
Drop Inlets	27	each	$3,500.00	$95,000
Inlet Pipelines	600	LF	$75.00	$45,000
Bore and Jack at Railroad Crossing	1	each	$40,000.00	$40,000

Railroad Drainage Easement	1000	SF	$10.00	$10,000
Bore and Jack at Highway 58 Crossing	1	each	$40,000.00	$40,000
Archaeological Investigation/Monitoring	1	each	$35,000.00	$35,000
Utility Relocation (water, sewer, gas)	1	estimate	$50,000.00	$50,000
			Subtotal	$1,498,000
Contingency			25%	$374,500
Design			20%	$299,600
Environmental /Administration			40%	$599,200
			Total	**$2,771,300**

Pro and Cons

The main disadvantages of this project are the cost of the improvements and potential for silting. During high frequency storms, water that sheet flows across the farmland south of town conveys sediment in suspension. The sediment could deposit at the discharge point and create a maintenance problem. The project has several advantages. First it solves the problem of flooding caused by watershed runoff. Secondly, with the installation of drop inlets at key intersections in the south side of the community, roadside ditch flow could be intercepted, reducing or eliminating some of the problems with the current roadside ditch system.

Project 8 – Existing Drainage System Improvements

Localized flooding occurs throughout the community. This flooding occurs in areas where the existing roadside ditch infrastructure does not have the capacity to carry the runoff that is delivered to it. This is very prominent in the southern section of the community where runoff from upstream watersheds creates some of the worst flooding. Many of these ditches are not maintained on a consistent basis and their size varies from residential lot to residential lot. Driveway culverts crossing these ditches vary in size, condition, and hydraulic capacity. In some areas, lack of adequate slope and depth to the ditch cause flooding of nearby structures.

To reduce localized flooding and properly convey storm runoff throughout, a detailed assessment of the existing system should be completed. Standards for ditch size should be determined and structures, which do not comply with this standard, should be replaced. The existing system capacity analysis and an improvement plan including development of routine maintenance procedures should be outlined. The existing drainage ditches should be resized where necessary, and driveway culverts would be cleaned and evaluated for upgrade. The existing storm drain system along and across Highway 58 should be assessed as well. A consistent system of curbs and gutters in the downtown or commercial districts would further enhance conveyance of runoff through town.

There are two basic sub projects that could be completed to improve the overall drainage infrastructure of the community. The first project, **Project 8A**, is to improve and add to the ditch network within the residential portions of the community. The additional ditches are shown on **Figure 10**. Along with the additional ditches, upgrades could be completed to the existing ditches that receive flow from the substantial watershed areas. As a start, expanding the ditch

system along I street, Margarita Ave, Encina, and F Street would provide greater drainage capacity to the southern portions of the community, which experience the greatest amount of flooding.

A second sub project, **Project 8B**, would be to install a subterranean storm system with curbs and gutters through the Highway 58 corridor. This is shown on **Figure 10**. This would aid in drainage along the commercial district and fit within the overall design plan of the community.

Project Cost Estimates

Project 8A. Road Drainage Ditch Rehabilitation

Item	Quantity	Unit Cost	Unit Price	Cost
V-Ditch rehabilitation	15640	LF	$ 15.00	$ 234,600
Driveway culverts (new or replace)	85	each	$ 200.00	$ 17,000
New Drainage ditches	3900	LF	$ 45.00	$ 175,500
			Subtotal	$ 427,100
Contingency			25%	$ 106,775
Design			20%	$ 85,420
Environmental /Administration			40%	$ 170,840
			Total	**$ 790,135**

Project 8B. Commercial District Subterranean Stormdrain Line

Item	Quantity	Unit Cost	Unit Price	Cost
Storm drain Line	1600	LF	$ 175.00	$ 280,000
Laterals	200	LF	$ 125.00	$ 25,000
Inlets	8	each	$ 2,500.00	$ 20,000
Curbs and Gutters	3000	LF	$ 15.00	$ 45,000
			Subtotal	$ 370,000
Contingency			25%	$ 92,500
Design			20%	$ 74,000
Environmental/Administration			40%	$ 148,000
			Total	**$ 684,500**

Pros and Cons

These projects will be very beneficial to the community. There are few problems with the projects other than the capital expenditure needed to complete them. Some homeowners may need to dedicate space and perhaps easements for new roadside ditches. This project could be combined in part with other projects such as Project 7.

CONCLUSIONS

The drainage problems in the Santa Margarita Community are two fold; flooding from Yerba Buena Creek and flooding within the local watersheds in and around the community. Five alternative projects to alleviate the flooding from Yerba Buena Creek have been proposed. Two of these projects have dubious feasibility, the western by-pass and creek channel improvements. The western by-pass has issues with cost and with property easements. The costs are generally elevated by the need of long, expensive storm drain pipelines culverts as well as a new crossing under the railroad tracks. The channel improvements on Yerba Buena Creek would solve the problem, however, are expensive and would likely be extremely difficult to permit. The temporary environmental impacts would be extensive. The cost/benefit of the project would likely be low and federal funding for a channel modification project would be difficult to obtain. The offline detention basins show the most promise for addressing the flood issues on Yerba Buena Creek. From a cost perspective, the single or multiple basins in series are generally the same. In terms of operational ease and maintenance, the single basin is probably the best choice. Construction of the single basin will require extensive grading. As mentioned before, the cost of the project depends on the availability of a nearby disposal area. We have identified an adjacent disposal area. If soils have to be hauled a significant distance, the cost could be increased by 25 percent or more. The advantage of the basin in series concept is that less excavation needs to be done, and it has a greater flow reduction during large storm events. With these projects there is potential to create significant amounts of wetland habitat in both basins. Also the basins could be designed to store water for agricultural use, assuming appropriative water rights could be attained. Both the basin designs and costs assume that onsite soils will be suitable to construct earth embankments. Generally, none of the projects will provide the community with 100-year flood protection but they will significantly reduce the flooding recurrence and extent. The channel vegetative management alternative should be explored and developed further. For a relatively modest cost, the efficiency of the channel to carry flow could be expanded as well as reducing the potential for one of the culverts to clog during large storm events.

Handling the issues with the localized flooding is somewhat complex. The project alternatives put forth in this technical memorandum basically outline the main alternatives to handling the drainage system. Each of these alternatives can be constructed as a stand alone project, or components of each of the projects could be combined to fit budget and community needs.

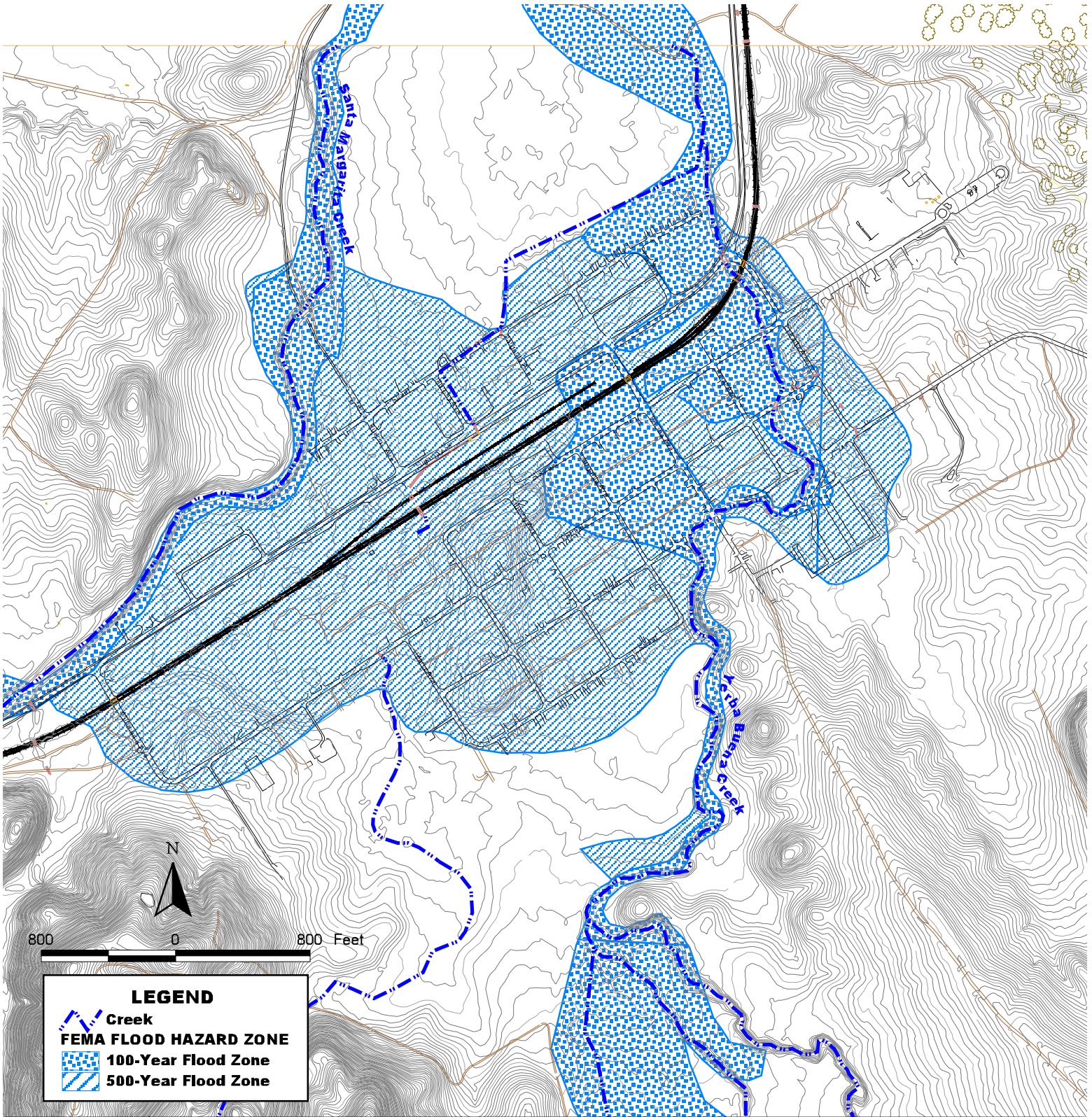
Summary of Project Cost Estimates

Summary Cost Table

Project 1. Western By-Pass	$ 1,606,982
Project 2. Creek Channel Modification	$ 4,800,750
Project 3. Detention Basins in Series	$ 1,436,895
Project 4. Single Excavated Detention Basin	$ 1,387,870
Project 5. Vegetative Management	$ 354,750
Project 6. South Side Levee	$ 152,116
Project 7. South Side Levee and Culvert	$ 2,771,300
Project 8A. Road Drainage Ditch Rehabilitation	$ 790,135
Project 8B. Commercial District Subterranean Stormdrain Line	$ 684,500

Summary Table of 100-year Peak Discharges (cfs)

Project	**Encina Culvert**	**RR tracks**	**Confluence SM Creek**
Existing Conditions	2,512	2,703	2,970
Project 1	1,423	1,606	1,718
Project 3	1,011	1,130	1,312
Project 4	1,443	1,628	1,888



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Project No.:
210176
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May 2003
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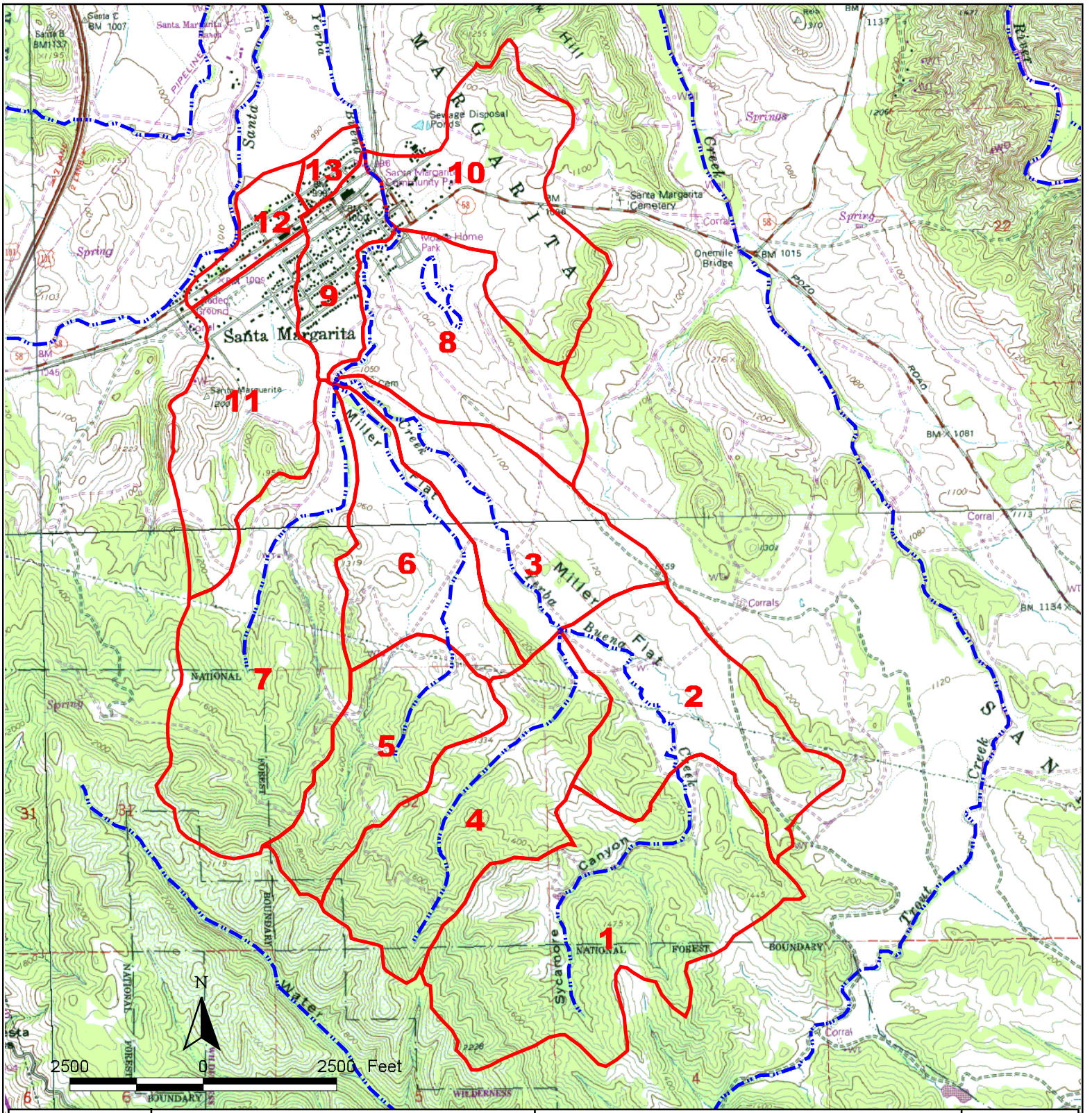
Santa Margarita Community

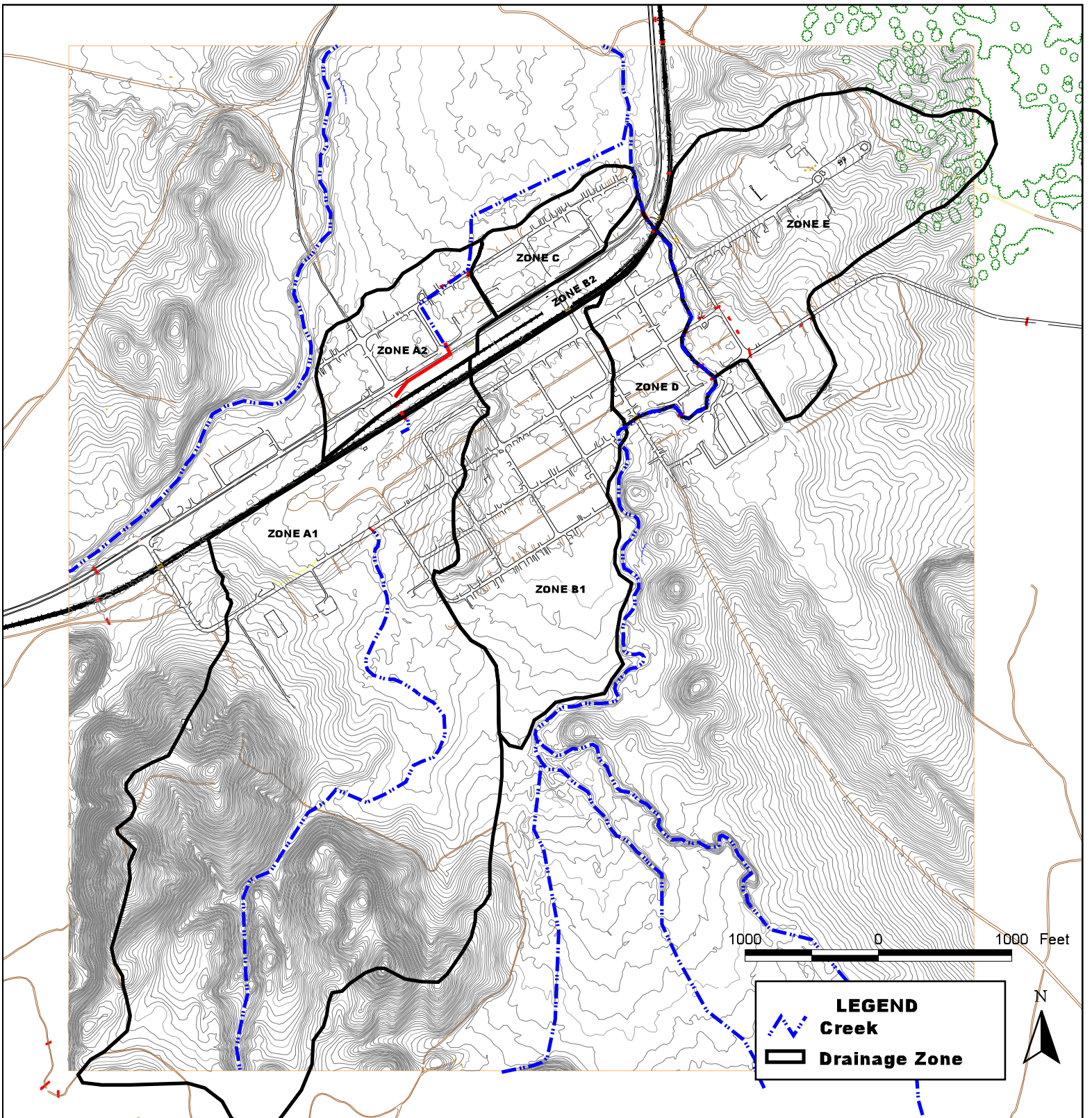
FEMA FLOOD HAZARD ZONES

FIGURE

1



Project Name: SLO H&H Project No.: 210176 Date: May 2003 Path: Z:\2001\210176	QUESTA ENGINEERING CORP. Civil Environmental & Water Resources P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807	**SLO County H&H Study** **Santa Margarita Community** **YERBA BUENA CREEK WATERSHED BASINS**	**FIGURE** **A1**



