



AtkinsRéalis



MONTECITO

FLOOD CONTROL MASTER PLAN

OCTOBER 2024



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EXECUTIVE SUMMARY



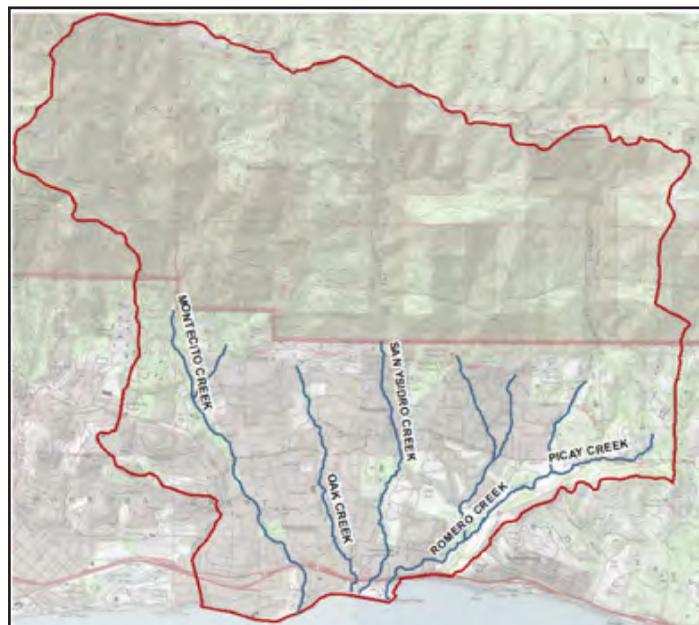
Introduction

The Montecito area has been impacted by many flooding events over the past century. Flooding conditions result from high volumes and intensities of rainfall that fall on the steep watershed. Most of the creek channels are mostly natural channels that in some cases have some man-made changes such as bank protection and grade stabilization; however, the creek channels are not engineered for a specific design capacity. Flooding events are complicated by the fact that debris production (rocks and sediments plus woody debris) can compromise channel capacities and bridge/culvert capacities, especially during post-fire flooding events.

In the last 60 years alone, several notable events have caused widespread flooding damages in Montecito. The Santa Barbara County Flood Control District (SBCFCD) was formed by the State of California in 1955 to provide funding and focused flood control efforts within the County. Since the early 1960's, the SBCFCD has implemented various mitigation measures to reduce flooding risks. While these projects over the years have been implemented as stand-alone projects, an integrated plan to coordinate project implementation and prioritization had not been undertaken.

As a result, the SBCFCD, with support of the community, commissioned the first phase of an integrated plan, detailed in this report. The Montecito Flood Control Master Plan would develop a more formalized approach to the work the District began in the 1960s.

This Montecito Flood Control Master Plan is a first step to plan and guide project implementation moving forward. This plan is a flood control plan. The goals of this plan are to design improvements to channel reaches and bridge/culvert crossings to increase the flood flow capacity through the targeted watersheds. Debris control, however, is an important element of the Flood Control Master Plan. This plan integrates the existing and planned debris basin projects along with the long-term goal to increase debris capture as opportunities arise.



PROJECT STUDY AREA

Implementation of this Master Plan would be difficult. There are many challenges with a project of this size and scope. With a current estimated project cost nearing one billion dollars, the financial hurdles are huge. The SBCFCD is not able to fund this project, perhaps not even able to fund a cost share of this project with current funding levels. Implementation of the project would need to be implemented over time and with the assistance of state and federal funding. Finally, retaining support and engagement in our community would be needed to support the plan and its implementation over time. Additional local funding, such as bonds or new property assessments, may be needed to leverage state and federal funding.

Project Overview

Flooding and debris flow events have occurred in the community of Montecito resulting in damage to property and threatening life and health. The purpose of this Flood Control Master Plan (Master Plan) project is to enhance community resilience against these natural events and geomorphic processes. The plan investigates potential solutions and improvements for flooding in Montecito. This Master Plan is intended to guide the planning, design,

and construction of improvements to mitigate to the extent possible flooding, flood water, and debris flow impacts to the community.

The Master Plan is the first phase of a series of flood mitigation improvements analyses for the community of Montecito. Subsequent phases would further advance the design of the plan elements.

The Master Plan project area includes the areas draining to Montecito Creek, Oak Creek, San Ysidro Creek, Romero Creek, and their tributaries, for a total of 20.5 linear miles of streams.

The goals of the project are:

- To provide the greatest amount of feasible riverine flood hazard mitigation, while minimizing cost and impacts to properties and structures
- Reduce damage to property, structures, and public infrastructure
- Enhance community resiliency against damage from flooding events
- Seek public input throughout the planning process
- Facilitate grant seeking opportunities
- Provide a long-term plan that helps implement improvements in an orderly and prioritized manner

Alternative Formulation

Potential solutions and improvements for flooding in Montecito were created. Alternatives were developed and evaluated, and a preferred mitigation solution selected.

Initial Alternative Creation

Initial alternatives were created without filtering for cost or feasibility. All ideas presented by stakeholders, the public, the County, and the consultant team were considered and entered into an initial alternative database.

Initial Alternative Screening

The initial alternative database was evaluated. The goal of the evaluation was to eliminate alternative concepts that are not expected to be supported, are too costly, or are impractical to implement. The initial screening resulted in alternatives eliminated from further consideration.

Initial strengths/opportunities and weaknesses/constraints were summarized for each alternative. Additionally, fatal flaws were identified that remove alternatives from further consideration (for example, would harm endangered species habitat, cannot be maintained, etc.).

Alternative Analyses

After the initial screening, the remaining alternatives were advanced for further analyses. Analyses were performed to develop conceptual mitigation designs. Refinement of the alternative concepts occurred, and different concepts were applied at different locations.

The goal was to maximize flow mitigation, preferably to contain the 100-yr or 1% annual chance event or greater. This flow event is preferred as this is the flood event used by FEMA for Flood Insurance Studies, developing the Special Flood Hazard Areas, flood insurance, and regulatory requirements. However, lesser design capacities were considered.

The alternatives or combinations of alternatives were placed in updated hydraulic models to analyze their mitigation effectiveness. The existing condition models from the FEMA study were modified to produce an updated existing condition including proposed improvements.

Preferred Alternative

The preferred alternative contains a combination of analyzed alternatives. Creek channel widening, basins, bridges/culverts, and no action are combined to produce the overall mitigation strategy.

The preferred alternative includes the following:

- 6.3 miles improved channels
- 48 bridge/culvert replacements
- 14.2 miles of “no action” channels
- Potential locations for 8 additional debris basins

Channel widening of the creek systems was chosen as the preferred solution where the 1% annual chance flood flows are not contained within the existing stream channels.



PREFERRED ALTERNATIVE OVERALL PLAN

In some stream reaches, the flood flows are contained in the existing stream geometry and these areas are identified for No Action. Although more frequent (i.e., lesser flows) return intervals were considered, it was determined that the 1% annual chance event could be mitigated through the channel widening process with minimal additional impacts over more frequent return intervals.

Existing bridges, culverts, and stream crossings were examined for carrying capacity beneath the structures. In general, most drainage structures are undersized. A total of 48 structures would require replacement along the streams with 6 existing structures remaining as they have the ability to convey the required flows.

Effectiveness

The preferred alternative would realize the following benefits:

326 Acres of flood risk reduction and removed from FEMA- designated floodplain

851 Parcels with flood risk reduction **54** All weather access crossings created

8 Additional debris basins **247** Parcels needing construction easements

52 Acres of construction/maintenance easements (25 already acquired) (red lines in Fig.17)

160 Acres of construction/maintenance easements (28 already acquired) (blue lines in Fig.17)

3,000 Approximate length of improved bridges/culverts

Debris Basins

Eight basins or approximately 50 acres were identified for potential new debris basin sites. These sites were chosen due to proximity to the streams, ease of maintenance access, and lack of existing buildings and structures.

Note that the quantity of debris generation and required volumes to mitigate debris flow risks were not determined as part of this project. This debris

control, however, is an important part of the plan. This plan integrates existing and planned debris basin projects along with the long-term goal to increase debris capture as opportunities arise. Potential basin sites were identified based on geographical factors only (undeveloped, availability, location, etc.).

Cost

The cost to construct the preferred alternative would require a substantial investment, which likely exceeds the ability for the County and Flood Control District to fund. While grants may be available from various federal and state programs, a significant cost share is typically required in these grant programs. Implementation would take a long period of time and would require significant support from the community, including potential funding, for successful implementation. Additional local funding, such as bonds or new property assessments, may be needed to leverage state and federal funding. The design of the preferred alternative was created to maximize funding opportunities. Conceptual costs of the features included in the preferred alternative are detailed in the table below.

Environmental Considerations

While making capacity improvements to the creek systems is needed to reach the increased capacity goals, environmental considerations are also paramount in the project’s implementation. The creek channels would retain their natural character and would be designed to improve fish passage. In some cases where right-of-way options are limited, improved channel banks would be constructed for stability and to avoid the taking of homes. Throughout the project area, the creek channel bottom would remain natural.

Next Steps

This plan is the first step in the process to mitigate flooding and debris risk in the Montecito area. It is the first phase of a series of flood mitigation improvements analyses.

Improvements would be accomplished in phases, as funding allows, generally consisting of investigations, alternative analyses, conceptual design, preliminary design, final design, and construction. Other considerations are:

- Full implementation of the plan improvements would require a significant investment, and grant funding would be maximized to the extent possible.

- All alignments and improvements shown in the plan are subject to change and refinement during the design and construction process.
- The permitting process for jurisdiction and environmental considerations would be accomplished during subsequent phases.
- Utilities would likely require relocation to construct proposed improvements. Coordination would be accomplished with applicable utility owners.

COST OF ITEMS IN PREFERRED ALTERNATIVE

ITEM	DESIGN COST, USD*	CONSTRUCTION & PERMITTING COST, USD*	EASEMENT/ROW COST, USD*	TOTAL COST, USD*
Channels and Bridges**	\$35.4 Million	\$173.6 Million	\$439.8 Million	\$648.8 Million
Debris Basins**	\$12.0 Million	\$47.9 Million	\$201.3 Million	\$261.2 Million

Unit costs used to generate the estimates are detailed in Appendix 3.

* 2024 dollars

** Assumes channel improvements implemented for Oak Creek (\$145.0 Million channels and bridges vs. \$63.2 Million basins only, net difference \$81.8 Million)

INTRODUCTION & BACKGROUND



Introduction

The Montecito area has been impacted by many flooding events over the past century. Flooding conditions result from high volumes and intensities of rainfall that fall on the steep watershed. Most of the creek channels are mostly natural channels that in some cases have some man-made changes such as bank protection and grade stabilization; however, the creek channels are not engineered for a specific design capacity. Flooding events are complicated by the fact that debris production (rocks and sediments plus woody debris) can compromise channel capacities and bridge/culvert capacities, especially during post-fire flooding events. In addition, most of Montecito is located on an alluvial landform that can make flood control efforts even more challenging due to sediment deposition and flow path uncertainty.

Flood History

In the last 60 years alone, several notable events have caused widespread flooding damages in Montecito including 1964, 1969, 1995 (2 events), 1998, and several other years with flooding to various degrees. In a recent event, the 1-9 Debris Flow which occurred on January 9, 2018 caused extensive damage in Montecito including the tragic loss of life. While the 1-9 Debris Flow was a result of the Thomas Fire and an intense storm cell, fires in the watersheds can contribute to flooding impacts by accelerating runoff and debris production. Several reports completed by Government agencies have also documented past events including; Montecito Streams (US Army Corps of Engineers, 1971; 1969 Floods (SBCFCD 1969), 1995 Floods (SBCFCD, 1995); and 1998 Floods (SBCFCD, 1998).

Flood Control District Formed

The Santa Barbara County Flood Control District (SBCFCD) was formed by the State of California in 1955 to provide funding and focused flood control efforts within the County. Since the early 1960s, the SBCFCD, often in conjunction with state and federal agencies, other public works divisions, and incorporated cities within the County have implemented mitigation measures to reduce flooding risks. Emergency projects following fires in the

1960s/70s have included stream clearing, debris basin construction, and bridge replacements. The SBCFCD has also implemented maintenance work on these natural channels (mostly on private property) if determined a regional benefit for the community. Further piecemeal improvements, by both public and private entities have resulted over time. In recent years, since the 1-9 Debris Flow, more projects have come forward including new debris basins, expansion of existing debris basins, basin modifications, and bridge replacements (private and public). While these projects over the years have been implemented as stand-alone projects, often to address a localized problem, an integrated plan to coordinate project implementation and prioritization had not been undertaken.

Flood Control Master Plan

As a result, the SBCFCD, with support of the community, commissioned the first phase of an integrated plan detailed in this report. The Montecito Flood Control Master Plan would develop a more formalized approach to the work the District began in the 1960s.

This Montecito Flood Control Master Plan is a first step to plan and guide project implementation moving forward. This plan addresses flood flow capacities. The goals of this plan are to design improvements to channel reaches and bridge/culvert crossings to increase the flood flow capacity through the targeted watersheds while preserving the natural character in the community and enabling fish passage throughout. Debris flows, on the other hand, behave much differently, are rarer in occurrence, and involve a magnitude of necessary improvements that are not feasible. Such actions would require relocation of hundreds of homes and/or installation of several large basins similar to the Santa Monica Basin in Carpinteria that would cost hundreds of millions of dollars each. Debris control, however, is an important element of the Flood Control Master Plan. As we have seen in the community in the past, debris is produced in every significant flood event. To that end, this plan integrates the existing and planned debris basin projects along with the long-term goal to increase debris capture as opportunities arise. Debris control helps preserve downstream channel and bridge

capacities, allowing those facilities to carry as much flood flows as possible.

Public Input

Through the first phase of the Master Plan development, several public meetings were held to get input from the public. The plan considered to what level the improvements would be targeted to. As a result, the SBCFCD heard the community voice a desire to get the highest capacity of improvements possible. At the same time, the design effort had to be sensitive to impacts to private properties (requirements for easements or entire acquisition of properties) and cost of the Master Plan. The resulting plan seeks to achieve a “100 year” capacity, or the 1% annual chance storm recurrence. The targeted project requires easements from private property owners, and in rare cases, potential complete purchase of

properties along the project reaches. While this need was kept to a minimum, the project as defined would require wider creek channels and thus more right-of-way.

Plan Features

The Master Plan requires the widening of stream channels, in some cases twice as wide compared to existing conditions. When absolutely required, improved vertical or near vertical engineered banks would be used to narrow the right-of-way needs, and reduce private property impacts. Natural or “soft” channel bottoms are included throughout the project. Bridges would need replacement in many cases to match the creek channel flow design. As a part of the US 101 improvement project through Montecito, the SBCFCD coordinated with Caltrans to have new bridges constructed over Oak, San Ysidro, and Romero

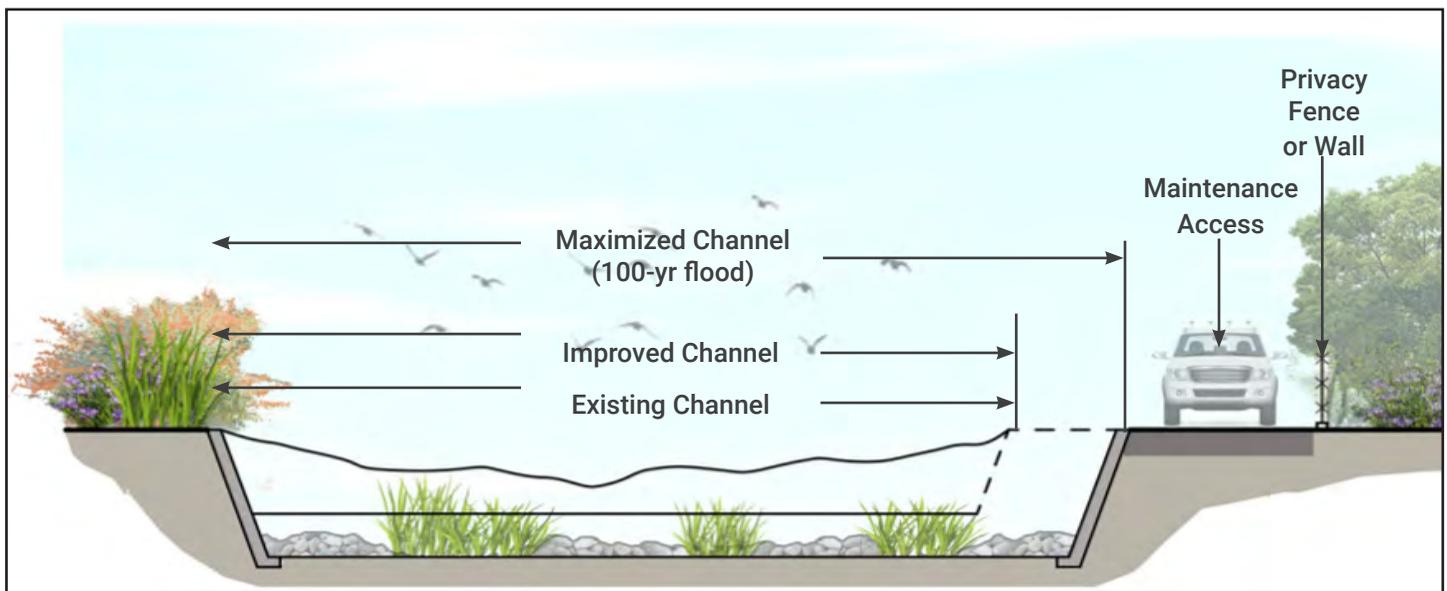


FIGURE 1. CHANNEL SECTION WITH WALL

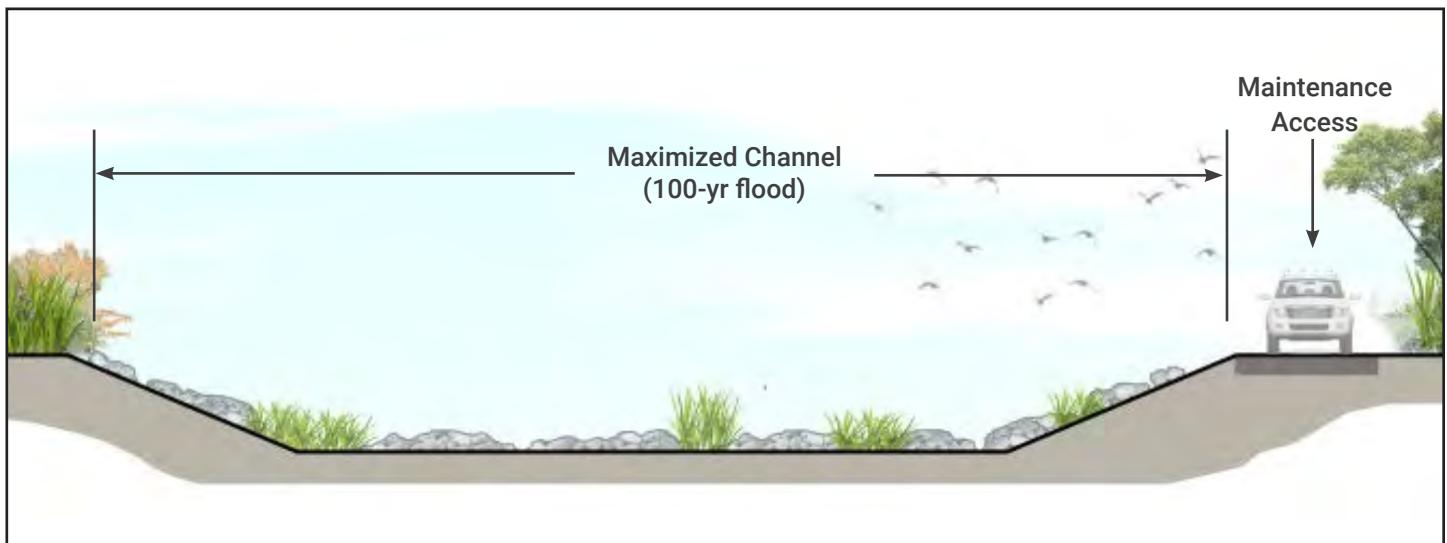


FIGURE 2. CHANNEL SECTION WITHOUT WALL

Creeks as a part of their work. This improvement would greatly aid in project implementation in the future. Typical improved channel sections are shown in **Figures 1 and 2**.

Plan Implementation Challenges

Implementation of this Master Plan would be difficult. There are many challenges with a project of this scope. With a current estimated project cost nearing one billion dollars, the financial hurdles are huge. The SBCFCD is not able to fund this project, perhaps not even able to fund a cost share of this project with current funding levels. The project would need to be implemented over time and with the assistance of state and federal funding.

State and federal funding will be challenging as well. Often funding granted from other agencies requires a positive Benefit/Cost Ratio, a factor that has been difficult to achieve in the past. Increased local funding is also necessary. For example, this may require increased benefit assessments or tax levies. Other challenges include the time and costs of acquiring easements from adjacent properties to construct the improvements. As part of the funding strategy, the feasibility of future assessments would also need to be considered for both construction and maintenance.

After construction, ongoing maintenance would be needed to retain the design capacities, another cost component that would be challenging in the future. On-going, natural debris production in the watershed

would require costly maintenance work (in basins and channels) both annually and following storms. Past events have documented the high costs of debris removal.

Environmental challenges would be faced to implement this plan. While the design work was mindful of environmental impacts, the plan area has permitting issues with endangered species such as Southern Steelhead and other state and federal regulations governing modifications of creek channels. Permit requirements can add enormous costs and time delays to the work. Costs of potential mitigation requirements are unknown at this time but are likely to be extensive. The plan would rely on SBCFCD's extensive experience finding solutions for flood and debris control improvements that are compatible with environmental objectives, such as performed with the Randall Road Debris Basin project.

Finally, retaining support and engagement in our community would be needed to support the plan and its implementation. The time horizon for a project like this would be decades. Often times, we see public interest wain in the aftermath of flood events and memories grow short/interest is lost. However, this plan has reached this point because community interest is still strong, in part due to not only the memories of the 1-9 Debris Flow, but also as a result of plentiful seasonal rain totals in recent years.

Project Overview

Flooding and debris flow events have occurred historically in the community of Montecito resulting in damage to property and threatening life and health. The purpose of this Flood Control Master Plan (Master Plan) project is to enhance community resilience against these natural events and geomorphic processes. The plan investigates potential solutions and improvements for flooding in Montecito. This Master Plan is intended to help guide the planning, design, and construction of improvements to mitigate to the extent possible flooding, flood water, and debris flow impacts to the community.

The Master Plan is the first phase of a series of flood mitigation improvements analyses for the community of Montecito. Subsequent phases would further advance the design of the plan elements. The Master Plan would be accomplished in phases, as funding allows, generally consisting of investigations, alternative analyses, conceptual design, preliminary design, final design, and construction.

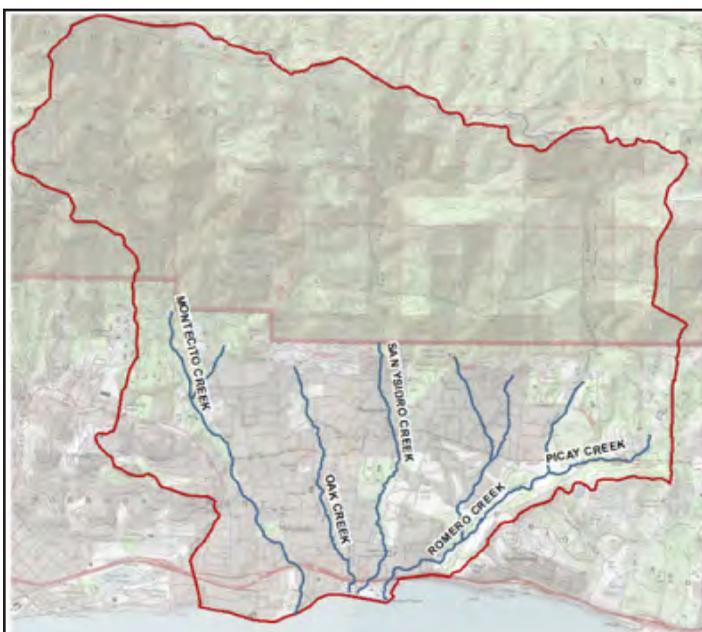


FIGURE 3. PROJECT STUDY AREA

The Master Plan project area is shown in **Figure 3**. It includes the areas draining to Montecito Creek, Oak Creek, San Ysidro Creek, Romero Creek, and their tributaries, for a total of 20.5 linear miles of streams.

The purpose of the project is to provide a coordinated master plan for flood control and debris capture for creek systems in the Montecito area. The area has recently suffered from catastrophic debris flows, which are a separate hazard in the watershed with different characteristics. Although debris flow mitigation is considered, this project focuses on riverine flooding hazard mitigation for project area streams.

Project Goals

The goals of the project are:

- To provide the greatest amount of feasible riverine flood hazard mitigation, while minimizing cost and impacts to properties and structures
- Reduce damage to property, structures, and public infrastructure
- Enhance community resiliency against damage from flooding events
- Retain natural character and provide improved fish passage
- Seek public input throughout the planning process
- Facilitate grant-seeking opportunities
- Provide a long-term plan that helps implement improvements in an orderly and prioritized manner

History, Geologic, and Geomorphic Conditions

The project area is in a geologically dynamic location. Storm water runoff flows on steep slopes from Santa Ynez mountains in the Los Padres National Forest to the Pacific Ocean. The vertical elevation difference of approximately 3,700 feet occurs in only 4 miles of horizontal distance, resulting in steep stream slopes. These steep slopes have extreme runoff potential.

The velocity of the water on the steep slopes creates a high sediment carrying capacity of the storm water, eroding the mountain material and depositing it as velocity decreases and slopes flatten. The developed portion of the community of Montecito is situated on accumulated deposited material of over 600 vertical feet (Gurrola et al, 2020). Water flows through the accumulated deposits consisting of rock, boulders, and sediment to outlet into the Pacific Ocean.

