



# TECHNICAL MEMORANDUM

**Date:** June 29, 2023

**BKF Job Number:** 20211367-15

**To:** Krzysztof Lisaj, County of San Mateo

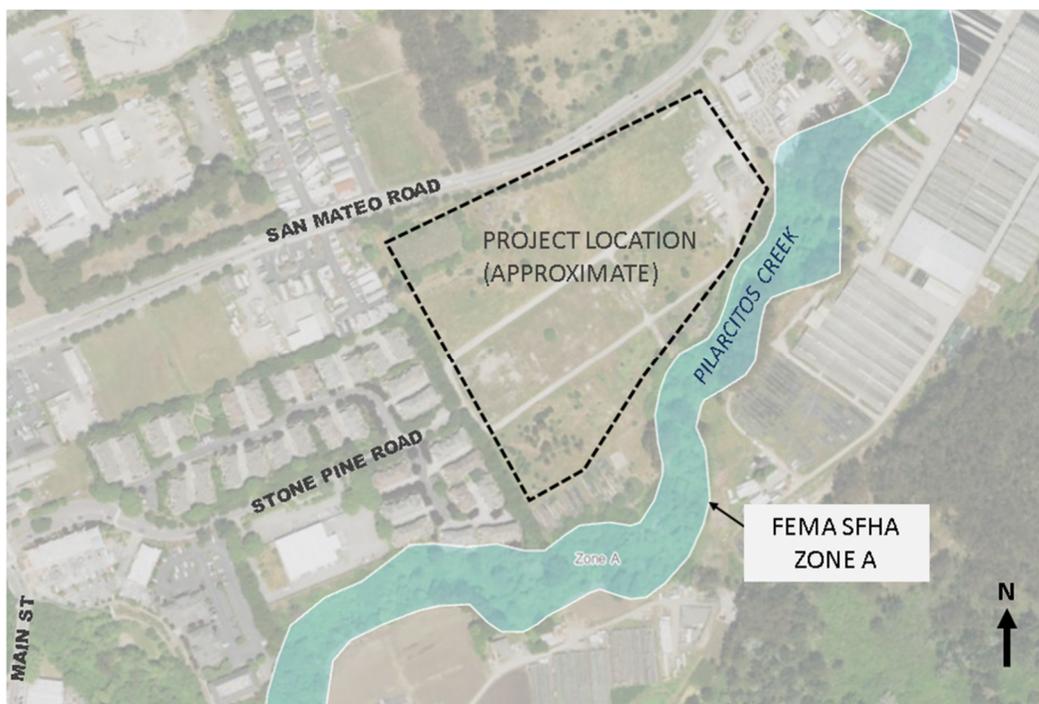
**From:** Stephanie Tanverakul, PE, BKF Engineers  
Kim Baxter, BKF Engineers

**Subject:** **Pilarcitos Creek Floodplain Study**

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## A. INTRODUCTION

New farm worker housing consisting of approximately 50 manufactured units and related infrastructure is being proposed for development at the City of Half Moon's Bay Corporate Yard at 880 Stone Pine Road (Project). The Project is in close proximity to Pilarcitos Creek and a Federal Emergency Management Agency (FEMA) 100-year Zone A floodplain, shown on Figure 1, based on Flood Insurance Rate map (FIRM) panel 06081C0260E.



**FIGURE 1: Project Location with FEMA SFHA Overlay**

FEMA SFHA Zone A areas are estimated based on approximate methodologies without a detailed hydraulic model and so do not have base flood elevations (BFEs) shown. FEMA hydraulic analysis for this section of Pilarcitos Creek has not been updated since 1980. The Zone A mapped area near the project site shows inconsistent flood plain limits compared with recent topography and the overall Zone A boundary is low resolution.

The purpose of this technical memorandum is to document the hydrologic and hydraulic analysis conducted using publicly available high-resolution topographic data to estimate 100-year and 500-year flood extents and flood elevations. The estimated flood extents and elevations can be used in the Project design to estimate protection from flood damage in extreme storm events.