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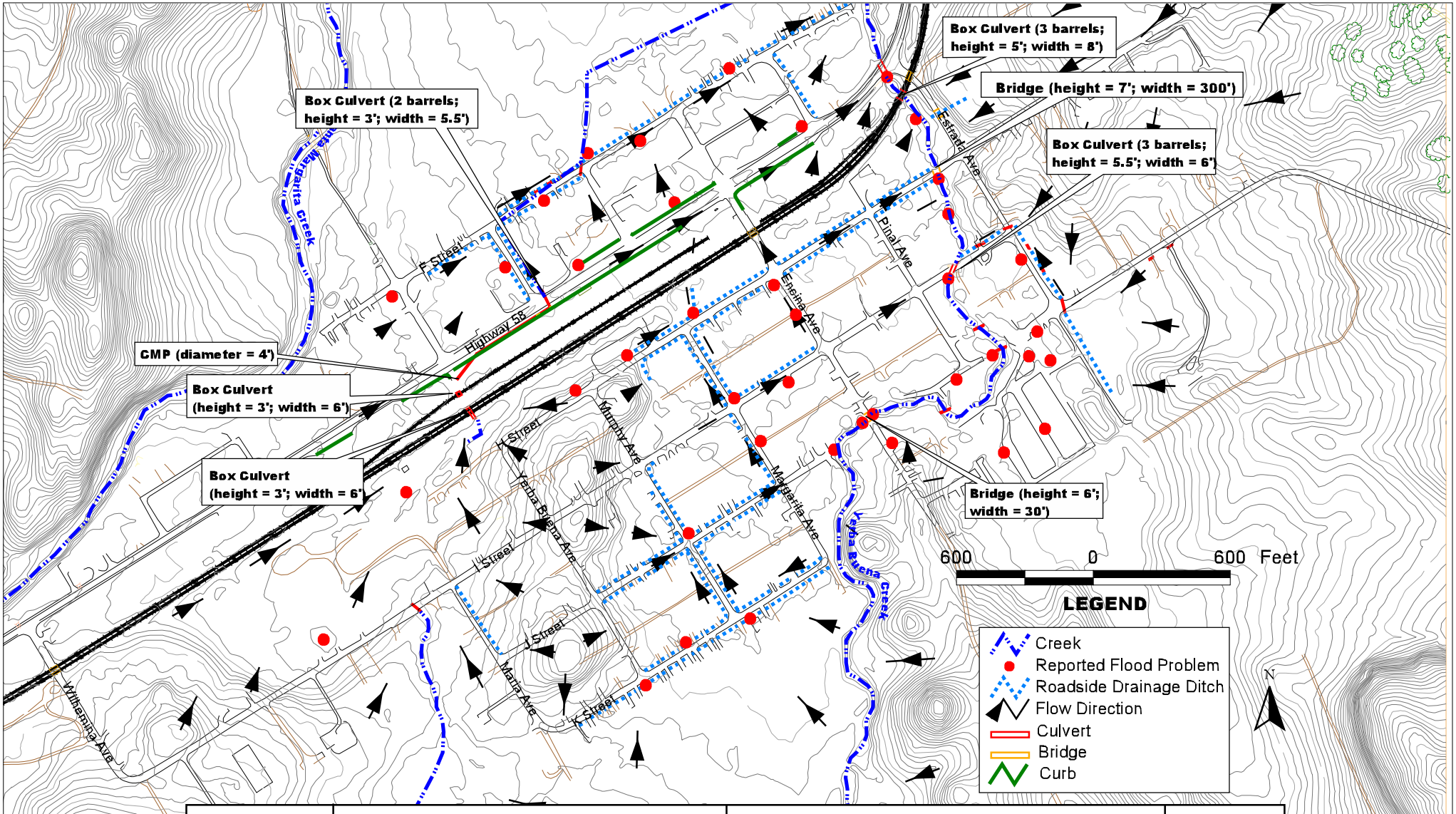

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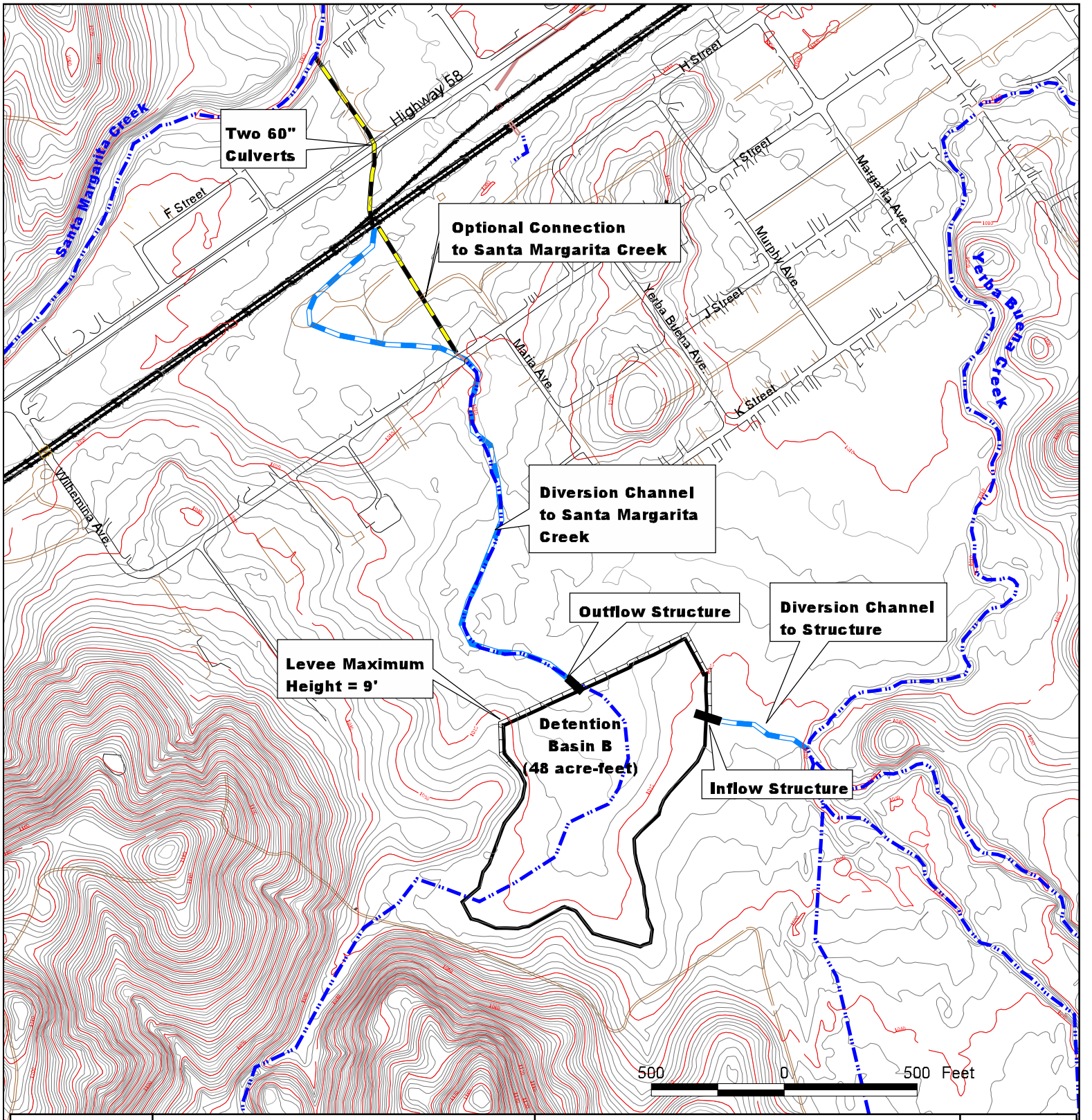

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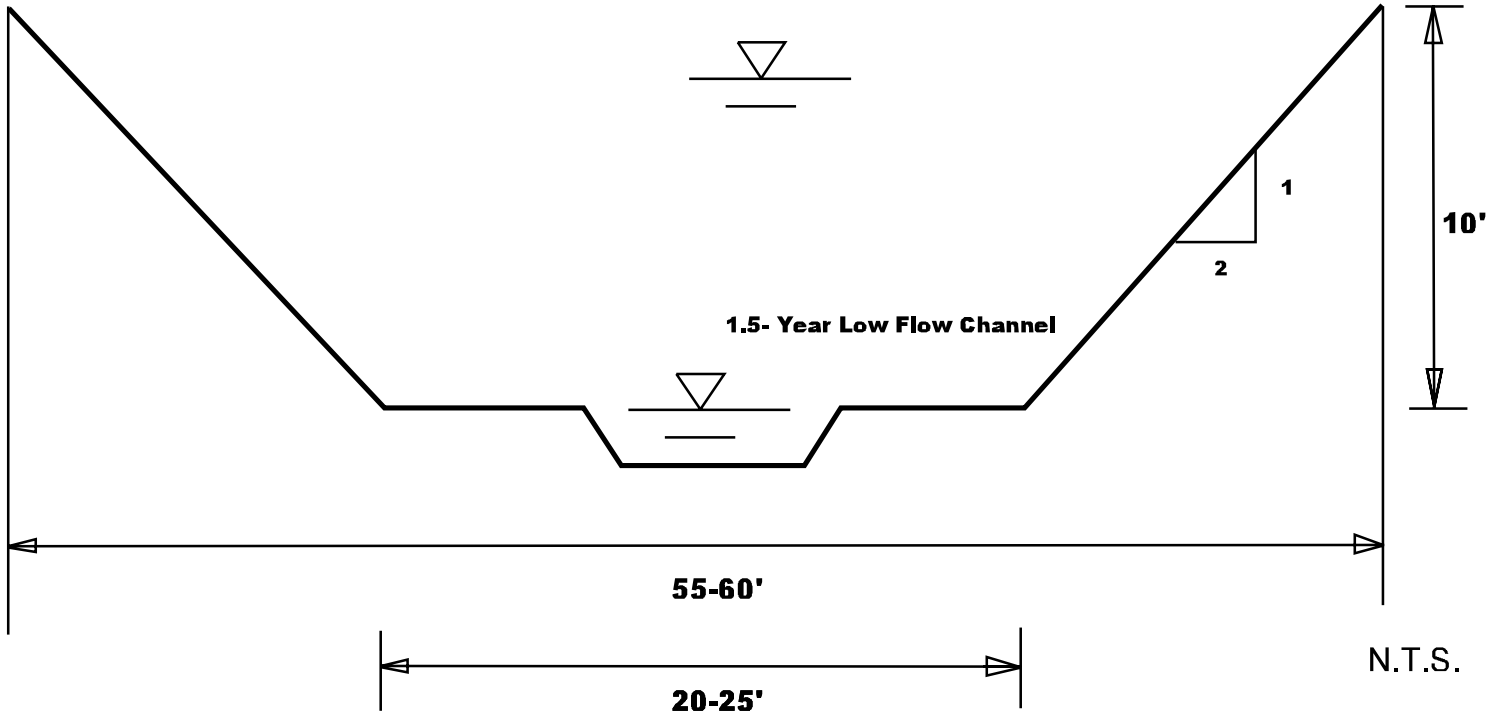
PROJECT 1
WESTERN BYPASS
TO SANTA MARGARITA CREEK
WITH OFFLINE DETENTION BASIN

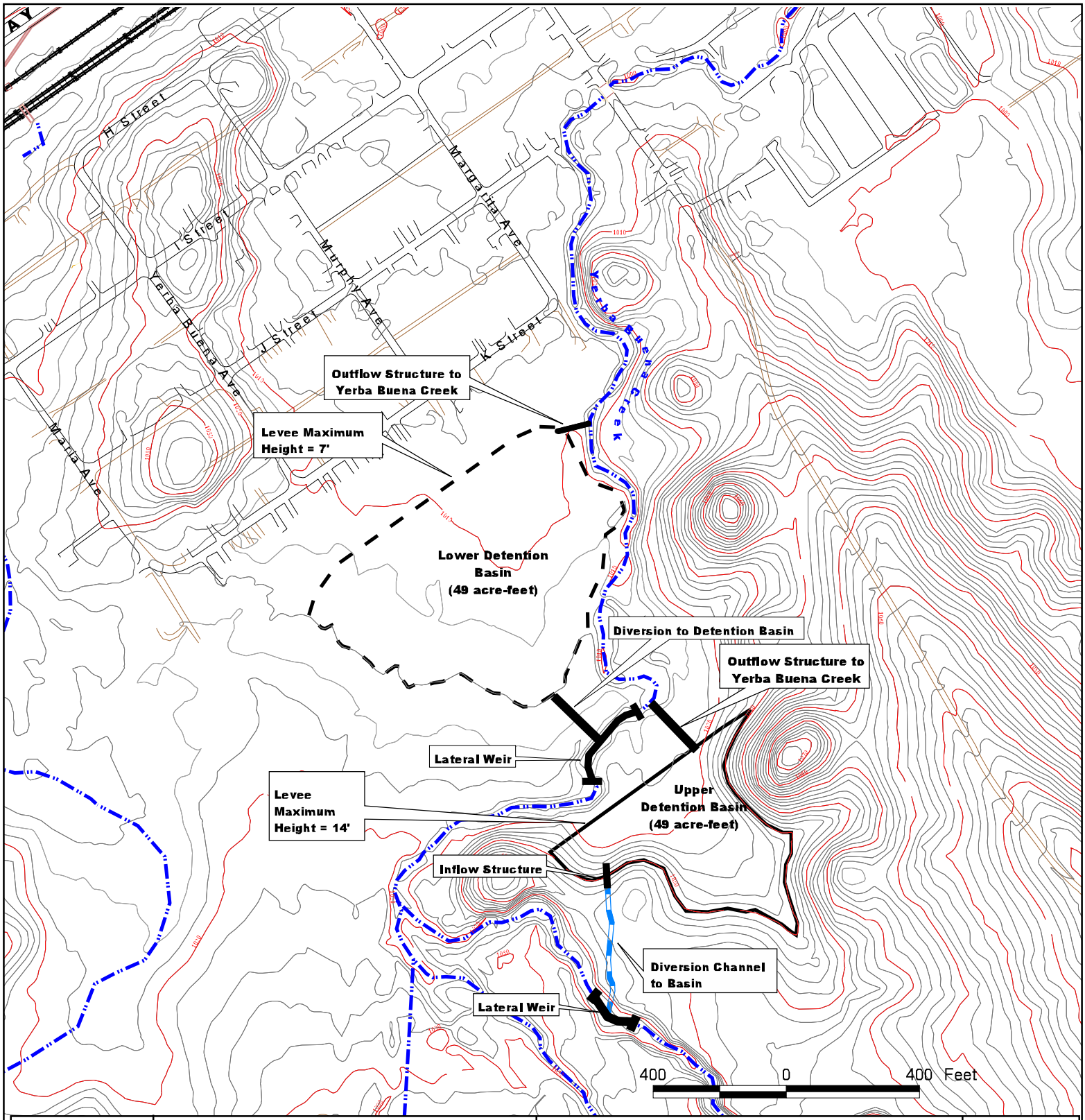
FIGURE

4

100-Year Flow Parameters:
Q = 2525 cfs
Depth = 9 feet
V = 7 fps
S = 0.3 %



Project Name: SLO H&H Project No.: 210176 Date: May 2003 Path: Z:\2001\210176	QUESTA ENGINEERING CORP. Civil Environmental & Water Resources P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807	**SLO County H&H Study** **Santa Margarita Community** **PROJECT 2** **CHANNEL MODIFICATION** **TYPICAL CROSS SECTION**	**FIGURE** **5**



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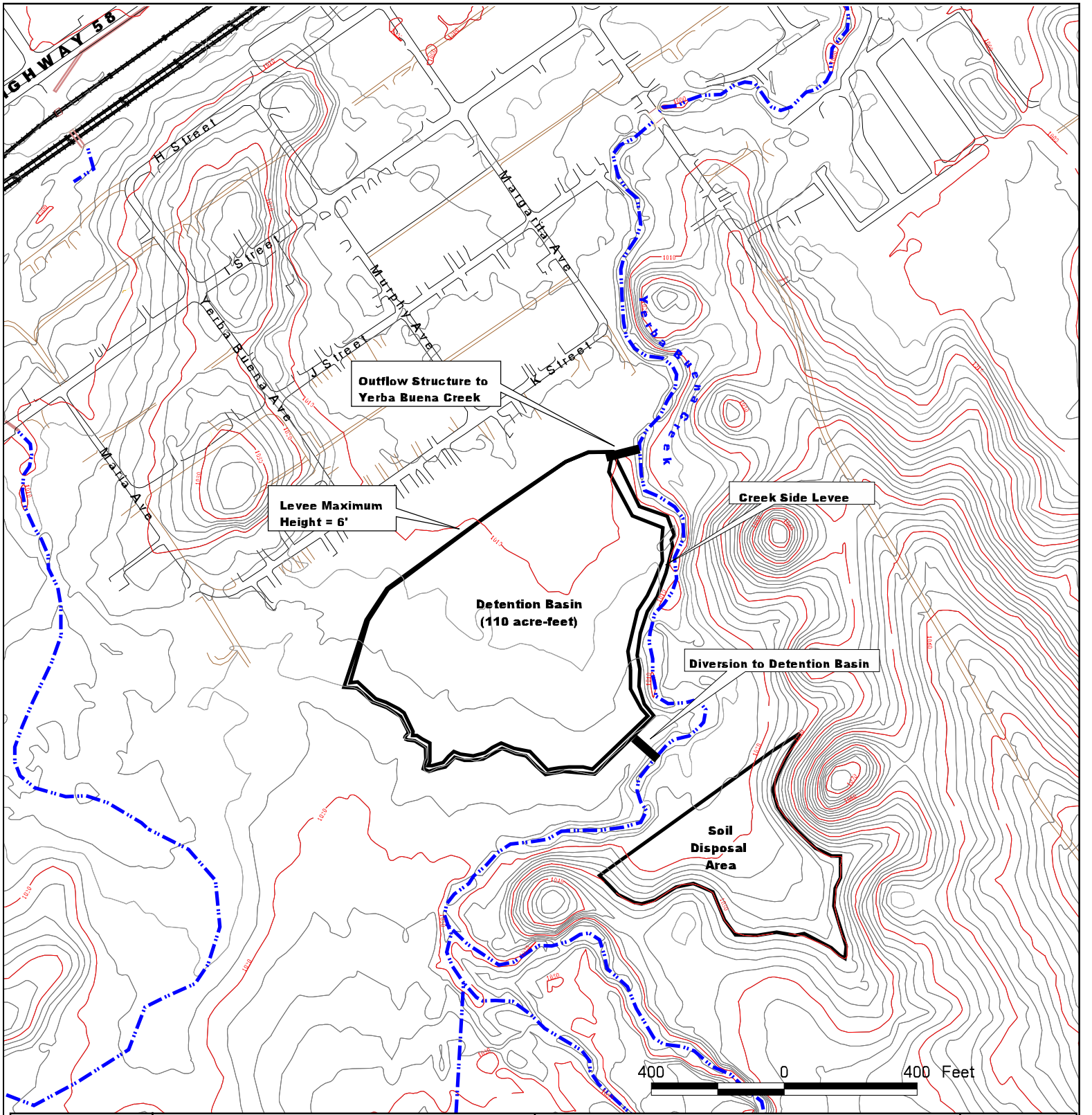
Santa Margarita Community