The Montecito region has a well-documented history of flooding and debris flows. Flood records exist for significant flooding events in 1825, 1861, 1885, 1907, 1914, 1964, 1967, 1969, 1971, 1995, 1998, 2005, 2018, 2023, and 2024. The 1914 post-fire event was particularly notable with reports of 16" of precipitation with 8.5" falling in 72 hours and 4.5 inches of rain in a 2-hour period on January 25th. A settlement called "Old Spanishtown" was located on the banks of Montecito Creek was completely destroyed, and 3 fatalities occurred in the smaller Montecito population of 2,500. The January 9, 2018 debris flow in Montecito resulted in 23 deaths, over 160 injuries, over 500 buildings damaged or destroyed (Magnoli, 2018).

The steep stream banks and bottom elevations may shift or move horizontally and vertically (note steep slopes in **Figure 4**). Streams naturally shift to reach a balanced slope where the alignment and shape of the stream settles into a stable state. In general, anecdotal evidence indicates that the studied streams are not stable, as evidenced by lateral erosion, vertical erosion, and sediment deposition. This ongoing natural process cannot be stabilized by simple maintenance activities, such as digging out the deposited sediment. It would be redeposited over time, and no amount of maintenance would stabilize the creeks without constructed improvements.

The watershed is also highly affluent and largely developed. Real estate and property values are at a premium. Development has encroached on the geomorphic floodplain, resulting in properties at risk for flooding and debris flows. The desire for privacy has resulted in an abundance of walls, vegetation screening, and security gates which often form an impediment to flows.

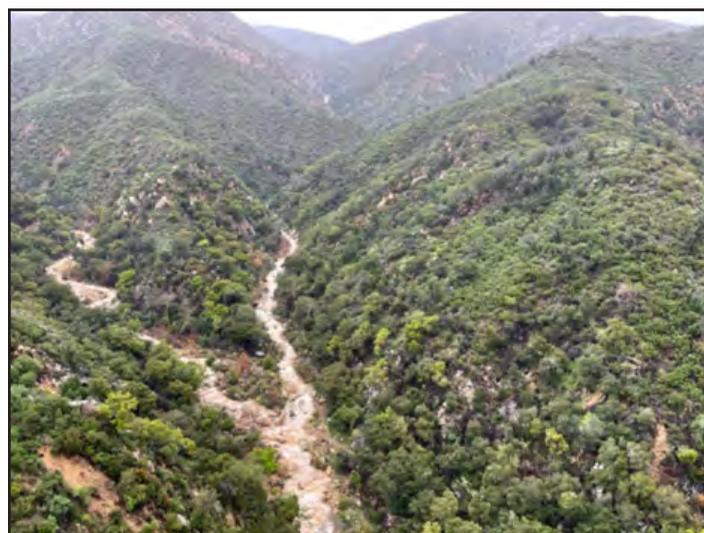


FIGURE 4. MONTECITO CREEK AT COLD SPRING CREEK

Public Outreach

Community outreach was performed to solicit ideas and feedback from the public and stakeholders. Three public meetings were held: an initial meeting to introduce the project and gather information (held on May 23, 2023), a meeting to present alternative concepts and solicit feedback (held on November 29, 2023), and a third meeting to present the final plan (held on April 24, 2024).

The County created a dedicated page on their website to house information on the project. This page is found at <https://www.countyofsb.org/3824/Montecito-Flood-Control-Master-Plan>. The website houses maps, presentation materials, recordings of the public meetings, and pertinent updates. A copy of the Executive Summary of this document is additionally located on this site.

Comments were received from the public through email, written forms, and calls. A majority of the comments received reported locations of flooding. Additional comments included: maintenance and ownership of the channels, permitting for bank stabilization, private property rights, and environmental considerations. These comments (redacted for privacy) are summarized in **Appendix 1**.

Reference Data

Additional information was referenced in preparation of the plan.

- Topographic data included LiDAR mapping from 2018, collected after the debris flow occurred (Woolpert, 2019).
- Improvement plans for the Randall Road debris basin, which was constructed prior to the 2023 storm. This basin is located upstream of the East Valley Road (SR 192) bridge crossing on San Ysidro Creek (Santa Barbara, 2021).
- Information on the US 101 widening from Caltrans. Proposed hydraulic improvements were taken from the submittal to the County associated with the freeway widening (Stantec, 2022).
- Parcel data and ownership was obtained from the County dated January 12, 2022 in GIS shapefile format. Parcel boundaries were overlain on proposed improvements to determine impacts (Santa Barbara, 2022).

- Existing Flood Control District Easements across private property in the project area were obtained from the County in GIS shapefile format, dated December 19, 2023. Proposed improvements considered the location of existing easements to determine impacts and potential new easement requirements (Santa Barbara, 2023).
- **Biological:** Requirements for the endangered Southern California Steelhead Trout were considered in improvement design. It is assumed that any proposed improvements would have environmental studies and consultations performed prior to construction.
- **Permitting:** Permitting was not considered as a limiting factor in mitigation designs. Permit processes have different levels of cost and complexity but are assumed to be possible (except for endangered species, previously discussed).

The area has been extensively studied for flooding and debris flows. Select references are discussed below.

FEMA Santa Barbara Flood Recovery Mapping

A debris flow occurred in Montecito on January 9, 2018, changing the landscape with extensive deposition, causing extensive property damage, and resulting in 23 fatalities. FEMA initiated the Recovery Mapping effort in 2018 to assist with recovery and rebuilding efforts. The Recovery Maps were issued in Spring of 2018, which included post-fire, post-debris flow flood elevations for the 1% Annual Chance Event.

The study included pre- and post-fire peak flow rates, developed using a rainfall-runoff model. To account for sediment and debris increasing the volume of flow, the post-fire flow rates were bulked with a factor of 2. A hydraulic model was developed to determine post-fire inundation and flood elevations to allow for immediate rebuilding activities.

FEMA Studies

In addition to the County Flood Control District, FEMA has created hydrology, hydraulics, and flood risk information for the County. The current Flood Insurance Study (FIS) for Santa Barbara County and Incorporated Areas has an effective date September 28, 2018 (FEMA, 2018), with new revisions recently developed.

Revised analyses were performed by the Federal Emergency Management Agency (FEMA) beginning in 2020 and issued as preliminary in 2024 (MIP Case Number 20-09-0018S). The draft data was released to the County in June of 2023 and the draft Flood Insurance Rate Maps (FIRMs) were issued in preliminary form in March of 2024. These studies are anticipated to become effective in 2026, pending the statutory notification and public comment process. Since the FEMA studies are used for flood insurance purposes, they are an important reference to this study. Proposed improvements consider flood insurance impacts based on the most recent FEMA analyses.

January 9, 2023 Flood Event Documentation

A runoff event occurred on January 9, 2023. The event resulted in approximately a 4% annual chance (25-year) runoff event as measured at the Montecito and Carpinteria Creeks gages. Flooding was recorded on Olive Mill Road, Jameson Road, the US 101 highway. Pictures were obtained from the County and news agencies (**Figure 5**).

The 2024 FEMA study included a comparison of the revised modeling against the storm event (FEMA, 2023). The models matched well to the reported storm data. Cal OES also studied the January rain events for debris and landslides. Shallow landslides were noted to have occurred in the upper watershed, with at least 1,162 landslides occurring resulting in a minimum total volume of approximately 4.8 million cubic feet of sediment entering the upper channels (Cal OES, 2023).



FIGURE 5. JANUARY 9, 2023 FLOOD EVENT

HYDROLOGY & HYDRAULICS



Introduction

The computations behind solutions of flooding problems are based in hydrology and hydraulics. **The 2024 FEMA models are used as the basis for analysis for this project as best available data** (STARR II, 2024). These models were validated against statistical gage records and the January 9, 2023 storm event.

Hydrology was developed using a rainfall-runoff model for the watershed draining to the study streams, using the Recovery Mapping model from 2018 as a base. A bulking factor of 1.25 was utilized to account for upland debris and minor sediment transfer during clear-water flow events. This bulking factor does not include debris flows (note that the Recovery Mapping used 2.0 as the bulking factor for debris considerations).

Most of the Montecito area in the FEMA study is contained in a USACE HEC-RAS software program model, computed for two-dimensional (2D) flow. 2D flow areas are computed with the HEC-RAS 2D flow computational algorithms, which utilizes a finite-volume solution scheme. This type of analyses is well suited for areas where flow spreads laterally in many directions, which is the case in the lower-lying areas of Montecito. The terrain used was from the post-debris flow event, gathered in 2018.

The upper portions of the streams entering the community are contained in well-defined channels, where the flow direction is known. These streams are modeled in the FEMA study in HEC-RAS using the 1D computational algorithms. The full Saint Venant equations are solved in both cases in either one dimension or two dimensions.

In producing Special Flood Hazard Areas (SFHAs) for FEMA flood insurance studies, a 1-percent (1%) annual chance event is simulated. The 1% annual chance event is the flood event that has a 1-percent chance of being equaled or exceeded in any given year. This event is also referred to as the base flood or 100-year flood. It is the standard used by most federal and state agencies for floodplain management and to determine the need for flood insurance. A structure

located in an SFHA shown on an NFIP map has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage.

The US101 freeway widening, in construction at the time of this report, is included in the modeling as an existing condition.

Flood Frequency

Runoff from both large storms and small storms were considered. A full range of simulated flood frequencies were examined in this flood mitigation project, from the 10-percent to 0.2-percent annual chance events (10-year to 500-year events). Although the goal of the project is to provide the largest amount of feasible flood mitigation, mitigating the 1% annual chance event has additional benefits. These benefits are:

- Flood insurance purchase requirements for homeowners may be reduced.
- Flood insurance premiums may be reduced.*
- Federal grant programs are available to fund improvement projects that reduce base flood extents.
- Community resiliency.
- Risk reduction.

* Flood insurance premium ratings are based on numerous factors and rating has recently changed. A reduction may not be realized.

Further information on flood frequency considerations for mitigation design is found in the alternative analyses' sections of the report.

Existing Flooding Conditions

Currently, flooding occurs in both frequent and infrequent events. The carrying capacity of the streams in Montecito varies, with some streams able to carry more flows than others. Older culverts and bridges are typically not able to pass all flows generated in the 1% annual chance event. In addition to roadway flooding and closures, storm water may spread laterally and break out of the main channel

at undersized crossings. Debris, such as sediment, rocks, and vegetation, can contribute to flooding by reducing the carrying capacities of culverts, bridges, and channels. Debris clogging can cause flooding in smaller storms, block culverts and bridges, and/or cause uncertain flow paths. This leads to difficulty when predicting flooding and may not be adequately captured in models.

Recent events occurred on January 9, 2023 and March 30, 2024. In both instances, structure flooding and roadway flooding occurred, and the US 101 freeway was closed due to flooding (see **Figures 5 and 6**). The 1/9/2023 event was estimated at a 4% annual chance event (25-year), and the 3/30/24 event was estimated at a 10% annual chance event (10-year). Flooding during these smaller and relatively frequent events illustrate the need to provide mitigation measures.

The 1% annual chance event is an important flood frequency storm to consider in the plan. The 2024 FEMA restudy provides a map of the areas that are at

risk for flooding during the 1% annual chance event. An overview is provided in **Figure 7** and additionally shown in the Maps section of this report (**Map 3**).



FIGURE 6. COLD SPRINGS DEBRIS BASIN DURING JANUARY 9, 2023 FLOOD EVENT

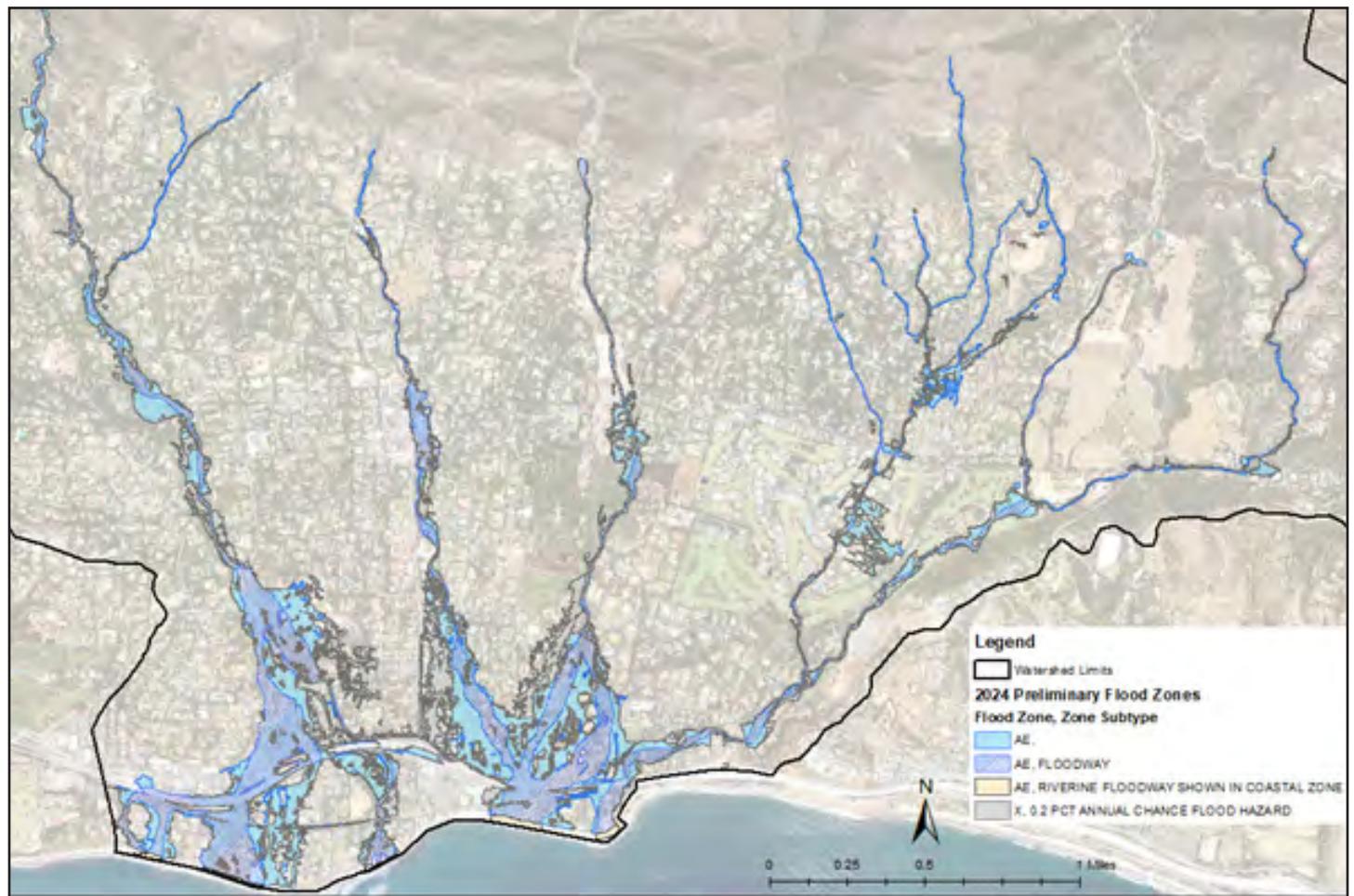


FIGURE 7. MAP OF 1% ANNUAL CHANCE EVENT (100-YR) FLOODING

ALTERNATIVE FORMULATION



Initial Alternative Creation

Potential solutions and improvements for flooding in Montecito were created. Alternatives were developed and evaluated, and a preferred mitigation solution selected. The process for creating and selecting alternatives is described in the subsequent report sections.

Initial alternatives were created without filtering for cost or feasibility. All ideas presented by stakeholders,

the public, the County, and the consultant team were considered and entered into an initial alternative database. The initial alternative database contains a descriptive name, description, general concept, access requirements category (low, medium, or high), and assumed future maintenance category (low, medium, or high).

The initial alternatives considered are described in **Table 1** below. An Initial Alternative Database with additional information is included in **Appendix 2**.

TABLE 1: INITIAL ALTERNATIVES

NAME	DESCRIPTION
No Action	No improvement actions would occur. The existing conditions would remain.
Debris Nets	Install numerous debris nets in the upper watershed to capture rocks and large debris such as trees.
Acquisition	Purchase of properties in the floodplain and/or high hazard areas with demolition of structures. Properties would be designated as protected open space.
Maintenance	Maintain existing capacity of streams by removing deposited sediments and repairing scour and erosion. This would be a stand-alone effort; not routine maintenance that may be needed for any other proposed improvement.
Creek Channel Widening	Provide stormwater conveyance in improved channels that are sized to contain the specified flood event (wider and/or deeper channels, bigger bridges and/or culverts as necessary).
Debris Basins	Provide basins to capture debris such as rocks, trees, and sediment. The outlet of these basins would be relatively open to conform to endangered species requirements on some streams.
Stormwater Basins	Provide basins for stormwater capture to reduce the downstream peak flows. This would allow for smaller downstream conveyance structures where existing channels, culverts, and bridges may be sufficient. The restrictive nature of the outlets may not conform to endangered species requirements on some streams.
Underground Conveyance	Provide underground large diameter conduits to convey stormwater, such as pipes or box culverts.
Low Impact Designs	Low Impact Designs include a suite of water control items such as bioretention, green roofs, infiltration, permeable pavement, rain barrels, and microbasins, typically applied on a single home or lot basis.
Advanced Warning Systems	Install automated advanced warning systems to warn of flood or debris flows to allow for emergency preparation or evacuation. Currently, decisions are made solely on rain forecasts.
Levees	Build berms along channels, allowing for additional conveyance of waters downstream and containment of floodwaters between the berms.
Structure Elevation	Raise all habitable structures above base flood elevation.
Regulation	Enact building and floodplain elevation rules to protect future and rebuilt structures, such as raising them above the base flood elevation, structural reinforcement for debris flows, and similar measures.

Initial Alternative Screening

The initial alternative database was evaluated. The goal of the evaluation was to eliminate alternative concepts that are not expected to be supported, are too costly, or are impractical to implement. The initial screening resulted in alternatives eliminated from further consideration.

Overall conditions and constraints were developed by the project team (County and consultant) to govern the alternative evaluation process.

1. Improvements are generally restricted in the Los Padres National Forest due to ownership, access, permitting, geographic, and geomorphic constraints.
2. The purpose of the project is flood mitigation. Any mitigation for debris flow, sedimentation, and erosion other than provided by the existing and planned debris basin projects incorporated in this plan is incidental
3. The County generally cannot perform maintenance on private properties. Any recommended improvements must also include easements or permissions (along with feasible maintenance access ramps and pathways) so that the County can perform repairs and maintenance in the future.

Initial strengths/opportunities and weaknesses/constraints were summarized for each alternative. Additionally, fatal flaws were identified that remove

alternatives from further consideration (for example, would harm endangered species habitat, cannot be maintained, etc.). The purpose of the evaluation was to reduce the number of initial alternative concepts to be advanced for further analyses. The reasons for removal are documented in the database, attached in the appendices.

The results of the initial evaluation are as follows. From the list in Table 1, alternatives were either eliminated from further consideration, or advanced for additional evaluation. Advanced alternatives are in **Table 2** and eliminated alternatives are in **Table 3**. Elimination reasons are further described below.

TABLE 2: ALTERNATIVES ADVANCED

ALTERNATIVES ADVANCED
No Action/Open Space *
Acquisition *
Creek Channel Widening
Debris Basins
Underground Conveyance *
Structure Elevation *
Stormwater Basins *

* Eliminated as wholesale alternatives, but may be applied to localized situations.

TABLE 3: ALTERNATIVES ELIMINATED AND ELIMINATION SUMMARY

ALTERNATIVES ELIMINATED	MAIN REASONS FOR ELIMINATION
Debris Nets	Does not solve flooding; difficult and prohibitively costly to maintain
Maintenance	Does not solve flooding where channels and culverts are undersized
Low Impact Designs	Does not solve flooding for large flow volumes
Advanced Warning Systems	Does not solve flooding – not enough time for response due to Montecito terrain
Regulation	Does not solve current flooding – would take decades to realize benefits
Levees	Residual risk and cost prohibitive

Eliminations

Several alternatives were rejected for not meeting the project goal of flood mitigation.

Debris Nets

Debris nets capture transported rocks and debris in the flood runoff in the upper watershed, but do not decrease flood flow amounts. Several debris nets have been constructed in the watershed by others. This is considered a separate effort from this plan. These nets were considered a temporary post-fire measure, to be removed upon watershed recovery. Post-debris capture maintenance proved difficult to impossible due to the location of the nets. By design, the nets are placed in steep, remote locations in the upper watershed and access is typically by helicopter only. Furthermore, debris is not removed from the system potentially increasing long term risks. A picture of a debris net is shown in **Figure 8**.



FIGURE 8. DEBRIS NET

Maintenance

Streams are subject to natural processes of erosion and sedimentation. Natural channels see changes to their banks and stream beds in response to runoff. Typically, maintenance actions remove debris, obstructive vegetation, and sediment. However, maintenance does not drastically improve conveyance capacity. If a stream is undersized, no amount of maintenance would solve flooding caused by larger storm events.

It is expected that constructed improvements would require maintenance. However, as a stand-alone alternative, it is not sufficient to meaningfully impact flooding in the community. Additional discussion on

maintenance is contained in the Maintenance section of the report.

Low Impact Design

Low impact designs include a suite of water control items such as bioretention, green roofs, infiltration, permeable pavement, and similar measures. These measures are typically applied on smaller-scale basis, such as an individual lot, parking area, or sidewalk and are successful in improving pluvial and urban flooding. However, they do not solve riverine flooding where high peak flows and volumes result from steep upstream watersheds. As is the case in Montecito, upstream mountains contribute large quantities of water into the streams which could not be solved by low impact design measures.

Advanced Warning Systems

Automated advanced warning systems can warn of imminent flood or debris flow events to allow for evacuation and emergency preparation. However, these systems are only effective where sufficient time is available to provide a response. Due to the Montecito terrain and geography, flood and debris flow events happen very quickly, where only minutes are available from initial readings to inundation.

Currently, decisions are made based on forecast events due to the lack of response time available from actual event gage readings. This is the best available response plan for this watershed. Installing warning systems based on gages would not provide sufficient advanced warning. Additionally, the warning systems would not solve the flooding or debris flow risks but only warn of imminent hazards.

Regulation

Enacting building and floodplain elevation rules help protect future and rebuilt structures. These rules could include raising finished floor elevations, structural reinforcement in designs to resist debris flows, and similar measures. However, it does not solve hazards at existing structures that may be subject to flooding.

It should be noted that the County of Santa Barbara currently follows FEMA's floodplain regulations that require elevation of structures above the base flood elevation and similar items. Additionally, the County has enacted local regulations that exceed FEMA minimum requirements. These regulations protect the community in the future but do not solve all existing and future flooding concerns.

Levees

The use of levees was also rejected as a alternative. The main reason for rejection was due to the residual risk from failure. Above-ground structures to contain flow laterally can result in a more hazardous situation. According to FEMA:

“Levees may reduce the risk from flooding events, but they do not eliminate flood risk. The possibility that a flood will exceed the capacity of the levee always exists, no matter how well the structure is built and maintained. And, levees can fail if they haven’t been properly maintained or when faced with a flood that exceeds their engineered design capacity—letting floodwater rush under or directly through the levee. When levees overtop or fail, the flooding that follows can be catastrophic.”(FEMA, 2020).

Levees additionally have funding constraints, design, and maintenance considerations. The footprint required for levees in this plan are similar to that of a below grade, channel alternative. For these reasons, the levee alternative was abandoned for further consideration.

Localized Application Alternatives

Some alternatives are not appropriate for application on a widespread basis to solve flood control issues, but may be used in localized situations in conjunction with other measures. These localized applications are discussed below.

No Action/Open Space

In general, taking no action to improve flood conveyance leaves the community at risk. Flooding has caused significant damage in the past and would continue to do so in the future. However, certain segments of the streams may have sufficient capacity to convey flood waters or do not cause flood damages. These locations may be left “as-is” with no constructed improvements. An example of this is currently found in the community at the Ennisbrook Open Space. This is a designated area of land on San Ysidro Creek that allows natural stream processes to continue. A cost savings is realized by prioritizing improvements to critical sections of creeks while allowing other reaches to remain as-is.

Acquisitions and Structure Elevations

Two alternatives, acquisitions and structure elevation, were rejected as wholesale alternatives strictly due to their prohibitive costs. Meaning, implementing these as the sole means to solve flooding problems on a watershed-wide scale is cost prohibitive (along with other consequences listed in the database table in **Appendix 2**). Additionally this alternative does not offer protection to transportation facilities which are critical in emergency situations. However, these two items may be implemented in certain situations combined with other alternative strategies.

Underground Conduits

It is cost-prohibitive to contain all flood flows in underground conduits. The amount of flow in the streams is greater than can be reasonably contained in underground pipe, boxes, or similar conduits. Maintenance is also difficult. Additionally, many utilities would require relocation to make room for underground conduits. Although containing flow underground does not work to solve all flooding problems, it is the preferred method to convey flows beneath roads. Culverts and bridges are used to convey flow underneath freeways, roads, and driveways.

Stormwater Basins

Peak flow attenuation by collecting storm water in basins is an effective strategy for flood mitigation. The volume of water required to be retained is often significant, as evidenced by the size of the existing Santa Monica basin upstream of Carpinteria which is large enough to mitigate downstream flooding. Given property values, the cost of acquiring sufficient land may be cost prohibitive.

On streams where fish passage is required, storm water retention is limited due to the required outlets. Therefore, stormwater retention is only viable on non-critical habitat streams, such as Oak Creek.

ALTERNATIVE ANALYSES



After the initial screening, the remaining alternatives were advanced for further analyses. Analyses were performed to develop conceptual mitigation designs. Refinement of the alternative concepts occurred, and different concepts were applied at different locations. For example, a refined alternative may consist of multiple different types of mitigation concepts, such as a no-action segment, a basin, channel widening with different cross sections or bank protection, and a bridge replacement. The footprint of each mitigation measure was developed based on site specific flows and/or volumes.

