PLAN TO MINIMIZE IMPACTS
SANTA MARIA CREEK
FLOOD PROTECTION CORRIDOR PROJECT

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INTRODUCTION

Proposition 13 grant funds have been used to acquire and protect FEMA floodplain properties in the Santa Maria Creek Flood Protection Corridor (SMCFPC, Figure 1). Specifically, proposition 13 funds were used to acquire Oak Country I and II (formerly known as Oak Country Estates), portions of which are within the Santa Maria Creek floodway and floodplain. Prior to acquisition, Oak Country Estates had previously been slated for development of 57 single family residences. Oak Country Estates is part of the Ramona Grasslands Preserve and will be managed to preserve its unique biological and cultural resources.

The Flood Protection Corridor Program was created by the Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act of March 2000 (Proposition 13). The Program is authorized to fund projects providing non-structural approaches to flood management, including the acquisition and restoration of wildlife habitat and agricultural land preservation. Proposition 13 requires the applicant, in conjunction with the Department of Water Resources, develop a plan to minimize the impacts on adjacent landowners prior to acquiring any interest in land.

California Water Code Section 79041 states:

> ”*Prior to acquiring an easement or other interest in land pursuant to this article, the project shall include a plan to minimize the impacts on adjacent landowners. The plan shall include but not be limited to, an evaluation of the impact on floodwaters, the structural integrity of affected levees, diversion facilities, customary agricultural husbandry practices and timber extraction operations, and an evaluation with regard to the maintenance required for any facilities that are proposed to be constructed or altered.”*

This Plan to Minimize Impacts is intended to satisfy the requirements of the Proposition 13 grant. To support this plan, a hydrologic and hydraulic study of Santa Maria Creek within the project area has been prepared and is provided as Appendix A.

PROJECT OVERVIEW

Approximately seven miles of Santa Maria Creek flow westward across the 8,000-acre Ramona Grasslands Wildlife Area (Ramona Grasslands)[1]. The County of San Diego currently owns and manages 3,521 acres within this area (Figure 1a). Approximately four of the seven miles of Santa Maria Creek comprise the SMCFPC, all of which are within the FEMA Special Flood Hazard Area floodplain (Figure 1). This reach of Santa Maria Creek flows westward across the County San Diego’s Ramona Grasslands Preserve (Figure 2). There have been repeated occurrences of flooding along the Santa Maria Creek, with as many as 200 homes suffering damage from a single flood event. The preservation of Oak Country Estates provides flood protection to current and future residents of the Ramona community by preserving over 155 acres of the Santa Maria Creek within the FEMA floodplain and an additional 647 acres buffering the floodplain.

[1] As defined in a CA Department of Fish and Game Conceptual Area Protection Plan (CAPP).

As secondary benefits, the acquisition of Oak Country I and II will further the assembly of lands within the Ramona Grasslands and preserve critical habitat for threatened and endangered species and important Native American cultural resource sites. The project will provide tertiary benefits to agriculture in the region through the development of best management practices for grazing; thereby allowing the long-term implementation of conservation-compatible grazing regimes to maintain habitat quality for the federally endangered Stephens' kangaroo rat and restore riparian and ephemeral aquatic habitats (e.g., vernal pools, swales, and alkali playas).

Santa Maria Creek is the ecological centerpiece of the Ramona Grasslands. The creek emerges from the rapidly urbanizing community of Ramona, then flows through an extensive grasslands area, and onward through the coastal scrub and chaparral covered slopes of Bandy Canyon to the San Pasqual Valley. There, the creek joins the San Dieguito River, which feeds Lake Hodges, a municipal drinking water reservoir recently designated as a Clean Water Act Section 303 (d) impaired water body.