PROJECT 3
YERBA BUENA CREEK
DETENTION BASINS IN PARALLEL

FIGURE

6



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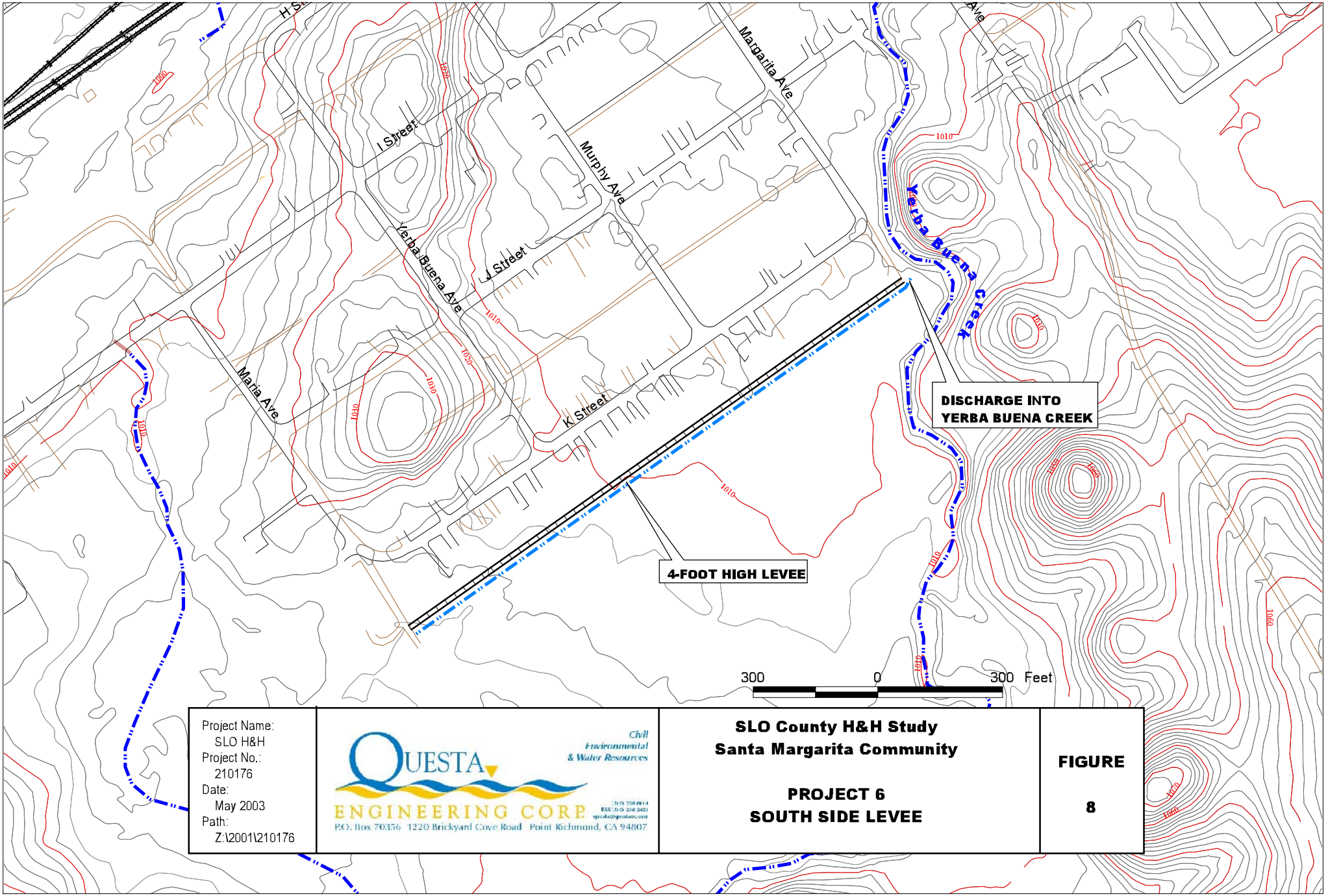

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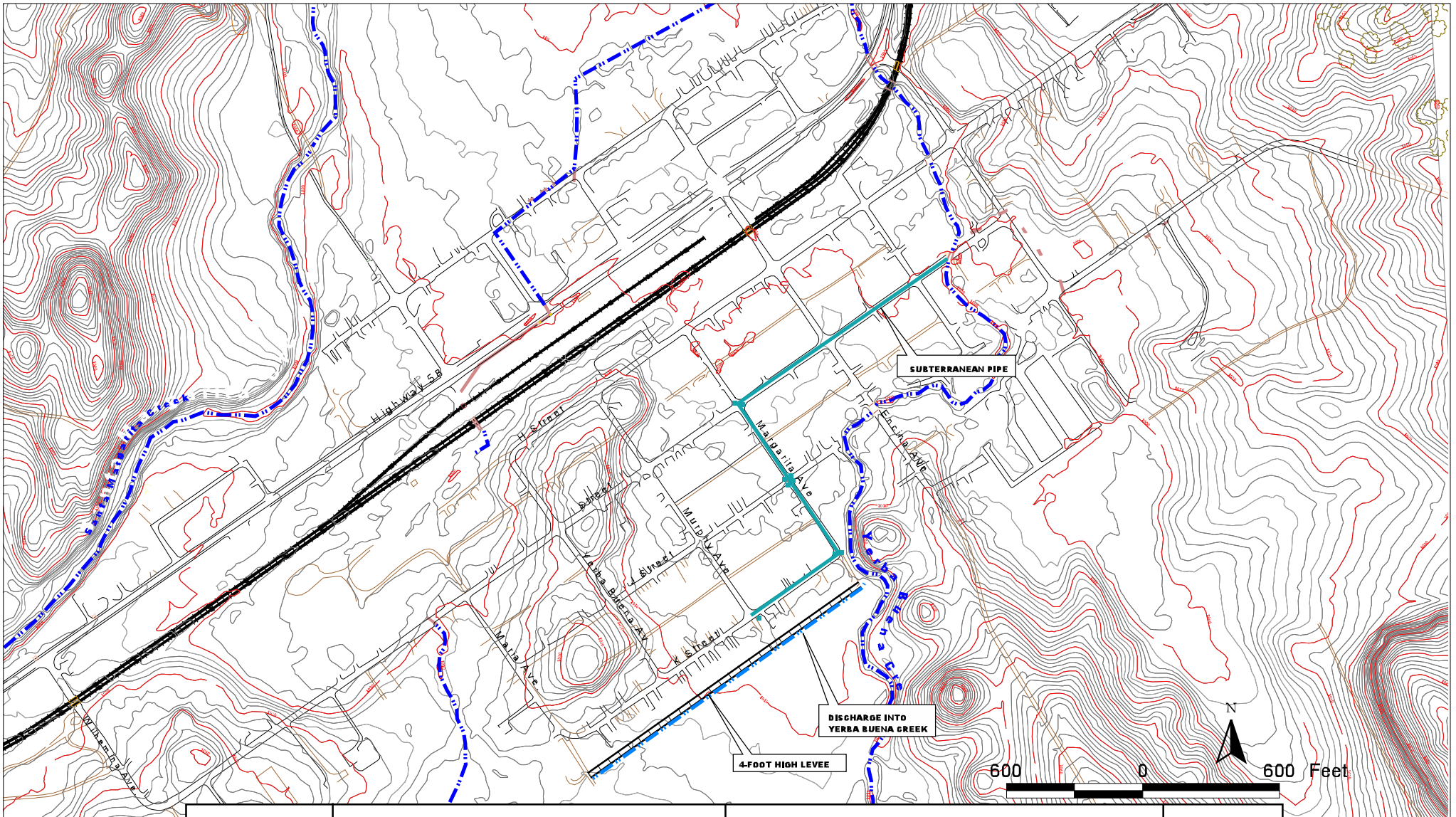

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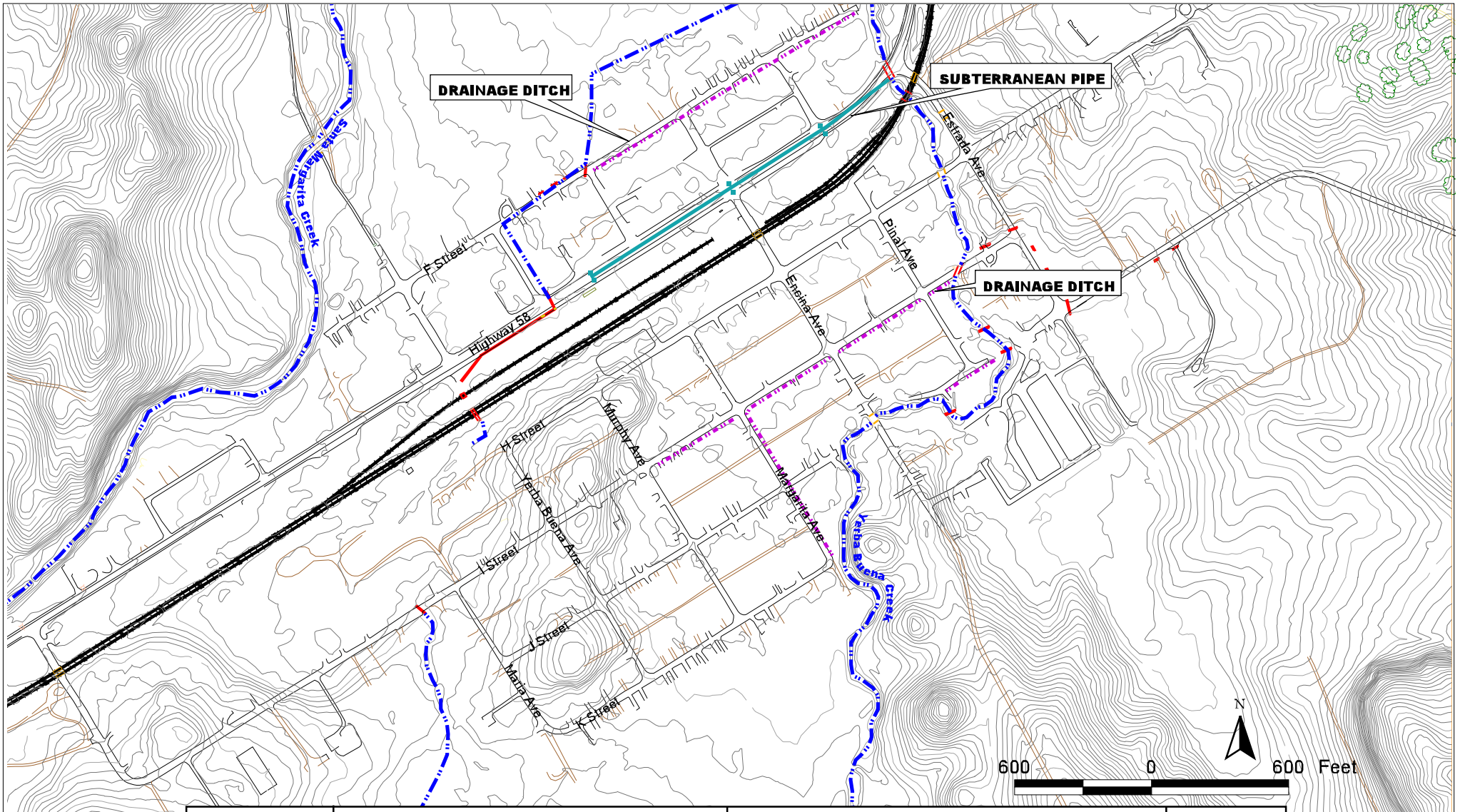
Santa Margarita Community

PROJECT 7
SOUTH SIDE LEVEE
WITH SUBTERRANEAN PIPE SYSTEM

FIGURE

9



Project Name: SLO H&H Project No.: 210176 Date: May 2003 Path: Z:\2001\210176	QUESTA ENGINEERING CORP. Civil Environmental & Water Resources P.O. Box 70356 1220 Brickyard Cove Road Point Richmond, CA 94807	**SLO County H&H Study** **Santa Margarita Community** **PROJECT 8A & 8B** **LOCALIZED DRAINAGE INFRASTRUCTURE**	**FIGURE** **10**

APPENDIX A

HYDROLOGIC ANALYSIS

This section summarizes the hydrologic and hydraulic analysis. It provides information on the approach, methodology, and calibration of the models used to analyze the proposed flood management alternatives.

Watershed Hydrology

The purpose of hydrologic modeling for this project was to quantify the runoff resulting from the 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storms under the existing condition. The resulting existing condition Santa Margarita flow values were used as a basis for alternative solutions which address the flooding problems in the Community. Further, the existing conditions model was modified to size and configure the detention basin options which comprise Projects 1 and 3.

Previous studies have predicted 100-year recurrent flow in Yerba Buena Creek near the downstream end of Santa Margarita. A Federal Emergency Management Agency (FEMA) study predicted a flow of 2570 cfs (73 cms) at the crossing of Yerba Buena Creek and the Southern Pacific Railroad. Envicom Corporation reports a value of 2970 cfs (84 cms) between HWY 58 and Santa Margarita Creek. These values were used to verify the hydrologic model of the Santa Margarita Creek watershed developed for this project.

Hydrologic Modeling Approach

Questa's modeling approach involved creating of a theoretical watershed runoff model using the U.S. Army Corps of Engineers' Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) computer modeling package.

The model has three components: a watershed model; a flow routing model; and a precipitation model. The watershed model mimics the physical characteristics of the watershed and develops the relationship between precipitation and runoff. The flow routing model describes how flow moves from the upper reaches of the watershed to the mouth and determines the relative timing of this runoff. The precipitation model utilized a standard 24-hour rainfall distribution with the most intense amounts in the middle of the storm. National Oceanic and Atmosphere Administration (NOAA) rainfall data was used to determine design storm depth and intensity.

The Santa Margarita Creek watershed is approximately 5.1 square miles, with significant topographic variability. Elevations vary from 990' to 2,200 feet in a space of approximately 3.5 miles. Storms coming off the Pacific Ocean hit the coast and are pushed over the mountains. This tends to create widely varying rainfall amounts within the watershed.

Watershed Model

The watershed model was formed by dividing the watershed into 13 individual sub-basins of similar properties (**Figure 4**). The Soil Conservation Service (SCS) unit hydrograph method was chosen to determine runoff characteristics from each of the sub-basins. This method was chosen because two main parameters, a runoff curve number and basin lag, can be easily determined from the available information. Also this technique has been used extensively throughout the western United States and much empirical data suggests that it is a valid technique for predicting runoff. Other parameters developed for each of the sub-basins were an *initial abstraction* (the amount of rainfall lost to infiltration prior to runoff occurring), a *basin lag time* (the time it takes for a sub-basin to develop peak runoff rates), and a creek *base flow*.

The land use and land cover of a basin are described by the runoff curve number. Curve numbers (CN) range from one to 100, with a lower value denoting less runoff for a given precipitation value than higher values. Curve numbers for typical combinations of soil types and land cover have been determined by measuring both rainfall and runoff from watersheds of a known size. These empirical data make it possible to identify appropriate curve numbers for most watersheds in the United States.

Curve numbers were determined for each sub-basin of the Santa Margarita Creek watershed based on soil type and vegetation type. Soil and vegetation information was derived from the Geographic Information System (GIS) data obtained from San Luis Obispo County Planning Department. The soil distribution is based on published data. The vegetation mapping was based on a composite map created by the California Coastal Commission and a landsat thematic mapper derived vegetation coverage map published by the University of California, Santa Barbara, for areas outside the coastal zone. Curve numbers were assigned according to SCS recommendations as outlined Technical Report 55 (TR55). Initial curve number estimations were calibrated to yield available 100-year flow values. Calibrated sub-basin curve numbers ranged from 66 to 81 and were typically lower in the upper portions of the watershed (**Table A1**).

Initial abstraction is the amount of water temporarily stored in puddles, on plant stems, in the soil, etc., before runoff begins. It is related to the runoff curve number but can vary from this relationship depending on how recently the watershed experienced a significant rainfall event. Values ranged from 0.5 to 1.0 inches (1.3 to 2.5 cm). Because the purpose of the modeling is to predict the runoff from a 100-year, 24-hour storm, and because the most intense rainfall in the design storm occurs 12 hours after the storm begins, the initial abstraction is usually "filled" long before the most intense design rainfall occurs. This makes initial abstraction a less important variable for our purposes than the curve number. It would be more important if the purpose of the modeling were to predict peak flow rates from less intense, shorter duration storms.

Table A1
Curve Numbers for Yerba Buena Creek Watershed

1	0.81	53	72
2	0.46	73	73
3	0.40	70	70
4	0.51	52	72
5	0.34	53	72
6	0.34	75	75
7	0.70	51	71
8	0.40	70	70
9	0.15	79	79
10	0.44	66	66
11	0.40	75	75
12	0.08	78	78
13	0.04	81	81

Basin lag time is the difference in time between peak rainfall intensity and peak runoff. It can be calculated as a function of the hydraulic length of a watershed, the average land slope in the watershed, and the SCS curve number, based on a relationship derived by the SCS (1972). Lag time for each of the Santa Margarita Creek sub-basins is listed in **Table A2**.

Table A2
Yerba Buena Creek Sub-basin Lag Time

Basin	*Curve Number*	*Length (feet)*	*Elevation Change*	*Slope*	*SCS Lag Time (minutes)*
1	72	6770	760	0.11	25
2	73	4625	220	0.05	30
3	70	7200	180	0.03	37
4	72	7680	865	0.11	27
5	72	2980	330	0.11	19
6	75	6620	220	0.03	33
7	71	6620	740	0.11	26
8	70	4060	75	0.02	45
9	79	700	40	0.06	3
10	66	2750	120	0.04	21
11	75	6680	445	0.07	27
12	78	700	5	0.01	7
13	81	700	5	0.01	7

Flow Routing

Runoff from individual sub-basins is routed through the system using the Muskingum-Cunge 8-point hydrologic routing technique or the Kinematic wave technique. Both methods account for floodplain storage effects and travel time attenuation on the hydrograph as it moves downstream. This technique uses typical cross-sections for individual stream routing reaches. Manning's roughness coefficients were assigned to left overbank, channel centerline, and right overbank areas.

Precipitation

The precipitation model stores the design precipitation for each part of the watershed. Precipitation for the design storm is based on *NOAA Atlas II, Precipitation-Frequency Atlas of the Western United States*. Precipitation for the 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storms were distributed over the SCS Type I storm.

