APPENDIX R -
MASTER DRAINAGE PLAN

Camarillo Springs Golf Course

Master Drainage Plan and Floodplain Analysis

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1 Introduction

This Master Drainage Plan (MDP) documents the regional and local hydrology and floodplain hydraulics for the proposed Camarillo Springs Golf Course project. The proposed project is designed to preserve the amount of existing floodplain storage on Conejo Creek, to maintain or reduce Base Flood Elevations through the study area, and to remove more than 150 existing residences from the current FEMA floodplain.

This study includes analysis and comparison of existing conditions (current) and proposed conditions (with project) floodplain storage during the 100-year storm event, floodplain mapping, and river hydraulics of Conejo Creek.

The proposed project drainage system is analyzed with an XPSWMM hydraulic routing model. The existing conditions and proposed conditions Conejo Creek floodplain hydraulics are analyzed with HEC-RAS two dimensional models.

1.1 Project Description

The existing Camarillo Springs Golf Course is located in the City of Camarillo, CA in southeastern Ventura County at the base of the Santa Susana Mountains (Figure 1), in the Camarillo Springs Creek watershed, tributary to Conejo Creek.

The proposed project includes approximately 32 acres of residential development on the existing north golf course property, neighborhood parks, walking trails, and open space. The project flood protection system will consist of elevating the proposed 32-acre development area to be a flood protection barrier along the northern boundary of the site. The project area, including over 150 existing residences, will be protected from the Conejo Creek floodplain. The proposed design incorporates a drainage system that will divide the flow from the upper Camarillo springs watershed so that some of the flow will be conveyed through a large bypass culvert directly to Conejo Creek, and some of the flow will be diverted to the interior lake for storage.

The proposed conditions design preserves the amount of existing conditions Conejo Creek floodplain storage through a combination of increasing the Conejo Creek overbank floodplain storage on the south golf course area, and storing Camarillo Springs Creek flow before it can add to the Conejo Creek floodplain volume.

1.2 FEMA Flood Mapping

The current floodplain mapping for the project area is shown on FIRM Panels 06111C0934E and 06111C0953E. The FIRM panels are included in *Appendix A*.

The proposed project revises the floodplain adjacent Conejo Creek, and also within the Camarillo Springs project area, where the floodplain will be removed from more than 150 existing residences, as shown on Figure 3. A Conditional Letter of Map Revision (CLOMR) application, Case No. 19-09-1295R is pending final approval FEMA.

1.3 Previous Studies

There have been numerous studies performed within the Calleguas and Conejo Creek Watersheds in regards to hydrology, hydraulics, sediment transport that have useful baseline information related to the current floodplain/watershed conditions for the Camarillo Springs Golf Course area. The following list includes recent studies in the area related to Hydrology and Hydraulics.

Calleguas Creek Watershed Feasibility Study (USACE, 2003)

The feasibility study was a complete regional watershed analysis of the Calleguas Creek basin and existing facilities, focusing on determining peak discharges and hydrographs for Calleguas Creek tributaries as well as sediment transport for environmental impacts.

Calleguas Creek Watershed Hydrology Study using VCRat (VCWPD, 2003)

VCWPD developed a complete regional watershed model of the Calleguas Creek system, including Conejo Creek and Revolon Slough, using the Ventura County Modified Rational Method (VCRat).

Calleguas Creek Watershed Management Plan (2004)

The Watershed Management Plan was a collaborative effort between local government and community agencies to create a cooperative strategy for resource management and protection.

Preliminary Ventura County Flood Insurance Study (Nolte Associates Inc., 2015)

In 2004, Nolte Associates Inc. competed a draft publication of the Ventura County Flood Insurance Study (FIS) for the Federal Emergency Management Agency (FEMA). The publication went through an initial public review process, then became effective in January 2010. It went through additional review/revisions before becoming most recently effective in January 2015.

Calleguas Creek Letter of Map Revision (PACE, 2015)

In 2014, PACE completed a Letter of Map Revision (LOMR) based on a previous Conditional Letter of Map Revision for portions of Calleguas Creek near the 101 Freeway crossing. The LOMR, which FEMA approved in 2015, included a comprehensive hydraulic analysis of the creek and overbank areas.

2 Hydrology

The Camarillo Springs Golf Course project is located within the local Camarillo Springs Creek watershed, tributary to Conejo Creek regional watershed, which is part of the larger Calleguas Creek regional watershed (Figure 4). Hydrology for the MDP analysis is obtained from previous local and regional studies, augmented with project specific analysis. The local and regional hydrographs are time shifted to correspond to local and regional coincident storm peaks in the hydraulic analysis.

2.1 Regional Hydrology – Conejo Creek

There have been multiple hydrologic studies of Conejo Creek using various approaches hydrologic parameters. The studies and the results were reviewed and compared to select the results used in the present MDP analysis. The results are summarized in *Table 2-1*.

2.1.1 US Army Corps of Engineers

In February 2003, The United States Army Corps of Engineers, in cooperation with VCWPD, prepared a comprehensive study of Calleguas Creek, which included its tributaries – notably Conejo Creek. The study, entitled "*Calleguas Creek Watershed Feasibility Study*," provided rainfall-runoff models for estimating peak flowrates and hydrographs at key locations, including just upstream of the proposed project development at the Highway 101 crossing of Conejo Creek. The study used HEC-HMS modeling with extensive land use, precipitation, streamflow, and soil data.

2.1.2 Ventura County Watershed Protection District Study

In March 2003, a Countywide study, initiated by Federal Emergency Management Agency (FEMA) and in cooperation with the USACOE, was prepared by VCWPD entitled "*Calleguas Creek Watershed Hydrology Study*." The study included VCRat (Modified Rational Method) peak flowrates and hydrographs for the entire Calleguas Creek Basin.

2.1.3 FEMA Flood Insurance Study (FIS)

The effective Flood Insurance Study, dated April 2018, shows peak flowrates for Conejo Creek which are lower than those obtained from the USACOE and VCPWD Countywide studies. *Table 2-1* provides a basis of comparison between the effective FIS flow rates and the various study flowrates.

2.1.4 FEMA Conejo Creek Model

A FEMA HEC-RAS model of Conejo Creek through Camarillo springs, uses flowrates from the 2003 VCWPD study, adjusted with aerial reduction factors from curves generated by VCWPD. That model was the FEMA effective hydraulic model prior to a 2015 LOMR.

2.1.5 Conejo Creek 2015 LOMR

The hydraulic model of Conejo Creek in the project area was updated as part of an approved 2015 LOMR. For that LOMR, the VCRat 100-year Conejo Creek hydrologic model was revised, following guidance from VCWPD staff, to include volume scaling (hydrograph fattening). The model for that LOMR became the FEMA effective model for the study reach of Conejo Creek. The hydrology used in that model is the primary source for the hydrology used in the present MDP.

Table 2-1 100-Year Flowrates

	US ACOE	VCWPD	FEMA FIS	FEMA Conejo Creek Model	Current Effective FEMA (VCRat)
100-year Peak Flowrate	22,500 cfs	22,987 cfs	22,000 cfs	23,070 cfs	23,097 cfs*

**used for present study*

2.2 Local Hydrology

The MDP hydraulic analysis of Conejo Creek uses a main Conejo Creek channel flow hydrograph, introduced at the upstream extent of the hydraulic models, and multiple lateral inflow hydrographs, introduced at locations along the study reach. In existing conditions, the hydrographs are obtained from the FEMA effective model. The hydrographs are provided in *Appendix B*. In proposed conditions, all the hydrographs are unchanged from the existing condition, except for the lateral inflow hydrograph encompassing the Camarillo Springs Creek watershed. This lateral inflow hydrograph was modified based on onsite lake storage volume. The process for obtaining the adjusted lateral inflow hydrograph for proposed conditions is described in Section 2.2.1.

2.2.1 Design Hydrology for Regional Floodplain Analysis

Hydrographs for the local lateral inflows to Conejo Creek are obtained from the FEMA effective HEC-RAS (one dimensional) model. The hydrographs include flows from Camarillo Springs Creek, the East Camarillo Drain, the Oak Grove Channel, and Upland Road Drain.

The proposed conditions inflow to Conejo Creek, at Ridge View Street, is scaled by the ratio of original runoff volume minus lake storage, divided by the original runoff volume. The lake storage volume is calculated by analyzing the proposed conditions flood protection design using XPSWMM hydraulic routing software. *Appendix C* has the adjusted hydrograph at Ridge View Street that was used for the proposed condition model.

2.2.2 Project Site Hydrology

2.2.2.1 VCRat Hydrographs for Proposed Hydraulics

As shown in Figure 5, there are three main areas that drain near the project area to Conejo Creek:

- Watershed A (WS-A): the area tributary to the bypass culvert
- Watershed B (WS-B): the area directly tributary to the lake (South Adjacent Lower Camarillo Springs Creek Watershed and South Project Development)
- Watershed C (WS-C): the area that drains to the north/east of the lake and project (East Adjacent Lower Camarillo Springs Creek Watershed and East Project Development)

JDS Civil performed hydrologic modelling of these areas and provided hydrographs for use in the floodplain analysis. The hydrographs are provided in *Appendix C*. Only hydrographs from Watersheds A and B flow through the north golf course area and to the bypass culvert and lake. The hydrographs for these two watersheds, along with onsite hydrographs from the proposed development, were entered into the XPSWMM Model to obtain the volume entering the lake. As described in Section 2.2.1, once the volume stored and retained by the lake was determined from XPSWMM, it was removed from the local lateral inflow hydrograph in the two-dimensional HEC-RAS Model.

The hydrograph for Watershed C, which flows to the east and north of the project development and will be conveyed to Conejo Creek by means of overland flow or conveyance infrastructure to be put in by others, still is connected to Conejo Creek and is therefore still encompassed in the adjusted lateral inflow

hydrograph. The portion of the hydrograph from Watershed A, which flows through the bypass culvert from the West Basin, also still flows directly to Conejo Creek and is therefore also still encompassed in the adjusted lateral inflow hydrograph. Only the lake storage volume removal changed the original lateral inflow hydrograph to produce the adjusted lateral inflow hydrograph. Peak flowrates and volumes are noted on Figure 6.

2.2.2.2 Local Sediment Production

To accommodate potential sediment and debris, calculations were prepared to quantify the volume of debris that could be generated from the Upper Camarillo Springs Watershed (WS-A). The proposed design includes multiple debris basins upstream of the bypass culvert inlet, and a trash rack to stop floating debris from entering the culvert. The volume of the basins is reserved for trapped debris, and thus is not included in the flood volume storage analysis. The debris calculation is provided to quantify the amount of storage that will be provided for debris capture upstream of the bypass culvert.

The potential debris production on the upstream watershed was calculated following the methodology described in the 2005 Ventura County report, Debris and Detention Basins. The report calculates debris production using a regression equation from a 1978 USGS publication, Erosion and Sediment Yields in the Transverse Ranges. The calculation relates debris production on a watershed to five significant parameters.

$$S_y = 1.244 + 0.828\ Log(A) + 1.382\ Log(ER) + 0.375\ Log(SF) + 0.251\ Log(FF) + 0.840\ Log(K)$$

A is the watershed area in mi^2.

ER is the elongation ratio, defined as the ratio of the diameter of a circle with the same area as the watershed to the length of the main channel of the watershed.

SF is the acres of slope failure per square mile of watershed. This value is established using a slope failure map GIS layer from the California Department of Conservation.

FF is the fire factor, is a parameter related to the recovery of vegetative cover and the time elapsed following a fire that denudes the watershed. The value of FF ranges from 88, six months after a burn, to 20, 4.5 years after a burn, to 1, 7.5 years after a burn. The parameter is used to quantify the likelihood that the design debris producing event occurs immediately following a complete watershed burn.

K is the precipitation factor, defined as the 10-day precipitation multiplied by the 24-hour precipitation squared. These values are obtained from the NOAA Atlas 14 data set for the location of the Camarillo Springs watershed.

To provide an envelope of possible values to the calculation, three different conditions were analyzed – six months after burn (FF = 88), 4.5 years after burn (FF = 20), and 7.5 years after burn (FF = 1). The sediment production was calculated for current conditions with no recent burn, and the statistically uncertain conditions presented in the 1978 USGS publication. The calculations are shown in *Appendix C*.

Note that the calculated values represent a statistical worse case situation for the quantity of debris that could possibly be produced on the watershed. The calculation does not reflect the ability of the upper watershed to transport the debris to the upper watershed outlet. The calculation does not account for intermediate storage and entrapment of any of that debris at local depressions and features within the watershed.

3 Camarillo Springs Creek Hydraulic Analysis

The proposed project is designed to create flood protection for the existing residences, and new development. A design performance requirement is that the proposed design must preserve the amount of existing Conejo Creek floodplain storage. The proposed project will occupy overbank area where there is approximately 389 ac-ft of existing Conejo Creek floodplain storage (Figure 15). The proposed project provides compensatory storage consisting of 90 ac-ft of storage in the interior lake, and increases the floodplain storage on the south golf course area by 302 ac-ft (Figure 16).

The existing conditions floodplain storage on the north golf course area and the south golf course area results from Conejo Creek overbank flow, and so the storage may be analyzed and calculated from the existing conditions Conejo Creek floodplain hydraulic models. The proposed conditions floodplain storage on the south golf course area also results from Conejo Creek overbank flow, and may be analyzed and calculated from the proposed conditions Conejo Creek floodplain hydraulic models. The proposed conditions floodplain storage on the project lake results from Camarillo Springs Creek flow that is stored before it can combine with Conejo Creek flow, so the proposed conditions lake storage is not provided by the Conejo Creek floodplain hydraulic models. The proposed conditions interior floodplain and lake storage must be analyzed with a hydraulic routing model of the Camarillo Springs Creek and the proposed drainage system. The analysis was done with an XPSWMM hydraulic routing model.

3.1 XPSWMM Hydraulic Analysis

The Camarillo Springs Creek flow diversion, bypass culvert hydraulics, and lake storage hydraulics, are evaluated with an XPSWMM dynamic hydraulic routing model. The present study used XPSWMM version 2017.1 for the analysis.

3.1.1 Hydrologic Data

The hydrograph into the East Basin and the hydrograph into the Lake were obtained from proposed condition VCRat output files, as described in Section 2 and provided in *Appendix C*.

3.1.2 Boundary Conditions

The large bypass culvert and the lake drainage culvert drain to Conejo Creek. A stage time table, representing the time varying water surface elevation in Conejo Creek during the design storm, was extracted from the Conejo Creek hydraulic models. The stage time table was applied as the downstream boundary condition for the outlets to Conejo Creek.

3.1.3 Drainage System Inlet and Debris Basins and Lake Storage

The East Basin provides 8.1 ac-ft of debris storage, and has a footprint of 3.1 ac. The West Basin, which is the inlet to the Bypass Culvert, provides 1.1 ac-ft of debris storage, and has a footprint of 0.4 ac.

The lake provides 90 ac-ft of floodplain storage as surcharge between elevation 108 ft and 114 ft, and has a footprint of 19.7 ac. Certain key dimensions and geometric data in the model are summarized in Table 3-1.

Table 3-1 Input Values for XPSWMM Model

Parameter	Road Inlet Weir	Overflow Orifice to Lake	Secondary Overflow to North	Golf Cart Tunnel at Cam. Spr Rd (10x7)	Proposed RCB Culvert (10x6)	Low Flow Pipe**
Description of Purpose in Model	Flow over Camarillo Springs Road	Overflow from West Basin to Lake	Overflow Weir from West Basin to Driving Range	Flow from East Basin to West Basin	Flow from West Basin to Conejo Creek	Low flow from East Basin to Lake
Length	160	45	100	160	3,400	220
Crest or Inverts	128	123	128*	118.6 / 117.8	119.0 / 107.7	110.0 / 106.8
Loss or Discharge Coef's	3.0	.528	3.0	0.20 / 0.44	0.20 / 0.44	-
Manning's n	-	-	-	0.013	0.013	0.014

**will be finalized in final design and based on final TTM*
***could be a sump drain, only used to drain the East Basin*

Culverts and pipes incorporated friction losses, entrance losses, and exit losses. Exit loss coefficients were calculated using the Borda-Carnot equation. Using a ratio of upstream to downstream area of one-third, the exit loss coefficient becomes 0.44. Entrance loss coefficients follow conventional published values of 0.20 corresponding to slightly rounded entrances. Interior conduit Manning's roughness values were chosen as 0.013 corresponding to concrete surfaces.