It was noted that the most restrictive locations for providing conveyance capacity in the streams is located at the outlet to the Pacific Ocean. This is due to the following:

- The slope is reduced as the streams enter the flatter areas at the coast. Lower slopes result in less conveyance capacity.
- The ability to provide deeper channels is limited by sea level.
- Extensive development along the coast.

As the coastal area governs, mitigation evaluations began at the Pacific Ocean. Restrictions in conveyance at the downstream end would restrict capacity for the rest of stream. Channel conveyance alternatives for varying flow events were determined, along with capacities of existing drainage structures.

The goal was to maximize flow mitigation, preferably to contain the 100-yr or 1% annual chance event or greater. This flow event is preferred as this is the flood event used by FEMA for Flood Insurance Studies, developing the Special Flood Hazard Areas, flood insurance, and regulatory requirements. This reduction also facilitates grant seeking opportunities. Providing mitigation for this event has increased advantages as FEMA program benefits are realized compared to lesser designs. However, lesser design capacities were considered.

The alternatives or combinations of alternatives were placed in updated hydraulic models to analyze their mitigation effectiveness. The existing condition models from the FEMA study were modified to produce an updated existing condition including proposed improvements. Where necessary, overflow locations that occur during existing conditions were removed and any breakout flows added back to the conveyance corridor. These flows are summarized in **Table 4**.

The results of the analyses are listed in **Table 5**, with a brief summary. The results are further described in subsequent sections of the report.

Acquisitions

Acquisitions of building structures were only considered as a last resort, where no other feasible alternative exists. An overarching goal of the project is to provide a design that allows all existing buildings to remain. However, if minimal structures prevent implementation of an entire upstream section, acquisitions were considered.

Creek Channel Widening

Creek channel widening is a viable alternative to solve flooding in the watershed. This is particularly effective combined with debris basins to help minimized sediment and debris deposition in the channels. The bottom of the channels should generally be kept natural for environmental and species considerations. Due to the high cost of property in the area, vertical or nearly vertical walls would help reduce easement acquisition costs. Maintenance and inspection roads are recommended, with periodic ramps to access the channel invert. **Figures 9 and 10** show improved channel concepts.

TABLE 4: MITIGATION DESIGN FLOWS, 100 YR

STREAM	DOWNSTREAM LIMIT	UPSTREAM LIMIT	100-YR DESIGN FLOW, CFS
Montecito Creek	Pacific Ocean	East Valley Road	6619
Montecito Creek	East Valley Road	Hot Springs/Cold Springs Confluence	6589
Oak Creek	Pacific Ocean	Railroad Tracks	1809
	Railroad Tracks	N Jameson Lane	1760
Oak Creek	N Jameson Lane	Willina/Ramona Lane	1191
Oak Creek	Willina/Ramona Lane	Sinaloa Drive	1401
Oak Creek	Sinaloa Drive	Los Padres National Forest	1215
San Ysidro Creek	Pacific Ocean	Alignment of Monarch Lane	3733
San Ysidro Creek	Alignment of Monarch Lane	East Mountain Drive	3592
San Ysidro Creek	East Mountain Drive	Los Padres National Forest	3188
Romero Creek	Pacific Ocean	N Jameson Lane	4169
Romero Creek	N Jameson Lane	Confluence with Buena Vista Creek	4045
Romero Creek	Confluence with Buena Vista Creek	Confluence with Picay Creek	3842
Buena Vista Creek	Confluence with Romero Creek	Confluence with East and West Branches	1530
Buena Vista Creek East Branch	Confluence with West Branch	Alisos Drive	667
Buena Vista Creek East Branch	Alisos Drive	Confluence with Tributary 2	557
Buena Vista Creek East Branch Tributary 1	Confluence with Buena Vista Creek East Branch	Camino Del Rosario	553

TABLE 5: SUMMARY OF ANALYSES RESULTS

ALTERNATIVES ANALYZES	RESULTS
Acquisition *	Avoid/minimize as much as possible
Channel Widening	Viable alternative
Debris Basins	Viable solution for debris capture
Underground Conveyance *	Use at transportation crossings
Structure elevation *	Could be applied by property owners
Stormwater Basins *	Viable solution for smaller flow volumes and where fish passage is not mandated
No Action *	Viable where flow is currently contained in the main channel, does not flood structures, and/or located in preserve lands

* Eliminated as wholesale alternatives, but may be applied to localized situations.

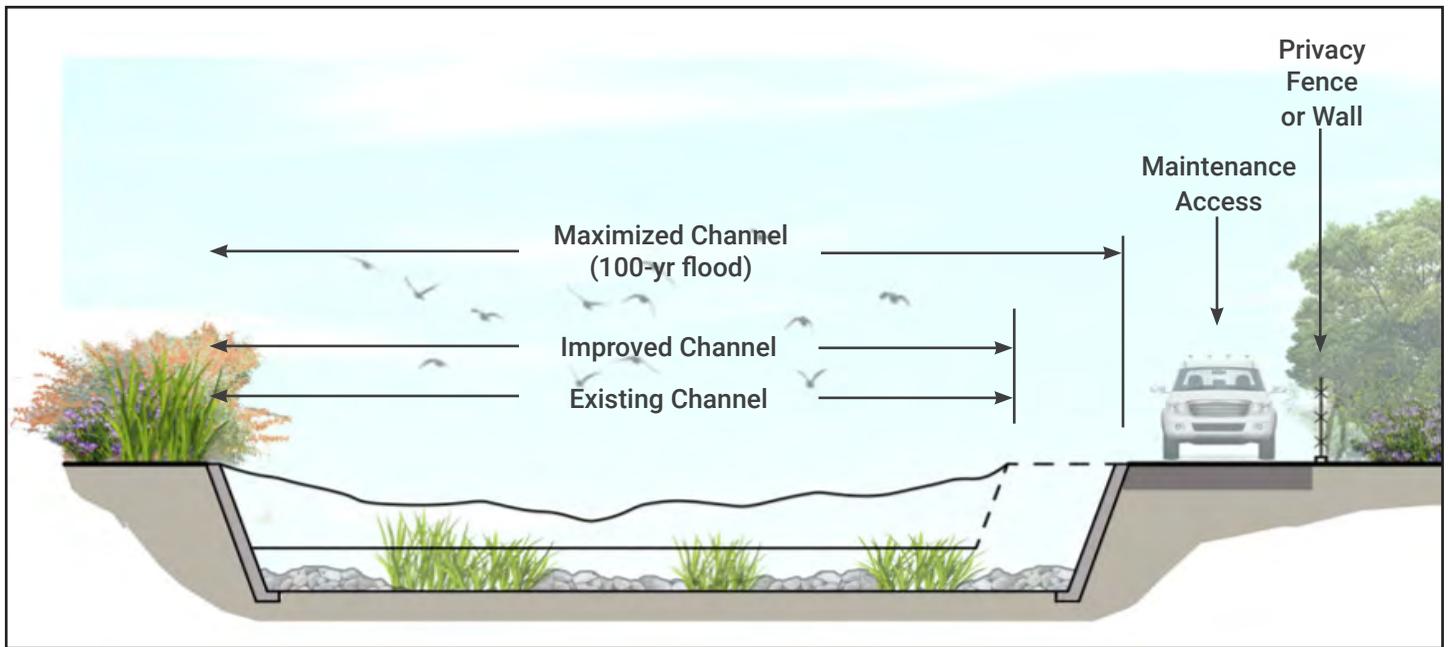


FIGURE 9. IMPROVED CHANNEL CONCEPT

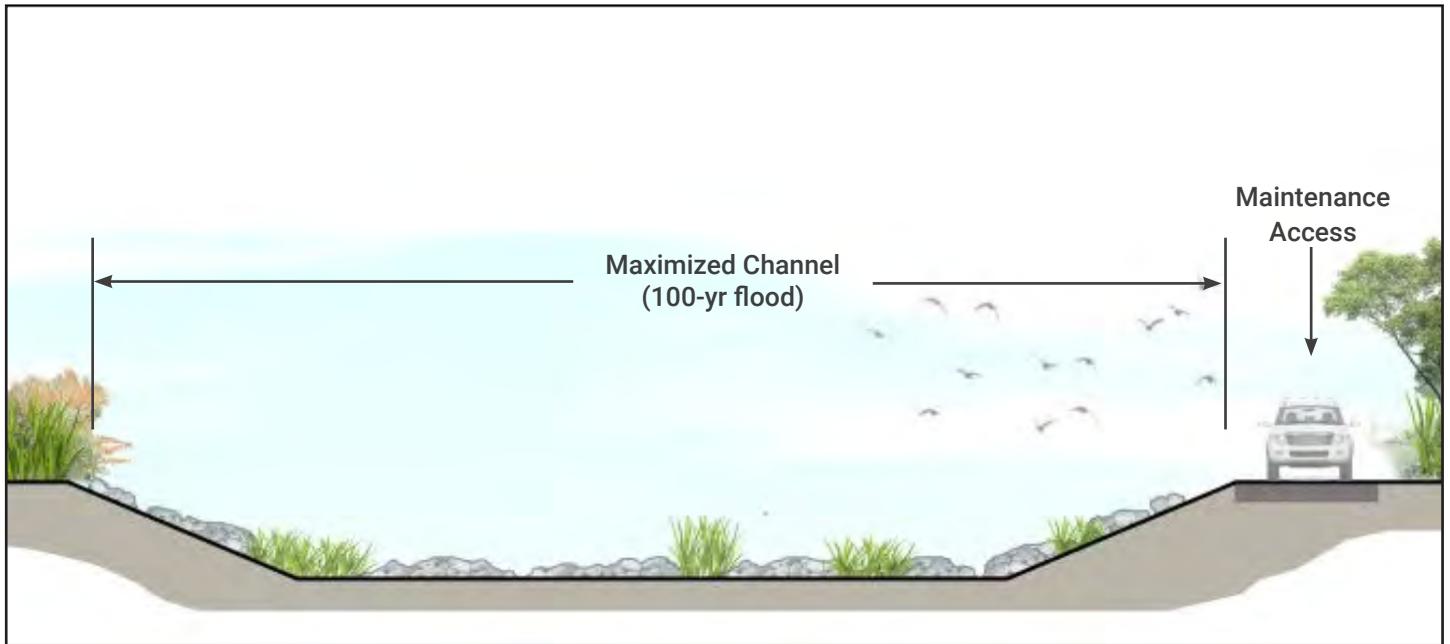


FIGURE 10. NATURAL CHANNEL CONCEPT

Debris Basins

Debris basins similar to **Figure 11** are a viable alternative to capture sediment and debris and help mitigate debris flow risks. Note that this plan is focused on flood control, while existing and planned debris basin projects are integrated into this plan. However, complete mitigation of potential future post-burn debris flows was not studied in this plan. Projects by others may occur that separately address debris flow mitigation that may build on these recommended locations or provide alternative locations or solutions.



FIGURE 11. DEBRIS BASIN

Underground Conveyance

Due to the large amount of flow in the creeks, underground conveyance structures were limited to only those necessary beneath transportation elements (roads and the railroad). The required size and amount of sediment and debris known to be carried in the streams limited the use of underground structures. Large, expensive structures similar to **Figure 12** are necessary to carry flow and debris.



FIGURE 12. METAL CULVERT

Structure Elevation

Raising of individual buildings above the flood risk elevations could be applied by property owners. This is particularly useful for localized flooding not caused by the larger study streams. New construction is currently regulated to mandate elevation above the base flood elevation and therefore should be sufficiently elevated. Older structures should be elevated when substantially improved.

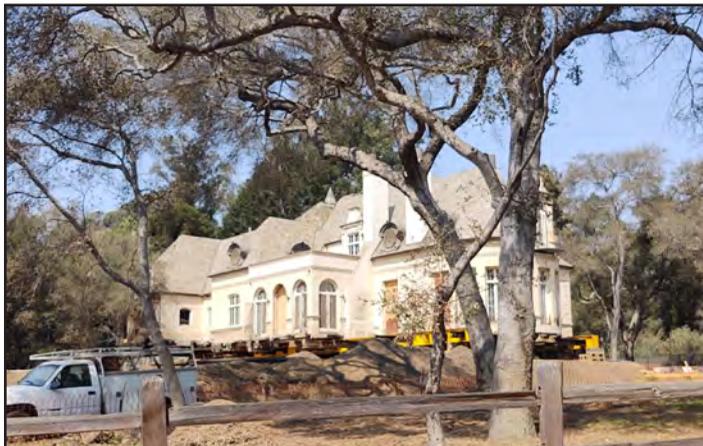


FIGURE 13. HOUSE BEING ELEVATED

Stormwater Basins

Stormwater basins generally require a large footprint and restrictive outlet to mitigate flows. Fish passage is an important consideration. The analyses indicated that only Oak Creek is feasible for storm water retention. The larger creeks of Montecito Creek, San Ysidro Creek, and Romero Creeks have prohibitively large storage volumes (compared to the amount of undeveloped land available for retention). The Buena Vista Creek system contains many smaller branches that would require numerous smaller basins, along with a lack of undeveloped land at these locations.



FIGURE 14. DEBRIS/STORMWATER RETENTION BASIN

No Action

The no action alternative is viable where flow is currently contained in the channel, does not flood structures, and/or is located on dedicated preserve lands. With no constructed improvements, this alternative is the most cost effective. However, the channel would be subject to the natural processes of erosion and deposition. In the future, easements could be obtained to allow for access and maintenance.



FIGURE 15. NATURAL CHANNEL

PREFERRED ALTERNATIVE



The preferred alternative contains a combination of analyzed alternatives. Creek channel widening, basins, underground conveyance, and no action are combined to produce the overall mitigation strategy. **Figure 16** presents the overall plan, and **Map 1** in the attachments contains detail maps.

The preferred alternative includes the following:

- 6.3 Miles improved channels
- 48 bridge/culvert replacements
- 14.2 miles of “no action” channels
- Potential locations for 8 additional debris basins

Creek channel widening was chosen as the preferred solution where the 1% annual chance flood flows are not currently contained within the existing stream channels. In some stream reaches, the flood flows are contained in the existing stream geometry and

these areas are identified for No Action. Although more frequent (i.e. lesser flows) return intervals were considered, it was determined that the 1% annual chance event could be mitigated through the channel widening process with lesser additional impacts over more frequent return intervals.

The space required for the channels to mitigate the 1% annual chance event was available without needing to acquire existing buildings, with one exception. The ability to minimize the top width of the channel while preserving buildings is largely due to the steep watershed slopes. This allows for additional carrying capacity in a deeper channel, and steeper side slopes would be used to minimize the overall footprint. The one exception is at the coast, where sea level prevents constructing a deeper channel and forces a wider footprint.



FIGURE 16. PREFERRED ALTERNATIVE OVERALL PLAN

Existing bridges, culverts, and stream crossings were examined for carrying capacity beneath the structures. In general, most drainage structures are undersized. A total of 48 drainage structures would require replacement along the streams with 6 existing drainage structures remaining as they have the ability to convey the required flows. This would result in 54 all-weather transportation crossings on the streams. Note that the existing culverts and bridges were evaluated only for their hydraulic carrying capacity and may need to be replaced for other reasons such as structural loading, condition, or other factors, to be determined during subsequent phases of the project.

The channel footprint is conceptual and conservative at this planning stage. The conceptual design

includes at least one foot of freeboard. Additionally, a sediment building factor of 1.25 is included in the design flows (same as the FEMA study). Note that the construction of the additional proposed debris basins would help mitigate sediment loading into the channels.

The upper reaches of the channels are generally confined within rocky, steep-sloped channels. These reaches are lower priority than the lower reaches as the channels tend to be self-flushing due to the higher velocities. A channel schematic is shown in **Figure 17** and a channel geometry summary is contained in **Table 6**. Hydraulic models of the preferred condition are included in the **electronic attachments**.

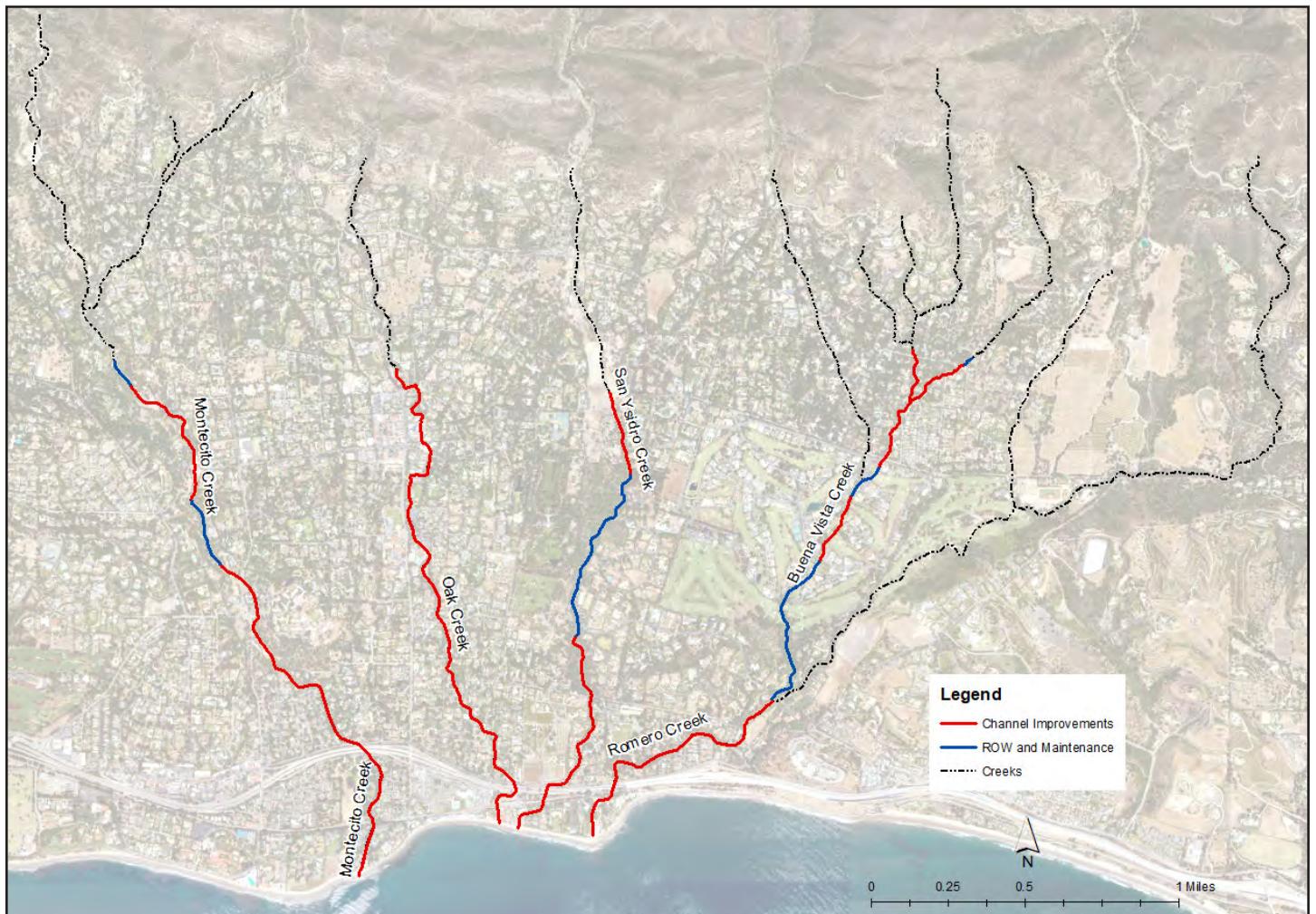


FIGURE 17. CHANNEL SCHEMATIC

TABLE 6. CHANNEL GEOMETRY SUMMARY

STREAM	DOWNSTREAM LIMIT	UPSTREAM LIMIT	BOTTOM WIDTH	SIDESLOPE	BANK WIDTH	DEPTH (AVERAGE)
Oak						
	Ocean	u/s Railroad	45	vertical	2	5
	u/s Railroad	101	40	vertical	2	6
	US101	Ramona Ln	32	1:1	5	5
	Ramona Ln	N of Monte Vista	32	1:1	5	5
	N of Monte Vista	park basin	23	1:1	5	5
	park basin	mid park basin	23	1:1	6	6
	mid park basin	San Ysidro Rd	20	1:1	7	7
Montecito						
	Ocean	Railroad	50	vertical	2	11
	Railroad	101/Frontage	40	vertical	6.6	11
	101/Frontage	200 Olive Mill Rd	40	1:1	12	9
	200 Olive Mill	u/s Olive basin	40	1:1	12	10
	Below E Valley	Above E Valley	40	1:1	12	10
San Ysidro						
	Ocean	235'	80	vertical	2	7
	235'	497'	70	vertical	2	7
	497'	709'	60	vertical	2	7
	709'	101 Fwy	50	vertical	2	8
	101 Fwy	200' u/s 101	50	1:1	9	9
	200' u/s 101	Jelinda Dr Align	40	1:1	7	7
	400' d/s Glen Oaks	E Valley Dr	40	1:1	7	7
Romero						
	Ocean	101 Fwy	50	vertical	2	7
	101 Fwy	d/s Sheffield	44	1:1	9	9
	d/s Sheffield	Oak Tree Pl align	44	1:1	12	12
Buena Vista						
	Birnam Wd Dr	Las Fuentes	30	1:1	8	8
Buena Vista East						
	d/s E Valley	u/s E Valley	20	1:1	6	6
	nr Tabor Ln	Tabor Ln	20	1:1	6	6
	Tabor Ln	u/s Veloz	20	1:1	5	5
Buena Vista East Trib 1						
	BV East Confluence	u/s Camino Del Rosario	8	1:1	6	6

Oak Creek

Unlike most of the study streams, Oak Creek is feasible for storm water retention as a method to reduce flooding. The larger creeks of Montecito Creek, San Ysidro Creek, and Romero Creeks have prohibitive storage volumes required to mitigate flooding and would likely be prohibited due to watersheds being steelhead trout habitat.. The Buena Vista Creek system contains many smaller branches that would require numerous smaller basins, along with a lack of undeveloped land for potential basins.

This results in two options to mitigate flooding from Oak Creek: channel widening or provide storm water retention. The current preferred alternative shows larger channels to contain flow that would not be necessary if stormwater basins were built. The preferred alternative maps show the suggested basin locations but are notated as debris basins. These

could be changed to stormwater basins which would allow smaller channels to be built downstream.

The stormwater retention basins on Oak Creek would reduce the 1% annual chance event flows from 1,215 cfs to 600 cfs. The 1% event hydrograph is shown in **Figure 18**. This flow reduction amount was derived from the available conveyance width as the channel exits to the ocean, which is limited to approximately 600 cfs before requiring structure acquisition.

The volume required for retention is approximately 76 acre-feet. The area indicated is (from south to north, see **Figure 19**):

- Lower Basin area=4.4 acres
- Middle Basin area=2.8 acres
- Upper Basin area=3.2 acres

Each basin would require a depth of approximately 15 feet to produce the required volume.

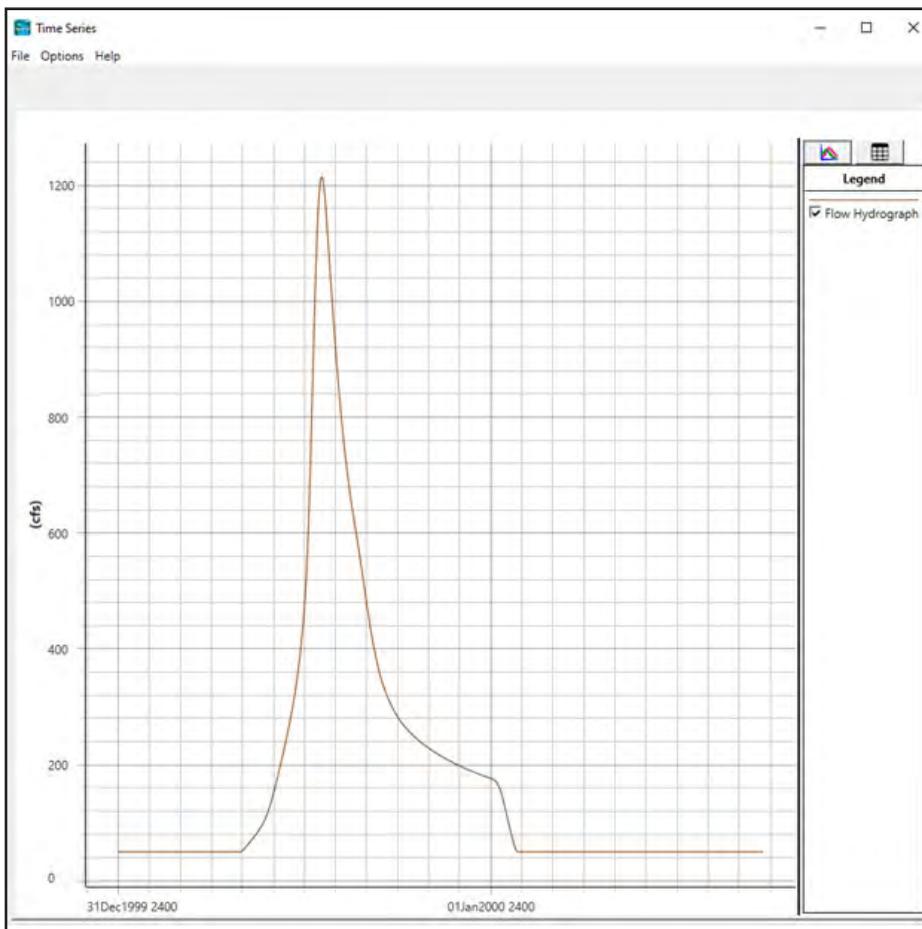


FIGURE 18. 1% ANNUAL CHANCE EVENT HYDROGRAPH FOR OAK CREEK



FIGURE 19. PROPOSED OAK CREEK BASIN LOCATIONS

Effectiveness

The preferred alternative would realize the following benefits:

- 326** Acres of flood risk reduction and removed from FEMA- designated floodplain

- 851** Parcels with flood risk reduction **54** All weather access crossings created

- 8** Additional debris basins **247** Parcels needing construction easements

- 52** Acres of construction/maintenance easements (25 already acquired) (red lines in Fig.17)

- 160** Acres of construction/maintenance easements (28 already acquired) (blue lines in Fig.17)

- 3,000** Approximate length of improved bridges/culverts

FIGURE 20. PREFERRED ALTERNATIVE BENEFITS

Maps are included in the Appendix and electronic spatial files provided that indicate the following:

- Floodplain Reduction Areas and associated parcels
- Parcels for easements

Debris Basins

Eight basins or approximately 50 acres were identified for potential new debris basin sites. These sites were chosen due to proximity to the streams, and lack of existing buildings and structures. The basins identified along Oak Creek can serve as debris basins or retention basins. (See section on Oak Creek alternative)

Note that the quantity of debris generation and required volumes to mitigate debris flow risks were not determined as part of this project. This project identified potential basin sites based on geographical factors only (undeveloped, availability, location, etc.).