Existing Condition - HMS Results

		Peak Discharge (cfs)					
HMS Junction	Location	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
J1	Miller Flat	123.2	345.7	462.9	755.9	1038.4	1224.4
J1a		137.3	387.0	519.7	855.6	1181.9	1399.8
J2	3000 feet Upstream of Encina Ave	218.9	627.1	847.4	1406.4	1959.3	2322.6
J3	Encina Culvert	232.6	675.7	916.2	1521.8	2116.8	2512.1
J3a	Railroad Tracks and Creek Crossing	248.9	719.5	977.2	1628.0	2273.1	2703.2
J4	Downstream end of Santa Margarita	275.3	787.1	1070.0	1783.1	2494.8	2969.8
1		60.6	166.1	221.4	358.4	491.3	578.1
2		35.9	93.1	122.8	196.0	266.5	312.6
3		25.9	81.7	111.6	186.5	259.7	307.8
4		37.4	102.3	136.3	220.8	302.6	356.1
5		32.6	87.1	115.3	184.8	251.8	295.5
6		34.8	79.3	101.7	156.1	207.8	241.2
7		46.7	134.5	181.0	297.2	410.3	484.3
8		17.6	51.4	69.9	116.5	162.3	192.5
9		55.8	109.4	135.6	197.3	254.5	290.9
10		13.4	59.7	87.5	159.5	231.6	279.7
11		46.3	105.4	135.0	207.1	275.5	319.7
12		24.0	48.1	59.9	87.9	114.0	130.6
13		15.2	28.2	34.5	49.1	62.6	71.1

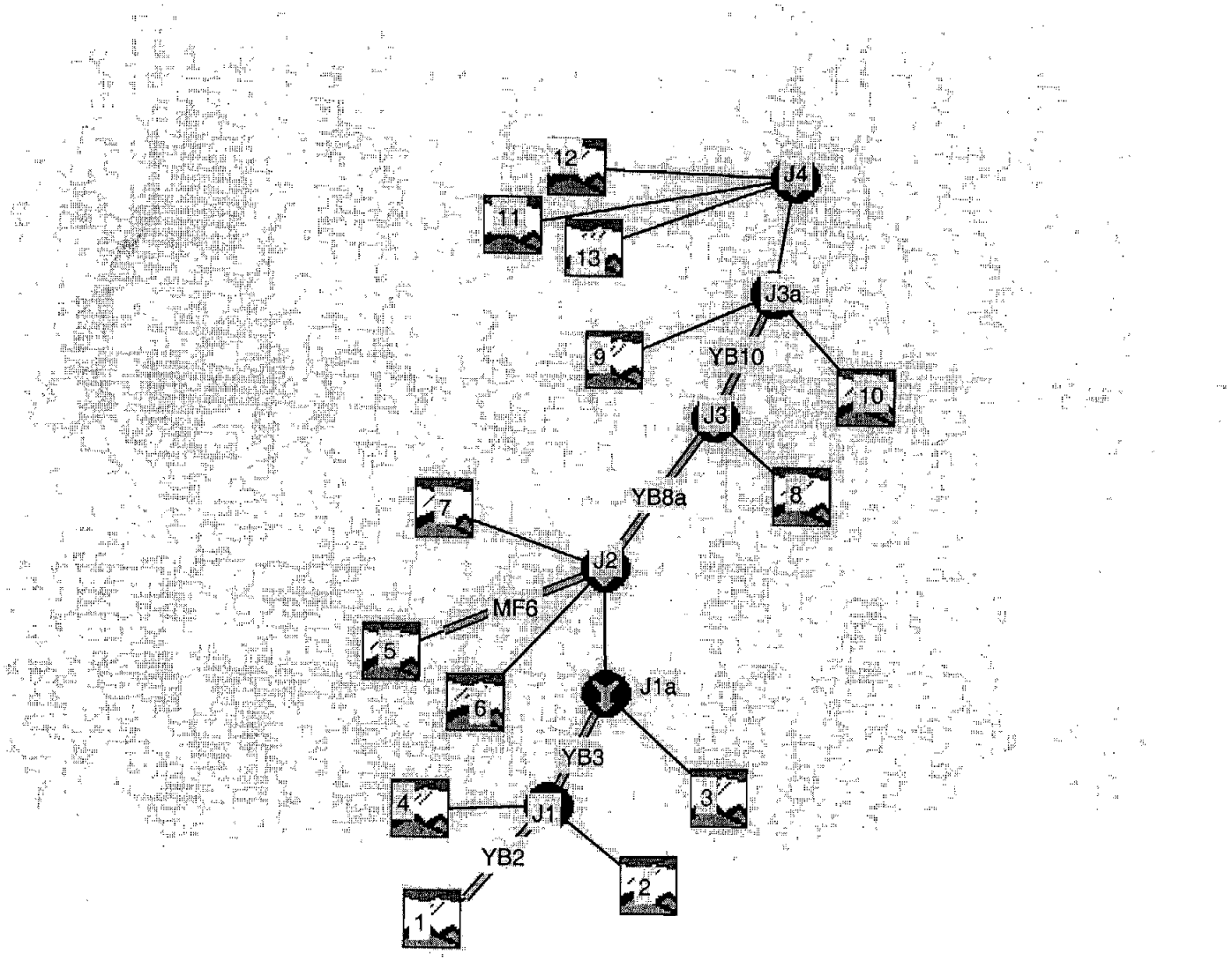
Project 1 - HMS Results

		Peak Discharge (cfs)					
HMS Junction	Location	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
J1	Miller Flat	123	346	463	756	1038	1224
J1a		137	387	520	856	1182	1400
J2	3000 feet Upstream of Encina Ave	219	627	847	1406	1959	2323
J3	Encina Culvert	232	675	775	1022	1264	1423
J3a	Railroad Tracks and Creek Crossing	249	718	836	1126	1414	1606
J4	Downstream end of Santa Margarita	262	751	878	1195	1509	1718
DB		219	626	707	906	1103	1233
DB(br)		0	1	141	500	856	1090
Basin		18	40	61	266	404	500
Santa Margarita Ck		18	40	61	266	404	500
1		61	166	221	358	491	578
2		36	93	123	196	267	313
3		26	82	112	187	260	308
4		37	102	136	221	303	356
5		33	87	115	185	252	296
6		35	79	102	156	208	241
7		47	134	181	297	410	484
8		18	51	70	117	162	192
9		56	109	136	197	255	291
10		13	60	88	159	232	280
11a		31	71	90	139	184	214
11b		18	41	53	81	108	125
12		24	48	60	88	114	131
13		15	28	34	49	63	71

Project 3 - HMS Results							
		Peak Discharge (cfs)					
HMS Junction	Location	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
J1	Miller Flat	123	346	463	756	1038	1224
J1a		137	387	520	856	1182	1400
J2	3000 feet Upstream of Encina Ave	219	626	774	1021	1254	1403
J2a		218	483	487	617	717	766
J3	Encina Culvert	231	529	551	729	906	1011
J3a	Railroad Tracks and Creek Crossing	247	577	620	803	1005	1130
J4	Downstream end of Santa Margarita	275	662	748	987	1185	1312
DC		137	386	399	399	400	400
DC(br)		0	1	121	456	782	1000
Upper Basin		0	0	3	132	231	280
DB		218	483	487	493	499	503
DB(br)		0	143	288	528	754	900
Lower Basin		0	2	6	46	107	147
1		61	166	221	358	491	578
2		36	93	123	196	267	313
3a		26	82	112	187	260	308
4		37	102	136	221	303	356
5		33	87	115	185	252	296
6		35	79	102	156	208	241
7		47	134	181	297	410	484
8a		3	9	13	21	30	35
8b		15	45	61	102	142	168
9		56	109	136	197	255	291
10		13	60	88	159	232	280
11		46	105	135	207	276	320
12		24	48	60	88	114	131
13		15	28	34	49	63	71

Project 4 - HMS Results							
		Peak Discharge (cfs)					
HMS Junction	Location	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
J1	Miller Flat	123	346	463	756	1038	1224
J1a		137	387	520	856	1182	1400
J2	3000 feet Upstream of Encina Ave	219	627	847	1406	1959	2323
J2a		218	479	479	479	759	1123
J3	Encina Culvert	233	537	568	671	1044	1443
J3a	Railroad Tracks and Creek Crossing	250	589	628	747	1194	1628
J4	Downstream end of Santa Margarita	277	675	760	994	1405	1888
DB		218	479	479	479	759	1123
DB(br)		0	192	478	1200	1200	1200
Lower Basin		0	17	48	150	221	255
1		61	166	221	358	491	578
2		36	93	123	196	267	313
3a		26	82	112	187	260	308
4		37	102	136	221	303	356
5		33	87	115	185	252	296
6		35	79	102	156	208	241
7		47	134	181	297	410	484
8		18	51	70	117	162	192
9		56	109	136	197	255	291
10		13	60	88	159	232	280
11		46	105	135	207	276	320
12		24	48	60	88	114	131
13		15	28	34	49	63	71

HEC-HMS **Project: SM_v2** **Basin Model:** Existing Condition



HMS * Summary of Results

Project : SM_v2 Run Name : e-2

Start of Run : 01Mar03 1200 Basin Model : Basin_exist_QatRR
End of Run : 02Mar03 1200 Met. Model : Met 2
Execution Time : 16May03 1440 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	32.646	01 Mar 03 2216	9.6275	0.340
MP6	32.557	01 Mar 03 2244	9.3634	0.340
1	60.611	01 Mar 03 2226	21.999	0.810
YB2	60.446	01 Mar 03 2246	21.390	0.810
4	37.387	01 Mar 03 2227	13.840	0.510
2	35.923	01 Mar 03 2231	13.247	0.460
J1	123.24	01 Mar 03 2241	48.476	1.780
YB3	122.95	01 Mar 03 2301	46.911	1.780
3	25.941	01 Mar 03 2219	9.5631	0.400
J1a	137.26	01 Mar 03 2300	56.474	2.180
7	46.714	01 Mar 03 2227	17.980	0.700
6	34.788	01 Mar 03 2232	11.690	0.340
J2	218.94	01 Mar 03 2258	95.508	3.560
38a	217.09	01 Mar 03 2319	92.498	3.560
	17.569	01 Mar 03 2256	9.4366	0.400
J3	232.60	01 Mar 03 2319	101.93	3.960
YB10	231.90	01 Mar 03 2323	101.41	3.960
9	55.770	01 Mar 03 2157	6.5833	0.150
10	13.407	01 Mar 03 2227	7.8240	0.440
J3a	248.94	01 Mar 03 2323	115.82	4.550
11	46.264	01 Mar 03 2224	13.867	0.400
12	24.032	01 Mar 03 2201	3.3811	0.080
13	15.223	01 Mar 03 2201	1.9982	0.040
J4	275.26	01 Mar 03 2323	135.06	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : e-5

Start of Run : 01Mar03 1200 Basin Model : Basin_exist_QatRR
End of Run : 02Mar03 1200 Met. Model : Met 5
Execution Time : 16May03 1444 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	87.131	01 Mar 03 2214	19.183	0.340
MF6	86.747	01 Mar 03 2234	18.536	0.340
1	166.10	01 Mar 03 2222	44.296	0.810
YB2	165.63	01 Mar 03 2236	43.261	0.810
4	102.30	01 Mar 03 2223	27.872	0.510
2	93.084	01 Mar 03 2227	26.254	0.460
J1	345.69	01 Mar 03 2232	97.387	1.780
YB3	345.33	01 Mar 03 2246	95.159	1.780
3	81.689	01 Mar 03 2215	19.944	0.400
J1a	387.03	01 Mar 03 2245	115.10	2.180
7	134.49	01 Mar 03 2222	36.751	0.700
6	79.250	01 Mar 03 2229	22.125	0.340
J2	627.06	01 Mar 03 2241	192.51	3.560
38a	625.65	01 Mar 03 2255	188.34	3.560
	51.376	01 Mar 03 2247	19.708	0.400
J3	675.74	01 Mar 03 2255	208.05	3.960
YB10	675.07	01 Mar 03 2257	207.32	3.960
9	109.44	01 Mar 03 2156	11.751	0.150
10	59.723	01 Mar 03 2218	17.757	0.440
J3a	719.45	01 Mar 03 2257	236.83	4.550
11	105.35	01 Mar 03 2222	26.203	0.400
12	48.141	01 Mar 03 2201	6.0896	0.080
13	28.231	01 Mar 03 2200	3.4552	0.040
J4	787.14	01 Mar 03 2257	272.58	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : e-10

Start of Run : 01Mar03 1200 Basin Model : Basin_exist_QatRR
End of Run : 02Mar03 1200 Met. Model : Met 10
Execution Time : 16May03 1444 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	115.33	01 Mar 03 2213	23.990	0.340
MF6	114.36	01 Mar 03 2232	23.270	0.340
1	221.37	01 Mar 03 2221	55.556	0.810
YB2	220.63	01 Mar 03 2234	54.398	0.810
4	136.31	01 Mar 03 2222	34.958	0.510
2	122.77	01 Mar 03 2226	32.783	0.460
J1	462.88	01 Mar 03 2230	122.14	1.780
YB3	461.91	01 Mar 03 2243	119.65	1.780
3	111.59	01 Mar 03 2215	25.251	0.400
J1a	519.74	01 Mar 03 2242	144.90	2.180
7	181.04	01 Mar 03 2221	46.280	0.700
6	101.66	01 Mar 03 2229	27.274	0.340
J2	847.41	01 Mar 03 2238	241.73	3.560
38a	846.95	01 Mar 03 2250	237.03	3.560
	69.873	01 Mar 03 2245	24.963	0.400
J3	916.20	01 Mar 03 2250	261.99	3.960
YB10	915.81	01 Mar 03 2252	261.16	3.960
9	135.55	01 Mar 03 2156	14.244	0.150
10	87.515	01 Mar 03 2217	22.985	0.440
J3a	977.17	01 Mar 03 2252	298.39	4.550
11	135.04	01 Mar 03 2222	32.287	0.400
12	59.854	01 Mar 03 2201	7.4009	0.080
13	34.485	01 Mar 03 2200	4.1494	0.040
J4	1070.0	01 Mar 03 2251	342.22	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : e-25

Start of Run : 01Mar03 1200 Basin Model : Basin_exist_QatRR
End of Run : 02Mar03 1200 Met. Model : Met 25
Execution Time : 16May03 1444 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	184.81	01 Mar 03 2213	35.708	0.340
MF6	183.38	01 Mar 03 2228	34.825	0.340
1	358.42	01 Mar 03 2220	83.076	0.810
YB2	358.02	01 Mar 03 2231	81.671	0.810
4	220.76	01 Mar 03 2222	52.277	0.510
2	195.98	01 Mar 03 2225	48.682	0.460
J1	755.89	01 Mar 03 2228	182.63	1.780
YB3	754.56	01 Mar 03 2239	179.64	1.780
3	186.54	01 Mar 03 2214	38.333	0.400
J1a	855.55	01 Mar 03 2237	217.97	2.180
7	297.16	01 Mar 03 2221	69.657	0.700
6	156.09	01 Mar 03 2228	39.667	0.340
J2	1406.4	01 Mar 03 2234	362.12	3.560
\8a	1405.3	01 Mar 03 2244	356.47	3.560
	116.54	01 Mar 03 2243	37.919	0.400
J3	1521.8	01 Mar 03 2244	394.39	3.960
YB10	1520.2	01 Mar 03 2246	393.42	3.960
9	197.30	01 Mar 03 2156	20.153	0.150
10	159.46	01 Mar 03 2216	36.114	0.440
J3a	1628.0	01 Mar 03 2245	449.68	4.550
11	207.13	01 Mar 03 2221	46.922	0.400
12	87.851	01 Mar 03 2200	10.516	0.080
13	49.131	01 Mar 03 2200	5.7814	0.040
J4	1783.1	01 Mar 03 2244	512.90	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : e-50

Start of Run : 01Mar03 1200 Basin Model : Basin_exist_QatRR
End of Run : 02Mar03 1200 Met. Model : Met 50
Execution Time : 16May03 1444 Control Specs : Control _SM

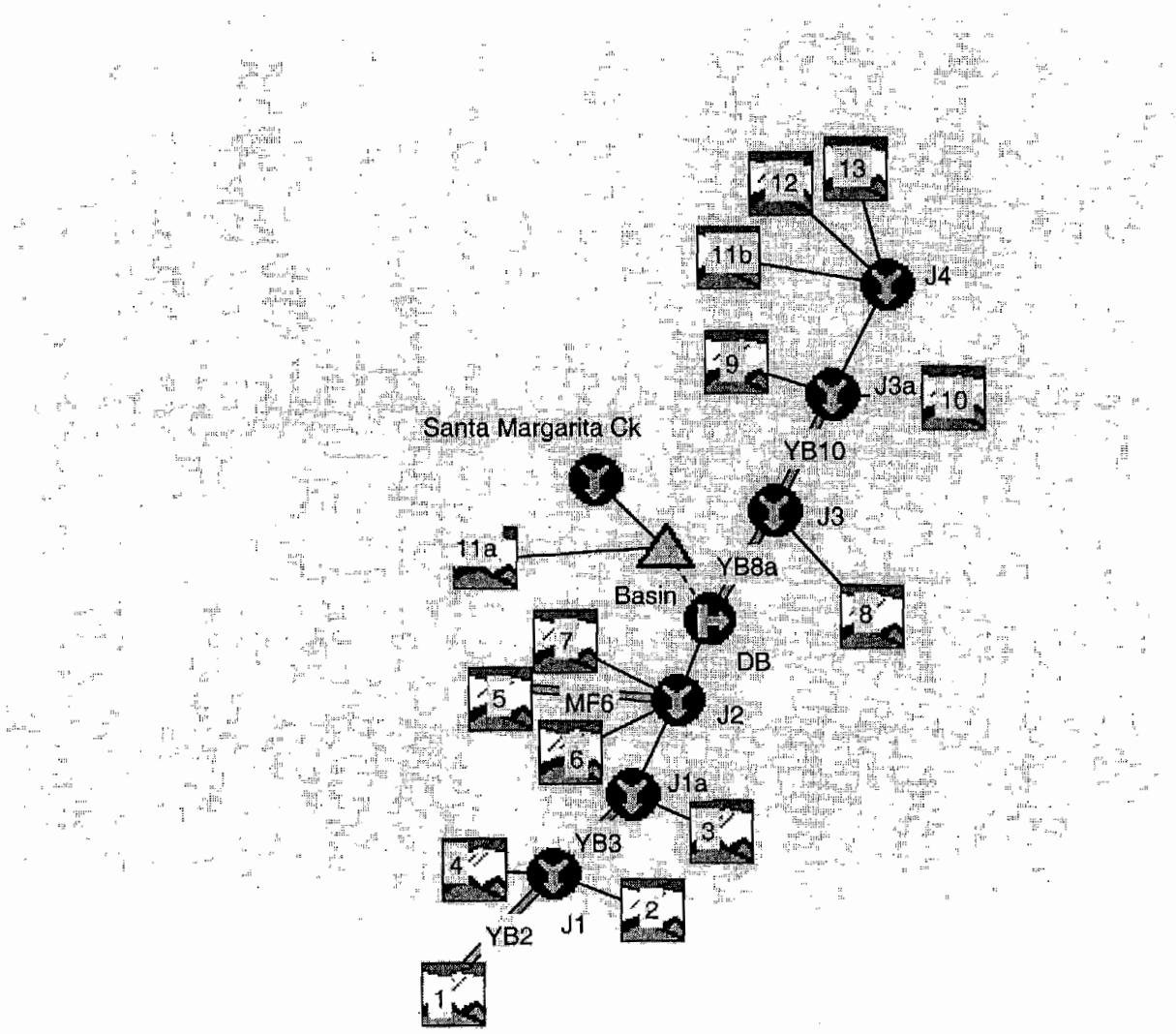
Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	251.77	01 Mar 03 2212	46.918	0.340
MP6	251.10	01 Mar 03 2226	45.899	0.340
1	491.29	01 Mar 03 2220	109.46	0.810
YB2	490.07	01 Mar 03 2230	107.87	0.810
4	302.63	01 Mar 03 2221	68.885	0.510
2	266.52	01 Mar 03 2224	63.872	0.460
J1	1038.4	01 Mar 03 2227	240.62	1.780
YB3	1035.9	01 Mar 03 2236	237.24	1.780
3	259.71	01 Mar 03 2214	50.976	0.400
J1a	1181.9	01 Mar 03 2235	288.22	2.180
7	410.26	01 Mar 03 2220	92.149	0.700
6	207.76	01 Mar 03 2227	51.380	0.340
J2	1959.3	01 Mar 03 2231	477.65	3.560
\8a	1955.0	01 Mar 03 2240	471.23	3.560
	162.32	01 Mar 03 2242	50.444	0.400
J3	2116.8	01 Mar 03 2240	521.67	3.960
YB10	2115.6	01 Mar 03 2242	520.56	3.960
9	254.50	01 Mar 03 2156	25.659	0.150
10	231.63	01 Mar 03 2215	49.027	0.440
J3a	2273.1	01 Mar 03 2241	595.25	4.550
11	275.50	01 Mar 03 2221	60.749	0.400
12	113.96	01 Mar 03 2200	13.426	0.080
13	62.569	01 Mar 03 2200	7.2901	0.040
J4	2494.8	01 Mar 03 2240	676.71	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : e-100