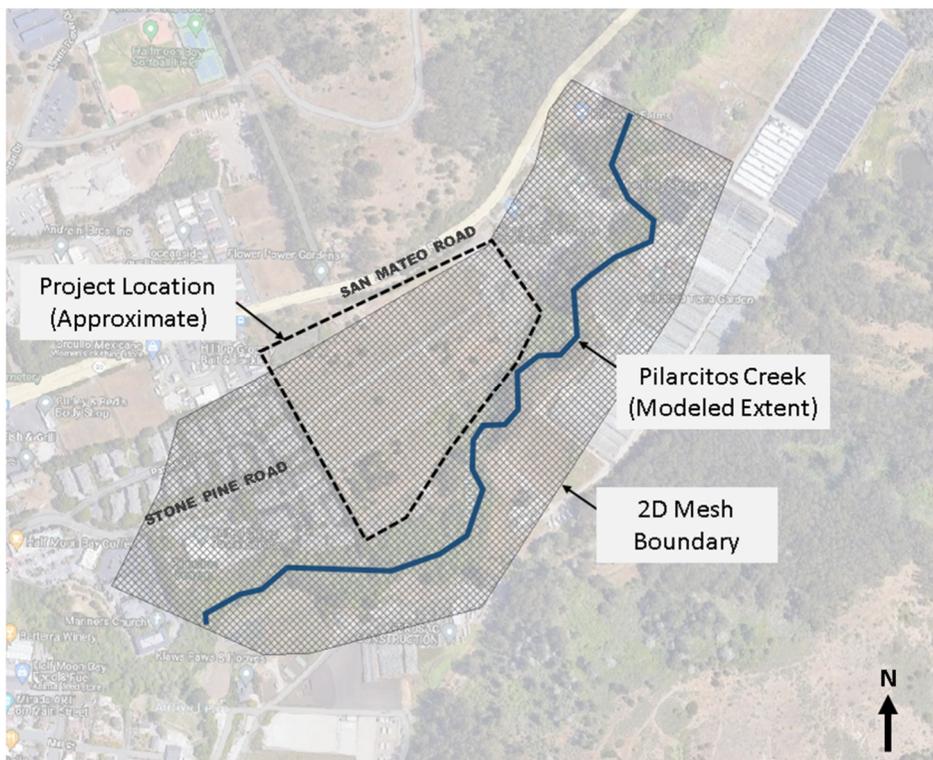
## B. HYDROLOGY

Estimation of the 100-year and 500-year peak flow is based on the long-term stream gage record for Pilarcitos Creek (USGS 11162630) located approximately 3,000 feet downstream of the Project. Since 1967, the USGS has operated the gaging station providing 56 verified annual peak flow values. A statistical analysis of the historical annual peak flows was performed following flood frequency estimation methodology using USGS PeakFQ software. The PeakFQ output is provided in Appendix A. The 100-year peak flow is estimated to be 3,444 cfs and the 500-year peak flow is estimated to be 4,838 cfs at the Project site.

Hydrographs for a 100-year, 24-hour and 500-year, 24-hour storm were estimated using streamflow data at the Pilarcitos Creek gauge. A unit hydrograph was created from streamflow data at the USGS Pilarcitos gauge that was then scaled to the estimated peak flows.

## C. HYDRAULIC ANALYSIS

A two-dimensional (2D) model was setup using U.S. Army Corps of Engineers HEC-RAS hydraulic modeling software. The 2D model is setup to analyze the full length of the channel adjacent to the Project, and also extends a few hundred feet upstream and downstream from the Project. Model extents are shown on Figure 2.



**FIGURE 2: HEC-RAS Model Setup**



Hydraulic parameters used in the model include:

*Datum and Elevations:* The County of San Mateo 2018 Digital Elevation Model (DEM) is used.

*Hydraulic Model:* A 5-foot by 5-foot cell size is used for the 2D grid to compute overland flow depth and extent in the HEC-RAS model.

*Roughness Coefficient:* A Manning's roughness of 0.04 is used for the HEC-RAS 2D grid surface roughness. The Manning's roughness factor was estimated based on guidance from National Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA). The HEC-RAS manual recommends a range of 0.03 and 0.05 for developed, open space areas that contain a mixture of some constructed material and mostly vegetation.

*Boundary Conditions:* The downstream boundary condition is set to normal depth using a slope of 0.01. The upstream boundary condition is set to the 100-year and 500-year hydrographs.