3.1.4 Model Configuration

The model layout is shown on Figure 17.

There are two inflow hydrographs. Flow from the 820 acres of the upper Camarillo Springs Creek watershed is introduced at the East Basin. Flow from hillsides and residential area adjacent to the lake are introduced directly to the lake.

Basins and the lake are represented as storage nodes. The bypass culvert, lake drainage culvert, low flow pipes, and golf car tunnel are represented as culverts. The flow path over Camarillo Springs Road is represented as weir. The flow from the basin overflow orifice to the lake is represented as an open channel. The flow from the basin secondary overflow weir is also represented as an open channel.

The general design flow mechanism is that upper Camarillo springs Watershed runoff flows into the East Basin, through the golf cart tunnel, and into the West Basin where the flow is divided, with some flow entering the bypass culvert, and some flow going through a rectangular orifice to the lake for storage. The stored surcharge on the lake flows through the lake drainage culvert to Conejo Creek after the Conejo Creek peak subsides. For storms greater than 100yr, a secondary overflow spillway from the West Basin is utilized to direct higher flows north toward the driving range. The secondary overflow spillway is also used in the case of a blockage occurring in the lake drainage culvert or the bypass culvert.

The XPSWMM model is included in *Appendix E*.

3.1.5 Drainage System and Lake Storage Model Results

During the 100-year design storm, with coincident peaks in Conejo Creek, and in Camarillo springs Creek, the 20-acre lake provides 90 ac-ft of Conejo Creek floodplain storage by surcharging and storing Camarillo Springs Creek flow volume before it can add to the Conejo Creek floodplain volume. During the storm, the lake surcharges to a maximum of 114 ft.

4 Conejo Creek Hydraulic Analysis

The Conejo Creek Floodplain hydraulics were analyzed with HEC-RAS two dimensional modelling.

4.1 Hydraulic Analysis – HEC-RAS 2D

The HEC-RAS two dimensional modelling follows guidelines from the HEC-RAS Two Dimensional Modeling User's Manual (v5.0) and the HEC-RAS Supplemental User's Manual (v5.0.4).

4.1.1 Modelled Configurations

The Conejo Creek floodplain hydraulics were modelled in two configurations: the existing conditions (no project) and the proposed conditions (with project). The 2D models are included in Appendix E.

The only differences between the existing conditions models and the proposed conditions model are the proposed grading and geometric changes along the north golf course area, the proposed grading and geometric changes along the south golf course area, and the proposed conditions lateral inflow hydrograph from Camarillo Springs Creek modified to reflect revised proposed hydrology, and the proposed drainage system and lake storage.

4.1.2 Topographic Data

The topographic data consist of digital LiDAR topographic mapping data was flown by the County of Ventura in July 2013. The topographic data was used to generate existing conditions models. The topographic data was merged with proposed conditions grading files to generate proposed conditions models. TIF files containing elevation data were developed for use in the HEC-RAS two dimensional models.

4.1.3 Model Extents

The HEC-RAS two dimensional model domain extends from just upstream of the confluence of Conejo Creek and Calleguas Creek to approximately 4,250 ft upstream of US Hwy 101. Approximately 18,800 ft of Conejo Creek is modelled in the 6.7 sq mi 2D flow area (Figure 7).

4.1.4 Inflow Hydrographs

Inflow hydrographs for the models were obtained from the FEMA effective model, and from project specific hydrologic modelling described in Section 2. The proposed conditions inflow hydrograph from Camarillo Springs Creek was modified to reflect the proposed drainage and storage system, using the XPSWMM modelling described in Section 3.

4.1.5 Land Use/Manning's Roughness

Land use data was obtained from the U.S. Geological Survey National Land Cover Database (2011). The land use information was used to define Manning's roughness in the overbanks of the model. Manning's n values associated with each land use were obtained from the HEC-RAS 2D Modeling User Manual (US Army Corps of Engineers, 2016) and Open Channel Hydraulics (Ven Te Chow, 1959). *Table 4-1* provides a list of Manning's roughness values used in the 2D model.

Table 4-1 Manning's Roughness Values per Land Use

Land Cover Definition	Manning's n
Open water	0.035
Developed, Open Space	0.040
Developed, Low Intensity	0.080
Developed, Medium Intensity	0.065
Developed, High Intensity	0.120

Land Cover Definition	Manning's n
Barren Land	0.025
Deciduous Forest	0.100
Mixed Forest	0.100
Shrub/Scrub	0.070
Grassland/Herbaceous	0.025
Pasture/Hay	0.030
Cultivated Crops	0.035
Woody Wetlands	0.065
Emergent Herbaceous Wetlands	0.065

Manning's roughness values in the channel were calibrated so the existing condition model's water surface elevations matched the effective FEMA BFEs. Manning's n values vary horizontally along the channel and range from 0.035 to 0.08.

4.1.6 Boundary Conditions

The main Conejo Creek channel inflow hydrograph is specified as the upstream boundary condition. The downstream boundary condition is a normal depth condition. Flow hydrographs are also specified as internal boundary conditions to define lateral inflows to the channel.

4.1.7 Model Parameters

The computational settings are summarized in *Table 4-2*.

Table 4-2 Computation Settings for HEC-RAS 2D Models

Computation	Setting
Computation Interval	3 seconds
Simulation Time	26 hours
Overbank Grid Cell Size	50 ft by 50 ft
Channel Grid Cell Size	15 ft by 15 ft
Number of Grid Cells	Approx. 88,000

4.1.8 Modelling Results

The existing conditions and the proposed conditions flow depths, flow velocities, depth differentials, and velocity differentials are presented in Figure 8 – Figure 14. The exhibits show the calculated changes to the Conejo Creek depth and velocity that would result from the proposed project.

Flow Depth Analysis Results

The existing and proposed conditions flow depth exhibits depict the deepest flow depth that occurs for each HEC-RAS 2D element at any time in the design storm analysis. The flow depth exhibits also show the greatest extents of the surface water during the design storm. As can be seen by comparing the flood depth exhibits for the existing and proposed conditions, Figure 8 and Figure 9, the peak flow depths do not change significantly outside of the project boundary on the properties upstream or downstream of the project, or on the properties west of the project. Any changes to the floodplain extents are not detectable at the FEMA map scale.

Comparing the existing and proposed conditions flow depth exhibits, changes to the flow depths and extents can be seen within the Camarillo Springs project site. The changes within the north golf course area reflect onsite project grading and fill, and also the onsite floodplain storage of flow generated on the local watershed. The exhibits also show the reduction in the peak WSEL within the main project area, and removal of the 100-year floodplain from more than 150 residential homes along the southern edge of the

golf course. The comparison also shows the increase in overbank floodplain storage depth on the south golf course area.

Flow Depth Impacts

The flow depth differential exhibit, Figure 10, shows the flow depth changes, calculated as the proposed conditions depth minus existing conditions depth. The figure shows the significant depth increases, by design, on the project property on the south golf course area. Only very slight increases in the modelled flow depth occur anywhere in the Conejo Creek channel, or on adjacent overbank areas through the entire study reach. Absolute flow depth increases of less than 0.1 ft, are shown in the Conejo Creek channel and on all offsite overbank areas throughout the entire project study area. There are several observations that indicate that these are not substantial impacts.

- These slight differences from the models are on the same order of magnitude as the hydraulic model convergence tolerance, and so are at the low limit of the model ability to reliably calculate.
- The small differences are calculated using a hypothetical large storm event that is very rare.
- The differences are not sustained, and would only occur during a short time.
- In actual field conditions, these changes are not measurable in elevation.
- These changes also do not cause any change to mapped floodplain extents.

These slight depth changes, are essentially calculated artifacts, but are not changes that would be visible or measurable. These changes are not significant impacts to the Conejo Creek floodplain, or to surrounding properties.

Flow Velocity Analysis Results

The existing and proposed conditions flow velocity fields are shown on Figure 11, and Figure 12. The exhibits depict the grid averaged velocity field in Conejo Creek at the peak of the hydrographs. Comparison of the flow velocity exhibits for the existing and proposed conditions reveal that there are minor changes to the velocity outside of the project property, with some larger velocity changes within the project property, on the south golf course storage area. The exhibits also show the north part of the project area, including more than 150 existing homes, with no velocity in proposed conditions.

The HEC-RAS 2D modelling reveals velocity components in two dimensions. Small changes to the velocity field reflect circulation, and lateral flow on the main Conejo Creek channel and overbank floodplain. These small differences represent various local flow velocity directions, not generally in the downstream direction. These differences do not cumulatively represent overall channel flow velocity, in the downstream direction, that would be calculated with HEC-RAS one dimensional modelling typically used for design and FEMA floodplain mapping.

Flow Velocity Impacts

The flow velocity differential, Figure 13, shows the flow field localized velocity changes, calculated as the proposed conditions flow velocity minus the existing conditions velocity. The figure shows that there are minor increases to the velocity offsite areas. Absolute velocity increases are less than 0.5 ft/sec everywhere, except for a few isolated spots. Most of the area shows no increase in velocity.

The impacts of any calculated changes in velocity are examined by considering if the flow could cause erosion. The National Engineering Handbook recommends allowable sustained velocity design values of 2 ft/sec to 10 ft/sec. For the study reach, a peak velocity of 4 ft/sec was used, as recommended by the County for a threshold of significance. This threshold value is used to calculate possible velocity impacts of significance, as shown in the flow velocity differential exhibit in Figure 14. The impacts threshold is chosen as the condition where the velocity in existing conditions is below 4 ft/sec, but the velocity in

proposed conditions is above 4 ft/sec. It can be seen from Figure 14 that the project does not impact offsite areas by creating new areas of erosive conditions.

There are only a few scattered cells that are shown with the impacts condition, but they are all surrounded by large areas of no color. Isolated spots indicate localized, transient model peaks. Such areas do not indicate velocity differences that could be expected and measured in field conditions.

The velocity field results are from two dimensional modelling. This should be kept in mind when considering and comparing point by point values with small differences, as shown in Figure 11 – Figure 14. The changes are calculated by localized values which may be in any direction streamwise or laterally. These changes can represent variation in lateral flow or circulation, but do not cumulatively represent an increase in downstream flow velocity, and would not be calculated as a velocity change using a HEC-RAS one dimensional model generally used for design and FEMA mapping. These small changes can also arise from dynamic modelling oscillation. Such oscillations will generally be different, point by point, in different models, and will then show up as a small calculated difference through much of the flow field. Note that the area with a small increase in velocity extends well upstream of US Hwy 101 for some distance, where no project impacts to velocity can realistically occur.

There are several observations that indicate that the velocity field differences are not substantial impacts.

- The absolute velocity differences are generally less than 0.5 ft/sec.
- At least part of the calculated differences are caused by localized circulation, lateral flow, and dynamic model oscillations.
- The differences are not sustained and would only occur for a short time.
- The differences do not cause new areas to be in a possible erosive condition.
- The slight differences are calculated using a hypothetical large storm that is very rare.

These slight velocity field differences, are not changes that would be visible or measurable. These differences are transient conditions calculated during a hypothetical large, rare, storm event. These changes are not significant impacts to the Conejo Creek floodplain, or to surrounding properties.

5 Final Design Considerations

The proposed project design has been analyzed and developed to an advance level so that many hydrologic, hydraulic, design, and operational details are known. The hydraulic performance, and floodplain conditions are understood in advance of final design. During final design, many additional details will be established for the construction drawings, and for the project operations and maintenance. Some larger project components are specifically discussed.

5.1.1 Bypass Culvert and Inlet Debris Basins

The bypass culvert has been sized and designed to convey part of the flow from the upper Camarillo Springs watershed, to Conejo Creek. Precise outlet details and outfall erosion protection will be established during final design, as part of the construction documents.

The inlet and debris basins have been sized to capture the largest possible volume of debris that could be generated on the upper Camarillo Springs watershed. The exact grading and configuration of the basins, and debris deposition profile, will be refined at the design stage to ensure that the basins meet county design standards for debris basins.

5.1.2 Lake Storage and Lake Outlet

The lake feature within the north area has been sized and designed to provide overflow storage and detention for additional flows from the surrounding areas, before they reach Conejo Creek. Flows entering the lake are comprised of runoff from the adjacent lower Camarillo Springs watershed and residential areas to the south of the property, runoff from the southerly half of the new proposed development, and the portion of flows from the upper Camarillo Springs watershed that did not enter the bypass culvert. The upper watershed flows enter the lake via a low-flow pipe or overflow orifice.

The lake has been designed to provide storage for the flows during large storm events above what is the normal operating water surface elevation of the lake feature. A lake outlet will then release the flood storage after the storm has passed. It has been designed for gravity drainage to Conejo Creek. Exhibit 1 in *Appendix D* shows the lake grading and proposed lake outlet. The precise grading and outlet configuration, which will be established during final design, will allow the storage volume to drain within the time required by The Ventura County Watershed Protection District.

5.1.3 South Golf Course Area Storage

The south golf course storage area is shown in Figure 16, and with grading in Exhibit 2 in *Appendix D*. The area provides some Conejo Creek floodplain storage in existing conditions. Project grading and design increase the overbank storage in that area in proposed conditions. The area is designed to provide storage for larger flow events, but is graded to drain passively back to the Conejo Creek channel. The precise grading for the inlet and outlet configuration, which will be established during final design, will allow the storage volume to drain within the time required by The Ventura County Watershed Protection District.

Engineered bank protection, which may be buried, will provide integrity to the inflow and outflow between the main Conejo Creek channel, and the golf course storage area and protect against erosion. A drainage easement over the storage and conveyance areas may be established to ensure that the storage volume is maintained. Maintenance activities on the storage area will be under the jurisdiction of a public entity.

6 Conclusions

The proposed Camarillo Springs project hydraulics have been analyzed, incorporating proposed conditions hydrology, using an XPSWMM hydraulic routing model. The Conejo Creek floodplain hydraulics have been analyzed, in existing conditions and in proposed conditions, using a HEC-RAS 2D dynamic floodplain model. The study shows that the proposed project development will be protected from the FEMA 100-year floodplain, and more than 150 existing residences will be removed from the current FEMA floodplain. The study also shows that the proposed project preserves the amount of existing Conejo Creek floodplain volume.

6.1 Hydraulic Analysis and Floodplain Mapping Summary

- Currently, the Camarillo Springs Golf Course north area is located within a 100-year FEMA floodplain resulting from combined Camarillo Springs Creek flow and Conejo Creek overbank flow.
- Currently, there are 89 existing residential structures located within the 100-year FEMA floodplain to the southwest of the golf course (generally near Margarita Avenue), and 65 existing residential structures located within the 100-year FEMA floodplain to the south of the golf course (generally near Irena Avenue). This is a total of 154 homes.
- The project development includes a flood barrier that will remove 127 entire lots and 27 residential structures from the 100-year Conejo Creek FEMA floodplain.
- The HEC-RAS 2D model results indicate that outside of the project property, extremely small differences in depth between existing conditions and proposed conditions are on the order of precision of the model and are not detectable at the FEMA map scale.
- No design alterations or mitigation measures are necessary for the extremely small depth variations.
- The HEC-RAS 2D model results indicate that outside of the project property, small variations in velocity are present, however, the variations do not result in erosive velocities on significant or contiguous area.
- No design alterations or mitigation measures are necessary for such small isolated transient patches.
- The project as proposed has been designed to achieve a condition of less than significant impacts to floodplain area, depth, velocity, and erosive conditions.