Start of Run : 01Mar03 1200 Basin Model : Basin_exist_QatRR
End of Run : 02Mar03 1200 Met. Model : Met 100
Execution Time : 16May03 1445 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	295.54	01 Mar 03 2212	54.212	0.340
MF6	293.43	01 Mar 03 2226	53.129	0.340
1	578.06	01 Mar 03 2220	126.66	0.810
YB2	576.77	01 Mar 03 2229	124.95	0.810
4	356.12	01 Mar 03 2221	79.706	0.510
2	312.59	01 Mar 03 2224	73.749	0.460
J1	1224.4	01 Mar 03 2226	278.41	1.780
YB3	1223.1	01 Mar 03 2235	274.78	1.780
3	307.77	01 Mar 03 2213	59.249	0.400
J1a	1399.8	01 Mar 03 2234	334.03	2.180
7	484.32	01 Mar 03 2220	106.83	0.700
6	241.21	01 Mar 03 2227	58.949	0.340
J2	2322.6	01 Mar 03 2230	552.93	3.560
18a	2321.2	01 Mar 03 2238	546.17	3.560
[illegible]	192.46	01 Mar 03 2242	58.641	0.400
J3	2512.1	01 Mar 03 2238	604.81	3.960
YB10	2511.5	01 Mar 03 2240	603.61	3.960
9	290.94	01 Mar 03 2156	29.189	0.150
10	279.68	01 Mar 03 2215	57.562	0.440
J3a	2703.2	01 Mar 03 2239	690.36	4.550
11	319.67	01 Mar 03 2220	69.683	0.400
12	130.63	01 Mar 03 2200	15.293	0.080
13	71.086	01 Mar 03 2200	8.2531	0.040
J4	2969.8	01 Mar 03 2238	783.59	5.070


12
13
11b
J4
9
J3a
10
Santa Margarita Ck
YB10
J3
11a
YB8a
Basin
8
7
DB
5
MF6
J2
6
J1a
3
YB3
4
2
J1
YB2
1

HMS * Summary of Results

Project : SM_v2 Run Name : Run 1

Start of Run : 01Mar03 1200 Basin Model : project1
End of Run : 02Mar03 1200 Met. Model : Met 2
Execution Time : 16May03 1435 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	32.646	01 Mar 03 2216	9.6275	0.340
MF6	32.557	01 Mar 03 2244	9.3634	0.340
1	60.611	01 Mar 03 2226	21.999	0.810
YB2	60.446	01 Mar 03 2246	21.390	0.810
4	37.387	01 Mar 03 2227	13.840	0.510
2	35.923	01 Mar 03 2231	13.247	0.460
J1	123.24	01 Mar 03 2241	48.476	1.780
YB3	122.95	01 Mar 03 2301	46.911	1.780
3	25.941	01 Mar 03 2219	9.5631	0.400
J1a	137.26	01 Mar 03 2300	56.474	2.180
7	46.714	01 Mar 03 2227	17.980	0.700
6	34.788	01 Mar 03 2232	11.690	0.340
J2	218.94	01 Mar 03 2258	95.508	3.560
3	218.59	01 Mar 03 2258	95.356	3.560
B8a	216.78	01 Mar 03 2319	92.347	3.560
8	17.569	01 Mar 03 2256	9.4366	0.400
J3	232.29	01 Mar 03 2319	101.78	3.960
YB10	231.55	01 Mar 03 2323	101.26	3.960
9	55.770	01 Mar 03 2157	6.5833	0.150
10	13.407	01 Mar 03 2227	7.8240	0.440
J3a	248.59	01 Mar 03 2323	115.67	4.550
11b	18.142	01 Mar 03 2222	5.2076	0.150
12	24.032	01 Mar 03 2201	3.3811	0.080
13	15.223	01 Mar 03 2201	1.9982	0.040
J4	262.14	01 Mar 03 2323	126.25	4.820
11a	30.953	01 Mar 03 2221	8.6853	0.250
DB(br)	0.34752	01 Mar 03 2258	0.15160	0.000
Basin	17.641	01 Mar 03 2253	8.6304	0.250
Santa Margarita Ck	17.641	01 Mar 03 2253	8.6304	0.250

HMS * Summary of Results

Project : SM_v2 Run Name : Run 2

Start of Run : 01Mar03 1200 Basin Model : project1
End of Run : 02Mar03 1200 Met. Model : Met 5
Execution Time : 16May03 1435 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	87.131	01 Mar 03 2214	19.183	0.340
MF6	86.747	01 Mar 03 2234	18.536	0.340
1	166.10	01 Mar 03 2222	44.296	0.810
YB2	165.63	01 Mar 03 2236	43.261	0.810
4	102.30	01 Mar 03 2223	27.872	0.510
2	93.084	01 Mar 03 2227	26.254	0.460
J1	345.69	01 Mar 03 2232	97.387	1.780
YB3	345.33	01 Mar 03 2246	95.159	1.780
3	81.689	01 Mar 03 2215	19.944	0.400
J1a	387.03	01 Mar 03 2245	115.10	2.180
7	134.49	01 Mar 03 2222	36.751	0.700
6	79.250	01 Mar 03 2229	22.125	0.340
J2	627.06	01 Mar 03 2241	192.51	3.560
\	626.07	01 Mar 03 2241	192.21	3.560
.88a	624.66	01 Mar 03 2255	188.04	3.560
8	51.376	01 Mar 03 2247	19.708	0.400
J3	674.75	01 Mar 03 2255	207.75	3.960
YB10	674.11	01 Mar 03 2257	207.02	3.960
9	109.44	01 Mar 03 2156	11.751	0.150
10	59.723	01 Mar 03 2218	17.757	0.440
J3a	718.49	01 Mar 03 2257	236.53	4.550
11b	41.318	01 Mar 03 2220	9.8380	0.150
12	48.141	01 Mar 03 2201	6.0896	0.080
13	28.231	01 Mar 03 2200	3.4552	0.040
J4	750.53	01 Mar 03 2257	255.91	4.820
11a	70.506	01 Mar 03 2219	16.407	0.250
DB(br)	0.99534	01 Mar 03 2241	0.30558	0.000
Basin	40.397	01 Mar 03 2247	16.376	0.250
Santa Margarita Ck	40.397	01 Mar 03 2247	16.376	0.250

HMS * Summary of Results

Project : SM_v2 Run Name : Run 8

Start of Run : 01Mar03 1200 Basin Model : project1
End of Run : 02Mar03 1200 Met. Model : Met 10
Execution Time : 16May03 1435 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	115.33	01 Mar 03 2213	23.990	0.340
MF6	114.36	01 Mar 03 2232	23.270	0.340
1	221.37	01 Mar 03 2221	55.556	0.810
YB2	220.63	01 Mar 03 2234	54.398	0.810
4	136.31	01 Mar 03 2222	34.958	0.510
2	122.77	01 Mar 03 2226	32.783	0.460
J1	462.88	01 Mar 03 2230	122.14	1.780
YB3	461.91	01 Mar 03 2243	119.65	1.780
3	111.59	01 Mar 03 2215	25.251	0.400
J1a	519.74	01 Mar 03 2242	144.90	2.180
7	181.04	01 Mar 03 2221	46.280	0.700
6	101.66	01 Mar 03 2229	27.274	0.340
J2	847.41	01 Mar 03 2238	241.73	3.560
[illegible]	706.57	01 Mar 03 2238	237.35	3.560
[illegible]8a	705.99	01 Mar 03 2251	232.64	3.560
8	69.873	01 Mar 03 2245	24.963	0.400
J3	774.94	01 Mar 03 2251	257.60	3.960
YB10	774.62	01 Mar 03 2253	256.76	3.960
9	135.55	01 Mar 03 2156	14.244	0.150
10	87.515	01 Mar 03 2217	22.985	0.440
J3a	835.75	01 Mar 03 2252	293.99	4.550
11b	52.956	01 Mar 03 2219	12.121	0.150
12	59.854	01 Mar 03 2201	7.4009	0.080
13	34.485	01 Mar 03 2200	4.1494	0.040
J4	878.30	01 Mar 03 2251	317.66	4.820
11a	90.383	01 Mar 03 2218	20.214	0.250
DB(br)	140.85	01 Mar 03 2238	4.3793	0.000
Basin	60.895	01 Mar 03 2257	24.198	0.250
Santa Margarita Ck	60.895	01 Mar 03 2257	24.198	0.250

HMS * Summary of Results

Project : SM_v2 Run Name : Run 9

Start of Run : 01Mar03 1200 Basin Model : project1
End of Run : 02Mar03 1200 Met. Model : Met 25
Execution Time : 16May03 1435 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	184.81	01 Mar 03 2213	35.708	0.340
MF6	183.38	01 Mar 03 2228	34.825	0.340
1	358.42	01 Mar 03 2220	83.076	0.810
YB2	358.02	01 Mar 03 2231	81.671	0.810
4	220.76	01 Mar 03 2222	52.277	0.510
2	195.98	01 Mar 03 2225	48.682	0.460
J1	755.89	01 Mar 03 2228	182.63	1.780
YB3	754.56	01 Mar 03 2239	179.64	1.780
3	186.54	01 Mar 03 2214	38.333	0.400
J1a	855.55	01 Mar 03 2237	217.97	2.180
7	297.16	01 Mar 03 2221	69.657	0.700
6	156.09	01 Mar 03 2228	39.667	0.340
J2	1406.4	01 Mar 03 2234	362.12	3.560
	905.98	01 Mar 03 2234	336.12	3.560
B8a	905.51	01 Mar 03 2246	330.43	3.560
8	116.54	01 Mar 03 2243	37.919	0.400
J3	1021.8	01 Mar 03 2245	368.35	3.960
YB10	1021.6	01 Mar 03 2247	367.36	3.960
9	197.30	01 Mar 03 2156	20.153	0.150
10	159.46	01 Mar 03 2216	36.114	0.440
J3a	1126.2	01 Mar 03 2246	423.62	4.550
11b	81.213	01 Mar 03 2219	17.614	0.150
12	87.851	01 Mar 03 2200	10.516	0.080
13	49.131	01 Mar 03 2200	5.7814	0.040
J4	1194.8	01 Mar 03 2245	457.54	4.820
11a	138.56	01 Mar 03 2218	29.373	0.250
DB(br)	500.39	01 Mar 03 2234	26.002	0.000
Basin	265.69	01 Mar 03 2258	54.844	0.250
Santa Margarita Ck	265.69	01 Mar 03 2258	54.844	0.250

HMS * Summary of Results

Project : SM_v2 Run Name : Run 10

Start of Run : 01Mar03 1200 Basin Model : project1
End of Run : 02Mar03 1200 Met. Model : Met 50
Execution Time : 16May03 1436 Control Specs : Control _SM

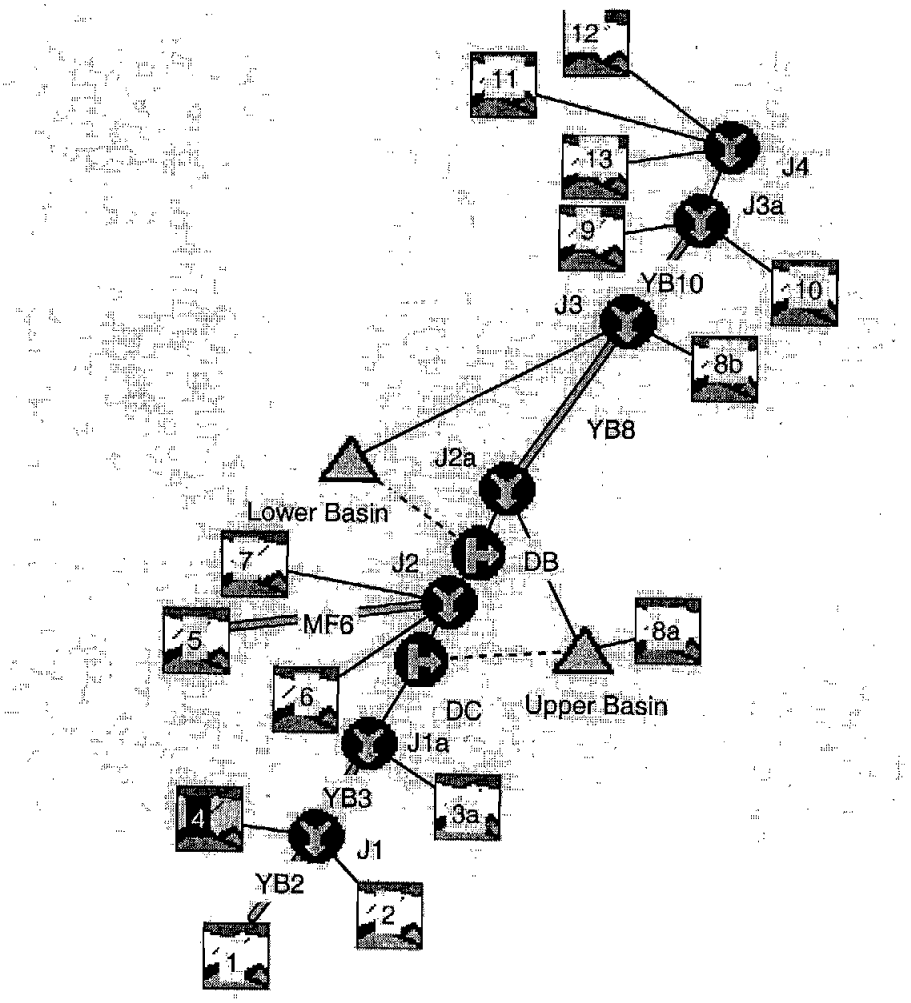
Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	251.77	01 Mar 03 2212	46.918	0.340
MF6	251.10	01 Mar 03 2226	45.899	0.340
1	491.29	01 Mar 03 2220	109.46	0.810
YB2	490.07	01 Mar 03 2230	107.87	0.810
4	302.63	01 Mar 03 2221	68.885	0.510
2	266.52	01 Mar 03 2224	63.872	0.460
J1	1038.4	01 Mar 03 2227	240.62	1.780
YB3	1035.9	01 Mar 03 2236	237.24	1.780
3	259.71	01 Mar 03 2214	50.976	0.400
J1a	1181.9	01 Mar 03 2235	288.22	2.180
7	410.26	01 Mar 03 2220	92.149	0.700
6	207.76	01 Mar 03 2227	51.380	0.340
J2	1959.3	01 Mar 03 2231	477.65	3.560
\	1103.2	01 Mar 03 2231	424.05	3.560
88a	1101.6	01 Mar 03 2242	417.54	3.560
8	162.32	01 Mar 03 2242	50.444	0.400
J3	1263.9	01 Mar 03 2242	467.99	3.960
YB10	1263.3	01 Mar 03 2244	466.85	3.960
9	254.50	01 Mar 03 2156	25.659	0.150
10	231.63	01 Mar 03 2215	49.027	0.440
J3a	1414.4	01 Mar 03 2242	541.54	4.550
11b	107.99	01 Mar 03 2218	22.804	0.150
12	113.96	01 Mar 03 2200	13.426	0.080
13	62.569	01 Mar 03 2200	7.2901	0.040
J4	1509.1	01 Mar 03 2241	585.06	4.820
11a	184.26	01 Mar 03 2217	38.025	0.250
DB(br)	856.04	01 Mar 03 2231	53.593	0.000
Basin	404.26	01 Mar 03 2302	90.967	0.250
Santa Margarita Ck	404.26	01 Mar 03 2302	90.967	0.250

HMS * Summary of Results

Project : SM_v2 Run Name : Run 11

Start of Run : 01Mar03 1200 Basin Model : project1
End of Run : 02Mar03 1200 Met. Model : Met 100
Execution Time : 16May03 1436 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
5	295.54	01 Mar 03 2212	54.212	0.340
MF6	293.43	01 Mar 03 2226	53.129	0.340
1	578.06	01 Mar 03 2220	126.66	0.810
YB2	576.77	01 Mar 03 2229	124.95	0.810
4	356.12	01 Mar 03 2221	79.706	0.510
2	312.59	01 Mar 03 2224	73.749	0.460
J1	1224.4	01 Mar 03 2226	278.41	1.780
YB3	1223.1	01 Mar 03 2235	274.78	1.780
3	307.77	01 Mar 03 2213	59.249	0.400
J1a	1399.8	01 Mar 03 2234	334.03	2.180
7	484.32	01 Mar 03 2220	106.83	0.700
6	241.21	01 Mar 03 2227	58.949	0.340
J2	2322.6	01 Mar 03 2230	552.93	3.560
[illegible]	1232.9	01 Mar 03 2230	479.08	3.560
[illegible]88a	1230.6	01 Mar 03 2241	472.08	3.560
8	192.46	01 Mar 03 2242	58.641	0.400
J3	1423.0	01 Mar 03 2241	530.72	3.960
YB10	1422.6	01 Mar 03 2242	529.50	3.960
9	290.94	01 Mar 03 2156	29.189	0.150
10	279.68	01 Mar 03 2215	57.562	0.440
J3a	1605.5	01 Mar 03 2241	616.25	4.550
11b	125.33	01 Mar 03 2218	26.156	0.150
12	130.63	01 Mar 03 2200	15.293	0.080
13	71.086	01 Mar 03 2200	8.2531	0.040
J4	1717.5	01 Mar 03 2240	665.95	4.820
11a	213.83	01 Mar 03 2217	43.615	0.250
DB(br)	1089.7	01 Mar 03 2230	73.855	0.000
Basin	499.86	01 Mar 03 2303	116.74	0.250
Santa Margarita Ck	499.86	01 Mar 03 2303	116.74	0.250