## D. RESULTS

The estimated flood elevations at the Project site for the 100-year and 500-year storm events are presented in Table 1 below. Figures 4 and 5 illustrate the estimated flooding extents. The water surface elevation of the flood extents in the Project site are shown on Figures 6 and 7.

**TABLE 1: Maximum Flood Water Surface Elevation**

Cross-Section Number (see Figures 3 and 4)	100-Year Max Water Surface Elevation (ft)	500-Year Max Water Surface Elevation (ft)
1	78.55	79.82
2	76.26	77.82
3	75.68	76.88
4	75.58	76.83
5	75.48	76.92
6	75.40	76.86

## E. DISCUSSION AND STUDY LIMITATIONS

The HEC-RAS model was built using 2018 County DEM and does not account for new developments or other land changes since 2018. These land changes may or may not have an impact on the modeling results presented here.

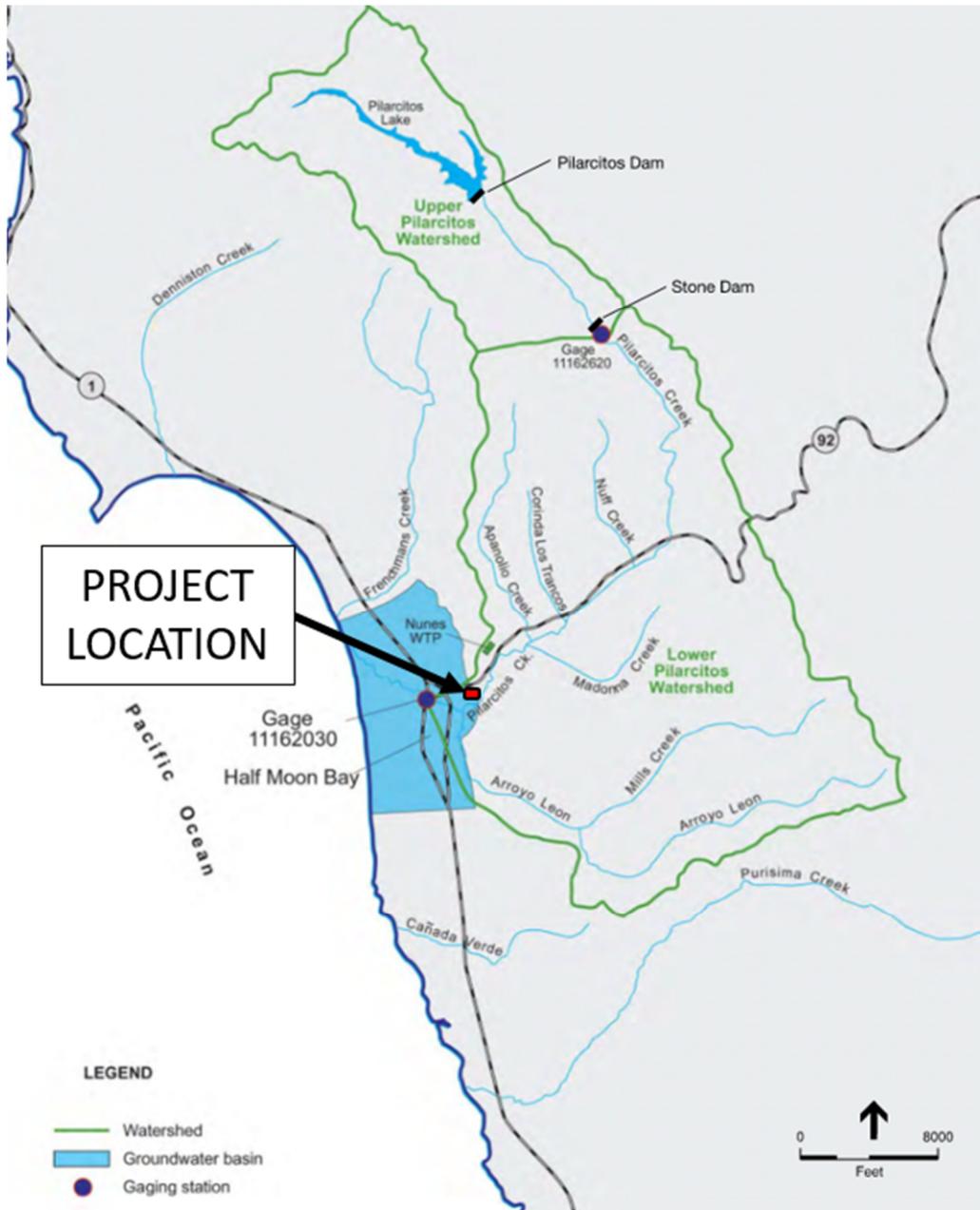
For the modeling effort in this memo, we assumed a Manning's roughness coefficient based on visual aerial assessment of the area and recommendations by the HEC-RAS manual by the Army Corps of Engineers and NRCS. The overland area 2D modeled area is assumed to be mostly developed open space area. Although the roughness assessment accounts for vegetation in and around the channel that is consistent with NRCS standards, large obstructions such as fallen trees and debris have the potential to impact overall Manning's roughness coefficient and affect capacity of the creek.