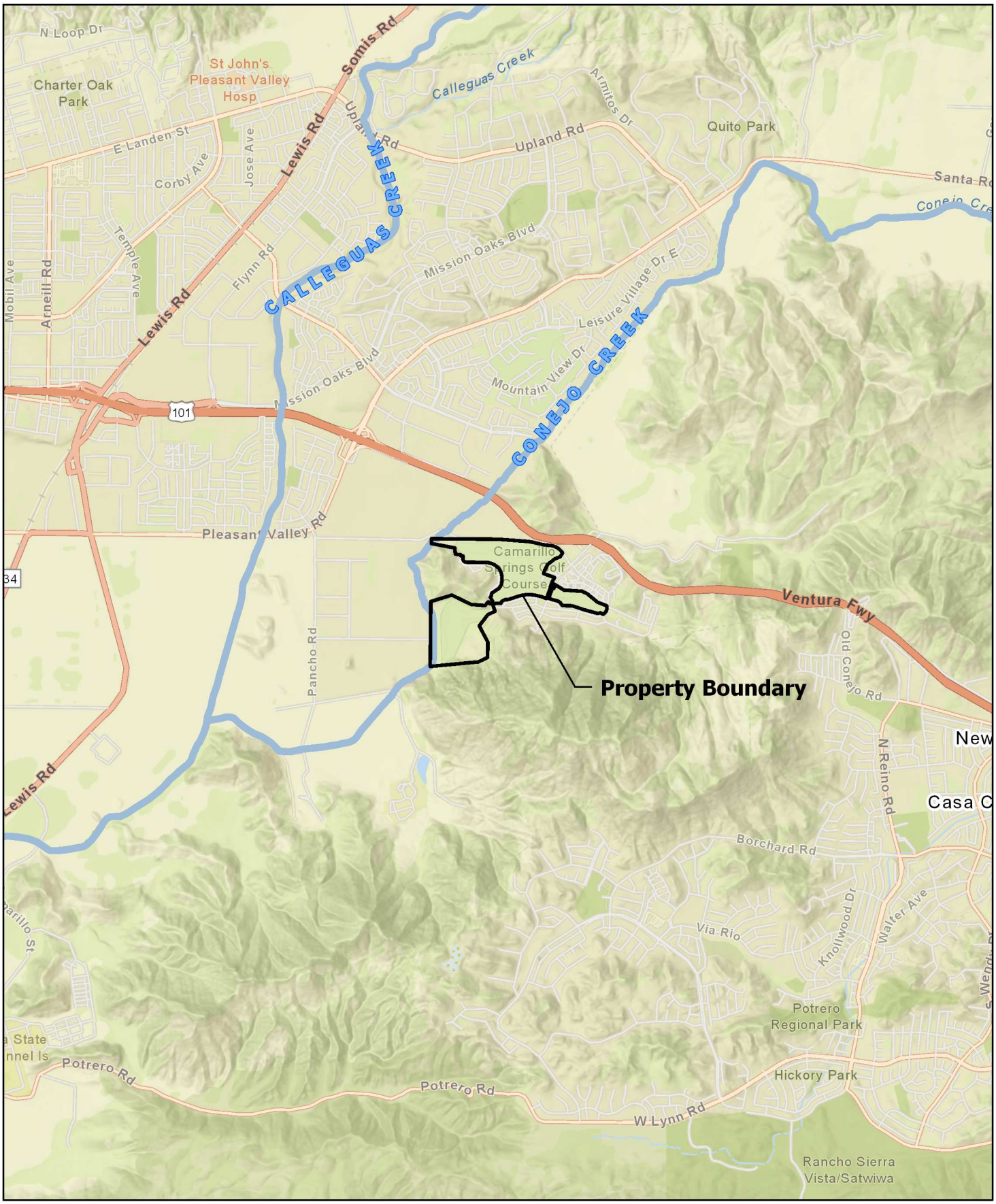
6.2 Conejo Creek Floodplain Storage

- Floodplain storage consist of Conejo Creek flow from upstream of project, and from Camarillo Springs Creek flow added to Conejo Creek flow.
- In proposed conditions, part of Conejo Creek floodplain storage consists of Camarillo Springs Creek flow, which is captured and stored before it merges with Conejo Creek
- In proposed conditions, part of Conejo Creek floodplain storage consists of additional overbank storage on south golf course area, greater than in existing conditions, created by project grading.
- In proposed conditions, the lake floodplain storage will drain within the time specified by VCWPD design standards.
- In proposed conditions, the south golf course area floodplain storage is above adjacent Conejo Creek flowline, and will drain within the time specified by VCWPD design standards.
- Overbank area between Conejo Creek and south golf course storage will incorporate design features to maintain flow corridor and ensure overbank storage.

Storage volume balances are provided in Figures 15 and 16, and proposed grading of the north golf course area, including the west basin and east basin, and the south golf course area are provided in *Appendix D*.

PACE
Advanced Water Engineering

Figures



CAMARILLO SPRINGS

VICINITY MAP

PACE Advanced Water Engineering

0 2,000 4,000 8,000 Feet

Date: 10/31/2018

Job Number: B306

Figure 1



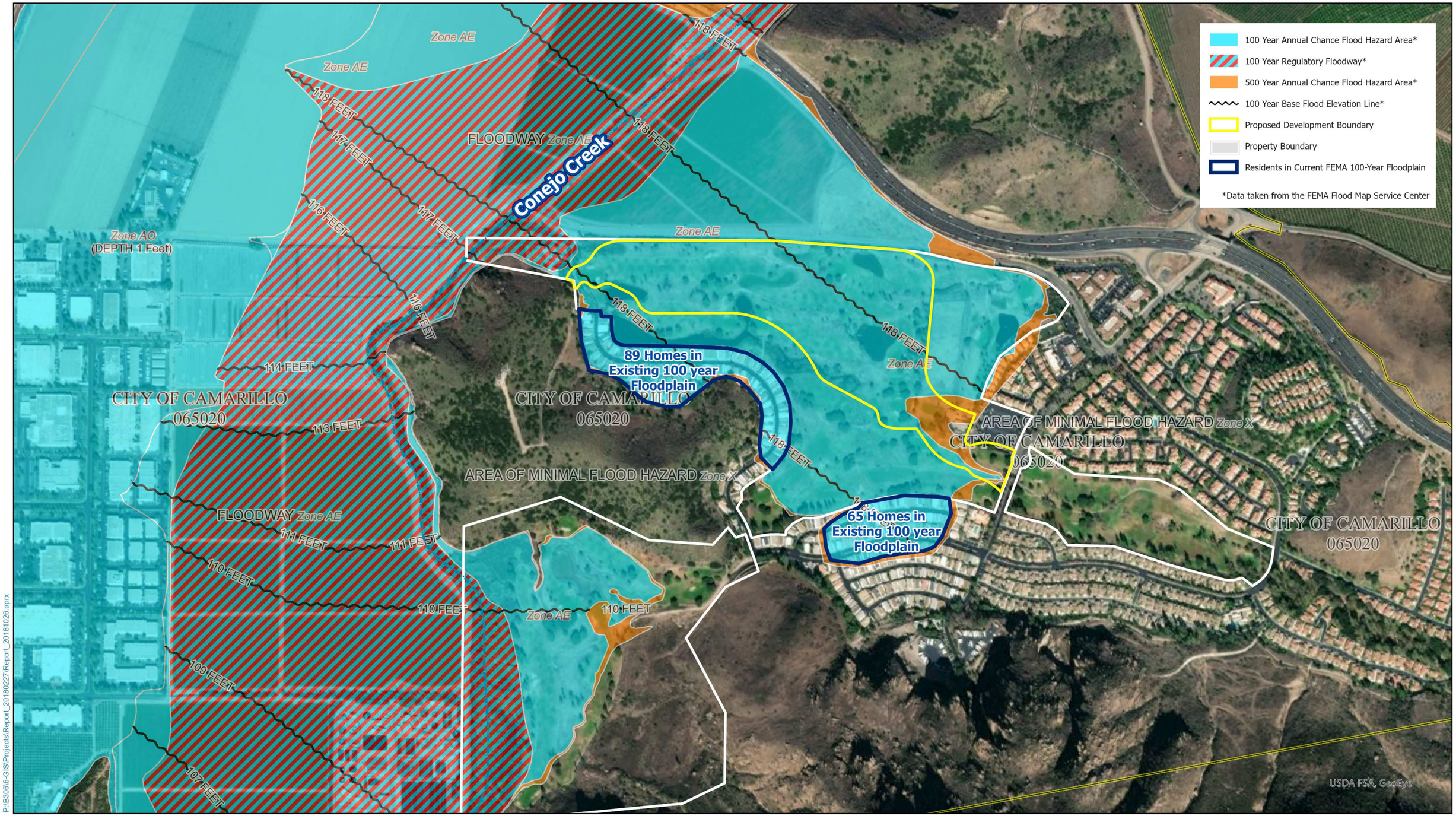
Camarillo Springs | Overall

Landscape Concept Plan

30 August 2017

burton

Figure 2



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CAMARILLO SPRINGS

EFFECTIVE FEMA FLOODPLAIN

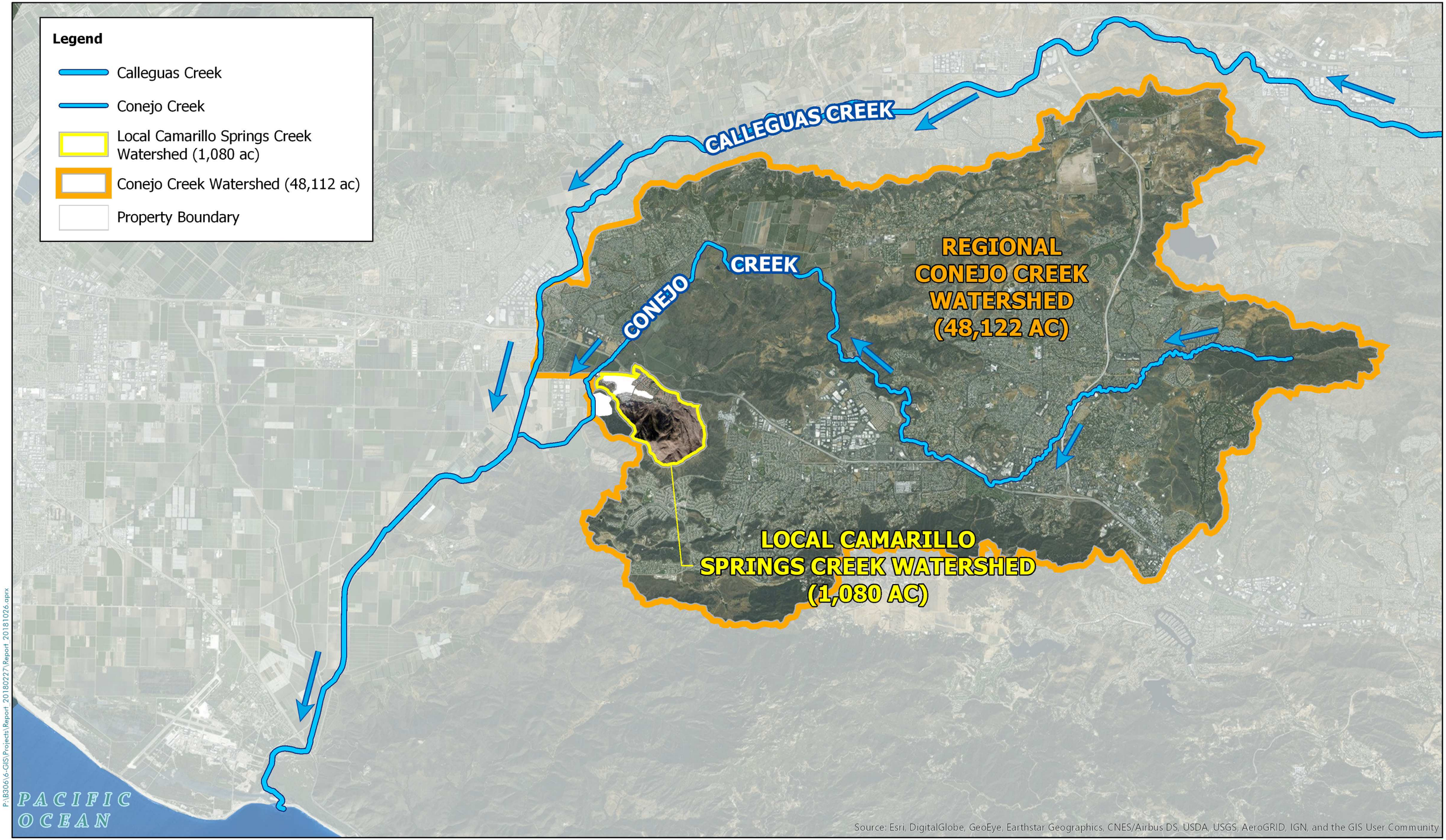
PACE Advanced Water Engineering

0 300 600 1,200 Feet

Date: 8/26/2020

Job Number: B306

Figure 3



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CAMARILLO SPRINGS

REGIONAL & LOCAL WATERSHED HYDROLOGY MAP

PACE Advanced Water Engineering

0 0.75 1.5 3 Miles

Date: 10/29/2018

Job Number: B306

Figure 4

WS-C
120 ac

WS-B
140 ac

WS-A
820 ac

Legend

- Conejo Creek
- Camarillo Springs Watershed (1080 ac)

Proposed Condition Development Watersheds

- Upper Camarillo Springs Watershed (820 ac) (Drains primarily to bypass culvert with low flows to lake storage)
- South Adjacent Camarillo Springs Watershed (140 ac) (Drains to lake storage)
- East Adjacent Camarillo Springs Watershed (120 ac) (Drains to north near driving range)
- Proposed Development (32 ac)

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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CAMARILLO SPRINGS