12
11
13
J4
J3a
9
YB10
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J3
8b
YB8
J2a
Lower Basin
7
J2
DB
MF6
5
8a
6
DC
Upper Basin
J1a
YB3
4
3a
J1
YB2
2
1

HMS * Summary of Results

Project : SM_v2 Run Name : Run 7

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 2
Execution Time : 19May03 0935 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	0.45542	01 Mar 03 2258	0.19868	0.000
Lower Basin	0.071023	02 Mar 03 1200	0.055711	0.000
5	32.646	01 Mar 03 2216	9.6275	0.340
MF6	32.557	01 Mar 03 2244	9.3634	0.340
1	60.611	01 Mar 03 2226	21.999	0.810
YB2	60.446	01 Mar 03 2246	21.390	0.810
4	37.387	01 Mar 03 2227	13.840	0.510
2	35.923	01 Mar 03 2231	13.247	0.460
J1	123.24	01 Mar 03 2241	48.476	1.780
YB3	122.95	01 Mar 03 2301	46.911	1.780
3a	25.941	01 Mar 03 2219	9.5631	0.400
J1a	137.26	01 Mar 03 2300	56.474	2.180
DC	136.92	01 Mar 03 2300	56.333	2.180
	46.714	01 Mar 03 2227	17.980	0.700
[illegible]	34.788	01 Mar 03 2232	11.690	0.340
J2	218.60	01 Mar 03 2258	95.366	3.560
DB	218.14	01 Mar 03 2258	95.168	3.560
8a	3.0571	01 Mar 03 2232	1.3394	0.056
DC(br)	0.34316	01 Mar 03 2300	0.14119	0.000
Upper Basin	0.0	01 Mar 03 1200	0.0	0.056
J2a	218.14	01 Mar 03 2258	95.168	3.616
YB8	216.68	01 Mar 03 2315	92.783	3.616
8b	15.373	01 Mar 03 2256	8.2571	0.350
J3	230.62	01 Mar 03 2315	101.10	3.966
YB10	230.15	01 Mar 03 2319	100.54	3.966
9	55.770	01 Mar 03 2157	6.5833	0.150
10	13.407	01 Mar 03 2227	7.8240	0.440
J3a	247.40	01 Mar 03 2319	114.95	4.556
11	46.264	01 Mar 03 2224	13.867	0.400
13	15.223	01 Mar 03 2201	1.9982	0.040
12	24.032	01 Mar 03 2201	3.3811	0.080
J4	274.56	01 Mar 03 2319	134.20	5.076

HMS * Summary of Results

Project : SM_v2 Run Name : Run 4

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 5
Execution Time : 17May03 1350 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	143.32	01 Mar 03 2241	4.0051	0.000
Lower Basin	1.8074	01 Mar 03 2302	1.6330	0.000
5	87.131	01 Mar 03 2214	19.183	0.340
MF6	86.747	01 Mar 03 2234	18.536	0.340
1	166.10	01 Mar 03 2222	44.296	0.810
YB2	165.63	01 Mar 03 2236	43.261	0.810
4	102.30	01 Mar 03 2223	27.872	0.510
2	93.084	01 Mar 03 2227	26.254	0.460
J1	345.69	01 Mar 03 2232	97.387	1.780
YB3	345.33	01 Mar 03 2246	95.159	1.780
3a	81.689	01 Mar 03 2215	19.944	0.400
J1a	387.03	01 Mar 03 2245	115.10	2.180
DC	386.06	01 Mar 03 2245	114.82	2.180
	134.49	01 Mar 03 2222	36.751	0.700
	79.250	01 Mar 03 2229	22.125	0.340
J2	626.12	01 Mar 03 2241	192.23	3.560
DB	482.80	01 Mar 03 2241	188.22	3.560
8a	9.3018	01 Mar 03 2226	2.7908	0.056
DC(br)	0.96757	01 Mar 03 2245	0.28776	0.000
Upper Basin	0.0	01 Mar 03 1200	0.0	0.056
J2a	482.80	01 Mar 03 2241	188.22	3.616
YB8	482.79	01 Mar 03 2253	184.89	3.616
8b	44.954	01 Mar 03 2247	17.245	0.350
J3	528.78	01 Mar 03 2252	203.77	3.966
YB10	528.75	01 Mar 03 2254	203.02	3.966
9	109.44	01 Mar 03 2156	11.751	0.150
10	59.723	01 Mar 03 2218	17.757	0.440
J3a	577.17	01 Mar 03 2245	232.53	4.556
11	105.35	01 Mar 03 2222	26.203	0.400
13	28.231	01 Mar 03 2200	3.4552	0.040
12	48.141	01 Mar 03 2201	6.0896	0.080
J4	662.49	01 Mar 03 2244	268.28	5.076

HMS * Summary of Results

Project : SM_v2 Run Name : Run 7

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 10
Execution Time : 17May03 1351 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	287.71	01 Mar 03 2232	12.465	0.000
Lower Basin	5.8761	01 Mar 03 2315	5.1835	0.000
5	115.33	01 Mar 03 2213	23.990	0.340
MF6	114.36	01 Mar 03 2232	23.270	0.340
1	221.37	01 Mar 03 2221	55.556	0.810
YB2	220.63	01 Mar 03 2234	54.398	0.810
4	136.31	01 Mar 03 2222	34.958	0.510
2	122.77	01 Mar 03 2226	32.783	0.460
J1	462.88	01 Mar 03 2230	122.14	1.780
YB3	461.91	01 Mar 03 2243	119.65	1.780
3a	111.59	01 Mar 03 2215	25.251	0.400
J1a	519.74	01 Mar 03 2242	144.90	2.180
DC	399.12	01 Mar 03 2242	141.44	2.180
	181.04	01 Mar 03 2221	46.280	0.700
	101.66	01 Mar 03 2229	27.274	0.340
J2	774.36	01 Mar 03 2232	238.27	3.560
DB	486.65	01 Mar 03 2232	225.80	3.560
8a	12.686	01 Mar 03 2225	3.5327	0.056
DC(br)	120.62	01 Mar 03 2242	3.4593	0.000
Upper Basin	3.2533	02 Mar 03 0155	2.4220	0.056
J2a	486.65	01 Mar 03 2232	228.23	3.616
YB8	486.48	01 Mar 03 2244	224.42	3.616
8b	61.138	01 Mar 03 2245	21.843	0.350
J3	551.23	01 Mar 03 2246	251.44	3.966
YB10	551.20	01 Mar 03 2248	250.60	3.966
9	135.55	01 Mar 03 2156	14.244	0.150
10	87.515	01 Mar 03 2217	22.985	0.440
J3a	620.14	01 Mar 03 2239	287.82	4.556
11	135.04	01 Mar 03 2222	32.287	0.400
13	34.485	01 Mar 03 2200	4.1494	0.040
12	59.854	01 Mar 03 2201	7.4009	0.080
J4	747.52	01 Mar 03 2235	331.66	5.076

HMS * Summary of Results

Project : SM_v2 Run Name : Run 14

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 25
Execution Time : 17May03 1352 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	528.33	01 Mar 03 2226	35.677	0.000
Lower Basin	45.647	01 Mar 03 2338	19.767	0.000
5	184.81	01 Mar 03 2213	35.708	0.340
MF6	183.38	01 Mar 03 2228	34.825	0.340
1	358.42	01 Mar 03 2220	83.076	0.810
YB2	358.02	01 Mar 03 2231	81.671	0.810
4	220.76	01 Mar 03 2222	52.277	0.510
2	195.98	01 Mar 03 2225	48.682	0.460
J1	755.89	01 Mar 03 2228	182.63	1.780
YB3	754.56	01 Mar 03 2239	179.64	1.780
3a	186.54	01 Mar 03 2214	38.333	0.400
J1a	855.55	01 Mar 03 2237	217.97	2.180
DC	399.46	01 Mar 03 2237	195.92	2.180
	297.16	01 Mar 03 2221	69.657	0.700
	156.09	01 Mar 03 2228	39.667	0.340
J2	1021.4	01 Mar 03 2226	340.07	3.560
DB	493.08	01 Mar 03 2226	304.39	3.560
8a	21.191	01 Mar 03 2224	5.3609	0.056
DC(br)	456.09	01 Mar 03 2237	22.047	0.000
Upper Basin	132.44	01 Mar 03 2308	22.785	0.056
J2a	616.53	01 Mar 03 2307	327.18	3.616
YB8	616.42	01 Mar 03 2318	322.58	3.616
8b	101.98	01 Mar 03 2243	33.179	0.350
J3	729.25	01 Mar 03 2313	375.52	3.966
YB10	729.23	01 Mar 03 2315	374.49	3.966
9	197.30	01 Mar 03 2156	20.153	0.150
10	159.46	01 Mar 03 2216	36.114	0.440
J3a	803.33	01 Mar 03 2311	430.76	4.556
11	207.13	01 Mar 03 2221	46.922	0.400
13	49.131	01 Mar 03 2200	5.7814	0.040
12	87.851	01 Mar 03 2200	10.516	0.080
J4	987.30	01 Mar 03 2220	493.98	5.076

HMS * Summary of Results

Project : SM_v2 Run Name : Run 15

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 50
Execution Time : 17May03 1353 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	754.36	01 Mar 03 2224	61.037	0.000
Lower Basin	106.69	01 Mar 03 2354	42.839	0.000
5	251.77	01 Mar 03 2212	46.918	0.340
MF6	251.10	01 Mar 03 2226	45.899	0.340
1	491.29	01 Mar 03 2220	109.46	0.810
YB2	490.07	01 Mar 03 2230	107.87	0.810
4	302.63	01 Mar 03 2221	68.885	0.510
2	266.52	01 Mar 03 2224	63.872	0.460
J1	1038.4	01 Mar 03 2227	240.62	1.780
YB3	1035.9	01 Mar 03 2236	237.24	1.780
3a	259.71	01 Mar 03 2214	50.976	0.400
J1a	1181.9	01 Mar 03 2235	288.22	2.180
DC	399.78	01 Mar 03 2235	241.11	2.180
	410.26	01 Mar 03 2220	92.149	0.700
	207.76	01 Mar 03 2227	51.380	0.340
J2	1253.5	01 Mar 03 2224	430.54	3.560
DB	499.11	01 Mar 03 2224	369.50	3.560
8a	29.511	01 Mar 03 2224	7.1273	0.056
DC(br)	782.11	01 Mar 03 2235	47.106	0.000
Upper Basin	230.92	01 Mar 03 2312	49.562	0.056
J2a	716.55	01 Mar 03 2310	419.07	3.616
YB8	716.54	01 Mar 03 2320	413.83	3.616
8b	142.03	01 Mar 03 2242	44.138	0.350
J3	905.55	01 Mar 03 2313	500.81	3.966
YB10	905.53	01 Mar 03 2315	499.62	3.966
9	254.50	01 Mar 03 2156	25.659	0.150
10	231.63	01 Mar 03 2215	49.027	0.440
J3a	1004.9	01 Mar 03 2308	574.31	4.556
11	275.50	01 Mar 03 2221	60.749	0.400
13	62.569	01 Mar 03 2200	7.2901	0.040
12	113.96	01 Mar 03 2200	13.426	0.080
J4	1184.6	01 Mar 03 2219	655.78	5.076

HMS * Summary of Results

Project : SM_v2 Run Name : Run 16

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 100
Execution Time : 17May03 1354 Control Specs : Control _SM

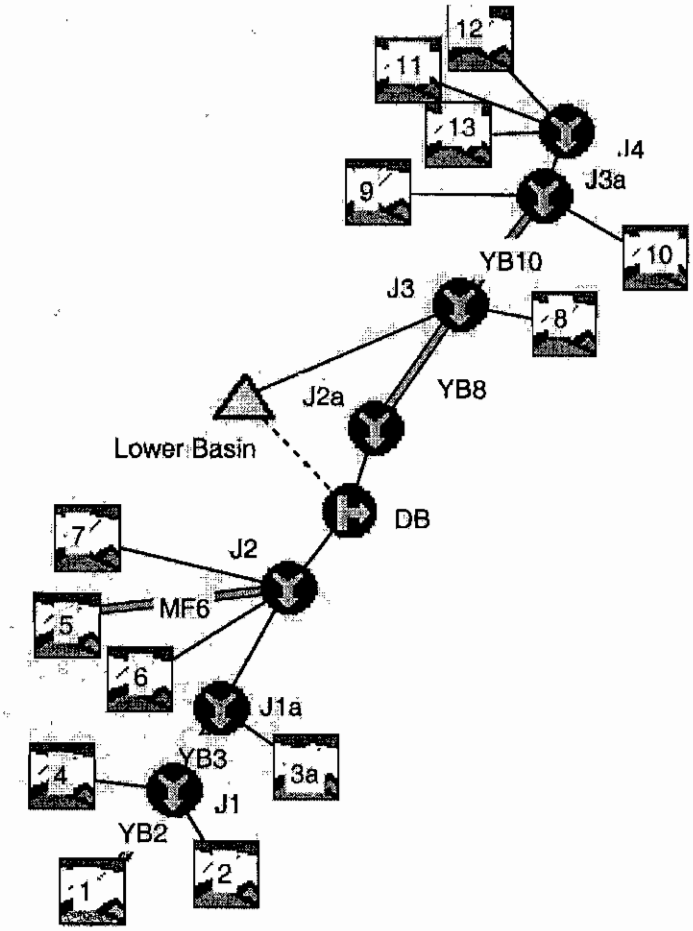
Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	900.00	01 Mar 03 2224	79.879	0.000
Lower Basin	147.39	02 Mar 03 0004	60.753	0.000
5	295.54	01 Mar 03 2212	54.212	0.340
MF6	293.43	01 Mar 03 2226	53.129	0.340
1	578.06	01 Mar 03 2220	126.66	0.810
YB2	576.77	01 Mar 03 2229	124.95	0.810
4	356.12	01 Mar 03 2221	79.706	0.510
2	312.59	01 Mar 03 2224	73.749	0.460
J1	1224.4	01 Mar 03 2226	278.41	1.780
YB3	1223.1	01 Mar 03 2235	274.78	1.780
3a	307.77	01 Mar 03 2213	59.249	0.400
J1a	1399.8	01 Mar 03 2234	334.03	2.180
DC	400.00	01 Mar 03 2234	268.19	2.180
	484.32	01 Mar 03 2220	106.83	0.700
	241.21	01 Mar 03 2227	58.949	0.340
J2	1403.2	01 Mar 03 2224	487.10	3.560
DB	503.23	01 Mar 03 2224	407.22	3.560
8a	34.988	01 Mar 03 2223	8.2831	0.056
DC(br)	999.77	01 Mar 03 2234	65.837	0.000
Upper Basin	279.62	01 Mar 03 2316	69.418	0.056
J2a	766.03	01 Mar 03 2313	476.64	3.616
YB8	766.01	01 Mar 03 2323	470.99	3.616
8b	168.40	01 Mar 03 2242	51.311	0.350
J3	1011.2	01 Mar 03 2312	583.06	3.966
YB10	1011.2	01 Mar 03 2314	581.79	3.966
9	290.94	01 Mar 03 2156	29.189	0.150
10	279.68	01 Mar 03 2215	57.562	0.440
J3a	1129.5	01 Mar 03 2304	668.54	4.556
11	319.67	01 Mar 03 2220	69.683	0.400
13	71.086	01 Mar 03 2200	8.2531	0.040
12	130.63	01 Mar 03 2200	15.293	0.080
J4	1311.7	01 Mar 03 2218	761.77	5.076

HMS * Summary of Results

Project : SM_v2 Run Name : Run 6

Start of Run : 01Mar03 1200 Basin Model : project3rev
End of Run : 02Mar03 1200 Met. Model : Met 100
Execution Time : 17May03 1309 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	770.00	01 Mar 03 2224	68.451	0.000
Lower Basin	133.46	02 Mar 03 0002	59.608	0.000
5	295.54	01 Mar 03 2212	54.212	0.340
MF6	293.43	01 Mar 03 2226	53.129	0.340
1	578.06	01 Mar 03 2220	126.66	0.810
YB2	576.77	01 Mar 03 2229	124.95	0.810
4	356.12	01 Mar 03 2221	79.706	0.510
2	312.59	01 Mar 03 2224	73.749	0.460
J1	1224.4	01 Mar 03 2226	278.41	1.780
YB3	1223.1	01 Mar 03 2235	274.78	1.780
3a	307.77	01 Mar 03 2213	59.249	0.400
J1a	1399.8	01 Mar 03 2234	334.03	2.180
DC	400.00	01 Mar 03 2234	268.19	2.180
	484.32	01 Mar 03 2220	106.83	0.700
	241.21	01 Mar 03 2227	58.949	0.340
J2	1403.2	01 Mar 03 2224	487.10	3.560
DB	633.23	01 Mar 03 2224	418.65	3.560
8a	34.988	01 Mar 03 2223	8.2831	0.056
DC(br)	999.77	01 Mar 03 2234	65.837	0.000
Upper Basin	324.02	01 Mar 03 2312	72.805	0.056
J2a	869.40	01 Mar 03 2245	491.45	3.616
YB8	869.09	01 Mar 03 2254	485.82	3.616
8b	168.40	01 Mar 03 2242	51.311	0.350
J3	1123.8	01 Mar 03 2254	596.74	3.966
YB10	1123.8	01 Mar 03 2256	595.59	3.966
9	290.94	01 Mar 03 2156	29.189	0.150
10	279.68	01 Mar 03 2215	57.562	0.440
J3a	1273.3	01 Mar 03 2248	682.34	4.556
11	319.67	01 Mar 03 2220	69.683	0.400
13	71.086	01 Mar 03 2200	8.2531	0.040
12	130.63	01 Mar 03 2200	15.293	0.080
J4	1525.8	01 Mar 03 2236	775.57	5.076


12
11
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YB10
J3
8
J2a
YB8
Lower Basin
DB
7
J2
MF6
5
6
J1a
YB3
4
3a
J1
YB2
1
2