Pilarcitos Reservoir is at the upstream end of Pilarcitos Creek, and is operated by the SFPUC for water storage and diversion. SFPUC releases water from the reservoir to the portion of Pilarcitos Creek



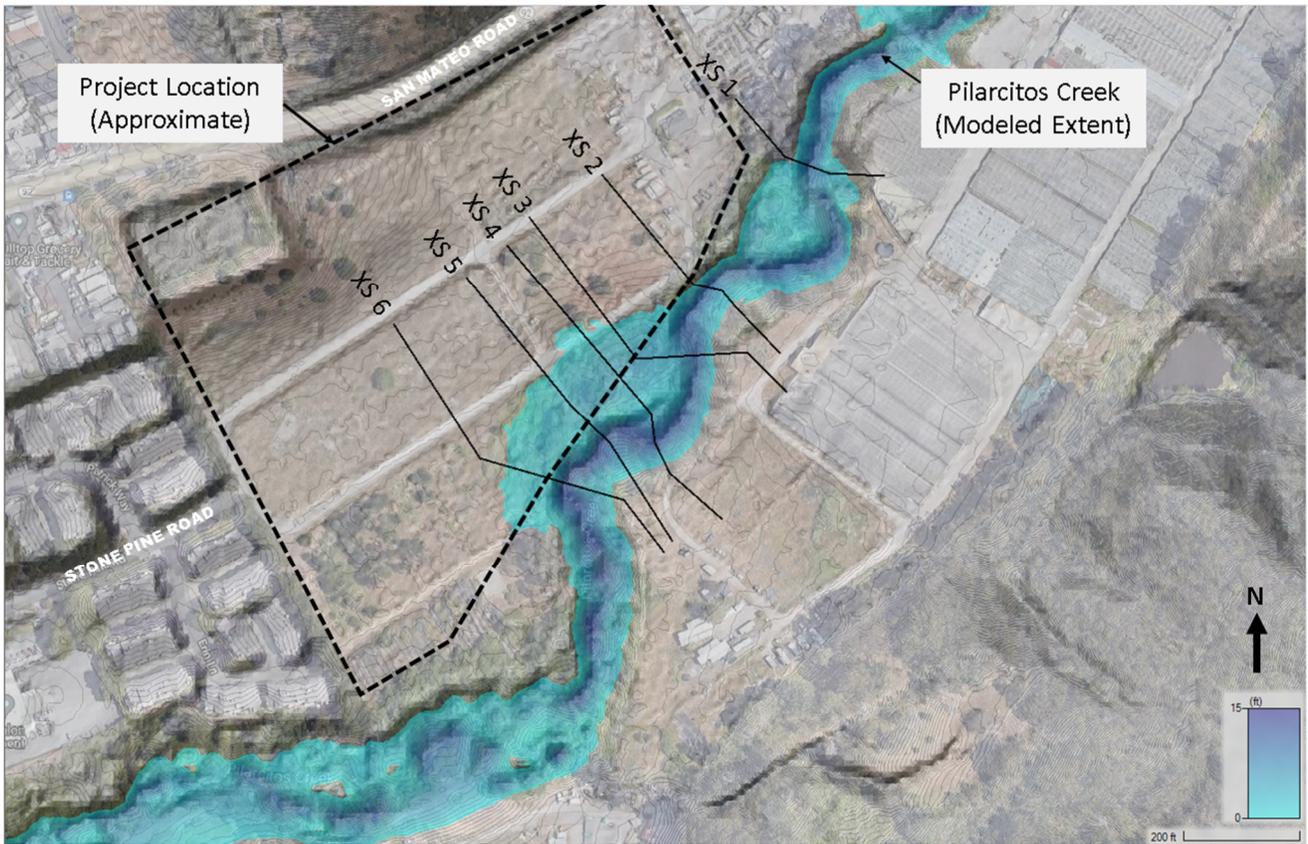
upstream of Stone Dam only during specific times for use by Coastside CWD and diversion to San Andreas Reservoir or Crystal Springs Reservoir. Figure 3 shows the Pilarcitos watershed with the reservoir, dams, and project location shown. Under normal operations, intentional releases from Stone Dam into Pilarcitos Creek do not occur. In the rare instances where releases from the dam have occurred during past flood events, this additional flow was captured in the downstream USGS stream gage and is thus factored into our statistical analysis and design peak flows referred to above.