Bridges and Culverts

The stream corridors cross over 50 drainage conveyance structures such as culverts and bridges. 48 of these may require replacement for hydraulic capacity improvements. The ownership of each structure is shown in **Table 7**. Note that any structures not identified for replacement due to hydraulic considerations may require replacement due to other factors, such as structural capacity or condition.

TABLE 7. BRIDGE/CULVERT OWNERSHIP

BRIDGE/CULVERT OWNERSHIP	NUMBER OF BRIDGES/CULVERTS
Private	21
Public (County)	19
Union Pacific Railroad	5
CalTrans	9

Cost

The cost to construct the preferred alternative would require a substantial investment which likely exceeds the ability for the County and Flood Control District to fund. While grants may be available from various federal and state programs, a significant cost share is typically required in these grant programs. Additional local funding, such as bonds or new property assessments, may be needed to leverage state and federal funding. The design of the preferred alternative was created to maximize funding opportunities. The cost of the items included in the preferred alternative are detailed below in **Table 8** and attached as **Appendix 3**.

TABLE 8. COST OF ITEMS IN PREFERRED ALTERNATIVE

ITEM	DESIGN COST, USD*	CONSTRUCTION & PERMITTING COST, USD*	EASEMENT/ROW COST, USD*	TOTAL COST, USD*
Channels and Bridges**	\$35.4 Million	\$173.6 Million	\$429.8 Million	\$638.8 Million
Debris Basins**	\$12.0 Million	\$47.9 Million	\$201.3 Million	\$261.2 Million

Unit costs used to generate the estimates are detailed in Appendix 3.

* 2024 dollars

** Assumes channel improvements implemented for Oak Creek (\$145.0 Million channels and bridges vs. \$63.2 Million basins only, net difference \$81.8 Million)

INDIVIDUAL LOT EROSION PROTECTION

Sedimentation and erosion are natural geologic processes. The streams may move, both laterally and vertically, in response to rainfall and runoff. As much of the property in the watershed is privately owned, as a general rule the County may not perform work on the streams on private property (with limited exceptions, see Maintenance Section of this report). Conditions caused by the stream are the responsibility of the property owner. Thus, individual property owners may wish to perform improvements to protect against these processes.

Process

If an individual property owner wants to perform work in a stream, a permit is required. The process to obtain permits to perform improvements may seem overwhelming. The first place to start is on the County website at <https://www.countyofsb.org/1082/Permitting-Home>. The process, forms, guidance documents, and additional information may be found on the website. The link on the top right corner called "How Do I?" provides frequently asked questions and contact information for permitting staff. Work inside the banks of a stream may also need a permit from the California Department of Fish and Wildlife, and in some cases a permit from the US Army Corps of Engineers.

In many cases, engineering may be required. This is necessary to ensure that improvements don't cause harm, pose a danger, or inflict unintended damages on neighboring properties or the public. The streams perform important natural functions, such as allowing floodwaters to pass or providing habitat for endangered species. For example, placing fill in a stream may result in less water conveyance capacity and subsequent flooding of adjacent properties, illustrated in **Figure 21**.

Easements

Easements may be obtained by the County to allow access, clearing, maintenance, construction, and/or other functions on private property. Easements are legal documents executed on real property that grant nonpossessory right to use and/or enter for a specified purpose. Occasionally, with permission, the County may perform clearing and maintenance on creek channels located on private properties under certain circumstances for the public benefit as resources allow. Typically, County maintenance actions do not include mitigation of erosion scars, or the potential for erosion.

Easements are acquired by the County for construction of channel improvements as a part of an engineered improvement project. When the County constructs an engineered project to provide for capacity improvements, the County typically would maintain all aspects of the project including preserving the channel configuration.

Any improvements constructed as part of this plan are subject to the acquisition of easements. The intention is to obtain easements on all properties where improvements are specified. The easements would allow the County to monitor, maintain, and repair the drainage structures over time.

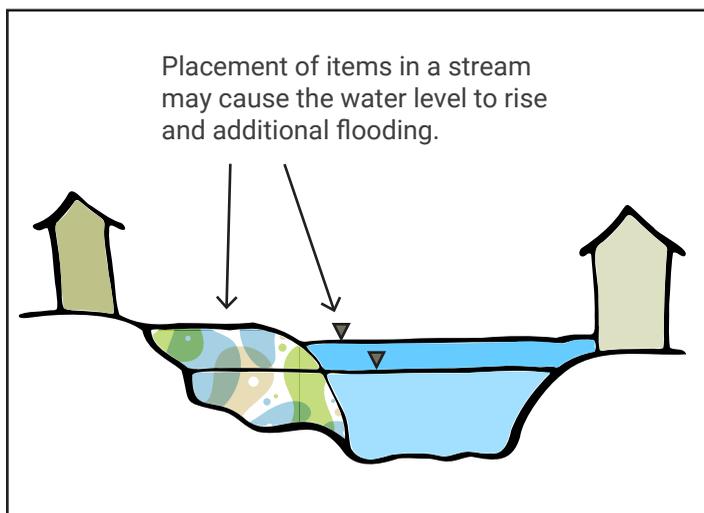


FIGURE 21. WATER DISPLACEMENT DIAGRAM

Creek Care Guide

In 2003, the Santa Barbara County Creek Care Guide was developed based on information developed by numerous agencies (Santa Barbara, 2003). This publication explains watershed characteristics, stream processes, and legal considerations.

The Creek Care Guide may be found online; a link to the document is found in the References section. Property owners may wish to review the Appendix in that document, which contains biotechnical bank stabilization techniques. An excerpt from that appendix is shown in **Figure 22**.

As previously mentioned, the County and other agencies should be consulted for permitting requirements for any stream improvement projects.

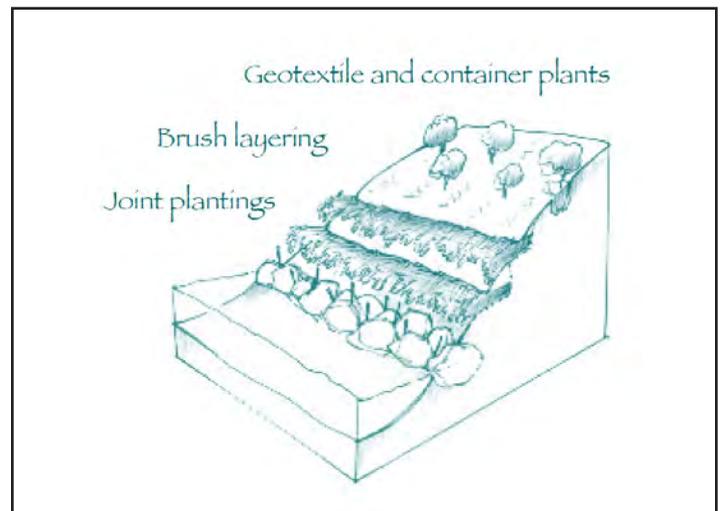


FIGURE 22. EXCERPT FROM 2003 CREEK CARE ILLUSTRATING A BIOTECHNICAL APPLICATION OF BANK STABILIZATION

MAINTENANCE



The Santa Barbara County Flood Control District (SBCFCD) is authorized by the Water Code to conduct flood control activities for the public benefit. In general, most, if not all Flood Control Districts in the State of California do not conduct any actions on private property and/or unimproved drainage courses. The other districts in the state only maintain facilities that they own and maintain, typically with the facilities being located on fee owned property or easements dedicated to the flood control purpose needed.

In Santa Barbara County, the SBCFCD has historically constructed facilities that are then owned and maintained, and has conducted certain maintenance actions on private property over natural creeks. The SBCFCD can only construct facilities that are in the public's interest and serves a broad region. Likewise, the SBCFCD limits its maintenance of creeks and channels on private property under the following limitations; 1) that the maintenance work benefits a region (not the private property owner) and the work does not cause damage to other properties; 2) that the SBCFCD's fund balance is able to afford the work without compromising needed work on projects constructed and owned by the SBCFCD. Those facilities constructed by (or assumed by) the SBCFCD have been assumed by the SBCFCD and thus are the highest priority for maintenance needs, both funding and resources.

On private property, the SBCFCD does not, and cannot, maintain the geometry of the creek or channel. Natural channels see changes to their banks and stream beds that are a natural process. Typically, the work that would be considered (assuming the above criteria is met) would be actions to remove debris, obstructive vegetation, and sediment that would otherwise reduce the channel capacity and increase the threat for regional flooding.

On facilities the SBCFCD built or assumed, the maintenance role is expanded to maintain the facility to its design function and, if needed, the geometrical configuration of the facility which is often linked to the design of the project.

In Montecito, the SBCFCD owns relatively little in the way of improved projects. Bridges are owned by other public agencies or private property owners.



FIGURE 23. UPPR BRIDGE

The existing network of debris basins are the most prominent facility the SBCFCD owns. In this Master Plan, improvements that are identified are improving the stream channels to a target design (geometrical cross-section) and increasing debris control through more basin storage. For those areas that are in the footprint of the project, the SBCFCD would acquire easements (or possibly in some cases fee ownership) for the improvements in the Master Plan. Once constructed, those constructed elements would be under SBCFCD control and would be maintained like other projects in the County. Easements may also be dedicated to the District as a condition of approval on discretionary development projects.

In some cases, the Master Plan identifies areas of channel improvements, but may have areas between these improvements that it was determined at this time that no work is needed. The Plan however considers the overall footprint of the plan to be the project and as such, the SBCFCD would acquire easements and maintain these unimproved areas for flow capacity only (not geometrical cross-section) so as to allow the project to function as a system. The SBCFCD maintenance of these unimproved reaches would begin to receive this maintenance status once the improvements that adjacent, upstream and downstream, are completed.

While the plan considers replacement of some bridges, these bridges would be maintained by the original owner (private, public, or other such as the railroad).



NEXT STEPS

This plan is the first step in the process to mitigate flooding and debris risk in the Montecito area. It is the first phase of a series of flood mitigation improvements analyses. This Master Plan and subsequent improvements would be accomplished in phases, as funding allows, generally consisting of investigations, alternative analyses, conceptual design, preliminary design, final design, and construction. Other considerations are:

- Full implementation of the plan improvements would require a significant investment, and grant funding would be maximized to the extent possible. Additional local funding, such as bonds or new property assessments, may be needed to leverage grant funding.
- All alignments and improvements shown in the plan are subject to change and refinement during the design and construction process.
- The permitting process for jurisdiction and environmental considerations would be accomplished during subsequent phases.
- Utilities may require relocation to construct proposed improvements. Coordination would be accomplished with applicable utility owners.

Phase 2 of this Master Plan is expected to begin as soon as funding allows. Phase 2 would recommend a prioritization and phasing scheme to give an opportunity for design and construction of smaller segments of the overall plan. Preliminary design during Phase 2 would help refine the project costs, improvement footprint, and extents. No date has been determined yet for construction as funding sources need to be pursued and realized.



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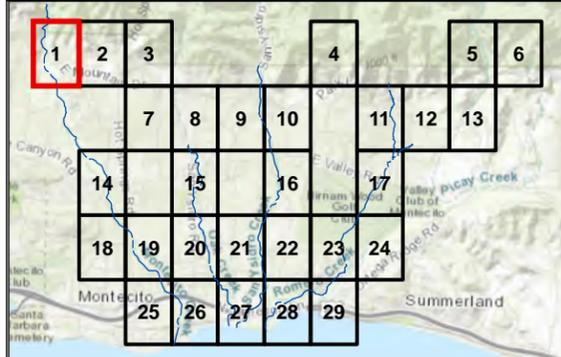
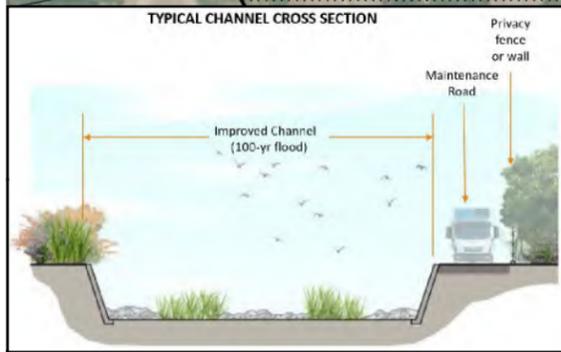


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MAP 1

Preferred Alternative Improvements



Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
- ▨ Potential Debris Basins
- Parcel Lines

Flood Hazard Areas

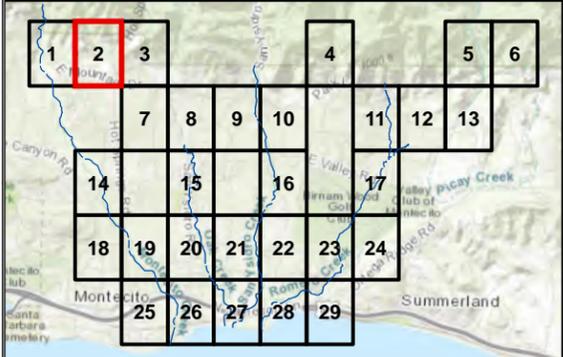
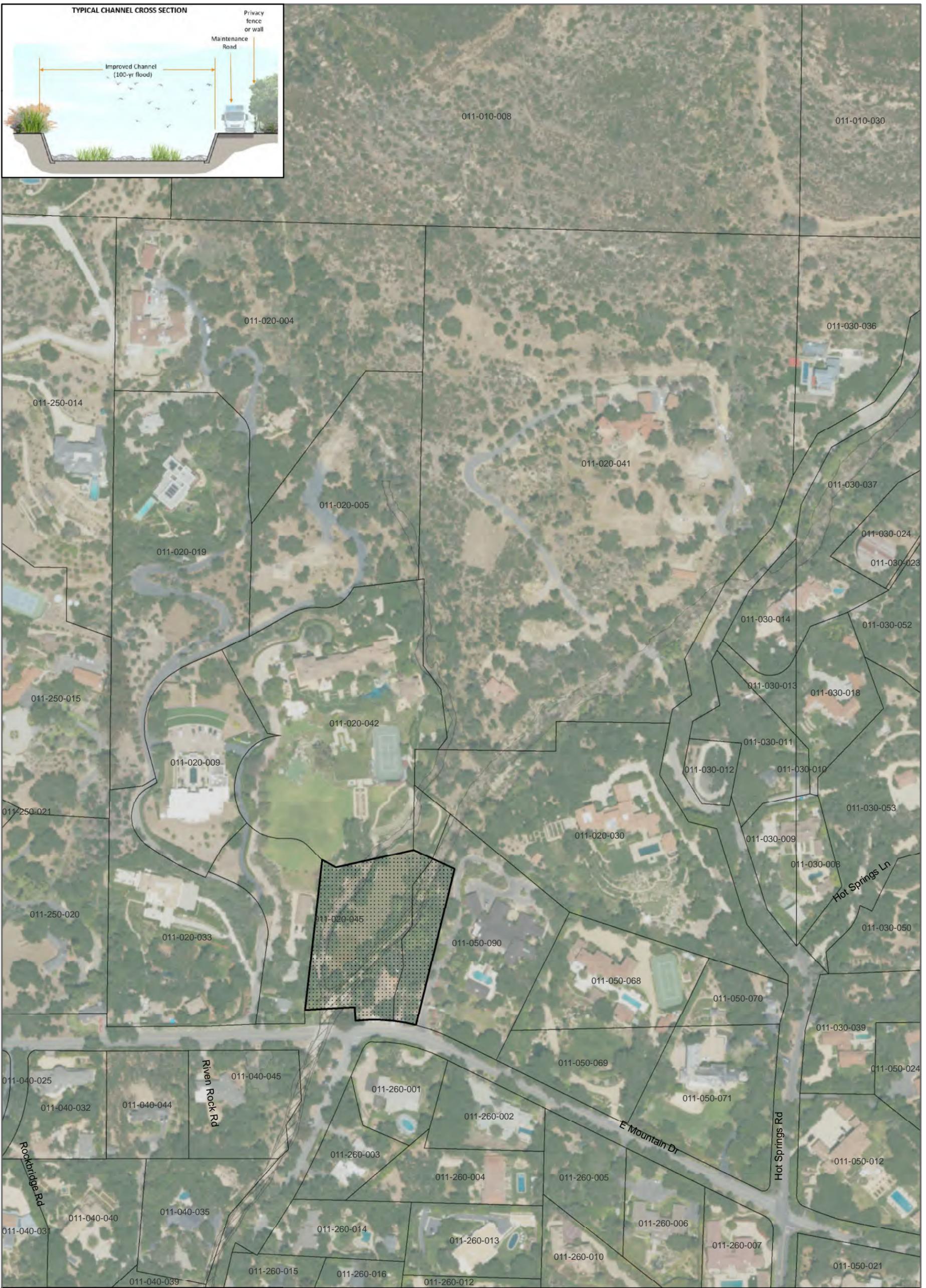
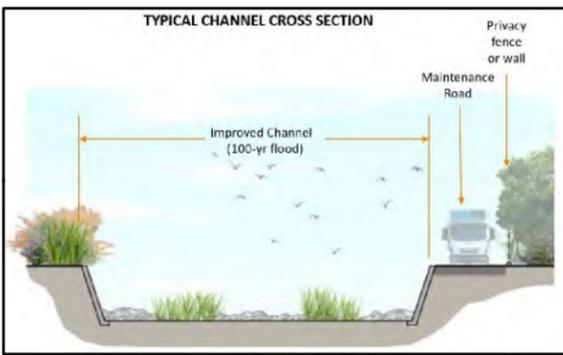
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Proposed Infrastructure