The Ramona Grasslands is largely undeveloped and is being used primarily for grazing cattle. However, development proposals are pending which, if constructed, would add as many as 500 new homes to the Ramona Grasslands within the next three to five years. Because of the diversity and sensitivity of its native species and the importance of its Native American cultural sites, preservation of the Ramona Grasslands is a priority for The Nature Conservancy (TNC), the County of San Diego, the U.S. Fish and Wildlife Service, the CDFG and other conservation partners.

TNC has worked with property owners in the area and has identified willing sellers interested in selling all or a portion of their property for conservation. TNC has acquired property (that is now owend by the County of San Diego) within the floodplain of the Ramona Grasslands, including Cagney Trust, Gildred and Davis-Eagle properties (Figure 1a). Other complementary actions to preserve land within the floodplain have occurred. For example, working in partnership with TNC, the County of San Diego recently won a $1.5 million grant, the primary purpose of which is to restore 1.5 miles of the Santa Maria Creek through the Cagney Trust property and the Vorhees Lane properties (Figure 1).

The SMCFPC provided funds used to acquire the Oak Country Estates property (a total of approximately 700 acres, including 230 acres for Oak Country I and 476 acres for Oak Country II.). The Oak Country Estate property straddles Santa Maria Creek in the southwestern corner of the Ramona Grasslands. By acquiring real property interests in this rural flood protection corridor in advance of imminent urbanization, the SMCFPC is a proactive approach to controlling future flood damage. As part of the natural resources management strategy for the Ramona Grasslands, the Santa Maria Creek corridor on the Oak Country I property will be fenced to allow cattle access to the stream to be managed under a grazing management program. This Plan looks at the potential impacts of implementing a managed grazing program, including excluding cattle from the Santa Maria Creek corridor, on the Oak Country I property.

PLAN TO MINIMIZE IMPACTS

The Oak Country Estates property supports over 1-mile of Santa Maria Creek, including areas of the FEMA 100- and 500-year floodplain (Figure 1). The channel has incised from historical conditions, and is currently dominated by mulefat (*Bacharris salicifolia*) scrub habitat with few riparian trees. The Santa Maria Creek floodplain within the Oak Country Estates property is comprised of grasslands, vernal pools and other ephemeral wetlands, and, in the northwest corner of the property, oak woodlands. The grasslands on the property, in conjunction with grasslands on other properties in the Ramona Grasslands, support cattle grazing, a historic land use in this area.

As part of the management and monitoring program for the Ramona Grasslands, stream cross-sections were surveyed to assess the existing geomorphology of the Santa Maria Creek channel (Figure 3). These cross-sections were used to model the stages of flood events, including the Oak Country I property. The technical methodology and results of this modeling study (Tague et al. 2009) is described in detail in Appendix A. The results are summarized in the relevant sections of this Plan. Also conducted was a study of historic changes in the channel geomorphology and distribution of riparian habitat in Santa Maria Creek, which is included as Appendix B.

IMPACT ON FLOODWATERS

The acquisition and permanent conservation of the Oak Country Estates property, in conjunction with the acquisition and permanent conservation of additional properties in the Ramona Grasslands, will prevent the construction of residential development in the floodplain of Santa Maria Creek. Thus, filling of Santa Maria Creek floodplain areas in the Ramona Grasslands and any associated adverse effects on flooding will be precluded. Historical aerial photography and the physical and biological character of the Ramona Grasslands adjacent to Santa Maria Creek indicate that this is an area which has historically experienced regular flooding (refer to Appendix B for more information). In fact, the 100-year floodway, as mapped by FEMA, extends well outside of the Santa Maria Creek channel throughout most of the Ramona Grasslands (Figure 2). The FEMA Special Flood Hazard Area floodplain currently extends off of the Oak Country Estates property and onto adjacent properties (Figure 2). The regular overbank floods through the Ramona Grasslands likely maintain rare alkali playa habitats adjacent to Santa Maria Creek.