HMS * Summary of Results

Project : SM_v2 Run Name : Run 12

Start of Run : 01Mar03 1200 Basin Model : project4
End of Run : 02Mar03 1200 Met. Model : Met 2
Execution Time : 19May03 0951 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	0.45613	01 Mar 03 2258	0.19897	0.000
Lower Basin	0.22994	02 Mar 03 0045	0.18455	0.000
5	32.646	01 Mar 03 2216	9.6275	0.340
MF6	32.557	01 Mar 03 2244	9.3634	0.340
1	60.611	01 Mar 03 2226	21.999	0.810
YB2	60.446	01 Mar 03 2246	21.390	0.810
4	37.387	01 Mar 03 2227	13.840	0.510
2	35.923	01 Mar 03 2231	13.247	0.460
J1	123.24	01 Mar 03 2241	48.476	1.780
YB3	122.95	01 Mar 03 2301	46.911	1.780
3a	25.941	01 Mar 03 2219	9.5631	0.400
J1a	137.26	01 Mar 03 2300	56.474	2.180
7	46.714	01 Mar 03 2227	17.980	0.700
	34.788	01 Mar 03 2232	11.690	0.340
J	218.94	01 Mar 03 2258	95.508	3.560
DB	218.48	01 Mar 03 2258	95.309	3.560
J2a	218.48	01 Mar 03 2258	95.309	3.560
YB8	217.01	01 Mar 03 2315	92.921	3.560
8	17.569	01 Mar 03 2256	9.4366	0.400
J3	233.09	01 Mar 03 2315	102.54	3.960
YB10	232.45	01 Mar 03 2319	102.00	3.960
9	55.770	01 Mar 03 2157	6.5833	0.150
10	13.407	01 Mar 03 2227	7.8240	0.440
J3a	249.70	01 Mar 03 2319	116.41	4.550
11	46.264	01 Mar 03 2224	13.867	0.400
13	15.223	01 Mar 03 2201	1.9982	0.040
12	24.032	01 Mar 03 2201	3.3811	0.080
J4	276.86	01 Mar 03 2319	135.66	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : Run 13

Start of Run : 01Mar03 1200 Basin Model : project4
End of Run : 02Mar03 1200 Met. Model : Met 5
Execution Time : 19May03 0951 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	192.04	01 Mar 03 2241	5.2614	0.000
Lower Basin	17.120	01 Mar 03 2301	5.2345	0.000
5	87.131	01 Mar 03 2214	19.183	0.340
MF6	86.747	01 Mar 03 2234	18.536	0.340
1	166.10	01 Mar 03 2222	44.296	0.810
YB2	165.63	01 Mar 03 2236	43.261	0.810
4	102.30	01 Mar 03 2223	27.872	0.510
2	93.084	01 Mar 03 2227	26.254	0.460
J1	345.69	01 Mar 03 2232	97.387	1.780
YB3	345.33	01 Mar 03 2246	95.159	1.780
3a	81.689	01 Mar 03 2215	19.944	0.400
J1a	387.03	01 Mar 03 2245	115.10	2.180
7	134.49	01 Mar 03 2222	36.751	0.700
	79.250	01 Mar 03 2229	22.125	0.340
_ 2	627.06	01 Mar 03 2241	192.51	3.560
DB	478.57	01 Mar 03 2302	187.25	3.560
J2a	478.57	01 Mar 03 2302	187.25	3.560
YB8	475.78	01 Mar 03 2313	183.92	3.560
8	51.376	01 Mar 03 2247	19.708	0.400
J3	536.77	01 Mar 03 2241	208.86	3.960
YB10	535.84	01 Mar 03 2244	208.12	3.960
9	109.44	01 Mar 03 2156	11.751	0.150
10	59.723	01 Mar 03 2218	17.757	0.440
J3a	588.99	01 Mar 03 2244	237.63	4.550
11	105.35	01 Mar 03 2222	26.203	0.400
13	28.231	01 Mar 03 2200	3.4552	0.040
12	48.141	01 Mar 03 2201	6.0896	0.080
J4	674.70	01 Mar 03 2244	273.38	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : Run 27

Start of Run : 01Mar03 1200 Basin Model : project4
End of Run : 02Mar03 1200 Met. Model : Met 10
Execution Time : 19May03 0952 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	478.28	01 Mar 03 2238	20.592	0.000
Lower Basin	48.005	01 Mar 03 2311	20.475	0.000
5	115.33	01 Mar 03 2213	23.990	0.340
MF6	114.36	01 Mar 03 2232	23.270	0.340
1	221.37	01 Mar 03 2221	55.556	0.810
YB2	220.63	01 Mar 03 2234	54.398	0.810
4	136.31	01 Mar 03 2222	34.958	0.510
2	122.77	01 Mar 03 2226	32.783	0.460
J1	462.88	01 Mar 03 2230	122.14	1.780
YB3	461.91	01 Mar 03 2243	119.65	1.780
3a	111.59	01 Mar 03 2215	25.251	0.400
J1a	519.74	01 Mar 03 2242	144.90	2.180
7	181.04	01 Mar 03 2221	46.280	0.700
	101.66	01 Mar 03 2229	27.274	0.340
	847.41	01 Mar 03 2238	241.73	3.560
DB	478.99	01 Mar 03 2220	221.14	3.560
J2a	478.99	01 Mar 03 2220	221.14	3.560
YB8	475.43	01 Mar 03 2327	217.37	3.560
8	69.873	01 Mar 03 2245	24.963	0.400
J3	568.21	01 Mar 03 2326	262.81	3.960
YB10	567.49	01 Mar 03 2328	261.98	3.960
9	135.55	01 Mar 03 2156	14.244	0.150
10	87.515	01 Mar 03 2217	22.985	0.440
J3a	628.04	01 Mar 03 2235	299.21	4.550
11	135.04	01 Mar 03 2222	32.287	0.400
13	34.485	01 Mar 03 2200	4.1494	0.040
12	59.854	01 Mar 03 2201	7.4009	0.080
J4	759.67	01 Mar 03 2235	343.04	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : Run 28

Start of Run : 01Mar03 1200 Basin Model : project4
End of Run : 02Mar03 1200 Met. Model : Met 25
Execution Time : 19May03 0952 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	1200.0	01 Mar 03 2233	75.538	0.000
Lower Basin	150.46	01 Mar 03 2327	72.092	0.000
5	184.81	01 Mar 03 2213	35.708	0.340
MF6	183.38	01 Mar 03 2228	34.825	0.340
1	358.42	01 Mar 03 2220	83.076	0.810
YB2	358.02	01 Mar 03 2231	81.671	0.810
4	220.76	01 Mar 03 2222	52.277	0.510
2	195.98	01 Mar 03 2225	48.682	0.460
J1	755.89	01 Mar 03 2228	182.63	1.780
YB3	754.56	01 Mar 03 2239	179.64	1.780
3a	186.54	01 Mar 03 2214	38.333	0.400
J1a	855.55	01 Mar 03 2237	217.97	2.180
7	297.16	01 Mar 03 2221	69.657	0.700
	156.09	01 Mar 03 2228	39.667	0.340
J2	1406.4	01 Mar 03 2234	362.12	3.560
DB	478.51	01 Mar 03 2348	286.58	3.560
J2a	478.51	01 Mar 03 2348	286.58	3.560
YB8	477.09	01 Mar 03 2359	282.02	3.560
8	116.54	01 Mar 03 2243	37.919	0.400
J3	670.74	01 Mar 03 2358	392.03	3.960
YB10	670.62	01 Mar 03 2400	390.97	3.960
9	197.30	01 Mar 03 2156	20.153	0.150
10	159.46	01 Mar 03 2216	36.114	0.440
J3a	747.28	01 Mar 03 2219	447.24	4.550
11	207.13	01 Mar 03 2221	46.922	0.400
13	49.131	01 Mar 03 2200	5.7814	0.040
12	87.851	01 Mar 03 2200	10.516	0.080
J4	994.25	01 Mar 03 2219	510.46	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : Run 29

Start of Run : 01Mar03 1200 Basin Model : project4
End of Run : 02Mar03 1200 Met. Model : Met 50
Execution Time : 19May03 0952 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	1200.0	01 Mar 03 2217	120.19	0.000
Lower Basin	220.82	01 Mar 03 2342	112.89	0.000
5	251.77	01 Mar 03 2212	46.918	0.340
MF6	251.10	01 Mar 03 2226	45.899	0.340
1	491.29	01 Mar 03 2220	109.46	0.810
YB2	490.07	01 Mar 03 2230	107.87	0.810
4	302.63	01 Mar 03 2221	68.885	0.510
2	266.52	01 Mar 03 2224	63.872	0.460
J1	1038.4	01 Mar 03 2227	240.62	1.780
YB3	1035.9	01 Mar 03 2236	237.24	1.780
3a	259.71	01 Mar 03 2214	50.976	0.400
J1a	1181.9	01 Mar 03 2235	288.22	2.180
7	410.26	01 Mar 03 2220	92.149	0.700
	207.76	01 Mar 03 2227	51.380	0.340
_ 2	1959.3	01 Mar 03 2231	477.65	3.560
DB	759.27	01 Mar 03 2231	357.46	3.560
J2a	759.27	01 Mar 03 2231	357.46	3.560
YB8	756.58	01 Mar 03 2241	352.36	3.560
8	162.32	01 Mar 03 2242	50.444	0.400
J3	1044.1	01 Mar 03 2242	515.69	3.960
YB10	1042.6	01 Mar 03 2244	514.47	3.960
9	254.50	01 Mar 03 2156	25.659	0.150
10	231.63	01 Mar 03 2215	49.027	0.440
J3a	1193.7	01 Mar 03 2243	589.16	4.550
11	275.50	01 Mar 03 2221	60.749	0.400
13	62.569	01 Mar 03 2200	7.2901	0.040
12	113.96	01 Mar 03 2200	13.426	0.080
J4	1404.6	01 Mar 03 2242	670.62	5.070

HMS * Summary of Results

Project : SM_v2 Run Name : Run 30

Start of Run : 01Mar03 1200 Basin Model : project4
End of Run : 02Mar03 1200 Met. Model : Met 100
Execution Time : 19May03 0952 Control Specs : Control _SM

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
DB(br)	1200.0	01 Mar 03 2213	146.84	0.000
Lower Basin	255.46	01 Mar 03 2353	137.06	0.000
5	295.54	01 Mar 03 2212	54.212	0.340
MF6	293.43	01 Mar 03 2226	53.129	0.340
1	578.06	01 Mar 03 2220	126.66	0.810
YB2	576.77	01 Mar 03 2229	124.95	0.810
4	356.12	01 Mar 03 2221	79.706	0.510
2	312.59	01 Mar 03 2224	73.749	0.460
J1	1224.4	01 Mar 03 2226	278.41	1.780
YB3	1223.1	01 Mar 03 2235	274.78	1.780
3a	307.77	01 Mar 03 2213	59.249	0.400
J1a	1399.8	01 Mar 03 2234	334.03	2.180
7	484.32	01 Mar 03 2220	106.83	0.700
	241.21	01 Mar 03 2227	58.949	0.340
J2	2322.6	01 Mar 03 2230	552.93	3.560
DB	1122.6	01 Mar 03 2230	406.09	3.560
J2a	1122.6	01 Mar 03 2230	406.09	3.560
YB8	1120.2	01 Mar 03 2239	400.68	3.560
8	192.46	01 Mar 03 2242	58.641	0.400
J3	1442.6	01 Mar 03 2239	596.38	3.960
YB10	1441.5	01 Mar 03 2241	595.07	3.960
9	290.94	01 Mar 03 2156	29.189	0.150
10	279.68	01 Mar 03 2215	57.562	0.440
J3a	1628.2	01 Mar 03 2240	681.82	4.550
11	319.67	01 Mar 03 2220	69.683	0.400
13	71.086	01 Mar 03 2200	8.2531	0.040
12	130.63	01 Mar 03 2200	15.293	0.080
J4	1887.6	01 Mar 03 2239	775.05	5.070

Appendix F

ENVIROMENTAL TECHNICAL MEMORANDUM

APPENDIX F

ENVIRONMENTAL TECHNICAL MEMORANDUM

DRAFT

Santa Margarita
Community Drainage and Flood Control Project
Environmental Constraints Analysis

August 2003

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INTRODUCTION

In May 2003, a hydrology and hydraulics study examined the existing drainage conditions of the Santa Margarita community, identified problematic areas and issues, and developed conceptual alternative to the identified drainage and flood control issues. This environmental constraints analysis assesses the environmental impacts and fatal flaws associated with the proposed alternatives to the drainage problems in the community of Santa Margarita. 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 Santa Margarita, several site-specific alternatives have been proposed. The project alternatives have been organized by site-specific solution:

1) Yerba Buena Creek western bypass with an offline detention basin to control flooding
2) Yerba Buena Creek channel improvements to expand capacity
3) Interception levee and pipe system south of town to provide more positive drainage infrastructure to the southern portion of the community

Alternative 1. Western Bypass

Alternative 1 proposes to route high flows from Yerba Buena Creek into a new off-channel detention basin. This would reduce flows in Yerba Buena Creek, resulting in a greater level of flood protection for the community. Up to 1,300 cubic feet per second (cfs) of the 100-year flow (2,300 cfs) would be diverted from Yerba Buena Creek via a lateral weir along the western side of the creek that would direct water into an excavated diversion channel. The diversion channel would lead through an inflow structure into the excavated detention basin, which would feature a 9-foot high levee on the northern side, hold approximately 48 acre-feet of water, and cover approximately 12 acres of land. Water release would be metered through an outflow structure from the detention basin to an existing channel/swale that runs south of town toward the railroad tracks. Two new 60-inch diameter culverts would be installed from the railroad tracks and would traverse the community to new outfalls to Santa Margarita Creek. Optional underground pipes tying into the 60-inch culverts may be installed between I Street and the railroad tracks to reduce the flooding potential in this area. Flows would be released to Santa Margarita Creek at a maximum rate of 500 cfs.

Alternative 2. Yerba Buena Creek Channel Improvements

Alternative 2 would increase the capacity of Yerba Buena Creek by replacing two bridges and one box culvert that constrict flows. One bridge would be replaced at Encina Avenue and J Street and another would be replaced on H Street. A box culvert would be replaced on I Street. The cross sectional area of the channel would also be expanded. This would involve excavating native material and removing riparian vegetation from the channel. A cross section with 2:1 side slopes, a bottom width of 20 to 25 feet, a channel slope of 0.3 percent, and a depth of 10 feet

would convey flows at desired velocities. The reach recommended for the improvements extends through town and beyond the railroad tracks.

Alternative 3. Interception Levee and Pipe System along South Side of Town

Alternative 3 proposes to utilize a diversion levee and ditch, with a new subterranean pipe system extending down K Street, Margarita Avenue, and then H Street, to discharge flows through a new outlet into Yerba Buena Creek where it passes under Estrada Avenue. This alternative would retain the existing flow pattern of runoff in the community, while providing more positive drainage infrastructure to most of the southern portion of the community. The 4-foot high levee would comprise a length of approximately 1,500 feet from K Street to Margarita Avenue, and drop inlets tying into the pipe system would be installed at key intersections in the south side of the community.

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 habitats in the project areas.

Cultural Resources

Data sources from San Luis Obispo County Department of Planning and Building records, Environmental Impact Reports (EIRs) conducted in the area, RMC's past correspondence with Central Coast Water Authority (CCWA), and Essex's correspondence with local archeologists were 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* and *Santa Margarita Community Design Plan* were reviewed to determine whether the project was consistent with local policies. A Geographic Information System (GIS) 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 for all alternatives include potential impacts to endangered/threatened species habitat and the potential presence of cultural resources.

Permit Assessment

An assessment of the state and federal environmental permits that may be required 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, project alternative 3 would be possible to permit if mitigation measures are implemented to avoid significant environmental impacts. The U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service may not approve alternatives 1 and 2 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, water quality (including erosion control), and cultural resources. Mitigation measures for all alternatives could include:

- Conducting preconstruction surveys for sensitive species
    - Monitoring during construction in locations with sensitive species habitat and relocation of sensitive species if necessary
- Implementing erosion and sediment control measures during construction
- Performing a record search for cultural resources
    - Surface surveys, monitoring by qualified archaeologist during ground disturbance, and identifying exclusion zones for cultural resources may be necessary depending on results of record search. Recovery and treatment could be required depending on findings.

Additional Studies/Surveys

The following studies/surveys will need to be performed for all project alternatives 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: Santa Margarita Environmental Constraints

Alternatives	Biological Resources	Cultural Resources[1]	Land Use
Alternative 1. Western Bypass			
Route high flows from Yerba Buena Creek into a new 12-acre off-channel detention basin, which would discharge to Santa Margarita Creek.	Construction of the detention basin and outfalls to Santa Margarita Creek may affect endangered/threatened species habitat, including steelhead, arroyo toad, California red-legged frog (CRLF), and San Joaquin kit fox (SJKF). Other sensitive species that may also be affected include: several rare plants, western spadefoot, southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of the presence of steelhead and CRLF habitat, approval from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) may be difficult. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	The upper detention basin and associated construction east of Yerba Buena Creek will result in the loss of farmland of local importance[2]; the lower detention and associated construction west of Yerba Buena Creek will result in the loss of farmland of local potential[3].
Alternative 2. Yerba Buena Creek Channel Improvements			
Replace two bridges and one box culvert that constrict flows, and expand the cross sectional area of the channel.	Replacing bridges and box culvert and widening channel may affect endangered/threatened species habitat, including steelhead, arroyo toad, and CRLF. Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Because of permanent impacts to steelhead and CRLF habitat, the NMFS and the USFWS may not approve this project. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	None
Alternative 3. Interception Levee and Pipe System along South Side of Town			
Construct an earthen levee and associated drainage ditch south of Santa Margarita residential areas, directing flows into a new subterranean pipe system and discharging into Yerba Buena Creek where it passes under Estrada Avenue.	The outfall to the creek may affect endangered/threatened species habitat, including steelhead, arroyo toad, and CRLF. Other sensitive species that may also be affected include: southwestern pond turtle, two-striped garter snake, and nesting birds in the riparian zone. Higher project costs and schedule delays may result from required surveys, monitoring, and mitigation for sensitive species.	The entire area is sensitive. Local Chumash have been vigilant about the need for conducting proper cultural resource studies for projects in the area. Burial sites have been found south of town, and all areas along the creeks should be considered sensitive. Higher project costs and schedule delays may result from required record searched, surveys, monitoring, potential mitigation, and treatment of finds.	None

[1]Cultural resource information was obtained from Environmental Impact Reports conducted in the general area, RMC's correspondence with the Central Coast Water Authority (CCWA), and correspondence with Applied EarthWorks archeologists. No standard record searches or site visits were conducted

[2] Farmland of Local Importance is a designation that applies to areas of soils that meet all the characteristics of Prime Farmland (farmland with the best combination of physical and chemical features able to sustain long-term agricultural production) or Farmland of Statewide Importance (similar to Prime Farmland, but with minor shortcomings, such as greater slopes or less ability to store soil moisture) with the exception of irrigation

[3] Farmland of Local Potential is a designation that applies to lands having the potential for farmland, which have Prime Farmland or Farmland of Statewide Importance characteristics and are not cultivated

Table 2: Santa Margarita Permit Assessment

Alternative	Project Description	CEQA[1] Document	SHPO 106[2]	CDFG 1601[3]	CDFG 2080.1[4]	Corps 404 Permit[5]	USFWS Section 7[6]	NMFS Section 7[7]	RWQCB 401[8]	SWRCB General Permit[9]	SWRCB Phase II SWMP[10]	Notes
Alternative 1. Western Bypass												
Route high flows from Yerba Buena Creek into an off-channel detention basin, which would discharge into Santa Margarita Creek.	Build lateral weir along western side of Yerba Buena Creek, excavate diversion channel from creek, and construct inflow structure to excavated 48-acre feet capacity detention basin with 9-foot high levee; construct outflow structure from detention basin to existing open channel/swale that ends near south side of railroad tracks; install two 60-inch diameter culverts from the end of the channel near railroad tracks to new outfalls to Santa Margarita Creek in order to transport water through residential and commercial areas of the community; install optional underground pipes between I Street and railroad tracks that tie into the 60-inch culverts leading to Santa Margarita Creek.	ND[11] (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Yes	Yes	Yes	Yes	Yes	No	If potential barriers to steelhead passage resulting from the project cannot be mitigated, an Environmental Impact Report (EIR) may be required. Otherwise, a ND/MND will be required. A 2080.1 Consistency Determination may be required if there is a potential for incidental take of state threatened San Joaquin kit fox. Depending on the results of a cultural resources records search, Section 106 consultation may be required.