PROPOSED CONDITION DRAINAGE MAP

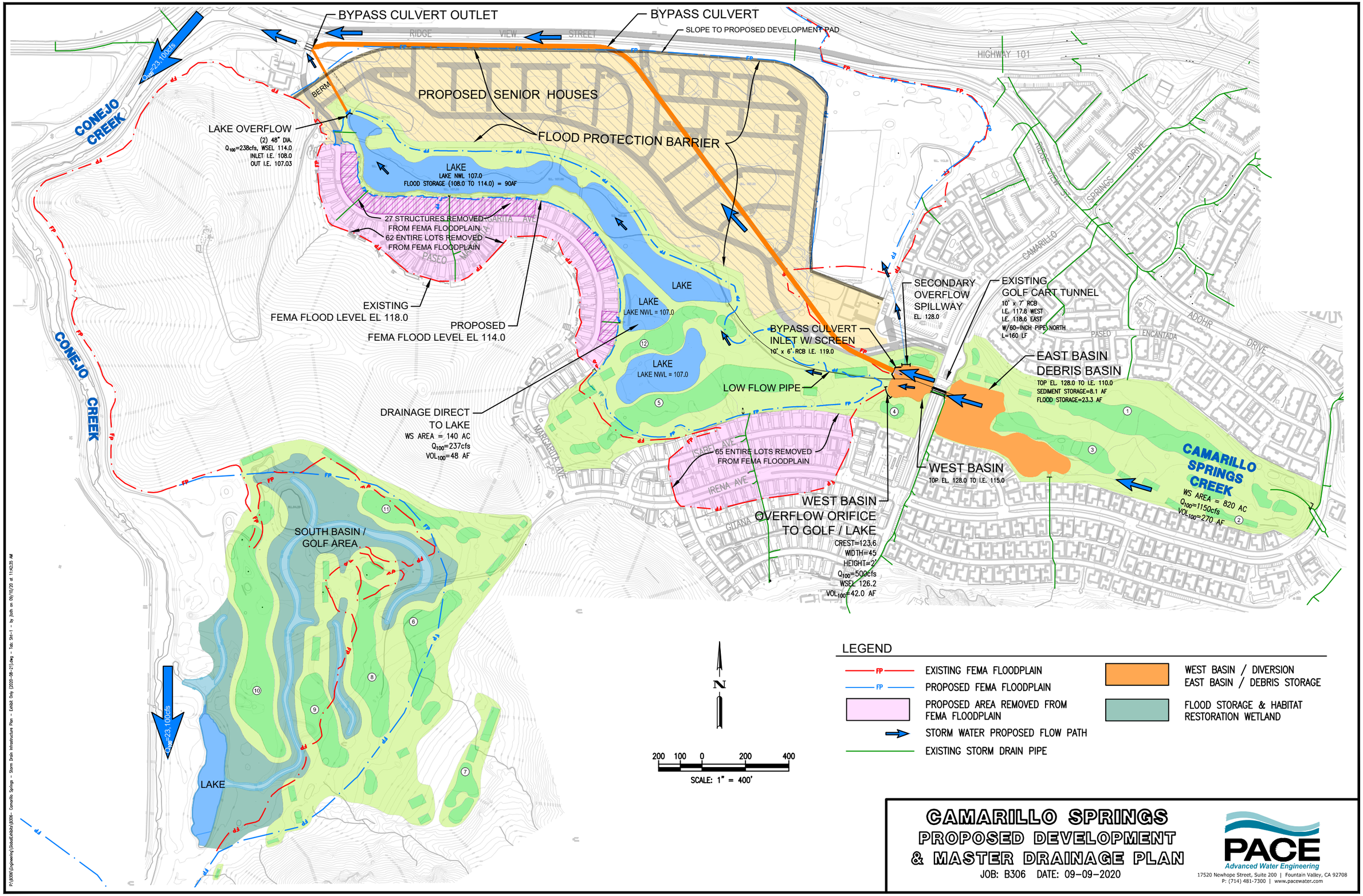
PACE Advanced Water Engineering

0 500 1,000 2,000 Feet

Date: 7/16/2020

Job Number: B306

Figure 5

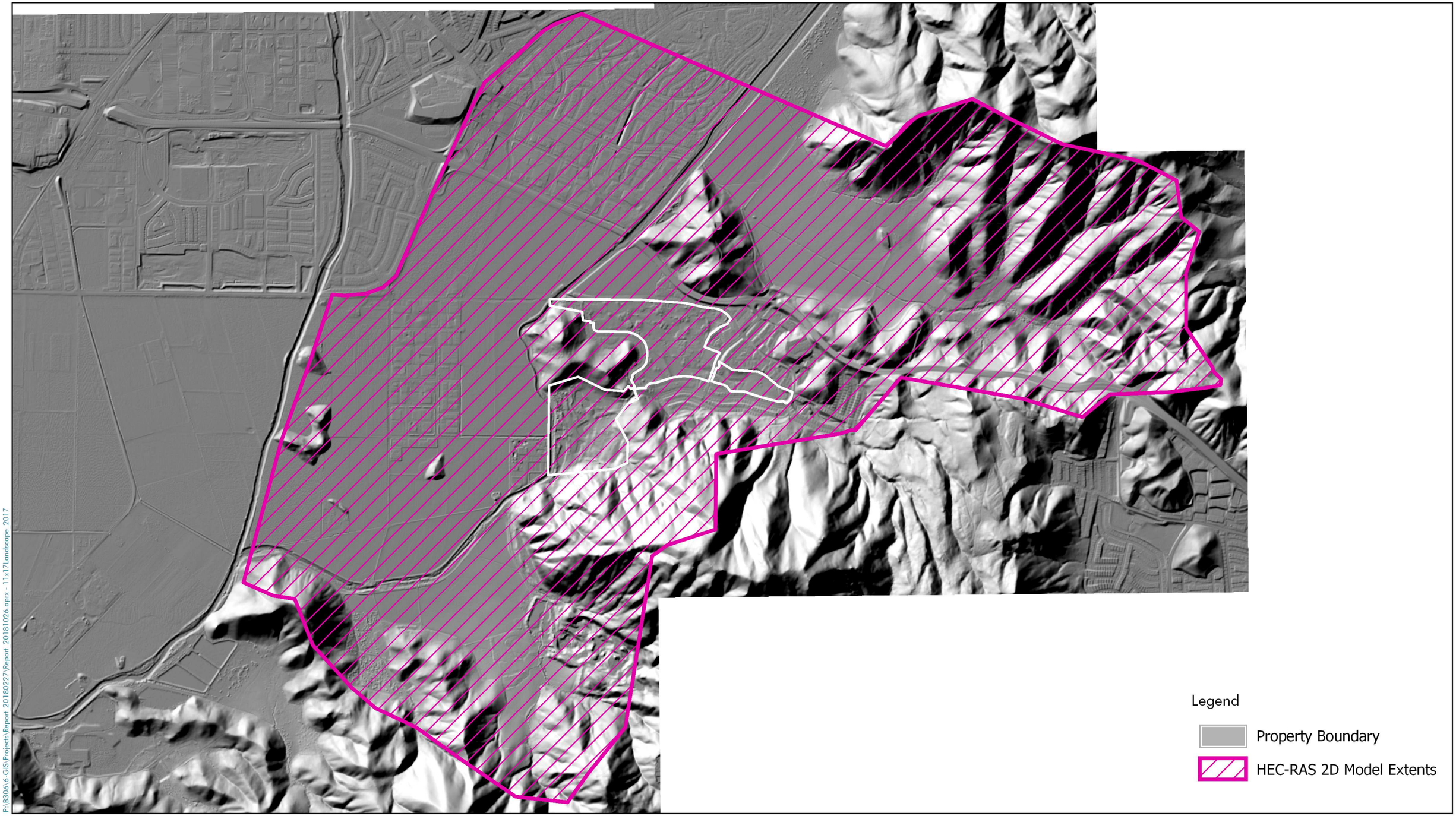


CAMARILLO SPRINGS
PROPOSED DEVELOPMENT & MASTER DRAINAGE PLAN

JOB: B306 DATE: 09-09-2020

PACE
Advanced Water Engineering
17520 Newhope Street, Suite 200 | Fountain Valley, CA 92708
P: (714) 481-7300 | www.pacewater.com

P:\B306\Engineering\Exhibits\B306- Camarillo Springs - Storm Drain Infrastructure Plan - Exhibit Only (2020-08-21).dwg - Tab: SM-1 - by Josh on 09/10/20 at 11:42:35 AM



P:\B306\6-GIS\Projects\Report 20180227\Report 20181026.aprx - 11x17Landscape 2017

CAMARILLO SPRINGS

HEC-RAS 2D MODEL EXTENTS

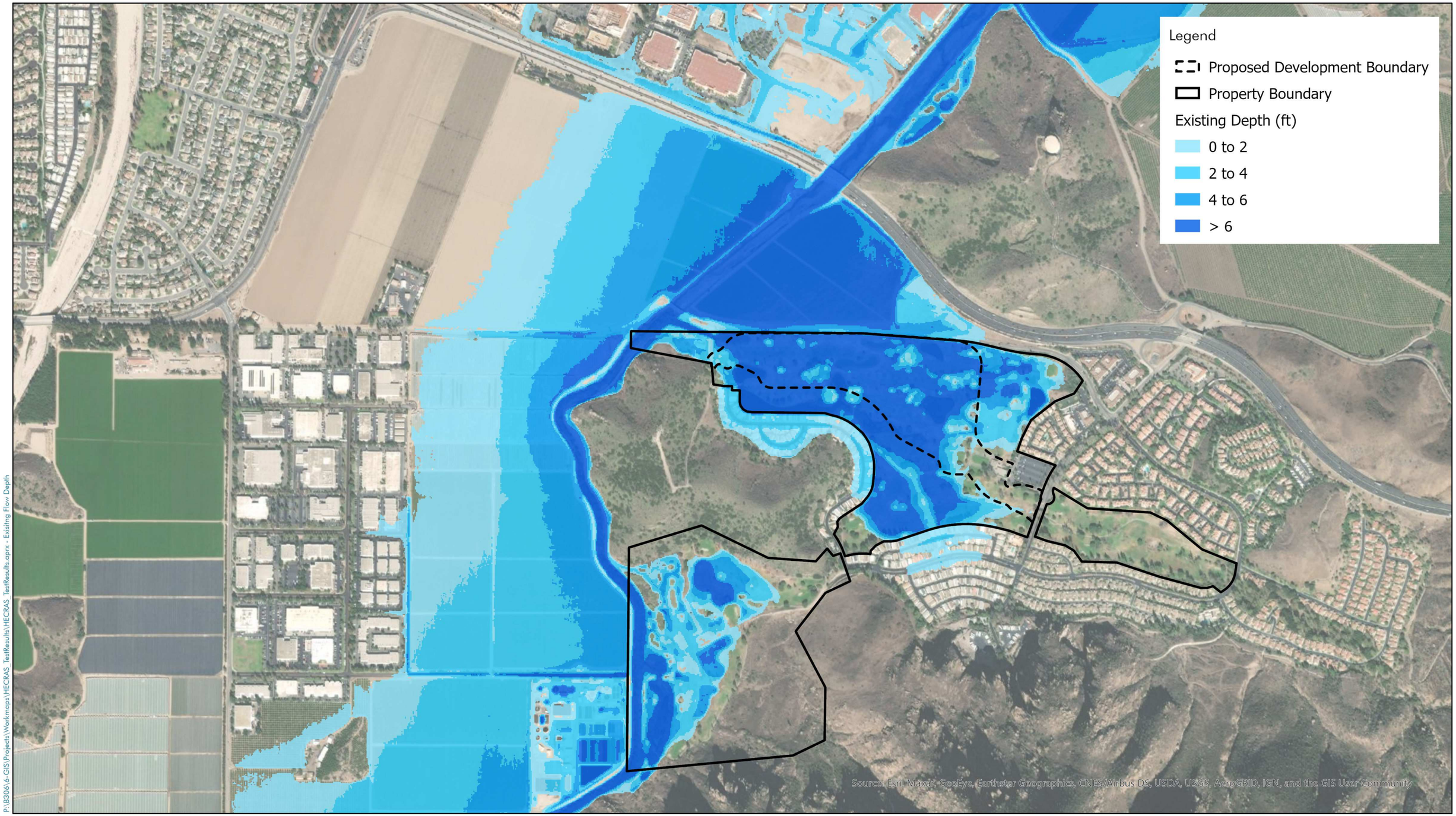
PACE Advanced Water Engineering

0 1,000 2,000 4,000 Feet

Date: 10/29/2018

Job Number: B306

Figure 7



P:\B306\6-GIS\Projects\Workmaps\HECRAS_TestResults\HECRAS_TestResults.aprx - Existing Flow Depth

CAMARILLO SPRINGS

HEC-RAS 2D
EXISTING CONDITIONS PEAK FLOW DEPTH (100-YEAR)

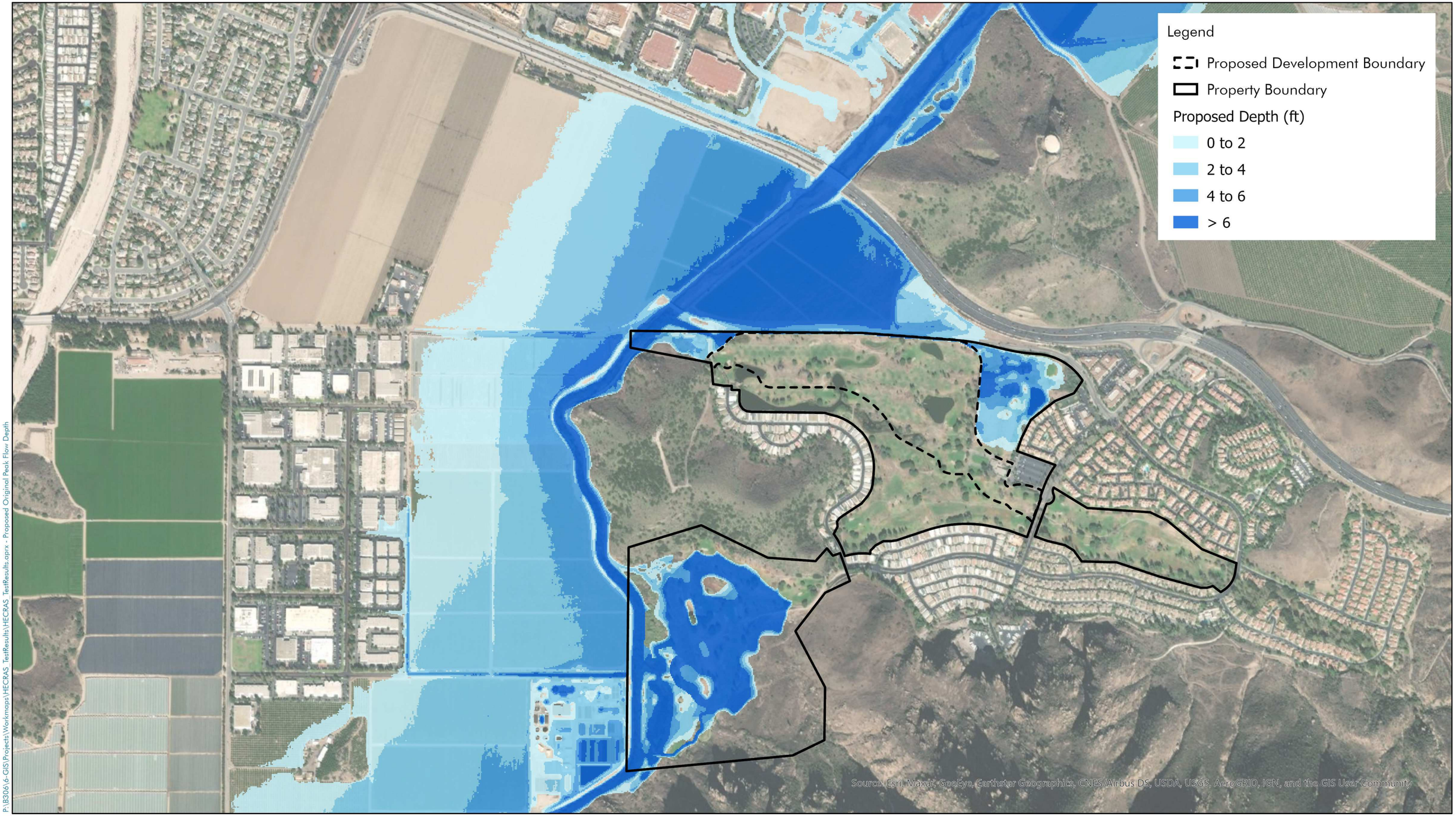
PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 8



P:\B306\6-GIS\Projects\Workmaps\HECRAS_TestResults\HECRAS_TestResults.aprx - Proposed Original Peak Flow Depth

CAMARILLO SPRINGS

HEC-RAS 2D
PROPOSED CONDITIONS PEAK FLOW DEPTH (100-YEAR)

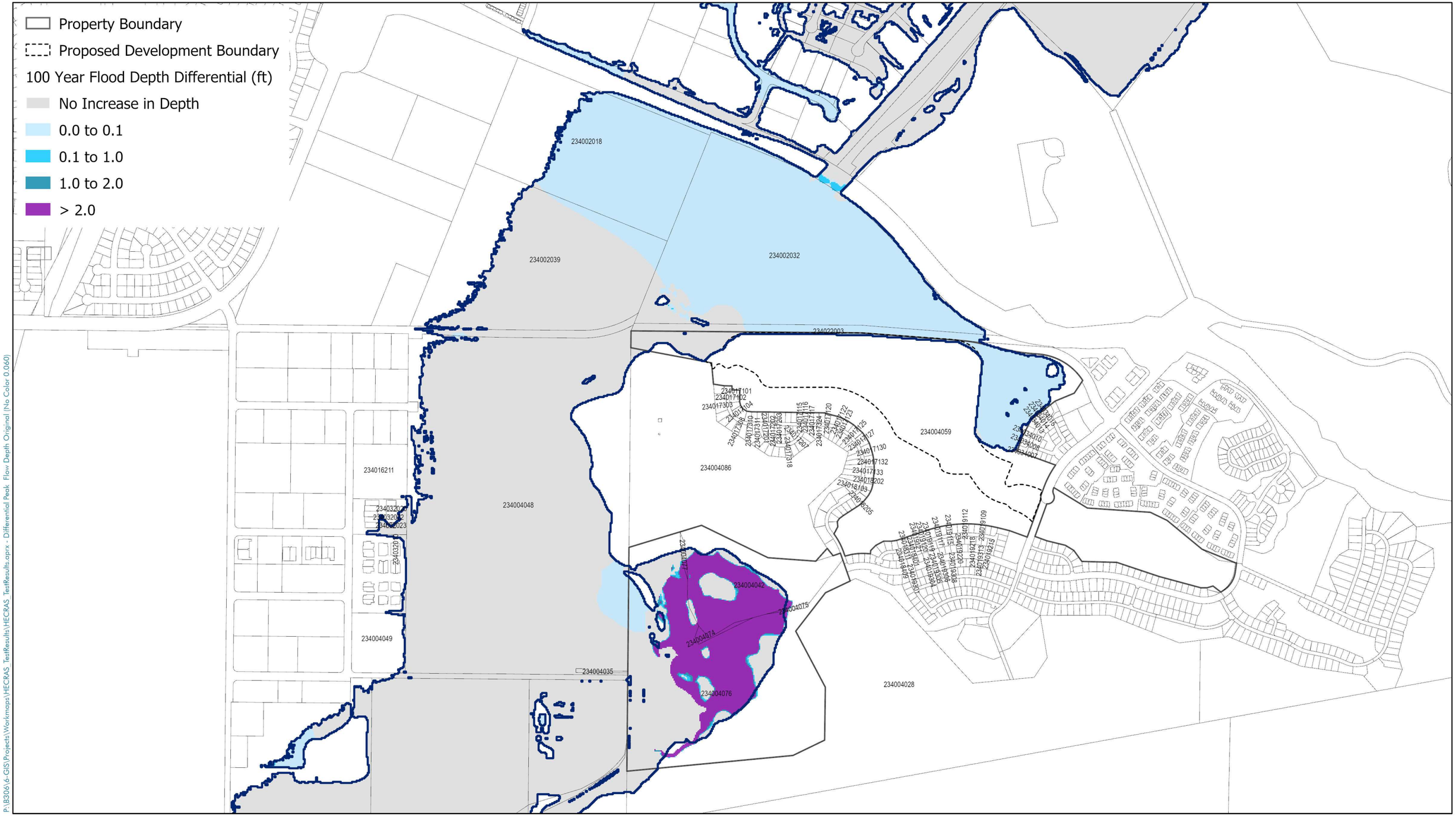
PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 9