As discussed above, a managed grazing program is being developed for the Ramona Grasslands, which would entail reducing grazing intensity in riparian habitats via fencing of the stream corridor. No fencing is currently planned on the Oak Country II property. Fencing will be installed on the Oak Country I property (Figure 1) to manage access of cattle to the riparian zone. This would potentially allow riparian vegetation in this reach of Santa Maria Creek to increase in density, and potentially affect stage-discharge relationships of the creek. There is currently dense, woody riparian vegetation only in the reach of Santa Maria Creek running through the private properties on Voorhes Lane (i.e., cross-sections SG4 and SG5, Figure 3), although it is not continuous through this reach.

The remaining reaches of Santa Maria Creek in the Ramona Grasslands have bare channel or support herbaceous or shrubby vegetation.

Researchers at the San Diego State University Department of Geography conducted hydrologic modeling of the Santa Maria Creek watershed basin and hydraulic modeling of the reach of Santa Maria Creek within the Ramona Grasslands. This study (Tague et al. 2009) is provided as Appendix A to this Plan. In addition to the Tague et al. (2009) study, cross-sections on the Oak Country Estates property at the downstream end of the Ramona Grasslands (i.e., cross-sections SG9, SG10, and SG11, Figure 3) were refined and extended further into the floodplain using a recently available 30 meter Digital Elevation Model (DEM). This allowed a more accurate assessment of the potential for and magnitude of overbank flooding on the Oak Country I property, and the implications of proposed management actions resulting in denser riparian vegetation in this reach of the creek.

Streamflow recurrence intervals were calculated based on 68 years of historic streamflow record. A previous report by Federal Emergency Management Agency (FEMA) (FEMA, 1991) estimated the 50, 100 and 200-year recurrence interval floods from historic streamflow records. The period of record for this report was not stated. Given this, and the fact that there is at least fifteen additional years of flow data, flood recurrence interval estimates were derived from the 68 years of streamflow data.

The standard FEMA flood frequency procedure was followed for 68 years of record (1912-1920; 1947-2007) by using a Log-Pearson Type III distribution following The "Bulletin 17B method" recommended by the Interagency Advisory Committee on Water Data (IACWD) and used by many US Federal Agencies. Bulletin 17B includes an estimate of coefficient of skewness in the computation. Skewness is estimated based on regional maps, which indicated a range of skew from 0 to 0.3 for Southern Coastal California. The best fit with observed data occurred using a skew of zero. Note, peak flows were estimated for a maximum recurrence interval of 200 years. Discharges for a series of flood intervals by the FEMA and Tague et al. studies are compared in Table 1.

Table 1. Annual instantaneous peak flows for current land use. Recurrence intervals of 50, 100, and 200-years were derived from regressions. Recurrence intervals are also shown for FEMA where available.

Recurrence Interval (years)	Estimated Peak Flow (cms)	Estimated Peak Flow (cfs)	FEMA Peak Flow (cfs)
2	3.5	125	
5	30.8	1090	
10	82.1	2900	
25	210	7400	
50	363	12,810	9,200
100	573	20,240	15,600
200	845	29,850	

The channel geomorphology information collected for the three cross-sections on the Oak Country I property (SG9, SG10, and SG11) and seven cross-sections upstream, augmented with floodplain elevations obtained from the 30 meter DEM for the Ramona Grasslands, were utilized to calculate the stages (elevations) associated with the Tague et al. flood discharges. Flood stages both for existing channel conditions and assuming denser riparian vegetation growth due to exclusion of cattle from the creek for management purposes were calculated (refer to Appendix A for assumptions associated with modeling flood stages for denser riparian growth). The assumption of denser riparian vegetation increase flood stages within the channel by an average of 12 cm at each of the cross sections, with a minimum increase of 2 cm at SG2 (2-year flood) and a maximum increase of 28 cm at SG7 (25-year flood). However, in all but two channel cross section locations (SG4 and SG9) the riparian restoration stage was still contained within the channel. For those two cases, the 'current conditions' flood stage had completely filled the channel capacity so that even a small increase in stage could not be accommodated. It should be noted that flood plain hydrology was not estimated and thus flood plain depth was not calculated if channel banks were overtopped. However, areas adjacent to the Oak Country Estates property (Oak County I and II) that would be affected by these floods are currently zoned as open space; thus no structures would be affected by these flows.