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

[2] State Historic Preservation Officer – Section 106 (Cultural resource information was obtained solely from the San Luis Obispo County Department of Planning and Building, EIRs conducted in the area, RMC's past correspondence with Central Coast Water Authority (CCWA), and Essex's correspondence with local archeologists): Required if a project has the potential to impact cultural resources and a federal agency funds the project or issues a permit for it

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

[4] California Department of Fish and Game – 2080.1 Consistency Determination: Required if a project has the potential for incidental take of state-listed species that are also federally listed (this project would not affect any species listed by the state only, which would require a 2081 Incidental Take Permit)

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

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

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

[8] 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 and requiring a federal permit

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

[10] 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 Santa Margarita does not meet these criterion, they do not need to comply with the Phase II program

[11] Negative Declaration or Mitigated Negative Declaration: Required for 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]	CDFG 2080.1[4]	Corps 404 Permit[5]	USFWS Section 7[6]	NMFS Section 7[7]	RWQCB 401[8]	SWRCB General Permit[9]	SWRCB Phase II SWMP[10]	Notes
Alternative 2. Yerba Buena Creek Channel Improvements												
Replace two bridges and one box culvert that constrict flows and expand the cross sectional area of the channel.	Replace bridges and box culvert along Yerba Buena Creek; excavate sediment and remove vegetation from the channel or construct levees and/or flood walls; establish low flow channel and construct adjacent floodplain, where possible.	ND (see notes)	Possibly (see notes)	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Because the project involves construction of new facilites and sensitive species or cultural resources may be present, a ND/MND will be required. If impacts resulting from the clearing of vegetation and widening of the channel are determined to be potentially significant and cannot be mitigated, an EIR may be required. Depending on the results of a cultural resources records search, Section 106 consultation may be required.
Alternative 3. Interception Levee and Pipe System along South Side of Town												
Construct a levee and drainage ditch south of residential areas, directing flows into new pipe system before discharging to Yerba Buena Creek.	Construct an earthen, 4-foot high levee and associated drainage ditch, extending approximately 1,500 feet from K Street to Margarita Avenue, discharging into a new subterranean pipe system extending from K Street to Margarita Avenue to H Street, which would direct flows into Yerba Buena Creek where it passes under Estrada Avenue.	ND (see notes)	Possibly (see notes)	Yes	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Possibly (see notes)	Yes	No	Because there is potential to impact threatened/endangered species, a ND/MND will be required. A 2080.1 Consistency Determination may be required if there is a potential for incidental take of state threatened San Joaquin kit fox. A Corps permit will be required if the construction of the new outfall involves work below the ordinary high water. The Corps will consult with the NMFS and USFWS if threatened/endangered species will be affected. If a Corps permit is required, a RWQCB 401 Certification will also be required. Depending on the results of a cultural records search and Corps involvement, Section 106 consultation may be required.

Table 3: Santa Margarita Permitting Timeframes

Permit	Typical Timeframe* (months)	Notes
California Environmental Quality Act (CEQA)		
Negative Declaration (ND)/Mitigated Negative Declaration (MND)	6 - 12	
Environmental Impact Report (EIR)	12 - 24	
California Department of Fish and Game (CDFG)		
1601 Streambed Alteration Agreement	3 - 6	CEQA must be completed before the 1601 Agreement can be issued.
2080.1 Consistency Determination	1 - 3	A federal Biological Opinion must be obtained before beginning the 2080.1 Consistency Determination Process.
Regional Water Quality Control Board (RWQCB) 401 Certification	1 - 3	CEQA must be completed before the 401 Certification 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 compliance is required, which can take one year or more.

Permit	Typical Timeframe* (months)	Notes
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	
State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Construction Permit	< 1	A Storm Water Pollution Prevention Plan must be prepared prior to construction and implemented during construction.

* 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).

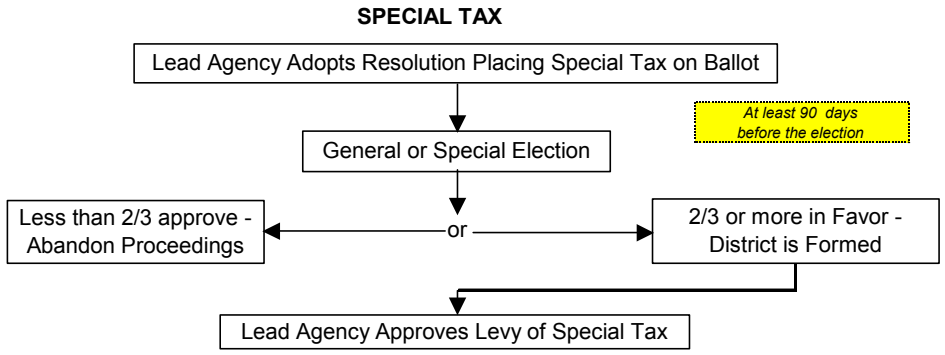

Figure 1 – Special Tax Adoption Process

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.

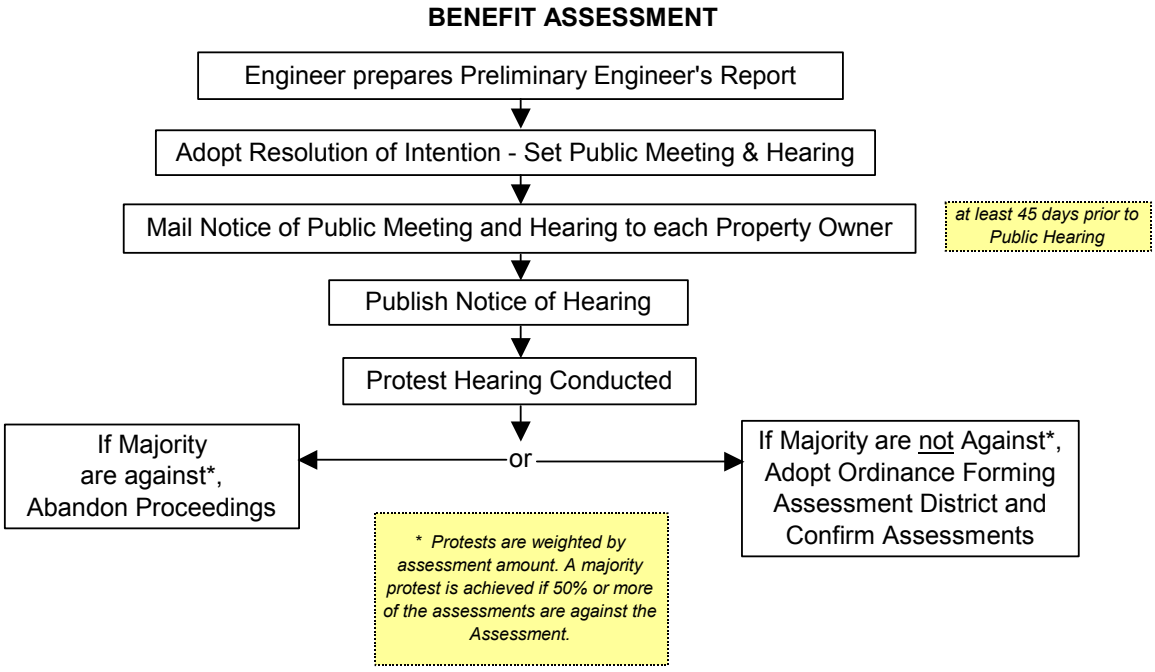

Figure 2 – Benefit Assessment Adoption Process

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.

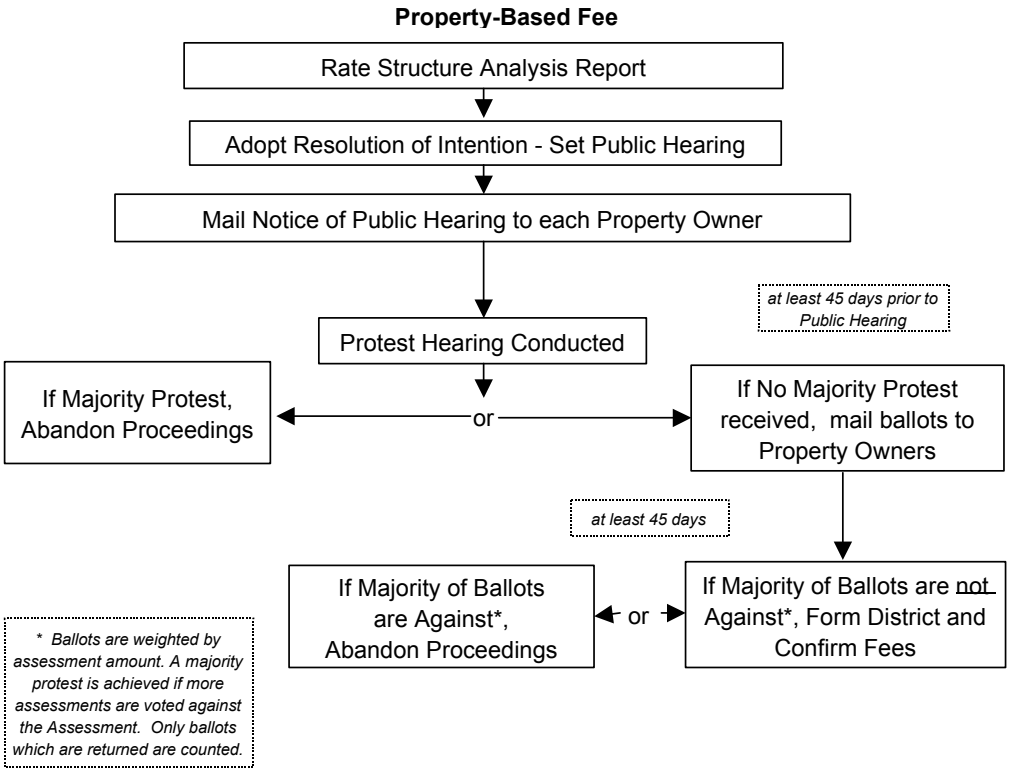

Figure 3 – Property Based Fee Adoption Process

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.

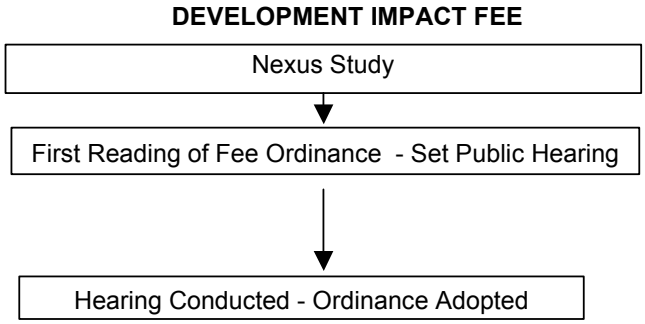

Figure 4 – Development Impact Fee Adoption Process

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: The Santa Margarita County Service Area 23 Advisory Group (Advisory Group) previously informally endorsed only Project 6 – the Southside Levee Project. Why does the draft report recommend the other projects (i.e. Projects 5 through 8) be constructed also?

Response 1: Projects 6, 7, and 8 will improve local drainage problems and mitigate nuisance flooding. Project 3 reduces the regional flooding and improves the level of protection on Yerba Buena Creek from less than a 10-year flood event to a 25-year level of flood protection. The Project team was notified that the Advisory Group informally endorsed only Project 6, the Southside levee project. However, the purpose of the report was to provide the County Flood Control and Water Conservation District and the Advisory Group with a comprehensive list of projects that will mitigate the majority of flooding that occurs in Santa Margarita. If the Project team had only recommended Project 6, it would not have satisfied its obligations to the District and the community in identifying a comprehensive project to provide flood protection.

Comment 2: How much land (acres) would Project 3 require to be obtained from the Santa Margarita Ranch (the "Ranch") for the basins?

Response 2: The total acreage for both the upper and lower detention basins is approximately 25 acres. The footprint of the detention basin could be reduced by excavating the area to construct a deeper basin. Additional excavation would increase construction and land disposal costs. If this project is carried forward to design, then the trade-off between land costs and construction costs should be investigated to develop the most economical project that achieves the project objectives.

Comment 3: Wouldn't there also be a water recharge benefit if a flood control project, i.e. detention basin, were constructed on the Ranch property?

Response 3: The water recharge benefit would be minimal because runoff from Yerba Buena Creek would flow to the detention basins only when the capacity of the downstream bridges and creek channels were exceeded. Therefore, only flows greater than 700 cfs would be diverted to the detention basins. The stored runoff would then infiltrate into and recharge the groundwater (the expected annual recharge was not calculated as part of this study). However, in order to have sufficient capacity to store runoff during peak storm events, the detention basins should remain empty during the rainy season. The ability to recharge the groundwater and serve as a water supply when rain runoff is available is in direct rivalry with the need to maintain an empty basin to provide sufficient storm detention capacity during a storm.

If the lead agency operated the detention basin as a water supply project also, then the detention basin capacity should be increased and creek diversion structures should be designed to divert runoff at lower flow rates (regulatory agencies my oppose diversion of water at lower flow rates). If this project is implemented with water supply as criteria, then operation of the detention basins and diversion structures would be modified.

Comment 4: How much land would Project 4 – Channel Widening take from adjacent property owners?

Response 4: Information gathered during the development of this project indicates that the parcel lines of properties located adjacent to the creek extend into the creek bank. Any channel widening project will encroach onto private property. The channel's bottom width varies from 25 to 30 feet near the railroad and Highway 51 crossing, 15 to 25 feet near I Street, 30 feet at Encina Avenue, and approximately 15 feet near J Street and upstream. The cross section and side slopes also vary throughout the entire reach within the community. Applying assumptions to

the existing side slopes and channel depths, approximately 10 to 15 feet will be required from each owner adjacent to the creek's bank. This distance would be measured from the top of bank. In locations where land constraints are an issue or where homes are located immediately adjacent to the creek bank, then other alternatives such as floodwalls could be constructed in place of widening the channel.

Comment 5: Wouldn't any development on Santa Margarita Ranch add to the flooding problem? More development means more runoff, right?

Response 5: More development does mean more runoff, but not necessarily more flooding. More runoff is generated from impervious surfaces such as roof tops, roads and driveways. The Ranch could construct on-site detention basins to manage all runoff generated from its development and therefore not impact Santa Margarita. Santa Margarita would continue to flood during large storms because the bridges and the Yerba Buena Creek channel lack sufficient capacity to convey peak storm runoff.

If a regional detention basin is not implemented cooperatively within the Ranch, then it would be this study's recommendation that the Ranch manage all runoff generated south of Santa Margarita on-site. If runoff generated from the south of the community is allowed to discharge to Yerba Buena Creek, then under no circumstance should the discharge result in an increase in peak flow (for flows greater than the minimum capacity of Yerba Buena Creek and its bridge crossings).

Comment 6: The County let them build here, it is therefore the County's responsibility to implement the projects.

Response 6: **S**tate and County zoning, land use, property development requirements, and building codes have changed over the years and continue to change periodically. The rights and restrictions related to a property owner's ability to build on their property involve historic and evolving Federal constitution and programs, State law and County regulations. As new ordinances are adopted and enacted to protect public safety and welfare, homes and structures applying for new building permits must abide by the new ordinances. Many homes and structures in Santa Margarita currently located within the 100-year floodplain and/or without modern drainage facilities were built prior to the Subdivision Map Act, current County standards, and also prior to the implementation of FEMA's National Flood Insurance Program. The County has adopted standards to protect against flood damage to homes located within the 100-year floodplain and all new home construction will meet these standards.

The County is not responsible for the design standards that allowed residents to build within a floodplain if there were no ordinances prohibiting such action. Likewise, the County is not responsible for providing, nor can the County legally provide, private property improvements which benefit private property owners with public funds. The County will not be held financially responsible to implement projects that remove homes from the floodplain, reduce flood damage on private properties or provide property benefiting drainage and flood control improvements (unless there are direct benefits to County facilities) per Resolution No. 68-223 in Appendix D. If such were the case, the County/District would be required to pave all roads, update and extend utility infrastructure, provide all drainage and flood control facilities, retrofit all structures to current standards, etc. in accordance with the latest ordinances and at County taxpayer cost. This is not the purpose of County Government or legal use of public funds.

Comment 7: Why didn't the County provide for these improvements and make these policy adjustments long ago?

Response 7: The District and the Upper Salinas Soil Conservation District investigated a solution to the flooding problem in Santa Margarita in 1966. The willingness of voters to approve general obligation or assessment bonds to pay for the capital improvements prevented the project from proceeding. In March 2000, Santa Margarita residents rejected a special property tax (Measure D-00) to provide funding for drainage services to control flooding in CSA 23. The measure gained support from only 34 percent of voters. The District and County lack the funds to pay for capital projects. The community's that benefit from flood protection projects should be willing to fund the projects via an assessment or property fee.

The County's building codes, at a minimum, meet the states uniform building code. The County has the authority to expand and strengthen the codes, but the initial standards are established by the state. The County's authority was limited when homes were first built in the floodplain. However, the County has adopted new standards to protect homes against flood damage. Unfortunately, these standards are not retroactive and the County cannot require an existing home to be improved to meet current standards.

Comment 8: Why did the County allow and does it continue to allow development in the flood zone when we know it flood on these properties.

Response 8: Federal and State law, and County regulations provide for a reasonable use and development of private property. There has to be legally supportable rationale whereby property development is restricted, controlled and/or prohibited. The County has adopted standards to protect against flood damage to homes and structures located within the 100-year flooplain. The flood damage protection standards are included in the County's Land Use Ordinance (22.07.060 et seq). One of the criteria applicable to residential development is the finish floor elevations of residences. The finish floor elevation shall be at least one foot over the level of the 100-year flood elevation.

Comment 9: To what extent is Santa Margarita Ranch supportive of any of these projects?

Response 9: Rossi Enterprises was provided with a copy of the December 2003 Draft Report and requested to provide comments. No comments were received from Ranch representatives on the Draft Report as of the date of the preparation of the final report.