P:\B306\6-GIS\Projects\Workmaps\HECRAS TestResults\HECRAS TestResults.aprx - Differential Peak Flow Depth Original (No Color 0.060)

CAMARILLO SPRINGS

HEC-RAS 2D
FLOW DEPTH DIFFERENTIAL (100-YEAR)

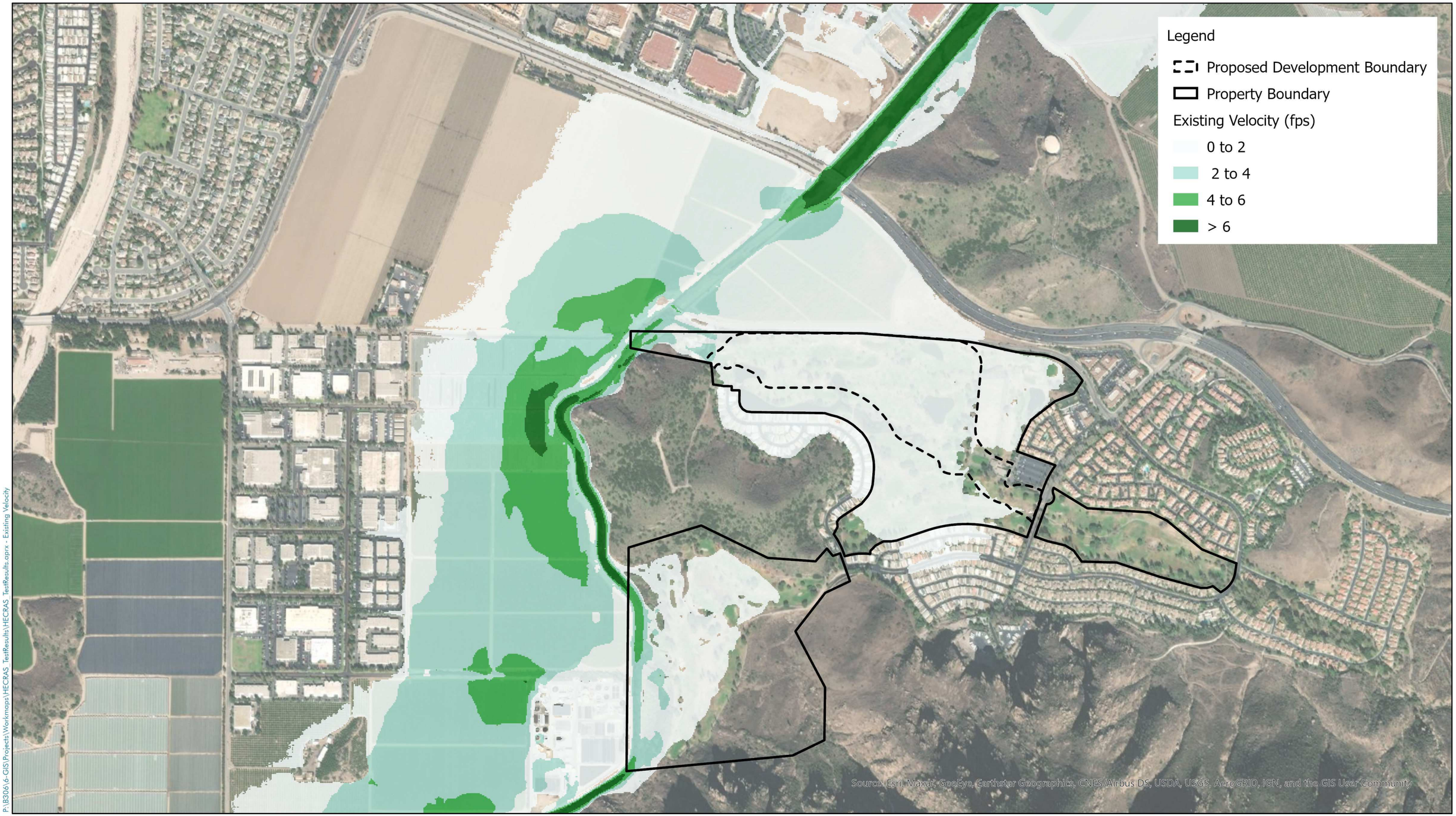
PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 10



P:\B306\6-GIS\Projects\Workmaps\HECRAS_TestResults\HECRAS_TestResults.aprx - Existing Velocity

CAMARILLO SPRINGS

HEC-RAS 2D
EXISTING CONDITIONS PEAK VELOCITY (100-YEAR)

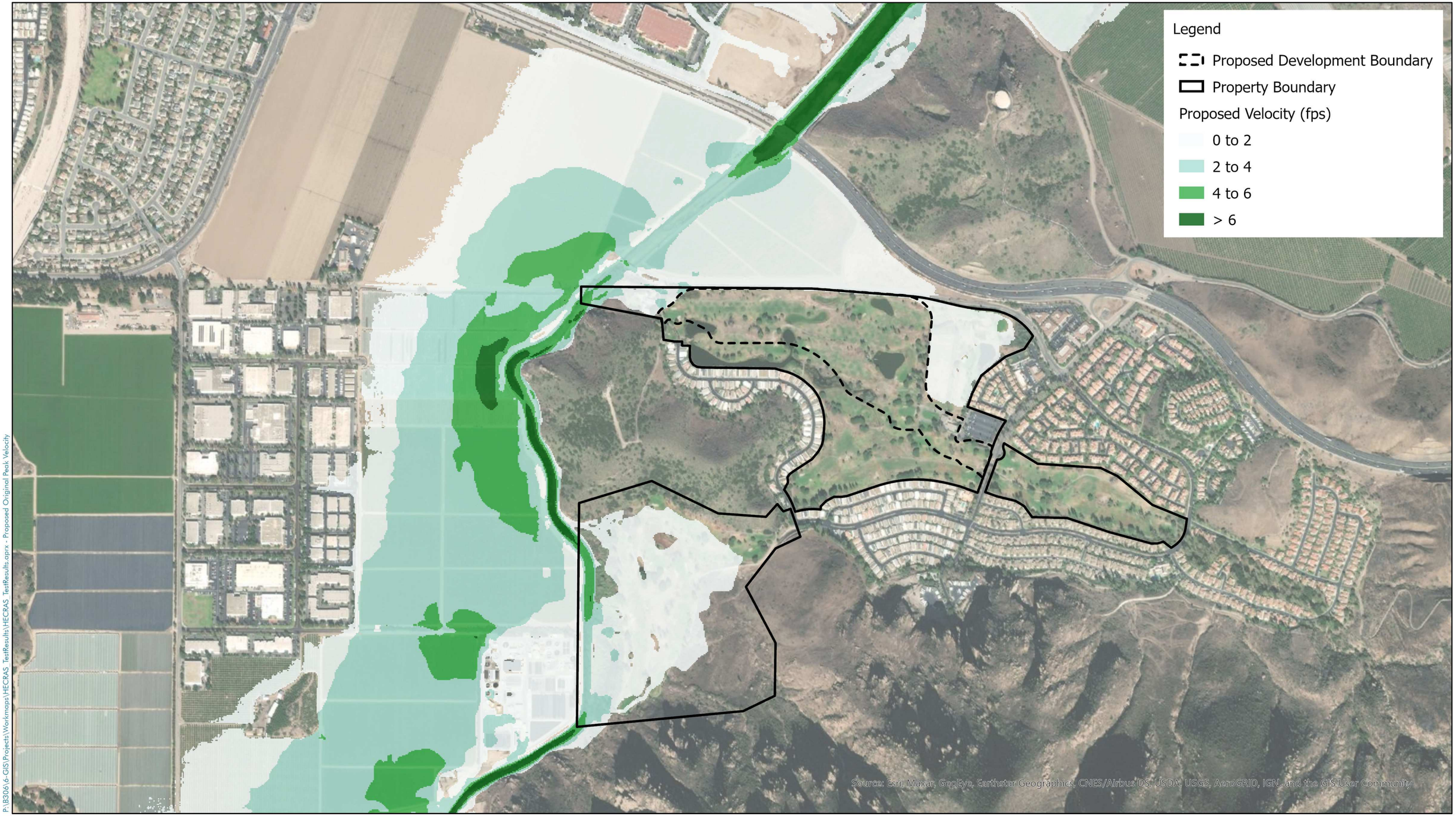
PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 11



P:\B306\6-GIS\Projects\Workmaps\HECRAS_TestResults\HECRAS_TestResults.aprx - Proposed Original Peak Velocity

CAMARILLO SPRINGS

HEC-RAS 2D
PROPOSED CONDITIONS PEAK VELOCITY (100-YEAR)

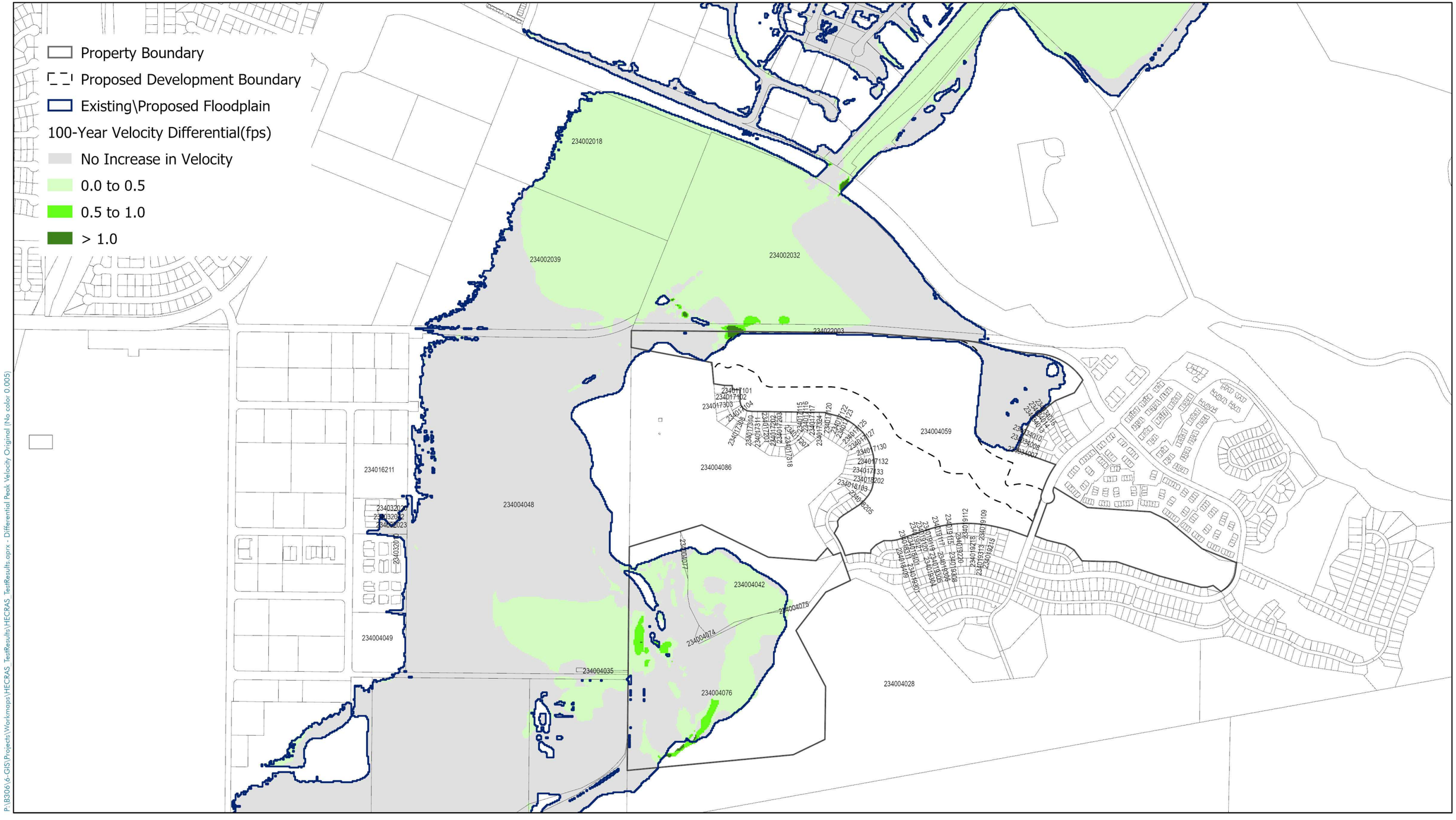
PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 12



CAMARILLO SPRINGS

HEC-RAS 2D
PEAK VELOCITY DIFFERENTIAL (100-YEAR)

PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 13

Property Boundary

Proposed Development Boundary

Existing\Proposed Floodplain

100-Year Velocity Differential(fps)

Proposed < 4FPS Existing > 4 FPS

234002018

234002039

234002032

234022003

234004059

234004086

234016211

234004048

234004049

234004042

234004075

234004074

234004035

234004076

234004028

P:\B306\6-GIS\Projects\Workmaps\HECRAS_TestResults\HECRAS_TestResults.aprx - Differential Peak Velocity Original (No color 0.005) 4 fps Threshhold

CAMARILLO SPRINGS

HEC-RAS 2D

PEAK VELOCITY DIFFERENTIAL - 4 FPS THRESHOLD (100-YEAR)