IMPACT ON LEVEE INTEGRITY

The project will not affect any levees as there are no levees onsite.

IMPACT ON DIVERSION FACILITIES

The project will not affect any diversion facilities as there are no diversion facilities onsite.

IMPACT ON CURRENT AND HISTORIC AGRICULTURAL PRACTICES

The acquisition of the Oak Country Estates property will actually facilitate ongoing and existing agricultural practice in the Ramona Grasslands. Managed grazing is being considered for long-term management of natural resources in the Ramona Grasslands. If Oak Country Estates property had been developed it would have reduced the area available for grazing in the Ramona Grasslands, thereby reducing the ability of the grazing lessees to maintain a profitable operation in the area. The proposed preservation of Oak Country Estates and management activities, such as fencing the stream corridor, will not adversely impact the current grazing operation on the property. Animals are watered via wells and do not rely on the stream for water. There is negligible reduction in pasturage as the riparian corridor has already been depleted of vegetation. Stock mobility is not negatively affected as ranchers routinely move their cattle from one area to another to allow grazed areas to regenerate. Fencing of the stream will not require building of crossings as cattle will be moved from one side of the stream to the other along existing ranch roads, as necessary.

IMPACT ON TIMBER OPERATIONS

The project will not affect any timber operations as there are no timber operations onsite.

EVALUATION OF THE MAINTENANCE REQUIRED FOR PROPOSED FACILITIES

There are no facilities proposed within the Santa Maria Creek within the Oak Country Estates property. That is, there are no roadways, culverts or other infrastructure that may impede flow or cause flooding. Fencing on Oak Country I in the vicinity of the Santa Maria Creek will require maintenance at an estimated cost of $20,000 annually.

CONCLUSIONS

In summary, the acquisition, preservation and management of the Oak Country Estates property within the Ramona Grasslands Preserve will not have significant adverse impacts to existing adjoining property owners or land use practices. Areas both upstream and downstream of the Oak Country Estates property that currently lie within the FEMA 100- and 500-year floodplains are zoned as open space. It is not anticipated that the boundaries of the FEMA flood plain will change as a result of excluding cattle from the Santa Maria Creek as the change in flood potential as a result of dense vegetation growth is small as explained below.

No structures within or fill of the Santa Maria Creek is proposed. The only change in the area may be an increase in density of riparian vegetation due to fencing to exclude cattle grazing in portions of the Santa Maria Creek. However, the increase flood potential is small as a result of more dense vegetation and the models show that banks are overtopped in only two out of ten channel cross section locations. For those two cases, the 'current conditions' flood stage had completely filled the channel capacity so that even a small increase in stage could not be accommodated. Additionally, it is likely that the downstream overtop estimate (at SG9) is overestimated since the smaller capacity upstream reaches of Santa Maria Creek would experience overflow before the larger capacity reaches further downstream, resulting in changes in hydrologic pathway and speed.

A Resource Management Plan under preparation will include management directives to reduce flood risk such as periodically allowing for managed grazing and removal of non-native vegetation. In addition, the acquisition, preservation and management of the Oak Country Estates property (that was previously proposed for development of 57 single family residences) as open space provides an incremental reduction in flood potential by preventing the loss of floodplain storage due to development (impervious surfaces and landscape irrigation) within the floodplain.