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Flood Hazard Areas

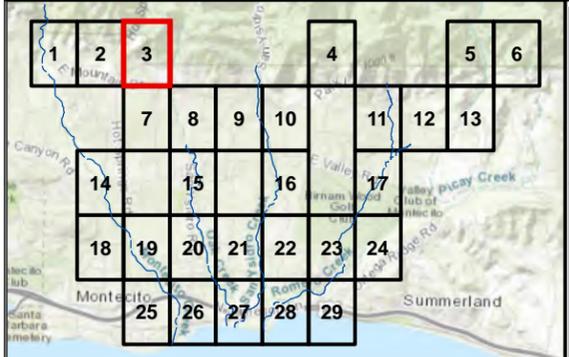
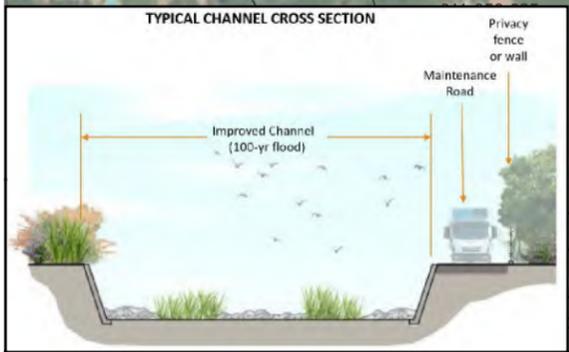
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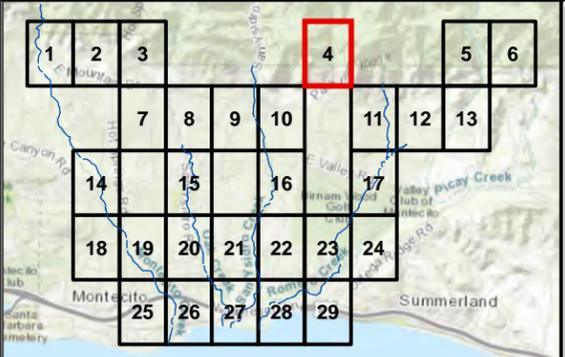
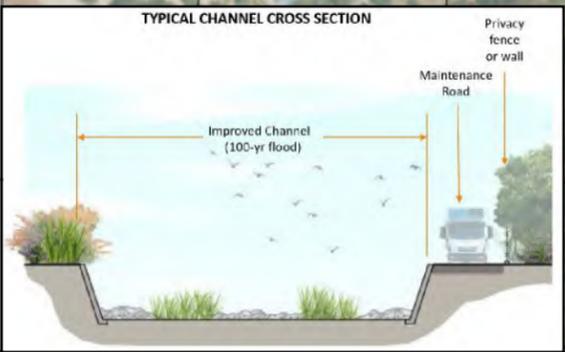
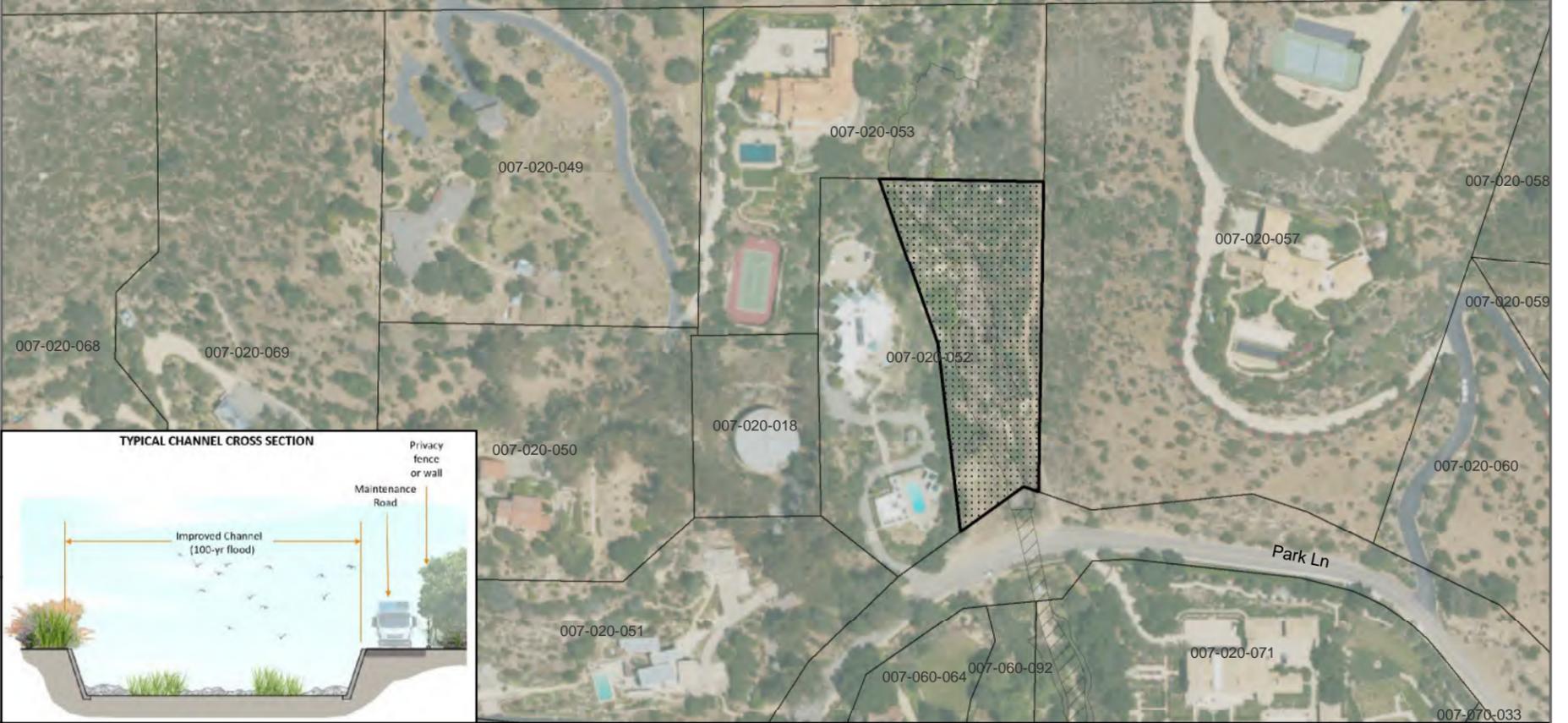
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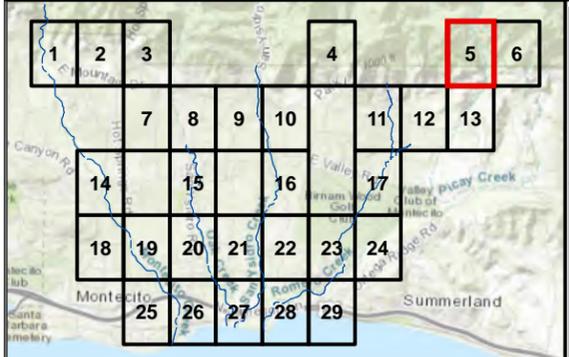
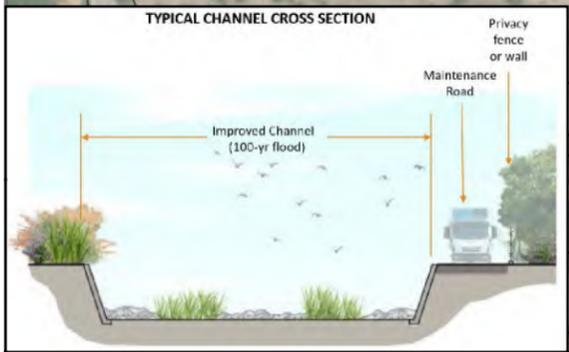
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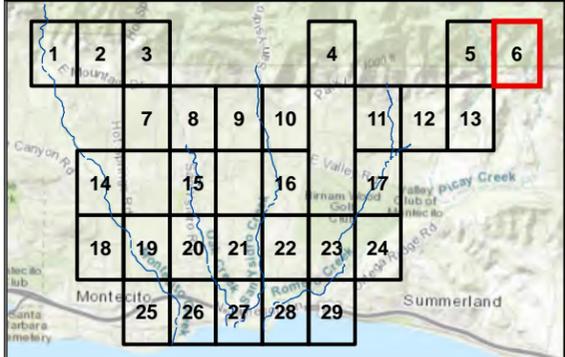
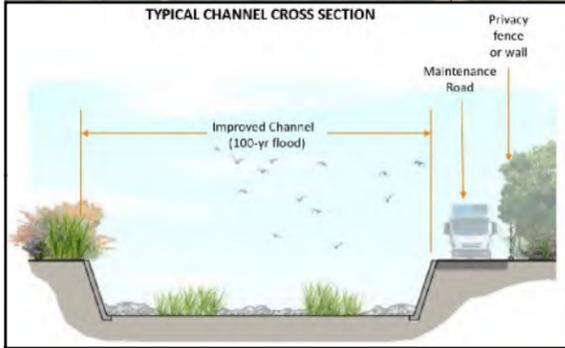
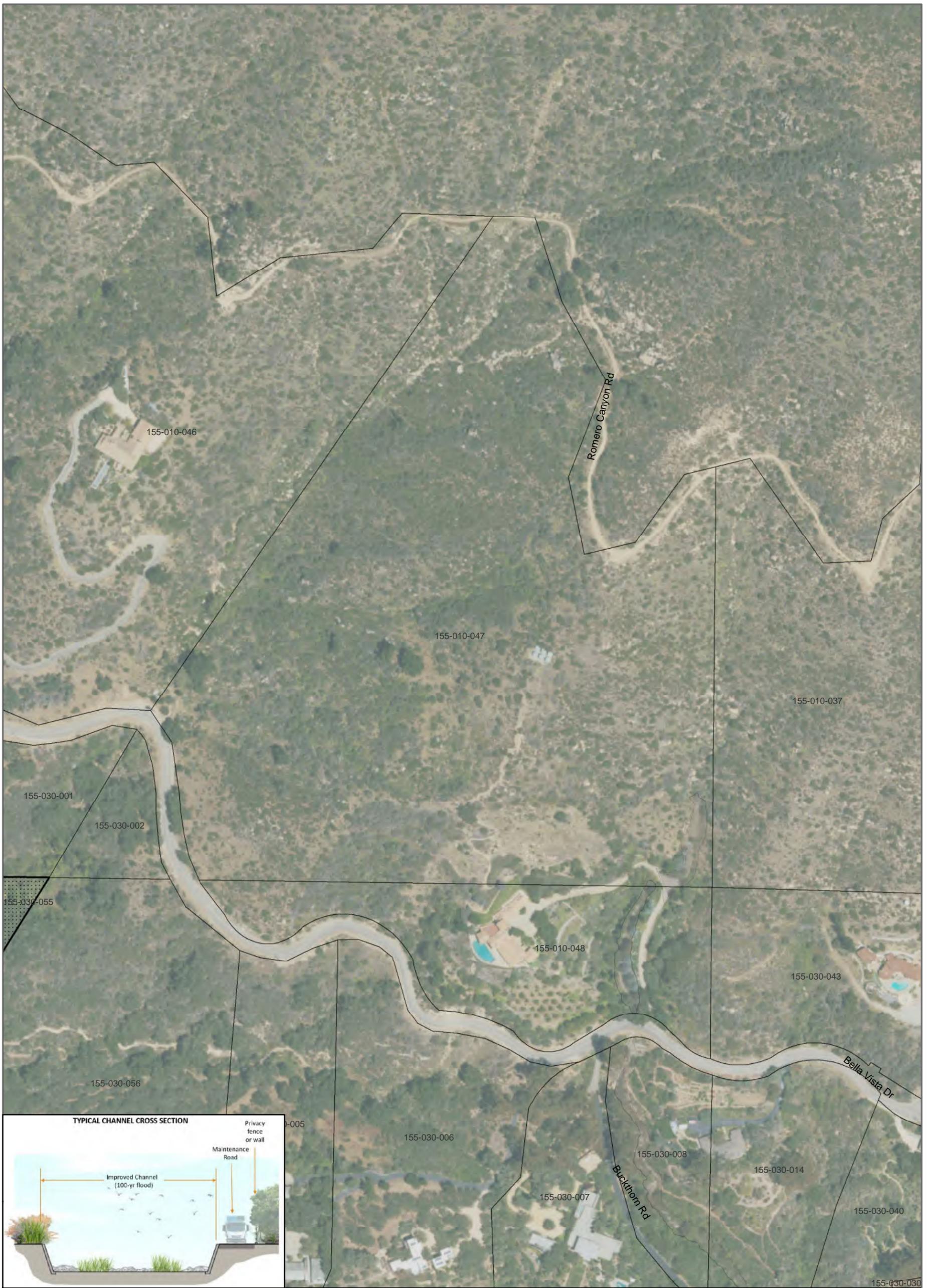
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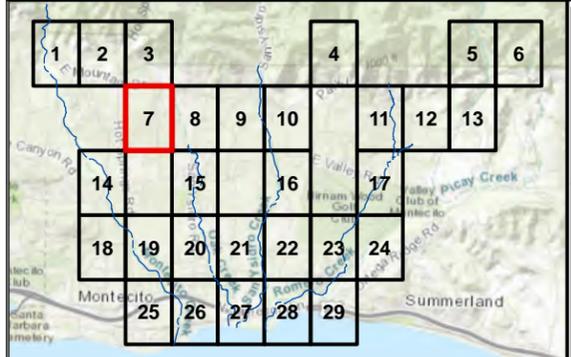
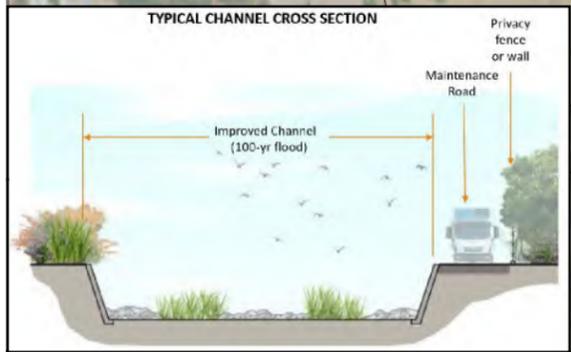
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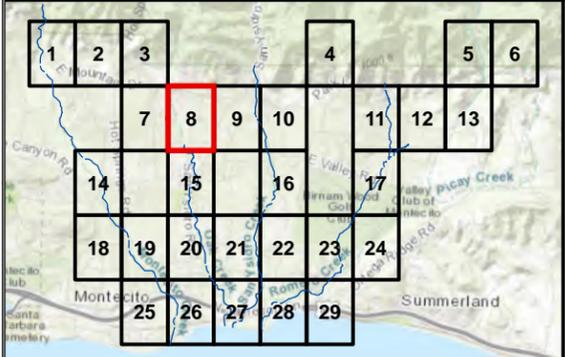
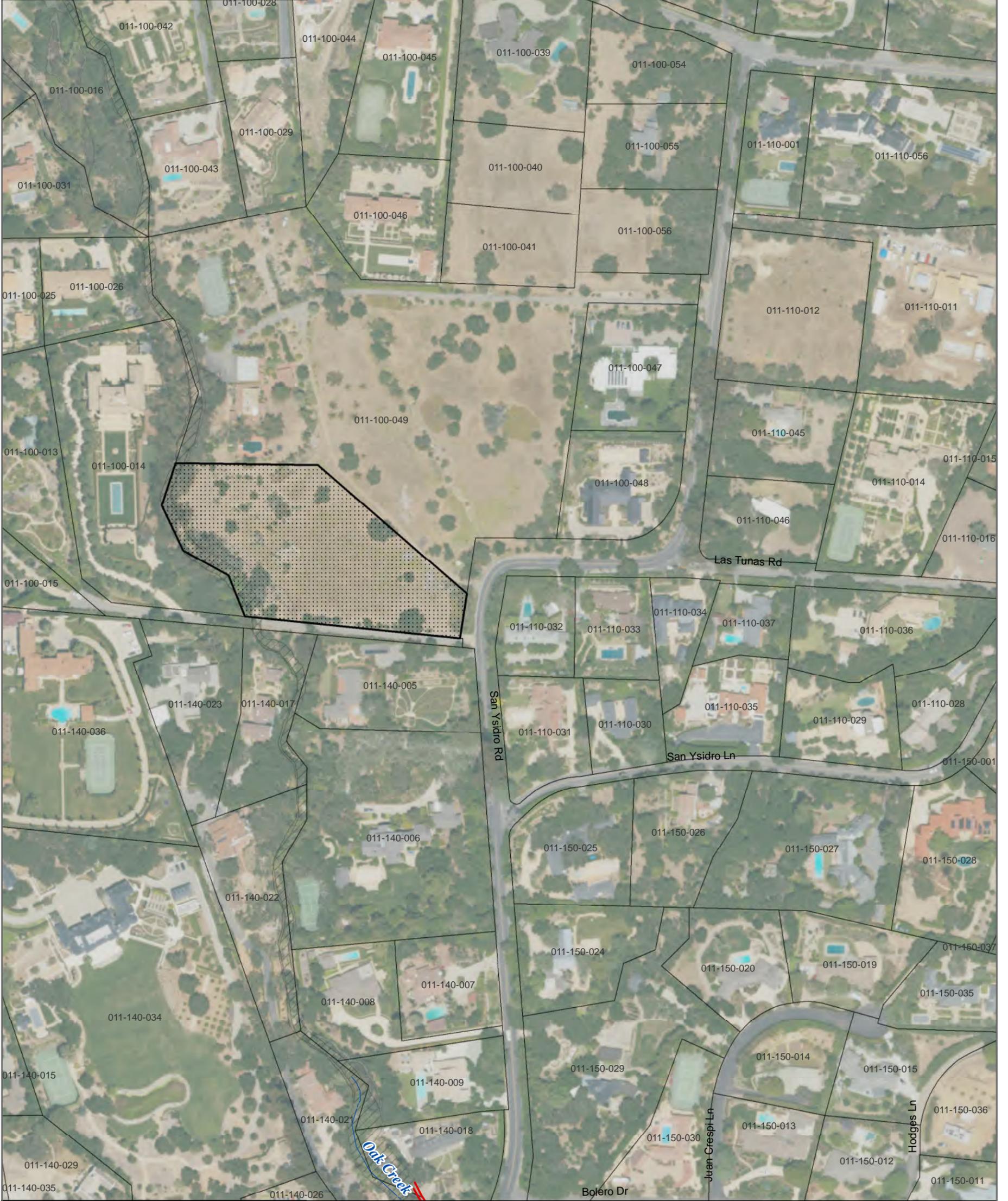
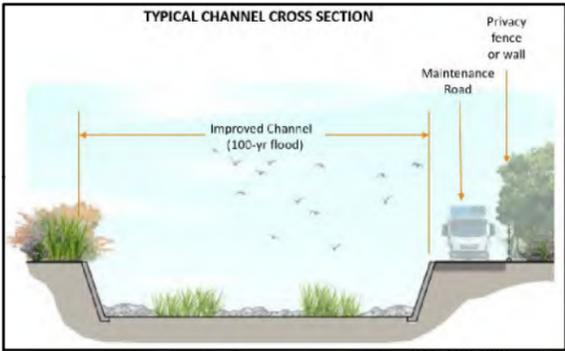
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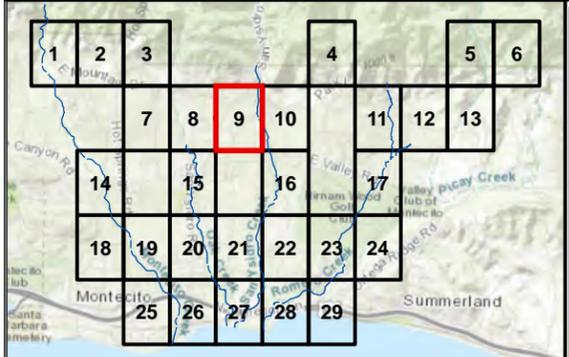
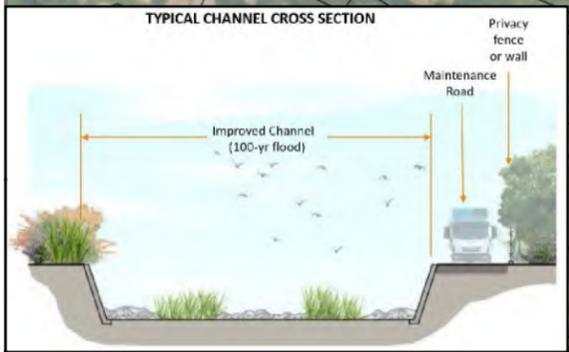
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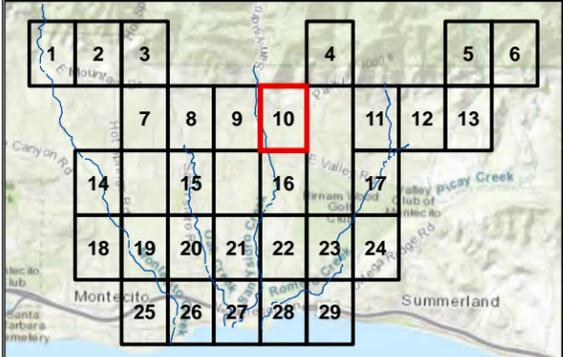
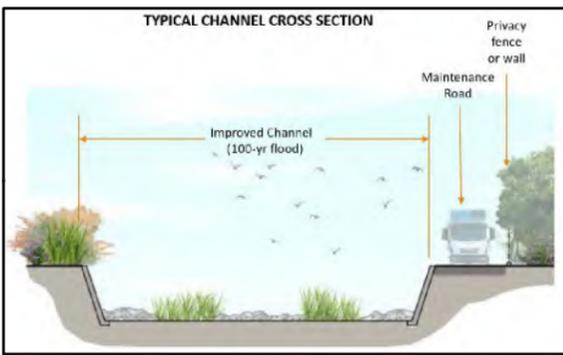
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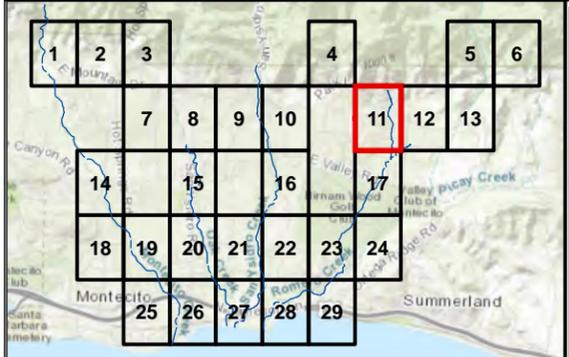
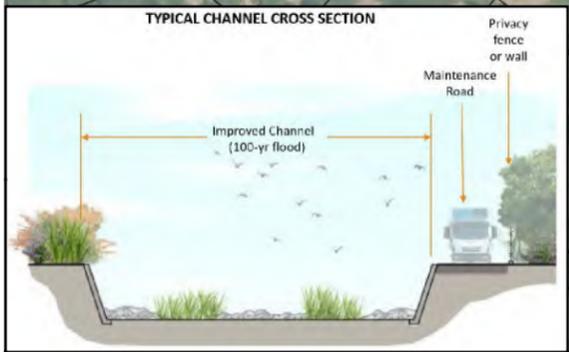
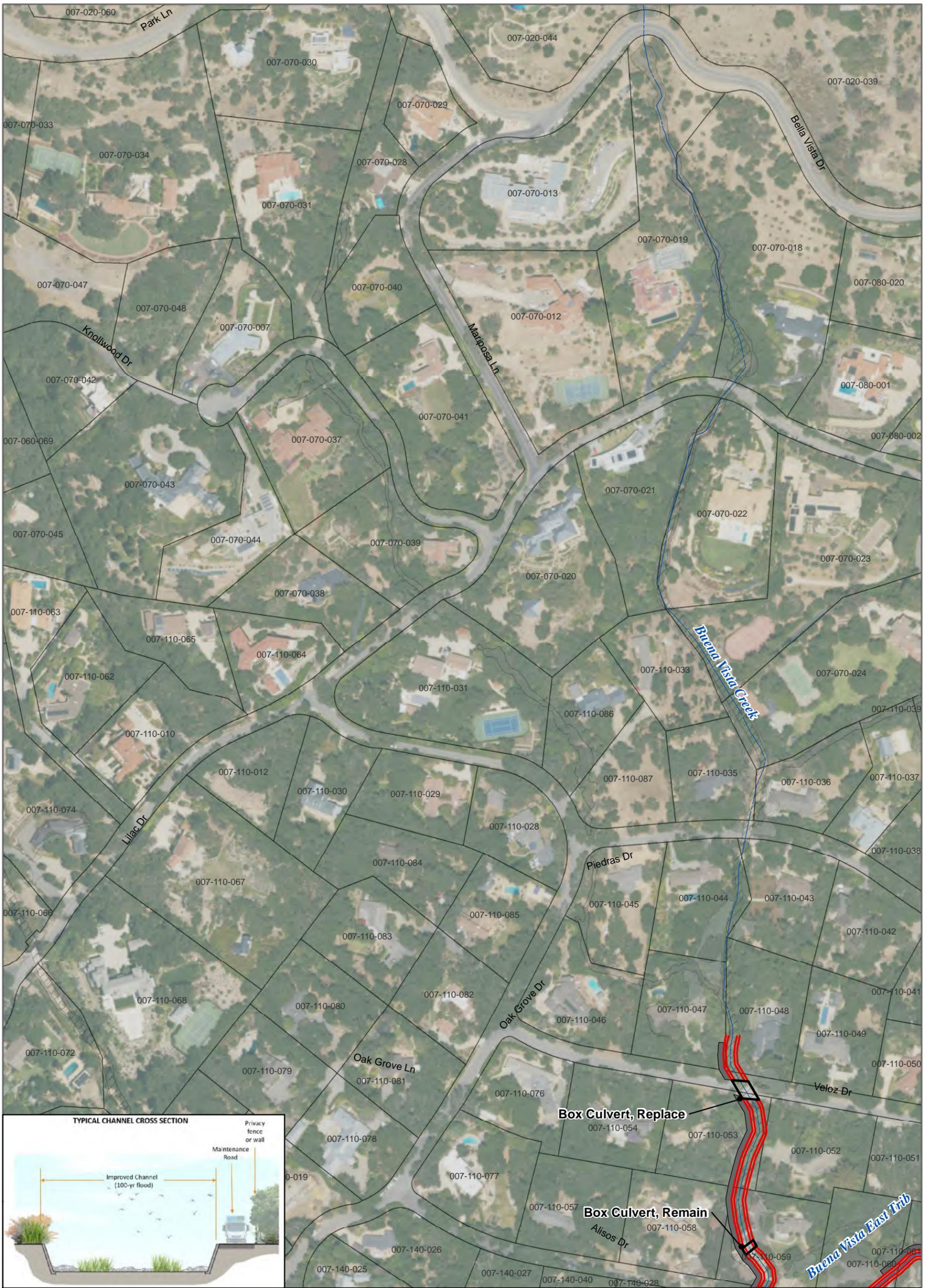
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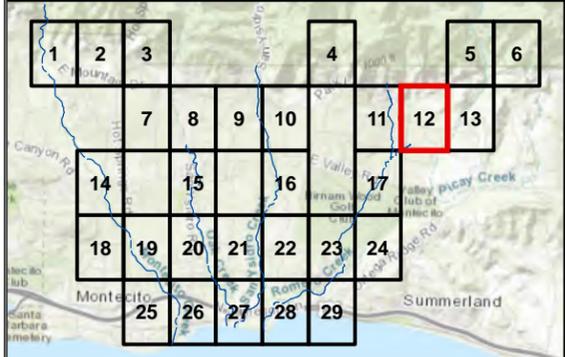
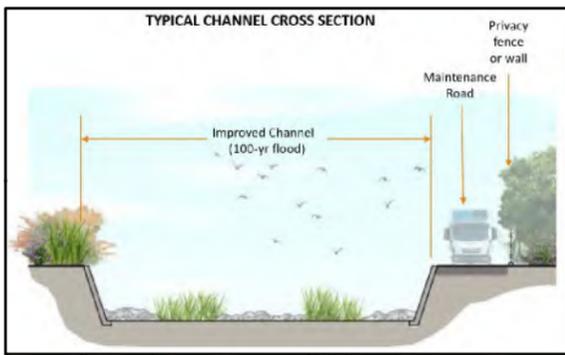
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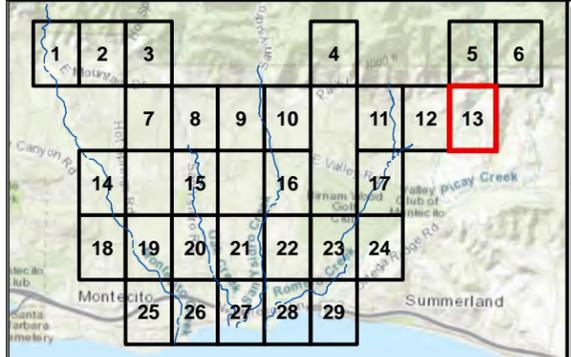
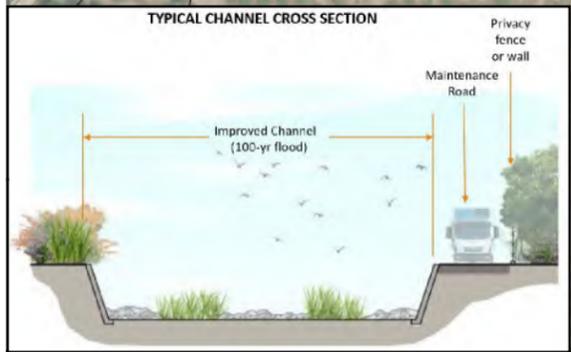
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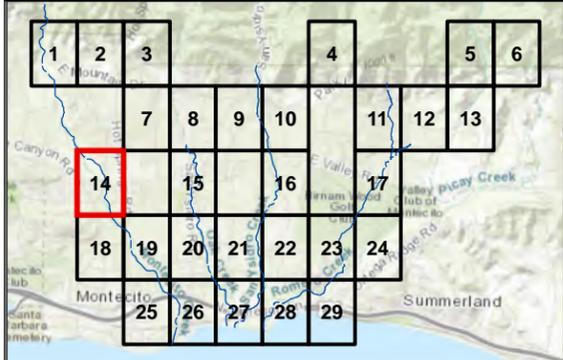
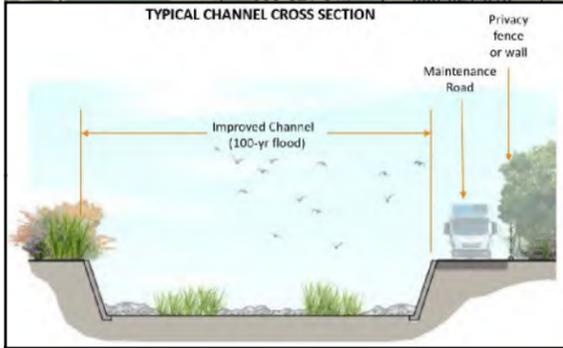
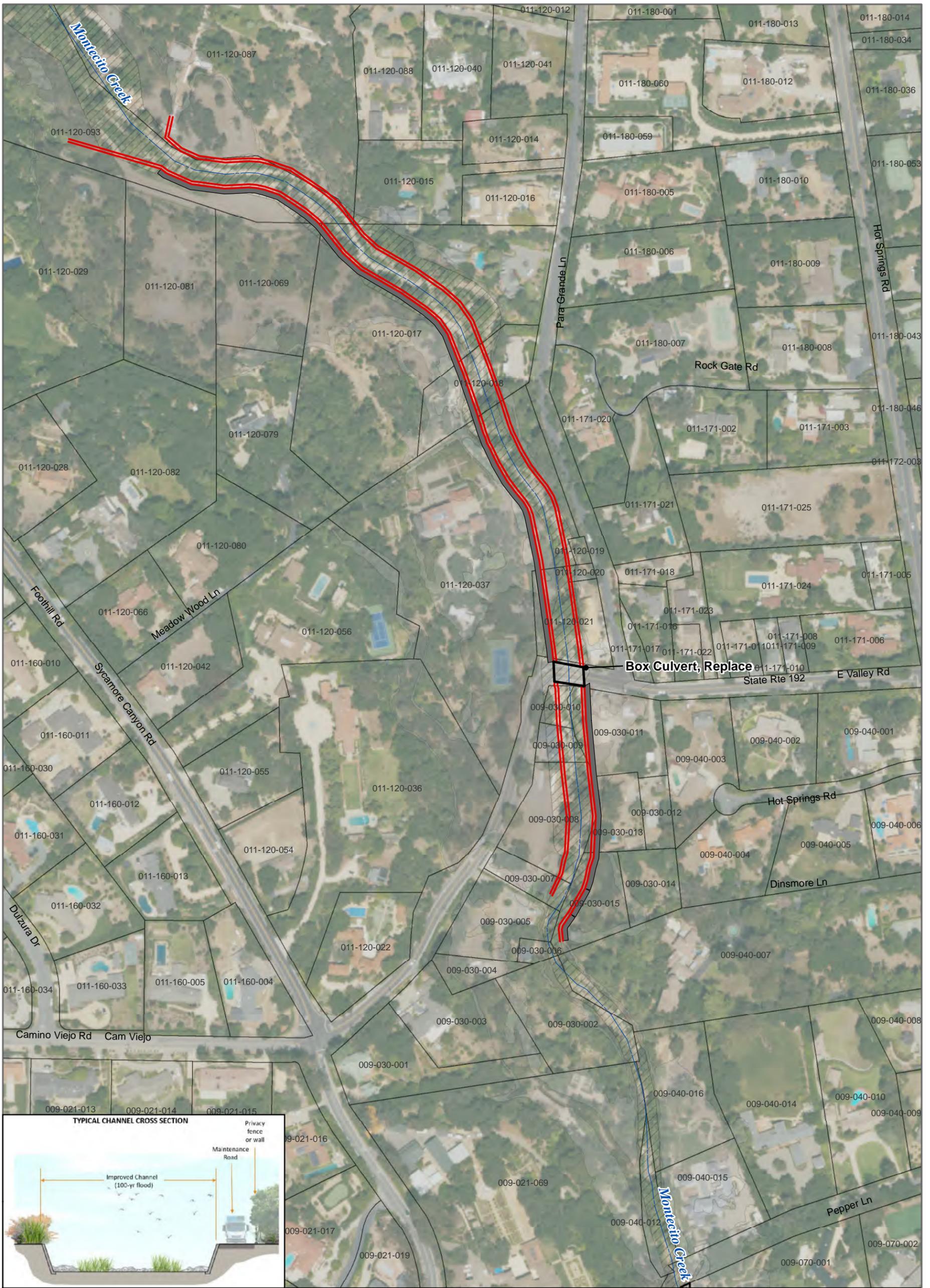
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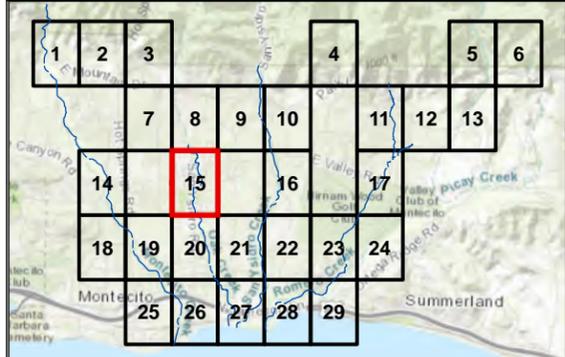
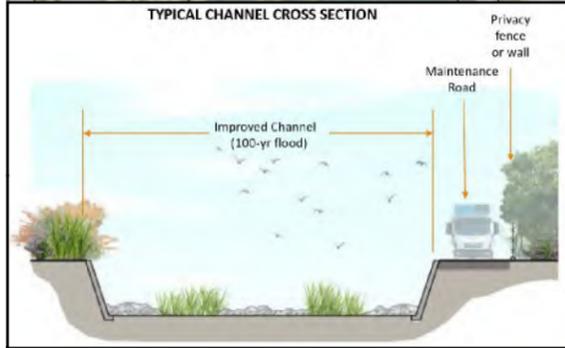
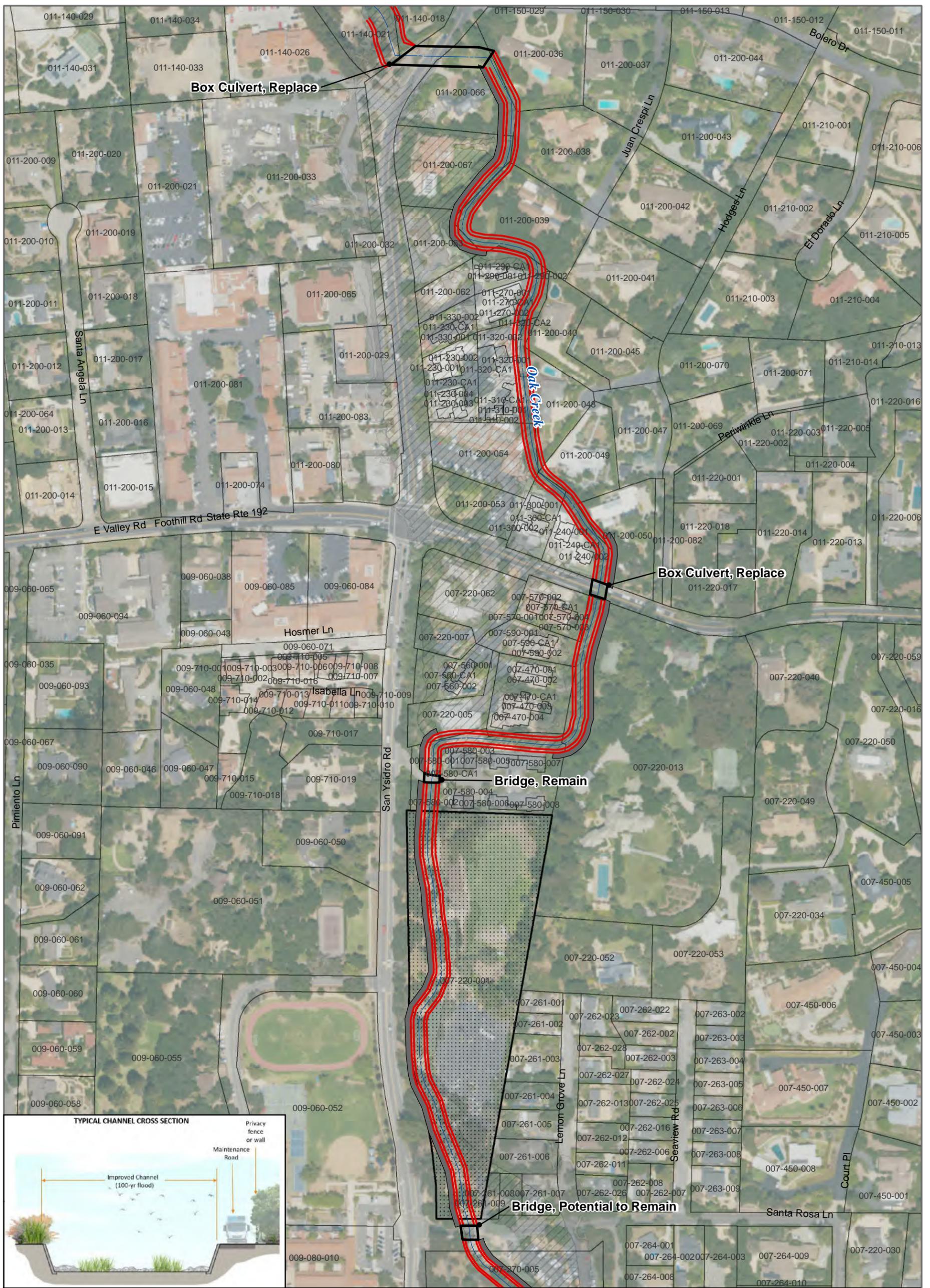
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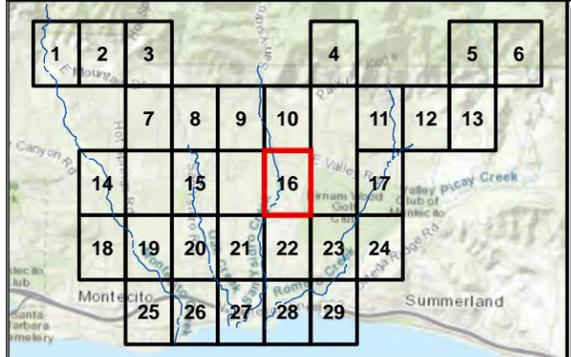
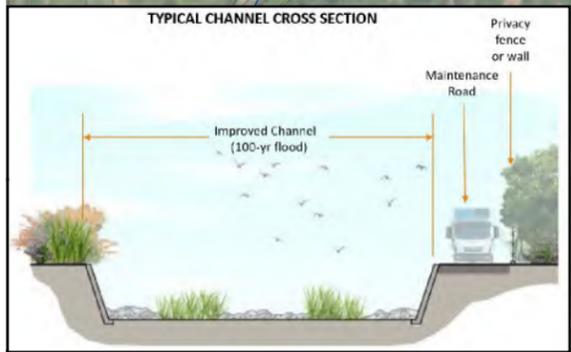
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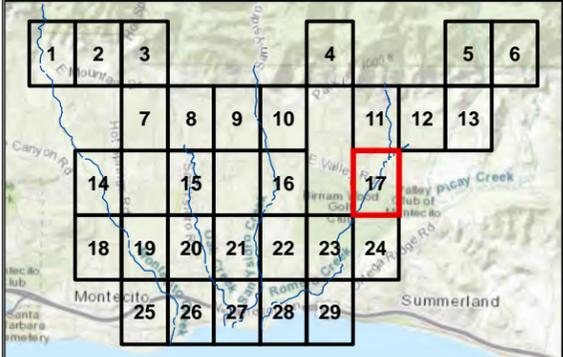
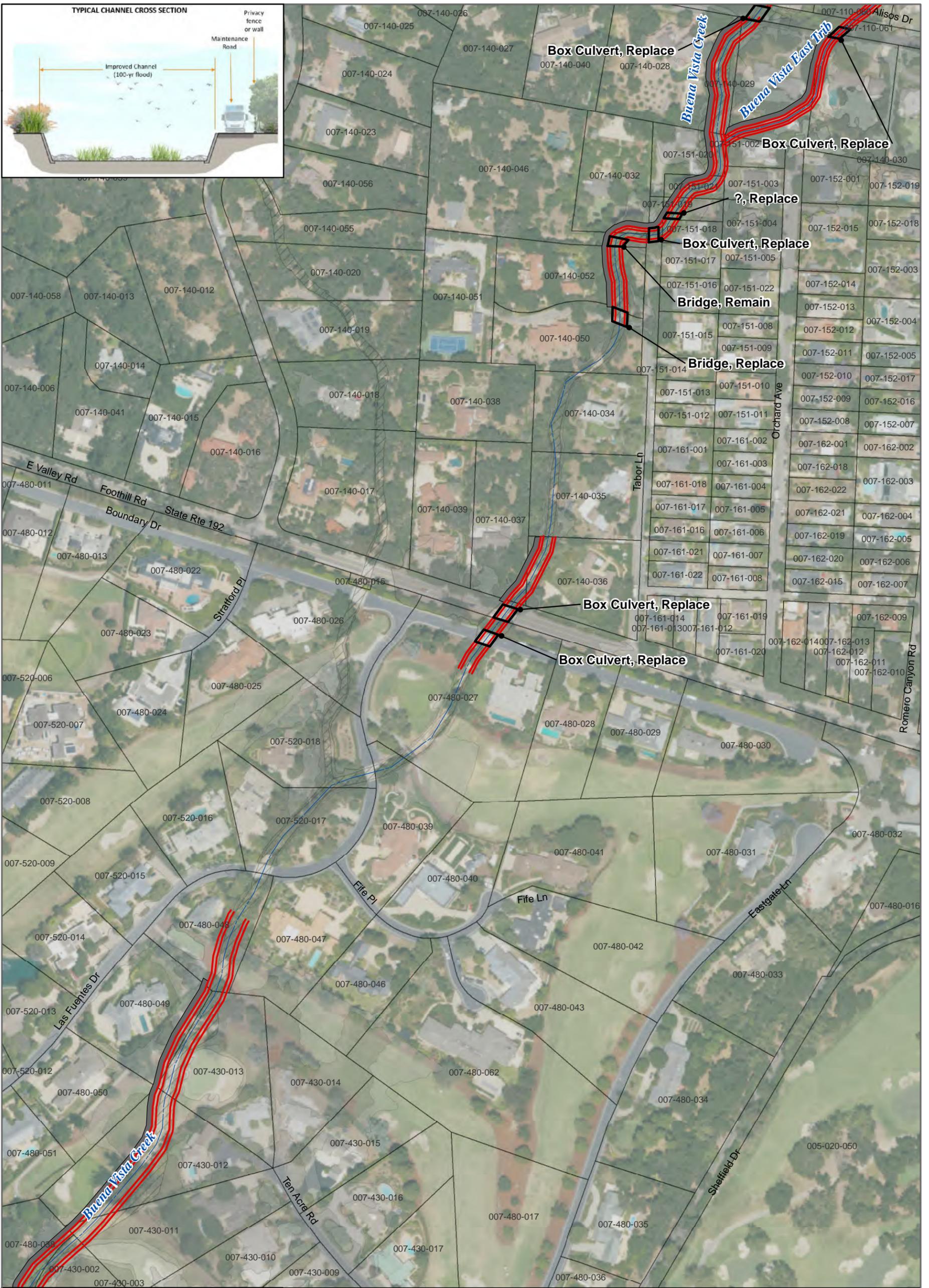
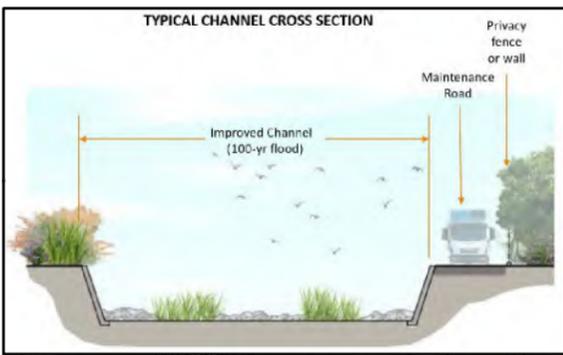
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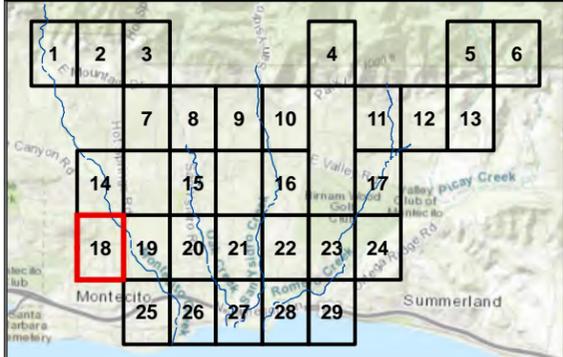
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Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- - - Centerlines
- Maintenance Roads
- ▤ Potential Debris Basins
- Parcel Lines