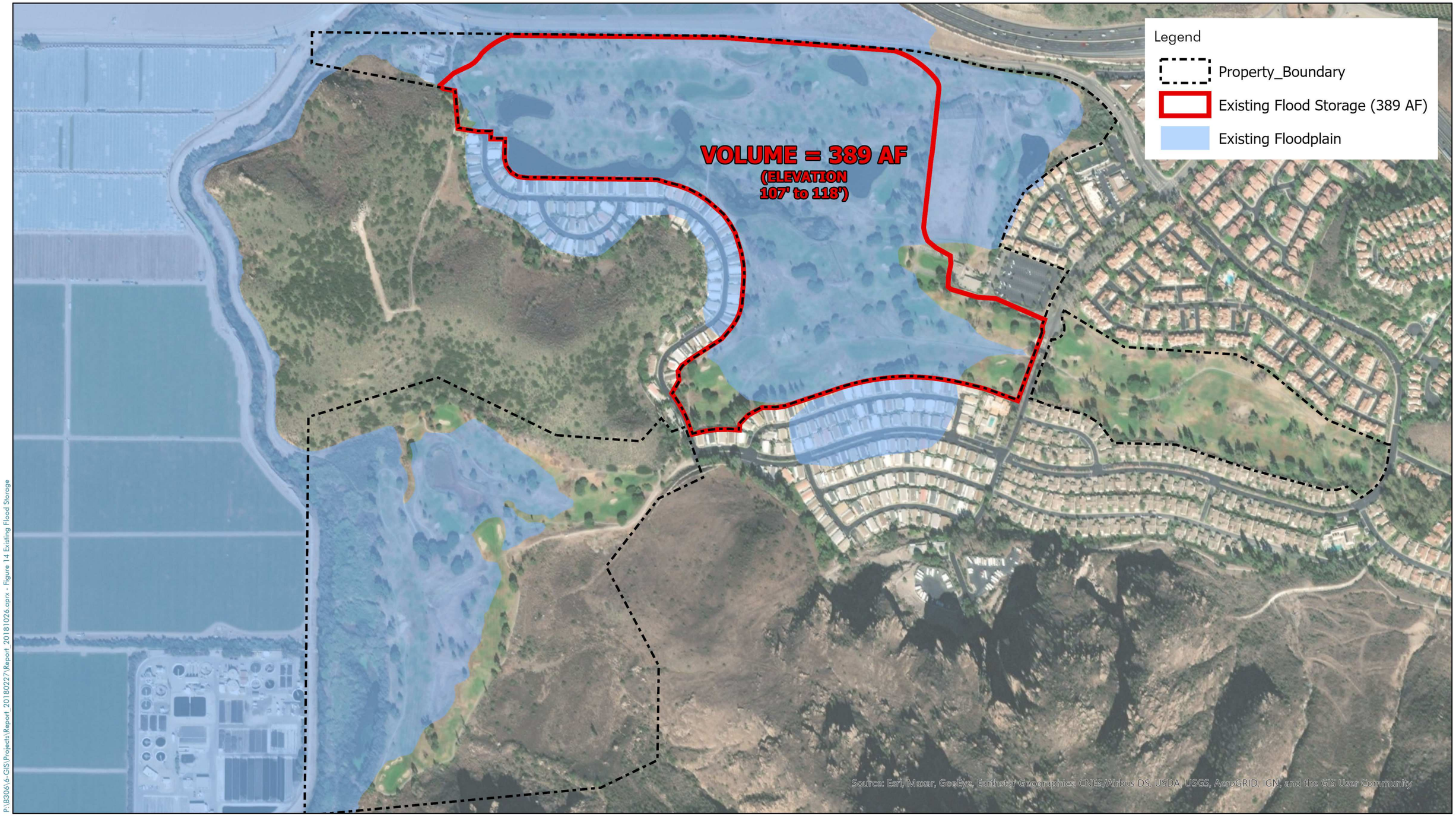
PACE Advanced Water Engineering

0 400 800 1,600 Feet

Date: 7/16/2020

Job Number: B306

Figure 14



P:\B306\6-GIS\Projects\Report_20180227\Report_20181026.aprx - Figure 14 Existing Flood Storage

CAMARILLO SPRINGS

EXISTING FLOOD STORAGE (100-YEAR)

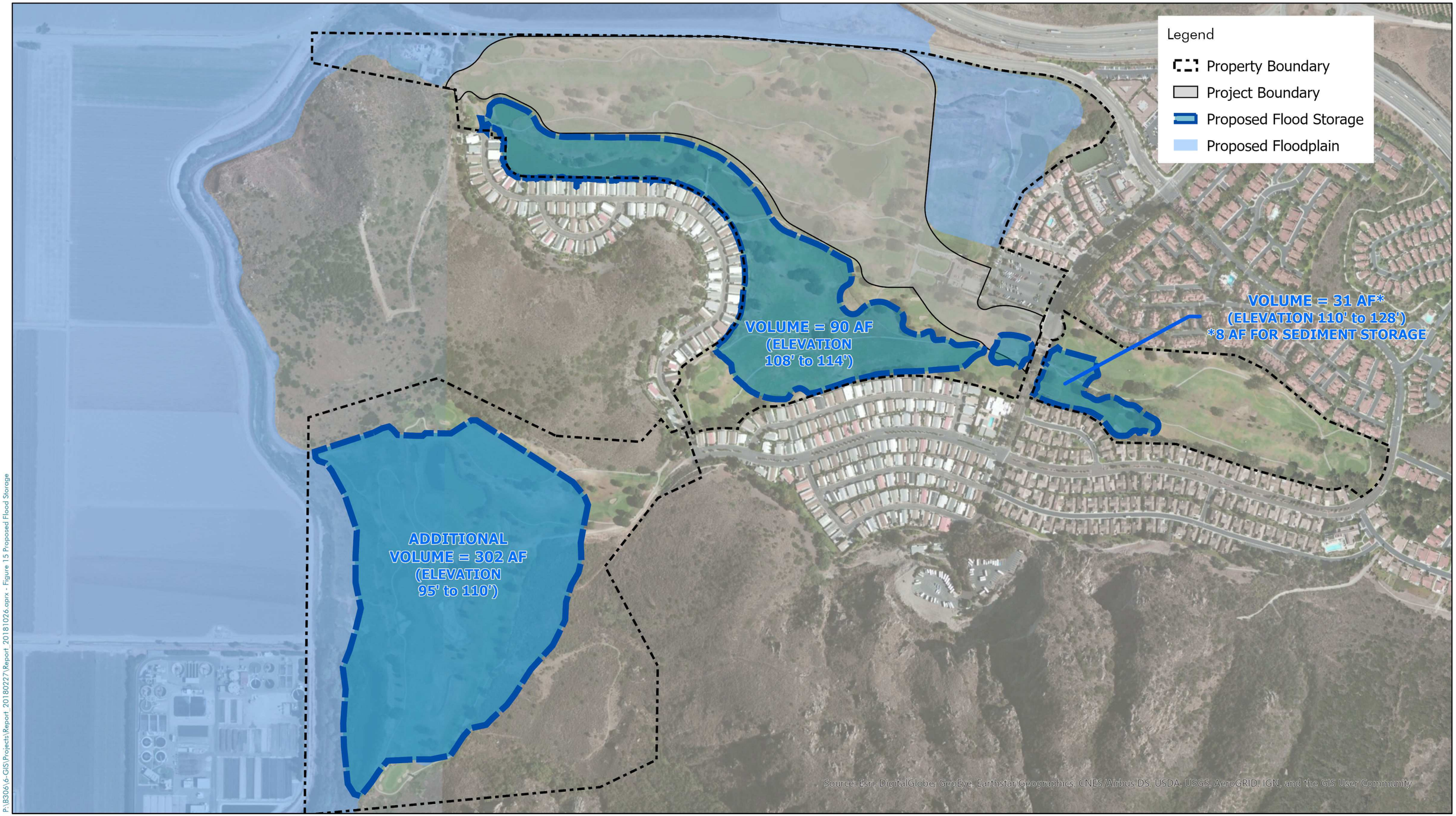
PACE Advanced Water Engineering

0 225 450 900 Feet

Date: 7/16/2020

Job Number: B306

Figure 15



P:\B306\6-GIS\Projects\Report_20180227\Report_20181026.aprx - Figure 15 Proposed Flood Storage

CAMARILLO SPRINGS

PACE Advanced Water Engineering

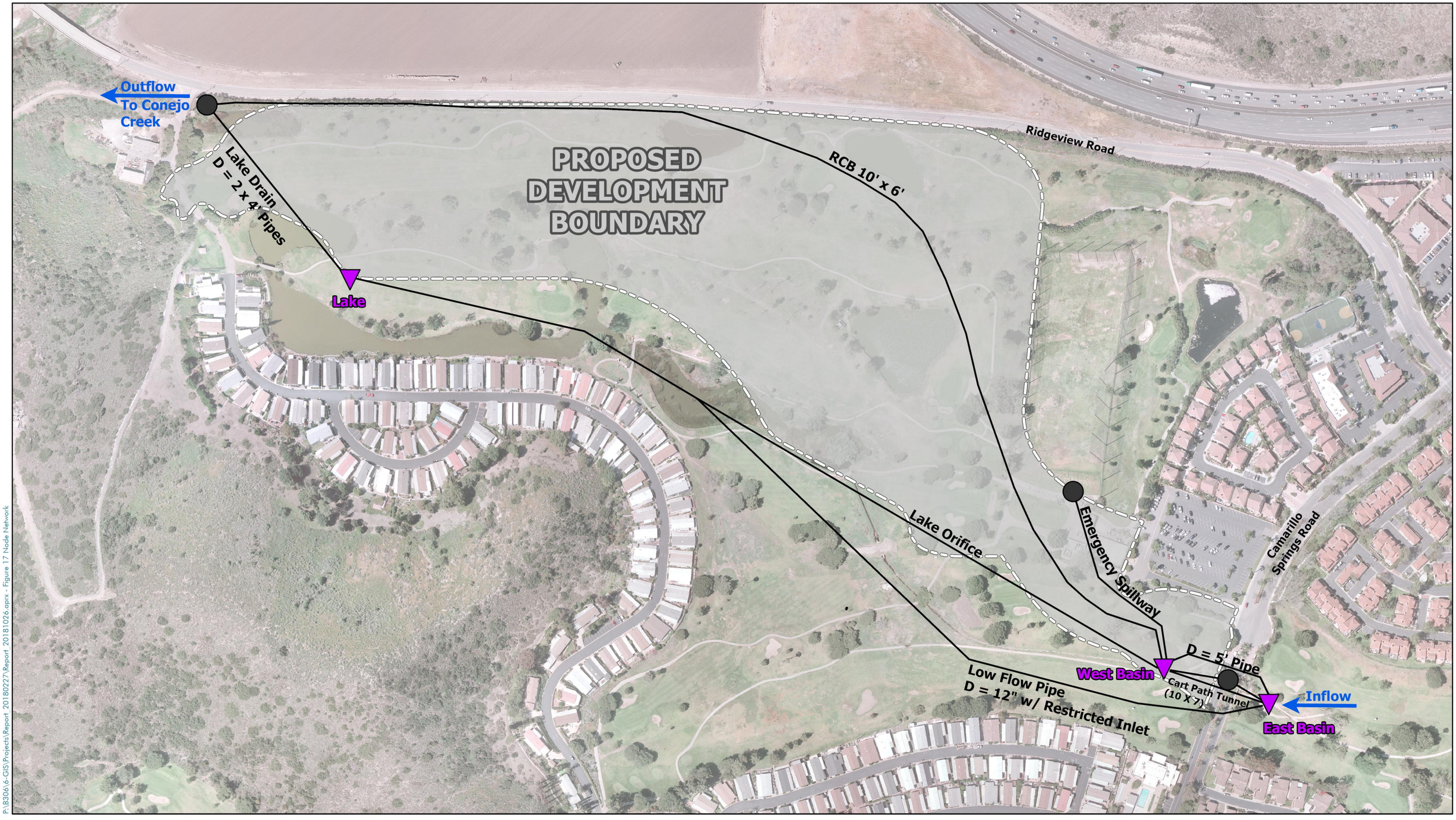
0 225 450 900 Feet

Date: 7/17/2020

Job Number: B306

PROPOSED FLOOD STORAGE (100-YEAR)

Figure 16



P:\B306\6-GIS\Projects\Report 20180227\Report 20181026.aprx - Figure 17 Node Network

CAMARILLO SPRINGS

XPSWMM
NODE NETWORK

PACE Advanced Water Engineering

0 125 250 500 Feet

Date: 7/31/2020

Job Number: B306

Figure 17

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.mcs.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at: http://www.fema.gov.

Provisionally Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by December 1, 2009. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 3776000mN — 1000-meter Universal Transverse Mercator grid values, zone 11
- 600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 20, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0934E

FIRM

FLOOD INSURANCE RATE MAP

VENTURA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 934 OF 1275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMARILLO, CITY OF	065020	0934	E
VENTURA COUNTY	060413	0934	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06111C0934E

EFFECTIVE DATE
JANUARY 20, 2010

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

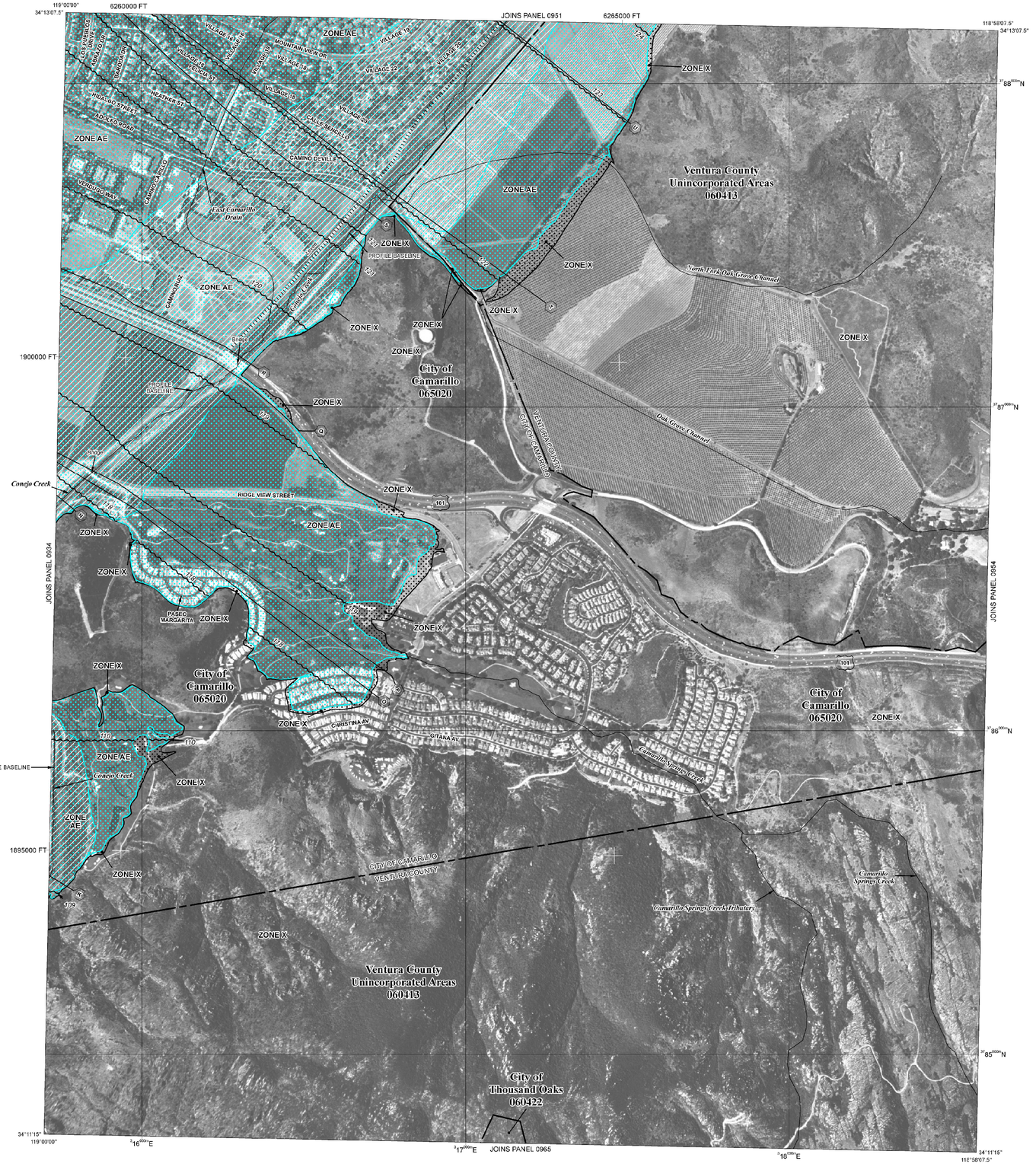
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.mcs.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3776000mN	1000-meter Universal Transverse Mercator grid values, zone 11
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 20, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0953E

FIRM

FLOOD INSURANCE RATE MAP

VENTURA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 953 OF 1275

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMARILLO, CITY OF	065020	0953	E
THOUSAND OAKS, CITY OF	060422	0953	E
VENTURA COUNTY	060413	0953	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06111C0953E