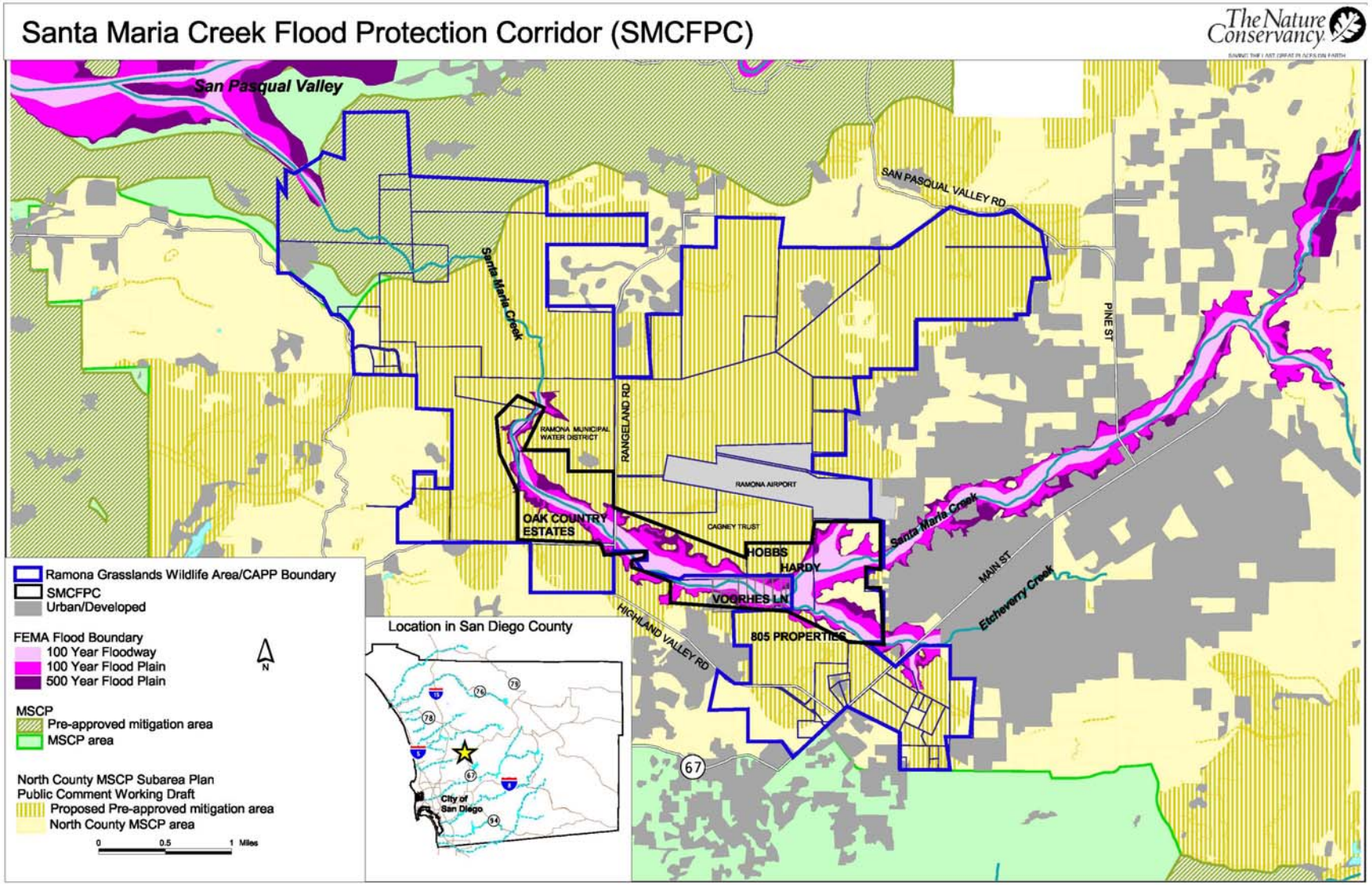

Figure 1. Map of the Santa Maria Creek Flood Protection Corridor, showing the Ramona Grasslands Wildlife Area.