Flood Hazard Areas

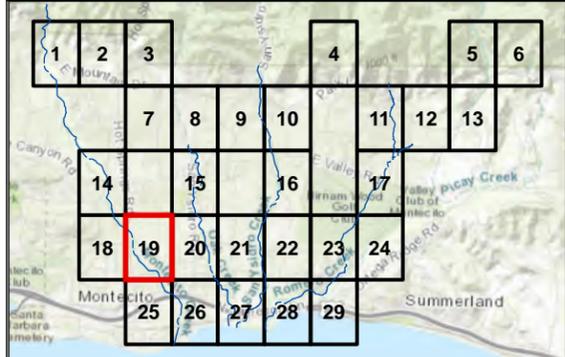
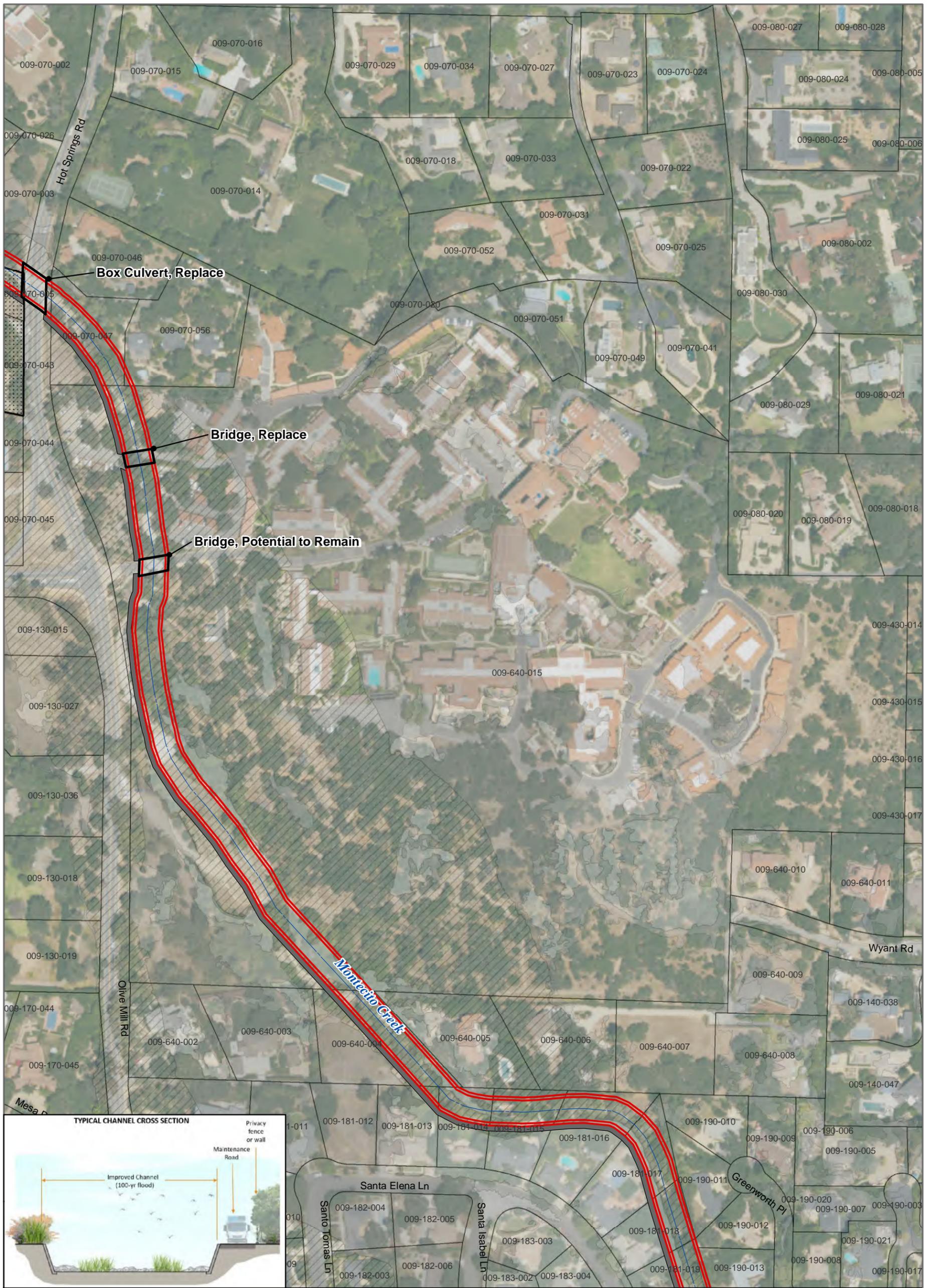
- AE Zone
- ▨ AE, Floodway
- X, 0.2 Pct
- X, Minimal Flood Hazard

**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
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- Parcel Lines

Flood Hazard Areas

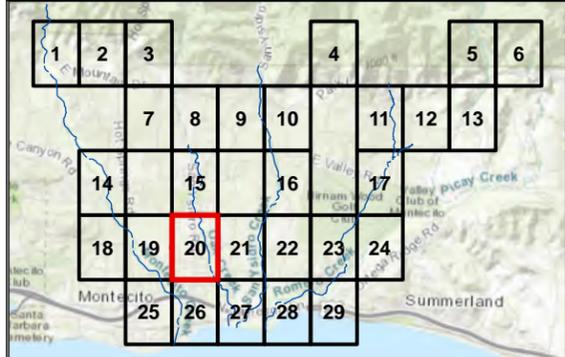
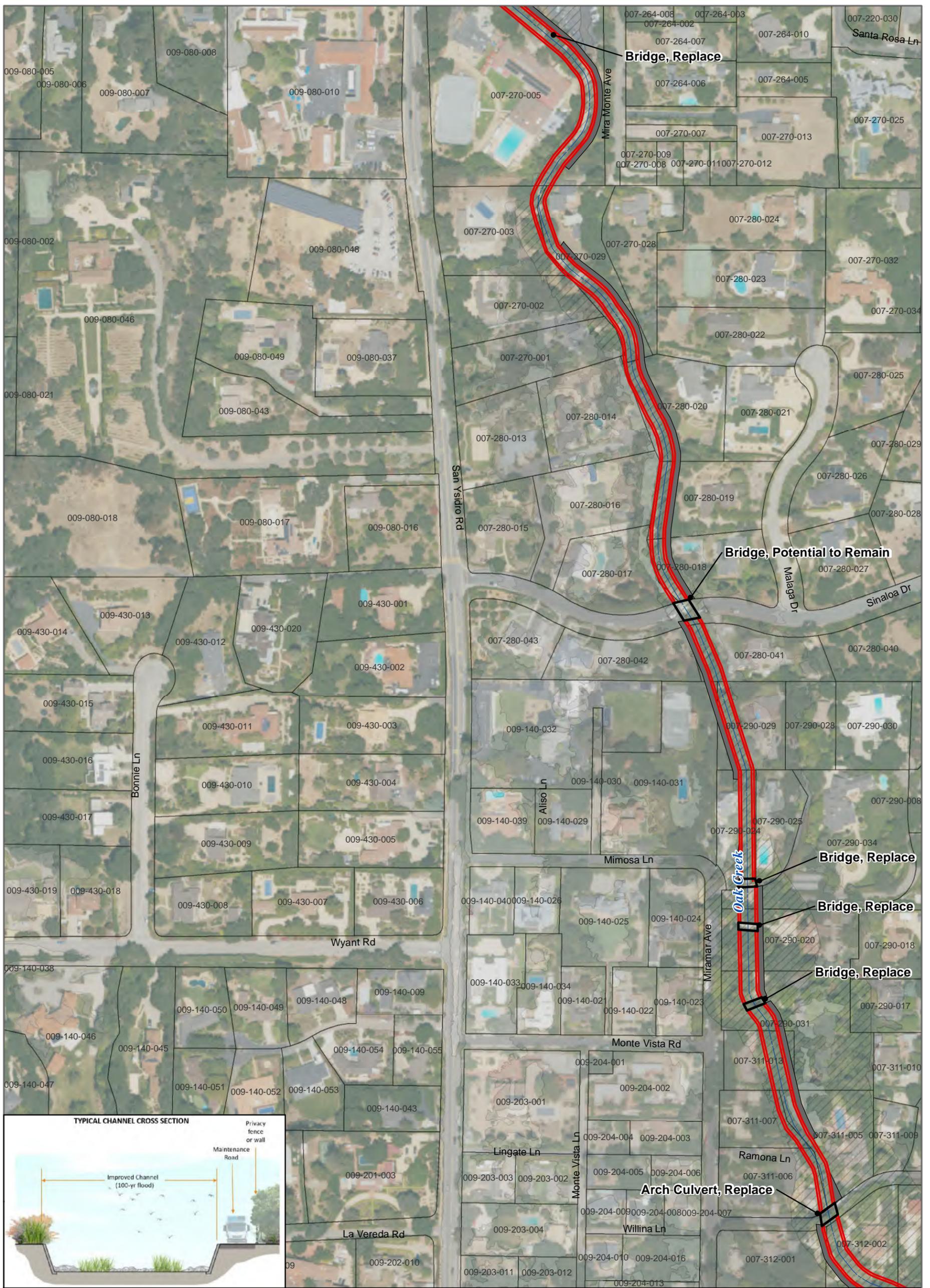
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

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Flood Hazard Areas

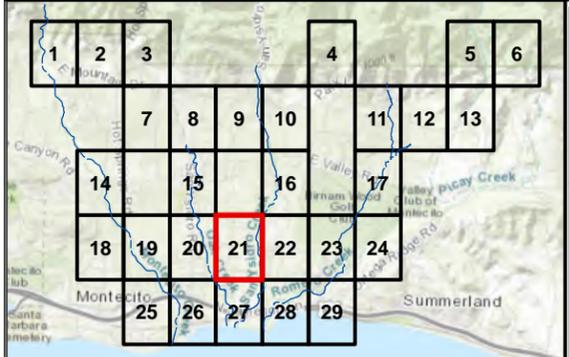
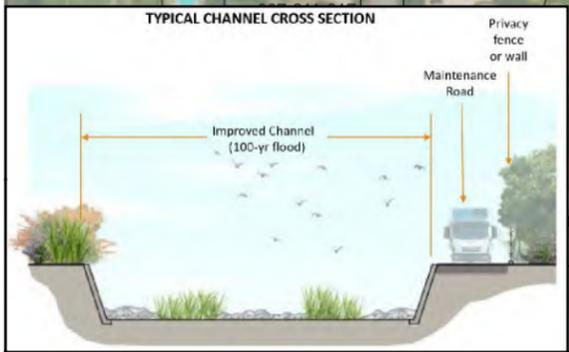
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
- ▨ Potential Debris Basins
- ▭ Parcel Lines

Flood Hazard Areas

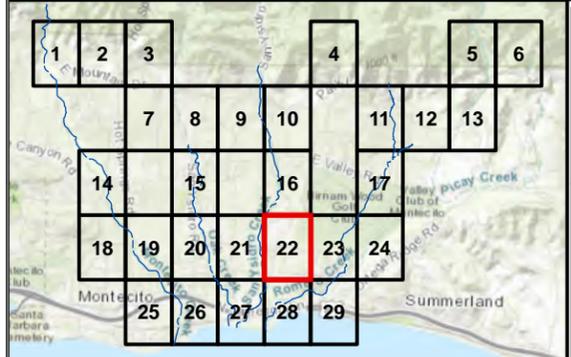
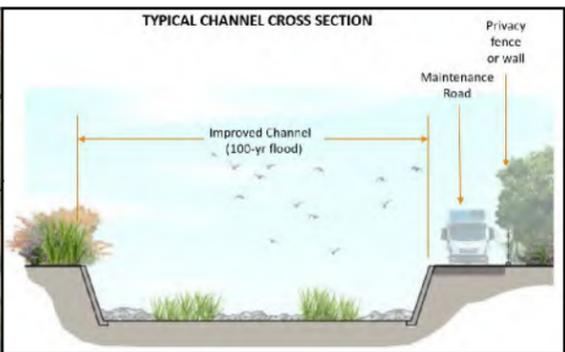
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- ▭ X, Minimal Flood Hazard

**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
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- Parcel Lines