Our analysis assumes that SFPUC will continue to maintain dams along Pilarcitos Creek and will manage them with the same operating procedures which have been utilized during past storm events.

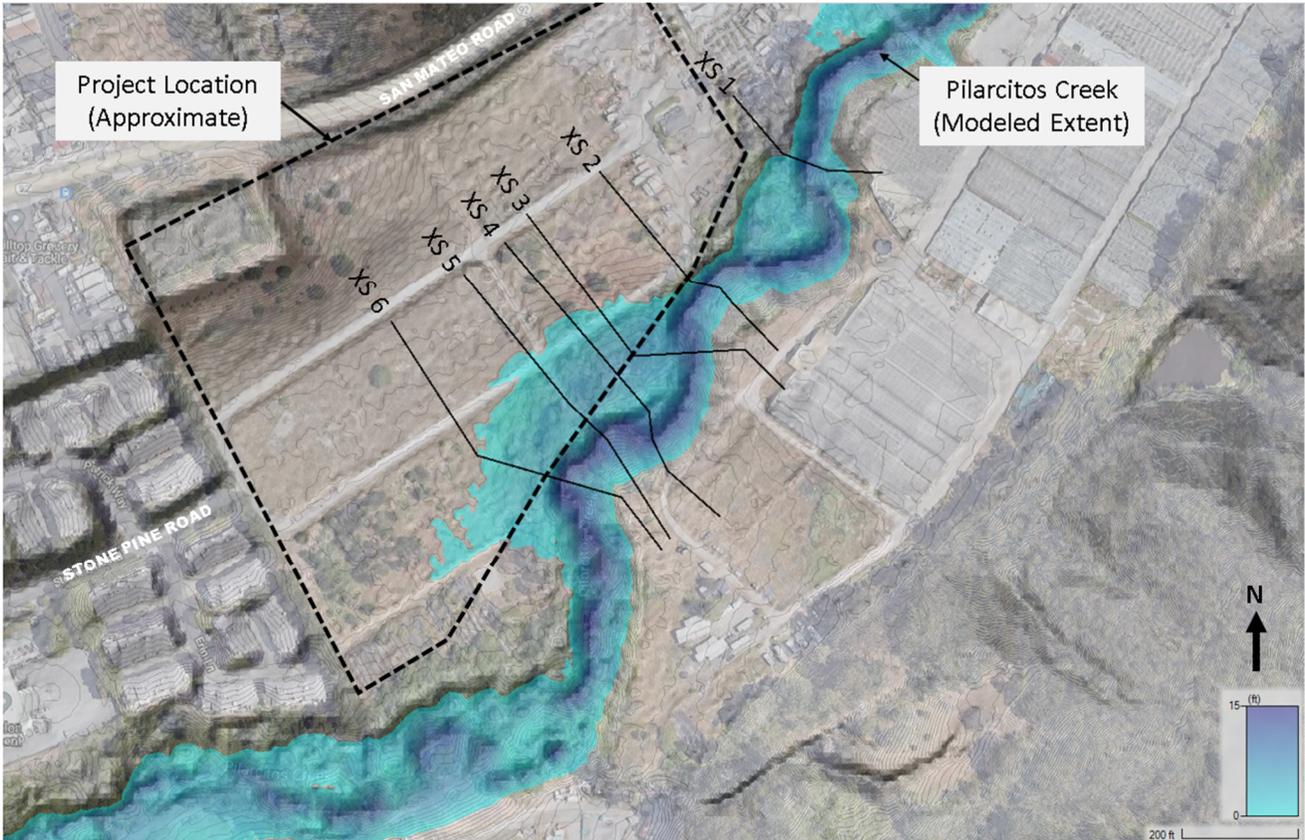


**FIGURE 3: Pilarcitos Creek Watershed**  
*(figure source: Todd Engineers)*

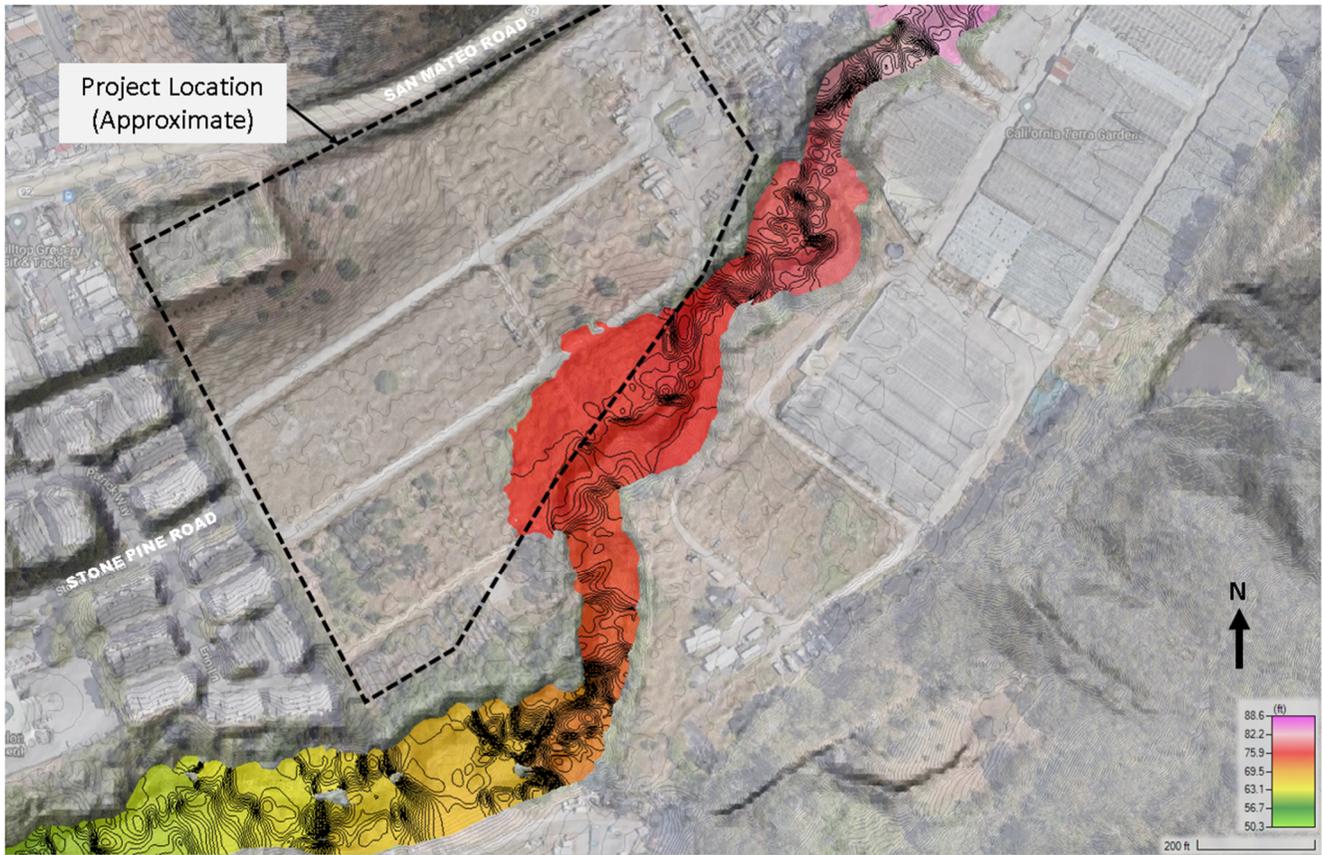




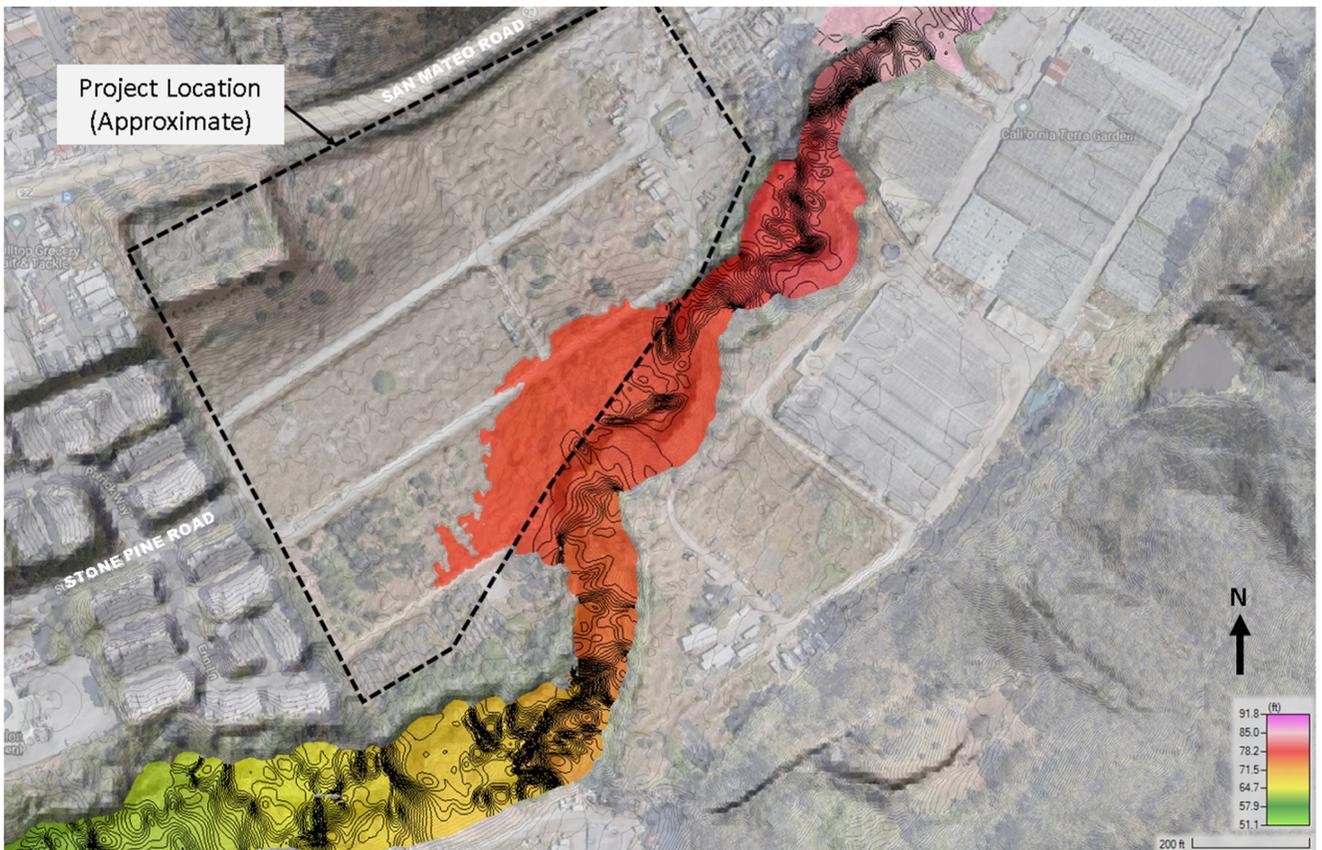
**FIGURE 4: 100-Year Event, Maximum Depth**



**FIGURE 5: 500-Year Event, Maximum Depth**



**FIGURE 6: 100-Year Event, Maximum Water Surface Elevation**



**FIGURE 7: 500-Year Event, Maximum Water Surface Elevation**