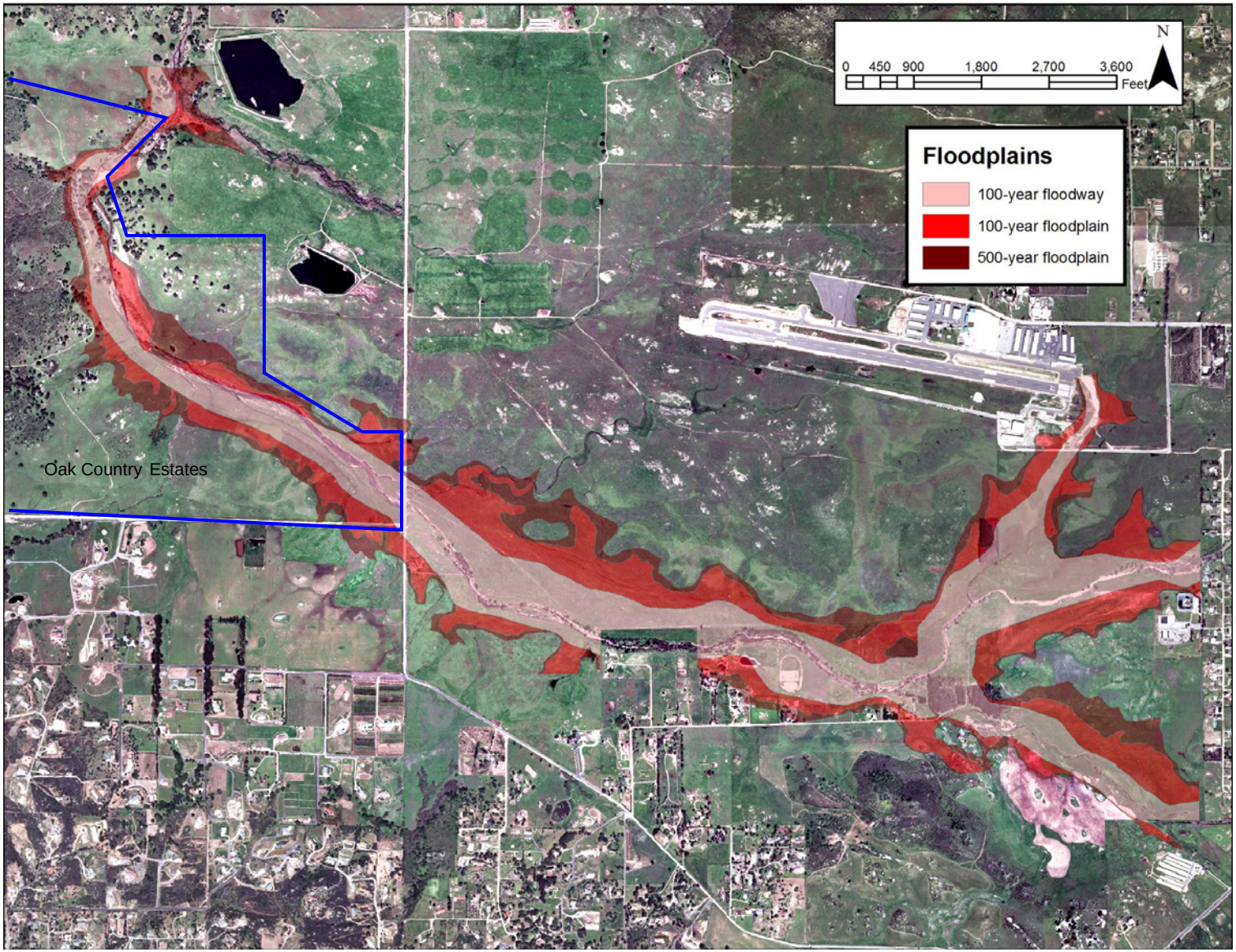

Figure 2. The FEMA floodplains within the Ramona Grasslands.