Flood Hazard Areas

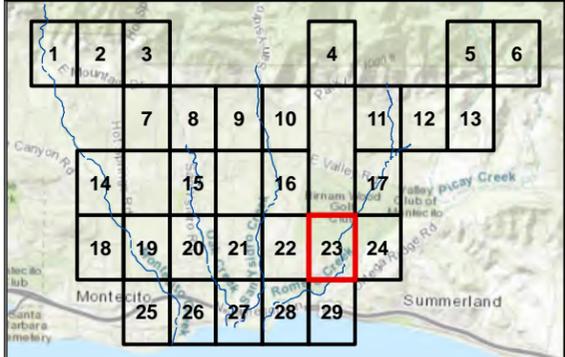
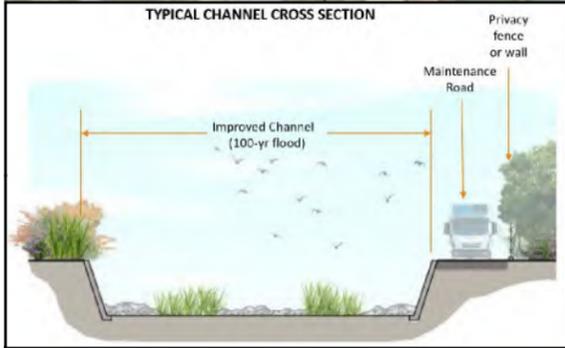
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
- Potential Debris Basins
- Parcel Lines

Flood Hazard Areas

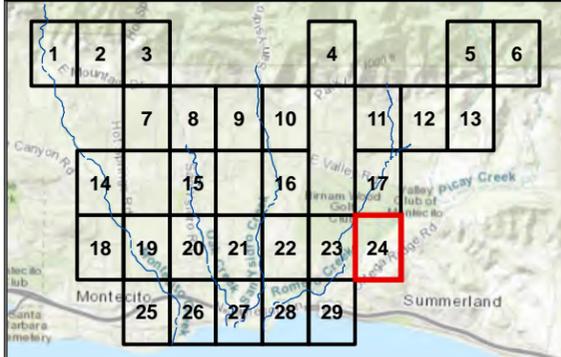
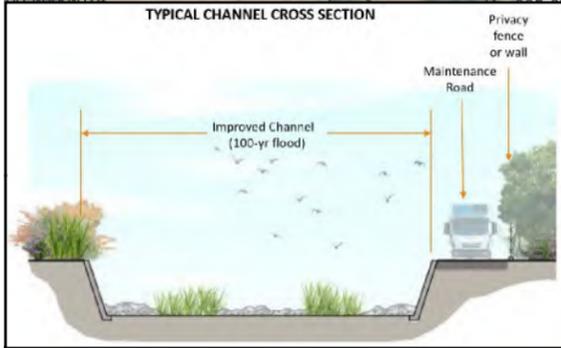
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
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- Parcel Lines

Flood Hazard Areas

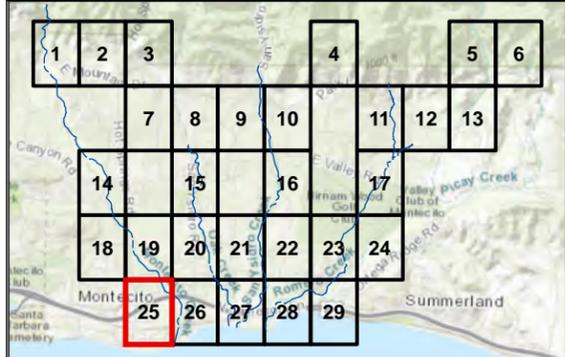
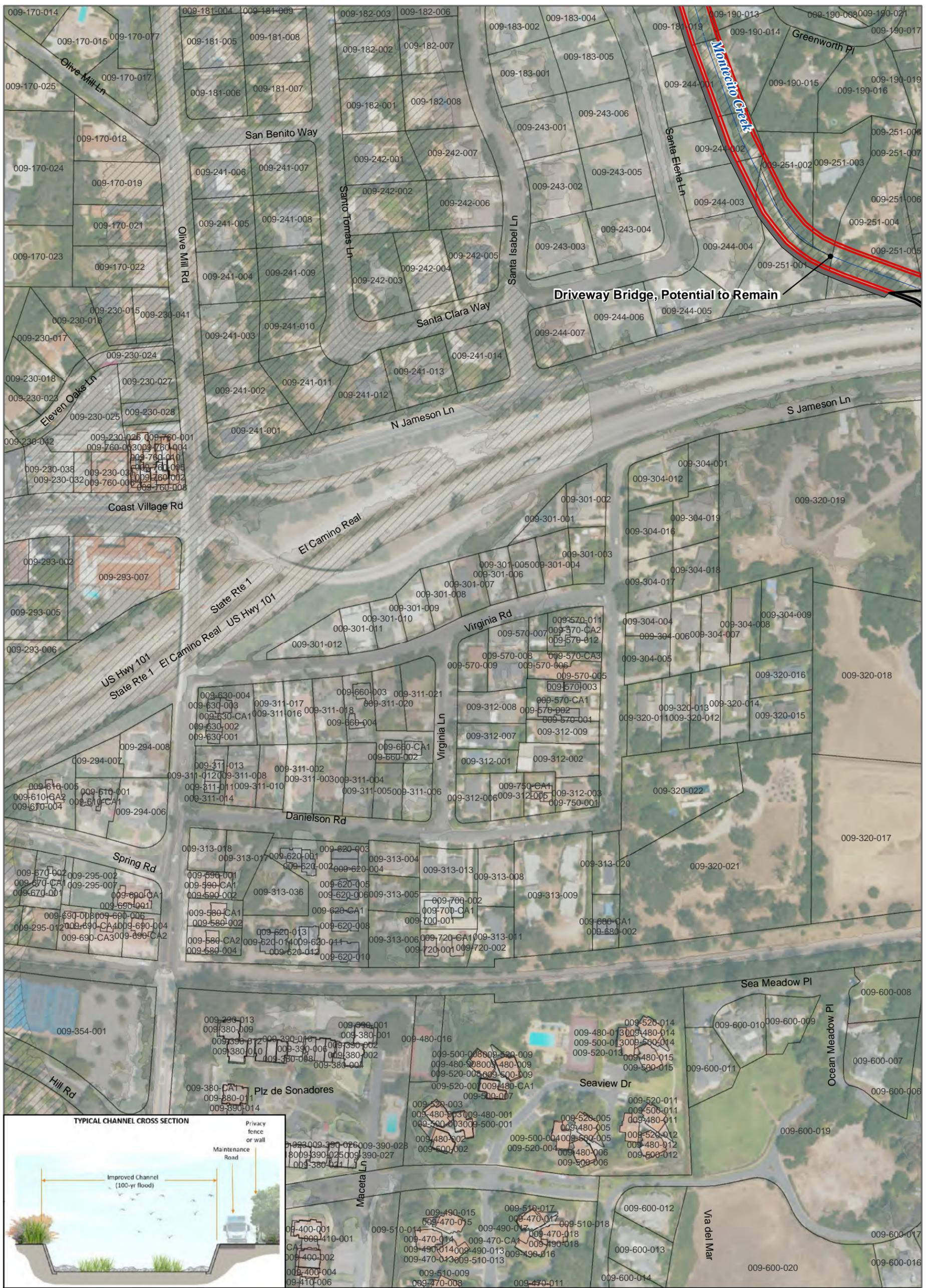
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
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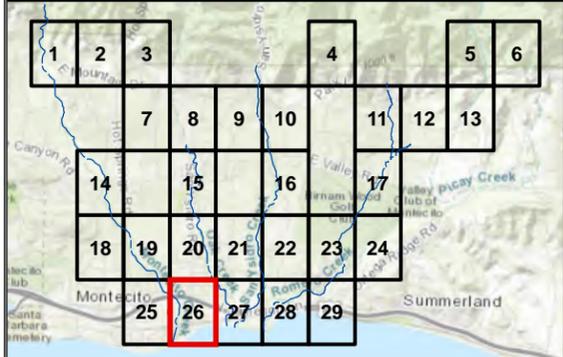
**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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**one COUNTY
one FUTURE**



Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
- Potential Debris Basins
- Parcel Lines

Flood Hazard Areas

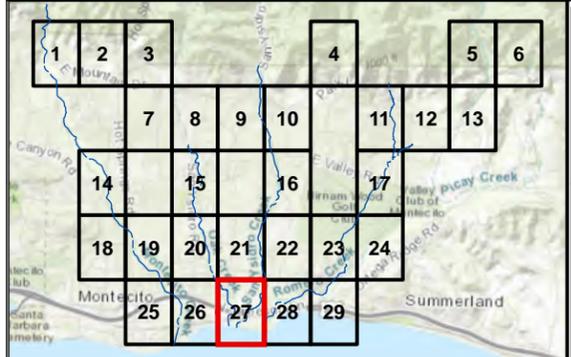
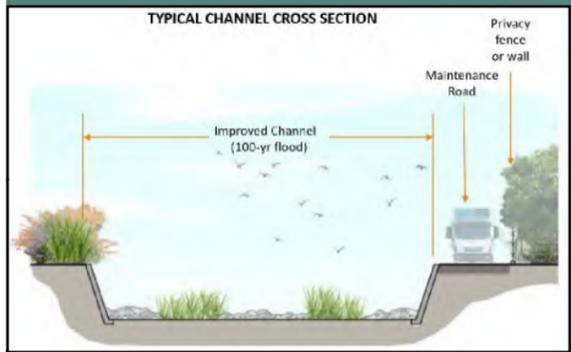
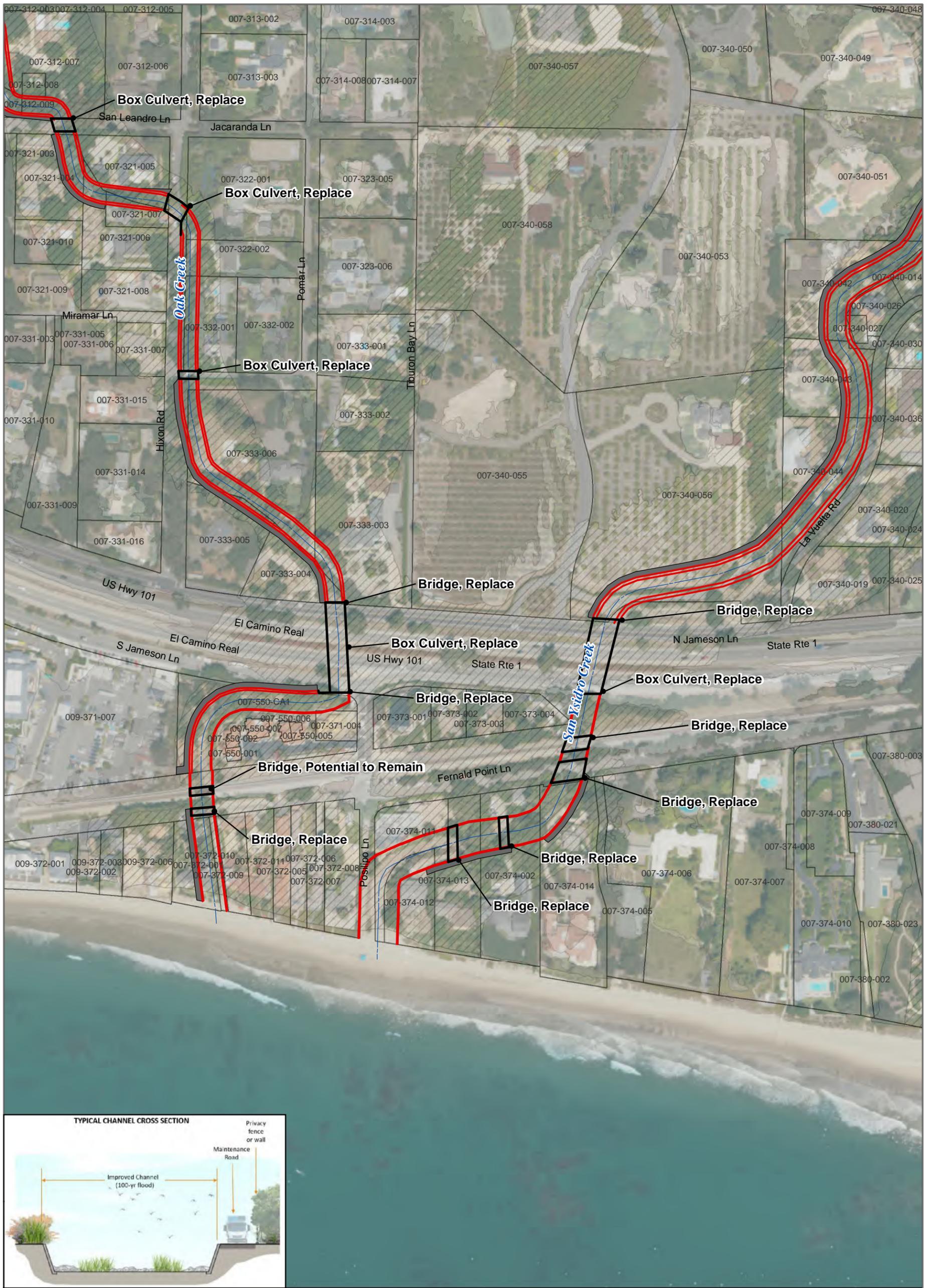
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
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Flood Hazard Areas

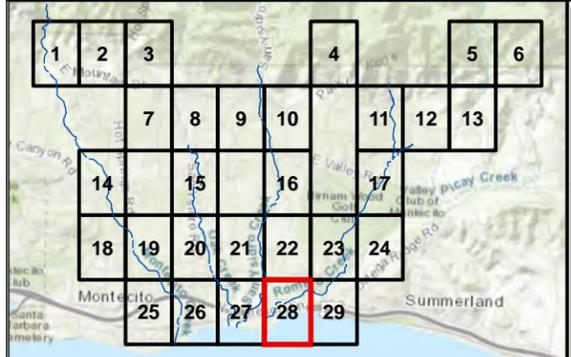
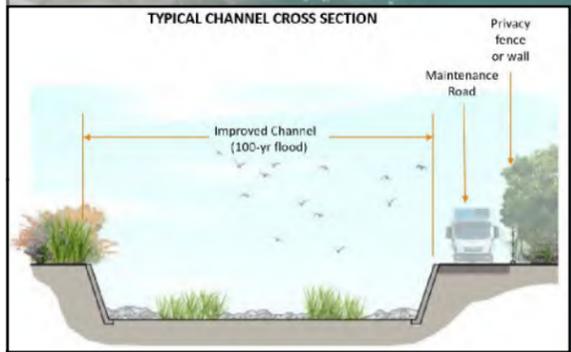
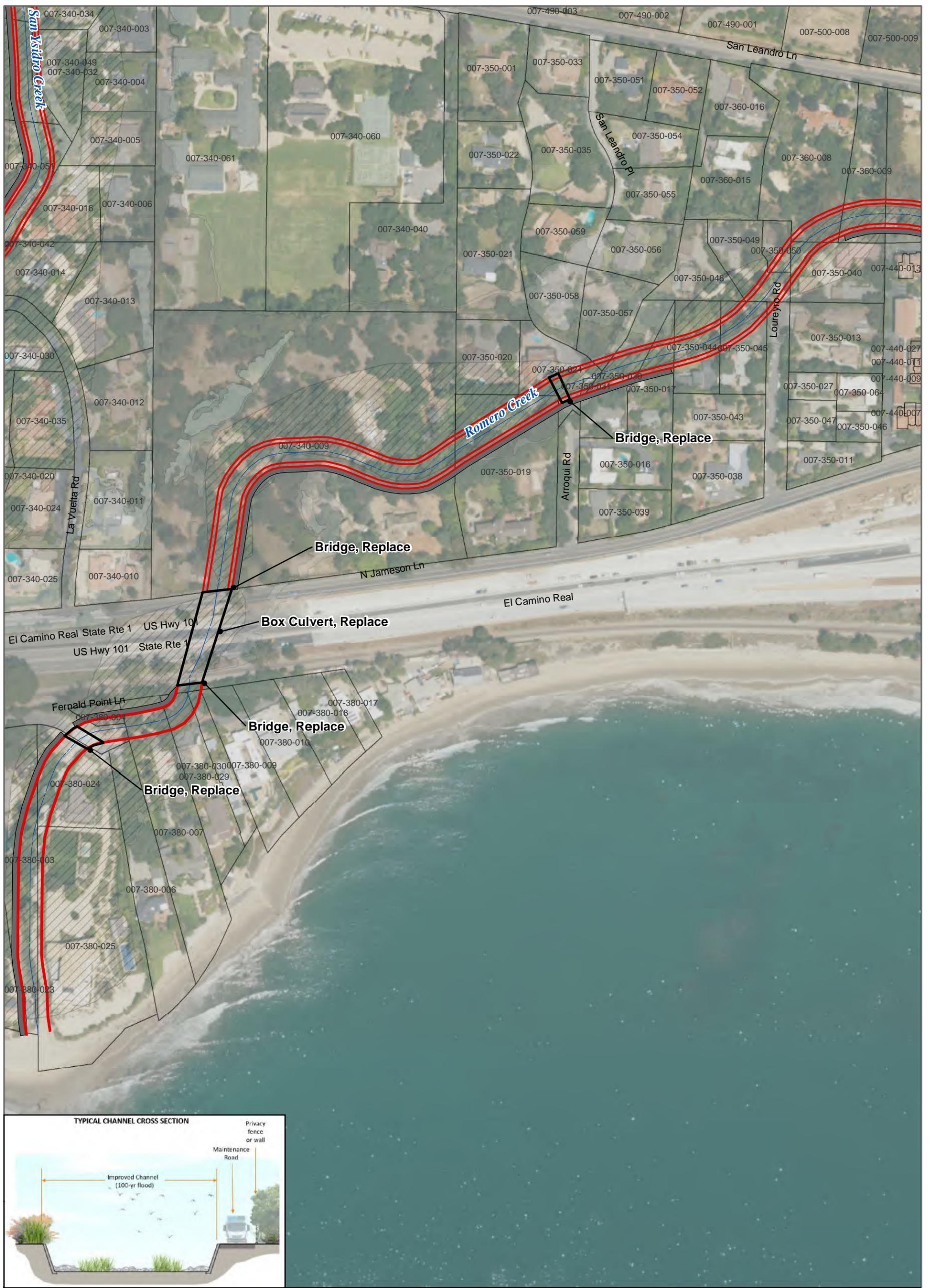
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
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Flood Hazard Areas

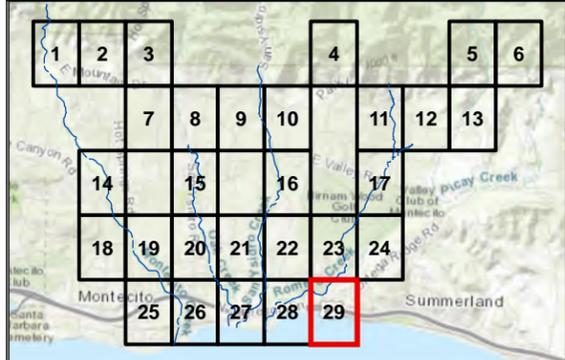
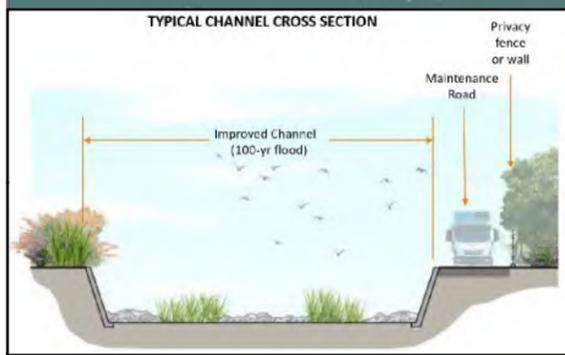
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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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Proposed Infrastructure

- Bridge/Culvert
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Flood Hazard Areas

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**County of Santa Barbara
Montecito Area
Flood Mitigation Master Plan
Proposed Improvements**

0 50 100 200 Feet

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MAP 2

Easement Parcels

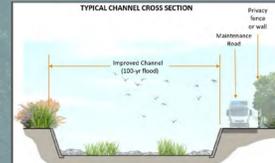


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MAP 3

Flood Reduction Areas/Parcels



Proposed Infrastructure

- Bridge/Culvert
- Channel Improvements
- Centerlines
- Maintenance Roads
- Potential Debris Basins
- Flood Risk Reduction Parcels
- Floodplain Reduction

**County of Santa Barbara
Montecito Area
Flood Risk Reduction Areas and
Parcels of the Preferred Alternative**

0 250 500 1,000 Feet

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Table with columns: APN, Owner, Sheet, APN, Owner, Sheet, APN, Owner, Sheet, APN, Owner, Sheet, APN, Owner, Sheet. Contains property records for various owners and sheets.

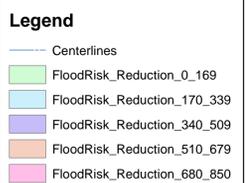


Table with columns: APN, Owner, Sheet, APN, Owner, Sheet, APN, Owner, Sheet, APN, Owner, Sheet, APN, Owner, Sheet. Continuation of property records from the first table.



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APPENDIX 1

Public Outreach Information

MONTECITO MASTER PLAN COMMENTS - Redacted

Note: See recordings of Public Meetings for additional verbal questions and comments

ID	From	Stream	Location	Issues	Comments/Questions
1	Resident Property Owner	San Ysidro	Romero Canyon Dr & Alisos Dr	Major Road flooding at Romero Canyon & Alisos Ave to an undersized culvert near Camino del Rosario. Will this situation be corrected? Is the private homeowner who owns the too-small/clogged channel responsible to upgrade it?	Would love to have the updated FEMA flood maps instead of outdated ones. Alisos Dr at Romero Canyon became a raging creek and 12 inches of gravel was deposited covering the road when the water receded. We evacuated, but our house was inaccessible during and after this event. Would love to have the updated FEMA flood maps instead of outdated ones.
2	Resident Property Owner	Montecito Creek	Jameson Lane	Creek flooding: my property is on Montecito Creek, January 2018 Water was up to my property & over on grounds. Concerned about creeks being regularly maintained so as to keep them draining to the sea w/out obstacles.	Jan 2018 up to & over part of property- Montecito Creek, Jn. 2023 water washed away more of my bank, taking vegetation with it. Who is responsible for maintaining clear running creeks? Debris basins helped prevent some flooding, sound walls not an issue w/previous flooding, why not have part of 101 construction.
3	Resident		concerns on both community-wide & not focused on individual parcels/properties	(1) Bring boulders & cobbles back to beach at the river mouths of (A) Montecito Creek (B)Oak Creek (C)San ysidro Creek & (D)Romero Creek in Montecito when clearing out debris basins, particularly after major events. (2) Consider dual use of debris basins by allowing them to be infiltration basins.	Our property was not affected because it is on High ground and is not in a flood zone. I have a Bachelors, Masters, & Ph.D in Geology.
4	Private Utility District		Sewer damage during flooding events	Our district has a significant amount of facilities (pipelines, manholes) along various creeks. We've had significant damage from each FEMA desimated storm events (2018, 2023) Various areas near Oak Creek, San Ysidro Creek, & Montecito Creek (could be more)	We would like to be pro-active & working with the County on this master plan. It may be helpful to see the latest FEMA flood maps to help flag our facilities in the designated flood zones. This way the District could potentially implement some projects ahead of or in lock-step with County projects from this Master Plan.
5	Resident	Oak Creek		Live on Oak Creek. Significant erosion. How to prevent further erosion and also mitigate possibility of rocks/boulders/debris damming up the creek to prevent significant flooding?	Cement and Rock in creek. Do not know who built it (county or home owners) Can the County repair?

MONTECITO MASTER PLAN COMMENTS - Redacted

Note: See recordings of Public Meetings for additional verbal questions and comments

ID	From	Stream	Location	Issues	Comments/Questions
6	Resident		El Bosque Lane/ Periwinkle Lane	2023 significant flooding through the property. See Pictures	I have some footage and photos taken in our neighborhood on January 9, 2023 that show significant flooding through the property located at 556 Periwinkle Lane. I realize that you will be holding a meeting here in Montecito on May 23, so I thought that these photos might be of help. We will certainly be there. The water comes from El Bosque Lane and runs through several properties like a river before flowing into a storm drain on Periwinkle lane. It floods at least 5 properties on its way from El Bosque to Periwinkle Lane.
7	Resident	San Ysidro	San Leandro Ln bridge adjacent to San Ysidro Creek	1991 rains, 1995 storm, & 1995 March Miracle rains. These rains caused considerable creek bank erosion/avulsion. How to control and manage this creek? How to reduce the threat to life, community, and property? What are the prudent protective steps to take to establish a plan for regular proactive maintenance rather than face post disaster reactive repairs? Of essence will be to define and regularly maintain the creek channel, to undertake and enable comprehensive efforts to preserve regulated flow capacity and in so doing enhance safety and habitability.	See Flood Control Master Plan ltr2 - dated 5/22/2023
8	Resident	Oak Creek		How does Oak Creek fit into the master plan?	Concerned this creek, which runs near my backyard/lower Manning Park, has become more and more shallow and needs a thorough cleaning. Earlier this year it jumped the banks and flooded the parking lot area in the Park hence my concern.
9	Resident	Montecito Creek			We were at the MUS meeting and write to follow up. We would like to see the proposed disaster map for Montecito.