EFFECTIVE DATE
JANUARY 20, 2010

Federal Emergency Management Agency

HYDROGRAPH FATTENED AT 3683B

INCOMING HYDROGRAPH PEAK (cfs):	37495.52	VOLUME (acre-ft):	13405.31		
HYDROGRAPH ADJUSTMENT FACTOR:	0.61600				
ADJUSTED HYDROGRAPH PEAK (cfs):	23097.24	VOLUME (acre-ft):	8257.67		
RUNOFF FACTOR(in):	4.66				
FATTENED HYDROGRAPH PEAK (cfs):	23097.24	VOLUME (acre-ft):	17032.43		

TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
0	0.00	0.00	0.00	100	1614.46	994.51	1346.94
200	1632.31	1005.50	1831.99	300	1795.54	1106.05	2093.54
400	2189.91	1348.98	2542.26	500	2645.33	1629.52	3100.22
600	3043.99	1875.10	3739.27	700	3496.84	2154.05	4592.82
800	4023.43	2478.43	5799.75	900	4770.62	2938.70	7685.07
1000	6247.01	3848.16	10951.79	1050	7548.17	4649.67	13417.62
1100	9475.45	5836.87	16538.21	1110	9956.18	6133.00	17225.43
1120	10514.16	6476.72	17931.38	1130	11242.03	6925.09	18661.11
1131	11322.08	6974.40	18734.32	1132	11402.16	7023.73	18807.31
1133	11484.29	7074.32	18880.38	1134	11568.99	7126.50	18953.58
1135	11655.33	7179.68	19026.74	1136	11742.00	7233.07	19099.67
1137	11833.04	7289.15	19172.94	1138	11925.39	7346.04	19246.07
1139	12019.79	7404.19	19319.13	1140	12118.12	7464.76	19392.37
1141	12223.11	7529.44	19466.18	1142	12334.15	7597.83	19540.37
1143	12448.78	7668.45	19614.56	1144	12566.36	7740.88	19688.65
1145	12689.10	7816.49	19762.90	1146	12815.64	7894.43	19837.06
1147	12944.18	7973.61	19910.87	1148	13077.94	8056.01	19984.73
1149	13230.09	8149.74	20060.22	1150	13385.91	8245.72	20135.41
1151	13532.94	8336.29	20208.74	1152	13731.11	8458.36	20287.37
1153	13918.67	8573.90	20363.76	1154	14112.27	8693.16	20439.86
1155	14328.46	8826.33	20517.50	1156	14556.09	8966.55	20595.24
1157	14791.44	9111.52	20672.62	1158	15040.21	9264.77	20750.20
1159	15293.22	9420.62	20826.91	1160	15568.88	9590.43	20904.59
1161	15894.68	9791.12	20985.70	1162	16223.10	9993.43	21065.43
1163	16592.01	10220.68	21147.21	1164	16996.25	10469.69	21230.40
1165	17422.63	10732.34	21313.50	1166	17875.46	11011.29	21396.80
1167	18330.21	11291.41	21478.01	1168	18774.40	11565.03	21556.13
1169	19194.88	11824.05	21630.16	1170	19578.21	12060.17	21699.22
1171	19934.58	12279.70	21764.31	1172	20256.96	12478.29	21825.09
1173	20535.87	12650.10	21881.11	1174	20776.90	12798.57	21933.03
1175	20987.79	12928.48	21981.61	1176	21175.18	13043.91	22027.44
1177	21346.28	13149.31	22071.16	1178	21507.62	13248.70	22113.26
1179	21665.10	13345.70	22154.13	1180	21824.60	13443.95	22194.14
1181	21990.48	13546.13	22233.52	1182	22160.29	13650.74	22272.11
1183	22333.53	13757.46	22309.85	1184	22511.04	13866.80	22346.76
1185	22692.70	13978.70	22382.81	1186	22877.23	14092.37	22417.94
1187	23063.38	14207.04	22452.08	1188	23249.78	14321.86	22485.13
1189	23436.01	14436.58	22517.13	1190	23622.77	14551.62	22548.10
1191	23812.19	14668.31	22578.09	1192	24007.28	14788.49	22607.26

Hydrograph Printouts

TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
1193	24213.70	14915.64	22635.75	1194	24431.66	15049.90	22663.51
1195	24661.25	15191.33	22690.58	1196	24905.91	15342.04	22716.93
1197	25167.95	15503.46	22742.64	1198	25448.53	15676.29	22767.65
1199	25748.52	15861.09	22791.97	1200	26070.02	16059.13	22815.58
1201	26415.68	16272.06	22838.46	1202	26791.44	16503.52	22860.74
1203	27189.19	16748.54	22882.12	1204	27608.24	17006.68	22902.55
1205	28054.01	17281.27	22922.15	1206	28533.34	17576.54	22940.96
1207	29053.89	17897.19	22959.04	1208	29621.24	18246.68	22976.43
1209	30218.84	18614.80	22992.79	1210	30848.04	19002.39	23008.14
1211	31512.08	19411.44	23022.49	1212	32208.01	19840.13	23035.80
1213	32910.90	20273.11	23047.78	1214	33600.77	20698.07	23058.33
1215	34269.39	21109.95	23067.46	1216	34905.75	21501.94	23075.20
1217	35482.81	21857.41	23081.48	1218	35991.13	22170.54	23086.42
1219	36427.30	22439.22	23090.23	1220	36790.24	22662.79	23093.01
1221	37079.57	22841.01	23094.96	1222	37293.50	22972.80	23096.22
1223	37431.52	23057.82	23096.93	1224	37495.52	23097.24	23097.24
1225	37490.59	23094.20	23097.20	1226	37421.86	23051.86	23096.85
1227	37295.20	22973.84	23096.13	1228	37118.28	22864.86	23095.00
1229	36897.02	22728.57	23093.37	1230	36637.50	22568.70	23091.23
1231	36341.78	22386.54	23088.44	1232	36015.32	22185.44	23084.99
1233	35663.14	21968.50	23080.86	1234	35291.41	21739.51	23075.98
1235	34907.02	21502.72	23070.36	1236	34515.71	21261.68	23063.99
1237	34123.85	21020.29	23056.89	1238	33732.67	20779.33	23049.04
1239	33340.84	20537.96	23040.39	1240	32950.31	20297.39	23030.91
1241	32562.25	20058.35	23020.58	1242	32181.64	19823.89	23009.45
1243	31812.44	19596.46	22997.59	1244	31454.16	19375.76	22984.99
1245	31111.75	19164.84	22971.73	1246	30778.13	18959.33	22957.68
1247	30454.58	18760.02	22942.88	1248	30140.15	18566.33	22927.31
1249	29834.28	18377.92	22910.97	1250	29537.85	18195.32	22893.85
1251	29249.11	18017.45	22875.94	1252	28968.55	17844.62	22857.28
1253	28697.19	17677.47	22837.86	1254	28426.78	17510.90	22817.50
1255	28157.83	17345.22	22796.14	1256	27888.55	17179.35	22773.75
1257	27619.22	17013.44	22750.31	1258	27349.81	16847.48	22725.80
1259	27081.08	16681.95	22700.25	1260	26813.12	16516.88	22673.62
1261	26548.40	16353.81	22646.02	1262	26287.00	16192.79	22617.45
1263	26027.26	16032.79	22587.84	1264	25766.42	15872.12	22557.06
1265	25503.78	15710.33	22525.05	1266	25240.37	15548.07	22491.87
1267	24977.29	15386.01	22457.53	1268	24715.20	15224.56	22422.10
1269	24454.79	15064.15	22385.55	1270	24196.81	14905.24	22347.99
1271	23944.35	14749.72	22309.57	1272	23694.05	14595.53	22270.12
1273	23441.04	14439.68	22229.35	1274	23186.19	14282.69	22187.30
1275	22930.93	14125.45	22144.04	1276	22676.22	13968.55	22099.62
1277	22422.67	13812.37	22054.12	1278	22172.03	13657.97	22007.62
1279	21925.32	13506.00	21960.25	1280	21687.41	13359.45	21912.39
1281	21452.18	13214.54	21863.61	1282	21214.97	13068.42	21813.56
1283	20977.15	12921.92	21762.33	1284	20740.32	12776.04	21710.10
1285	20505.73	12631.53	21656.94	1286	20274.59	12489.14	21602.97
1287	20047.58	12349.31	21548.28	1288	19824.61	12211.96	21492.90
1289	19610.92	12080.33	21437.35	1290	19399.01	11949.79	21380.96

Hydrograph Printouts

TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
1291	19188.51	11820.12	21323.73	1292	18978.91	11691.01	21265.60
1293	18769.70	11562.13	21206.56	1294	18562.52	11434.51	21146.75
1295	18357.86	11308.44	21086.27	1296	18156.89	11184.64	21025.26
1297	17960.11	11063.43	20963.80	1298	17768.70	10945.52	20902.04
1299	17580.69	10829.71	20839.83	1300	17398.60	10717.54	20777.47
1310	15718.41	9682.54	20130.19	1320	14307.60	8813.48	19458.51
1330	13104.32	8072.26	18775.46	1340	12076.26	7438.98	18093.70
1350	11208.62	6904.51	17425.64	1360	10432.23	6426.26	16768.30
1370	9739.88	5999.77	16127.91	1380	9100.72	5606.04	15502.75
1390	8505.97	5239.68	14894.50	1400	7968.77	4908.76	14310.06
1420	7038.20	4335.53	13214.97	1440	6215.97	3829.04	12201.44
1460	5483.20	3377.65	11267.33	1500	4290.77	2643.11	9643.13

HYDROGRAPH FATTENED AT 3705D

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**********************************************************************************************
*      INCOMING HYDROGRAPH  PEAK (cfs):   2858.36         VOLUME (acre-ft):    273.02      *
*      HYDROGRAPH ADJUSTMENT FACTOR:         0.94000                                         *
*      ADJUSTED HYDROGRAPH  PEAK (cfs):   2686.86         VOLUME (acre-ft):    256.64      *
*      RUNOFF FACTOR(in):   2.40                                                            *
*      FATTENED HYDROGRAPH  PEAK (cfs):   2686.86         VOLUME (acre-ft):    242.21      *
**********************************************************************************************
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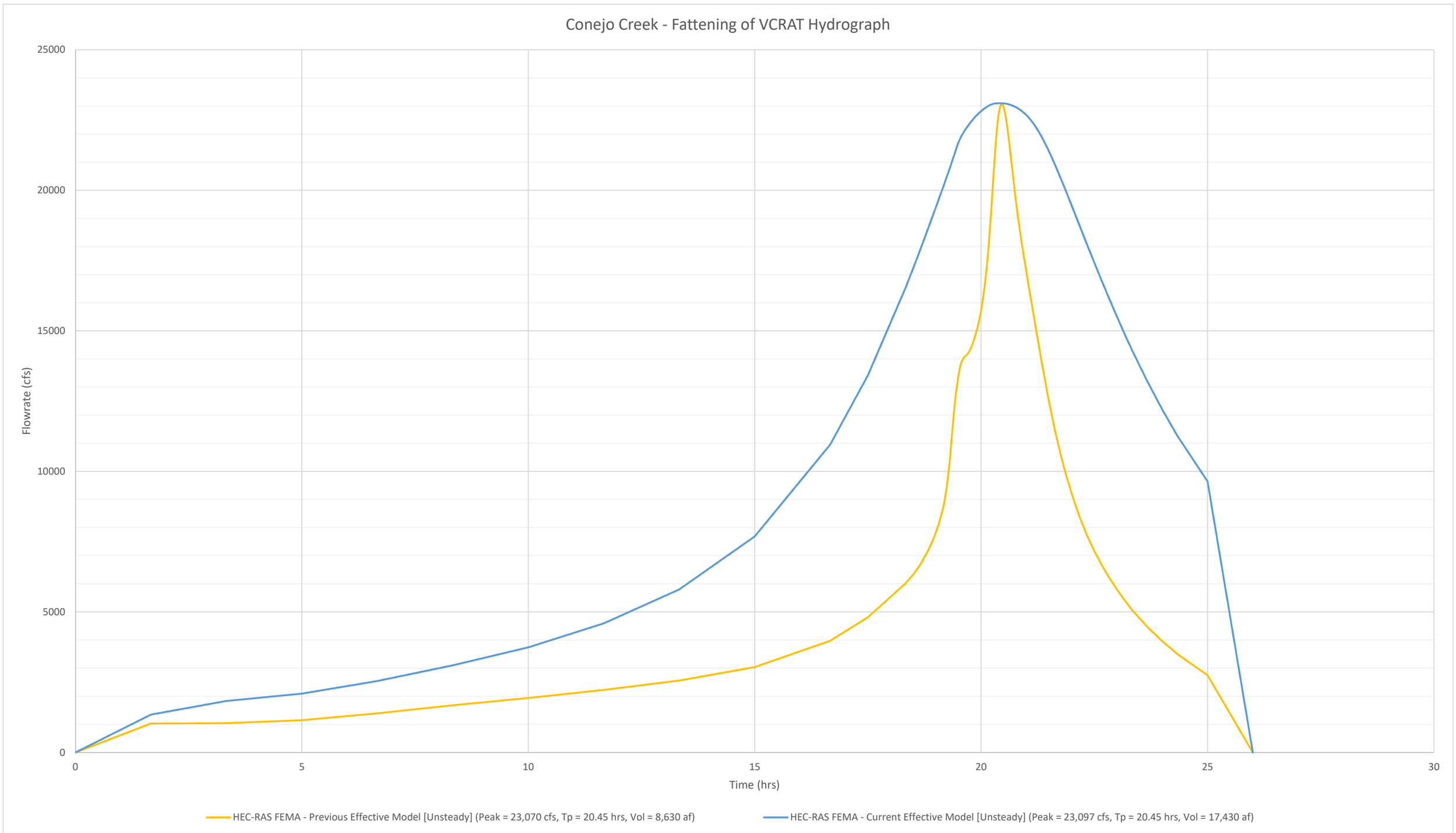
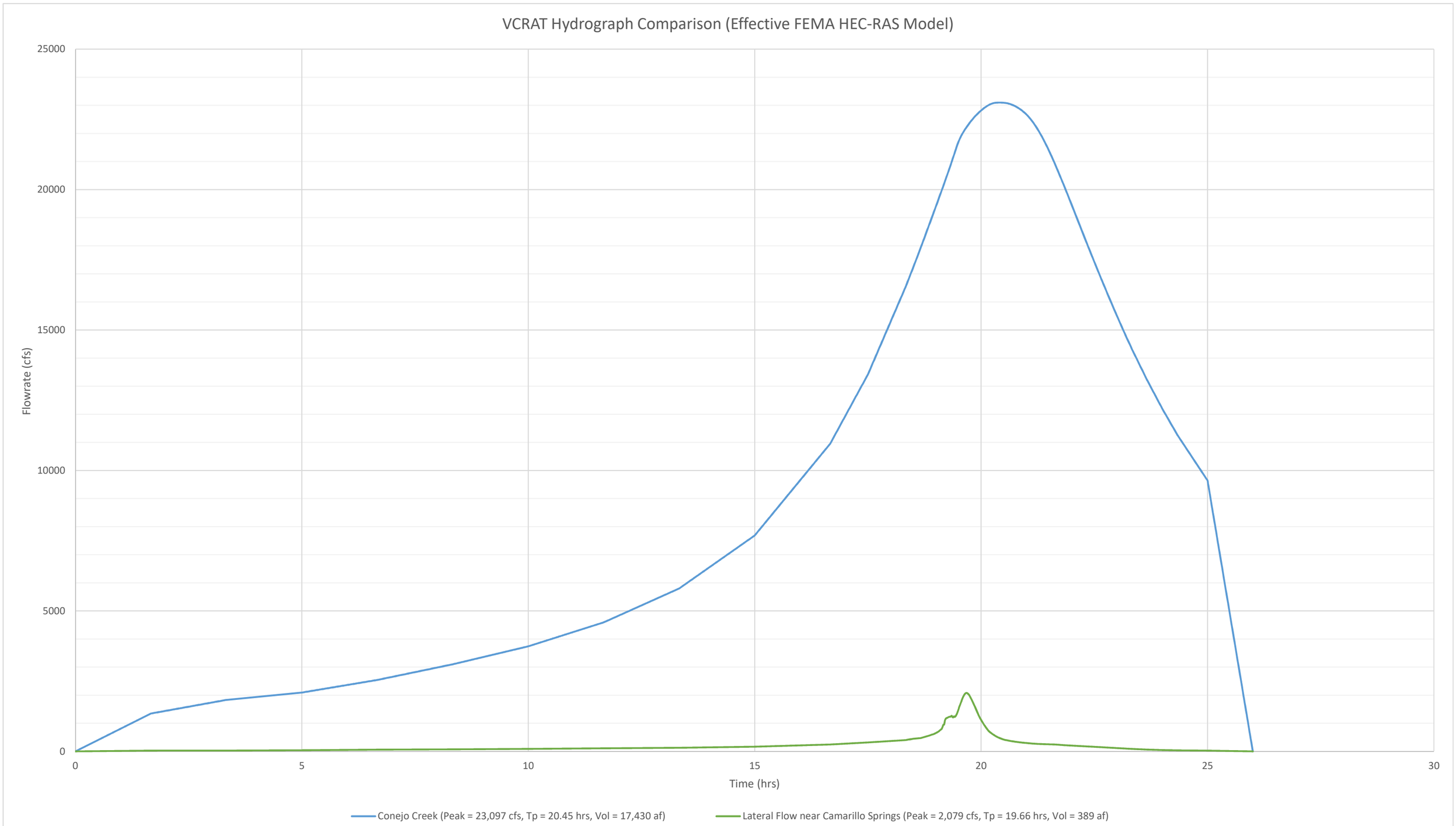
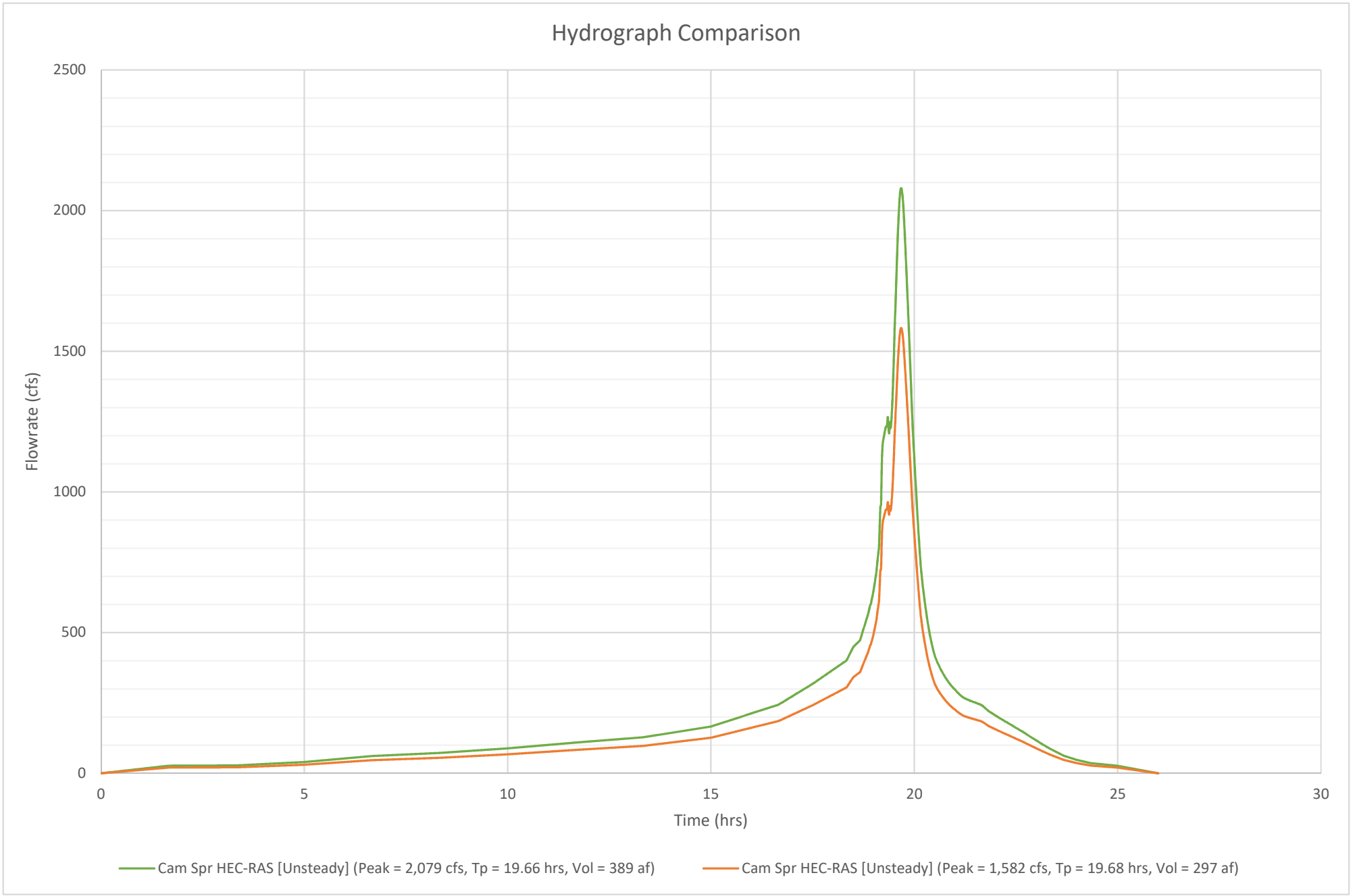
TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)	TIME (min)	PRE-ADJ (cfs)	PRE-FAT (cfs)	FATTENED (cfs)
0	0.00	0.00	0.00	100	3.33	3.13	2.86
200	3.46	3.25	2.61	300	15.57	14.64	13.86
400	31.08	29.22	28.25	500	36.76	34.56	33.33
600	53.56	50.35	48.73	700	66.33	62.35	60.11
800	82.17	77.24	73.95	900	117.09	110.06	104.77
1000	187.55	176.30	166.47	1050	274.67	258.19	243.68
1100	342.73	322.17	298.00	1110	385.49	362.36	335.38
1120	461.77	434.06	404.10	1130	558.16	524.67	491.39
1131	569.20	535.05	501.43	1132	580.80	545.95	511.98
1133	593.92	558.29	523.99	1134	608.76	572.24	537.63
1135	625.22	587.70	552.81	1136	642.31	603.77	568.59
1137	661.89	622.18	586.75	1138	681.83	640.92	605.24
1139	702.23	660.10	624.18	1140	722.24	678.91	642.73
1141	742.79	698.22	661.80	1142	763.25	717.46	680.79
1143	784.43	737.36	700.45	1144	806.81	758.40	721.26
1145	831.97	782.05	744.74	1146	859.12	807.58	770.13
1147	890.01	836.61	799.09	1148	926.34	870.76	833.29
1149	975.81	917.27	880.10	1150	1031.96	970.04	933.34
1151	1089.09	1023.75	987.55	1152	1182.26	1111.33	1076.41
1153	1284.17	1207.12	1173.72	1154	1414.90	1330.01	1298.81