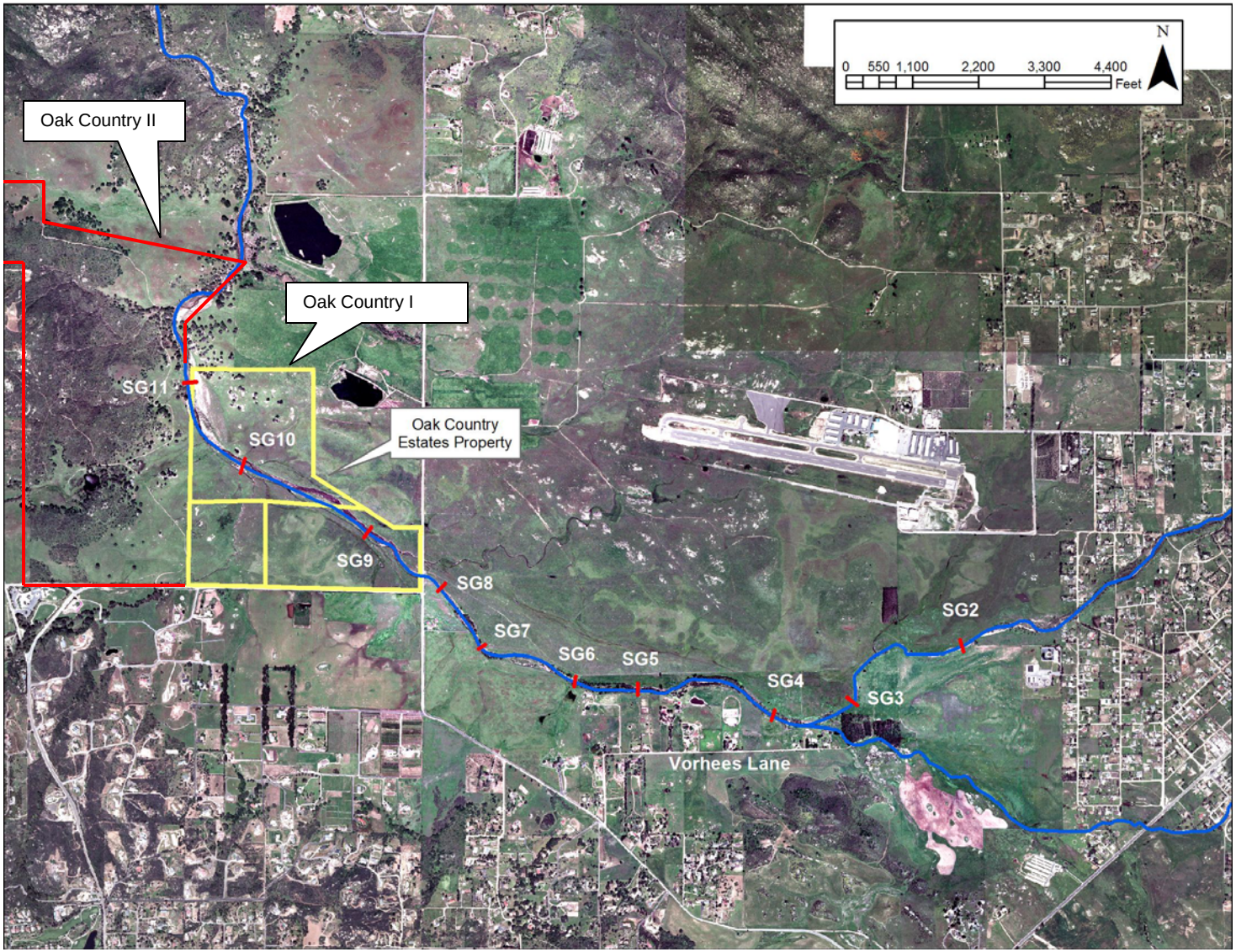

Figure 3. Locations of channel cross-sections (SG = stream geomorphology) along Santa Maria Creek in the Ramona Grasslands in relation to the Oak Country Estates property.