MONTECITO MASTER PLAN COMMENTS - Redacted

Note: See recordings of Public Meetings for additional verbal questions and comments

ID	From	Stream	Location	Issues	Comments/Questions
10	Resident	Oak Creek	Oak Creek & San Ysidro Creek See pictures	Living this nightmare since 1953 and with 101 being widened, it is not too late to incorporate some of these concepts as possible amendments to the plan. If there's a way to fix some or all of these issues, now is the time to consider it... especially if FEMA will assist in funding flood control projects that are "preventative" in nature, which essentially will lighten the load of future FEMA involvement when the next flood event happens.	Met with Matt Griffin (countyofsb.org) he was very helpful in discussing options and we understand that there's a study currently underway that will at least include ideas in the mix. One new idea Paul had which isn't on the attached sketch, was to install a connection between San Ysidro Creek and Romero Creek concrete channel that goes to the ocean. Olga pointed out that the Oak Creek bypass from North of the freeway to South of the freeway (similar to Floyd Wick's idea) is an option that was considered in the 2009 Oak and San Ysidro Creek Study (Craig Steward, Penfield & Smith). They believe that Caltrans needs to redesign their widening project to accommodate their bypass ideas.
11	Resident		Boeseke Pkwy	FEMA map incorrect	It appears FEMA map is incorrect as there is no steep bank behind our property. If our ability to protect our property is dependent upon this incorrect document we are unsure where we go from here. Perhaps you have some suggestions as we are fearful of the next flood.
12	Resident	Montecito Creek			I unfortunately missed the Montecito Flood Mitigation meeting. My hope is to attend as many future meetings as possible. I cannot thank you both enough for implementing this process. As we move along, I hope you will include me in whatever outreach efforts may be needed.
13	Resident	Montecito Cree	Hot Springs Rd	Issues regarding Montecito flooding were first delivered to our attention during the 2019 debris flow. In the Jan. 2023 storm cycle concerns about Montecito Creek flow capacities again arose. Our primary concern is with increased development that has occurred over decades permeable land area has been decreased and more runoff is being directed into a limited creek capacity. Equally, macro changes in weather may increase storm intensities straining the existing water-ways.	Our property abuts Montecito Creek and we experienced scouring along our creek embankment. The most important aspect the city, county and involved agencies could provide is a clear process forward for homeowners to participate in restoring damaged areas of our creek system. This could include streamlining the permit processes possibly reducing permit fees enabling homeowners to work collaboratively with appropriate agencies. Also providing prescriptive plans, which could be modified to suit individual situations, would expedite the process & ensure the creek watershed is being addressed as a whole & interrelated system serving our entire community.

MONTECITO MASTER PLAN COMMENTS - Redacted

Note: See recordings of Public Meetings for additional verbal questions and comments

ID	From	Stream	Location	Issues	Comments/Questions
14	County	San Ysidro		What I dont know is where / when the next grant round would start. There are 2 other items we should discuss by phone.	My thoughts are, this was a site we were considering for another basin / overflow area with a culvert connecting back into Montecito Debris Basin. However at the concept level, we were looking at all of the parcels here, however there is now a house on Parcel 44. Probably would want 58 and 59. This was an area Curtis was looking at as well, but when parcel 44 was rebuilt it fell off the interest table. As Matt may recall last time, even with how fast that went, we pushed hard and it was still a few years. People think that a FEMA grant is like an ATM, and you just go in there and make a withdrawal. That said, open space and a lay down spot in emergencies would perhaps work, but I'm guessing there will be a severe disagreement on the value. Keep in mind these property owners are all typically seeking damages from SCE for losses including property devaluation.
15	County	San Ysidro	Hot Springs Rd	Debris Basin location?	Do these properties have sufficient grade and location to be useful as a debris basin or other facility. They seem willing to not rebuild.
16	Private Firm	San Ysidro		Can we set up a time to talk (maybe at the site) so you can see it and see if you think it's worth pursuing FEMA or other money to buy them out and create either a mini debris basin or even just undeveloped overflow before my client starts down the permitting process to rebuild?	Here is the APN page for the property I was texting you about. My client's parcel is 5 (denoted with a green asterisk) and the Cantin parcel is directly across the street (43). The parcel next to them is 59 and also lost all structures. It is clear from standing there that redeveloping any of these parcels is not a great idea, particularly my client's parcel. I am also attaching a screenshot from the County's GIS with the flood overlays turned on.
17	Resident	Creek Flow above bridge	Boeseke Way, San Leandro Ln Old Stagecoach Bridge, San Leandro Lane Bridge	Flooding and scouring properties	Water under heavy flow over tops bank and flows, west through creekside properties, floods San Leandro and pushes into MAR. Also flows East out of its bank and scours properties on Boeseke Way has crossed San Leandro Lane and flooded downstream homes. Old Stagecoach Bridge - Sediment/boulders in creek bed have made channel so shallow that under heavy flow, water can no longer pass under the bridge. It overtops the banks and flows West & East. San Leandro Lane Bridge - Boulders placed to contain water in creek. Paint Bar formation blocking entry to bridge and pushing flow onto East bank.

MONTECITO MASTER PLAN COMMENTS - Redacted

Note: See recordings of Public Meetings for additional verbal questions and comments

ID	From	Stream	Location	Issues	Comments/Questions
18	Private Firm			Channelization	Recently made aware of the Montecito Master Plan currently in development. From what I have reviewed so far, it looks like there could be significant impacts to state waters, including channelization and hardening of creeks. Before you get too far along, what are your plans to engage with resource regulatory agencies in further developing the Montecito Master Plan?
19	Community Group			Conservation	The letter (attached) indicates concern about channelization and debris basins.
20	Resident	Oak Creek	610 El Dorado Ln	Observations on Oak Creek	Relative to the plans for the Oak Creek drainage, it seems to me to be a bit of overkill. The catchment is rather small and, as I recall, there was only a minor debris flow and flooding lower down. The underpass at San Ysidro did plug and flood, so a new underpass is probably called for, but a debris basin at the head and retention basin lower down seems over the top. If there's lots of money and the property owners agree, I suppose a debris basin would be nice. The other apparent overkill is the "Channel Concept". It seems like it would be hard to find so much space along all the drainages of Montecito. And channelizing the drainages may be counterproductive, though that's not my area of expertise. It certainly doesn't seem justified for Oak Creek, as mentioned above.
21	Resident	Chelham Creek	784 Chelham Way	culverts and flooding	Want improvements to the culverts on Chelham Creek. Note: this is outside the project study area

MONTECITO MASTER PLAN COMMENTS - Redacted

Note: See recordings of Public Meetings for additional verbal questions and comments

ID	From	Stream	Location	Issues	Comments/Questions
22	Resident	Oak Creek	1511 B East Valley Road	Flooding in house	During the 2.8" micro burst at about 8:30 PM on March 30th, our home at 1511 B East Valley Road was flooded with 2-3" of runoff throughout the whole house. Fortunately we were home and able to sweep much of the water out, however we are still incurring costs. Our total out of pocket cost will be in the \$30,000 range! This runoff was caused in part by the inadequate capacity of Oak Creek as it crosses under San Ysidro Road. This problem is an on-going issue and needs to be addressed as a priority improvement when your storm drainage master plan is adopted. In the interim, County Flood Control needs to install some sort of drainage barrier to slow down the flow coming down San Ysidro Rd and divert much of the flow into the drainage ditch adjacent to San Ysidro that runs below East Valley Road. Please put me touch with the person responsible for our area on your staff so I can detail how this storm event specifically affected our home.
23	Resident	San Ysidro Creek	At UPRR	Bridge at UPRR is undersized	As I took this short video clip this morning, it struck me that the Union Pacific Railroad bridge at San Ysidro Creek is about half the size of the one at Oak Creek, yet the creeks' watershed areas are exactly the opposite! It's easy to see the significant turbulence in the creek as it attempts to find its way through the constriction at the railroad bridge! I'm copying Paul also, because of our collective interest in what's going on with the pending Flood Control report that's underway. I'm also copying Walter to keep him in the loop, as he has a definite objective in finding solutions for this recurring nightmare. Clearly, the constriction at the RR bridge results in a backwater curve that impacts Hwy 101 and upstream properties.
24	County	n/a	n/a	Disposal of debris	One of the conversations with BEACON and the regulators has been the possibility of a beach-disposal site closer to Montecito. This has been for several years, at one point Tom was considering Butterfly Beach. Is this something that the Montecito Flood Plan would contemplate? Beacon is also working on a regional planning doc and I'd like them to be consistent.
25	Resident	Oak Creek and San Ysidro Creek	101 to coast	Proposed alternative alignments of outlet of the creeks to the coast	Maps given to County with ideas, attached



San Leandro Ln

San Leandro Ln

Jacaranda Ln

Pomar Ln

Miramar Ln

Hixon Ln

Pomar Ln

Hixon Ln

North Jameson Ln

So Jameson Rd

OAK

North Jameson Ln

SAN VISIDRO BYPASS
State Highway 101

State Highway 101

Posilipo Ln

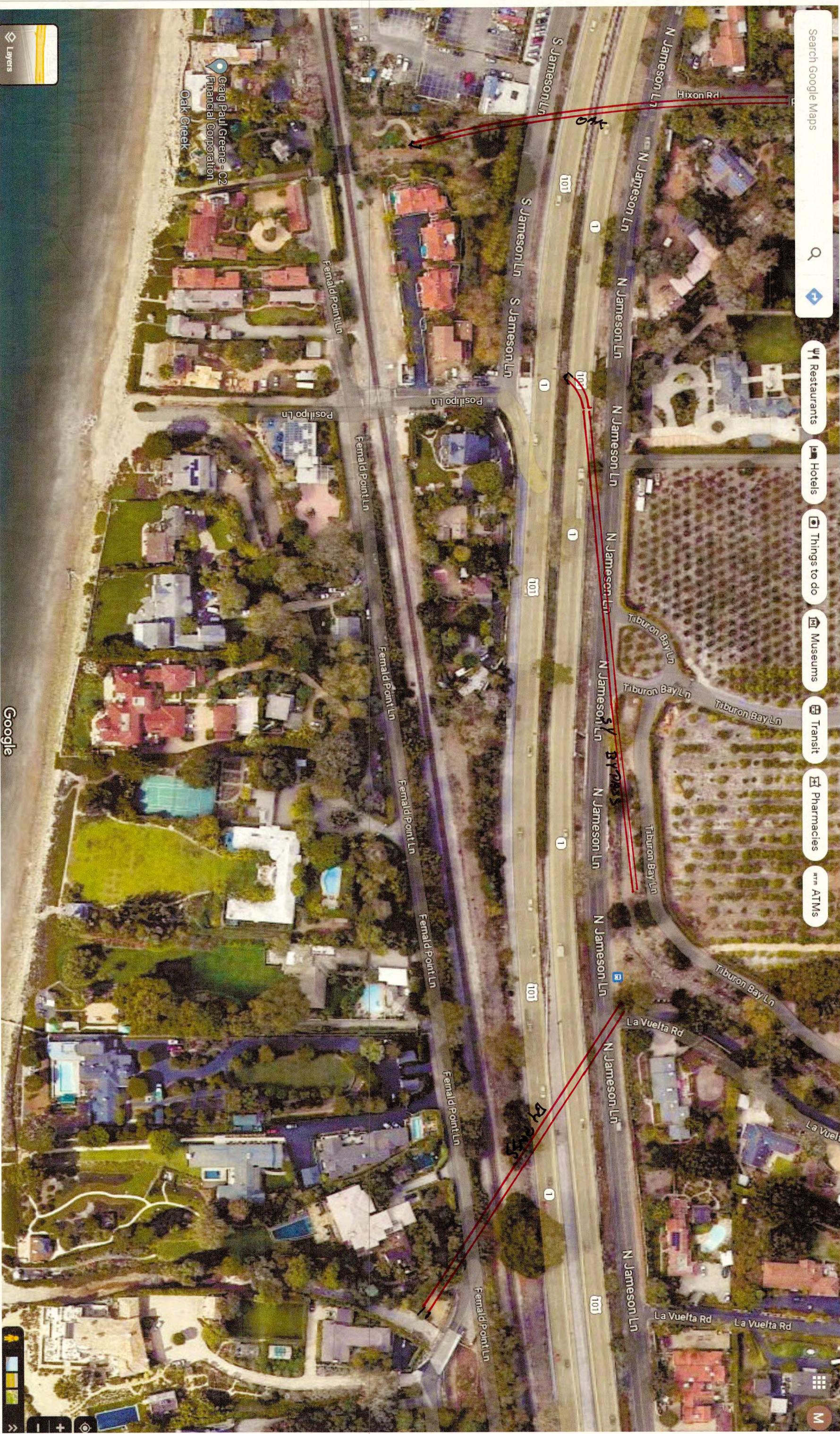
Fernald Point Ln

Posilipo Ln

Oak Creek

San Ysidro Creek

Tiburon Bay Ln



Possible Original Alignment of Oak Creek

Existing Alignment of Oak Creek

Possible Original Alignment of San Ysidro Creek

Flood Overflow Discharge from San Ysidro Creek to Oak Creek (650 feet)

Flood Overflow Discharge from Oak Creek (Submerged) to Pacific Ocean

Oak Creek





August 6, 2024

Re: Montecito Flood Control Master Plan

Dear Santa Barbara County Board of Supervisors,

We represent local community groups which support increased flood protection for County residents but are concerned about the Montecito Flood Control Master Planning process. We are specifically most concerned about the planned concrete channelization and additional debris basins in Montecito Creek, Oak Creek, San Ysidro Creek, Romero Creek, and their tributaries. We believe that if we work together, we can protect property from flooding without channelizing our streams which provide so many important benefits, including clean water, wildlife habitat, and recreation. Better coordination between resource agencies, environmental groups, and Santa Barbara County Flood Control and Water Conservation District (SBCFCWCD) will ensure concerns are addressed before the current Phase I planning process concludes and an alternative is selected. The Montecito Flood Control Master Plan effort offers an opportunity to develop a plan that prioritizes safeguarding lives and properties, while also conserving the remarkable landscape and biodiversity that define Montecito as a unique and irreplaceable place.

We request that you direct the SBCFCWCD staff to immediately establish a Technical Review Team and initiate a series of meetings with:

- Regional Water Quality Control Board
- California Department of Fish and Wildlife
- Army Corps of Engineers
- National Marine Fisheries Service
- US Fish and Wildlife Service
- California Coastal Commission, and
- Non-governmental organizations

These meetings will serve to discuss alternatives and compliance with these agencies' requirements before the County selects an alternative for permitting and environmental review. Selecting a preferred alternative for a project of this magnitude, scope, and consequence without establishing a Technical Review Team comprising subject matter experts, regional staff from resource agencies, and community representatives risks significant delays and inefficiencies during the design phase. A thorough review and assessment by such a team, culminating in the selection of a preferred alternative by stakeholders, will allow for SBCFCWCD to implement a project that will protect communities and the environment.

The Master Plan as currently envisioned could set back the community's valuable long-term efforts to rehabilitate watersheds and wildlife habitats. Flooding and debris flows are a

paramount concern for businesses and residents that need to be addressed. We believe that the best solution will protect the community and our watersheds. With this plan, we can serve as a model for modern flood control planning by embracing solutions that restore landscapes to a more natural state while protecting our communities. We urge you to enhance coordination and communication with State and Federal resource agencies, environmental organizations, and the community.

Our watersheds are vital to the health of our community and the quality of life in the County. As the Board of Supervisors, you have a critical role to help chart a forward-thinking path of collaboration that will achieve the mutually beneficial solutions that this project requires. We look forward to working together to ensure a healthy, safe, vibrant County that continues to protect the natural beauty that makes Santa Barbara County a world-class destination.

Thank you for your time and consideration of our requests,

Nate Irwin - Policy Associate
Santa Barbara Channelkeeper

Russell Marlow - Senior Project Manager
California Trout

Benjamin Pitterle - Director of Advocacy and Field Operations
Los Padres Forest Watch

Ken Owen - Executive Director
Channel Islands Restoration

Nancy Black – Board President
Committees for Land, Air, Water and Species (CLAWS)

Elizabeth Burns – Project Coordinator
Southern Steelhead Coalition

Katherine Emery, Ph. D. - Executive Director
Santa Barbara Audubon Society

Anne Burdette – President
Santa Barbara Urban Creeks Council

Ken Palley – Executive Committee
Surfrider Foundation Santa Barbara Chapter



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APPENDIX 2

Initial Alternative Database

Montecito Flood Control Master Plan
Initial Alternative Database

Name	Description/Concept	Capital investments	Access Requirements (Low/Medium/High)	Maintenance (Low/Medium/High)	Opportunities	Contraints
No action	No action - existing conditions would remain with undersized conveyance	None	High	High	No capital expenditure	Risk to human life and environment remains FATAL FLAW - does not solve flooding Existing flooding of 100's of properties Road closures and damage Property damage
Debris Nets	Install debris nets in the upper watershed (Los Padres NF)	Nets Easements	High	FATAL FLAW - maintenance by helicopter, not feasible. Roads, environmental, and permissions for conventional maintenance not feasible.	Debris capture	FATAL FLAW - does not solve flooding Environmetal process Permitting FATAL FLAW - maintenance not feasible
Acquisition	Buyout of properties in the floodplain and/or high hazard areas. Properties would be designated as protected open space	Easements	Low	Low	Environmental protection and habitat/species enhancement Open space as a public ammenity Allow natural processes with little human intervention Eligible for grant funding	Prohibitively expensive Taking of private properties Natural processes of deposition and erosion could change over time and move flooding
Maintenance	Maintain existing capacity of streams (as a stand-alone effort)	Access roads Easements	High	High	Lower cost	FATAL FLAW - existing stream capacity does not convey 100-yr event Frequent environmental disturbance Access does not exist in most areas

Montecito Flood Control Master Plan
Initial Alternative Database

Name	Description/Concept	Capital investments	Access Requirements (Low/Medium/High)	Maintenance (Low/Medium/High)	Opportunities	Constraints
Channelization	Provide stormwater conveyance for the 100-yr flood event in improved channels	Access roads Channels Bridges/Culverts Easements	High	Medium	Flood mitigation on 100's of parcels All weather roadway access reduced risk, increased safety increased resilience Can be combined with other alternatives Can incorporate community trails if desired Can be done in phases as funding available Eligible for grant funding	Debris mitigation not included Permitting Easement acquisition
Debris Basins	Provide basins for debris capture, allows species access at outlet	Basins Easements	Low	High	Debris flow mitigation provided Allows environmental requirements (endangered species) Can be combined with other alternatives, improves their function Eligible for grant funding	Minor flood mitigation
Stormwater Basins	Provide basins for stormwater and/or debris capture, restricted species access outlet	Basins Easements	Low	High	Flood mitigation provided by retention Can be combined with other alternatives Eligible for grant funding	FATAL FLAW (in some streams) - Endangered species may be harmed and would not be allowed by Federal Law

Montecito Flood Control Master Plan
Initial Alternative Database

Name	Description/Concept	Capital investments	Access Requirements (Low/Medium/High)	Maintenance (Low/Medium/High)	Opportunities	Constraints
Underground conveyance	Provide underground large diameter conduits to convey stormwater	Conduits Easements Utility relocations	Low	High	Underground means less surface acquisitions needed Provides some level of flood mitigation Can be combined with other alternatives Eligible for grant funding	Not possible to build big enough to convey 100-yr flood flows Utility relocations Disruption during construction of access Debris in the form of rocks, sediment, and vegetation likely to clog system
Low Impact Design techniques	Bioretention, green roofs, infiltration, permeable pavement, rain barrels, microbasins	Varies, possibly done by homeowners	None	Varies, possibly done by homeowners	Low cost, possible borne by homeowners	FATAL FLAW - flooding and debris from Los Padres NF, not local flooding sources. LID would not fix Difficult to implement or enforce Need Board approval and action, uncertain to happen based on burden to owners
Advanced warning systems	Install automated advanced warning systems to allow for preparation or evacuation. Existing warnings based solely on rain forecast resulting in excess evacuations.	Gages Software/hardware	None	Low	Low cost	FATAL FLAW - Very fast storm response - not enough time for response

Montecito Flood Control Master Plan
Initial Alternative Database

Name	Description/Concept	Capital investments	Access Requirements (Low/Medium/High)	Maintenance (Low/Medium/High)	Opportunities	Contraints
Levees	Build berms along channels to contain floodwaters	Access roads Channels Bridges/Culverts Easements	High	High	Flood mitigation on 100's of parcels All weather roadway access Can be combined with other alternatives Can incorporate community trails if desired Can be done in phases as funding available	Subject to failures or overtopping No FEMA funding Residual risk due to failures Raised roadway grades
Structure elevation	Raise all habitable structures above the base flood elevation	Structure rebuild	None	None	Reduces flood risk on insurable structures	Prohibitively expensive Does not address roadway safety Risk remains as only buildings are elevated Private property issues
Regulation	Enact building and floodplain elevation rules to protect future and rebuilt structures	None	None	None	Regulations currently in place, only minor changes/actions required	FATAL FLAW - while this may help in the future, it does nothing to solve current flooding problems. Does not prevent flooding from upper watershed



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APPENDIX 3

Cost Data

Montecito Flood Control Master Plan
 Planning Cost Estimates for the Preferred Alternative
 August, 2024

Assumptions/Note#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																														
Stream	Length Corridor (mi)	Length Corridor (ft)	Length for Design (mi)	Design ROW (ac)	Ramp area (ac)	Chnl+Rd Width (ft)	Corridor ROW (ac)	Exist ROW (ac)	Acquisition ROW (ac)	Maint ROW minus design	Bridge length (ft)	Bridge (sf)	(\$5 Million/ac) cost ROW	(\$90k/mi) cost topo	(\$5 Million/mi) cost channels	(\$600/sf) cost bridges	15% chan+br cost utility re	(5% of chnl+bridge+u) cost 30% design	(10% of chnl+br+util) cost 60% design	(10% of util) cost utility design	(10% of chnl+br+util) cost final design	total cost design	total cost construction	total cost ROW																					
Oak	2.65	13992	1.79	13.24	0.13	61	19.72	2.59	17.13	3.90	892	54,412	\$85,670,606	\$161,100	\$8,105,303	\$32,647,200	\$6,112,875	\$2,343,269	\$4,686,538	\$611,288	4,686,538																								
Montecito	2.36	12460.8	1.78	16.40	0.13	76	21.87	4.74	17.13	0.73	650	49,400	\$85,650,303	\$160,200	\$8,284,470	\$19,760,000	\$4,206,670	\$1,612,557	\$3,225,114	\$420,667	3,225,114																								
San Ysidro	2.46	12988.8	1	9.21	0.07	76	22.73	14.06	8.67	0.00	512	38,912	\$43,372,727	\$90,000	\$4,515,152	\$15,564,800	\$3,011,993	\$1,154,597	\$2,309,194	\$301,199	2,309,194																								
Romero	2.97	15681.6	0.91	8.82	0.07	80	28.87	3.50	25.37	16.54	320	25,600	\$126,830,909	\$81,900	\$4,246,970	\$10,240,000	\$2,173,045	\$833,001	\$1,666,002	\$217,305	1,666,002																								
Buena Vista	0.87	4593.6	0.22	1.55	0.02	58	6.13	0.00	6.13	4.59	62	3,596	\$30,661,818	\$19,800	\$1,041,288	\$1,438,400	\$371,953	\$142,582	\$285,164	\$37,195	285,164																								
Buena Vista East	1	5280	0.35	1.87	0.03	44	5.36	0.00	5.36	3.49	250	11,000	\$26,793,939	\$31,500	\$1,513,258	\$4,400,000	\$886,989	\$340,012	\$680,025	\$88,699	680,025																								
Buena Vista east trib 1	1.07	5649.6	0.2	0.78	0.01	32	4.16	0.00	4.16	3.39	155	4,960	\$20,824,242	\$18,000	\$853,220	\$1,984,000	\$425,583	\$163,140	\$326,280	\$42,558	326,280																								
Buena Vista West	1.12	5913.6				60	8.15	0.27	7.88	7.88			\$39,377,273																																
Cold Springs	1.13	5966.4				60	8.22	2.64	5.58	5.58			27,890,909																																
Hot Springs	0.98	5174.4				60	7.13	0.00	7.13	7.13			35,636,364																																
Hot Springs Trib	0.25	1320				60	1.82	0.00	1.82	1.82			9,090,909																																
Buena Vista East Trib 2	0.44	2323.2				60	3.20	0.00	3.20	3.20			16,000,000																																
Buena Vista East Trib 3	0.96	5068.8				60	6.98	0.00	6.98	6.98			34,909,091																																
Picay	2.21	11668.8				60	16.07	0.00	16.07	16.07			80,363,636																																
Totals:	20.47	70646.4	6.25	51.86			160.41	27.80	132.61	81.29	2841	187,880	\$419,804,545	\$562,500	\$28,559,659	\$86,034,400	\$17,189,109	\$6,789,158	\$13,178,317	\$1,718,911	\$13,178,317	\$35,427,203	\$150,972,277	\$439,804,545																					
Totals:																																													
add testing 15%:																																													
\$173,618,118																																													
Grand total:																																													\$648,849,867

Assumptions:

- 1 1 ramp per 1,000 feet of channel
- 2 60' width assumed where no improvements constructed
- 3 From County shapefile received 12/2023
- 4 Bridge or large culvert, arch structure, or similar, based on width of road
- 5 All costs, 2024 dollars. Assumes \$5 Million per acre, Extra \$20 Million added for coastal house (X20 cell), added total for maintenance ROW for the upper section of the creeks, not included in this plan
- 6 Assumes \$90k per mile, includes planimetrics, setting target survey points, \$200k for topo only w/o planimetrics
- 7 Assumes \$5 Million construction cost per mile of channel, not including bridges or utilities costs
- 8 Assumes \$600 per square foot of bridge, large culvert, arch structure or similar
- 9 Assumes 15% of cost of channels and bridge construction
- 10 Assumes 5% of construction cost of channels, bridges, and utilities. Bridge selection only, no bridge design. Caltrans, utilities, and UPRR coordination included.
- 11 Assumes 10% of construction cost of channels, bridges, and utilities. Includes 60% bridge design.
- 12 Assumes 5% of construction cost of utilities. Does not include fiber optic, high pressure gas; typical residential utility services only
- 13 Assumes 10% of construction cost of channels, bridges, and utilities
- 14 Includes 15% for testing and inspection, \$2 Million for permitting
- 15 Includes \$20 Million coastal house acquisition

green=ROW/maintenance
 purple=improved channel