Conejo Creek - Fattening of VCRAT Hydrograph
25000
20000
15000
10000
5000
0
Flowrate (cfs)
0
5
10
15
20
25
30
Time (hrs)
HEC-RAS FEMA - Previous Effective Model [Unsteady] (Peak = 23,070 cfs, Tp = 20.45 hrs, Vol = 8,630 af)
HEC-RAS FEMA - Current Effective Model [Unsteady] (Peak = 23,097 cfs, Tp = 20.45 hrs, Vol = 17,430 af)


VCRAT Hydrograph Comparison (Effective FEMA HEC-RAS Model)
Flowrate (cfs)
25000
20000
15000
10000
5000
0
0
5
10
15
20
25
30
Time (hrs)
Conejo Creek (Peak = 23,097 cfs, Tp = 20.45 hrs, Vol = 17,430 af)
Lateral Flow near Camarillo Springs (Peak = 2,079 cfs, Tp = 19.66 hrs, Vol = 389 af)


Hydrograph Comparison
2500
2000
1500
1000
500
0
Flowrate (cfs)
0
5
10
15
20
25
30
Time (hrs)
Cam Spr HEC-RAS [Unsteady] (Peak = 2,079 cfs, Tp = 19.66 hrs, Vol = 389 af)
Cam Spr HEC-RAS [Unsteady] (Peak = 1,582 cfs, Tp = 19.68 hrs, Vol = 297 af)

Debris Calculations – Camarillo Springs

Follows Scott-Williams (USGS) 1978

Evaluate each of the factors used in the debris production equation:

A ⇒ Watershed Area

$$A = (822\ AC) \times \left(\frac{1\ Mi^2}{640\ AC}\right) = 1.284\ mi^2$$

ER ⇒ Elongation Ratio

Find diameter, D, of a circle with Area, A

$$\frac{\pi D^2}{4} = A \Rightarrow D = \sqrt{\frac{4A}{\pi}} = \sqrt{\frac{4 \times (822\ ac) \times (43560\ Ft^2/Ac)}{\pi}}$$

$$D = 6{,}752.0\ Ft$$

L = Longest Watercourse = 11,973.4 Ft

$$ER = \frac{D}{L} = \frac{6{,}752.0\ ft}{11{,}973.4\ ft} = 0.5639$$

FF ⇒ Fire Factor

Fire Factor is an ad hoc parameter.

Three configurations are analyzed

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FF = 1 (Existing Condition, assumes no burn)

FF = 20 (Partially Burned condition, 4.3 yrs after fire)

FF = 88 (Burned Condition, 6 months after fire)

SF ⇒ Slope Failures

Slope Failures is the area of slope failures, in acres, per watershed area, in square miles.

The area of slope failures was measured on a GIS Map Layer from the California Department of Conservation. There is no slope failure on the watershed, so SF = 1.

K ⇒ Precipitation Factor

$$K = (P_{24\ Hour}) \times (P_{10\ Day})^2$$

Rainfall amounts are from NOAA Atlas 14
Data for Camarillo Springs Watershed Location

$P_{24\ Hour} = 6.52$ inches

$P_{10\ Day} = 14.6$ inches

$K = (6.52)(14.6)^2 = 1,389.8$

Calculate for Debris Produced:

$$\text{Log}(S_y) = 1.244 + 0.828\,\text{Log}(A) + 1.382\,\text{Log}(ER) + 0.375\,\text{Log}(SF) + 0.251\,\text{Log}(FF) + 0.840\,\text{Log}(K)$$

Existing Condition - No Burn (FF = 1)

$$\text{Log}(S_y) = 1.244 + 0.828\,\text{Log}(1.284) + 1.382\,\text{Log}(0.5639) + 0.375\,\text{Log}(1) + 0.251\,\text{Log}(1) + 0.840\,\text{Log}(1389.9)$$

$$\Rightarrow S_y = 4{,}268.2 \text{ cy} = \underline{2.6 \text{ af}}$$

Statistically Burned Condition – 4.3 yrs after fire (FF = 20)

$$\text{Log}(S_y) = 1.244 + 0.828\,\text{Log}(1.284) + 1.382\,\text{Log}(0.5639) + 0.375\,\text{Log}(1) + 0.251\,\text{Log}(20) + 0.840\,\text{Log}(1389.9)$$

$$\Rightarrow S_y = 9050.9 \text{ cy} = \underline{5.6 \text{ af}}$$

Statistically Burned Condition – 6 months after fire (FF = 88)

$$\text{Log}(S_y) = 1.244 + 0.828\,\text{Log}(1.284) + 1.382\,\text{Log}(0.5639) + 0.375\,\text{Log}(1) + 0.251\,\text{Log}(88) + 0.840\,\text{Log}(1389.9)$$

$$\Rightarrow S_y = 13131.4 \text{ cy} = \underline{8.1 \text{ af}}$$

Note: Applying a 125% safety factor to the no burn and lesser statistically burned values produces volumes that are below the 8.1 ac-ft from the conservative, immediately after a fire condition calculation.

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BYPASS CULVERT OUTLET
PROPOSED SENIOR HOUSES
BYPASS CULVERT
LAKE OVERFLOW
LAKE
LAKE WSL = 127.0
FLOOD STORAGE 7,000 ft. (+4.0) = 80AF
27 STRUCTURES REMOVED FROM FEMA FLOODPLAIN
62 ENTIRE LOTS REMOVED FROM FEMA FLOODPLAIN
PROPOSED FEMA FLOOD LEVEL EL 114.0
EXISTING FEMA FLOOD LEVEL EL 118.0
PROPOSED NORTH AREA FLOOD STORAGE VOLUME (2020-01-27)
ELEVATION | PROPOSED VOLUME (AF)
114 (18.7 ac) | 38
116 (20.5 ac) | 20
118 (22.0 ac) | 0
DRAINAGE DIRECT TO LAKE
BYPASS CULVERT INLET W/ SCREEN
12" x 4" RCB I.D. 119.0
SECONDARY SPILLWAY
EL 126.0
EXISTING GOLF CART TUNNEL
12 : 113.8 WCF
12 : 113.8 ECF
ALSO RCP, RPC WSPO
LOW FLOW PIPE
EAST BASIN OVERFLOW ORIFICE
CP 36 in. EL. 122.0
GOAT SIGN / SCRIBE SIGN
SCRIBE STORAGE 8.1 AF TO ELEV. 118.0
FLOOD STORAGE 22.8 AF TO ELEV. 126.67
EAST BASIN
TOP EL. 126.67 TO EL. 122.0
WEST BASIN
TOP EL. 126.0 TO EL. 118.0
WEST BASIN OVERFLOW ORIFICE TO GOLF CART TUNNEL
CAMARILLO SPRINGS CREEK
WS AREA = 820 AC
Q100 = 1150 cfs
VOLUME = 270 AF
PROFILE B-B 12" STORM DRAIN LOW FLOW
SCALE: 1" = 40' HORZ.
1" = 10' VERT.
PROFILE A-A 12" STORM DRAIN
SCALE: 1" = 40' HORZ.
1" = 10' VERT.
PROFILE C-C 12" STORM DRAIN
SCALE: 1" = 40' HORZ.
1" = 10' VERT.
PASCUZZO - PROPOSED EAST BASIN (2019-12-12)
ELEVATION | PROPOSED VOLUME* (af)
126.67 (1 ac) | 22.4
126.0 (0.7 ac) | 17.1
124.0 (1.8 ac) | 7.2
118.0 (7.8 ac) | 0.8
114.0 (9.7 ac) | 0.0
*AND IS SUBSTRACT SEDIMENT VOLUME
SEDIMENT VOLUME TABLE
ELEVATION | PROPOSED SEDIMENT VOLUME (af)
116 @ 0.3% slope (1.56 ac) | 7.7
118.0 @ 0% slope (1.56 ac) | 8.5
118.5 @ 0.5% slope (1.56 ac) | 13.1
0.1' AT AS-BUILD
ELEVATION - A
PROPOSED 36" RCP CULVERT
SCALE: 1" = 10'
SCALE: 1" = 50'
CAMARILLO SPRINGS
PLAN & PROFILE OF SOUTH, GOLF COURSE AREA, WEST AND EAST BASIN
PACE
PACE ENGINEERING
1201 DOVE STREET, SUITE 570
NEWPORT BEACH, CA 92660
(949) 660-1911

11
750 ft
[250 y]
327 ft
[109 y]
340 ft
[113 y]
665 ft
[222 y]
458 ft
[153 y]
6
600 ft
[200 y]
747 ft
[249 y]
8
10
9
363 ft
[121 y]
LIMIT OF GOLF
MAINTENANCE
CART PATH
750 ft
[250 y]
335 ft
[112 y]
7
495 ft
[165 y]
LAKE
(NWL 92.0)
750 ft
[250 y]

NORTH

60 0 60 120
SCALE 1"=60'

PASCUZZO - PROPOSED STORAGE SOUTH IN EXISTING GOLF AREA (2019-12-08)			
ELEVATION	EXISTING VOLUME (AF)	PROPOSED VOLUME (AF)	ADDITIONAL STORAGE (AF)
110 (37.70 ac)	130	458	328
105 (31.64 ac)	47	282	235
100 (23.40 ac)	19	135	116
95 (18.56 ac)	4	30	26
94 (15.75ac)	0	13	13

P:\18306\Engineering\Cadcad\Exhibits\18306- Camarillo Springs - South Golf Design.dwg - Tab: Ex Ponds fill_Prop South Area Layout (36x24) - by bpham on 01/09/20 at 3:24:52 PM